

Planning Multimedia Projects

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1. Planning Multimedia Projects

Learning Objectives

You will be able...

- ...to list the content of the four phases "issue analysis", "concept", "realisation" and "evaluation and marketing".
- ...to plan a web application chronologically with all its needed steps.

Introduction

Multimedia applications are mostly designed for a particular reason. This might be to sell or promote products or services, to convey information, to entertain the user, or to teach and educate.

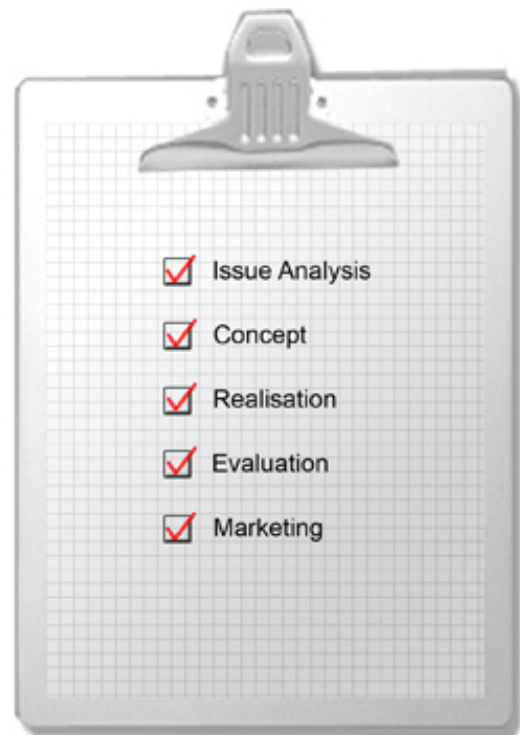
Developing multimedia applications is similar to the construction of buildings. The appearance and the functions of a house are different depending on the sense of the house-owner. Similarly, a multimedia application varies depending on its developer. Some prefer to concentrate on the design of the application and others prefer to concentrate on its functionality.

This lesson will show you the processes which have to be fulfilled from the beginning of the project until the end, independent of the application content. The four phases are:

- Issue Analysis
- Concept
- Realisation
- Evaluation and Marketing

Since the issue of this module is Multimedia Cartography, we concentrate on multimedia applications with cartographic background. But most parts of the conception can be transferred to the development of any other application.

For each phase of the project we provide either questions that have to be posed and their answers, checklists whose items have to be fulfilled or examples which clarify the theory.



Checklist for this lesson

1.1. Issue Analysis

Learning Objectives

You will be able...

- ...to define the target audience of an arbitrary application.
- ...to define the aim of an arbitrary application.
- ...to list at least four attributes the quality of an arbitrary dataset depends on.
- ...to list at least three locations where to find geometric or thematic data.

Introduction

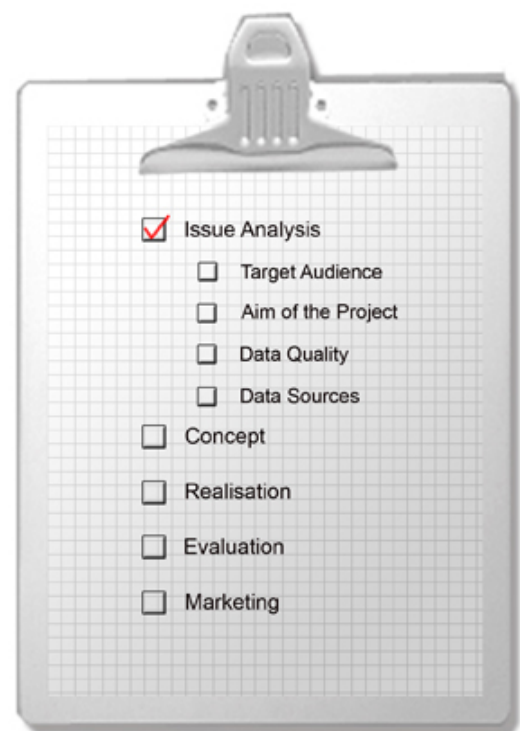
Before being able to start with the concept phase of a multimedia application we have to answer some preparing questions such as:

- WHO will use my project?
- Which are the GOALS of the product?
- HOW and WHERE is the product used?
- Where do I get data for my project?
- How is the quality of my data?
- ...

These questions are part of the issue analysis which defines first the target audience and the aim of the project. Furthermore, the needed data has to be searched and then be viewed to define its quality.

The answers for the listed and more questions have to be cleared before starting with the concept phase of the application.

In this unit we will go through the checklist of the issue analysis that you can see in the picture aside. Questions that have to be posed during this phase and their answers will be discussed.



Checklist for the Issue Analysis

1.1.1. Target Audience

The main question for defining the target audience of a project is "Who will use my project?". There are several sub questions which specify this question:

- What knowledge do the users have? Do they have any previous knowledge? Which schooling level do the users have?
- Is the target audience heterogeneous or homogeneous concerning the age, the schooling level, etc.?
- How motivated is the target audience? Is it a mandatory or a voluntary multimedia application?
- Do the users have experience with computer-aided applications?
- Etc.

The list of the questions is not complete. Depending on the project, some more questions have to be posed. With the above list we just want to show you that the definition of the target audience is very important for a project.

Another important question is "What language does my target audience speak?". Depending on the homogeneity of the target audience the application has to be translated into other languages. Often, applications are offered in English in addition to the original language.



Who will use my project?

(OGDEN Financial Planners LTD.)

When planning an open Internet application you have to be aware that everybody who possesses an Internet access is able to look at the application. Nevertheless the target audience has to be defined. Important is that your application fits to the knowledge of your defined target audience. Someone who accesses the application coincidentally has to reckon that he or she may not understand the content of the application.

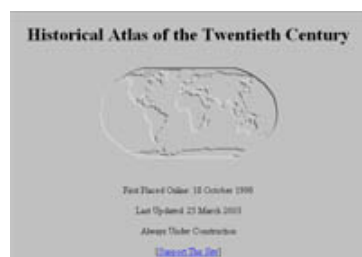
Exercise

Try to define precisely the target audience of the following multimedia projects. The following aspects have to be considered: age, knowledge, schooling level, heterogeneity, motivation, computer skills, language, etc. (e.g. younger persons from 15-20 of age; mostly men; schooling level: university; computing skills; homogeneous group of students; mandatory e-learning course; mother tongue is English; etc.).

You reach the homepages of the projects by clicking on the thumbnails. Discuss the answers on the discussion board "Target Audience" of this lesson. Comment on at least three entries of your colleagues.



Children's Map Zone (Ordnance Survey)



Historical Atlas (White)



Lonely Planet (Lonely Planet)

1.1.2. Aim of the Project

Parallel to the definition of the target audience, the aim of the project has to be defined. The question "Where is the project leading the users?" has to be clarified.

There are generally four different types:

- Education
- Information
- Entertainment

- Selling Products

Therefore the answers for the following questions have to be found first.

- Do I want to provide information? What do the users have to know after having visited the application?
- Does my application want to transfer some information?
- Is my multimedia application just developed to entertain the users?
- Or do I want to sell products with my application?

Only after having found the main aim of the application, some more questions have to be posed:

- **Teach Knowledge:** If knowledge ought to be imparted, what level does this knowledge possess? Do the users have to feature some previous knowledge? How complex is the knowledge that have to be imparted?
- **Impart Information:** If information has to be imparted, what kind of information do I want to impart?
- **Entertainment:** If my multimedia application is just for entertainment, what type of entertainment is it of (games, funny videos, etc.)? How is entertainment defined?
- **Selling Products:** Do I want to force the customer to buy the product? Do I only want to introduce my product?

Exercise

Check the following links by clicking on the thumbnails and define the aim of the applications. Discuss your results on the discussion board "Project Aim". You have to give reasons for your decisions and comment on at least three entries of your colleagues.



Flash Games (Flash Games)



GITTA (GITTA)



New York Times (The New York Times)

1.1.3. Data Quality

There are several reasons why one develops a multimedia application. You might be contracted by a customer or you just want to develop a multimedia application for fun during your spare time.

Sometimes when getting the request of developing a multimedia application, the employer already possesses some data which has to be included in the application. If so, it is important to view the data at an early stage, because often, the data is not prepared for this specific project. The files may have the wrong format or the geometry data is often too detailed for a map that has to be displayed on a screen, etc.

Have a look at the following example which illustrates a file whose data is not generalised and a file whose data is generalised.



Not generalised data



Generalised data

Not only the level of detail is an important attribute when viewing the data but rather the quality of data in general.

According to (Hurni 2005), the data quality depends on the following attributes:

- Precision (Positioning Accuracy depending on original measurement data, Updating, Generalisation and Reproduction Technique)

- Up-to-dateness
- Completeness
- Correctness: data should be error-free
- Reliability respectively Plausibility
- Readability, Data Format
- History (Resources, Data Collection, Transformations)

It is important to view as soon as possible the received data and check it for the listed items. Often the data is either not usable or a lot of time has to be spent to prepare the data for the project. Estimating the time that may have to be spent to prepare the data for the project is an important part of the issue analysis.

If you would have to spend most of your available time for the data preparation, you have to doubt the feasibility of the project.

Often, you will not receive any data for your project and you will have to look for data in various sources. That is why the next chapter deals with data sources.

1.1.4. Data Sources

Often, you do not receive any data from your employer. Therefore you have to start a search for data.

Depending on the application the search is easier or not.

For a simple personal Web Page you normally possess already all the needed information. Perhaps you have to create some illustrations or sort some pictures but the expenditure of time will not be that big.

When developing a multimedia application in the field of cartography, the resource search is more complex. Because normally a map is included in the application, geometry data such as administrative boundaries, hydrography, transport network, etc. has to be organized. The organisation differs from country to country depending on the country's law:

- **United States of America:** All data is free to download on the homepage of the national atlas which is provided by the US government: [National Atlas of the U.S.](#)
- **Switzerland:** The Federal Office of Topography (swisstopo) creates, maintains and revises the basic geodetic and topographic data for the whole of Switzerland. This data has to be ordered and paid for: [Swisstopo Products](#)



Logo National Atlas of the U.S. (National Atlas of the U.S.)



Logo Swisstopo (Swisstopo)

Needless to say, this list is not complete and the listed items are just examples.

Often the geometry data has to be extended by thematic data such as inhabitants of the countries, etc. This data is often not delivered with the geometry data and has to be organised separately. You sometimes are lucky and find the right information on the Internet and free to download. But sometimes you have to pay for the data and therefore contact some private or public offices to get the data.

Examples of addresses where you find free thematic data are:

- [The CIA World Factbook](#)
- [U.S. Census Bureau](#)
- [The United Nations Statistics Division](#)
- [Eurostat](#)
- [Swiss Federal Statistical Office](#)

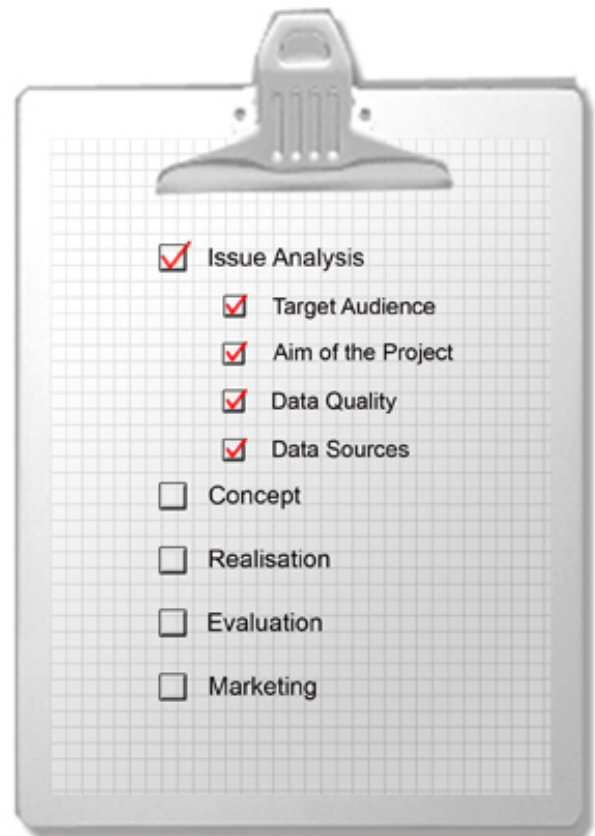
The located data (geometric and thematic) has to be checked for its quality (see list in chapter "**Data Quality**") to get information about its usability and the time that has to be invested for the data preparation.

Again: If you would have to spend too much of the available time for the data preparation, you have to doubt the feasibility of the project.

1.1.5. Unit-Summary

Before starting with the production of a multimedia application, some questions have to be asked and their answers have to be known:

- Who will use my project?
- What knowledge do the users have?
- Is the target audience heterogeneous or homogeneous concerning the age, the schooling level, etc.?
- Do I want to impart knowledge or is my multimedia application just to entertain the users, etc.?
- Do I receive data files from my customer?
- Do I have to organise the data by myself?
- Where can I find the needed datasets?
- How is the quality of the data?
- How much time do I have to spend for the data preparation?



Checklist for the Issue Analysis

1.2. Concept

Learning Objectives

You will be able...

- ...to define the content of an arbitrary planned application.
- ...to list at least two aspects that have to be considered when planning the layout of an application.
- ...to list at least one hardware and one software problem that may occur when using a multimedia application.
- ...to create a time schedule for a planned project.

Introduction

After having defined the target audience and the aim of the project, we can continue with the concept phase of the project.

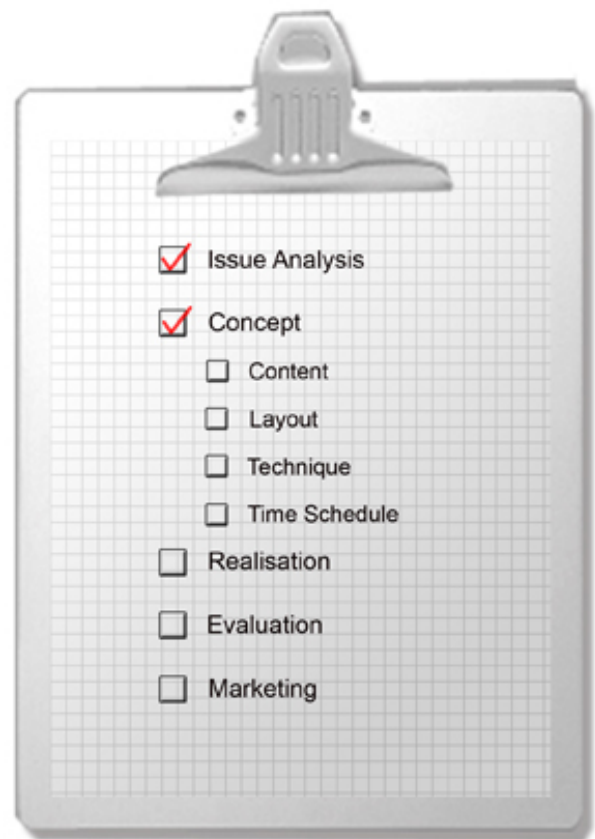
In this phase the content and the layout of the application have to be defined. We also have to make a decision about the technique that will be used for a project. Concretely the hardware and software components have to be defined.

An important part of the concept is the time schedule which includes all the steps that have to be fulfilled from the beginning until the end of the project and the estimated time that is needed for each phase.

In this unit we go through the following points which are all part of the concept phase:

- Content
- Layout
- Technique
- Time Schedule

In the technique section we dwell on possible software and hardware problems that have to be considered when planning a multimedia application.



Checklist for the content phase

1.2.1. Content

Depending on the target audience and the aim of the project, the content and the interactivity parts vary from application to application.

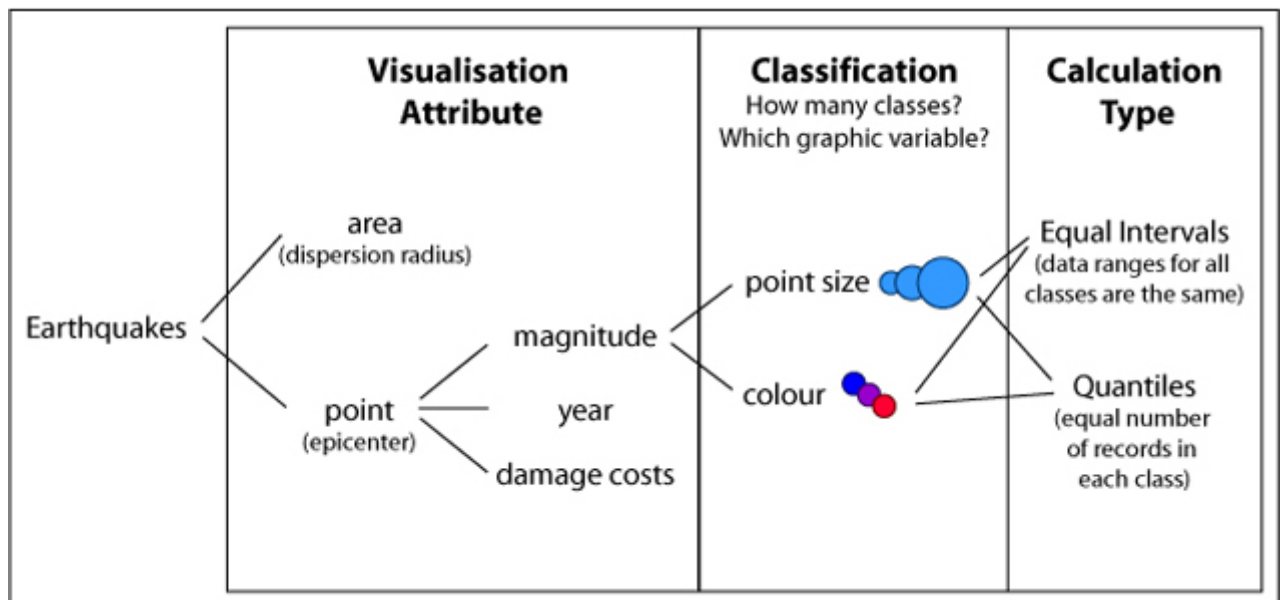
In this chapter we will demonstrate how to define the content of an application using an example. The topic of our example is "the visualisation of major earthquakes in USA between 1852-2003". We therefore want to create an interactive map. We do not want to give you a solution how this interactive map should be realised because there are several ways how to do this. We only introduce you the individual steps that are needed to define the content of an application with the given topic. In addition we show you some possibilities of how some aspects could be realised.

At first, all components that will be included in the application have to be defined. Not only the components but also their interactivities have to be defined. There are several possibilities of how to realise a component in an interactive way, as you will see.

The subject of our application is visualising earthquakes. The first question that has to be posed is: *How to visualise the earthquakes best?*

- **Earthquakes:** It has to be defined how to visualise the individual earthquakes.

First of all we have to make a decision about the visualisation attributes. The earthquakes can be represented as areas (dispersion radius) or as points (epicenter). When visualising the earthquakes e.g. as points, we have to make a decision about the attribute that will be visualised. This may be the magnitude, the year, the damage costs, etc. After having defined the visualisation attribute, we have to specify the classification which determines the number of classes the values have to be divided into and the calculation type (e.g. equal intervals, quantiles, etc.) which defines the border of the classes. When e.g. visualising the magnitude of the earthquakes we first have to decide how many classes will be used and afterwards the calculation type to get the border of each class. To visualise the differences of the classes we may change the size or the fill colour of the point symbols for each class. The following illustration shows an exemplary way how the visualisation of earthquakes may be realised:



Visualisation of Earthquakes

You will learn more about the visualisation rules of data in a further lesson.

- **Area (Map):**

In our application, we want to visualise the location and the magnitude of the earthquakes in the United States of America. Therefore we need a map which shows these geographical conditions. Examples (aerial or satellite maps, topographic maps, etc.) of possible maps are shown below. The decision which map is the best for our application is up to you. Consider that the map below are just examples. There exist many more maps.

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North America (Departement of Mathematical and Statistical Sciences University of Alberta)

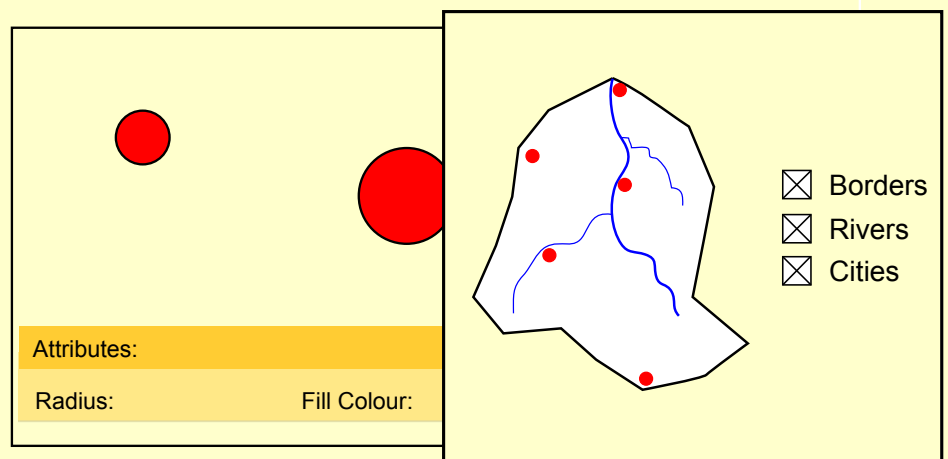


North America (C-MAP - The Electronic Chart Standard)



North America (Primap Software)

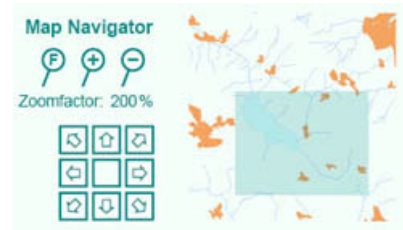
- **Thematic Navigation:** The user should have the possibility to orientate oneself thematically in the application.



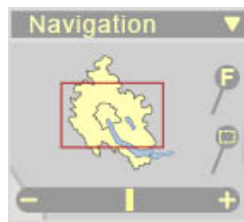
- **Spatial Navigation:** The user should have the possibility to orientate oneself spatially and navigate (zoom, pan, etc.) in an interactive map. Therefore, we recommend to include spatial navigation tools into an interactive map. A reference map which shows the original map in miniature and gives information about the zooming factor and the zoomed region is a good help for the user to keep the orientation in the map. The following images show some examples what type of spatial navigation tools may be implemented. They range from simple zoom functions such as zoom buttons until more complex ones, e.g. creating a zooming fence.



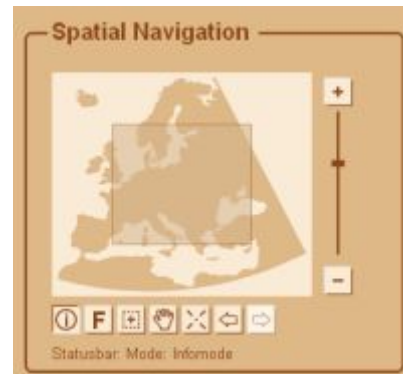
Simple Zooming Tools (Isakowski 2002)



Full View, Zoom Buttons, Pan in 8 directions (Neumann 2002)



Zoom Slider, Zoom Buttons, Full View and Zooming Fence (Isakowski 2004)



Zoom Slider, Zoom Buttons, Full View, Zooming Fence, Pan, Center, Previous Setting, Next Setting as well as movable rectangle (map extent) (Schnabel 2007)

- **About the Project:** For maps - analogue or digital - it is necessary to declare information such as who is the author of the application, which data did the author use, where did the data come from, when was the application created, etc. The decision which items have to be included in the "about the project" part depends on the target audience. For example a map for children does not have to declare many items in the "about the project" part. Unlike a map that is made for scientists. In this case the "about the project" part of the application has to include detailed information about e.g. the origin and the up-to dateness of the data, etc.

Exercise

Write a short essay about the content of an application with the title **"the visualisation of major earthquakes in USA between 1852-2003"**. Granted that you already have the thematic data as *shapefile*¹ with the following attributes for each earthquake: year, month, day, hour, minute, second, location (short description in text format), longitude, latitude and magnitude. In addition you have a shapefile with the state boundaries of the United States and their names.

First of all you have to define for which target audience do you want to create your application. Afterwards, like it is written above, you first have to make a decision about the visualisation of the earthquakes. Then you have to choose the map type, that you want to include as basic map, and so on.

After having defined the main parts of the content of your application, list all the other items and their possible interactivities that you want to include in your application. Give reasons about your decisions.

Hand in your essay to the tutor.

Take in account that the content of an application depends always on the definition of the target audience.

¹ A set of files that contain a set of points, arcs, or polygons (or features) that hold tabular data and a spatial location. This file format is used in ArcGIS software.

1.2.2. Layout

In the former unit we introduced how to define the content of an interactive map with a given topic. Now we have to define the ideal arrangement of the elements on the screen.

According to (Hurni 2005), there are several aspects which have to be considered when planning a layout for a map:

- Relevant aspects should have the major weight in the visualisation
- Hierarchical arrangement of text (Title, Subtitle, etc.)
- Strive for groups of elements
- Avoid congestion of the screen

Have a look at the following interaction part where you find some good and some bad examples in contrast.

We will not go into further details of creating the layout of an application, because this theory will be presented in the lesson "Layout and Graphical User Interface". But if you are interested in more layout principles, especially for analogue maps, have a look at the GITTA lesson "[Definition and Organisation of Map Elements](#)".

1.2.3. Technique

Before starting with the realisation of the application, some technical aspects have to be defined:

- Storage of data (Database, XML, Storage of Attributes in Geometry)
- If Storage of data in a database: Query technique

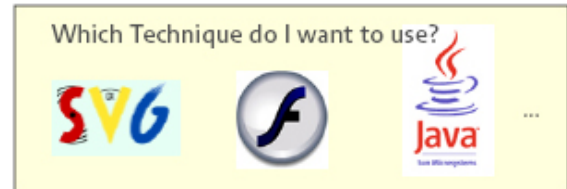
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- Visualisation (*Flash*², *SVG*³, etc.)
- Technique for Interaction (*JavaScript*⁴, *ActionScript*⁵, etc.)

It is important to specify where to store the data. Depending on the storage type we have to define how (with which scripting language) to extract the data for our application.

We recommend you to store the thematic and the geometric data separately for bigger projects, e.g. storing the thematic data in a database and the geometric data in a SVG file, etc. You will learn more about the advantages of this storage method in the next lesson **Internet Techniques and Web Formats**.

The choice for the interaction technique depends on the visualisation technique: When using SVG you have to program the interaction parts with JavaScript; when using Flash the interaction parts have to be programmed in ActionScript; etc.



Examples of Techniques

We do not want to give you any recommendation for a specific format that has to be used for multimedia applications. The choice depends on various factors such as the existing knowledge of the developer, the available hardware and software of the future users, etc.

Software and Hardware Problems

There are some aspects that have to be considered when coming to a decision about the technique that will be used. The ignoring of these aspects may cause some problems on the user side:

- *Hardware*⁶ Problems
- *Software*⁷ Problems

Hardware Problems

- **Screensize:**
The applications are always displayed on the screen. The display size varies from user to user. Some possess a 21 inch display which is pretty wide and some possess only a 15 inch screen. Whether the screen is wide or not, always the whole application has to be displayed on it. That means that e.g. the font size has a different appearance on a 21 inch screen than on a 15 inch screen.

² The term "Flash" refers to the vector graphics format, the Flash Player and to the multimedia authoring program used to create content for it. The Flash Player, developed and distributed by Adobe Systems (formerly by Macromedia), is a client application available in most web browsers. It features support for vector and raster graphics, a native scripting language called ActionScript and bidirectional streaming of audio and video.

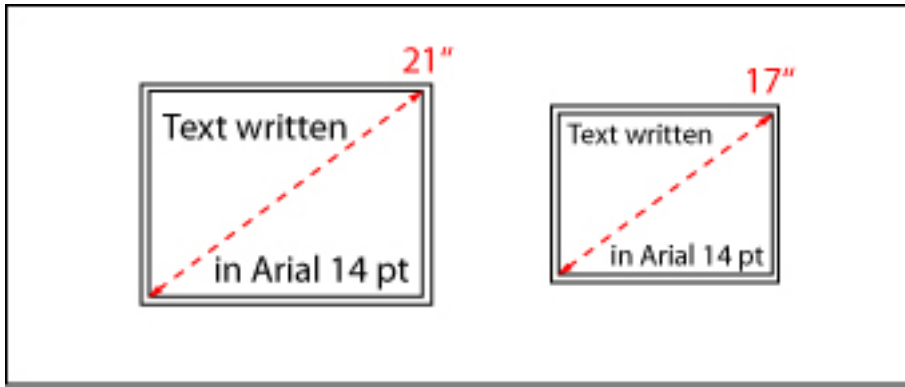
³ Scalable Vector Graphics (SVG) is a W3C standard and an XML markup language for the description of two-dimensional vector graphics, both static and animated.

⁴ JavaScript is a Scripting Language that is used to create dynamic, interactive Webpages.

⁵ ActionScript is the Scripting Language that controls the Flash movies and applications.

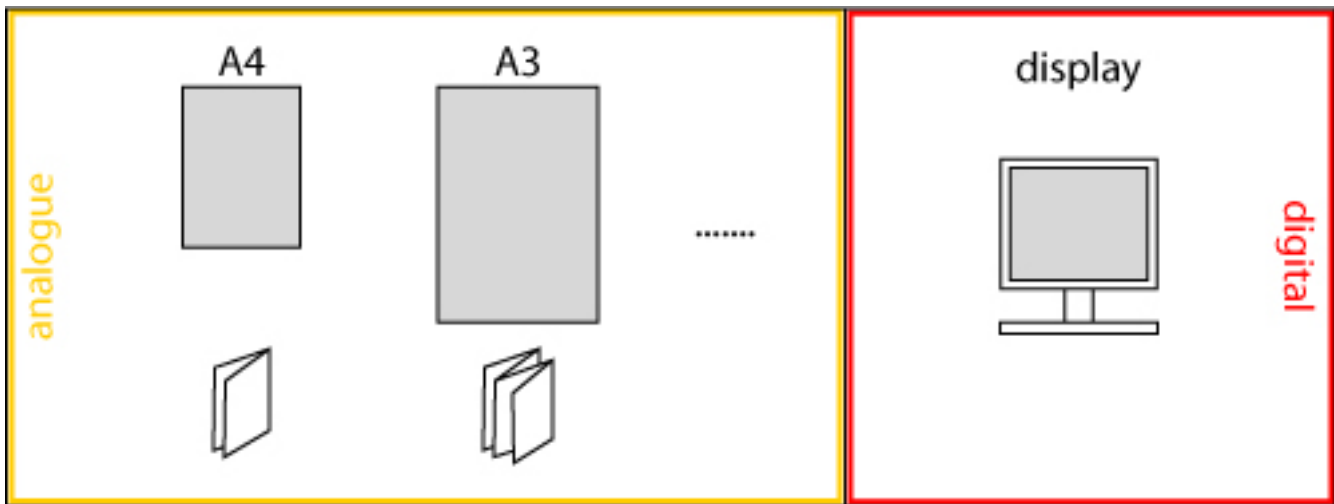
⁶ The physical, electrical, and mechanical parts of the computer.

⁷ A program or set of instructions that controls the operation of a computer.



Font on different displays

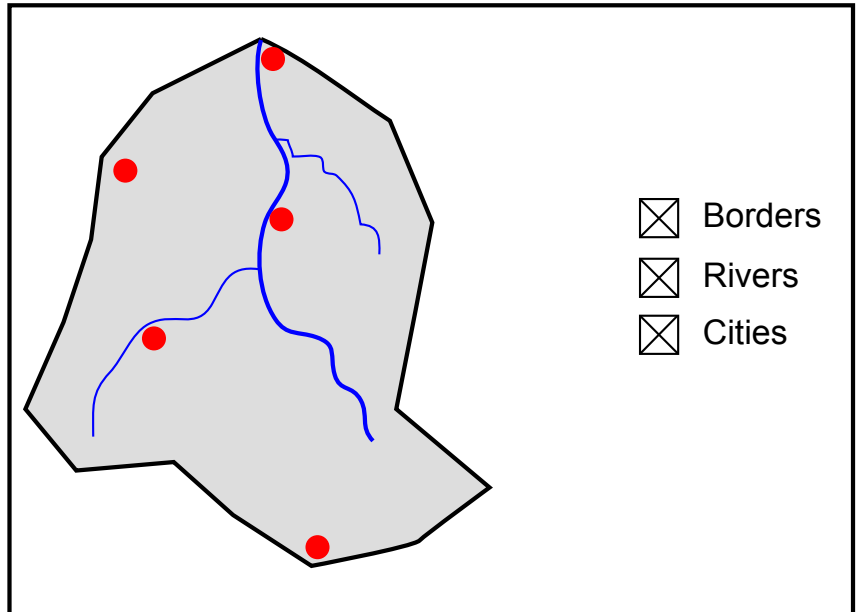
Considering Web Maps: Although the size of the displays may vary, it is more or less fix in contrast to analogue maps. That means that we are not able to vary the size of the application as it is possible with printed maps.



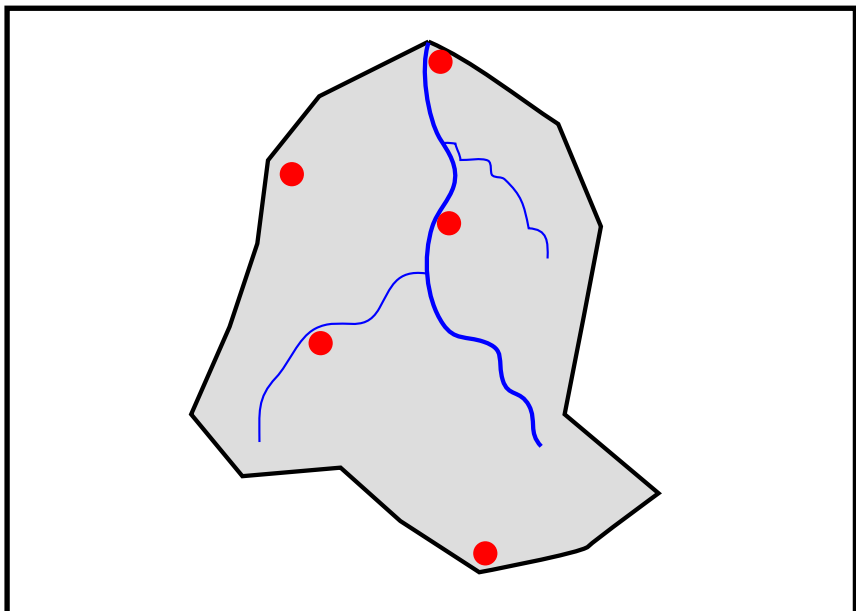
Display is always of the same size

There are some methods to minimise the display problem:

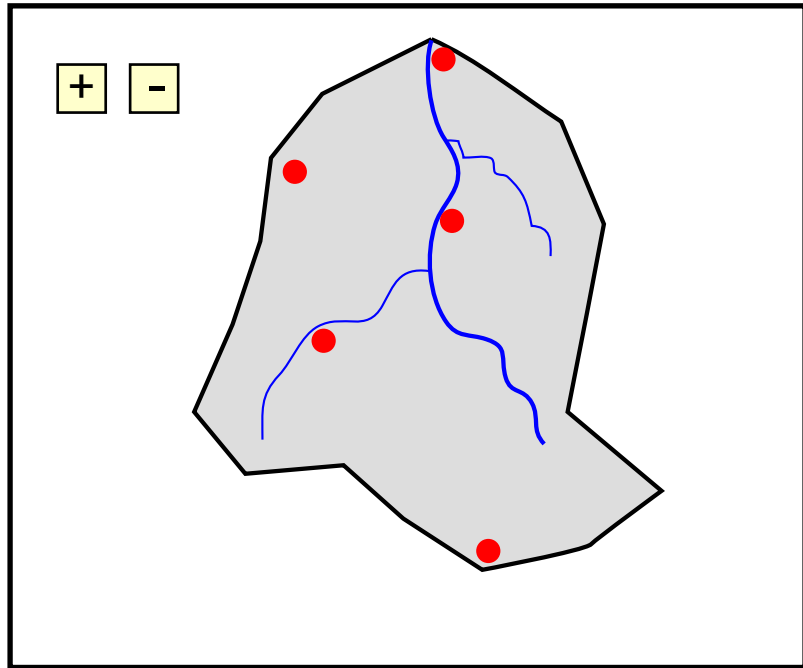
Switching on and off layers: Click on the checkboxes to switch on and off the layers.



Tooltip: Move mouse cursor over the rivers, cities and borders to see the information of the tooltip.



Zooming: Click on the buttons to zoom in and out.



For Internet applications there exist another problem:

- **Rate of Transmission:**
An other problem occurs with internet applications because of big differences in transfer rates (analog modem: max. 56 to 64 kBit/s; DSL: max. 150 to 15000 Kbit/s).
Fastest download time for a 10 MB file with
The best option to avoid this problem is keeping the file sizes small.
 - Phone line: 24min 58s
 - Broadband access (15MBit/s): 6s

Software Problems

- **Browser Compatibility:**
Not all users use the same *browser*⁸ software. This may cause problems, because the presentation of HTML, etc. differs from browser to browser. The reasons for this difference are listed in the box "Browser War" below.
In addition to the presentation, the capability of the different browsers varies as well (as you saw in the lesson [Internet Techniques and Web Formats](#)).
The presentation of a Web Page depends not only on the Web Browser software but also on the platform. A Web Page visualised in the Internet Explorer on a Windows computer looks different than in the Internet Explorer on a Macintosh (or Linux) as it is shown in the next images:

⁸ A Web Browser is a software application that runs on the user machine and enables the user to display and interact with Web Pages hosted by Web Servers. A Web browser locates and fetches each requested page and, by interpreting the formatting commands that the page contains, the page contents are displayed. There are a number of browser programs available such as Mozilla Firefox, Opera, Internet Explorer, etc.



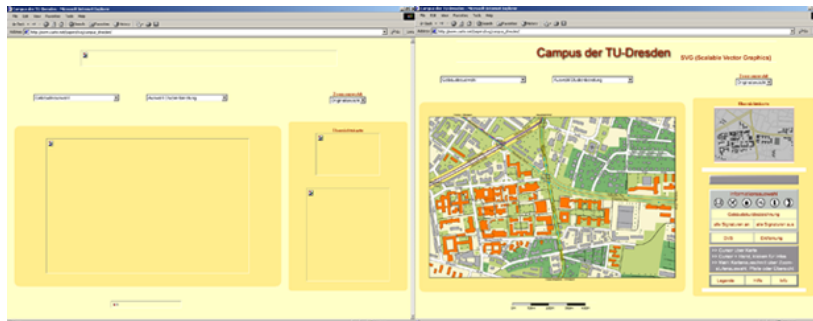
Font in Internet Explorer on Windows



Font in Internet Explorer on Macintosh

To solve the browser problem you have to test your application in different browsers and on different platforms.

- **Plugins:**
Additionally, plugins can cause problems. Some formats such as Flash or PDF require a Plugin such as e.g. the Adobe Flash Player or Adobe Acrobat Reader. If the user has not installed the plugin, the content of the application will not be displayed:



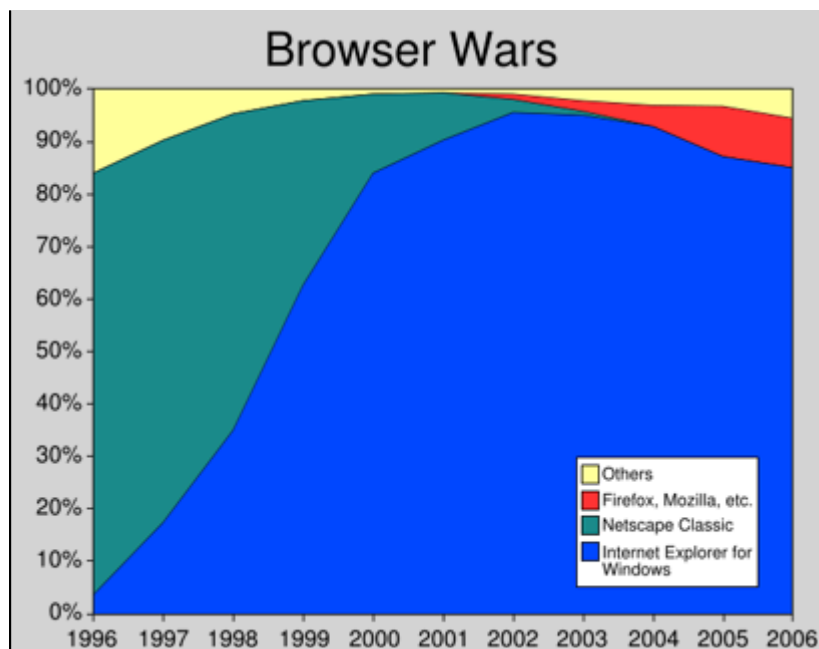
The visualisation of an application in a browser without the needed plugin and with the needed plugin (Berger 2002)

To solve this problem you ought to give the user the possibility to download the plugin by specifying the download link.

Not all users have the rights to install software on the computer that is used to view the application. In addition you have to be aware that not all plugins run on all platforms.

Browser War

The term "Browser War" is the name given to the competition for dominance in the web browser marketplace. The term is most commonly used to refer to two periods of time: the particularly intense struggle between Internet Explorer and Netscape Navigator during the late 1990s, and the growing threat which Mozilla Firefox poses to Internet Explorer from 2004 onward.



A rough estimation of the usage share of major web browsers by layout engines over time. (Wikipedia)

The details concerning this browser war you find on the [Wikipedia Homepage](#). In this lesson we only discuss the consequences that arose from this browser war.

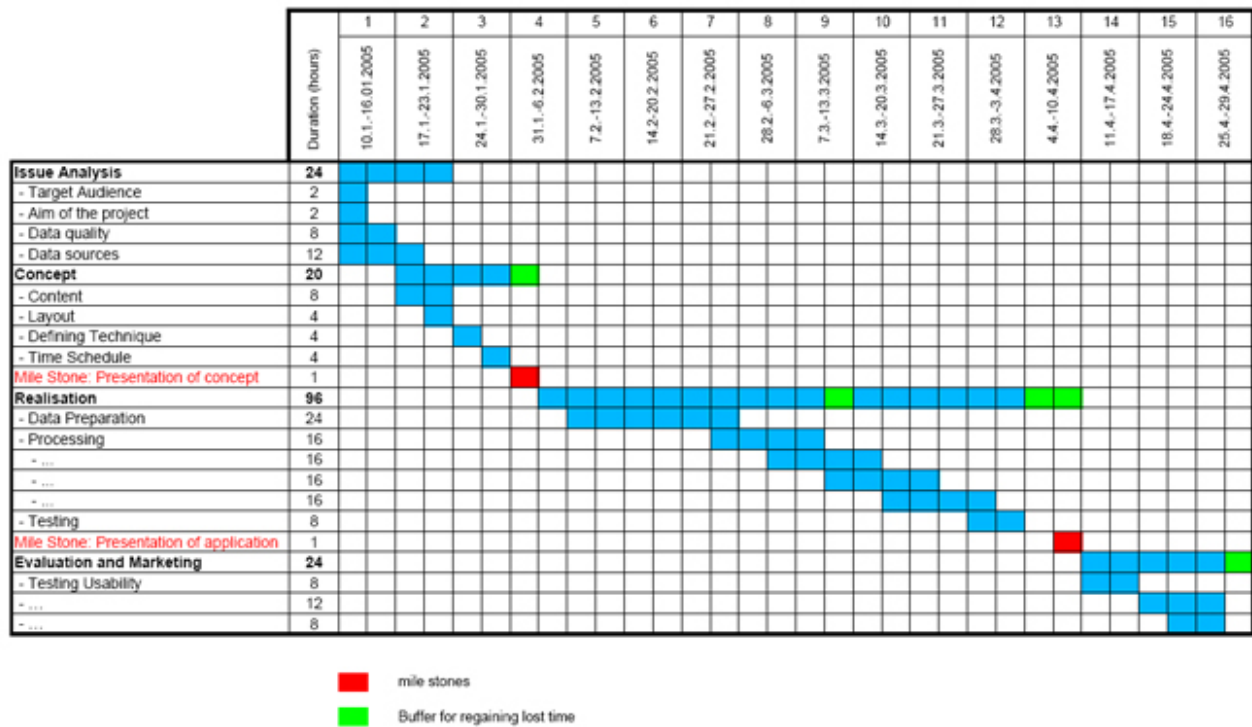
The browser war encouraged two specific kinds of behaviour among their combatants. One of them is the reason why there are presentation differences between some browsers (especially between Internet Explorer and Netscape Navigator / Mozilla Firefox): A web browser was expected to follow the standards set down by standards committees (for example, by adhering to the HTML specifications). But competition and innovation required that web browsers extend the standards with proprietary features (such as by adding special tags) without waiting for committee approval. These new tags only rendered properly in the one browser which implemented them, and sometimes caused problems with other browsers. Web standards were weakened as an outcome of a single company's dominance over the browser market. This causes web development to stagnate with obsolete and unnecessarily complex techniques. Many web developers also write their web pages to work with Internet Explorer's idiosyncrasies rather than stick to the standards, and this means that many web pages only render properly with Internet Explorer. In addition Internet Explorer 6.0 still lacks compliance with several standards such as CSS, the PNG image format, and XHTML. (Wikipedia)

1.2.4. Time Schedule

When developing a multimedia application it is important to arrange a timetable at the beginning of the project. Each step that has to be fulfilled from the beginning of the project until the end has to be listed in this time schedule and the required time has to be estimated. Mile Stones such as important meetings or presentations have to be visualised in the time schedule.

Have a look at the following illustration, by clicking on the thumbnail, to receive an impression of a possible time schedule. Please note, that every listed item is part of this lesson and the sequence of these items is also the same as it is in this lesson. Since time is always scarce, it is important to schedule enough buffer time, where you can regain lost time.

Exemplary Time Schedule



Exemplary Time Schedule

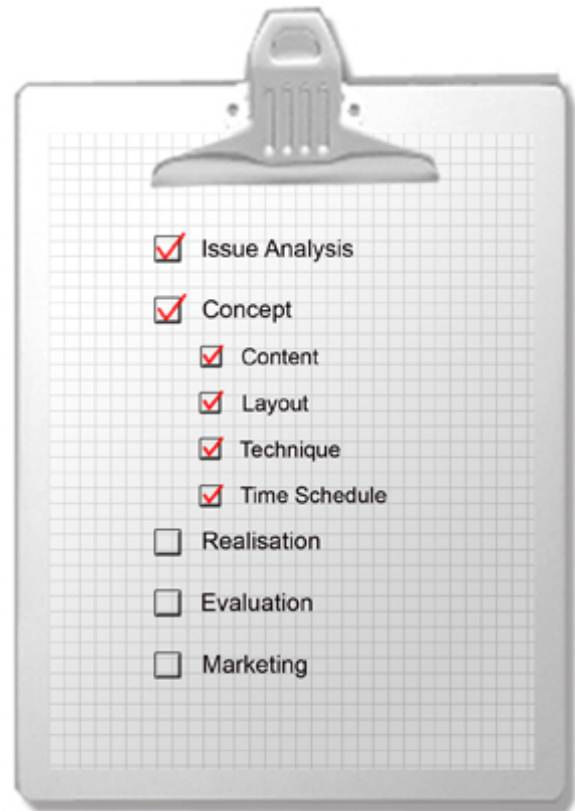
1.2.5. Unit-Summary

In the concept phase content, layout and techniques that will be used to realise the application have to be defined. A time schedule that leads the developer through the realisation phase has to be generated as well.

Only after having defined the content of the application, its layout and the time schedule can be created. Estimating the time of the various steps is an important part of the concept phase. Especially when developing a complex application it is important to know how much time can be spent on the different subjects.

When making a decision about the technique that will be used to realise the application, some aspects have to be considered.

- Hardware Problems
 - Screensize
 - Rate of Transmission (for Internet applications)
- Software Problems
 - Browser Compatibility
 - Needed Plugins for some formats



Checklist Concept

1.3. Realisation

Learning Objectives

You will be able...

- ...to list at least two ways how to prepare geometric or thematic data for a specific project.
- ...to explain why a finished application has to be tested and where it has to be tested.

Introduction

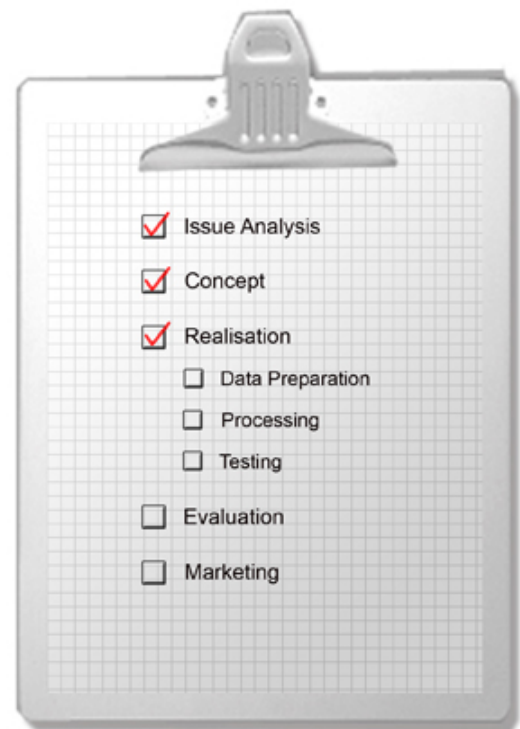
After having created the concept of the application we are able to start with the realisation. In an earlier step you had to look for data at various sources and view the located data to define its quality. Even if you would have received data from a customer, it was necessary to view the data at an early stage. Normally the data has to be preprocessed before using it for the application.

By viewing the data at an early stage, you were able to estimate the time that has to be invested for the preparation of the data. The needed time for this preprocessing phase is not to be underestimated as you will see in this unit.

We will introduce you some methods how data can or has to be prepared for a project.

Only after having fulfilled this step, the real processing can be started. Because the realisation of a real application - even if it is a simple application - would be too time-consuming, we cannot realise an application in this lesson. Therefore, we concentrate on giving hints and introduce some examples.

After having created an application, it has to be varified that the application runs both in different browser software (if it is a Web application) and on different platforms.



Realisation Phase

1.3.1. Data Preparation

Imagine that we have collected all the needed data for an application. Often the data does not fit the application, because e.g. the geometry is too detailed or the file might cover the whole world, but for our project we only need Europe, etc. Therefore, we have to prepare the data until it fits the requirements of the application.

Geometry Data

Depending on the application, there are several possibilities of adapting the geometry to the requirements of the project. Some examples are listed below:

- **Shape Simplification**
The data may be too detailed. Reasons may be, that the file would be too large without eliminating any data or that the presentation on the screen is not satisfying (coastline is too detailed for the presentation on a screen). Therefore, the geometry has to be generalised.



Ungeneralised Coastline (ESRI)



Simplified Coastline (ESRI)

If you are interested in detailed theory about generalisation - especially for maps - have a look at the GITTA lesson "[Generalisation of Map Data](#)".

- **Clipping specific regions**

Imagine developing an application with the title "Europe and its Countries" and you have a dataset of the whole world. It is obvious that you have to crop only the needed region.



Whole Dataset (ESRI)



Clipped Region (ESRI)

- **Aggregation of data**

When planning a project with the title "The cantons of Switzerland" and you possess a dataset with all communes of the country, you have to merge them to reach the wanted dataset.



Planning Multimedia Projects

Unmerged Data, reproduced with the permission
of swisstopo (JD072706) (Swisstopo)

Merged Data, reproduced with the permission
of swisstopo (JD072706) (Swisstopo)

- Etc.

Thematic Data

Not only the geometric but also the thematic dataset has often to be prepared to be able to include it in the application. Deleting or adding entries are common operations in this phase.

FID	Shape*	AREA	PERIMETER	OBJECTVAL	OBJECTID	OBJECTORI	YEAROFCHA	SEHR	GEMTEIL	BEZIRKSNR	KANTONSHR	GEMNAME	GEMFLAECH	LANDCODE	NATPARKNR
0	Polygon	8224977.173	14803.94153	2931	6941724	GGZS	2000	0	0	1403	14	Bergen (SH)	827	CHE	0
1	Polygon	3207327.965	8983.35262	2911	6941725	BFS	1997	0	0	1402	14	Altdorf (SH)	304	CHE	0
2	Polygon	1161689.303	5540.18333	2916	6941726	GGZS	2000	0	0	1402	14	Hofen	106	CHE	0
3	Polygon	17607814.81	19963.65547	2936	6941727	BFS	1997	0	0	1403	14	Merishausen	1756	CHE	0
4	Polygon	12607641.79	14710.68088	2951	6941728	BFS	1997	0	0	1404	14	Beggigen	1259	CHE	0
5	Polygon	2069196.391	8216.02182	2918	6941729	GGZS	2000	0	0	1402	14	Opfertshofen	210	CHE	0
6	Polygon	1842955.734	7390.17488	2913	6941730	BFS	1997	0	0	1402	14	Bibern (SH)	180	CHE	0
7	Polygon	21526160.39	24032.53939	2952	6941731	BFS	1997	0	0	1404	14	Schletheim	2160	CHE	0
8	Polygon	4942065.490	11457.15318	2917	6941732	BFS	1997	0	0	1402	14	Lohn (SH)	490	CHE	0

Table with too many entries. Each commune of Switzerland features 16 attributes. Reproduced with the permission of swisstopo (JD072706) (Swisstopo)

FID	Shape*	AREA	BEZIRKSNR	KANTONSHR	GEMNAME	GEMFLAECH
0	Polygon	8224977.17332	1403	14	Bergen (SH)	827
1	Polygon	3207327.96585	1402	14	Altdorf (SH)	304
2	Polygon	1161689.30310	1402	14	Hofen	106
3	Polygon	17607814.8117	1403	14	Merishausen	1756
4	Polygon	12607641.7924	1404	14	Beggigen	1259
5	Polygon	2069196.39130	1402	14	Opfertshofen (SH)	210
6	Polygon	1842955.73493	1402	14	Bibern (SH)	180
7	Polygon	21526160.3997	1404	14	Schletheim	2160
8	Polygon	4942065.49058	1402	14	Lohn (SH)	490

Table adapted to the application. Each commune of Switzerland features 7 attributes. Reproduced with the permission of swisstopo (JD072706) (Swisstopo)

In the given example we deleted entire attributes. Additionally or alternatively you can delete individual entries. Of course, for the given example it is not reasonable to delete any entries because normally (depending on the aim of the project) all communes have to be visualised. But imagine creating an application with the title "Visualisation of major hurricanes in the USA between 1850 and 1999" and you have a dataset which includes also the minor storms. Needless to say that you have to delete all those minor storms in your dataset.

Often you have data from different sources. In a first step it has to be defined if geometric and thematic data will be stored in the same file (or database) or separately. In a second step the data has to be brought together in one or several files.

There are several possibilities of storing thematic data: in a database, by using XML, Text files, etc. How to store best the data will be explained in the following lesson [Data Storage and XML](#).

Exercise

In a former exercise you had to define the content of an application with the title "**the visualisation of major earthquakes in USA between 1852-2003**". We told you that you receive two datasets, one with the earthquakes and one with the state boundaries:

- State boundaries: includes the geometry of the boundaries and thematic data about the states such as name, area, etc.

FID	Shape	AREA	PERIMETER	STATESP020	STATE	STATE_FIPS	ORDER_ADM	MONTH_ADM	DAY_ADM	YEAR_ADM
0	Polygon	267.357	374.768	2	Alaska	02	49	January	3	1959
1	Polygon	0	0.224	3	Alaska	02	49	January	3	1959
2	Polygon	0	0.118	4	Alaska	02	49	January	3	1959
3	Polygon	0	0.276	5	Alaska	02	49	January	3	1959

Attribute table of state boundaries (National Atlas of the U.S.)

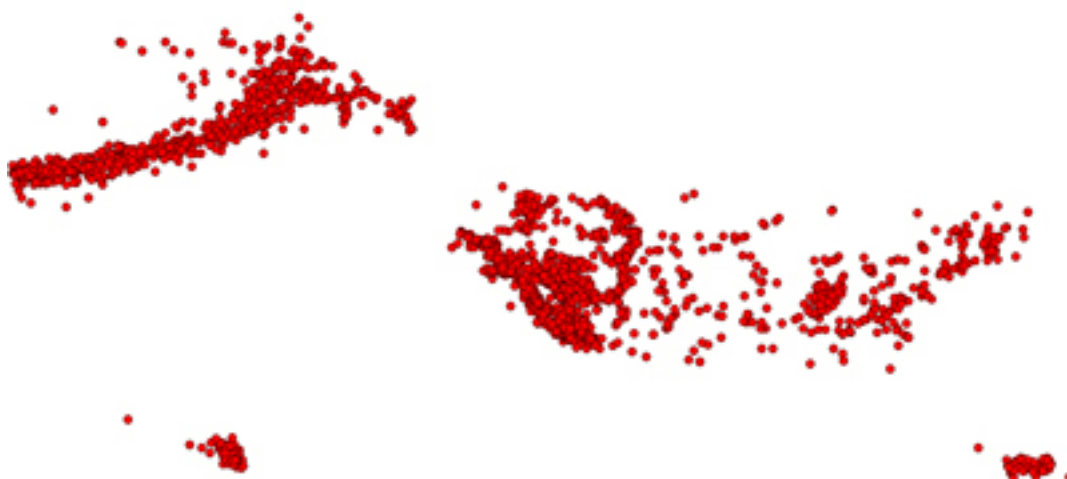


Visualisation of the above attribute table (state boundaries) (National Atlas of the U.S.)

- Earthquakes 1850-2004: includes the coordinates of all earthquakes and additional attributes such as magnitude, depth, etc.

FID	Shape	QUKSIGX029	QUAKE_ID	YEAR	MONTH	DAY	HOUR	MINUTE	SECOND		
0	Point	1	1	1568	-9999	-9999	-9999	-9999	-9999	Near Moodus-East Haddam, Connecticut	
1	Point	2	2	1627	-9999	-9999	-9999	-9999	-9999	Near Essex, Massachusetts	
2	Point	3	3	1638		6	11	7	-9999	Probably in the Saint Lawrence River valley, C	
3	Point	4	4	1663		2	5	22	30	-9999	In the Saint Lawrence River valley region, Can

Attribute table of earthquakes (National Atlas of the U.S.)



Visualisation of the above attribute table (earthquake) (National Atlas of the U.S.)

We now want you to download these two datafiles, view them and prepare them for your application whose content you already defined in chapter **Content**. Depending on your defined application content you have to adjust these two datasets. You can delete attribute categories and/or earthquake and state boundary entries. Of course you are free to add new attribute categories as well. But you have to be aware that for each existing entry you have to fill in the right attribute values. If you have a lot of entries and a lot of different values, this step can be time-consuming.

- Download: [states.zip \(24KB\)](#)
- Download: [earthquake.zip \(359KB\)](#)

Open the .dbf files in Excel and study the dataset. Make your own decision about which attribute categories do you want to keep and which ones do you want to delete. Explain in words which entries do you want to keep and which ones do you want to delete for each dataset.

Example:

- Keeping the following attributes in earthquake: year, location, etc.
- Deleting the following attributes in earthquake: hour, minute, second, etc.
- Deleting the following entries in earthquake: year <1950, etc.

Write down your decisions and hand it in to your tutor, together with your content essay.

1.3.2. Processing

Finally, we are able to start with the processing phase of the application. The processing phase differs depending on the planned application and its content.

Because the realisation of an application is too time-consuming, we cannot realise an exemplary application as part of this lesson. But we want to give you a list of items that have to be executed during the realisation phase of an arbitrary application:

- Realisation of layout with the chosen technique (Flash, SVG, etc.),
- Implementation of content components (e.g. navigation, buttons, legend, etc.),
- Programming of interaction parts.

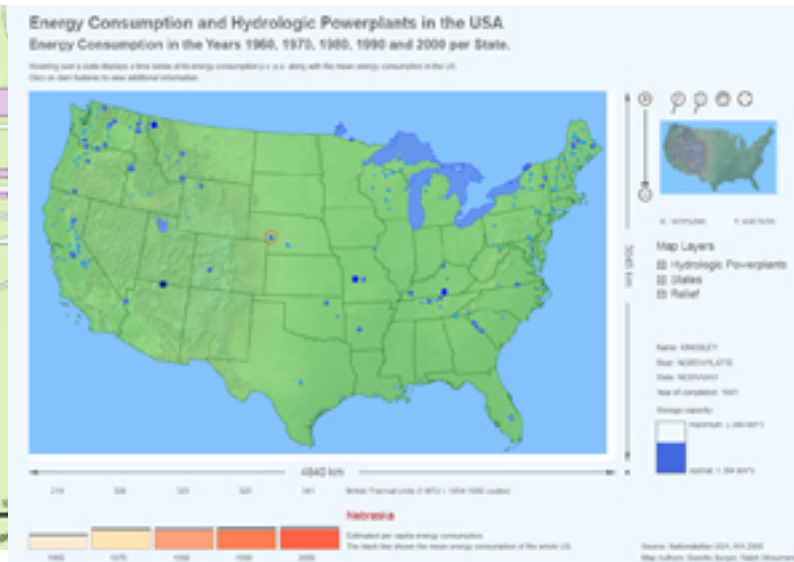
This list is very short and perhaps gives the impression that the realisation part of a project is the easiest one. But do not let yourself be fooled of this impression. The implementation of content components and the programming of interactions are the most difficult and time consuming parts of the project, especially when you are developing your first application. In the following section, we present you a few exemplary applications. For each example we specify the time that was invested to realise the application and the programming skills that the author had. All the applications are made with SVG and JavaScript (the third application uses *PHP*⁹ as well). The listed skills refer to the standard of knowledge at the beginning of the project. The estimated time includes also the data preparation.

Authors: 1 student with no skills in SVG and Javascript
Needed time: 16 hours



Small project (Neumann 2003)

Authors: 2 students with no skills in SVG and Javascript
Needed time: 14 weeks, 3 hours a week



Student project (Burger et al. 2005)

Author: 1 student with little skills in SVG and Javascript

Author: 1 expert with good skills in SVG and Javascript

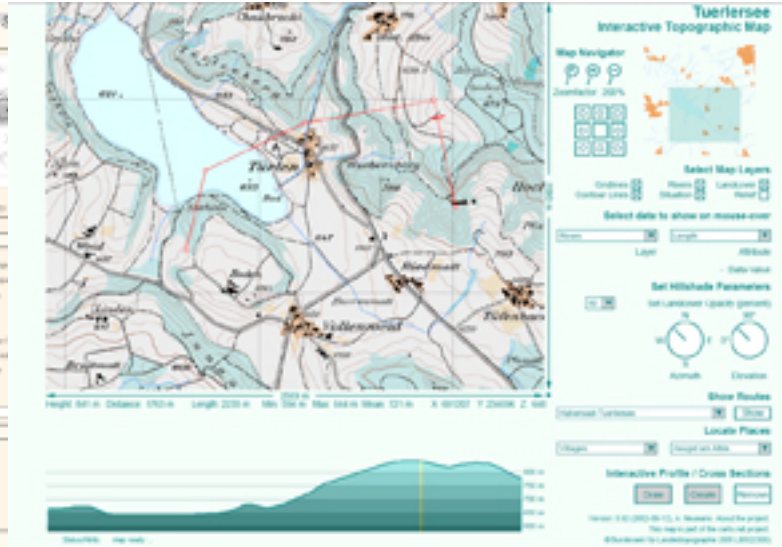
⁹ PHP (PHP: Hypertext Preprocessor) is a widely used serverside scripting language for the dynamic generation of web pages. The language is very popular since it allows easy access to databases and read and write access to files.

Needed time: 2 1/2 months, 8 hours a day



Diploma thesis (Sigrist 2007)

Needed time: 2 weeks, 8 hours a day



Large Project (Neumann 2002)

The realisation phase is not yet finished as you will see in the next chapter.

1.3.3. Testing

Although having fulfilled the processing phase, the application is not yet finished. Now, we have to test the application in two ways:

- First of all the application has to be tested in several browser softwares especially in the most common ones such as Internet Explorer, Mozilla Firefox, Safari, etc.



- Additionally, the application ought to be tested on different platforms such as Microsoft, Apple Macintosh and Unix.



Apple Macintosh



Linux (Unix)

When testing the application in different browsers and on different platforms the following items have to be controlled

- Presentation of Application: Font, Colours, Letter Spacing, etc.
- Animation: Do the animations act up?
- Interaction parts: Do the interaction parts act up?

The following pictures show the visualisation of an old CartouChe lesson in Internet Explorer and Mozilla Firefox. Have a look at the marked parts and compare them.



Visualisation of an old CartouCHE lesson in Mozilla Firefox



Visualisation of an old CartouCHE lesson in Internet Explorer

After having finished one of these testing phases, the application has to be adapted to the results of the tests.

1.3.4. Unit-Summary

The data that you located in an earlier step has to be prepared for the application, depending on the application content. Often, the data are too detailed so that we have to manipulate them. The manipulation tasks may be:

- Generalisation
- Clipping Specific Regions
- Merging Data

These operations can be applied to thematic and topographic data.

Finally the processing can be started. The sequence of the various operations depends on the application, but the following operations have to be fulfilled anyway:

- Realisation of layout with the chosen technique (Flash, SVG, etc.),
- Implementation of content components (e.g. navigation, buttons, legend, etc.),
- Programming of interaction parts.



Checklist of realisation phase

Independent of the application type (web page, multimedia map, etc.) the application has to be tested in various browser softwares (for web applications) and on various platforms, because the appearance and the interactions may vary from browser to browser and from platform to platform.

1.4. Evaluation and Marketing

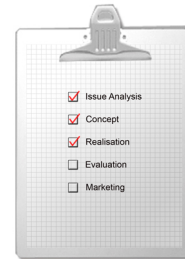
Learning Objectives

You will be able...

- ...to describe the cycle of evaluating an application and adapt it to its results.
- ...to list the differences between the marketing of a CD-ROM and a Web application.

After having finished the development of a multimedia application it is important to make an evaluation of the project. Persons that are part of the target audience have to test the application for its *usability*,¹⁰ its functionalities, etc. The application has to be adapted to the results of this evaluation. These steps have to be cycled several times, until the application fits to the requirements of the target audience. This unit will handle this issue.

After having adapted the application to the results of the evaluation, the application is ready to be published. How an application is best merchandised is part of this unit as well.



Checklist evaluation and marketing

1.4.1. Evaluation

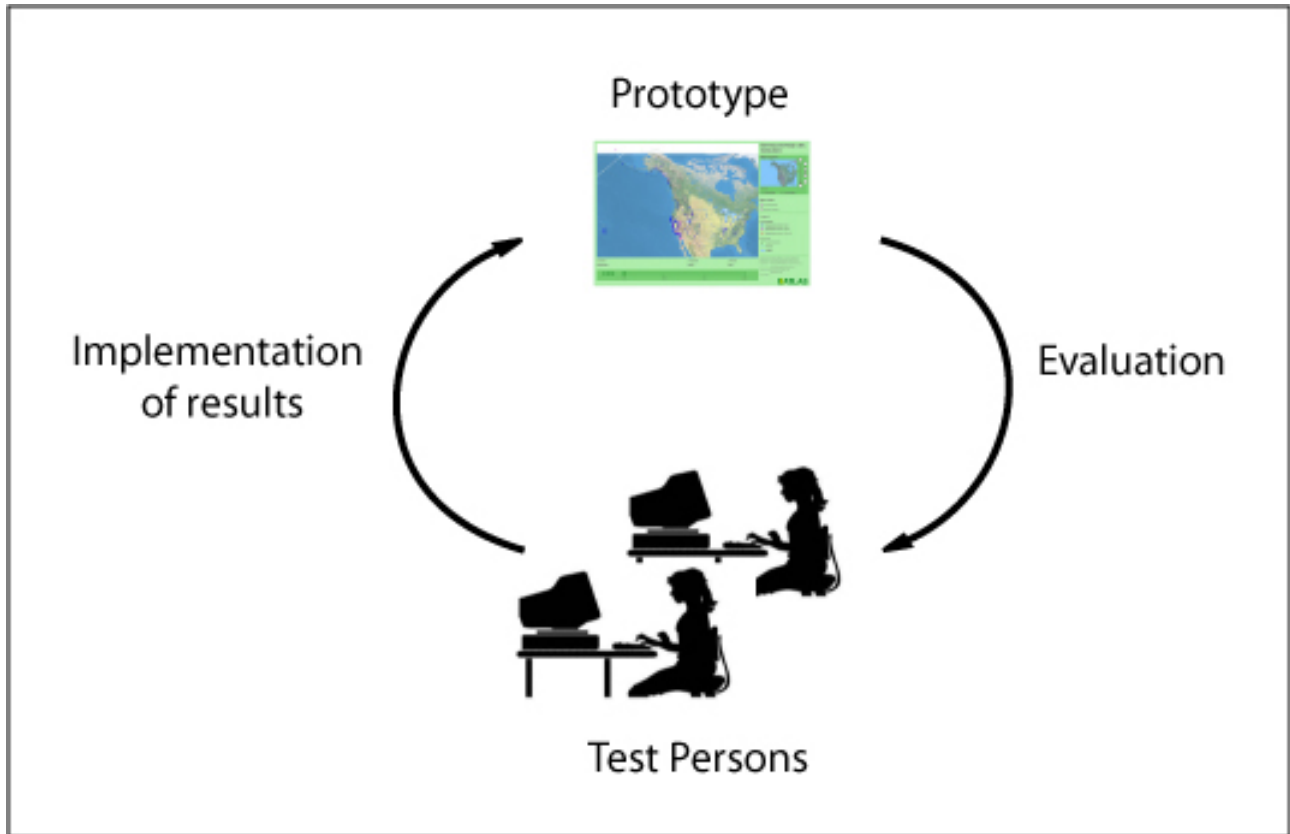
The evaluation is the last phase of the development of a multimedia application. Persons which represent the target audience have to test the application for its usability, its functionalities and the understanding of the content. Especially when having a heterogeneous target audience, it is important to execute the evaluation with various persons which represent each group of the target audience.

The evaluation phase runs through the following loop:

- 1. Step: Test persons check the application and make suggestions for improvement.
- 2. Step: Implementation of the most important results from step 1.
- 3. Step: Test persons check again the application and make again suggestions for improvement.
- 4. Step: Implementation of the most important results from step 3.
- And so on

This loop is run through until finally the application fits to the requirement of the target audience.

¹⁰ A measure of how easy it is for a user to complete a task. In the context of Web pages this concerns how easy it is for a user to find the information they require from a given Web site. Usability can be measured objectively via performance errors and productivity, and subjectively via user preferences and interface characteristics.



Evaluation Cycle

It is recommended to create a questionnaire which has to be completed by the test persons. General questions about the usability, the understanding of the content or the functionalities ought to be contained by the questionnaire. By doing so, you receive consistent feedback about those parts of the application that you definitely want to be checked. In addition to the prepared questions, the test persons should have the possibility to give individual feedback in the form of writing down some sentences. Therefore, the questionnaire has to contain blank parts which allow this form of feedback.

Exemplary Evaluation Form

Lesson:
Version of Lesson:
Date of Review:
Reviewer:

R E V I E W

The Learning Objectives of this lesson were clear.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
yes	rather yes	partly/partly	rather no	no

The meaning of the icons is clear.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
yes	rather yes	partly/partly	rather no	no

The navigation of this lesson is clear and understandable.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
yes	rather yes	partly/partly	rather no	no

Exemplary questions for an evaluation form

1.4.2. Marketing

After having developed, evaluated and corrected the multimedia application, the marketing phase starts. If you create smaller projects such as semester work during your studies, the marketing phase does not exist, because it is not a commercial product. But if you are developing a Web Page or a commercial multimedia application (either Web based or on CD-Rom), the marketing phase is the most important phase for the dispersion of the product.

We distinguish between the marketing of two multimedia products:

- CD-ROM
- Web Application

CD-ROM

The following items have to be considered when planning the marketing of a CD-ROM application:

- Copying of application
- Managing the Copyright
- Designing the CD Cover
- Packaging and Sale
- Despatch of application



DVD Cover "Atlas of Switzerland"
(Atlas of Switzerland)



Box Cover "Atlas of Switzerland" (Atlas of Switzerland)

Web Application

Because the World Wide Web is open for everyone that possesses an Internet access, other aspects have to be considered in contrast to the marketing of a CD-ROM application.

First of all the access authorisation has to be defined. Is the application open for everyone or is there a restricted access with needed username and password? If the access is restricted, the distribution and administration of the access data has to be managed. If the application is open to everyone, targeted advertisement has to point to the application.

Advertisement

The following media can be used for the advertisement of a multimedia application:

- World Wide Web (Web Pages)
- Trade Magazines
- Journals
- Television
- Radio
- Posters

Depending on the type of multimedia application, its target audience and its aim, not all media are qualified for the advertisement.

1.4.3. Unit-Summary

After having finished the development of a multimedia application, the prototype has to be evaluated. The test persons have to represent the target audience and the application has to be tested for its usability, its functionalities, etc. The main suggestions for improvement of the test persons have to be implemented in the prototype. This cycle has to run until the application fits to the requirements of the target audience.

After having completely finished the multimedia application, it has to be published. Depending on the application type (CD-ROM or Web application) the marketing of the product varies. A CD-ROM application has to be disposed while a Web application has "only" to be uploaded on the World Wide Web.

Both CD-ROM and Web applications have to be advertised anyway. Media such as the Internet, Trade Magazines, Journals, etc. are well suited for the purpose of advertisement.



Finally every item in the checklist is fulfilled

1.5. Self Assessment

Choose an arbitrary application on the web which can be either a homepage, a web application or an application that has to be downloaded and installed on the computer.

Do the usability test and the evaluation for the chosen example. Check the application in **different browser softwares** for the aspects you learnt in this lesson. The following list proposes some exemplary questions that have to be posed during the evaluation:

- **Layout:** Do you like the layout of the application? Do you propose some changings?
- **Content:** Does the content correspond to the possible target audience? Are you missing some functions? Are there sufficient or insufficient tools or functions? Did the authors choose an appropriate visualisation of the topic that is visualised?
- **Technique:** Did the author consider the possible hardware and software problems?
- **Usability:** Are the handling and the results of the functions and tools clear? Is the handling of the whole project obvious?
- **Etc.**

Write a short essay (approx. 1 A4 page) with the results of your evaluation and hand it in to your tutor.

Needless to say that in your essay you have to indicate the URL where to find the application.

Possible links where to find applications are:

- [Carto.net](#) (SVG Examples)
- [Institute for Cartography \(ETH Zurich\)](#)

1.6. Summary

Creating a concept for the development of a multimedia application is very important. But before creating a concept, the questions about the target audience and the aim of the project have to be defined. Questions like:

- Who will use my project?
- What is the aim of my project?
- Etc.

are important to define these items.

During the issue analysis, data which is needed for the project have to be searched and viewed. The data quality is important to make a decision about the feasibility of a project. The data quality defines also the time that is needed for the data preparation which is fulfilled during the realisation phase.

Only after having defined the target audience and the aim of the application, the concept phase can be started. Its content is defined through:

- the content of the application,
- the layout,
- the decision about the technique that is used to realise the application and
- the time schedule that includes every step that has to be fulfilled during the development.



Checklist for the development of an application

The next phase is the realisation phase: the located data has to be prepared for the specific application and afterwards the processing will be started.

After having finished the processing phase, the testing phase starts. The application has to be tested in different ways:

- In different browser softwares,
- On different platforms,
- By different users, which are part of the target audience.

The results have to be integrated in the application. That means that the application has to be adapted to the requirements of the software and hardware and the users.

Here you can download a pdf-file which summarises all the checklists we presented in this lesson: [Checklist](#)

1.7. Glossary

ActionScript:

ActionScript is the Scripting Language that controls the Flash movies and applications.

ArcGIS:

"ArcGIS is an integrated collection of GIS software products for building a complete GIS for your organization. The ArcGIS framework enables you to deploy GIS functionality and business logic wherever it is needed—in desktops, servers (including the Web), or mobile devices." (ESRI)

Flash:

"The term "Flash" refers to the vector graphics format, the Flash Player and to the multimedia authoring program used to create content for it. The Flash Player, developed and distributed by Adobe Systems (formerly by Macromedia), is a client application available in most web browsers. It features support for vector and raster graphics, a native scripting language called ActionScript and bidirectional streaming of audio and video." (Wikipedia)

GIS (Geographic Information System):

"A system of mapping software that integrates the collection, management and analysis of geographic data. This can be used to display the results of data queries as maps and analyse spatial distribution of data." (Quartix)

Hardware:

"The physical, electrical, and mechanical parts of the computer." (Eastern Shores - Library System)

JavaScript:

JavaScript is a Scripting Language that is used to create dynamic, interactive Webpages.

PHP:

"PHP (PHP: Hypertext Preprocessor) is a widely used serverside scripting language for the dynamic generation of web pages. The language is very popular since it allows easy access to databases and read and write access to files." (Wikipedia)

Shapefile:

"A set of files that contain a set of points, arcs, or polygons (or features) that hold tabular data and a spatial location. This file format is used in ArcGIS software." (City of Fort Collins)

Software:

"A program or set of instructions that controls the operation of a computer." (Scholarly Journals at the Crossroads)

SVG:

"Scalable Vector Graphics (SVG) is a W3C standard and an XML markup language for the description of two-dimensional vector graphics, both static and animated." (Wikipedia)

Usability:

"A measure of how easy it is for a user to complete a task. In the context of Web pages this concerns how easy it is for a user to find the information they require from a given Web site." (biz/ed)

"Usability can be measured objectively via performance errors and productivity, and subjectively via user preferences and interface characteristics." (Jermey et al. 2005)

Web Browser:

A Web Browser is a software application that runs on the user machine and enables the user to display and interact with Web Pages hosted by Web Servers. *"A Web browser locates and fetches each requested page and, by interpreting the formatting commands that the page contains, the page contents are displayed."* (Halsall 2005, p. 570) There are a number of browser programs available such as Mozilla Firefox, Opera, Internet Explorer, etc.

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