Evaluating Museum Websites using Design Patterns

Technical report number: IR-IMSE-001, December 2004

Martijn van Welie[*/**] (martijn.van.welie@satama.com)
Bob Klaasse[*]

[*]) Vrije Universiteit Amsterdam
Faculty of Sciences
Department of Computer Science
Section Information Management and Software Engineering
De Boelelaan 1081a, 1081HV Amsterdam, The Netherlands

[**]) Satama Interactive Amsterdam
Poeldijkstraat 4, 1059VM, Amsterdam
www.satama.nl

Contents

EVALUATING MUSEUM WEBSITES USING DESIGN PATTERNS 1

Abstract 4

INTRODUCTION 4

Method used 5
Pattern Collection 5

THE 'MUSEUM EXPERIENCE' 7

The target audience & their needs 7
Online versus offline experiences 8

MUSEUM SITES 9

Site Content and Structure 9
Brochureware versus the 'virtual museum' 10

ISSUES IN MUSEUM SITE DESIGN 12

The audience and the collection 12
Personalization & Customization 14
The museum as a community place 15
Education 15
Accessibility 17
Other factors for museum sites 17

CONCLUSIONS 17

Current Status and outlook 17
Pattern Usage in Museum Sites 18

REFERENCES 19

APPENDIX A. EVALUATING THE SITE OF THE RIJKSMUSEUM 20

Rijksmuseum.nl 20
The Welcome Page 20
The Homepage 21
Page grid 22
Main navigation 23
The Scrolling Menu 24
Breadcrumbs 24
Search Box 25
Sitemap 26
Browsing the Collection 28
A virtual tour 30
Catalogue browsing 32
Encyclopedia 33
Shop 36
The Rijksmuseum 'background' section 39
Overview of patterns used in Rijksmuseum.nl 40

APPENDIX B. EVALUATING THE SITE OF THE LOUVRE 41

The Homepage 41
Grid 42
Main Navigation 43
Virtual Tour 44

Selected Works 46
Atlas 48
Temporary Exhibitions 51
Auditorium – event calendar 52
Tours, Workshops 53
Education 54
Information 54
Latest News 55
Contact Us 55
Ticket Sales 55
Shop 55
Overview of patterns used in Louvre.fr 56

APPENDIX C. EVALUATING THE SITE OF THE NEW YORK GUGGENHEIM MUSEUM 57

The Homepage 58
Main Navigation 58
Liquid Layout 61
Exhibitions 62
The Collection 62
Directories 64
Education 65
The Museum Store 66
Membership/Sponsorship 67
Visit Us 68
Calendar 69
The Press Office 70
E-cards 70
Overview of patterns used in Guggenheim.org 72

APPENDIX D. THE 'MUSEUM SITE' PATTERN 73

Abstract

This report describes a detailed study of thee museum websites in order to determine the general characteristics and issues in museum site design. The sites of the Rijksmuseum, the Louvre, and the Guggenheim were analyzed in depth using an existing collection of design patterns as the main evaluation tool.

The purpose of the study was twofold:

1) To study the domain of museum sites in order to formulate their common characteristics in a 'Museum Site' design pattern.
2) To study the extent to which the existing pattern collection can be used to analyze museum sites.

The study was also used to refine existing patterns where needed as well as to create new patterns to describe design solutions that we previously not described in the pattern collection. The museum domain is an interesting domain that is experiencing a lot of rapid developments. During the study it turned out that the three reviewed sites where in some ways relatively 'conservative' in their design. Therefore a brief overview on developments in the museum domain is also discussed.

The results of this study show that the sites of these large museums could be described and evaluated well using the available design patterns. This study shows that the existing pattern language that was used is sufficiently 'rich' to describe the sites, sometimes even up to a very detailed level. Where the sites deviate from the suggested solution in the applied patterns, it is easy to see whether deviations are actually improvements of the user experience. This leads to the conclusion that used pattern language is sufficiently complete and effective for at least the domain of museum websites.

Introduction

The museum domain is an interesting domain where large highly interactive sites can be found. For that reason the domain was chosen for this study. In order to get a representative view on museum websites, we have randomly chosen three world-famous museums that have a reasonable amount of site content. The chosen sites are:

a) The Rijksmuseum in Amsterdam (http://www.rijksmuseum.nl),
b) The Louvre in Paris (http://www.louvre.fr)
c) The Guggenheim Museum in New York (http://www.Guggenheim.org)

The first two museums are similar in the sense that their collections contain many 'classics' such as the Mona Lisa by Da Vinci and the Nachtwacht by Rembrandt. The Guggenheim is a museum for modern and contemporary art with classics by Picasso, Cezanne and Mondriaan.

The websites of these museums have obviously been designed by professional design agencies, indicating that the museums have tried to make a serious effort in creating a suitable website for them. We did not want to review websites of smaller museums where their effort was possibly severely hindered by budgets and other resources, which may lead to unfair comparisons. The site of the Rijksmuseum has been designed by 'Eden Design' (www.edendesign.nl) a Dutch Design Agency. The site of the Louvre seems to be at least maintained by the museum's web-team itself. We have not been able to find out which agency has done the Guggenheim site.

After study these three museums we also briefly looked at other museum sites such as the San Francisco Museum of Modern Art[1], the National Museum of Ethnology in Leiden[2], the Natuurhistorisch Museum Maastricht[3], and the Metropolitan Museum of Art in New York[4] for particular features that those web sites offer.

Method used

The study was started by an in-depth analysis of the three selected museum sites. A 'drill-down' method was used to analyze the sites: starting from the homepage, all major sections were reviewed followed by an examination of specific sections such as the search engine or online shop. For each examined page we determined if existing patterns were used and whether of not variations on the basic patterns were introduced. Often this turned out to be the case and the potential advantages or disadvantages were discussed. See appendices A, B and C, for the documented analyses.

The second part of our analysis focused on writing the 'Museum Site' pattern. This high-level pattern discusses the main ingredients of a museum site and points to other relevant patterns. The three reviewed sites were used to verify the pattern and improve the pattern.

In order to fine-tune the 'Museum Site', we consulted literature on museum sites, in particular papers presented at the 'Museums and the Web' conference series[5]. This provided many additional insights into trends in museum site design and sites that featured innovative designs.

Pattern Collection

For this study the 'Amsterdam Pattern Collection'[6] was used and extended. At the time of writing this report the pattern collection contained around 100 design patterns, see table 1 for an overview. At the start of the study we hypothesized that this collection should be fairly complete in respect to museum sites since it already contained the most basic generic website elements. We only expected to find missing patterns that would be specific to the museum domain. This report will not discuss the individual patterns of this collection and assumes the reader has basic knowledge of existing design patterns. The reader is referred to www.welie.com for more information on the individual patterns and related literature.

[1] http://www.sfmoma.org/

[2] http://www.rmv.nl/

[3] http://www.nhmmaastricht.nl

[4] http://www.metmuseum.org

[5] http://www.archimuse.com/conferences/mw.html

[6] http://www.welie.com/patterns

Site Types	**User Experiences**	**Ecommerce**	**Basic Page Types**
• Artist Site • Automotive Site • Branded Promo Site • Campaign Site • Commerce Site • Community Site • Corporate Site • Multinational Site • My Site • News Site • Portal • Web-based Application	• Assistance • Community Building • Fun • Information Management • Information Seeking • Learning • Shopping	• Booking process • Case study • Login • Newsletter • Premium Content Lock • Product Advisor • Product Comparison • Product Configurator • Purchase Process • Registration • Shopping cart • Store Locator • Testimonials • Virtual Product Display	• Article Page • Blog Page • Contact Page • Form • Homepage • Guest Book • Input Error Message • Processing Page • Printer-friendly Page • Product Page • Settings Page (property sheet) • Tutorial
Navigation	**Searching**	**Managing Collections**	**Page Elements**
• Bread crumbs • Directory • Doormat Navigation • Double tab • Faceted Navigation • Fly-out Menu • Guided Tour • Header-less Menu • Icon Menu • Image Browser • Main Navigation • Map Navigator • Meta Navigation • Minesweeping • Overlay Menu • Panning Navigator • Repeated Menu • Retractable Menu • Scrolling Menu • Shortcut Box • Split Navigation • Teaser Menu • Trail Menu	• Advanced Search • FAQ • Help Wizard • Search Area • Search Tips • Search Results • Simple Search • Site Index • Site Map • Topic Pages	• Favourites (Collector) • List builder • List Sorter • Overview by Detail • Parts Selector • Table Filter • Table Sorter • Treeview • View	• Customizable Window • Constrained Input • Country Selector • Date Selector • Details on Demand • Footer Bar • Forum • Home Link • Hotlist • Language Selector • News box • News ticker • Outgoing Links • Poll • Send-a-Friend Link • Thumbnail • To-the-top Link • Progress indicator • Overlaid Hints • Guest Book
Basic Interactions	**Visual Design**		
• Action Button • Enlarged Click area • Paging • Slideshow • Stepping • Tabs • Wizard • Input/Selection Controls	• Alternating Row Colors • Center stage • Color-coded Areas • Font Enlarger • Grid-based Layout • Liquid Layout • Roll-over effects • Templates		

Table 1 The used pattern collection

The 'Museum Experience'

In literature on museums, the 'museum experience' is often mentioned. The word 'experience' indicates the experience visitors get when visiting a museum in real life. It focuses on how to construct exhibitions, attract visitors and have them reflect on their visit so that they ultimately learn something. It includes the attraction, engagement and closure [Lenker2002] of interacting with an exhibit and the museum as a whole. The museum experience is different per visitor type and includes activities such as finding the museum, planning a visit, conducting the visit, closing the visit and looking back at the visit. For other people it may not be so much about the visit itself but rather the museum as a source of information determines the experience.

The experiences for either physical museum or its website are not identical but they do overlap significantly. If the museum experience is taken broader that just the exhibit design issues and includes the marketing and sales aspects, the role of the museum's site is better understood. The site has an emphasis on the attraction and post-visit activities rather than the visit itself while the physical museum will typically focus on the visit itself. Nonetheless, a better understanding of the broad museum experience should start with an understanding of the museum's audience and their needs.

The target audience & their needs

The potential audience for a website is definitely not one sort of visitor. From surveys [Bowen99] it shows that the audience is typically formed by middle-age people 40-64 years old and fairly balanced between the sexes. For designing museum sites it is important to know who these people typically are and what they are coming for. The audience of a museum site may include the following types of people [Kravchyna & Hastings2002]:

- **People planning a visit to the physical museum**. These people need to be attracted and persuaded to embark on a visit to the physical museum. They will need information about what is currently going at the museum and they need the basic visiting information such as opening hours, ticket sales and route descriptions. Some studies [Kravchyna & Hastings2002] claim that up to 60% of the site's visitors visit the site before and after visiting the physical museum. Some visitors may be interested in determining in advance which objects they want to see and to define a route that takes them to see the objects.
- **People who have visited the museum**. These people may want to look back at what they have seen, look up some additional information on particular objects and purchase some gifts, reproductions or books.
- **Educators**. Educators need information about particular objects that goes beyond the 'bibliographical' details as well as high-quality resources such as images, map, video, and audio material. Educators need information on the historical context, research on the object and its meaning or interpretation. Additionally, educators may want to work with museums in order to create and improve existing material rather than museums supply providing 'educational packages' [Korteweg2002].
- **Researchers and students**. These people have similar needs as educators but their needs may differ in which resources and information needs to be available.
- **Curators**. Curators typically need very detailed information about every single item of the collection including information acquisition, restoration, preservation, dimensions, and so on.
- **Children**. Children want to learn and play at the same time. A museum often organizes birthday parties or special tours and in some cases the museum may have special exhibitions for children.

- **Potential visitors who are not able to make a real visit**. People that live on the other side of the world or people that are physically not able to go to the museum, may still have a profound interest in the museum's collections.
- **Managers and donators**. Basically, these people have an interest in the museum in general and their interest will largely overlap with other users.

The most important conclusion that should be drawn from this list of user types is the understanding that these user types have quite different needs. All marketing material, including print and online media, should be designed for specific user types. On the other hand it is also clear that the collection and exhibits are at the heart of the online experience, just like it is for the off-line experience.

Online versus offline experiences

A museum's website has 'experience' but that is focuses mainly on attracting visitors. The website is usually not a copy of the museum or exhibition itself. Typically, the site's primary function is to attract visitor and persuade them to choose for an actual visit and to provide with post-visit options such as purchasing gifts. This fits in the experience part of preparing a visit and 'remembering' a visit. The real visit must take place in the physical world and not in the virtual world. Apparently that is what most museums commercially speaking want nowadays. Nonetheless, some parts of the exhibitions may be displayed virtually but they usually do not fulfill more than a 'teaser' role.

So if we talk about the *online* museum experience it is about the planning and the preparation before making the visit and as a 'reference' or 'remembering' the museum afterwards. During a real museum visit the site obviously plays no role at all. Note that also museums exist that primarily want to be 'virtual' and then the online experience should be more similar to the offline experience[7]. Such museum site will be discussed in the next sections of this report.

Traditionally, museums are used to communicate in a "mass-communication way". That is, they present a single message to the entire audience. However, the audience for a museum web site is quite diverse and each type of visitor has its own needs and interests, which are in turn related to the context in which the site is used.

For example, children need interactive games or information that is specially designed for them rather than for adults. The Metropolitan Museum has a special section for kids where both on-line and 'offline' activities are listed. Such specialized sections are of course not only applicable for children, similar solutions can be made for other user types such as student and educators.

Simply because a site is interactive, certain user types can easily be triggered to find their specialistic content. For example, by simply having an 'Education' section educators and students can be attracted and given specially prepared content. In other cases the needs of certain user types concerns the same content but it will require a different of interaction with the content. For example, a curator will use the online collection database differently than a parent that is planning a visit.

[7] See http://www.chin.gc.ca/English/Digital_Content/Tip_Sheets/constructivism.html for more on online interactive museum experiences.

Figure 1 The Metropolitan offers a special section for children

Museum Sites

Site Content and Structure

Since the site must focus on the before-and-after aspects of a visit, museum sites all contain very similar content such an overall description, which exhibitions they currently have, how to get there and when they are opened and of course, the souvenir shop. The main sections of museum sites usually include the following sections:

- **General Information**
  Users who are planning a visit could find information they might want to know in advance here. Things like address, opening hours, ticket prices, floor plan, contact information, acquisition, home rules, accessibility and facilities could be found here.

- **Collection**
  The collection is the main asset of the museum and most be prominently featured on the site. This section of the website has two functions:
  1. Inform the user about the pieces the museum has in its collection.
  2. Let the user observe (a part of) the collection. Images and description is the minimum a museum must show.

- **Calendar /Exhibitions**
  Common events on a calendar of a museum are exhibitions, guided tours, lessons, courses, special days and symposia. It must possible to get more information about events, like starting time, prices, place, and other additional information about these events. Next to events where users have to pay for, there should be a "buy a ticket" Action Button to link the user to the shop to buy a ticket. The calendar must inform the user about - and invite the user to - coming events in the museum.

- **Education**
  The goal of this part of the website is to provide information about the educational activities of the museum. It is also possible to offer educational material for

download but only few museums do that. Usually the section could refer to books, cd-roms and web pages about the subject of the museum. The books and cd-roms could well be linked to the web shop. If the museum gives courses, workshops, lessons, tours or subject excursions, it should also be stated at this section. Also information about excursions for schools and ideas and resources for teachers and group leaders could well be placed here.

- **News**
  The news section could be implemented in a News Box and could well be integrated in the Homepage. This section is useful to inform the visitor about new acquired pieces, expansions of the building, new exhibitions, new activities, and all other kind of recent developments of the museum. News may also include press releases.

- **Shop**
  Visitors might want to buy museum-related things online, basically to buy 'souvenirs'. Usually there is an online 'shop' which is effectively an E-commerce Site within the museum website. A museum shop may also contain documentation related to exhibitions and to single exhibits at various levels of expertise. The user experience that is applicable here is the Shopping.

  A museum shop differs from the standard e-commerce site in the way that a museum shop sells museum-related artifacts and most of the time has fewer things to offer. Most of the times, the museum has outsourced the shop to external parties.

A number of additional sections can be found on extensive sites. These may include:

- **Children.** Special section dedicated to children.
- **Members**. Visitors may want to become members and enjoy additional services.
- **My Collection**. In this section members can create their only collections and customize some other functionalities.

Brochureware versus the ‘virtual museum’

The three reviewed sites give a rather conservative view on what museum sites apparently are nowadays. The sites mainly function as an ‘online brochure’ for the site with the addition of a browseable collection. Being a ‘virtual museum’ means that the ‘visit’ itself must be design as well. Some museums choose a virtual 3D world to do that [Guynup2003] but it can also be done on others ways. The important thing is to design for ‘visitors’ and not for ‘visit planners’ only.

There are museums that make more work out of their online presence and try to give at least some online ‘visiting’ of the museum. For example, in the Natural Historic Museum of Maastricht online visitors can actually walk through the caves. Besides the ‘fun’ aspect of it visitors can also learn something by reading about items they encounter.

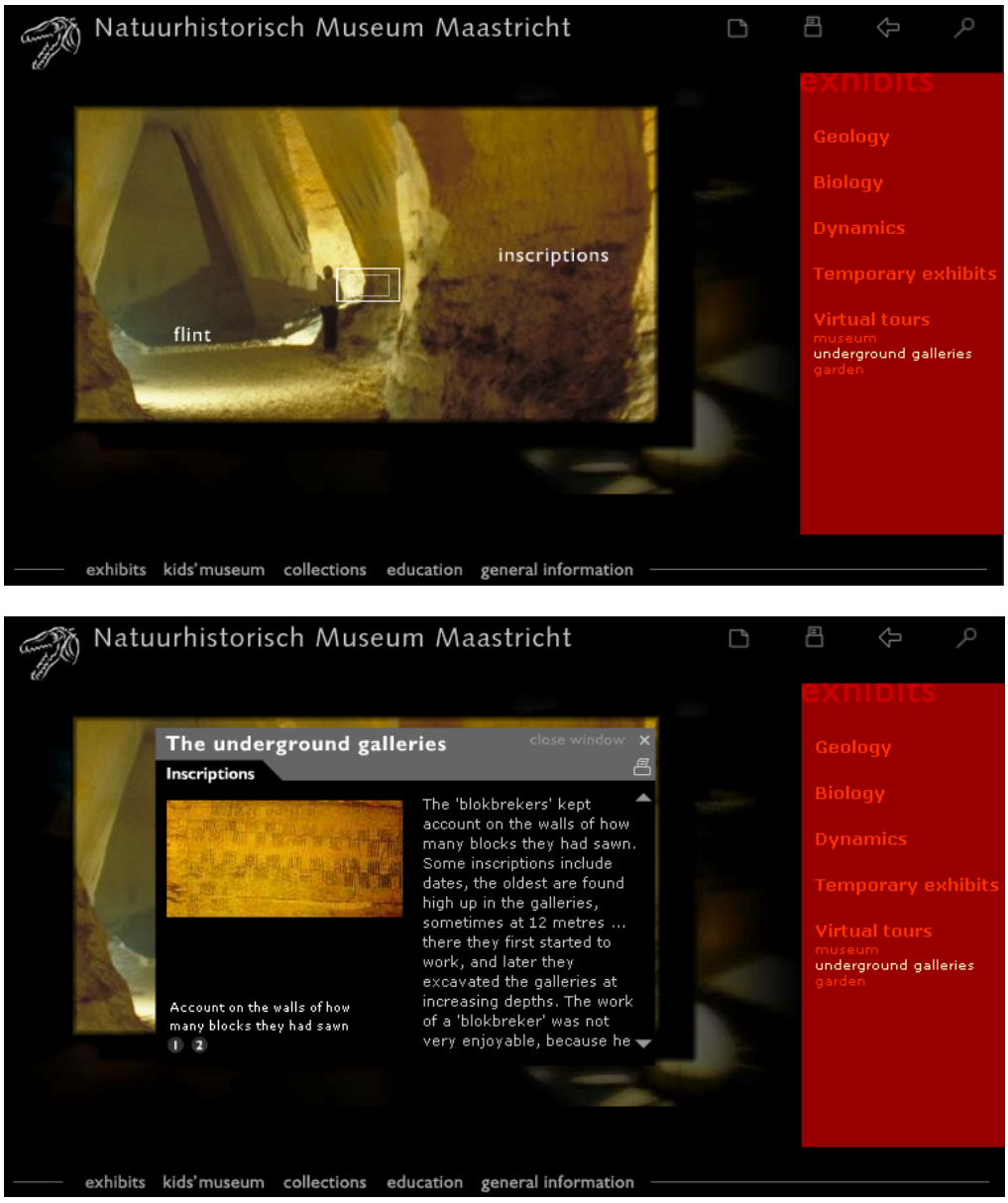


Figure 2 A virtual tour through man-made caves

Other examples, that go clearly beyond simulating a real visit i.e. unlike the cave example, are:

- **Stories about exhibits, to support experience of their use / function in original context** At the Dudley Castle in the UK [Johnson] there is a virtual tour that provides augmented reality on screens in the castle grounds, showing knights and other reconstructed castle inhabitants "living" around the reconstructed virtual building.

- **Virtual reconstructions.** For example, a 3D reconstruction the Parthenon [Devebec2004] and some of it statues have been made that allow people to see the Parthenon as it really was.

- **Virtual deconstructs**, such as the 'Virtual Mummy' [Germer1991] which can be unwrapped layer by layer although in reality the mummy has never really been unwrapped.

These examples show a real addition of VR or Augmented reality or other multimedia presentations where IT (and websites) that can uniquely contribute to the "museum experience".

One can only guess why most museums take such an approach to their sites. Obviously, there are financial issues involved that makes them choose to drive people to a visit of the physical museum. Nonetheless, considering the social cultural role of a museum one would expect a more interesting online presence.

In literature on Museums and the Web, there is plenty of discussion on 'normal' museum websites and 'virtual museums', the latter being online-only museums. This roughly translates to 'brochureware museum sites' and 'interesting museum sites'. However, the primary tasks of museums concern conservation of the collection and disclosing the collection to the public. Traditionally disclosing meant creating a physical space where a subset of the items in the collection was on display so that visitors could see them. With the arrival of the web, disclosure of the collection does not have to be limited to the physical space. The web can be used to display the collection in ways that are not possible in physical spaces, provide educational added value, to give (automated) tours for people that will never be able to physically visit the museum [Freedman2003]. In short, a whole different way of 'visiting a museum' and even a different way of looking at its collection.

Issues in Museum Site Design

The audience and the collection

The general lack of understanding of the site audience can be seen in many sections, and particularly in the 'Collection' section. Most sites present a searchable database where facts and images can be found. This can already be problematic [Mitroff et al 2003] when there is also a 'normal' search facility on the site that does not include the collection database. The site of the 'Rijksmuseum' suffers from this problem as well. When looking at the information presented it is clear that such a 'scientific' presentation of information is only suitable for curators and researchers. The Louvre shows the following information about an item in the collection:

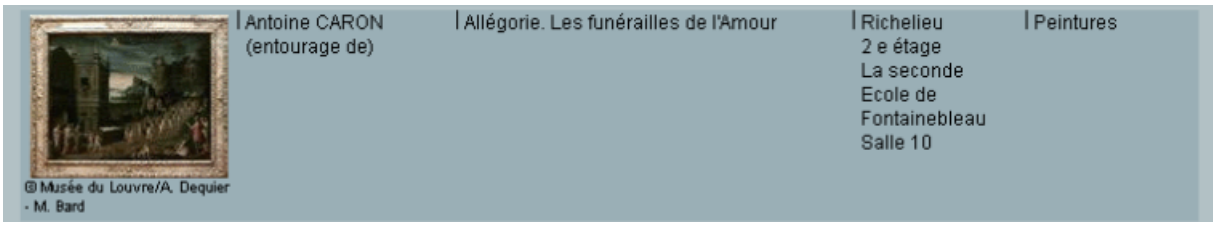


Figure 3 A typical presentation of an item in the collection database

This type of information is very basic and perhaps enough for curators who care for the straight to the point and correct display of information [Bowen99]. However, every type of user will see the same presentation of the item! To what extent does this help the students, educators, children or potential visitors? It probably helps them very little.

For a curator this may be the preferred way but visitors may be more interested in seeing several pictures of the items (instead of one), a decent description of the item with some relevant background information (which may be located in a Flash mini-site in the Education section [Mitrof et al2003]), links to other items of the same artist or of the

same artistic school/influence and so on. The question then arise of what it means for non-curators to see the collection online: are they really interested in searching in the collection using a standard search engine? Perhaps users are better helped by a different type of interaction. For example, users may start at a particular object and then gradually move through the collection by following 'related' links to other objects. Effectively, browsing through the collection then becomes a 'virtual visit' through the collection.

In modern art, more and more digital art is made which leads to the situation that the items in the collection are not physical anymore and are therefore better presented online [Guynup2003]. Such developments make the border between the online and offline collection vaguer.

Usually a collection is structured in ways similar to those of libraries. When large parts of the collection have been entered in the online collection database, different views on the collection can be created. For example, a history museum may show an online exhibition showing changes in clothing style, based on various items showing clothing [Freedman2003]. Such presentations can either be presented as new exhibitions but also as educational items. These presentations may not even exist as an exhibition in the physical museum so that the museum site plays a complementary role. From a design point of view, the items in the collection can become part of many possible narratives that tell a particular story.

Notable exceptions fortunately exist where art pieces are properly described in a very understandable and attractive way. See this example from the SFMOMA. Arguably, this may be seen as part of 'education' functionality on the site rather than browsing the collection but it provides does a lot of information non-curators may be very interested in.

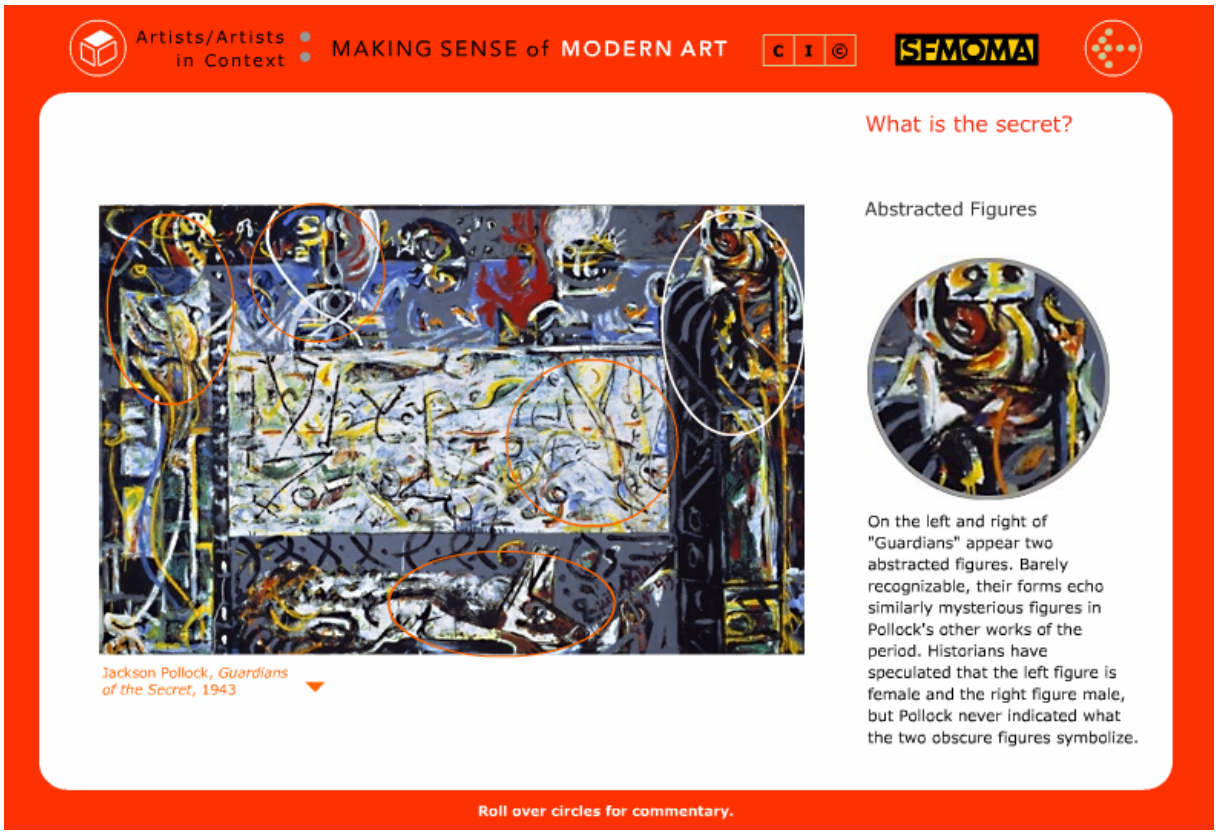


Figure 4 A painting being explained

Personalization & Customization

For site users that are planning a visit or are studying a part of the collection it can be very useful to 'bookmark' items in the collection. One could say that the experience of viewing an item is not over when users are seeing an item. There is often an additional task that relates to the overall goal of the users. For example, users may want collect several items because they are studying a group of items that are concern a common 'topic' such as 'Dutch landscapes'. There are several sites that provide such functionality using the name 'My Collection'. When pieces from the collection are viewed there is a button 'Add to My Collection' that adds the item to 'My Collection', sort of like adding something to your shopping cart.

Besides simply collecting objects, the objects can also be used to draw a map of the items, showing their location in the museum and plan a 'route' for visiting the items in a particular order. Other possibilities include the presentation of links to related content per item e.g. reproductions on sale in the shop, objects that are related through artistic or historical context, books and perhaps even different explanations of the object.

Creating a 'My Collection' can be the first step in a visitor loyalty strategy. Usually, a 'My Collection' section requires visitors to register and login to use the functionality. Consequently, targeted newsletters or other sorts of information can be presented to site users. Other uses of visitor information are to speed up shopping functionality by using the information in the users' profile. Thus enabling a 'one-click-shopping' type of purchase process. Other uses that can be seen in museum sites are 'personalized calendar views' and 'interest-based notifications' [Bowen2004]. For a detailed overview on personalization see [Bowen2004].

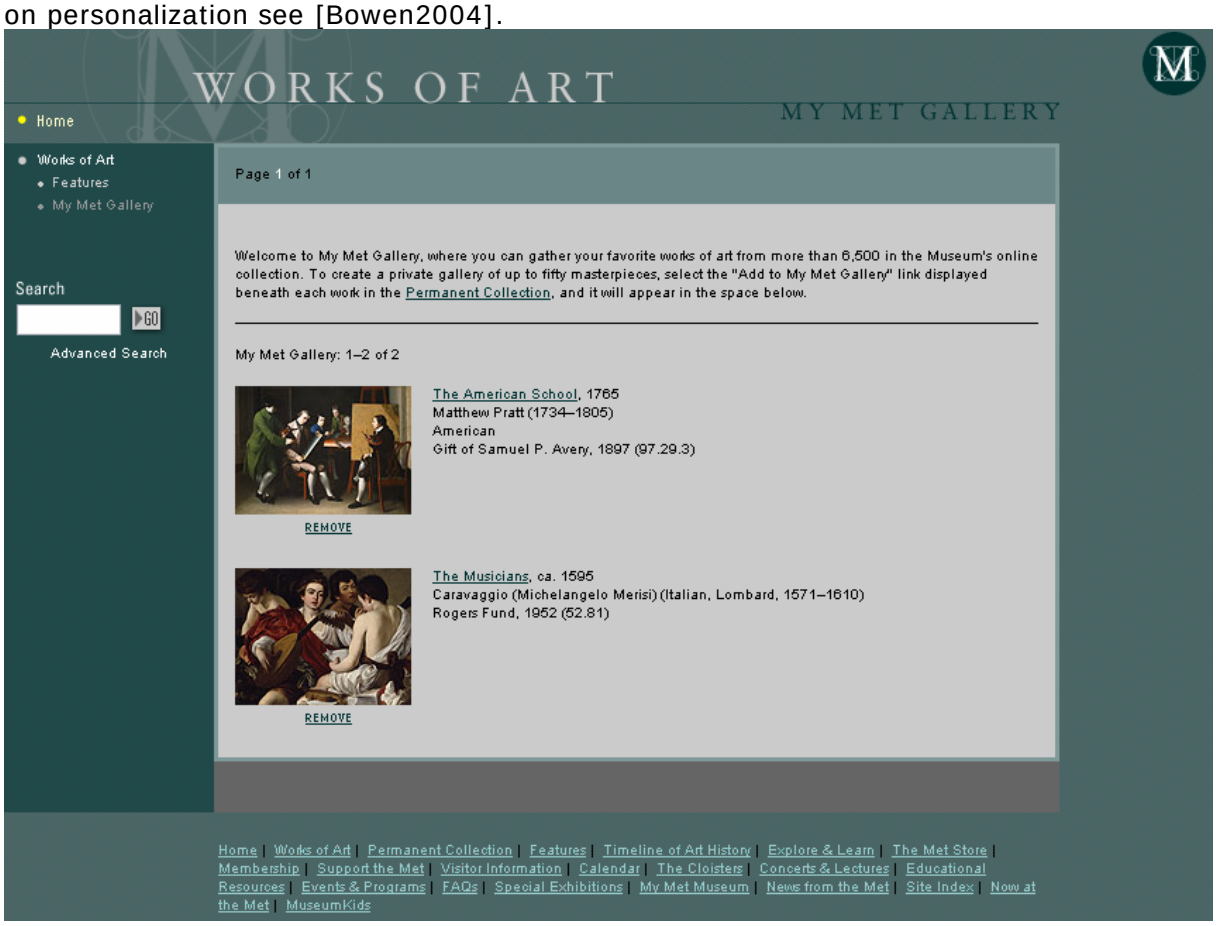


Figure 5 Collecting items in 'My Gallery'

The museum as a community place

So far visitors have been discussed as if they were isolated. In reality, museums have to deal with several communities of users [Bowen, Houghton & Bernier 2003]. Most museums do not provide any mechanisms for communities to start interacting between themselves or with the museum. When the museum is seen as a knowledge center it is logical that interaction on the knowledge level becomes possible. For example, users may want to discuss current exhibitions or have alternative explanations of objects in the collections.

The Spellman Museum of Stamps is an example of a site that has a forum[8] where discussions are held. Such functionality is not entirely trivial to design well. A large museum such as the Louvre will not want it to be possible that everybody can comment on objects and that those comments are directly visible to users viewing the item. Commenting functionality must be design to be more subtle than that. Curators must play an important role in regulating or moderating community type of features.

There are also other types of functionality that are relevant for creating communities. A common way is to have email newsletters and to organize special events for certain communities.

Education

Visiting a museum is not only about merely *seeing* an object; it is really about learning something about the object. In exhibition design the learning aspect is very much taken into consideration. For online museums the learning aspect is relevant in many areas. First there is relevancy when viewing items, and then there is relevancy for groups of items and special exhibitions. Lastly, there are teachers and students that need material for their own purposes.

Traditionally, a museum lacks the credibility to be an educator [Korteweg2002]. Museums are often simply seen as ‘keepers’ and ‘exhibitioners’ while they nowadays do much more than that. Therefore it is good to see that more and more museums actively try to educate and present their material in alternative ways. A good example is the ‘Explore and Learn’ section of the Metropolitan Museum of Art where several topics have been selected which is then presented in a mini-site with lots of explanations and downloadable resources.

[8] http://www.spellman.org/forum.php3

Figure 6 A mini-site about the Byzantium

Such topic related mini-sites can then be linked together by higher-level perspectives such as an 'Art Timeline' as the Metropolitan does. The important of education in relation to the museum is clear but the site itself must take the aspect into the fundamental design of the site and apply it in many different areas.

Figure 7 A mini-site based on a timeline

Accessibility

The museum building is a public place and by law must be accessible for all people including people with disabilities. Such accessibility requirements also exist in the online world and in some countries these requirements are also legally enforced, e.g. the section 508 law in the United States. Accessibility is generally relevant for most websites but it is especially relevant in the domain of museum sites. Creating accessible sites is not that problematic from a design point of view but it is important to put it on the design agenda from the start so that all appropriate measures are taken from the beginning of the project.

Other factors for museum sites

Although there a plenty of ideas for creating great museums sites, in practice there are a lot of limiting factors. The first one is **costs**. A visitor of the 'physical museum' usually pays an entrance fee whereas museums site are generally do not charge any entrance fees. Although this may change in the near future, large parts of the site will always stay freely accessible. Creating compelling sites that are regularly updated costs significant amounts of money while it hardly creates additional revenues for the museum. Many museums are heavily subsidized by governments and their budgets for web sites are tight. A substantial amount of museums even depend entirely on subsidizing for their survival.

Besides the cost issues there is also the issue of the lack of **technological expertise**. Most museums do not employ people with the skills to design, implement and maintain an online museum. Some have editors to maintain the current content but their skills are usually not sufficient for designing new sections and implementing new technology. They will therefore have to resort to hiring companies to help them which automatically leads to the involved cost issues.

Another issue is **copyright**. Often copyright issues may prevent the museum publishing high quality photographic material on the web [NewHeritage2002]. On the one hand this may be understandable, in many cases simply necessary for legal reasons, but on the other hand it goes against the public role of a 'heavily subsidized' museum. In most cases, the most practical way to go around these issues is using watermarking of images and keeping the resolution of images fairly low.

Conclusions

Current Status and outlook

The three museum sites that have been examined in depth are fairly exemplary for most museum sites. Museum sites have a high level of similarity in their structure and content, almost always focused on attracting visitors for their physical museum. On a functional level the basic functions and informational elements are in place but a visit to the museum's site is still far from an exciting and rich experience. There are notable exceptions but it takes significant effort to take an average site to a next level. Key issues for improving the sites are better alignment with their target audiences and moving towards a 'virtual museum' rather than being brochureware sites. Naturally, costs will prevent many museums in undertaking such efforts.

Museum sites in general and certainly the ones analyzed in this report have many usability issues that must be addressed. The analysis using patterns gives many points for improvements, but the problems found are not restricted to just the museum domain.

The usability issues found typically concern navigation, interaction, layout, wording and graphical design.

When looking at the museum sites it is also clear that there is a 'growing path' for museum sites. A small museum typically starts out with the basic brochureware site stating the opening hours, location and current collections. The next big step is when the museum puts the collection online and allows for searching through it. The following phase adds the educational aspect to the site as special education sections start to contain more than announcements and actually have interactive educational sections. In the last phase, the museum becomes almost a virtual museum as all target audience find what they need with multiple ways to browse and view collections, personalization and community aspects will complete the site. Based on this growing path the three museums reviewed in this report can be considered to be in the second or third phase, leaving still many chances for improvements.

Although from a user-centric point of view such a growing path is desirable, many museums themselves may think otherwise. From surveys such as [AlteredImage2001] and [FirstMonday2002] it can be seen that museums have mixed feelings about going fully online and interactive. The feeling is that there is no substitute for a visit to the real museum and that online efforts should be merely complementary and thereby attracting people to the physical museum. Undoubtedly, a high quality image of a painting by Rembrandt cannot substitute for seeing the real thing. Nonetheless, not everybody has the opportunity to do so and the online museum can open up an entire new audience.

Pattern Usage in Museum Sites

From the analysis of the three large museum sites it has become clear that such sites typically use around 30 or more design patterns from the used pattern collection. Surprisingly, only a few new patterns were identified (i.e. Timeline, Thumbnails, Press Release Page, Date Selector) which gives a good indicating of the completeness of the patterns collection in regards to the museum domain. The method of a top-down analysis of the major sections of the site turned out to be easy to execute as it was easy to recognize patterns that had been applied. In that sense, site evaluation using patterns is easy and almost trivial when the analyst thoroughly knows the pattern collection. The patterns were useful for describing and analyzing the sites in detail. Many points of improvements could be identified by simply looking at how the patterns were applied.

However, even the execution of those improvements does not necessarily make the sites good museum sites. As discussed, there are many possibilities for making museum sites much more attractive. Since these are all related to the target audience needs, and therefore they are very hard to cover in patterns. The resulting museum site pattern has been formulated to cover some of these aspects but it remains a merely a high-level description. We speculate that while patterns are useful to assess the sites general usability, they are less useful for truly understanding the overall quality of the site for the target audiences.

References

Altered Image, “What museums think: online exhibits – survey results”, http://voom.si.edu/class/survey_print.pdf

Bowen, J.P. “Time for Renovations: a survey of Museum Web Sites”, Museums and the Web 1999, http://www.archimuse.com/mw99/papers/bowen/bowen.html

Bowen, J.P., Filippini-Fantoni, S., ”Personalization and the web from a museum perspective”, Museums and the Web 2004, http://www.archimuse.com/mw2004/papers/bowen/bowen.html

Bowen, J.P., Houghton, M., Bernier, R. “Online Museum Discussion Forums – what do we have? What do we need?”, Museums and the Web 2003, http://www.archimuse.com/mw2003/papers/bowen/bowen.html

Debevec, P. 2004 http://www.debevec.org/Parthenon/

Freedman, M. “Think Different: Combining Online Exhibitions and Offline Components to Gain new Understandings of Museum Permanent Collections”, Museums and the Web 2003, http://www.archimuse.com/mw2003/papers/freedman/freedman.html

Germer, R., 1991, The Virtual Mummy: Unwrapping a Mummy by Mouse Click, http://www.uke.uni-hamburg.de/zentren/experimentelle_medizin/informatik/forschung/mumie/filme.en.html

Guynup, S.L. “From GUI to Gallery, a study of online virtual environments”, Museums and the Web 2003, http://www.archimuse.com/mw2003/papers/guynup/guynup.html

Johnson, C., Dudley Castle Virtual Tour, http://www.jtastudio.freeserve.co.uk/historic.htm

Korteweg, L., Trofanenko, B. “Learning by Design: Teachers/ Museums / Technology”, Museums and the Web 2002, http://www.archimuse.com/mw2002/papers/korteweg/korteweg/html

Kravchyna, V., Hastings, S.K. “Informational Value of Museum Web Sites”, 2002, First Monday, http://firstmonday.org/issues/issue 7_2/kravchyna/index.html

Lenker, J. “Train of Thoughts: Designing the Effective Web Experience”, New Riders Press; 1st edition (2002) ISBN: 0735711747

Mittroff, D., Misunas, M., Wise, S.“Bringing it all together: developing a user-centered search experience on the SFMOMA web site“, Museums and the Web 2003, http://www.archimuse.com/mw2003/papers/mitroff/mitroff.html

New Heritage, “Special report: museums + internet”, http://www.museophile.sbu.ac.uk/pub/jpb/new-heritage2002.pdf

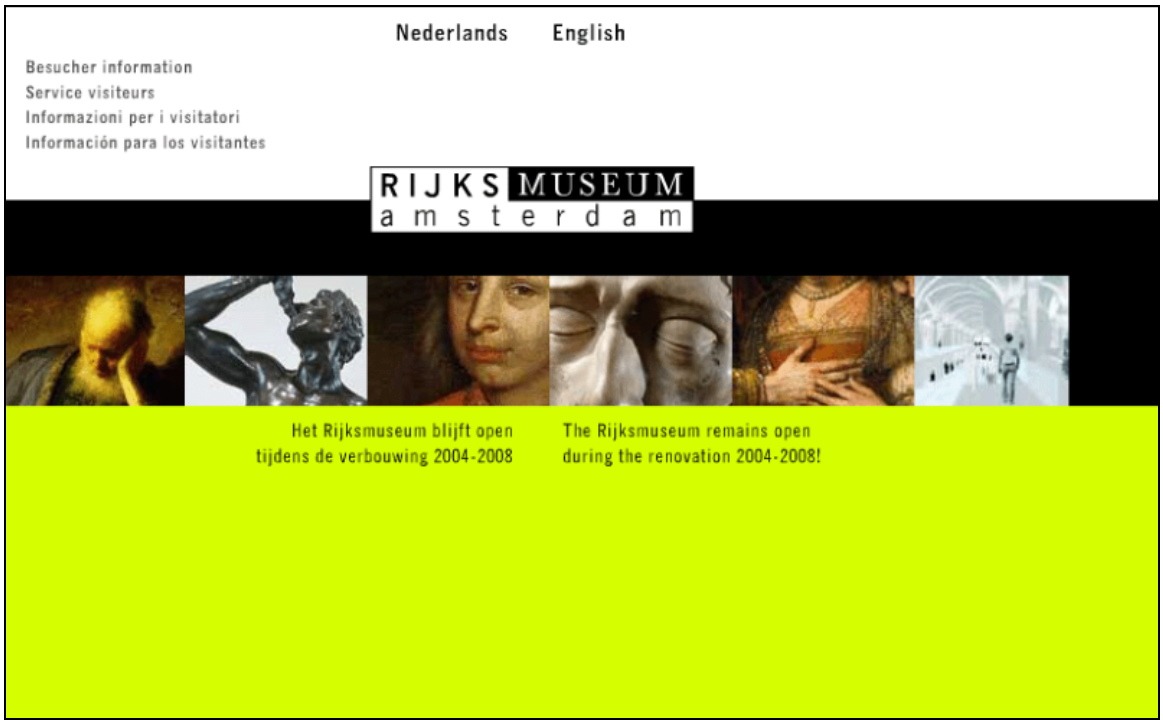
Appendix A. Evaluating the site of the Rijksmuseum

Rijksmuseum.nl

The website of the Rijksmuseum is divided in a couple of sections:

- Welcome Page
- Homepage
- General Information
- Collection
- Exhibitions
- Calendar
- Science
- Education
- Shop
- The Rijksmuseum

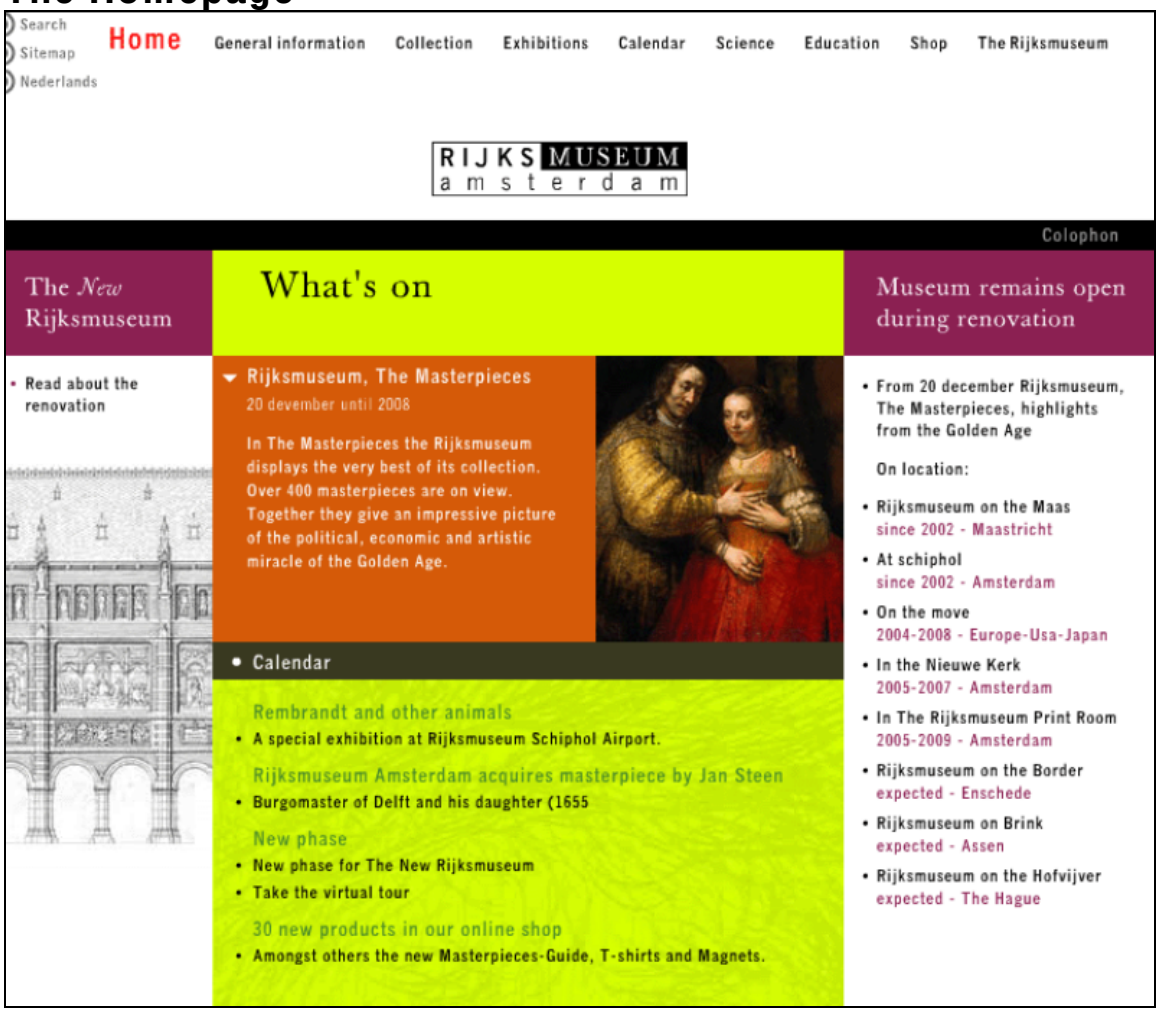
The Welcome Page



When entering the site of the Rijksmuseum, the user sees this 'Welcome page'. The purpose of this page is to allow people with different nationalities to see the most basic information in their own language; in this case this is Dutch, English, German, French, Italian and Spanish. However, the site is only available in two languages, Dutch and English. For the other languages there is simply one page with some information but it is not possible to see the entire site in those languages. So effectively the welcome page is nothing more than a Language Selector where visitors can choose between the Dutch site and the English site.

The images and the welcome page, together with the logo should enforce the identity of the museum to visitors. However, the images are paintings that are on display which have been cropped severely so that they are practically unrecognizable to anybody except experts. Nonetheless, they at least show that it is not a museum of modern art. What could have been nice is to include a picture of the building itself, since the building is a monumental site in the city of Amsterdam.

The Homepage

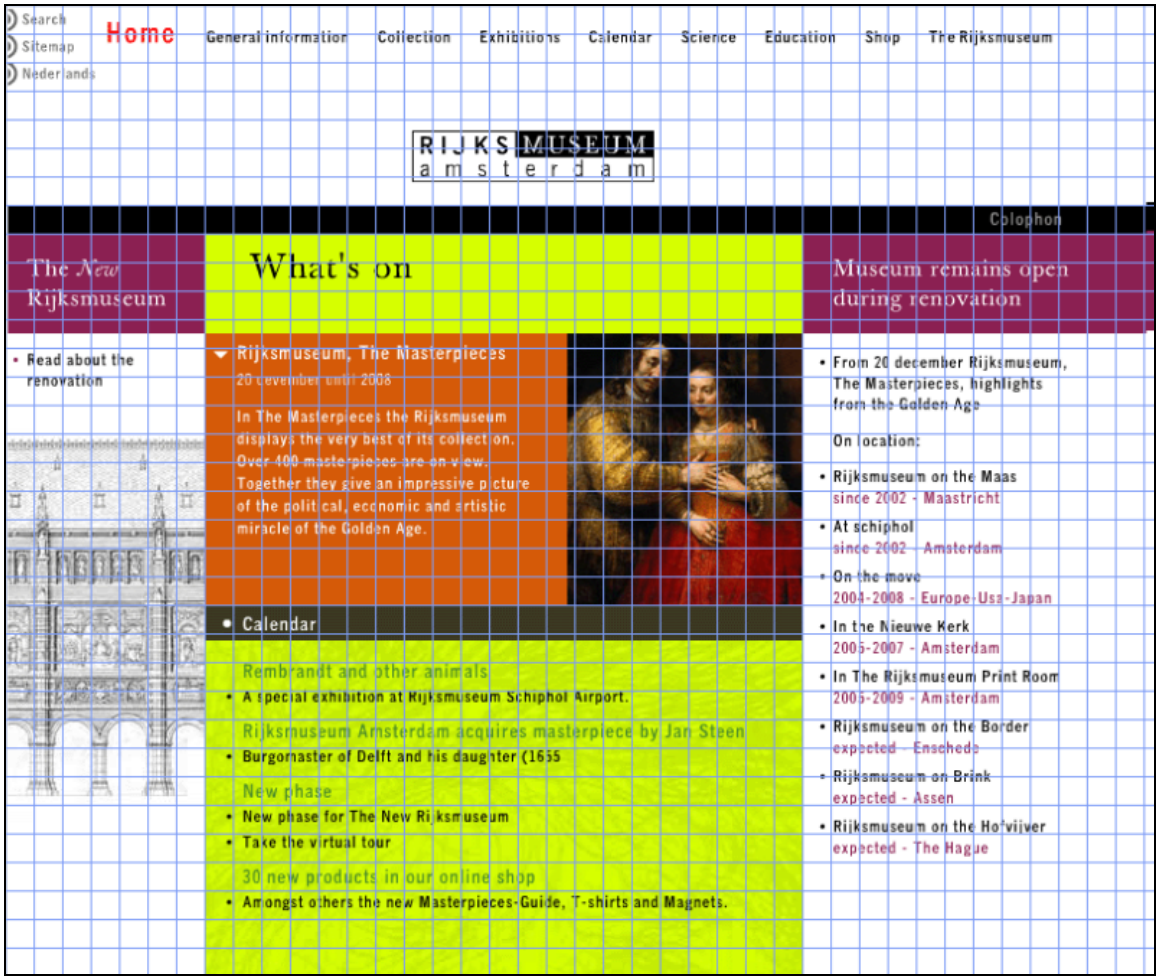


After choosing a language, the user arrives at the Homepage. A Homepage typically has three functions: giving an introduction, showing the 'entrance' and giving announcements. The 'introduction' aspect of this website a bit weak. The name of the museum already contains the word 'museum' but other than that, very little is done to establish the museum's identity. The homepage contains a horizontal menu as its Main Navigation which always stays at the top of the page. There is also a small Meta Navigation containing links to the search function and Sitemap and Language Selector. Oddly enough the Language Selector disappears once users move away from the homepage. A Search Box would have been good to have since the link to the search function is now a bit hidden and it is nothing more than a simple Search Box anyway. The announcements are main page content. There are three main types: the current main exhibition, the calendar and a miscellaneous section. All three are sort of News Boxes. There is a small difference between the Dutch Homepage and the English

Homepage. On the Dutch one, the user has the possibility to click on a link to subscribe him/her-self to a Newsletter.

Page grid

If we look at the visual design of the site, it is very clear that a Grid-based Layout has been applied. The grid creates a visual rhythm, which makes it easier and more pleasant for the eye to scan the objects on the page. As can be seen below, a 20x20 pixel grid is used for the basic page design. The spacing between elements is 20 pixels and so is the height of horizontal bars as well.



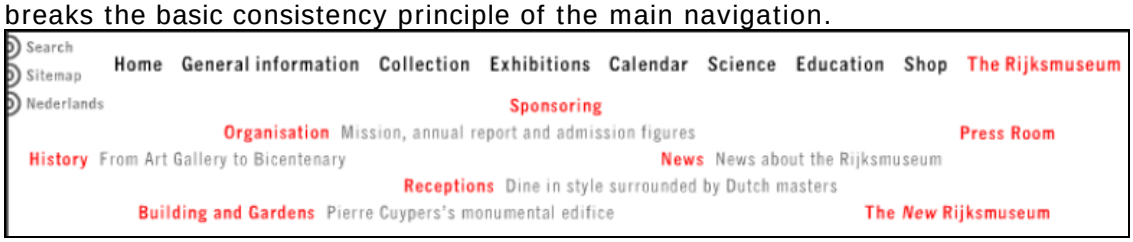
When looking closer at this page, it immediately becomes clear that not all page elements are properly aligned on the grid. For example some pieces of text are aligned to a gridline, but others are not, e.g. the 'What's on' text and items below it do not align for any obvious reason at all. The logo also seems to be placed arbitrarily; it is not horizontally centered as it is slightly off to the left. Similarly, the link to the "Colophon" in the upper right corner seems to be arbitrarily placed. Presumably, the design has been broken during coding in HTML since other elements are very intentionally aligned correctly.

Main navigation

The horizontal Main Navigation of the site contains following sections:

- Home
- General Information
- Collection
- Exhibitions
- Calendar
- Science
- Education
- Shop
- The Rijksmuseum

The first item is a Home Link. By clicking on that link, the user will be redirected to the Homepage. The other menu items show the next level of items when the user moves the mouse over the item, effectively making it a sort of Fly-out Menu. Strangely enough this behavior only occurs on the homepage and not on any of the lower level pages. This breaks the basic consistency principle of the main navigation.

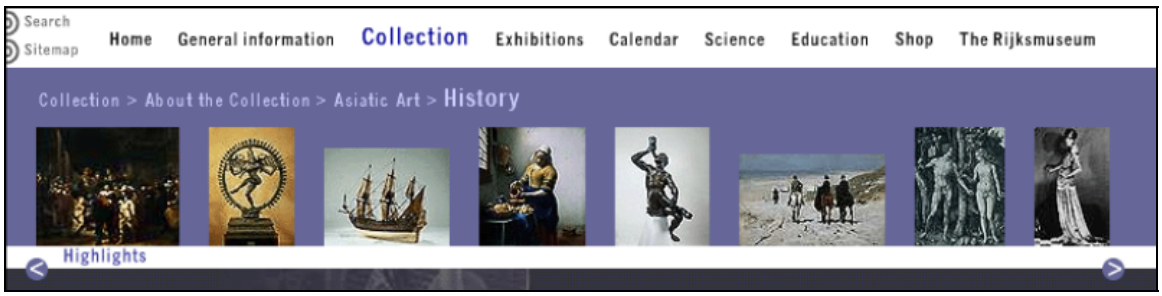


In an attempt to be original, the submenu items are scattered over the available space and horizontally arranged. This does not make it easy to scan and check if the desired section is present. On the other hand, it does give room for some explanation of what can be found in each section.

When users have made a choice on the homepage, they will see a new way to navigate through the second navigation layer! Inconsistently as it is, the submenu now appears on the left side of the screen! Also note that the Language Selector that previously was situated on the upper left corner will disappear when leaving the homepage.

The Scrolling Menu

The space that was previously used for showing the submenu of the main menu items, is used for a Scrolling Menu on all other pages than the homepage. It is used in all main sections except for the 'Calendar' section. This Scrolling Menu is used in a peculiar way since it has a 'teaser' role where its contained items basically deep link to lower placed content, rather than being a main navigation mechanism. By selecting an image (which is a Thumbnail) from an array of images, the user is being directed to a page containing an article or a larger version of the image itself. The remarkable thing is that it allows users to skip a couple of navigation layers while it is not at all clear to users where it is taking them.

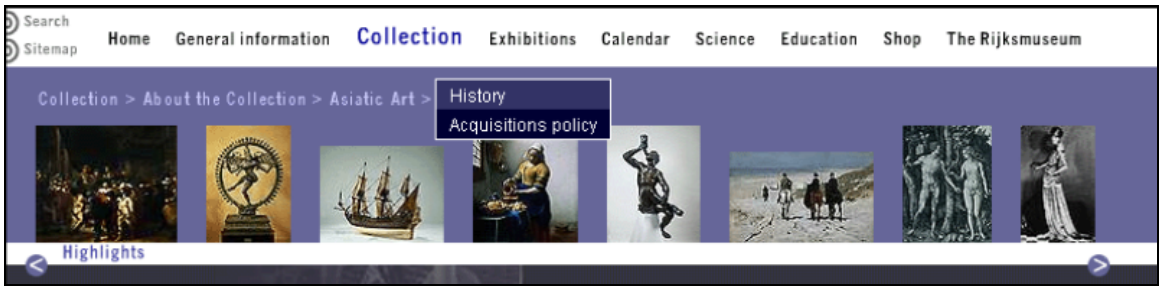


Closer inspection shows that the Scrolling Menus of many sections such as the 'Education' and 'Shop'-sections do not actually scroll even though the '<' and '>' arrows suggest that they do scroll! Apparently it only scrolls when the number of items is larger than what can be accommodated, but the user cannot see that at all as the navigation arrows are always shown.

Breadcrumbs

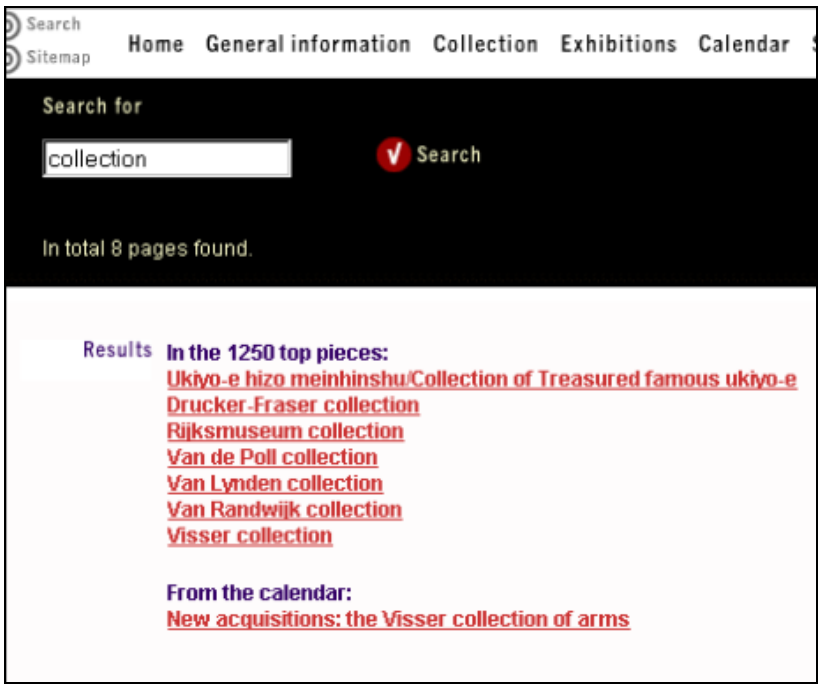
Another navigational aid that is used throughout parts of the site is a Breadcrumbs bar. From the second navigation level onwards Breadcrumbs are shown at the top of the page, just under the main navigation items. The Breadcrumbs show the path from the root of the hierarchical tree to the page where the user currently is. The labels are clickable and allow users to navigate easily one or more steps up on the hierarchical tree.

The Breadcrumbs on this site have an additional feature that is not often seen. When the user's pointer is above one of the labels, a Fly-out Menu appears, showing all submenu items that exist on that level. Nice and useful in our opinion.



Search Box

The 'search' link at the top-left corner of every page leads users to the search page. Initially it contains nothing more than a standard Search Box. The Search Results are shown underneath. Results are either paintings or calendar events and nothing else. A full site wide search would be more appropriate. Since the site is rather large and contains a lot of information, it could use an Advanced Search, which could then also be used for specific searches on paintings or calendar events. A minor issue is the fact that search results can have long labels and often wrap over two lines, which is not visually clear. Another issue is that the search results often contain several items with the same title but pointing to different pages, e.g. when searching on 'Rembrandt'.



Sitemap

The Sitemap gives an overview of the structure of the website. However, it only shows the first four levels of navigation and since it is a tree-control, the users have to click it open level by level. In terms of clicks, this is no better than actually going to the sections using the normal main navigation. The sitemap could be improved significantly if the tree-control was dropped and all sections were directly shown.

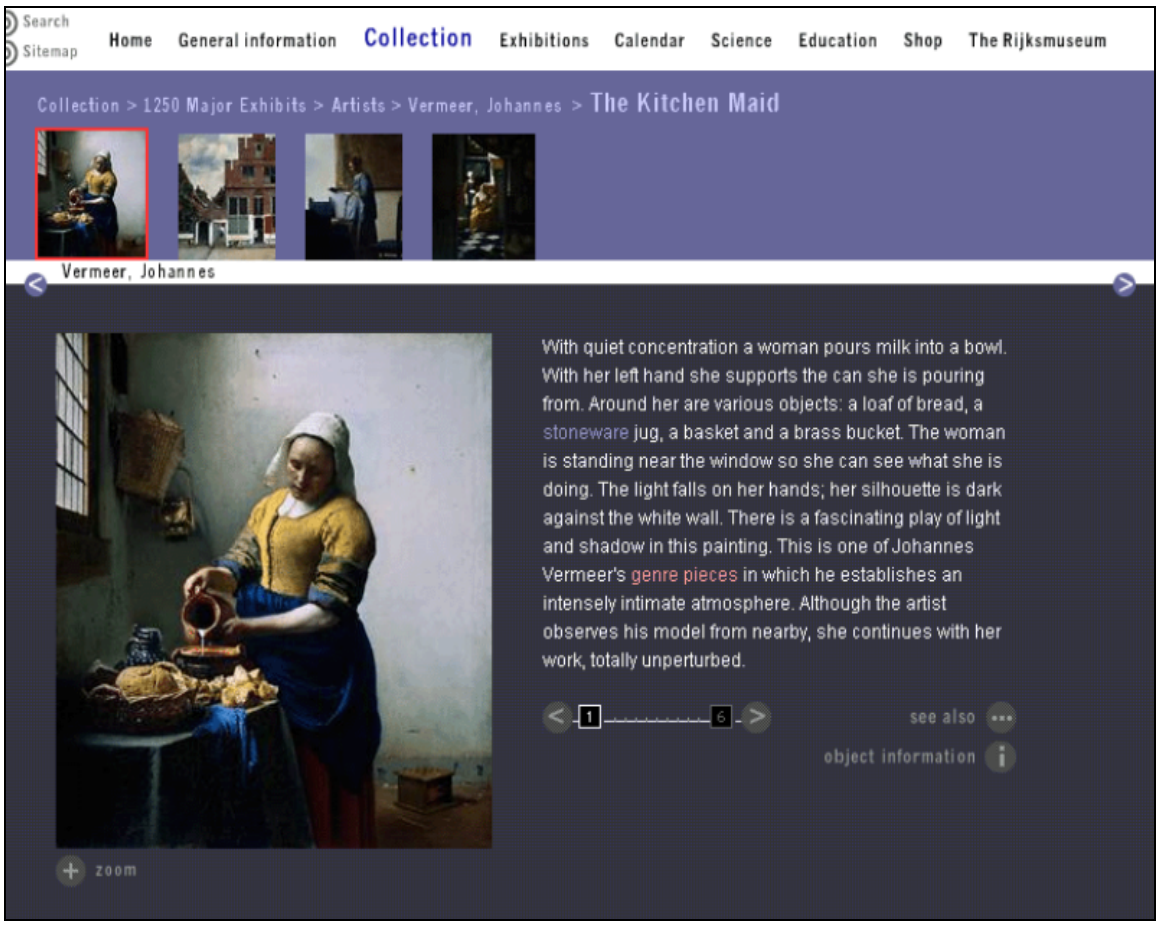
In the instructions at the top of the tree-control, it is mentioned that users should use the search function, which could have been linked already, to find specific topics. However, the search engine only allows users to search for paintings and calendar events!

Newsletter

To receive the Newsletter the user has to fill in a Form. If the Form isn't filled in completely, the user receives an Input Error Message. Unfortunately the form does not give an Input Error Message when an input with a wrong syntax (i.e. an e-mail address without the '@' symbol) is entered. It is even possible to enter an arbitrarily long postal code and a telephone number without any digits, all is happily accepted! The site uses client-side validation of the form which as a consequence gives error messages in a popup window instead of directly near the field that contains the error.

When users fill in the form they will notice that all fields are required, although that is not mentioned anywhere. While many users will think that it concerns an email newsletter it actually concerns a paper-newsletter that will be mailed to the users' address! This only becomes clear when users choose to view the previous newsletters in PDF.

Browsing the Collection



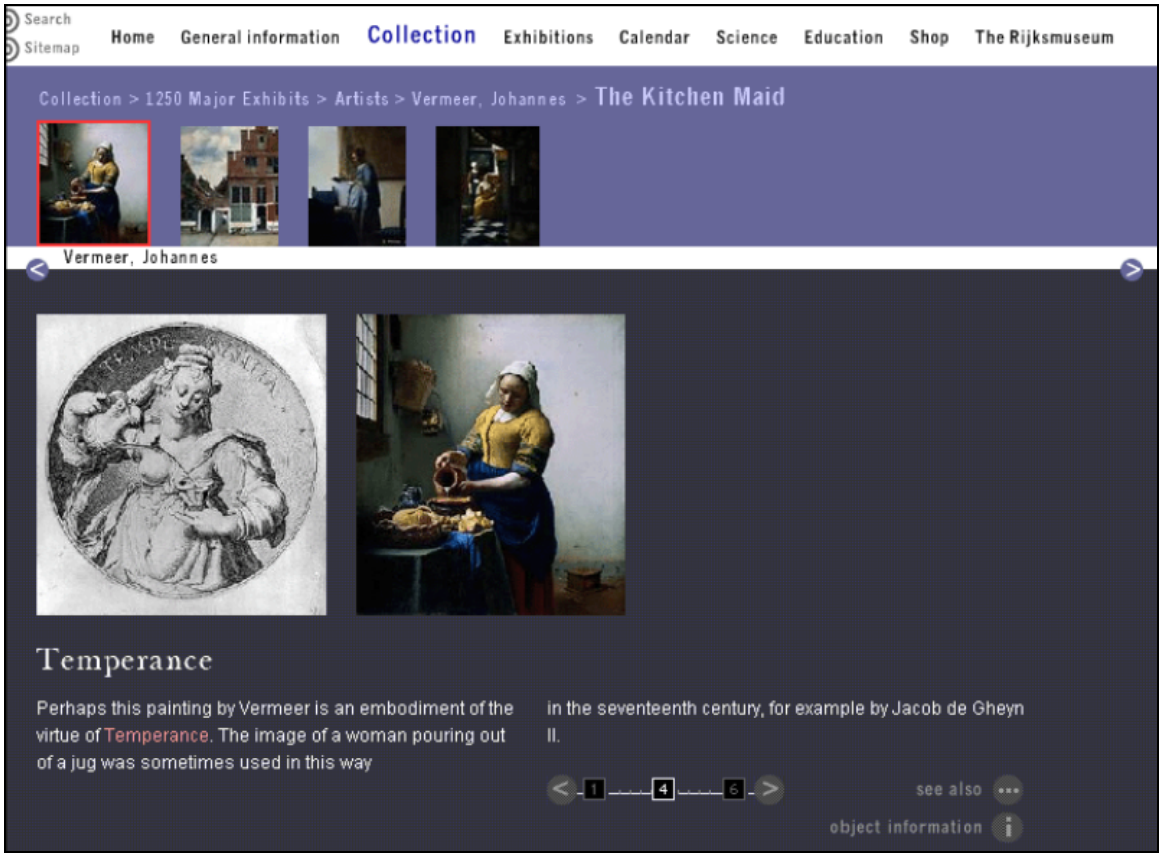
The Collection section of the site is the largest section of the website and has several nice features. Browsing the collection is primarily done using an Image Browser in combination with Stepping. The thumbnails of the images are shown in the upper frame while the selected image and explanation is shown in the lower frame. However, the upper en the lower frame are in fact **separate** Image Browsers. In the upper one, users can choose a collection, which will then appear in the lower frame but in the lower frame users can step between different images **belonging to the same artifact**. This is not a very common or natural way of navigating between images, and will likely confuse users especially since the same navigation arrows are being used in both the upper and lower frame.

The behavior of Stepping in the lower frame can be confusing:

	Image 1 of 6
	Image 2 of 6
	Image 3 of 6

The idea is to represent which image out of the entire set is currently being shown. There are several things that go wrong here. First, it always shows the number on the same

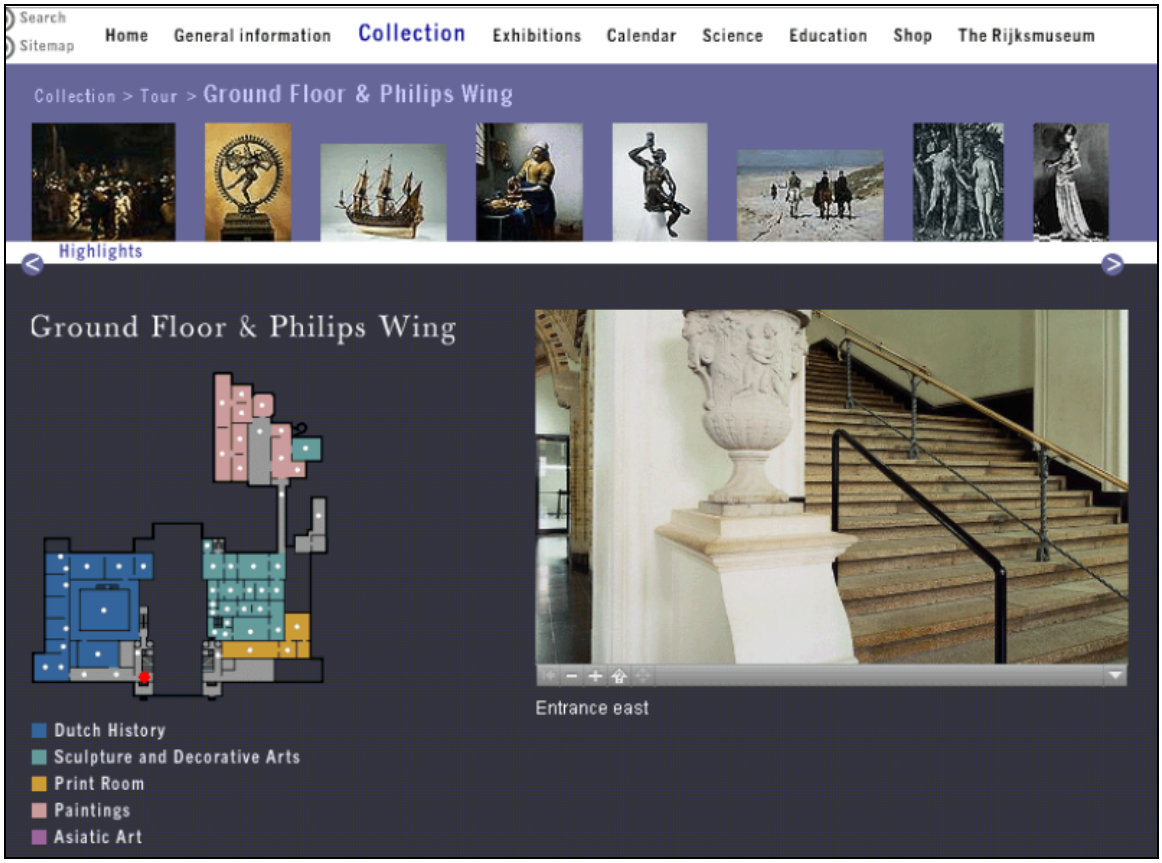
place, except the first and the last image, so there is no sense of 'progress' shown. Secondly, the horizontal line contains 'ticks' which can be interpreted as the number of images present. However, the ticks are totally arbitrarily placed and have no connection with the number of images. Thirdly, the navigation buttons are always placed at the bottom of the explanatory text which causes the navigation buttons to appear at different locations after every click. This prevents users from clicking through the images without moving the pointer.



The Stepping behavior in the upper frame containing the thumbnails is slightly awkward in comparison to the lower frame. Instead of having to click to see more items, the list of thumbnails automatically starts scrolling when hovering over the navigation button. In addition there is a link to see the 'next 10 objects' in the series, making it variation of Paging. The odd thing about this design is that the area has space for 8 ½ thumbnail image so scrolling is only used to get to the last 1 ½ thumbnail image!

A virtual tour

There is also the possibility to make virtual tours in the museum. The virtual tour is a particular kind of Virtual Product Display: a 360 degrees photo shot using QuickTime VR. The user must choose one room of the museum, and then he/she is able to look around in that room. The place of the viewpoint stays the same, but viewing angle can be changed. At the left side of the Virtual Product Display is a kind of Map Navigator to let the user switch to other rooms quickly.



Unfortunately, it is not possible to move from one room to another using the VR display only. Users will have to select the rooms using the map.

Searching through the collection

Another feature is the ability to search through a large part of the collection of the Rijksmuseum. Apparently this online search functionality was part of a separate project[9] and unnecessarily opens a new browser window. About 5000 objects are digitized and can be viewed on the website. A Search Area with a Simple Search, and an Advanced Search helps users find a particular object. Unfortunately, this section is only implemented in Dutch.

[9] The searchable catalogue was developed as part of the Token2000 research project, see www.token2000.nl

To perform a Simple Search multiple fields can be filled in, like 'object number', 'artist', 'object name', 'title word', 'description', 'collection', 'acquired from', 'way of acquiring', 'date of acquiring' and 'free search'. The links next to the edit boxes are pop-ups that show an explanation of the term. A bit unconventional since normally an icon with a question mark next to the label is used. When users select 'Uitgebreid zoeken', Dutch for 'advanced search', the menu item turns out to be a 'switch' and the label changes to 'Eenvoudig zoeken', Dutch for 'simple search'.

One could actually doubt whether this is still a 'simple search' since the user can search on so many fields and also control the way results are sorted. However, the *Advanced Search* only adds the option to make use of search terms like 'and', 'or' and 'not'. Both versions of the search forms are missing a 'Search' Action Button making it very unclear how to initiate the search command. On the simple version the form is submitted by using the 'enter' key after editing a search term. On the advanced version that does not work and the user has to select 'Zoeken' in the upper left corner. Very awkward.

When a search is performed, and there are results, the Search Results appear. A maximum number of twenty results are displayed. When there are more then twenty results there should be a possibility of Paging to navigate through the rest of the results,

but the website doesn't offer that possibility, which seems a bit strange. It now becomes impossible to see all results!
Some of the Search Results don't only consist of a textual description, but are also joined by a Thumbnail, which is clickable to view the object in a bigger screen.

Alle schilderijen van het Rijksmuseum online

Uw zoekvraag resulteerde in 30 records. Deze pagina bevat 20 records.

		Objectnummer	Korte omschrijving	Standplaatsen
1	☐	SK-A-4589	Jan Six (1618-1700). Dichter en burgemeester van Amsterdam / Halen, Arnoud van [schilder] en kopie naar Rembrandt Harmensz. van Rijn [graveur] 1700 tot 1732	extern
2	☐	SK-C-5	Het korporaalschap van kapitein Frans Banninck Cocq en luitenant Willem van Ruytenburch, bekend als de 'Nachtwacht' / Rembrandt Harmensz. van Rijn [schilder] 1642	zaal 12
3	☐	SK-C-6	De Staalmeesters: het college van staalmeesters (waardijns) van het Amsterdamse lakenbereidersgilde / Rembrandt Harmensz. van Rijn [schilder] 1662	zaal 9
4	☐	SK-A-3340	Borstbeeld van een man in oosterse kleding / omgeving van Rembrandt Harmensz. van Rijn [schilder] 1635	depot

Some standard elements from a Search Result page are also missing. The query is not shown on the page itself nor is there a possibility to refine the search or to go back to the main search page. The search engine itself is not that sophisticated neither. When searching for 'Rembrandt van Rijn' 30 results are given. When searching for just 'van Rijn' the search engine sadly gives zero results. A one-character spelling error 'Rembandt' will also lead to zero results.

Catalogue browsing

When looking in the '1250 Major Exhibits' of the Rijksmuseum, a new way to navigate can be found. A variation on a TreeView is used but the behavior is rather awkward. Once a choice has been made on one level, the other choices on that level disappear and the sub-items of the chosen item are shown. For the following levels it works in a 'normal' fashion again. One more awkward aspect is the fact that the labels are not selectable, only the triangles are links!!!

Figure 15 – 4th navigation level

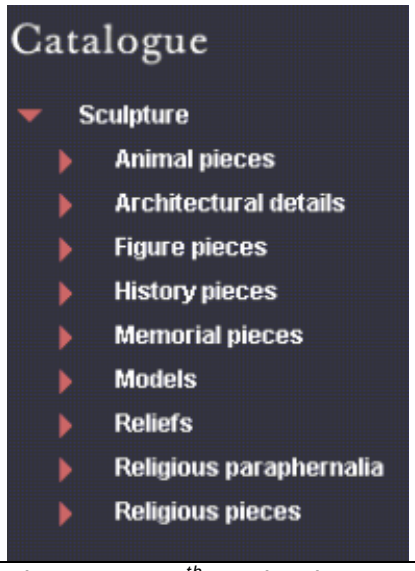


Figure 16 – 5th navigation level

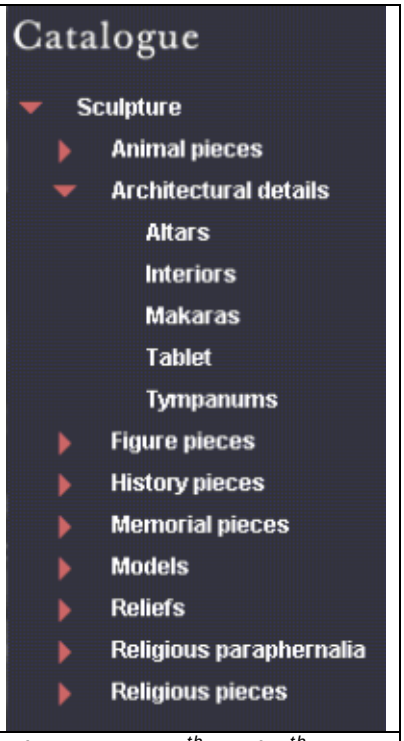
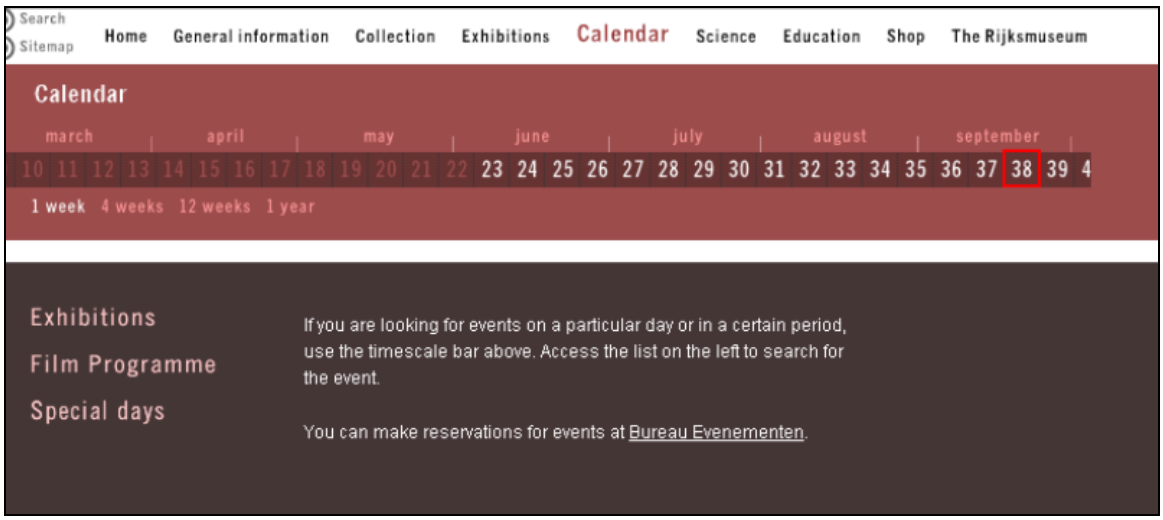


Figure 17 – 5th and 6th navigation level

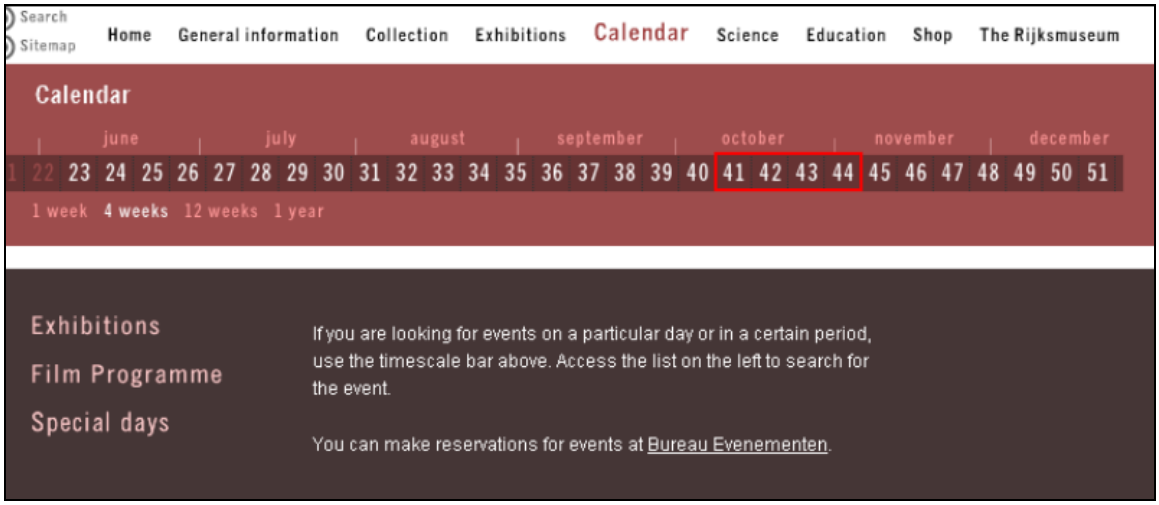
Encyclopedia

Another nice feature of the collection section is the encyclopedia of the 1250 major exhibits of the Rijksmuseum, see figure 23. It gives the possibility to search through an alphabetically ordered list of artist names. To navigate through all these artist names, a Paging mechanism based on the alphabet is offered.

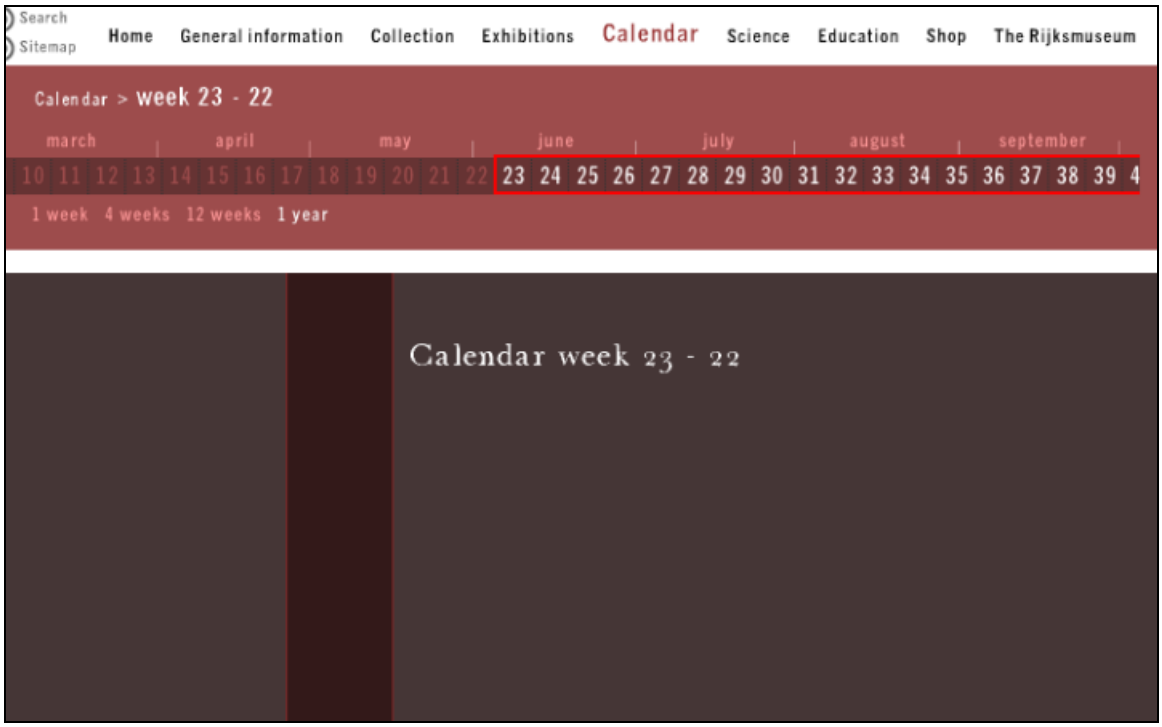
Event Calendar



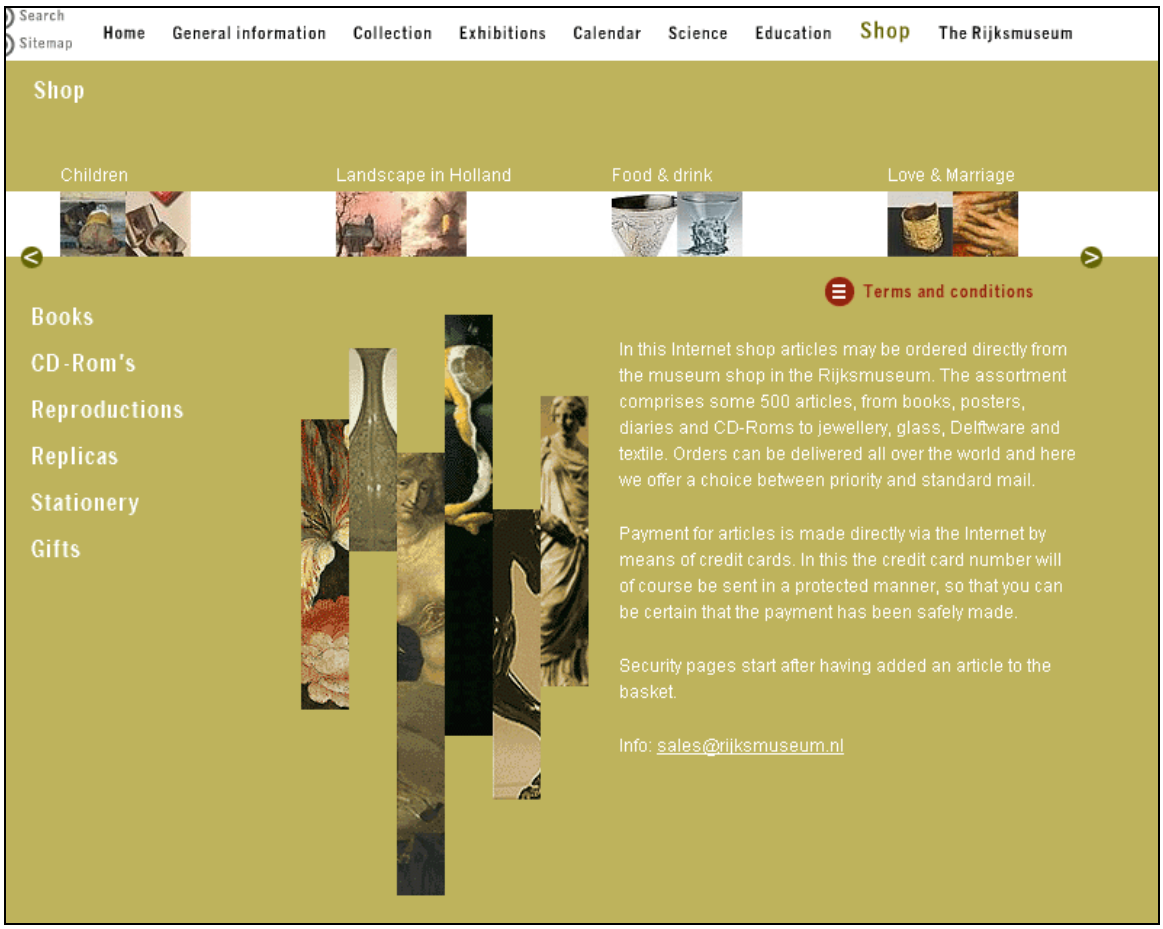
The Calendar is implemented using a Timeline. This Timeline helps the user to select a time interval. The user can choose between selecting a time interval of one week, 4 weeks, 12 weeks and a year. After selecting a time interval, the user should get an overview of the events that occur or occurred in the selected period.



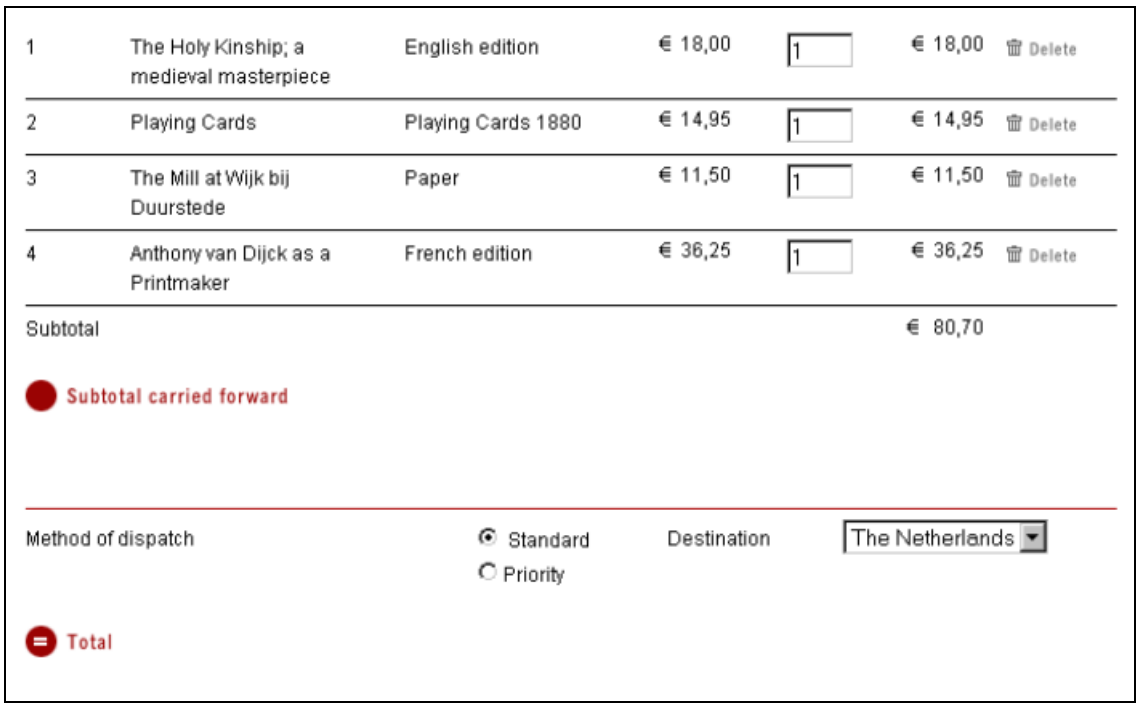
If there were really a lot of events on the calendar, this would not be a bad design, but even when selecting a complete year, this calendar gives no results! See image below. Although there are plenty of things to do in the museum, see the homepage list of event for example, these events are apparently not inserted into the database of the timeline.


Search
Sitemap
Home
General information
Collection
Exhibitions
Calendar
Science
Education
Shop
The Rijksmuseum
Calendar > week 23 - 22
march
april
may
june
july
august
september
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 4
1 week 4 weeks 12 weeks 1 year
Calendar week 23 - 22

Shop

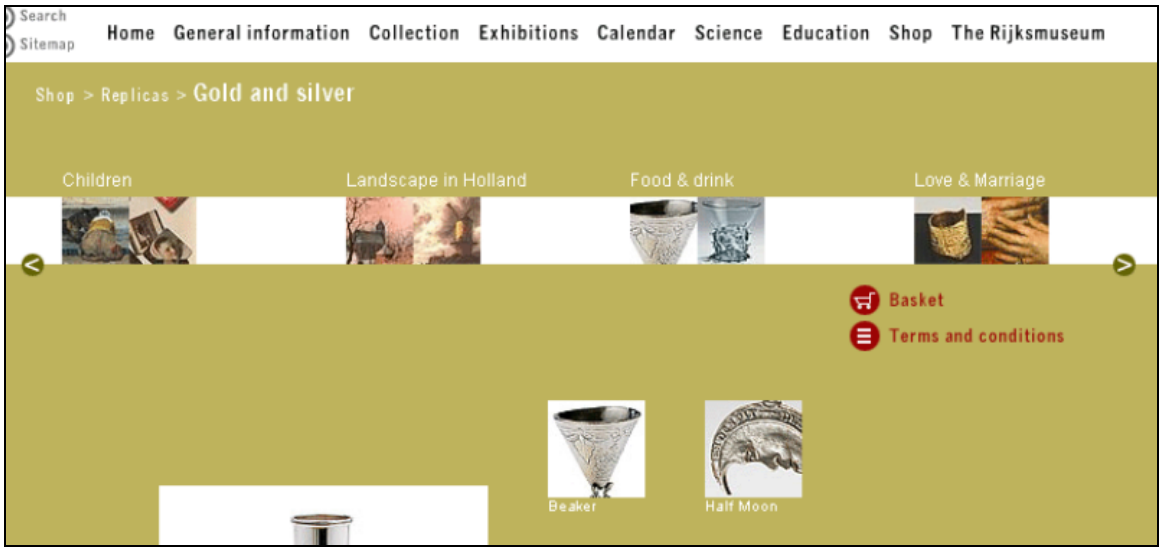


The 'Shop'-section is an E-Commerce Site by itself. As usual, the visitor has to select a product to get more information about it, or to order it. The products can be viewed by clicking through a hierarchical structure. If a product is selected, a textual description, a thumbnail and an "Add to basket"-Action Button will be displayed. When the user clicks the Action Button the product will be added to the Shopping Cart, which makes use of a List Builder.



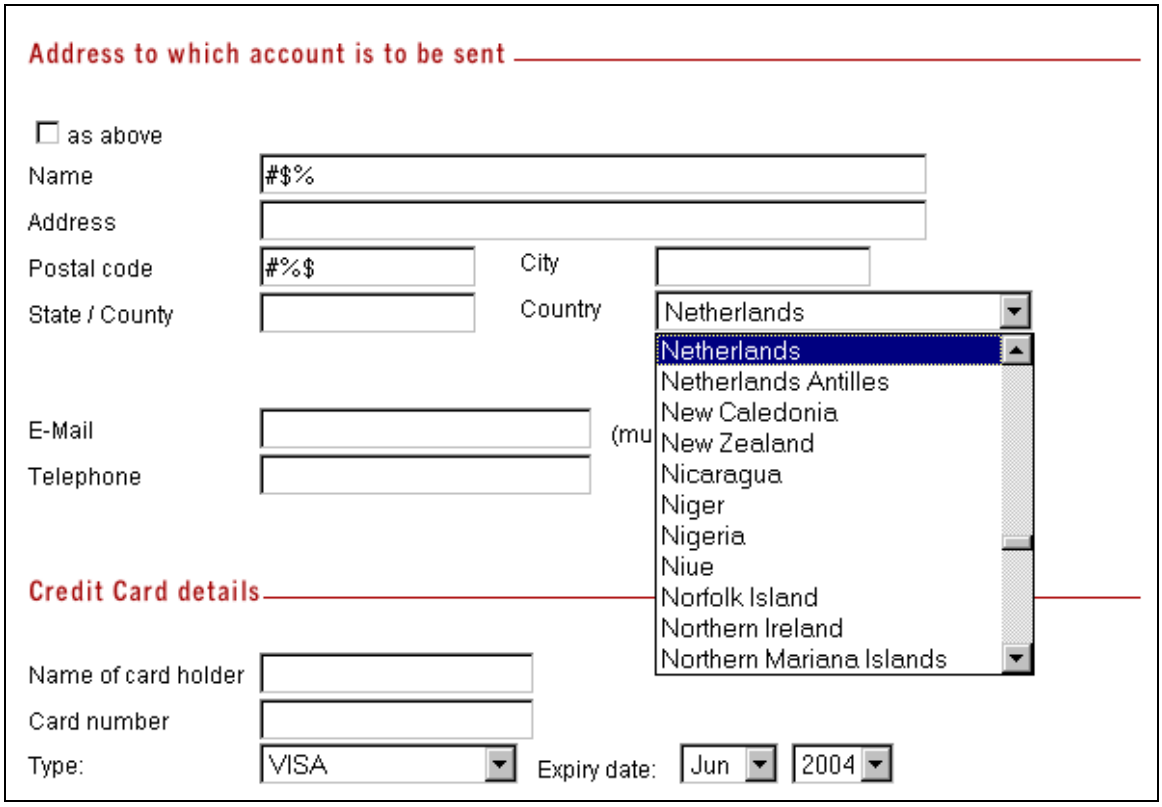
This Shopping Cart allows users to gather all products first and pay for them all at once and whenever they want. By showing the total costs including shipping the users know exactly what they will have to pay when they decide to purchase.

It is possible to shop further after adding a product to the basket. It should be easy for the user to go back to his shopping cart; therefore there should be a button to go to the cart instantaneously. On this website that is possible using the ink to the 'basket'. At the starting page of the shop there is no link to the cart, which is unfortunate, because after adding a product the user will come back to this page.

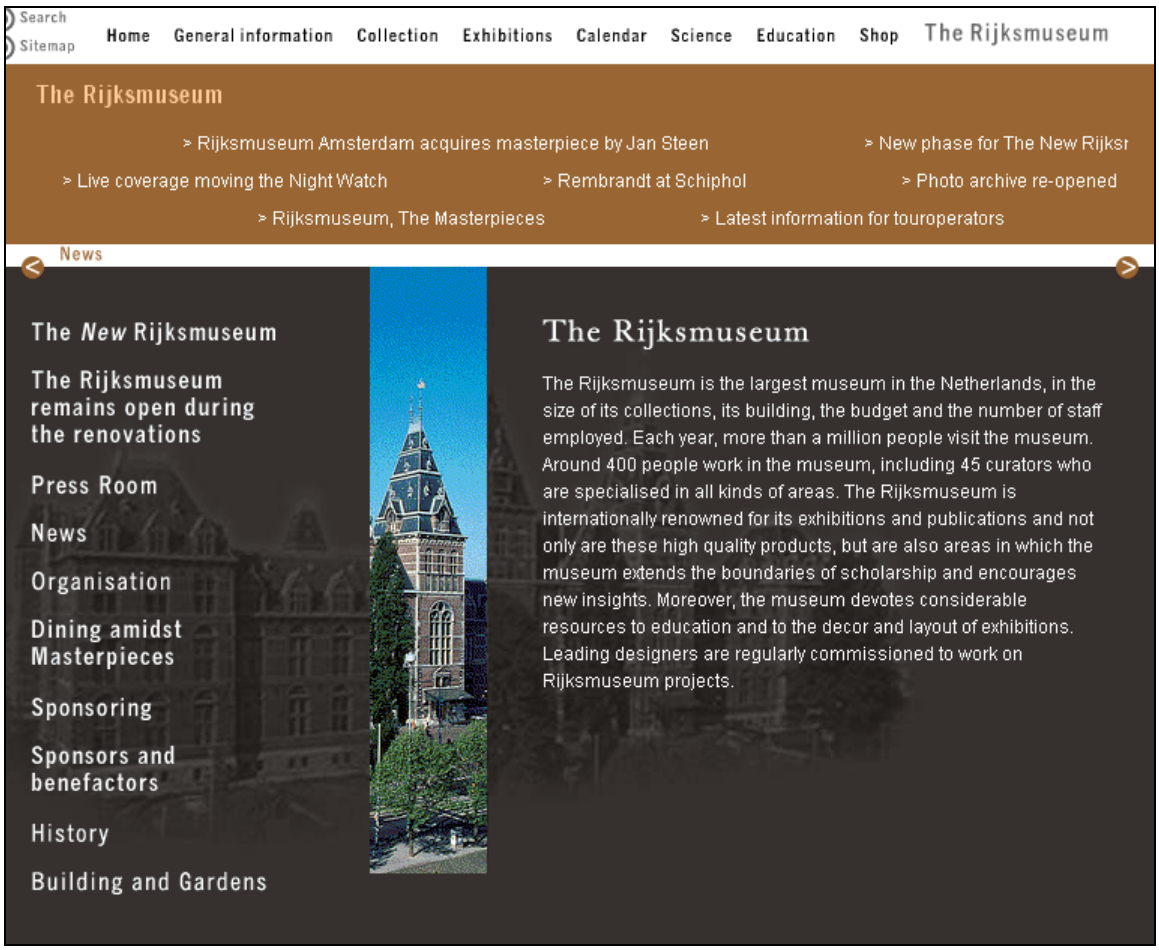


To complete the order, the user has to fill in a Form. Here information is asked about the address where the order has to be shipped to, credit card details, and the address to which the invoice is to be sent. Fortunately, users are not required to create an account first.

If some fields are still empty when clicking the “Order now” button an Input Error Message will be given. But just like when subscribing to the Newsletter: no Input Error Message is given when entering input with a wrong syntax. There are some fields that use Constraint Format to avoid entering incorrect data by not making it possible to enter data with a wrong syntax.



The Rijksmuseum 'background' section



The 'background' section is a variation on a Contact Page, because its main purpose is to bring the visitor in contact with the organization. There are also Press Releases to be found where old press releases are listed, ordered on date. In the Dutch version of the website, there is also a FAQ when clicking on "Schenken en Nalaten" (Donations).

The Scrolling Menu on top of this page shows the headers of news articles. These can be clicked on to see the whole article. So this Scrolling Menu is a variation of the News Ticker. The only difference is that a normal News Ticker scrolls automatically, but in this case the users have to do it themselves by using the arrows.

Overview of patterns used in Rijksmuseum.nl

- Grid Based Layout
- Main Navigation
- Home Link
- Fly-out Menu
- Language Selector
- Thumbnail
- Breadcrumbs
- Search Box
- Advanced Search
- Search Results
- Homepage
- Credits Page
- News Box
- Sitemap
- Form
- Newsletter
- Input Error Message
- Action Button
- Virtual Product Display
- Search Area
- Paging
- Stepping
- Image Browser
- Timeline
- E-Commerce Site
- List Builder
- Shopping Cart
- Constraint Format
- Contact Page
- Press Releases
- FAQ
- News Ticker
- Meta Navigation
- Map Navigator

Appendix B. Evaluating the site of the Louvre

The Louvre website (www.louvre.fr) has four main sections, i.e. 'Palace & Museum', 'Collections', 'Activities' and 'Information'. Links to the 'Shop' and 'Ticket Sales' are found at the bottom of the main navigation.

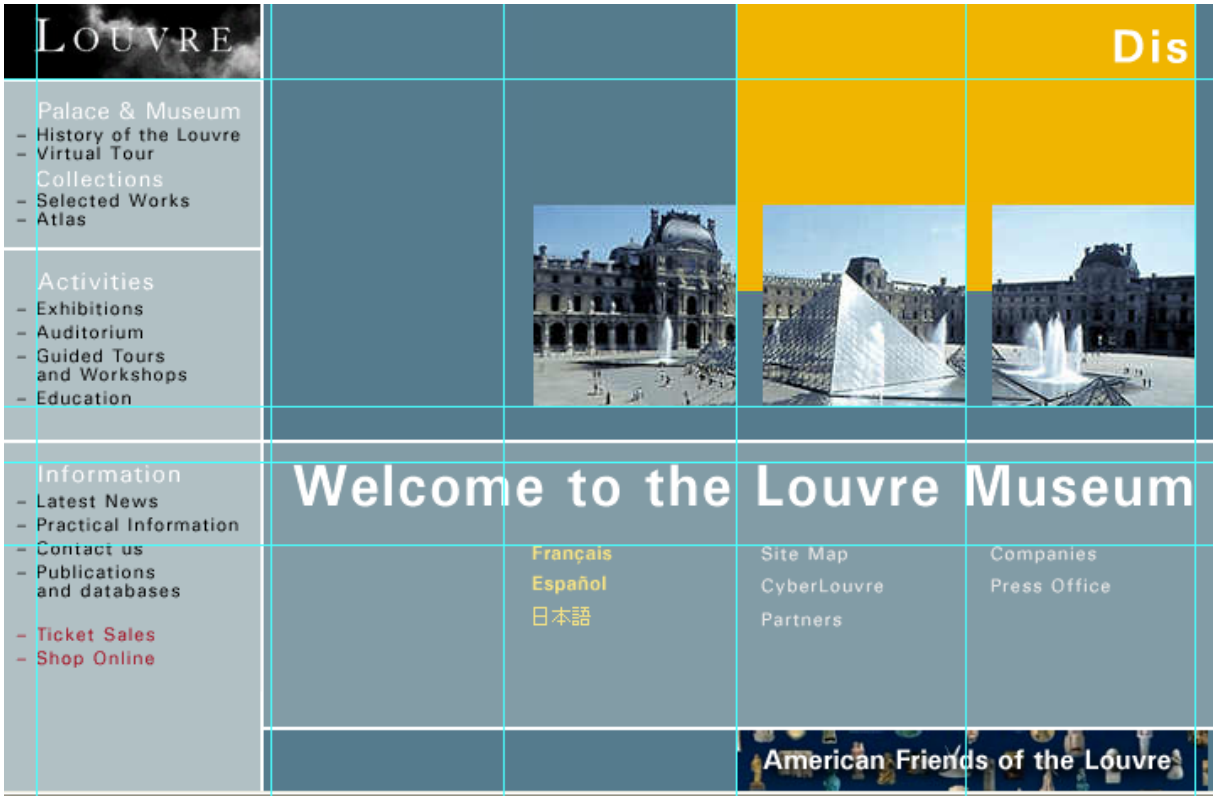
The Homepage

A typical Homepage has of three functions: giving an introduction, being an entrance and providing announcements. In the case of the Louvre, the introduction is short but powerful: the visitor is welcomed, and the picture of the famous building of the Louvre lets users know they are visiting the museum's site.

This Homepage clearly functions as an entrance. As on all pages, the Main Navigation is on the Homepage. Further there is a Language Selector to make the website understandable for English, France, Spanish and Chinese speaking people, a link to a Sitemap offers an alternative way of navigation, and a link to Press Releases lets users read old articles about the museum. These links are placed under the welcome message. When the page is just open, a flash animation is played for more than ten seconds on that place. This animation causes users to wait for the animation to end before they are able to make use of the Language Selector or the links. This can become annoying, especially for returning visitors, and it is not useful at all: people who want to use the Language Selector probably can not understand what the French text of the animation means. In fact, it merely mentions the commercial parties that were involved in building the site.

Grid

The site of the Louvre does not use a very strict modular Grid. Instead, a simple five-column layout is used with standardized spacing between elements. This five-column layout can be seen clearly on the homepage but cannot be detected on the other pages of the site. The content area is a frame in which pages using a 3-column layout are placed where the last column scales along with the browser window. A typical way of doing Liquid Layout.



Main Navigation

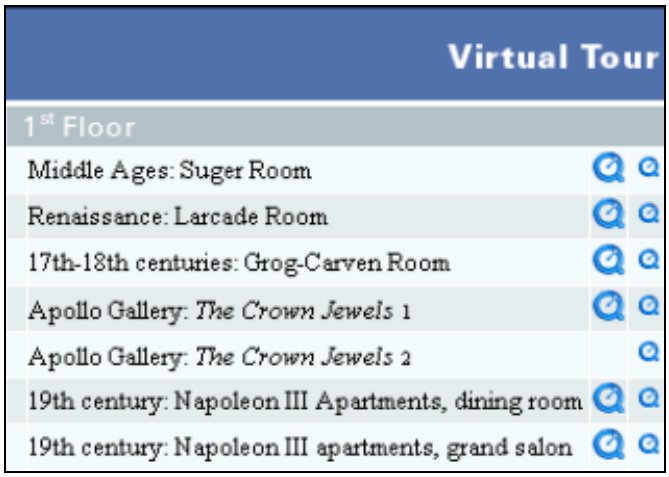
The navigation of this website is implemented by a vertical Main Navigation on the left side of the page. The menu is subdivided in the previously listed sections. On the bottom of the menu there are three more menu items: 'Ticket Sales', 'Louvre.edu' and 'Shop Online'. These items are differently displayed than the other menu items: they are red. This is done to indicate that these links are Outgoing Links: links that redirect the user to another site. This is true for the educational site and the shop. When clicking on these items, the link opens a new browser window. The 'Ticket Sales' link does not link directly to another page, so it isn't a real Outgoing Link. But to order a ticket, the user will have to go to another website. So indirectly the 'Ticket Sales' item is an Outgoing Link.

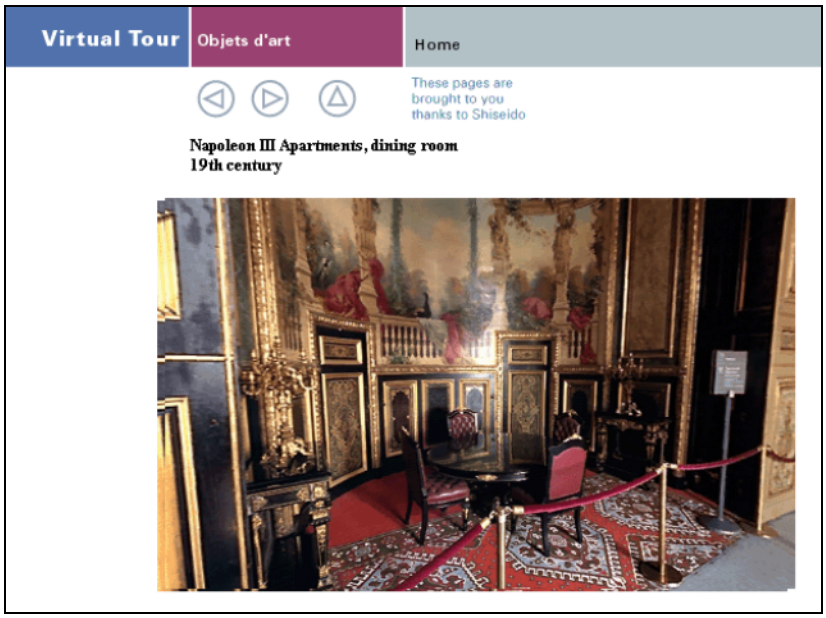
If the user chooses from one of the sections of the Main Navigation, a Home Link will appear on the upper right corner. The Home Link will redirect the user to the Homepage, which is a recognizable page for the user and a good starting point. Unfortunately, the 'Louvre' logo in the upper left corner does not function as a Home Link. Each section label is a link and takes the users back to the section's entrance page. None of the links that are part of the main navigation are underlined or otherwise indicated, making them impossible to distinguish from non-links in the main navigation.

Virtual Tour

When surfing to the Virtual Tour section, users are first presented with several sections of grouped Virtual Tours. After selecting the desired section, an overview of available 'tours' is presented. In order to see a tour, users have to click on the QuickTime symbols

that come in a large and small version. Unfortunately users cannot click on the label itself since that is the main trigger for action and not the QuickTime symbol. A 'virtual tour' in this case, is actually nothing more that a 360 degree image (QuickTime VR) of a particular room in the Louvre. It thereby acts as a Virtual Product Display. The tours itself are not linked, although that is possible to do in QuickTime VR, which causes users to go back and forth between the overview page and a single 'tour' and there is no feeling of 'walking through the museum'. This could have been avoided by placing the QuickTime image and the list on one page. Even with the 'large' version, this fits easily.

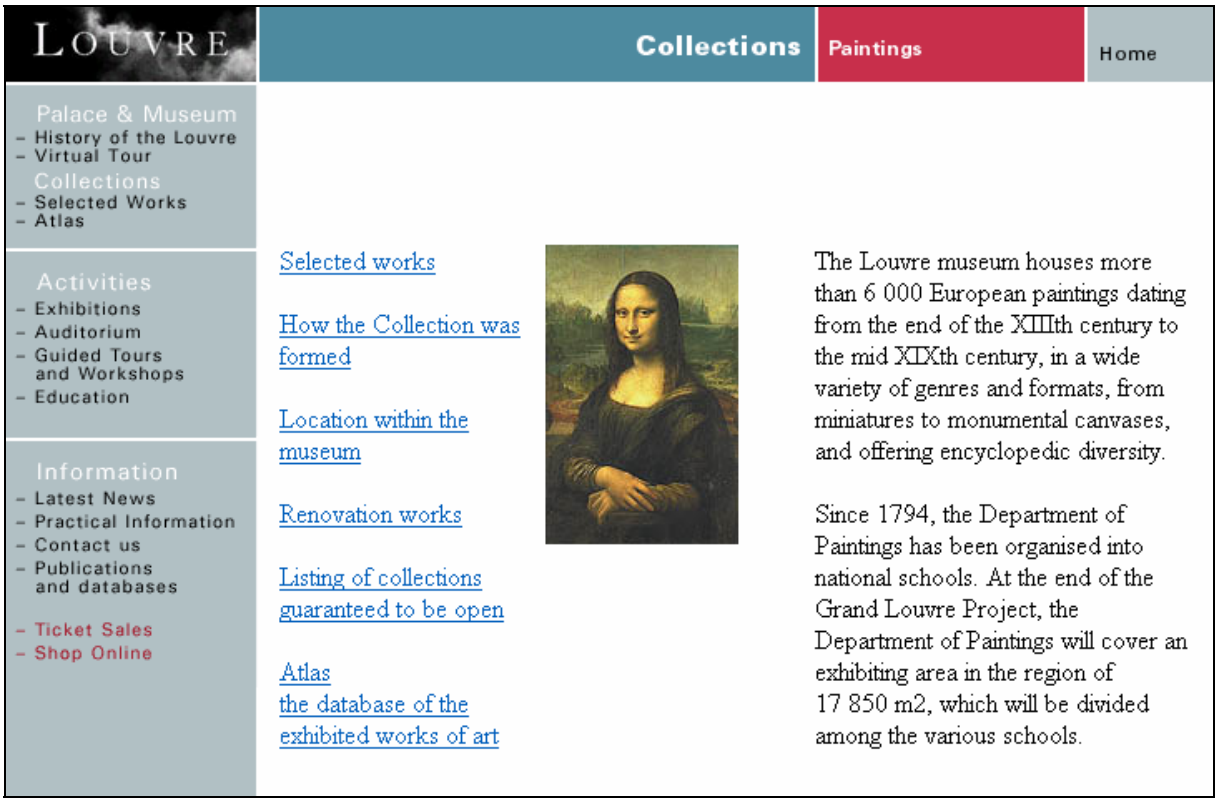




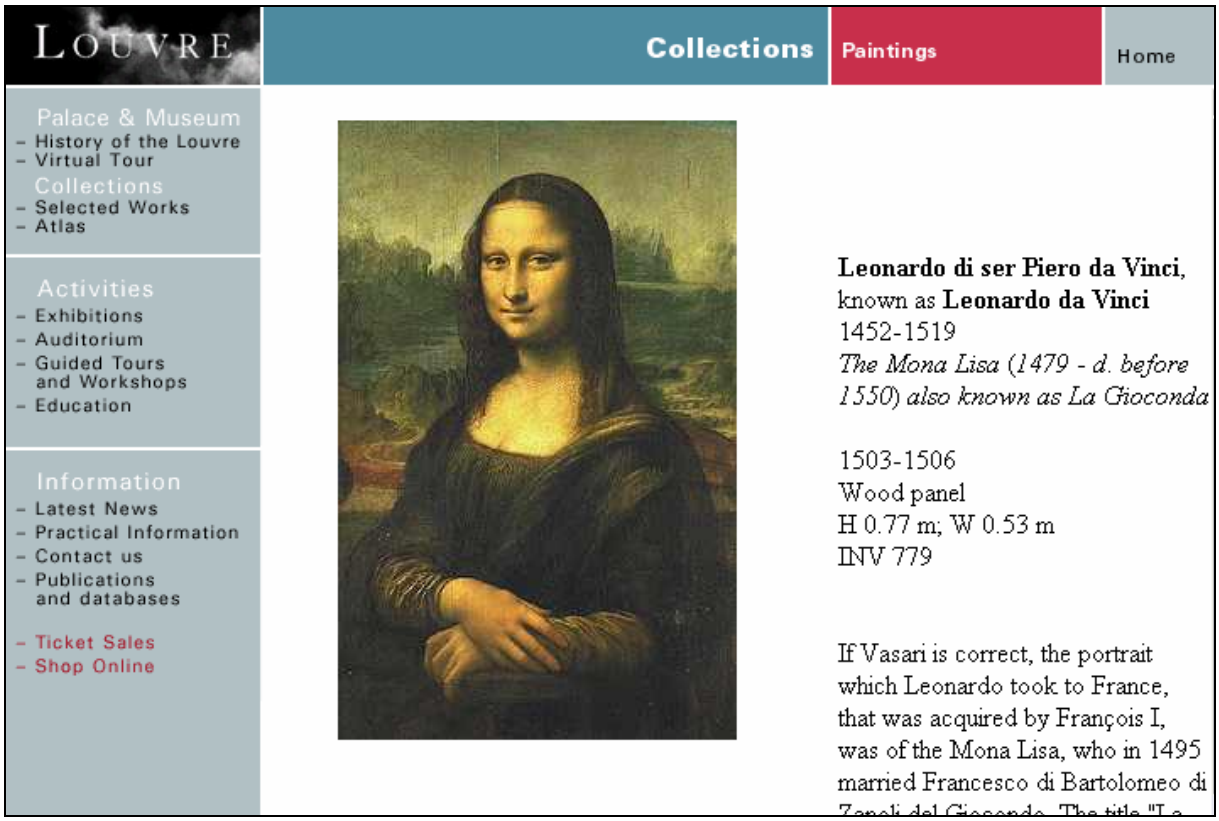
As can been seen in the above picture, the user is able to step through the Virtual Product Displays of different rooms, by using the arrow buttons. The pattern that allows a user to go to the next and to the previous task or object is called Stepping.

Selected Works

The selected works section contains the most interesting and famous objects of the Louvre. They are organized by different genres of art. These genres are displayed by an image of a famous object from that genre, and the name of the genre under the image.



For each collection there are several sub menus available that offer information about the collection. When users have selected ‘Selected Works’ they can see individual works, arranged by country and time, and see the item’s background information. However, during these steps the initial sub menus have disappeared and no other convenient navigation support is provided.

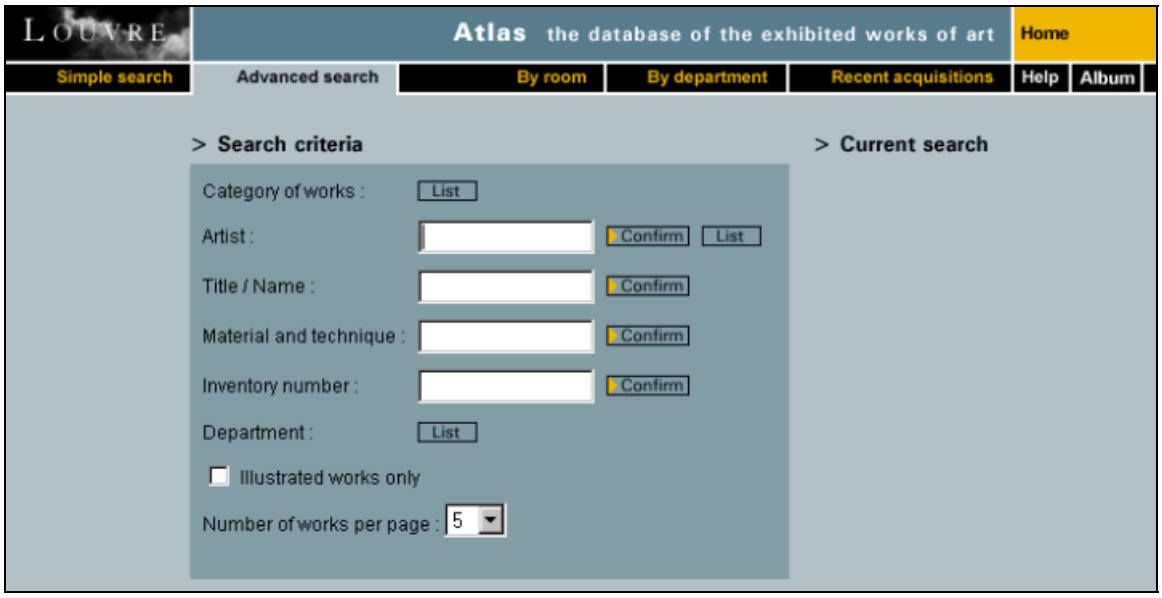


Atlas

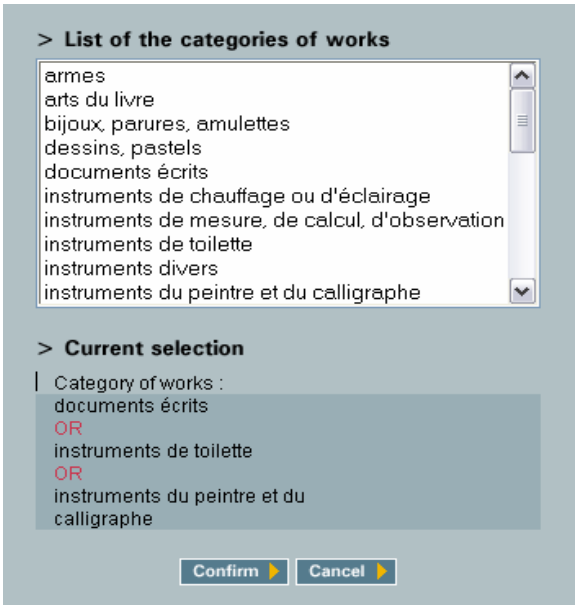
Another way to view items in the entire collection is to use the 'Atlas'. The 'Atlas'-section contains a large subsection of the museum's collection. Basically, it can be seen as one big Search Area, where the user is able to perform a Simple Search or an Advanced Search. The user is also able to search by room, by department or by recent acquisitions.

The 'Atlas' is clearly a separate project from the normal site which is underlined by the modified page layouts. The Credits Page and a Contact Page underline this fact.

The Advanced Search differs from the Simple Search by the number of fields that can be used.



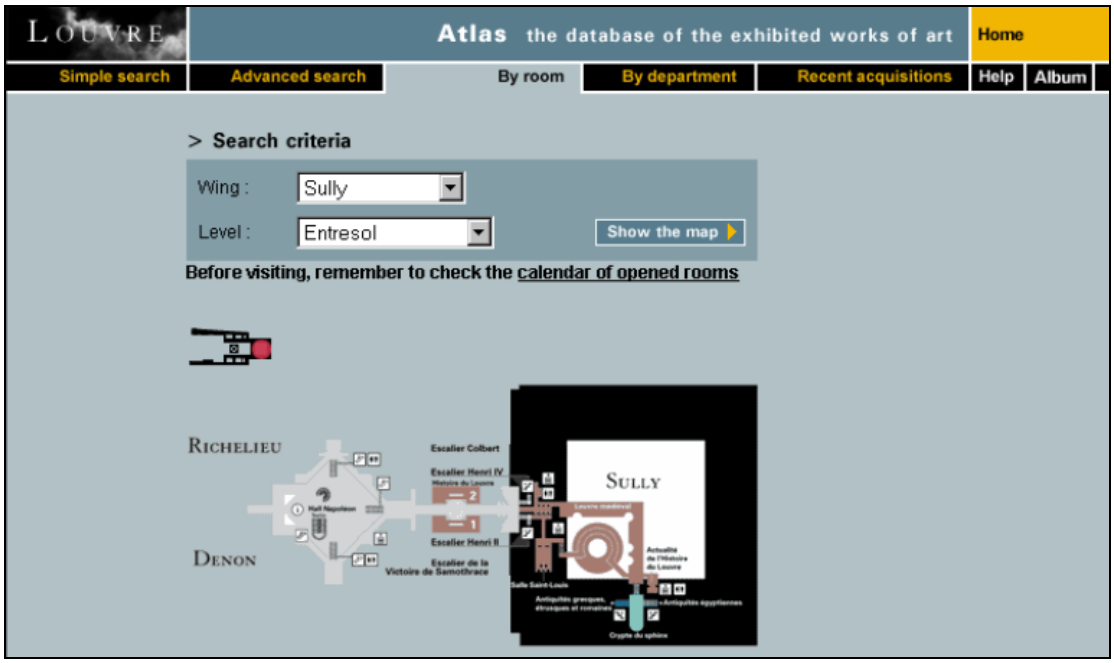
The Advanced Search gives the possibility to search by keys such as 'Artist' and 'Title'. For selecting the 'Category of Work' the site makes use of a variation of a pull down list to select multiple categories. However, in this case a list with checkboxes would also have sufficed.



The number of Search Results per page can be selected by the user. If there are more Search Results than would fit on one page, Stepping is used to let the user go to the next and previous page. However, Paging would have been more appropriate since results can be numerous. Sorting of the results is not possible. In same case, a Thumbnail is displayed next to an item to let the user see more information about the object. In general, the page looks a bit messy and the layout could be improved upon.

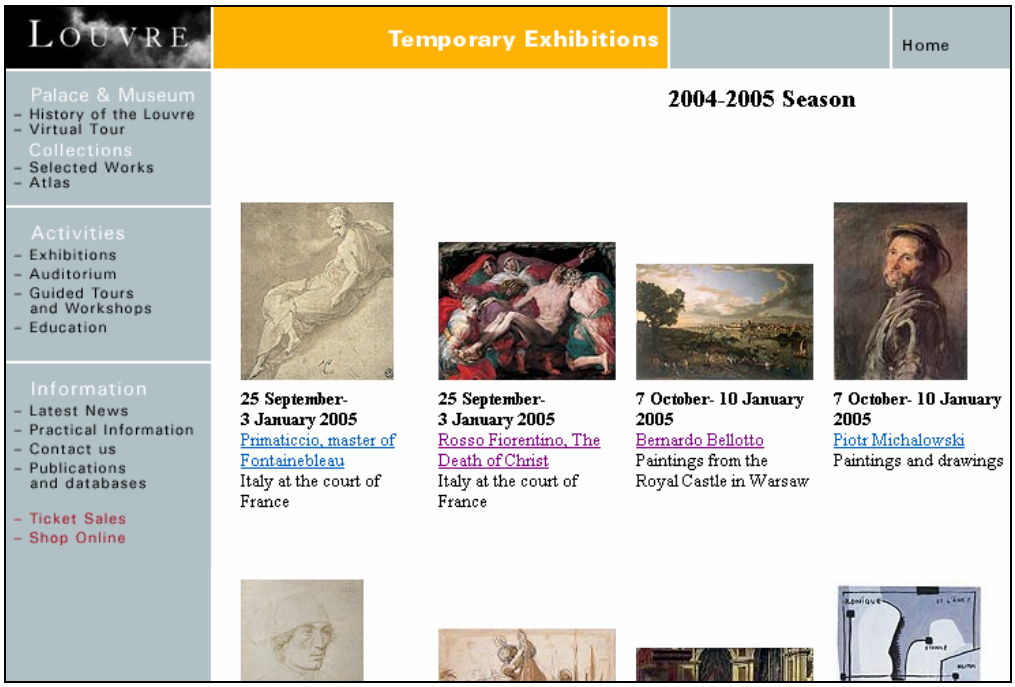
If one of the objects from the Search Results is selected, the user can click on an Action Button to add the object to the users' 'album'. The album access is placed in the upper-right-hand corner of the page and is hardly noticed at first. The user can step through the collection of works from the artist the selected work is from. Basically, the 'album' is a Collector used for collecting search results. The album is implemented by using a List Builder, where the total list of selected works is displayed, and where the user has the possibility to edit the list of objects.

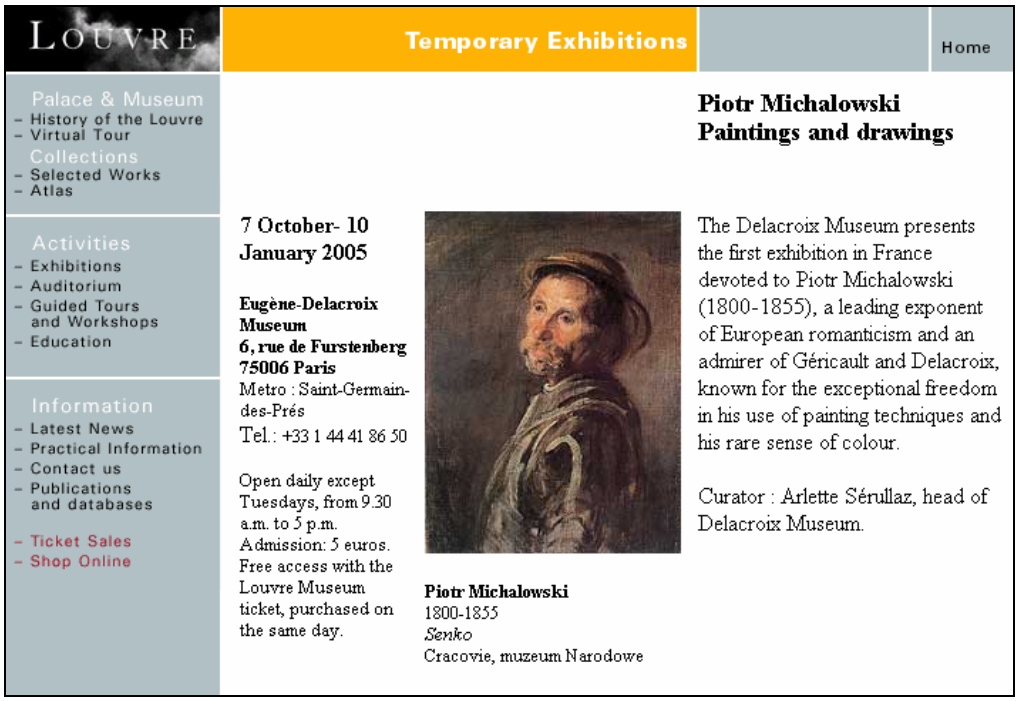
When the user searches by the departments, Map Navigation will appear.



Temporary Exhibitions

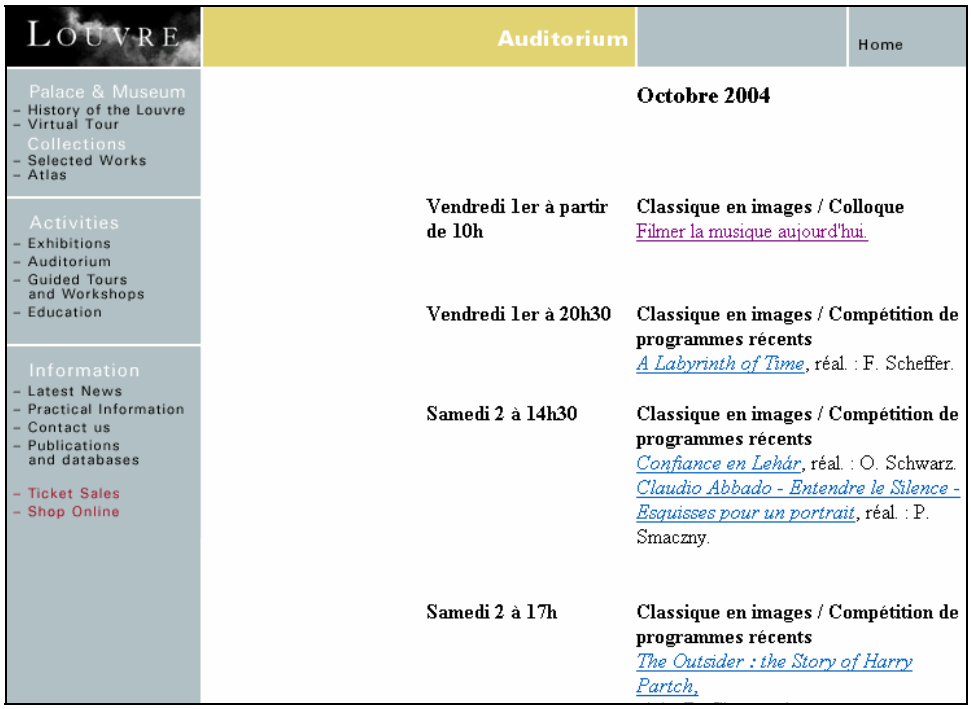
The first item in the list of 'Activities' is about exhibitions. It is simply a summary of the exhibitions ordered by date. For each exhibitions there is a one-page description with only very limited information.





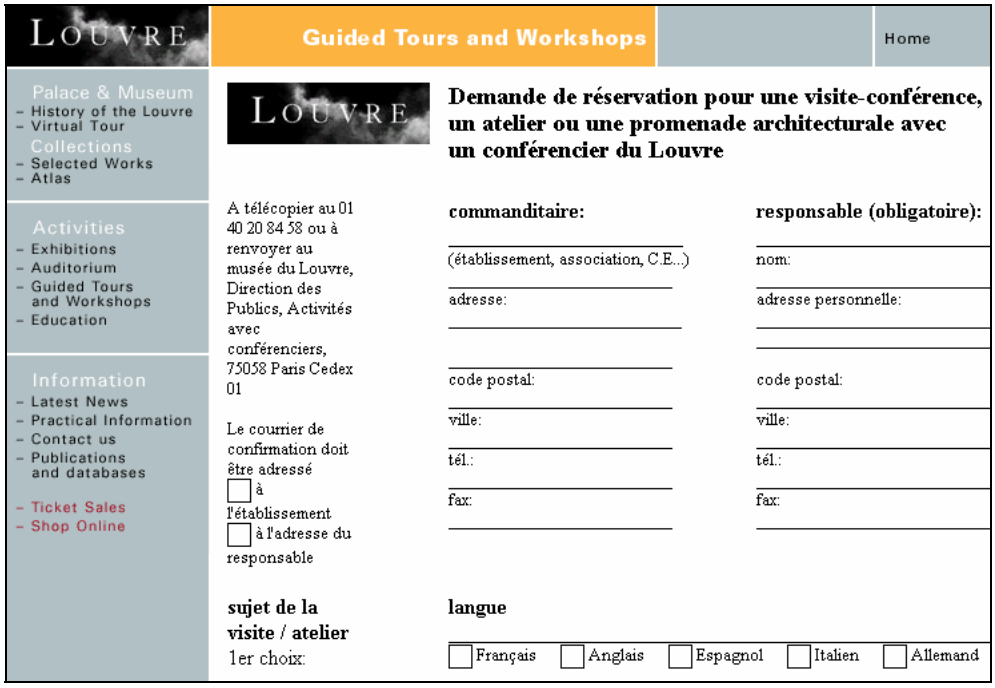
Auditorium – event calendar

Many events in the Louvre apparently take place in the Auditorium. The Auditorium section gives an overview of the agenda together with information about conferences, lectures, concerts and more. The agenda is split up by month and simply shows a listing of activities. For each activity there is usually a page with the details of the activity.



Tours, Workshops

The section 'Guided Tours and Workshops' is unfortunately only available in French. That makes you wonder how international those tours and workshops are. These sections mainly give a straightforward overview of the tours and workshop including the possibility to register. The registration form is not a Form but simply a page that must be printed and faxed to the museum. There is no Printable Page version of the form and the printout includes all the page's navigation. Although perhaps better than nothing, it is hardly acceptable especially for a museum of such high standard.



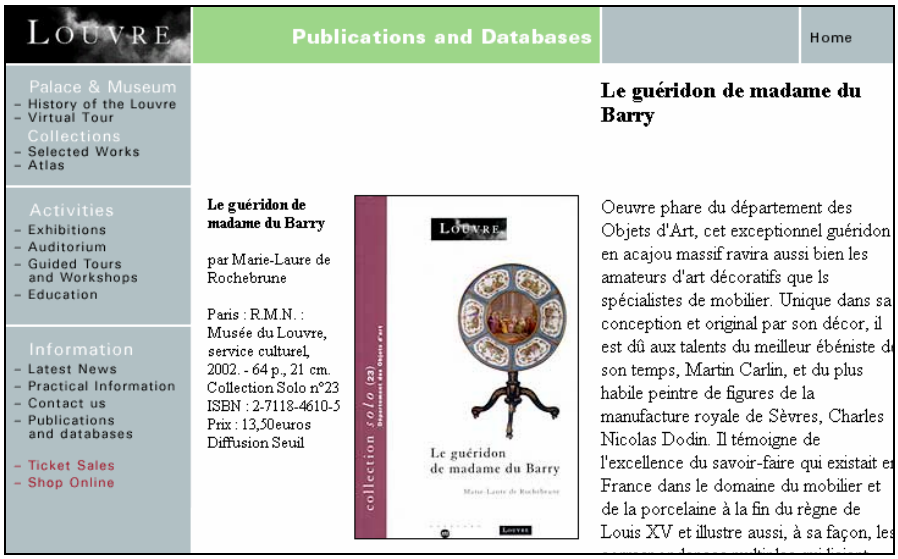
Education

The education section is also only available in French. Similar to the 'Guided tours and workshops' section, it mainly provides an overview of the educational activities that are planned. It is a pity is that about items such as the 'CyberLouvre' and 'Médiathèque' there is nothing more than 'description' pages. There is hardly any educational content to be found in the education section. Not even publications of the Museum are downloadable; they can only be bought or accessed in the 'CyberLouvre' or 'Médiathèque'.

Information

The information section provides the basic information visitors need such as the address, opening hours, latest acquisitions and publications.

The publications subsection is an interesting list of what the museum is actively producing. Most publications are listed by simply listing their bibliographical information and are only available in French. For some publications there is a special page with some more descriptions and usually an image of the cover. Unfortunately there is no guidance on how and where to buy the publications. None of the publications are available for downloading.



Latest News

There is a separate section for the latest news, which is implemented with a News Box. This section is only in French.

Contact Us

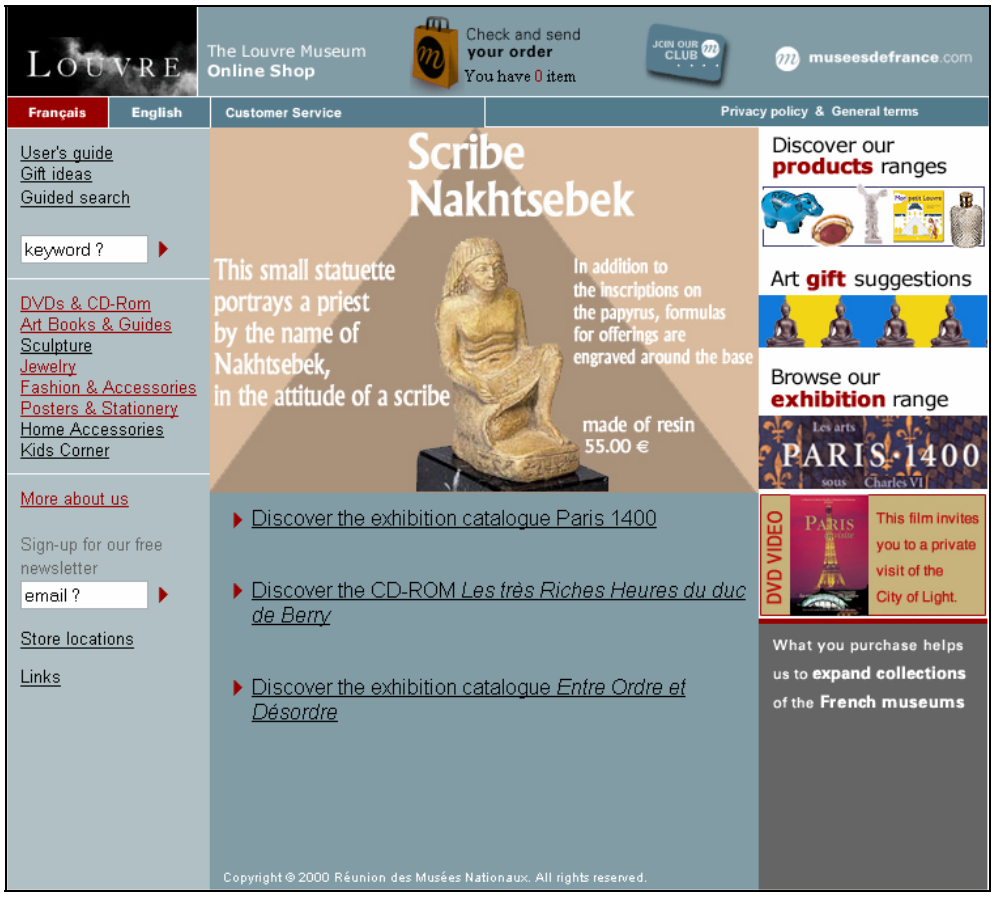
This page is a Contact Page, which lets the user get into contact with the people that are working for the Louvre. By clicking on 'Louvre's web team' a Credits Page can be found.

Ticket Sales

The ticket sales menu item creates the expectation that it is possible to buy tickets online. However, this is not the case. It is simply a page with information about how to buy tickets and visitors are referred to other parties, some of which are online, to purchase tickets. A missed opportunity.

Shop

The 'Shop Online' menu item takes users to a new website. The Online shop seems to be run by an other party than the Louvre itself, namely 'Réunion des Musées Nationaux (RMN)'. The shop itself is a fairly standard e-Commerce Site with the usual Product Pages, Shopping Cart and Checkout Process. Besides small usability issues such as not mentioning shipping costs directly in the shopping cart or mentioning payment options, the site is ok. Notably, it is not required to register on the site in order to purchase something.



Overview of patterns used in Louvre.fr

- Main Navigation
- Outgoing link
- Home link
- Homepage
- Liquid lay-out
- Language Selector
- Press Releases
- Thumbnails
- Image Menu
- Virtual Product Display
- Stepping
- Contact Page
- Credits Page
- Search Area
- Advanced Search
- Simple Search
- Search Area
- Search Results
- Collector
- Action Button
- List Builder
- Map Navigation
- News Box
- Sitemap

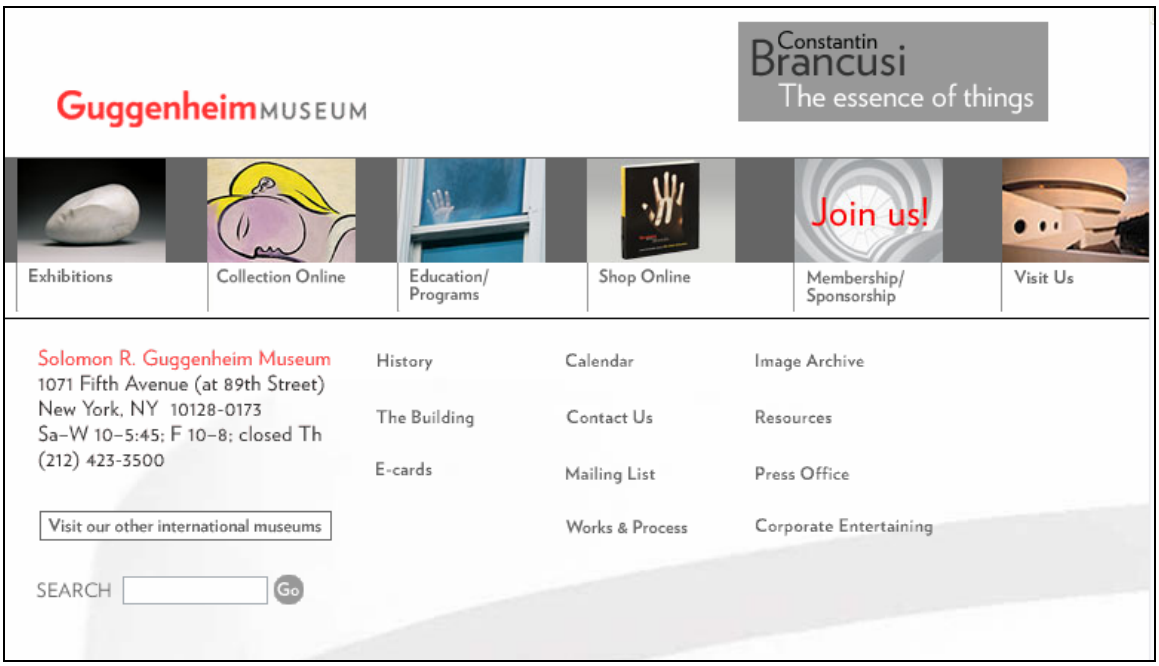
Appendix C. Evaluating the site of the New York Guggenheim museum

The site of the Guggenheim museum is actually nothing more than a single page that directs users to the local sites of any of the Guggenheim museums in Venice, Bilbao, Berlin, Las Vegas, and New York. When browsing to www.guggenheim.org users will see a simple image based menu, where the user has to indicate to which one of the five Guggenheim museums websites they want to go to. The menu is actually an Icon Menu where the label is shown in the upper left corner and as a roll over effect in the image.

For this report we will only concentrate on the website of the Guggenheim museum located in New York. This website is divided in six main sections:

1. Exhibitions
2. Collection Online
3. Education/Programs
4. Shop Online
5. Membership/Sponsorship
6. Visit us

The Homepage



As usual the Homepage can be analyzed by taking a look at the three different functions it has: 'introduction', 'entrance' and 'announcement'. The introduction of the website consists only of the logo at the upper right-hand corner. A museum website like this one perhaps does not really need a extended introduction. Nonetheless, some short description indicating the type of museum ('Modern Art') could be useful for people that are not familiar with the museum. Otherwise, this Homepage is entirely an 'entrance' for the visitors, since there are no 'announcements' whatsoever to be found. The only other piece of information is the visiting address and the opening hours. Lastly, there is a Simple Search box.

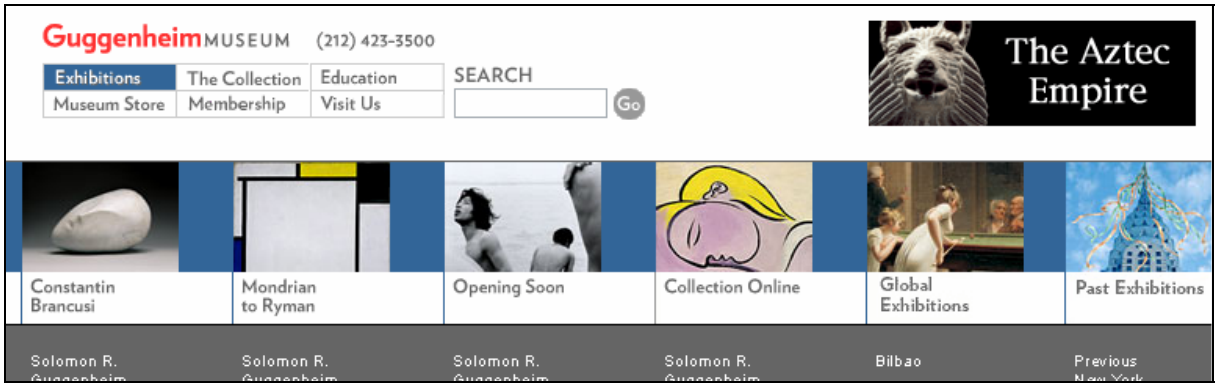
Main Navigation

The navigation of a site that is this large is very important. The user has to be able to conveniently move his way through the pages. The Main Navigation of this site is implemented by a kind of Icon Menu in combination with a textual description.

Although the main navigation gives the main entrances, there is also a Doormat Navigation used for several 'side entrances'.

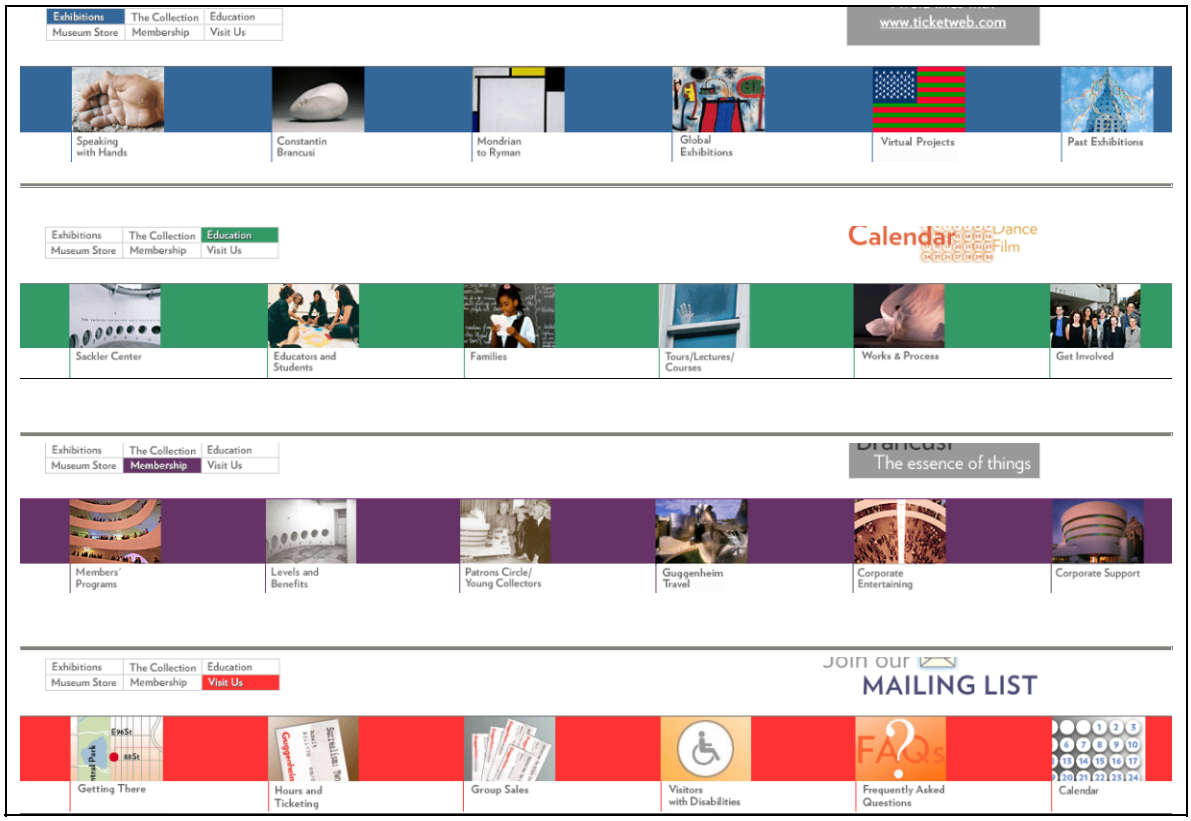
Some of the items are actually sub-items of the Main Navigation, e.g. Works & Process and 'Corporate Entertaining' while other elements are standing by itself e.g. 'The Building' and 'History'.

When the user has chosen one of the sections, except from the shop section, the second navigation layer appears. The six sections of the first main navigation layer are moved into a tiny new page element while their original places are replaced with the subsection menu items. Next to them, a Search Box is placed. All in all, not a very elegant solution, especially since the items are crammed into a 3x2 matrix. Even stranger, for some sections such as the 'Collection' section, a 6x1 matrix is used! It turns out that this happens whenever a section is really a different site, e.g. 'the collection' is actually a different site called www.guggenheimcollection.org. Similarly, the 'Museum Store' is actually a redirect to store.yahoo.com/guggenheim.

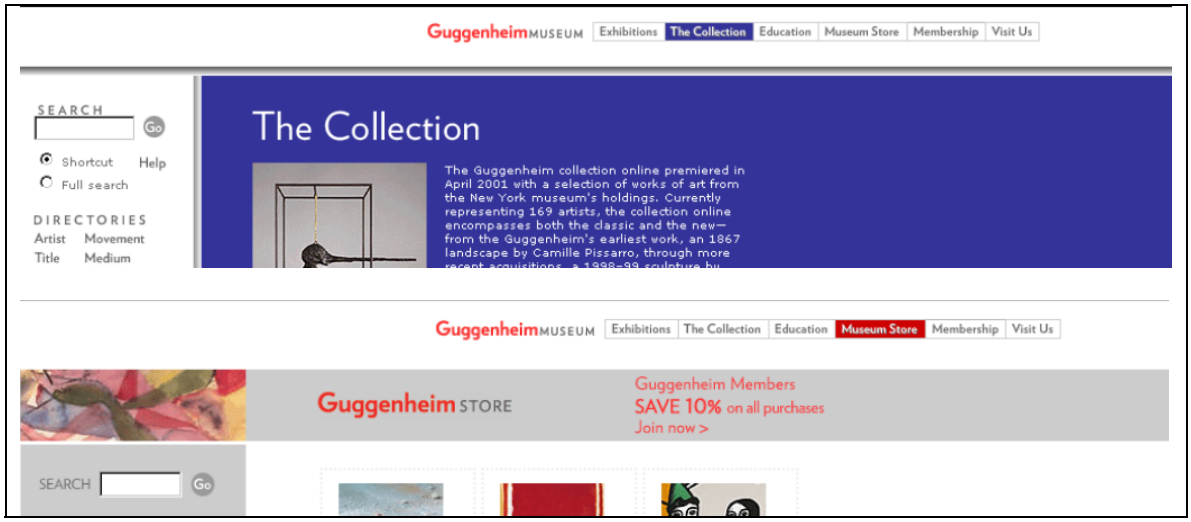


The logo of the Guggenheim museum has now become a so-called Home Link. The user can click on this link to go back to the recognizable Homepage. It is remarkable that when the 3x2 matrix is used, the phone number of the museum is placed next to the logo, while it is not displayed in case of the 6x1 matrix.

The new matrix menus use colored roll over effects. These colors return in the sections themselves as background color for the main navigation. Effectively they are Color-Coded Sections. The colors themselves seem to have been chosen purely arbitrarily.



The sections of the 'Museum Store' and the 'Collection' have inconsistent way of presenting the sub navigation, as can be seen below.



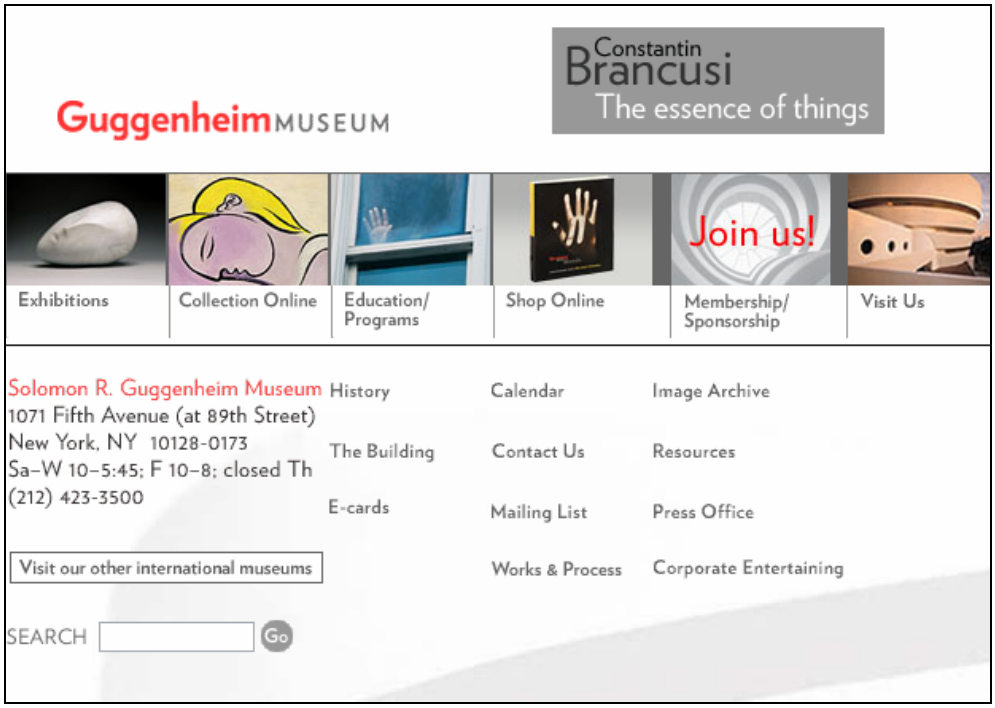
Why the designers have chosen to replace the menu is not evident. Probably there was a need to have more space for an item in the collection. In our opinion, there is no good reason to do it this way and it brings the disadvantage that it is inconsistent and inelegant.

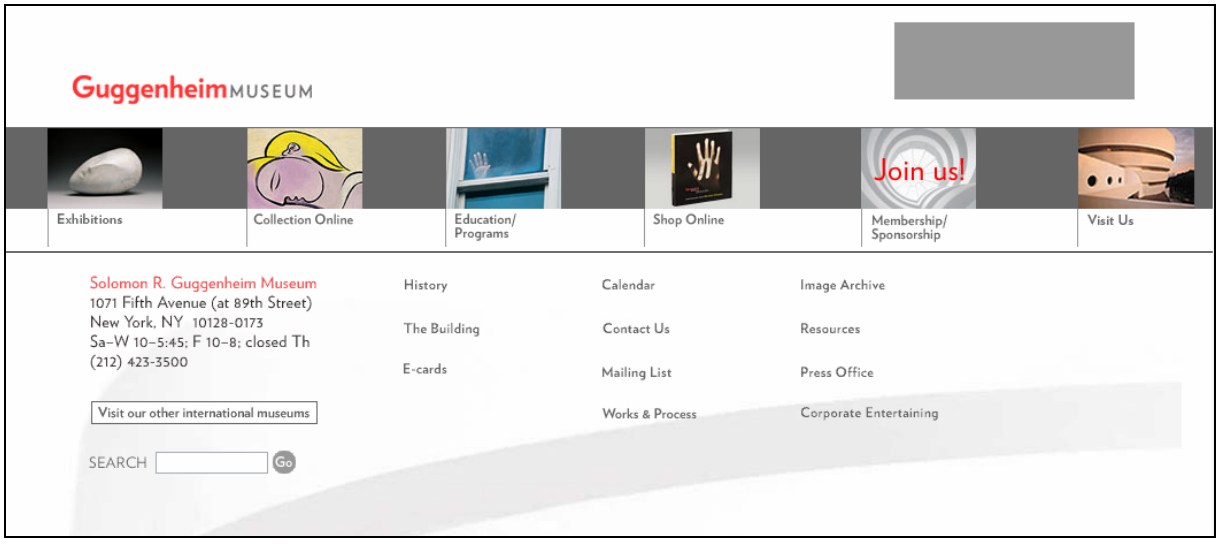
This website has a really flat navigation structure; except from the online collection it is not possible to click further than the second navigation layer. The advantage of this is that the users have to click at most two times to find the information they needed. The

disadvantage is that some pages have become very long because of the lack of sub navigation.

Liquid Layout

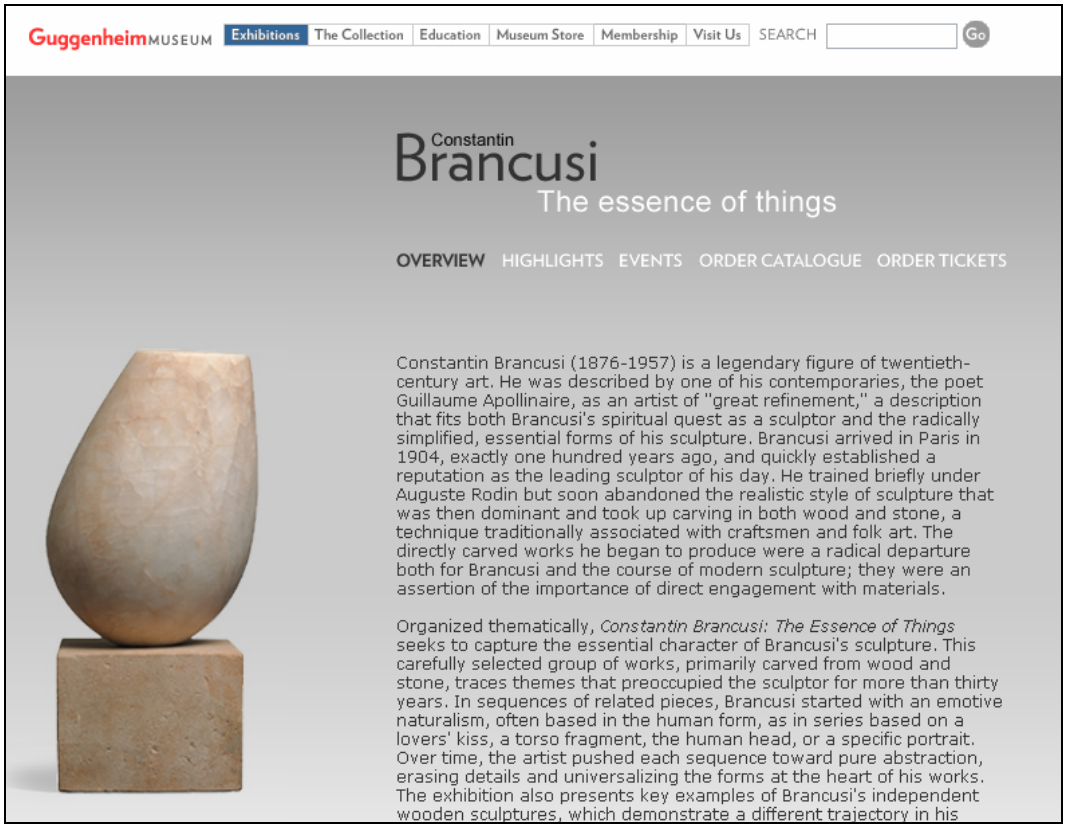
The site does not use Grid-based Layout at all. It instead uses full-blown Liquid Layout. The downside of this decision is that some pages are looking messy since hardly anything is aligned with other elements on the page. It would have been better to make limited use of Liquid Layout so that only content area's scale while navigational elements stay in place.





Exhibitions

The 'Exhibitions' section gives an overview of the current and upcoming exhibitions. Apparently, there are usually not than many exhibitions as there is only room for two exhibitions to be listed besides the fixed items 'Upcoming soon', 'Collection Online', 'Global Exhibitions', 'Past Exhibitions'. For each exhibition there is a mini-site of a small number of pages. Each mini-site has its own styling with little connection to the Guggenheim other than the font type that is used.



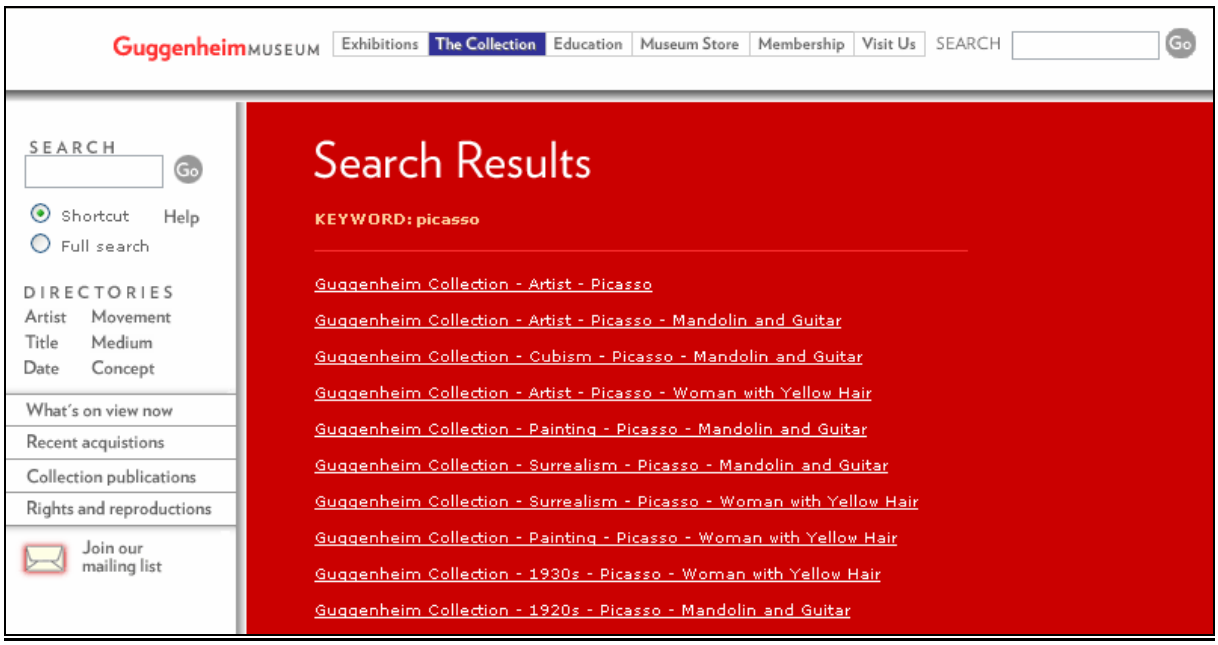
A consequence of creating mini-sites for exhibitions is that only the main navigation is left on the page and there is no access to any other sub-items of the exhibitions section. A simple Double Tab navigation could have solved this issue.

The Collection

The online collection of the Guggenheim is by far the largest and perhaps most interesting section. The section gives access to a large database of items that are part of the collection. In the left frame of the screen a Search Area is placed, the right side is reserved for eventual Search Results. There is also a link to a Credit Page in the right frame since this is an external site.

The collection can be viewed in two different ways: performing a search or browsing yourself through the different categories the objects are stored in. So it is a middle-ground between a Search Box and Advanced Search. To perform a search the Search Box should be used. When entering one or more keywords and hitting the Action Button 'Go', the user gets the Search Results in the right frame. It is possible to indicate to be redirected directly to the most interesting search results by checking the 'Shortcut' option. When the 'Full Search' option is checked, all related Search Results are displayed. There is no maximum number of Search Results, nor is there any other way to control the output options. There is also no Paging mechanism. So in practice it means that

users will get more than 100 results per page if they search using keywords such as 'Picasso'.



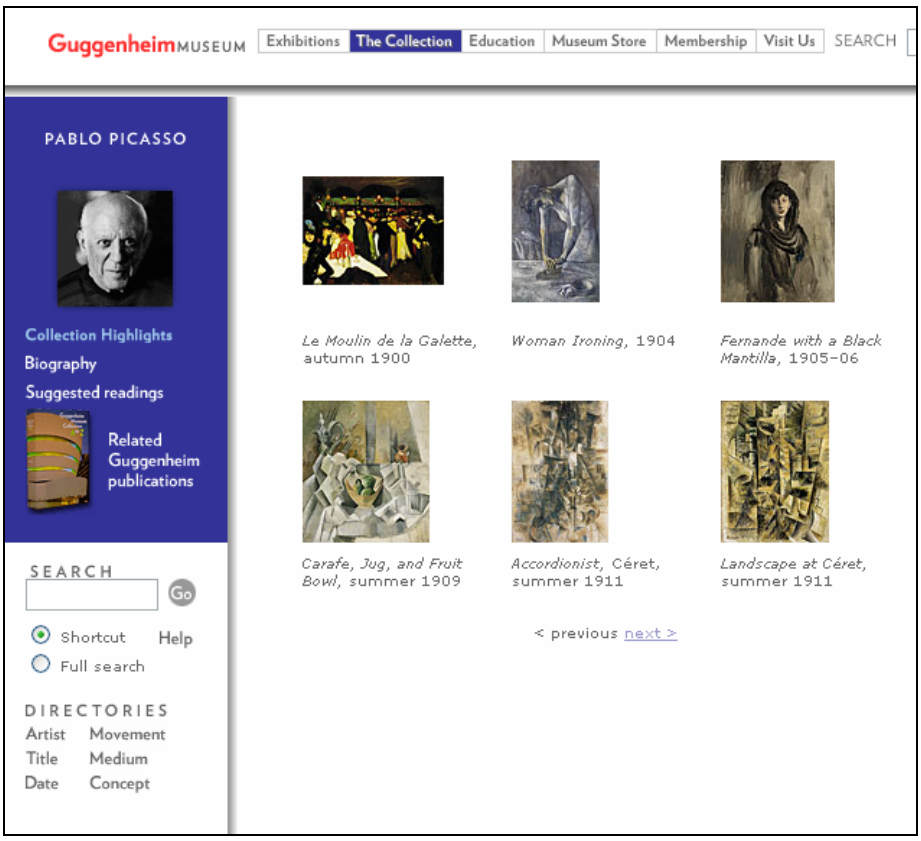
Another feature that appears on the collection pages is the possibility to subscribe to a Newsletter. Unfortunately, at the time of writing, this was a broken link. Nonetheless, it

is odd that this possibility is shown here. The newsletter is also accessible from the homepage and 'Visit Us' section.

Directories

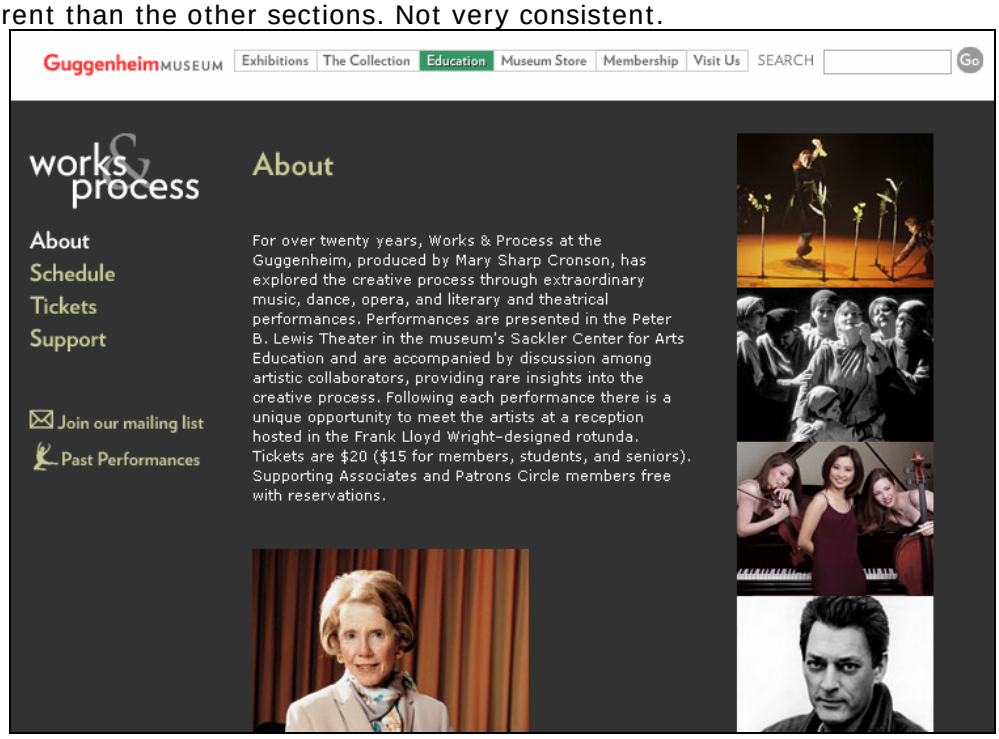
Under the header of 'Directory' it is possible to browse through the list of artist, titles, dates, movements, mediums and concepts. The lists with titles and artist have is a variation of a Site Index but then used for artist and titles only. The alphabet is displayed with clickable letters which take users to the correct place in the page.

If an artist, movement, medium or date is selected; a box with information about the selected subject is displayed in the upper right corner, above the search box. Also some links from the Search Area disappear. The artist sub navigation shows links to his works (shown by default) bibliographical information and other readings. The works of the artist are shown using Thumbnails which after selecting them shows a page with information about it. A Stepping mechanism is also used to navigate from one work to the other. Unfortunately the Stepping mechanism is also shown when there is only 1 item shown.



Education

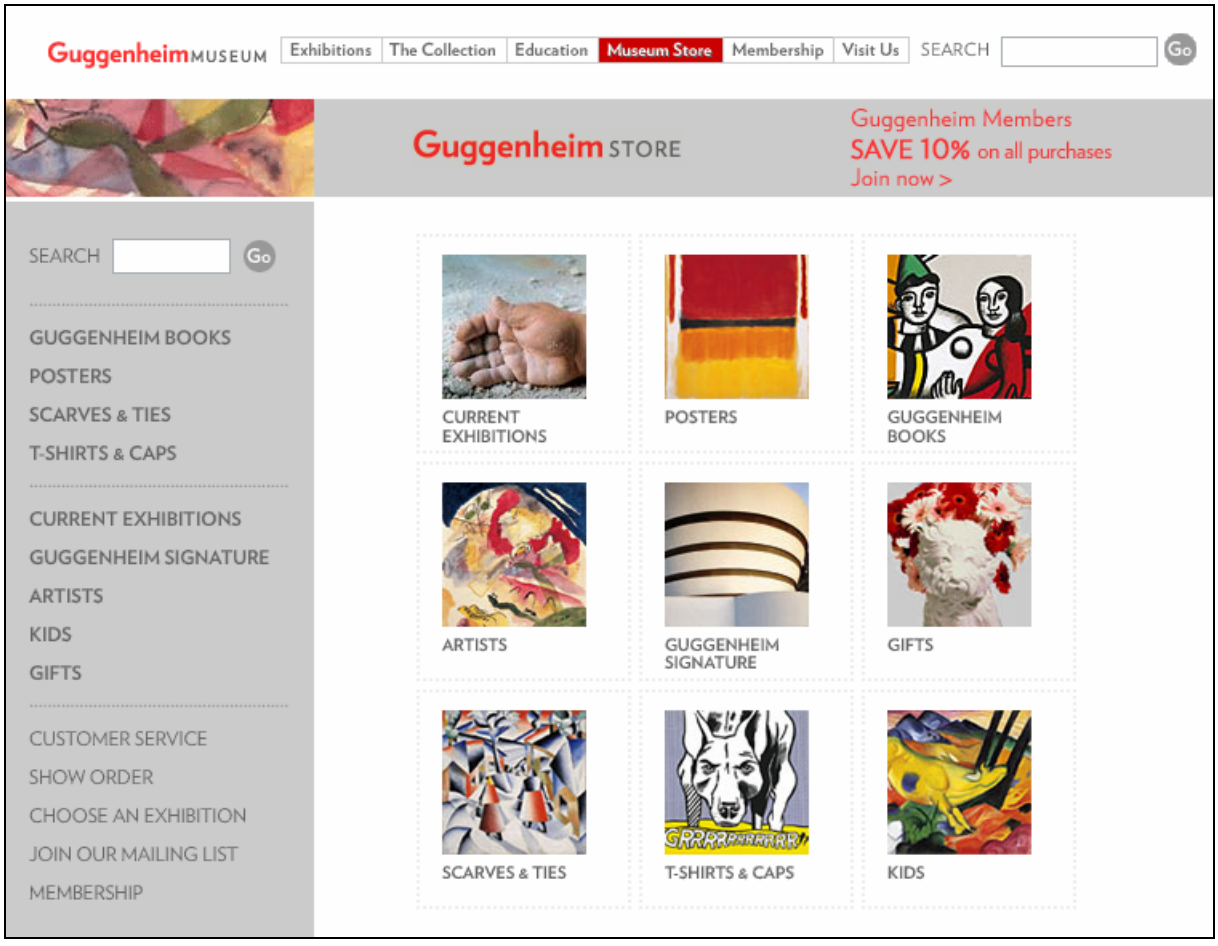
The education section is a simple section with some basic information for students, teachers, and other interested parties. Most pages are simply long pages where all information is listed with some in-page sub navigation. The ‘Sackler Center’ and ‘Works & Process’ lead to external sites again, including the change in main navigation, and look a bit different than the other sections. Not very consistent.



Although the section is labeled ‘education’ there is no educational material to be found. It is simply advertising their educational activities rather than being really educational.

The Museum Store

The museum store is actually a standard store hosted at Yahoo but skinned to look like a Guggenheim section. The store is an E-commerce site but it has some peculiarities. Although there is a Shopping Cart it is not visible to the user and only accessible through the menu item ‘Show Order’ that is placed almost at the bottom in the main navigation. It is also not visible how many items are in the shopping cart. In addition, when viewing the shopping cart there is no indication of payment methods or shipping costs. When choosing to start the Checkout Process, a Wizard with three steps is used. However, no indication of the steps or progress is given. Only at step 2 of the process will the user find out what the real costs will be and how to pay. Not very elegant.



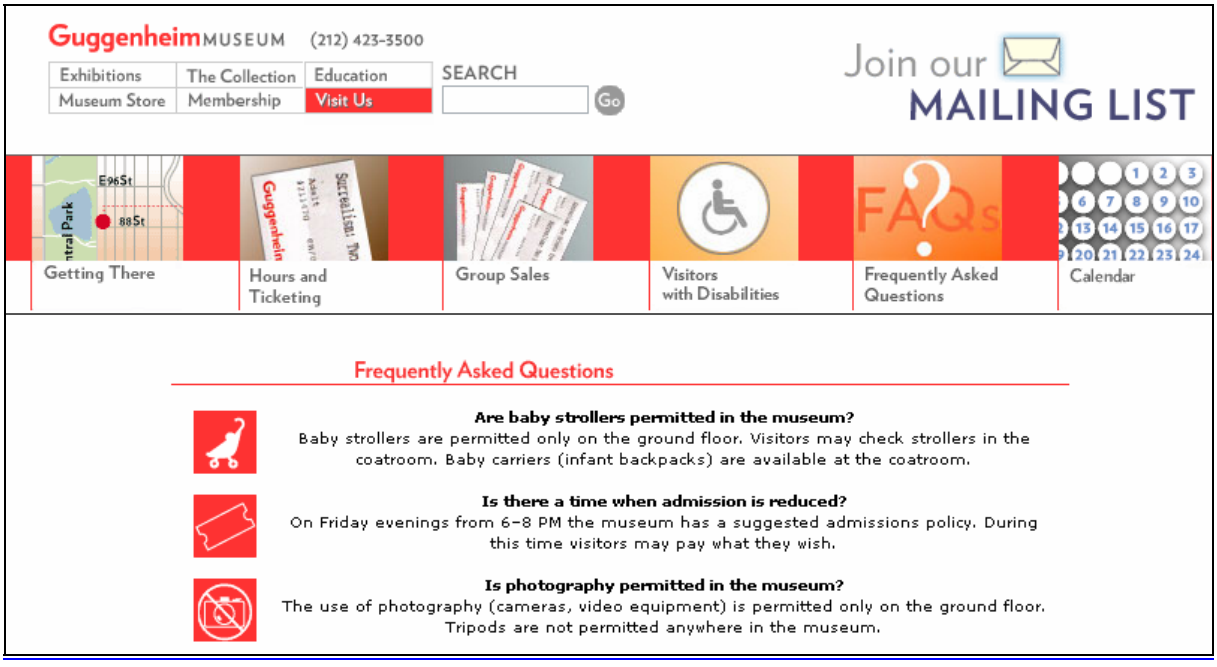
On the positive side, it is not necessary to create an account before being able to buy something while it remains possible to become a member. A missed opportunity is the integration of the store with the rest of the museum’s site. For example, when viewing a work of Picasso, a link to the store could have been shown for ordering a particular re-production or other related items.

Membership / Sponsorship

In this section information can be found about membership of the Guggenheim museum. There is information about the different levels and benefits of memberships, costs, and things like that. Some photos of important members are also stored here. These are displayed with Thumbnails, which are clickable for viewing them in a larger size. This is an Image Browser; the user has to select an image from of a set of thumbnails. Remarkable is that they have to be viewed in pairs. So the twelve Thumbnails, which are stored here at this moment, can be viewed in six different pairs. When one of those pairs is displayed, the user gets the option to Step to the previous or the next pairs of images by clicking on 'PREVIOUS' or 'NEXT'.

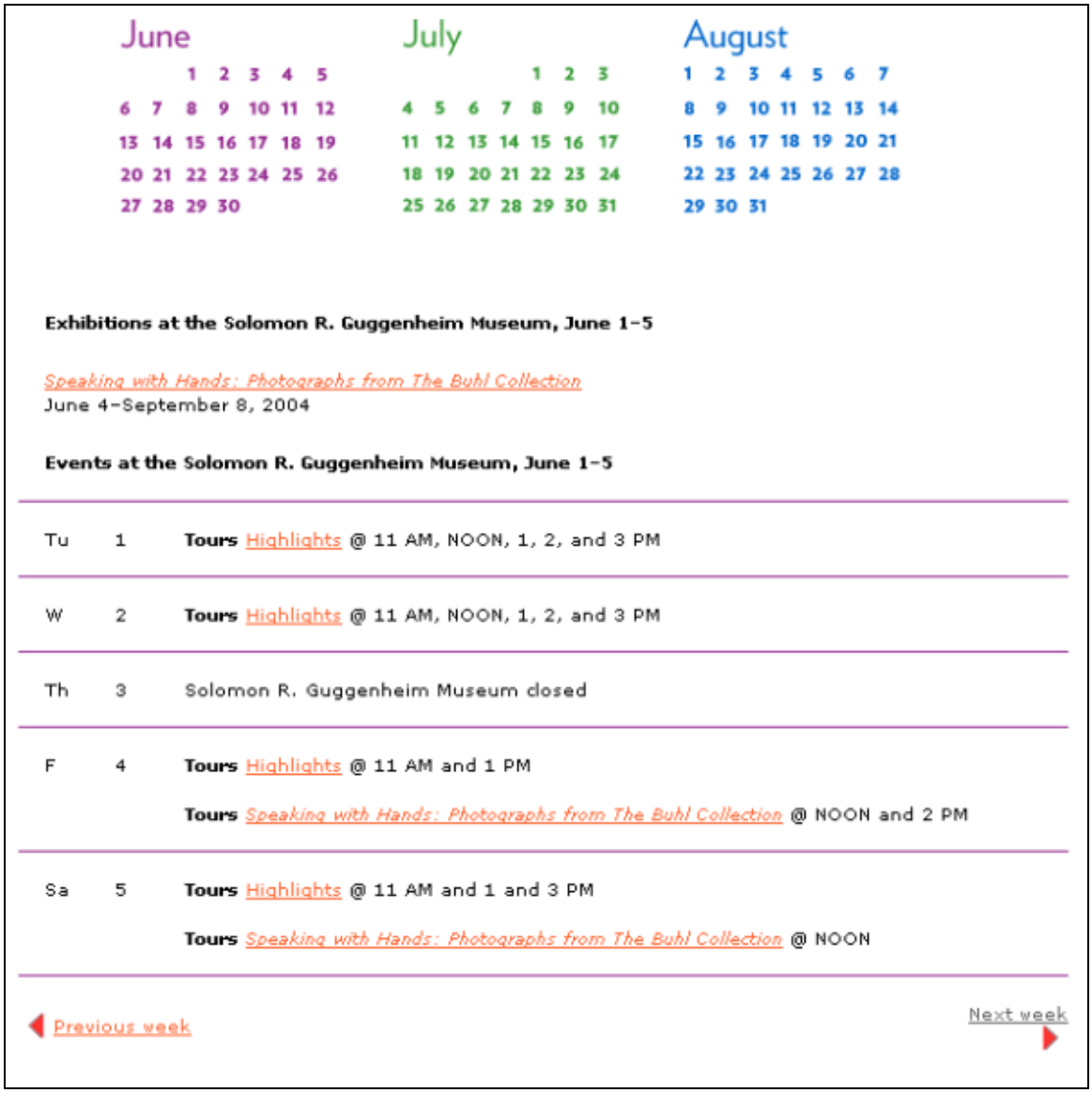
Visit Us

In this section information is stated about how to get to the museum, how to order tickets, the floor plan of the museum, some Frequently Asked Questions (FAQ) and again a link to the calendar and the Form for the Newsletter. Ironically, the huge newsletter looks like an advertisement now, it has even replaced earlier advertisements in the same position, but it does work!



Calendar

Accessible from the Homepage and the 'Visit us' section, there is an event calendar to be found. The calendar consists of a graphical representation of a Date Selector, some textual description of calendar items of the currently selected week, and a way of Stepping through the weeks (at the bottom of the page). It could be confusing that the user selects a specific date at the Date Selector and that the displayed calendar items are not only from that date, but also from the complete week the selected date belongs to. The calendar shows the events in the current month and the next two months. So it is not possible to see what is scheduled for any particular month in the year, nor to see what was scheduled in previous months.



June

		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

July

				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

August

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Exhibitions at the Solomon R. Guggenheim Museum, June 1-5

Speaking with Hands: Photographs from The Buhl Collection
June 4-September 8, 2004

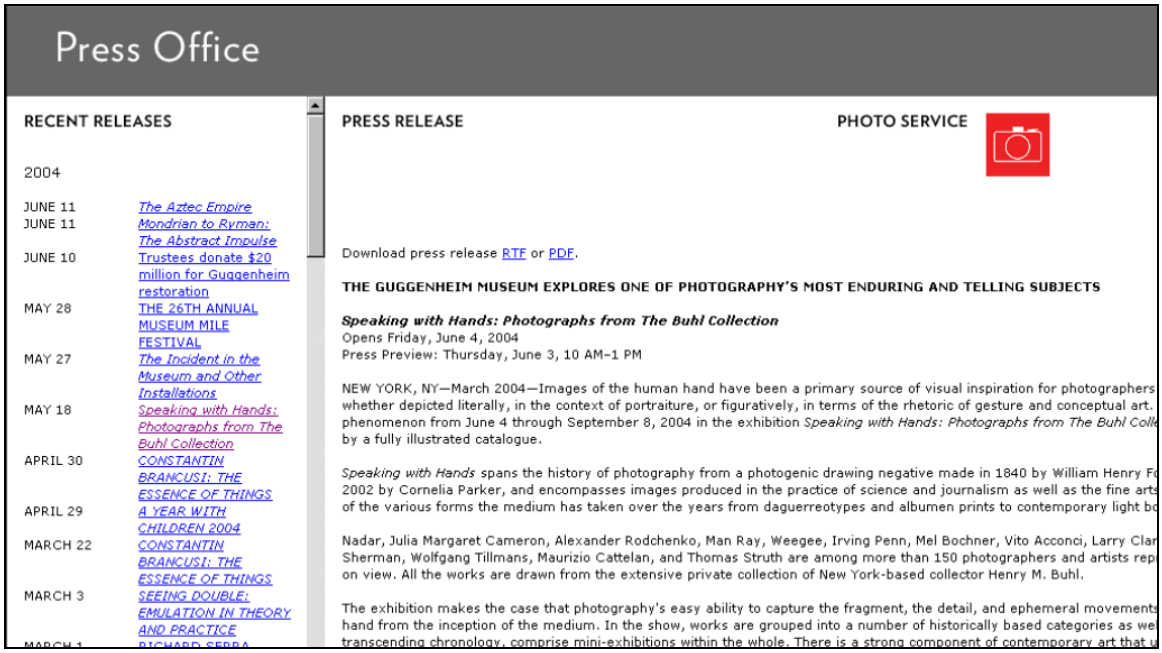
Events at the Solomon R. Guggenheim Museum, June 1-5

Tu	1	**Tours** Highlights @ 11 AM, NOON, 1, 2, and 3 PM
W	2	**Tours** Highlights @ 11 AM, NOON, 1, 2, and 3 PM
Th	3	Solomon R. Guggenheim Museum closed
F	4	**Tours** Highlights @ 11 AM and 1 PM **Tours** *Speaking with Hands: Photographs from The Buhl Collection* @ NOON and 2 PM
Sa	5	**Tours** Highlights @ 11 AM and 1 and 3 PM **Tours** *Speaking with Hands: Photographs from The Buhl Collection* @ NOON

Previous week Next week

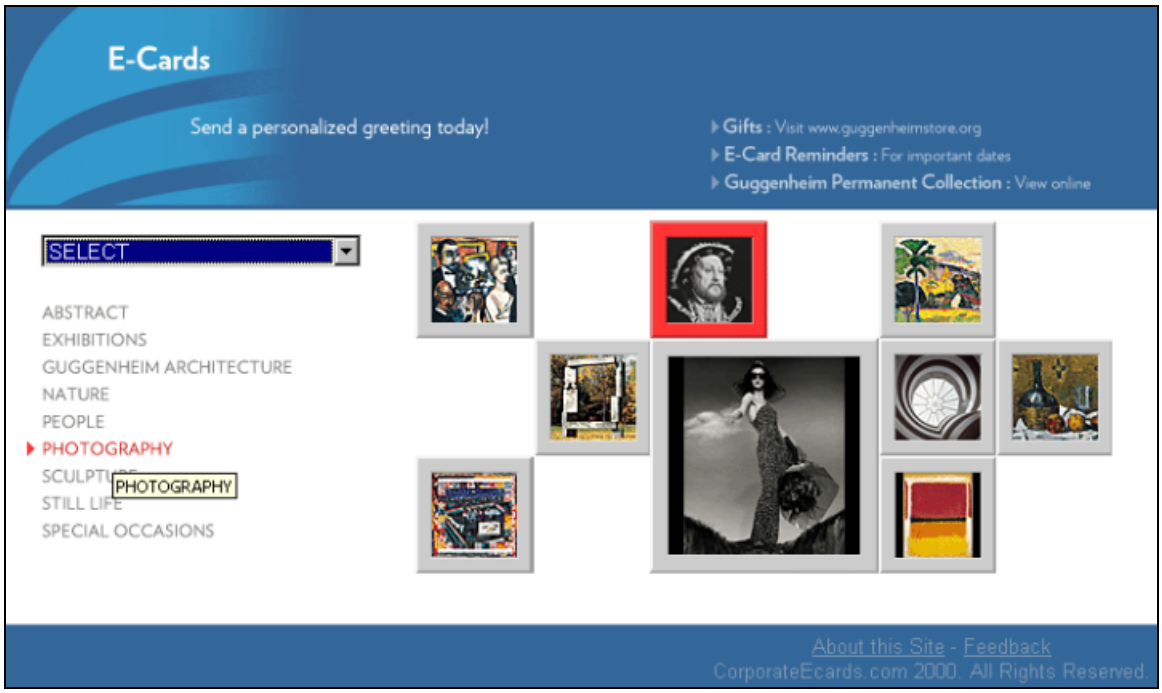
The Press Office

Another link on the Homepage redirects the user to the Press Releases, called 'Press Office'. It is implemented by splitting the screen into two different frames. The left one consists of shortcuts to articles and their dates, and the right one shows the articles. The shortcuts are sorted by date and are subdivided by the years the articles where published.

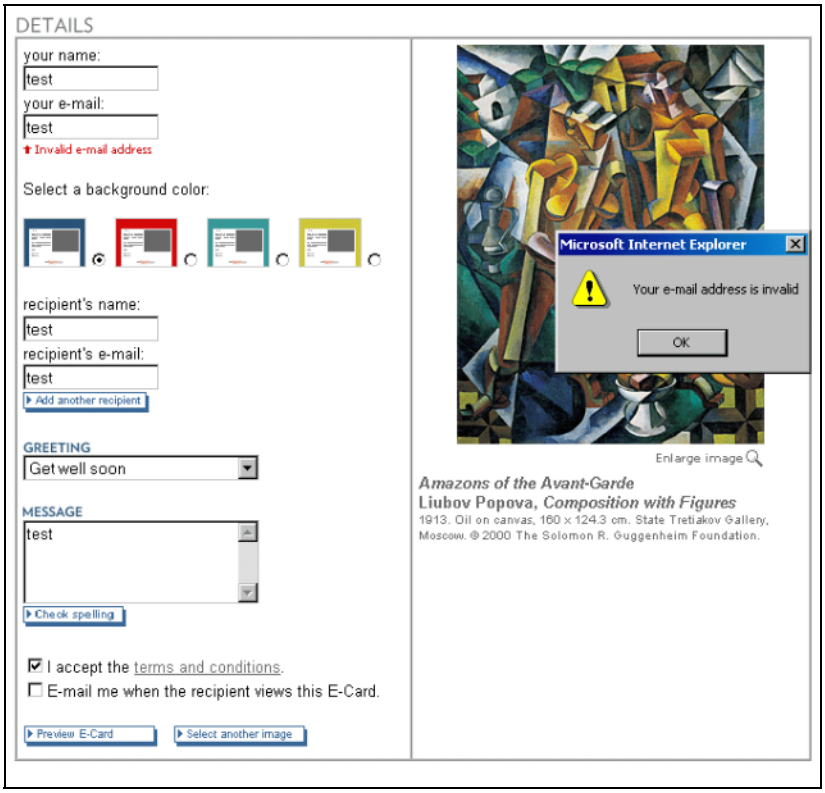


E-cards

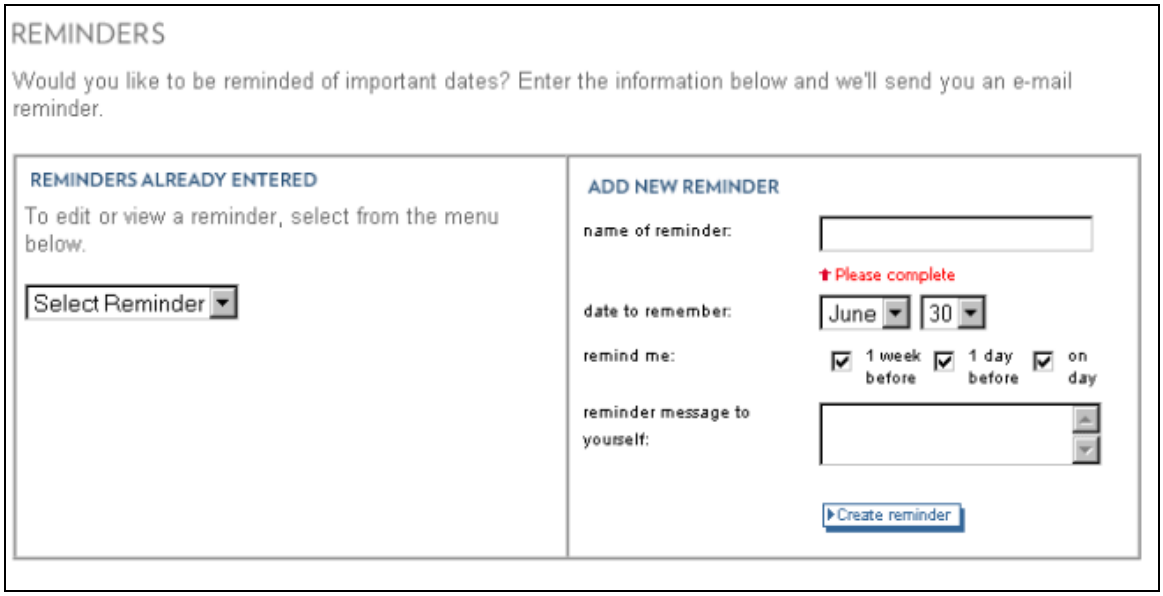
An interesting section accessible from the Homepage is the "E-cards"-section. To send a card two actions have to be performed: selecting a card, and filling in the details. The user has multiple ways to select a card. First the user could indicate what kind of image he/she wants. It is possible to choose from 'Abstract', 'Exhibitions', 'Guggenheim Architecture', 'Nature', 'People', 'Photography', 'Sculpture', 'Still Life' and 'Special Occasions'. These choices are represented just by these words, and also by corresponding images. It is not really clear that the image and text belong to each other; only the roll over effects (red color) indicates that the text and the images correspond to each other. This is again a kind of an Icon Menu. Unfortunately, the roll over effect takes a long time to appear so it is not directly clear that this feature is there at all.



When the first step in the selection process is done, several Thumbnails of cards that belong to the previously selected category or person will be displayed. This is the second step in the selection process: the user has to select a card. After that, users have to give details about the sending. This must be done by filling in a Form. When the user forgets to fill in all the fields or gives an e-mail address with an incorrect syntax, an Input Error Message is given. The form and an Input Error Message can be seen below.



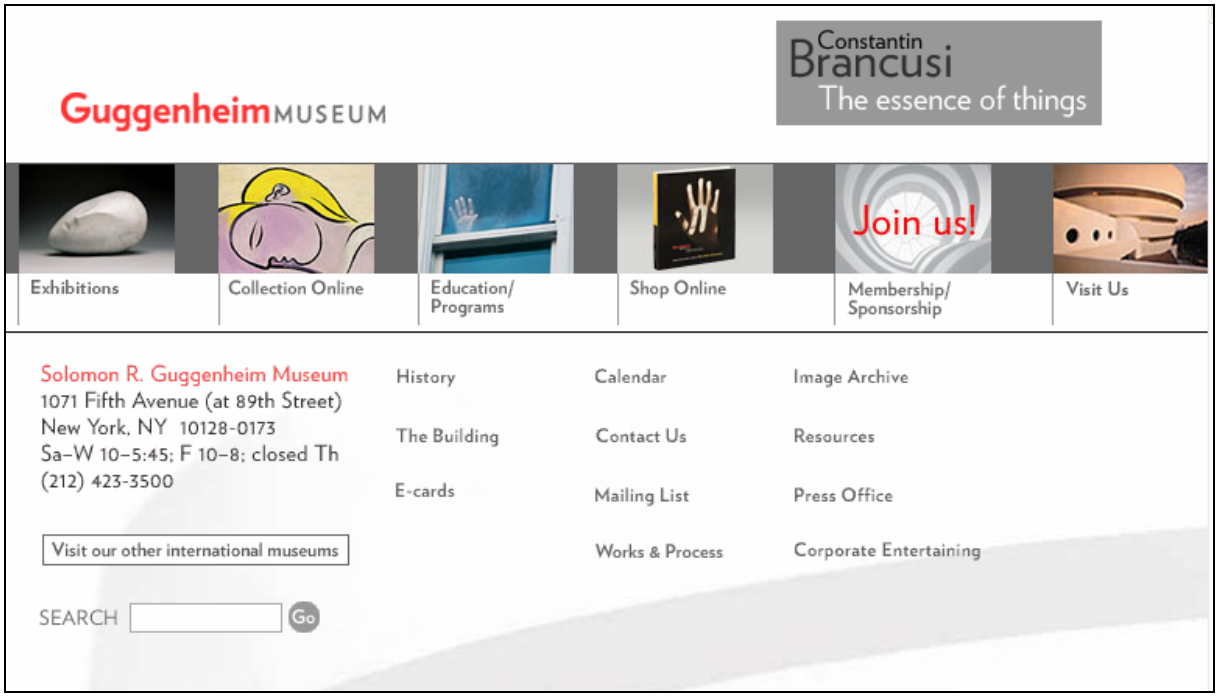
In the “E-card”-section it is also possible to let the website send you a reminder. Filling in another Form turns this feature on. This Form also contains patterns like the Action Button and a Date Selector.



Overview of patterns used in Guggenheim.org

- Doormat Navigation
- Image Menu
- Main Navigation
- Home Link
- Homepage
- Color-Coded Sections
- Liquid Layout
- Constraint Input Field
- Form
- Input Error Message
- Action Buttons
- Date Selection Field
- Stepping
- Contact Page
- Press Releases
- Liquid Layout
- Newsletter
- Search Area
- Search Results
- Credit Page
- Search Box
- Paging
- Thumbnails
- Frequently Asked Questions (FAQ)
- Credit Page
- Image Browser

Appendix D. The 'Museum Site' pattern



From www.guggenheim.com

Problem
Users need information about a museum, its collection or its activities. The main goals of users include visiting the museum, getting information about items in the collection of the museum, or getting information about other educational or scientific activities of the museum.

Use When
You are designing a website for a museum. A site for a museum often mainly acts as 'brochure' for the museum by giving all sorts of information which primarily is supposed to attract people to visiting the 'physical' museum. Such an experience is one of Information Seeking that focuses on informing visitors. Secondary goals may involve raising funds or provide membership functionality, a first step to creating a Community Building experience. The last goals include educational and online visiting of the museum. Currently most museum websites are not 'virtual' museums and usually stick to being an online 'brochure'. Nonetheless, there is a trend to become more and more virtual by adding new ways of interacting with the museum through the site.

The target audience for a museum website is first of all formed by potential visitors. Other audiences are educators, students, investors, donators, curators, and researchers.

Solution
Create an informative site focusing on the museum main collection, activities and visitor information. Complement the site by offering online ticket sales, memberships and online shop.

User tasks
There is a variety of user tasks that a museum site needs to support. These typically include:

- browsing the collection and getting detailed information per item (Collection)
- learning about items in the collection.
- obtaining information about coming events. (Calendar)
- obtaining information about current exhibitions. (Exhibitions)
- obtaining information about possible educational activities. (Education)
- obtaining general visiting information such as address, opening hours, and ticket pricing (General Information)
- obtaining information about research done by the museum. (Science)
- buying items at the online shop. (Shop)

These user tasks are mostly relevant as **pre-visiting** activities while tasks such as buying souvenirs in the online shop are more relevant as **post-visiting** activities.

Typical site sections
Museum sites are quite standard and have a very high degree of similarity. Most sites offer the following sections:

- **Collection**
  The collection is the main asset of the museum and most be prominently featured on the site. This section of the website has two functions:
  3. Inform the user about which pieces the museum has in collection.
  4. Let the user observe (a part of) the collection. Images and description is the minimum a museum must show. Better though, is to present items using a Virtual Product Display possibly in combination with a virtual tour through the museum.

  A common way to present these two needs is to let the visitor make use of an Advanced Search to find a particular piece. The user gets the Search Results as a combination of Thumbnail and short descriptions.

  Since the objects of the collection are the centerpiece of the museums assets, the objects online must be richly connected in order to support various possible interactions with the objects. An object may have links to educational items in which it appears, to other objects based on a formalized relationship, to the author, to its background information, to educational material and even to purchasable goods in the museums shop. Each object has many facets to it which all provide steps for successive interaction.

- **Calendar**
  Common events on a calendar of a museum are expositions, guided tours, lessons, courses, special days and symposia. It has to be possible to get more information about events, like starting time, prices, place, and other additional information about these events. Next to events where a user have to pay for should be a "buy a ticket" Action Button to link the user to the shop to buy a ticket. The calendar must inform the user about - and invite the user to - coming events in the museum. Usually a calendar is simply a listing in combination with a Date Selector.

- **Education**
  The goal of this part of the website is to provide information about the educational activities of the museum. It is also possible to offer educational material for download but only few museums do that. In such case, the user experience that is applicable here is the Learning experience.

  Usually the section could refer to books, cd-roms and web pages about the subject of the museum. The books and cd-roms could well be linked to the web

shop. If the museum gives courses, workshops, lessons, tours or subject excursions, it should also be stated at this section. Also information about excursions for schools and ideas and resources for teachers and group leaders could well be placed here.

- **General Information**
  Users who are planning a visit could find information they might want to know in advance here. Things like address, opening hours, ticket prices, floor plan, contact information (use a Contact Page), acquisition, home rules, accessibility and facilities could be found here.

- **News**
  The news section could be implemented in a News Box and could well be integrated in the Homepage. This section is useful to inform the visitor about new acquired pieces, expansions of the building, new exhibitions, new activities, and all other kind of recent developments of the museum. News may also include press releases.

- **Science**
  If applicable here must be given information about research, conservation and restoration and the library. An Advanced Search is needed to search through the online library catalogue (if present).

- **Shop**
  Visitors might want to buy museum-related things online, basically to buy 'souvenirs'. Usually there is an online 'shop' which is effectively an E-commerce Site within the museum website. A museum shop may also contain documentation related to exhibitions and to single exhibits at various levels of expertise. The user experience that is applicable here is the Shopping.

  A museum shop differs from the standard e-commerce site in the way that a museum shop sells museum-related artifacts and most of the time has fewer things to offer. Most of the times, the museum has outsourced the shop to external parties.

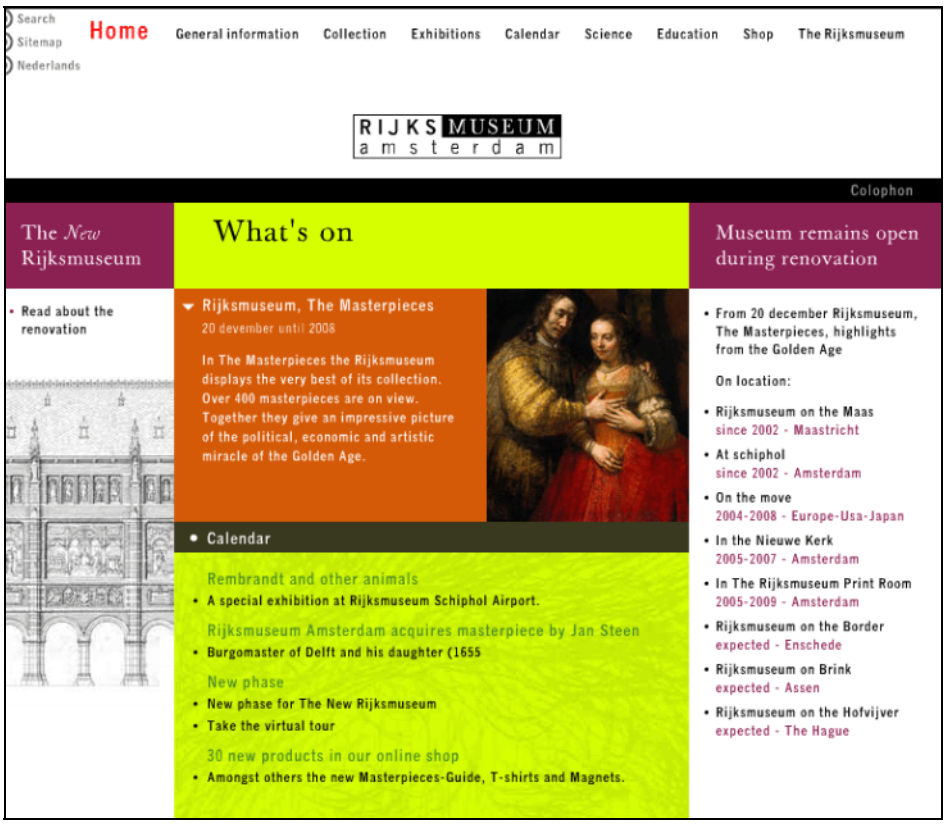
- **Visitors comments**
  Although museums are very much part of our community and culture, only rarely are visitors allowed to share comments about the museum online. For example, using a Guest Book users could tell about what they liked or did not like and what they would recommend others to do. Unfortunately, most museum sites are still very 'closed'.

The museum should have a Search box that searches through the entire site, including the collection database, calendar, education flash mini-sites and the normal site content. In addition an Advanced Search is needed for users with very specific needs, typically curators, students and researchers.

Why
The content of museum sites is primarily based on the information need of visitors. The collection is the main asset of a museum and must therefore also be presented in the site. The minimal effort is to present a searchable database of items but this can be extended to provide a better experience for average visitors. The shop is there for obvious commercial reasons and is usually outsourced.

Examples

The Louvre's site



The site of the Rijksmuseum.