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## Navigating Web Sites: Considering Navigational and Semantic Constraints.

Joachim Carlsen and Gisle Hannemyr  
International Peace Research Institute Oslo,  
Department of Informatics, University of Oslo  
*joachim@prio.no, gisle@ifi.uio.no*

**Abstract:** Two approaches for website design: The open and strongly hyperlinked structure associated with “information architecture” and a more closed approach based upon narrative techniques are compared through analysis and user observation. As a result, a hybrid approach to website design, known as the *reformulated accordion structure*, is suggested.

### Introduction

One of the most influential approaches for website design today is what is often called “information architecture” (Rosenfeld and Morville, 2002). In this tradition information is structured with the help of hierarchies and taxonomies and placed within an open hypertextual navigation structure.

Several critics (e.g. Conklin, 1987; Postman, 1993; Birkerts, 1994; Shenk, 1997; Dreyfus, 2001) has observed that the lack of sequential structure that characterizes this way of conveying information constitutes a radical departure from the sequential structure that characterizes many other forms of human communication (e.g. books, theatre, essays). The critics argue that the non-sequential nature of hypertext may be the cause of a number of problems associated with web based information systems, often to referred to with terms such as “information overload”, “data smog”, “information glut” and “lost in hyperspace”.

Another and different approach to website design would be to make use of narrative techniques to structure information. This approach has been advocated by a

number of hypertext researchers (e.g. Bernstein, 2001; Cloninger, 2003; Meadows, 2003). Through the use of narrative techniques, it would be possible to gain dramatic power by constraining the user's possible navigation paths or trajectories.

This article discusses and evaluates these alternate approaches to website design. After a brief description of the background and related work the paper considers three fundamental dilemmas related to these two approaches to web design. The first is about sequencibility, the second is about author intention and the third about immersion. The paper then describes an empirical investigation into website design. The study is conducted through interviews with the designers of specific websites, by doing a functional analysis of the websites themselves, and by using an adaptation of the "thinking aloud" method to analyze how users experience the original, open structure, websites and a prototype of redesigned website using with more constrained navigation paths and trajectories. The findings from this investigation are related to the three dilemmas, and the two different approaches to web design.

The motivation for this research is to see if the use of narrative techniques in website design provides the reader with more context for presentation of information and therefore renders a more meaningful and satisfying reader experience than the open hypertextual navigation structure that results from the "information architecture" approach.

## Background and Related Work

The problem of "information glut" has often been discussed as a consequence of the development of modern media. There have been some attempts to measure how much information we have accumulated, but the share size and heterogeneity of the information makes this difficult (See Lyman et al., 2003). But it is not necessary the growing amounts of information that is the problem, but how the information is presented on digital media.

Hubert L. Dreyfus even argue that the way information is presented on the web levels qualitative distinctions and leads to nihilism (Dreyfus, 2001, p. 73ff). The irony is that the technology that is at the core of the World Wide Web, hypertext, originally was proposed as a remedy for the information glut problem. In a seminal essay published in 1945, Vannevar Bush makes a note that:

[...] publication has been extended far beyond our present ability to make real use of the record. The summation of human experience is being expanded at a prodigious rate, and the means we use for threading through the consequent maze to the momentarily important item is the same as was used in the days of square-rigged ships (Bush, 1945).

Bush then proceeds to present a solution to the information glut problem, a hypertext-like mechanism using mechanical means to link together otherwise unrelated text fragments. Bush's 1945 essay is acknowledged by the originator of the term hypertext, Ted Nelson (Nelson, 1965) and the designer of the first working hypertext system, Douglas Engelbart (Engelbart, 1988) as the main inspiration behind their own work.

## Context

Neil Postman has pointed out that much of the information we've got today lacks any functional or meaningful context.

There is almost no fact - whether actual or imagined - that will surprise us for very long, since we have no comprehensive and consistent picture of the world which would make the fact appear as an unacceptable contradiction. We believe because there is no reason not to believe (Postman, 1990).

This context or "picture of the world" consists of geographical, historical and institutional information which electronic media fails to support. Scholars like Manuel Castells and Paul Virilio have thoroughly investigated the first two aspects, (Castells, 1996; Virilio, 1997) and Postman has focused on the third (Postman, 1993). He claims that the modern society or "technopoly" suffers from AIDS (Anti-Information-Deficiency-Syndrome), because modern institutions fail to organize, channel and destroy information for us. Postman proposes storytelling as one of the strategies these institutions could follow to counter this development.

To indicate that this overarching techno-cultural problem could be eased with the help of storytelling information architectures would probably be to overestimate the importance and cultural impact of web design. But as we move from a purely feature oriented and minimalist view of web design, as advocated by Jakob Nielsen (Nielsen, 2000), towards an understanding of websites as information shapes, we still need to better understand how navigational and semantic constraints influence a websites use qualities and its ability to "reach out" and communicate with its intended audience.

The shape of a website consists of navigational or spatial structures and the semantic structure of its content. Andrew Dillon has developed this model, which he calls the "spatio-semantic" model (Dillon, 2003). He claims that a stabilization of these shapes over some period of time makes them into genres. Such genres develop, die and transform continuously, and viewing web design in this way opens up for alternatives to the dominant functional-minimalist genres we see today on the web. One of these alternatives could be narrative.

The literature on interactive narratives has a brief history and problems inherent in the term "interactive narrative" continue to spur debates among scholars and practitioners. This debate has been value-laden with frequent mixing of terms like freedom and interactivity, but has gradually matured, especially within the community interested in analyzing computer games. The fundamental problem with interactive narratives could be seen as an opposition between narrative and database. Lev Manovich puts it like this:

As a cultural form, the database represents the world as a list of items, and it refuses to order this list. In contrast, a narrative creates a cause-and-effect trajectory of seemingly unordered items (events). Therefore, database and narrative are natural enemies. Competing for the same territory of human culture, each claims an exclusive right to make meaning out of the world (Manovich, 2002, p. 234).

Several attempts have been made to reconcile these forms. Early hypertext theory as advocated by George Landow imbued hypertext with liberating powers. He saw hypertext as a concretization of postmodern critical theory, and a possibility for a new reflexive literature (Landow, 1997, p. 2). With the help of terms like "multilinearity" and "readers narrative" he and others tried to establish a new reader centered understanding of narratives, which could fit the new medium (Bolter, 1991; Landow,

1997; Liestøl, 1994; Murray, 1997). Another and perhaps more vital tradition is based on structuralist narrative theory and the research on artificial intelligence. Brenda Laurels idea of designing an expert-system which is able to create a well formed narrative plot on the fly, have had continuous influence through projects like Oz, Mimesis, Façade and IDtension (Laurel, 1986; Bates, 1992; Mateas, 1997; Mateas, 2002; Young, 2001; Young, 2005; Szilas, 2003).

Espen Aarseth has thoroughly criticized both these traditions (Aarseth, 1994, p. 136ff; Aarseth, 1997). He claims that the “readers narrative” is a superfluous term and that AI constrained narratives are easily subverted. Aarseth have tried to develop a new theoretical framework for understanding new media, especially games, that is not dependant on narratology (see Aarseth, 1997).

There are some musings about narrative websites, but the field has been left largely unexplored by scholars. Mark Bernstein, Curt Cloninger and Mark Stephen Meadows have spoken for narratives as relevant for web design, but they have not gone into this at any length (Bernstein, 2001; Cloninger, 2003; Meadows, 2003). Others have looked at the relation between web media and the earlier more or less narrative formats it is based upon (Fagerjord, 2001; Engebretsen, 1999; Huesca and Dervin, 2003). A useful contribution has been Henry Jenkins theories about “environmental storytelling” and the recurrent concretization of a balanced narrative document structure, the *accordion structure* (Jenkins, 2004; Meadows, 2003; Liestøl and Rasmussen, 2003; Ryan, 2001). The accordion structure is in some literature called “string-of-pearls” or “vector with side branches”, but the central idea remains the same.

## Reformulation of Narrative Techniques

There are three fundamental dilemmas, which have dominated this discourse, concerning sequentiality, author intention and immersion. The first dilemma has been thoroughly analyzed by Gunnar Liestøl (Liestøl, 1994; Liestøl, 1999; Liestøl and Rasmussen, 2003). He calls this the “tempo-spatial” split in new media. The new spatial organization of the text no longer guarantees a specific reading, but opens the text to many readings.

Another take on this have been mentioned, the hostility between database and narrative. Espen Aarseth has discussed the second dilemma. He says:

As the reader jumps discontinuously between the narrative strands, the story seems to slip away and lose focus [...] the disordered state of the fragments disrupts the narrator's effort, as if there were an "other" – an antinarrator – who constantly derails and distracts the narrative (Aarseth, 1997, p. 92-93).

The double materiality of computer based text, with an underlying invisible programmed logic imbues the text with unintentionality. The author must “... expect the production of unintentional signifiers” (Aarseth, 1997, p. 127).

Janet Murray explains immersion metaphorically. She compares psychological immersion with the act of sinking the body down into water (Murray, 1997, p. 98).

The dilemma then is how to ensure such an experience and at the same time allow the reader to actively take part in the texts creation. Lev Manovich says it this way:

...the opposition between information and "immersion!" can be thought of as a particular expression of the more general opposition characteristic of new media-between action and representation (Manovich, 2002, p. 216).

The inward reflexive movement is disrupted by the outwardly necessity of choice. I am now briefly going to look at the three traditions mentioned above, and see how a balanced interactive structure can be reached.

## Reaching a Compromise

The fundamental concept, which underlies many of the theories of interactive narrative, is the concept of multilinearity. Lev Manovich explains:

The "user" of a narrative is traversing a database, following links between its records as established by the database's creator. An interactive narrative (which can be also called a hypertext in an analogy with hypertext) can then be understood as the sum of multiple trajectories through a database (Manovich, 2002, p. 38).

But this definition, as pointed out by Manovich is too wide. Many or most of these trajectories or lines do not conform to any definition of narrative aesthetics at all. The possibility of meaningless or random permutations is huge. The challenge for the author of interactive narratives is then to constrain the user or reader, to bring the number of possible trajectories down to a manageable size. These trajectories and constraints are often visualized with the help of node-link diagrams, flow-charts or other symbols. Several of the leading proponents of interactive narratives have made typologies of these topologies, which could be helpful for designers of interactive media (Bernstein, 1998; Meadows, 2003; Ryan, 2001). Marie-Laure Ryan has proposed 9 different node-link structures, which covers many of the aspects of already published interactive narratives (Ryan, 2001, p. 246ff). But the problem of node-link structuring of narratives becomes evident when the size of the texts grows or when the text itself is changeable. One possible solution to this problem is to develop an automatic author, which could constrain the reader or interactor on the fly.

According to Brenda Laurel a plays dramatic potential is a combination over time of possibilities, probabilities and necessities (Laurel, 1991, p. 69). In an ordinary play every incident is carefully chosen by an author and strung together in a cause and effect trajectory to create a feeling of wholeness and necessity. In an interactive narrative this stringing together varies and it therefore contains more potential for action (Laurel, 1991, p. 68). Laurel has illustrated this as a flying wedge (figure 1). The figure to the left illustrates a traditional play. The figure to the right illustrates a play with many endings depending on the users actions.

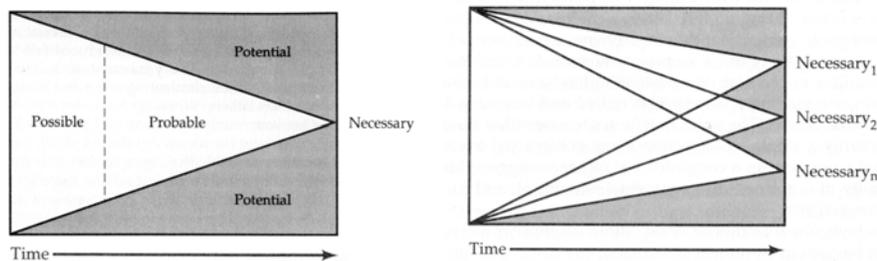


Figure 1: Brenda Laurels "Flying Wedges" (Laurel, 1991, pp. 70, 72)

The automatic playwright then, an expert system, has to know about dramatic form, dramatic structure and have access to authoring heuristics. The system knows all the characters and the world they inhabit. During the play the system plans new incidents dependant on what has gone before and prunes of potential action to reach a possible, probable and necessary conclusion. In this way the playwright:

... embodies the force of formal causality in the system. It takes the materials provided by the characters and formulates them into action according to its understanding of the characteristics of "good" dramatic structure (Laurel, 1991, p. 147).

This strategy is attractive and an effective demonstration of such an expert system would be a real attraction in any context. The problems with this system, as pointed out by Espen Aarseth, are that AI techniques aren't good enough and that the "interactor" could easily subvert the action. He asks; "Will the playwright be able to cope if the intrigue suddenly changes from Henry the lovesick gallant to Henry the Serial Killer?" (Aarseth, 1997, p. 139).

A third strategy is to view digital texts as information architectures and fall back on viewing constraints as relatively static and preplanned. The "staticness" is inherent in the term "information architecture" itself. Louis Rosenfeld and Peter Morville compare the organization system of a website with rooms, and the navigation system with doors and windows (Rosenfeld and Morville, 2002). It is then possible to invoke the terms "environmental storytelling" or "narrative architecture". Mark Stephen Meadows compares the narrator and architect.

The narrator's job, like the architect's, is to organize information in a way that builds context, symbology, metaphor, and meaning. One of architecture's primary goals is to appropriately subdivide space. This process of subdivision is not only for social interaction, but, like punctuation in a sentence, it is also a means of framing concentration and the presentation of information. The basic approach to narrative is the same (Meadows, 2003, p. 170).

Similar thoughts are put forward by Henry Jenkins which operates with four different types of narrative architectures in games; evocative, enacted, embedded and emergent (Jenkins, 2004). Enacted narratives are developed by exploration by the user. Embedded narratives are certain body of information to be discovered. Emergent narratives are stories, which emerge by simulation techniques. Growing knowledge of these narrative possibilities combined with the understanding of websites as attractions could foster the development of narrative websites. An example is David Siegel's notion of "third-generation websites", giving visitors "a complete experience, from entry to exit" (Siegel, 1997, p. 15).

One common narrative architecture or structure can be found in many games and could be a possible starting point for further exploration of narrative web design, the accordion structure. This structure has been proposed by many of the proponents of interactive narrative and is a balance between an open navigation structure on a micro level and an overarching dramaturgical structure on the macro level (figure 2). The new media's defining characteristic, interactivity, is afforded on the micro level while the old media's defining characteristic, sequentiality, is forced on the macro level.

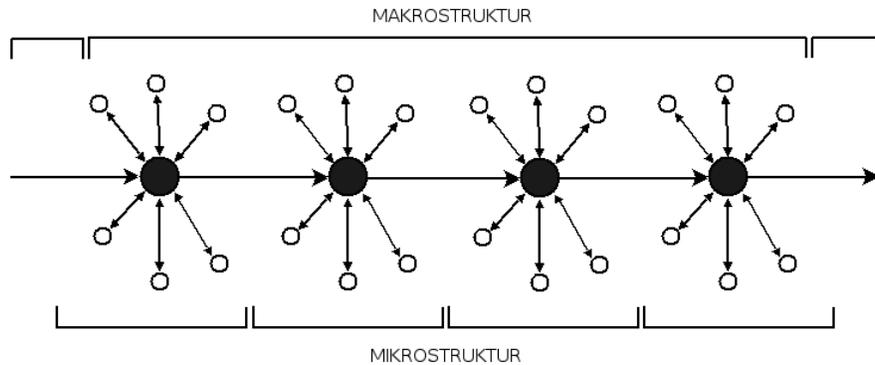


Figure 2: Accordion structure, adapted from (Liestøl and Rasmussen, 2003, p. 62) and (Ryan, 2001, p. 254)

## Analysis of existing Political Parties Websites

For the empirical part of the study, the websites of the major Norwegian political parties was chosen as cases for study. The reason for using political party websites is that these parties have a long term commitment to inform and to persuade. It is therefore taken for given that these websites has informing and persuasion as their major design objective. No other significance should be attached to our choice of political party websites as cases for study.

### Framework

Ida Engholm has proposed a framework for the analysis of websites based on classical design theory. She claims that a websites form is the result of its technology, user functionality and aesthetics (Engholm, 2004). The technical construction is that which supports the transmission and presentation of data on the screen. User functionality is that which allows the user to interact with the content on the website and the aesthetics is how the user experience the website. The sum of these aspects determines the website's form, an expression of the website's heterogeneous multimedial construction. But to understand a website fully, one has to understand these aspects in relation to a wider context; the users' competences, goals, cultural and institutional aspects and technology.

### Context

To get an understanding of the context of these websites seven interviews were conducted with the people responsible in the different political parties. They were asked about the history of the website, communication strategies, design, structure, publication technology and routines. The interviews were open ended and the discussions varied a great deal depending on the interviewee's technical competences.

The political parties' websites have been through two or three major redesigns since the diffusion of WWW 10 years ago. They have all moved from simple HTML-based solutions to the database driven solutions they use today. Several of the persons

interviewed indicated some frustration concerning how these redesigns have been done. The main problem is that the political parties themselves do not have the resources to hire persons to develop their websites and is thereby dependant on the provider. If the technical solution or the design itself does not fulfill the expectations they have, they are stuck with it, because there are no resources left at this point. One of the web masters told about their last redesign were one of their own employees had the necessary technical skills to develop the pages. The result was appreciated within the party and by the press who evaluates the party's websites before elections. The employee quit the job 2 years ago and the website has not been developed since. (Since the interview they have published a redesign) This problem seems to increase with the complexity of the publication systems used. The requirement that it should be easy to publish articles with the help of a simple web interface across the organization requires rather complex publication systems, which again makes it more expensive and difficult to make changes to the website.

All the interviewees were asked directly if there had been some overarching rhetorical or narrative strategies involved when designing the websites. None of them could answer this question at any length, since they seemingly had few ideas about how this could be relevant for web design. Generally they had little to say about how the websites communicated with different target groups. They hadn't done thorough target group analysis or evaluated the website with users. Maybe the question was put wrong, or they were reluctant to reveal their strategies, but the websites themselves seem to confirm the lack of conscious use of WWW. There are some campaign pages available on some of the websites, but they present little or no information. There is also some information organized by target group, but only superficially. The basic presentation technique is simple for most of the available information, which is organized by chronology, the organization chart and on some of the sites, by topic. Two of the interviewees admitted that their politicians and the party organization in general are dominantly oriented towards individual political issues and news.

## Functionality

The underlying technologies for the websites investigated are important, but highly standardized. This includes the necessary Internet protocols, web servers, browsers and so on. The understandings of these technologies are relevant, but not central, to the analysis. Functionality, that which allows the user to interact with the content is highly relevant. In this analysis functionality equals basic information architecture as mentioned earlier.

All websites were last checked January 16, 2005:

According to Rosenfeld and Morville a websites "rooms" is determined by its organization system. This system is divided in organization schemes and organization structures. An organization scheme determines the logical ordering of information and organization structures determines how this information is logically connected (Rosenfeld and Morville, 2002). The "doors" and "windows" are determined by the navigation systems. Usually there is a large degree of overlap between the organization systems and the navigation systems, since the latter simply expresses the first.

The information on the political websites is mainly organized by three categories, party organization, news and politics. Party organization is further divided into different central political organs and regional/local hierarchies. Some of the websites offers only contact information under the links to central organs, but others offer relevant documents too. The regional and local parties usually offer a mini-version of the main website, but often the information here is outdated and incomplete. One example of a website with much of the information organized by the organizational hierarchy is SV. An example of the opposite is Høyres website which uses topic maps (Pepper, 2002), which put less emphasis on the organization chart.

The news archive is the heart of these websites. This usually contains news cuttings, press releases, speeches, essays, statements and political logs. All of the websites uses the top 5 to 10 items on the main page, but the archives themselves exists in two variants, with and without topic as organization scheme. Krf, Sp and V have a chronology as only organization scheme, and SV, H and Ap uses topic in addition. SV have a well-developed topical scheme, but when one chooses one of the articles one is transported somewhere in the organization hierarchy. H uses topic maps with the result that one is easily moved to another topic without notice. Ap offers simple filtering by topic and one never leaves the archive by clicking on a link.

The last category, politics, organizes important political documents, information related to elections and conventions, and gives an alternative passage to different topics where available.

The navigation systems on these websites are simple. Most of the available information is reachable from the main page or the pages right beneath it. With the exception of H's navigation system, there is little or no use of contextual navigation. In Rosenfeld and Morville's terms the sites is largely dominated by the global site-wide navigation systems and to a variable degree, the local subsite-wide systems (See Rosenfeld and Morville, 2002, p. 114ff). The resulting structures are open and conform to what Gillenson et al. calls websites with loose control, a cross-linked hierarchical structure (Gillenson et al., 2000). The opposite, tight control structure, is a one-way linked hierarchy with links back to the site directory only at the leaf nodes.

## Aesthetics

There are two obvious levels to start an aesthetic analysis of these sites. First it is possible to investigate the graphical design of the page templates used. These aren't many and usually consistent. Second it is possible to delve into individual articles and analyze how they are written and so on. None of these activities touches the main issue here, which is to view the websites as whole entities and ask what story they tell. This question has already been partly answered. The possibility of reaching most of the information from the main page, or the pages right beneath it, results in an open loose control structure. Sp has 213 global links and H has 63, which could be represented as complete graphs. The complete graph affords  $n!$  trajectories or possible permutations and is antithetical to a narrative structure.

There are few attempts on the websites analyzed to indicate relations between individual documents, which can result in a fragmented experience. The best example of this is the common news archive, a chronological list of links to individual articles.

The user has to choose one item, read it, push the back button and choose another one. These articles have little or nothing in common thematically, even where there is some topical filtering. Jared Spool calls this down and up and down movement for “pogo sticking” (Spool et al., 1999), and this behavior combined with chronological organization is far from any narrative aesthetics. One of the websites, which behave differently, is H’s. If one considers this website without the global menu, it is evident that the combination of topic map technology, a fine grained topical scheme (72 topics) and extensive use of contextual links results in a more fluent and coherent experience. Another element worth mentioning on H’s site is a timeline available for each major topic. This timeline makes it possible to track the development of H’s politics through the years.

All in all the websites investigated actualizes the three dilemmas related to storytelling and new media:

- Storytelling becomes difficult because it is impossible to plan n! trajectories.
- Immersion is hindered because the sites require frequent selection and navigation up and down the hierarchy. (“pogo sticking”)
- Lack of consistent and detailed organization schemes and/or contextual navigation gives the feeling of unintentionality.

## Prototype Design and User Evaluation

To investigate how users experience a website where narrative techniques have been used to structure information and extend context, a prototype was developed based on the accordion structure. Documents available on SV’s website were used as content and the prototype was given a graphical layout inspired by the site. After a brief discussion of the prototype design, the user evaluation of the prototype, and for reference and comparison, SV’s website, is going to be described in some detail.

### The Prototype

One of the requirements revealed in the interviews was taken into account when designing the prototype. The presentation of articles has to rely on metadata available and registered when the article is put into the system. This means that it is not possible to look back and organize the articles statically to form a story. The second requirement was that the user should be able to choose between topics and within each topic, a number of articles, but all within a narrative macrostructure. With the basis in Brenda Laurels “shape of dramatic action” (Laurel, 1991, p. 68), and the accordion structure, this structure were conceptualized (Figure 3). Each microstructure (room) were linked to a dramatic phase (reduced from 7 to 5) and related to the classical complication curve.

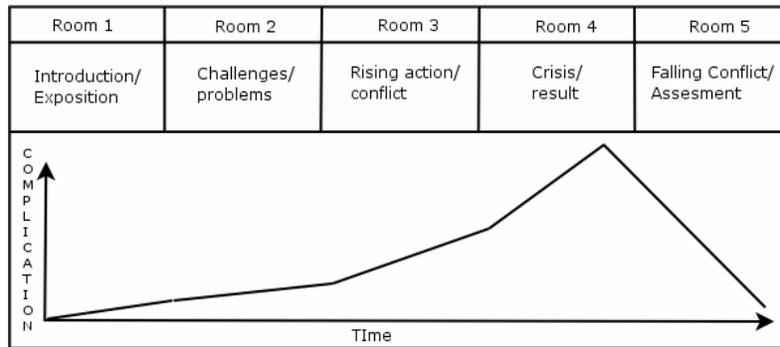


Figure 3: Mapping of micro and macro structural categories to a classical dramatic curve.

An important aspect of the accordion structure is that the user has to complete some tasks before they are give entrance to the next node, microstructure or room. This requirement can only be met with the help of state and user session information. HTTP and HTML are stateless protocols, and the presentation logic was therefore programmed with the help of a server-side scripting language PHP. Another important issue was related to the size of the total amount of information. Comparing a full-blown website with a prototype containing a small amount of articles was useless. A simple database was set up, which in the end contained over 400 articles with relevant metadata. These articles were cut and pasted from SV’s website, more precisely, the part of SV’s site related to parliamentary work. The thought were that this information would reveal stories fitting the model, stories about victories, losses, turning points, alliances, and so on. During the registration of the first batch of articles some serious problems surfaced related to the model. The articles rarely discussed the same issue or political process and it was therefore almost impossible to relate them along a dramatic curve. Another strategy was chosen, and that was to rely on the existing subdivision of articles and move the storyline up on a less detailed level. The resulting model has a presumably “flatter” complication curve and less distinct dramatic phases (Figure 4)

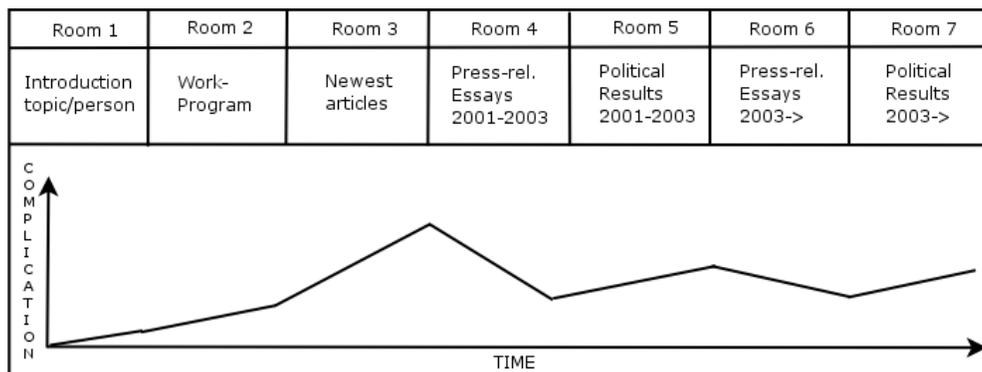


Figure 4: New model

First the chosen topic is introduced and brief information about the responsible politicians is presented. These politicians belong to the relevant parliamentary committee and have written most of the documents about the topic. Next the relevant

passages from the work-program are made available. The user chooses some of them and is given the option to move on to the next room. This behavior is implemented with the help of a calculated threshold value, which is compared to the users score that accumulates with each item viewed. Room 3 presents the newest documents, press releases, essays and accounts of political results. This is presumably the most exciting point in the presentation. The last four rooms is a chronological ping-pong where the presentation alternates between problem description and political results. The wholeness and dramatic quality of this construction can easily be questioned, but the structure and logic is very different from the original website, and to a large degree implements the accordion structure. This made it a good tool for investigating the dilemmas underpinning this research.

### User Evaluation

The two dilemmas related to narratives and new media: the opposition between narrative and database and the risk of unintentional sign behavior can be related to what Jonas Löwgren (Löwgren, 2002) calls “use qualities”. If one pictures the relation between database and narratives, loose structure and tight structure, intention and unintentional as a continuum, these use qualities could be said to belong somewhere on it (figure 5). The important qualities in this research are immersion (the third dilemma) and relevance (information overload).

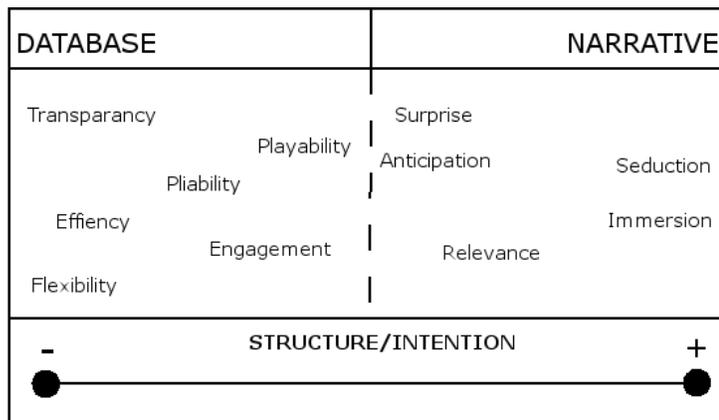


Figure 5: The relation between the dilemmas and use qualities.

### Methodology

A qualitative approach was chosen for this experiment and an open or informal variant of “thinking aloud”. This method had been designed to reveal what’s going on in people’s short-term memories when they are performing tasks, and is originally a strict method. One of the rules is that the only thing the evaluator can say is “keep talking”. According to Boren and Ramey this strict method is seldom followed in practice, and has been softened up, resulting in more interaction between the participant and the evaluator (Boren and Ramey, 2000). They have investigated the implications of this on the quality of the results, and found that the measure of

“lostness” is affected, because the participant is getting more help when stuck, but other measures are not affected. A “soft” method was chosen, even if the “navigation problem” was considered, because the evaluation was not oriented towards the completion of tasks.

Two test-rounds were performed. The first, consisting of 10 users focused on comparing SV’s existing website with the narrative prototype described above. This round revealed some methodological problems, because the information space of the actual web site was huge compared to the prototype. To eliminate this disparity, a second prototype, using the more limited information space of the narrative prototype, but with a more open structure mimicking SV’s existing news archive subsite, was implemented. The second test round, consisted of 4 users comparing the narrative and open prototypes, was then conducted.

The first 10 users were recruited with the help of the political parties youth organizations. The main reason for this is that this group has a basic interest for politics, something, which could ensure some prior engagement and therefore more and richer data. All in all these participants were experienced WWW users, aged under 25, 3 woman and 7 men. The last 4 users were not recruited from an undergraduate media course and could be characterized as having a medium interest in politics. They were women in their early twenties, experienced in the use of WWW.

The test environment differed slightly between the test rounds. The first round was conducted in a lab at the University of Oslo. Here the participants used a laptop computer and the Firefox browser. The reason for this was that the prototype was developed on Linux and there was not enough time to make it work in Internet Explorer. Either way these two browsers have a very similar user interface. The VGA signal from the laptop, video/sound of the user and sound of the evaluator were recorded and mixed in one mpeg-4 stream. Some synchronization problems occurred with this setup and for the second round a simpler strategy was chosen. This second round was conducted at the participant’s school. Video of the screen and audio were recorded with the help of an ordinary DV-camera. A stationary PC was used instead of a laptop. During both test rounds the evaluator sat to the right of the users, available for questions and conversation. Each test was performed in a similar manner. First the participants were asked questions concerning their experience with WWW. Then the evaluator described the task, which was to find out more about a self-chosen topic, and try to think aloud at the same time. During the test the participants were allowed to read silent, because this says something about the sites immersive qualities. Half through the test the sites were changed. The ordering was varied, so that this wouldn’t affect the quality of the data.

The data were analyzed and interpreted in five stages, reminiscent of John Creswell’s generic description of qualitative data analysis and interpretation (Creswell, 2003, pp. 190-195). The five stages were transcription, wholeness, coding, narrative and interpretation. The two test rounds resulted in 15 hours of video which were transcribed to 170 pages of text. Then the transcription was read with an open frame of mind, so that the data could “speak for itself”. This general understanding of the material was then used as basis for more detailed coding of the transcripts. Five

codes were developed, related to four aspects of the users' experience of the interfaces. These codes were:

- PPS - participants evaluation of presentation and style
- PRW - participants evaluation of relevance and wholeness
- PSN - participants evaluation of structure and navigation
- ON - observation of the participants navigation
- OSR – observation of silent reading

After this process of coding, a narrative was developed for each participant, which was further interpreted to answer the questions motivating and guiding the research.

## Results

In the following more weight is going to be put on findings related to relevance/wholeness, structure/navigation and how these are related. Findings related to presentation/style and silent reading/immersion was piecemeal and weak compared to those related to the first two categories.

Several of the users thought SV's website (or the reduced version of it in test round two) was fragmented and had no clear ordering. Many of the same users appreciated the prototype because the documents had, as they perceived it, a clear ordering. Example statements supporting this observation are presented in table I.

<b>Statements concerning relevance and wholeness</b>		
<b>Participant</b>	<b>Statement about SV's website</b>	<b>Statements about the prototype</b>
#1	...here is many, individual documents, but they are also; uhm... saved chronologically by year, but not by topic [...] instead of just individual articles and news stories it should be organized by topic.	I think it is great that they have this archive. That it is possible to go back follow the development of political issues...
#2	It is easy to find articles, but it is difficult to get the whole picture.	...the last one (prototype) gives a good and gradual introduction to SV's politics.
#5	This is what I miss here, what do SV mean about economic policies? What you see here is, there isn't anything principal here. [...] Only individual cases.	I think this is the right way to do it; one should first be presented for the principal outline before individual cases.
#7	I think so far it is much details and press releases and very little, uhm... ideology. [...] I miss that in a way.	...here you got everything there you've got "FN soldiers buying prostitutes"... [...] I like the buildup better, principally.

Table I: Statements concerning relevance and wholeness.

Many of the users didn't like the constrained navigation coded in the prototype. Some of these users managed to use the prototype correctly, but thought the option to choose any room or set of links should be available all the time. Others had problems

using the prototype and needed extensive help. The following example statements illustrate this. (Table II)

<b>Statements concerning structure and navigation</b>	
<b>Participant</b>	<b>Statements about the prototype</b>
#2	...if it had been something special I was looking for then it would have been worse. What in hell is this? And you have to gather points to be given the opportunity to move on and then you have to click on many links and move on. No, not there either.
#3	If I hadn't clicked on all these links, I wouldn't have got this one. ("move on") (right) ...I hadn't got that one then, OK. But why? No, no I have to apologize if I ask silly, but then you have to read everything then.
#5	It reminds me of a book. Step by step and then you move on and you begin in one end and you develop until you are through the case, it is divided in chapters, sequentially. But in a book, you can go straight to the table of contents and look it up.
#7	Unless it is something special, I don't see the point, that the link shouldn't be available from the start.
#8	It should have been available straight away because I should decide my own surfing, and not be forced through the pages.
#14	...then I have to choose one topic to find out what I can find, but maybe if I had been looking for green tax or environment, then I would have seen the first page and then I wouldn't have thought the information was available.

Table II: Statements concerning structure and navigation

There are a lot more statements like these, but some examples have been given. The major finding in this experiment is evident when one compares the two results:

- 9 out of 14 preferred the narrative structure of the prototype
- 10 out of 14 reacted negatively towards the constrained navigation

This finding indicates that there is a more complex relation between document-structure, intention and use-qualities than is modeled in figure 5. It seems that the division between structure and navigation as defined by Rosenfeld and Morville (Rosenfeld and Morville, 2002, ch. 5 and 7) and Andrew Dillon's separation of semantic and navigational properties (Dillon, 2003), are relevant in this case. The results seem to indicate that narrative structure can be coded with the help of both semantic and navigational constraints. Semantic constraints are dependant on language and conventions, while navigational constraints are coded directly in the interface. If one considers the findings in the light of these definitions, it seems that the users appreciated the narrative ordering on the semantic level, but was distracted and put off by the forced navigation.

It seems that a combination of open navigation and conventional structuring would have been a better solution for the users. This would have been easy to implement, and would have given the users a feeling of relevance and wholeness and at the same time the opportunity to choose freely. I have reformulated figure 5 along these lines to indicate that both the narratives use qualities and the databases use qualities can be achieved in the same electronic text with the help of semantic constraints rather than navigational. Use of navigational constraints excludes the database's typical qualities (efficiency, flexibility, pliability etc.).

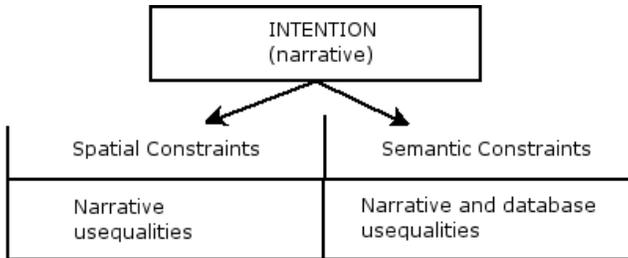


Figure 6: Reformulation of figure 5, intention, constraints and use-qualities

This also leads to a reformulation of figure 2, the accordion structure. It is not necessary to force the user to stay within each room, but give him/her the opportunity to choose between them, skip them and change their sequence (Figure 7). The best example of such a structure is found in many books.

This is according to Aarseth a “random access” structure:

... any book can be opened at any page and can be started at any point. The book form, then, is intrinsically neither linear nor nonlinear but, more precisely, random access ... (Aarseth, 1997, p. 46).

But convention or genre makes us read the book from beginning to end even if we don't have to.

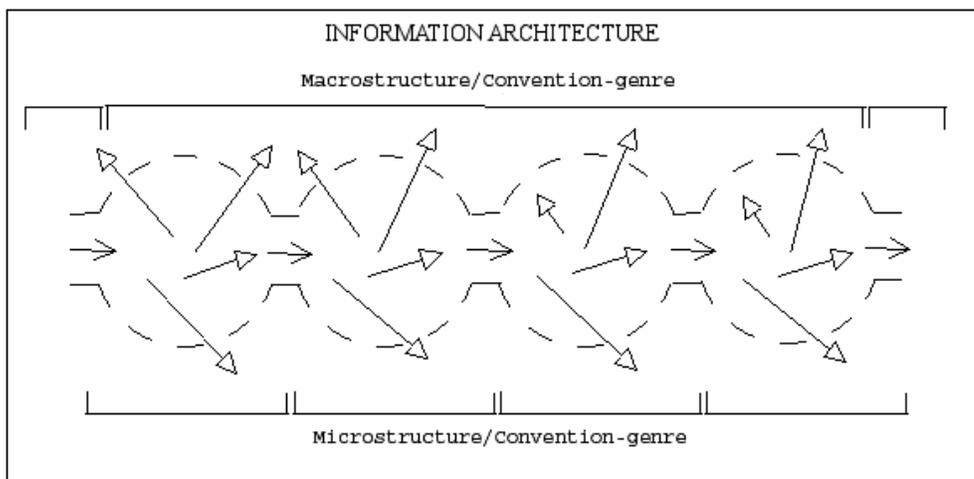


Figure 7: Reformulated Accordion Structure

## Conclusions and Future Work

The main findings in this project are related to the analysis of pre-existing websites and the user testing of an alternative narrative prototype.

The analysis of the websites, including interviews with the people responsible for them, revealed that the websites included in this study to a large degree are news oriented and organized hierarchically, for instance by using the organization hierarchy itself as an organizing principle. The people interviewed had few thoughts about alternative strategies of communication. It was made clear that narrative or rhetoric strategies hadn't been considered when designing the websites.

User testing revealed that users appreciated the narrative structure of the narrative prototype, but not the forced navigation sequence, indicating a more complex relationship between structure and navigation than is often described in the literature. Today's openly structured websites are appreciated the way they are. Our user tests also revealed that better semantic ordering of the information is desirable. The claim that narrative structuring of websites gives the users a better understanding of the wholeness and context of the information, have not been invalidated by this research, but more work is needed.

There are several possible continuations: One possibility is to create two identical prototypes, one with a forced narrative sequence and one with an always-available table of contents. Evaluating these two variants together could add more detail to our understanding of the relationship between navigational semantic constraints. A second possibility is to create a semantically richer set of tags for each article and try to create more detailed and better narratives based on them.

Further research should also investigate the possibility of constructing a narrative engine for web publication based on a simplified version of Laurels automatic playwright. Secondly the limits of collective tagging could be explored. How is it possible to construct narratives based on interpretative skills distributed across an organization, and what kind of narratives will emerge?

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