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Human Cognition and Usability of Tourism Portals

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Mohamed Omran
Matrikelnummer 0025147

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Zusammenfassung

Diese Arbeit befasst sich mit den Usability Aspekten von Webseiten bezugnehmend auf menschliche Wahrnehmungsfakten. In den letzten Jahren ist Tourismus zu einem der wichtigsten e-commerce Märkte geworden, der in fast jeder Region und Kultur vertreten ist. Die verschiedenen Tourismusportale gewinnen jeden Tag mehr an Bedeutung und werden von den unterschiedlichsten Usern besucht, mit der Erwartung, dass man genau auf ihre Bedürfnisse eingeht. Mit dem als Hintergedanken werden wir diese Branche als Hauptreferenten für die Arbeit nutzen.

Im ersten Kapitel werden wir über einige Fakten der menschlichen Wahrnehmung reden, die für die Wahrnehmung im Web von Bedeutung sind. Es wird auch darauf hingewiesen, dass sich diese von einer Tourismusregion zur anderen unterscheiden können. Diese Wahrnehmungsprinzipien vereinfachen dem User den Zugang zum Inhalt einer Seite. Zusätzlich gehen wir auf die Wichtigkeit von Farbempfinden, typografischer Gestaltung und virtueller Haptik ein.

Usability Studien werden bereits seit mehreren Jahren durchgeführt und genutzt. Im zweiten Kapitel werden die wichtigsten Fakten und Ergebnisse der verschiedenen Studien präsentiert und Checklisten und Richtlinien vorgestellt. Diese Richtlinien sollen einen Leitfaden für die Zugänglichkeit und Benutzerfreundlichkeit (Usability) bilden.

Anschließend im dritten Kapitel werden wir, mithilfe unserer Richtlinien, bestimmte Tourismus Webseiten evaluieren und analysieren. Dabei werden sowohl bekannte Reiseportale wie Tiscover.at, offizielle Regierungswebseiten wie Egypt.travel, aber auch kleine Reiseagentur-Webseiten wie Goldstars.at, unter die Lupe genommen. Letztere wird anschließend einer Validierung unterzogen, um Wiederverwendungs- und Modifikationsmaßnahmen zu ermitteln.

Abstract

This paper deals mainly with human cognition and usability aspects of ecommerce websites, specifically regarding tourism portals. In the last years tourism has risen to be one of the most advanced economic sectors for e-commerce and is represented in almost every regions and culture. The different tourism portals win more importance by each day and are visited by the most different users, each expecting it to fulfill his needs. For this reason we are using this branch as a main reference to analyze usability and cognition aspects.

In the first chapter we are discussing some human cognition aspects. There are standard cognition facts that are agreed on when dealing with cognition problems on the web. But human cognition also differs from one region and culture to another. These cognition principles ease user accessibility to the content. Also the importance of colors, its perception, typographic layouts and virtual haptics are handled.

Usability studies are dealt with for many years now. In the second chapter we are going to state the main facts and results of the different studies, showing some tests and creating checklists and rules to be used for the developing of websites. These rules will be the guidelines for the usability and accessibility of websites.

In the third chapter we will evaluate and analyze specific tourism sites of different focus, by using the previously specified guidelines. There will be a comparison between famous tourist sites like Tiscover.at, official government sites like Egypt.travel and local startup sites as Goldstars.at. Web site quality validation (reuse & modifying measures) are used on the last website.

Motivation

„Engineering a great web-solution is a real Renaissance task. You ought to be a great technician, a high profile usability engineer, a good designer, an exceptional entertainer, an experienced communitarian and a true culture-voyeur. A super generalist in perfection: The vision of art plus the eyes of a child scaled to perform in real business..." [WebE03]

E-tourism is a trend in the tourism industry. 26% of the entire ecommerce runs through the branches of tourism and travel. [ECA04]

The use of information technologies in tourism has a long tradition and tourism has always been a classic market for electronic commerce. With the drastic increase of use of the internet and World Wide Web the possibilities got more and more. Without the specific use of IT, tourist companies have a disadvantage competing in the tourism field.

It is foreseen that worldwide 30% of next year's travels will be booked online. In Austria this means an increase to 17 million nights of online bookings. [ECCA08]

Tourism websites addresses different users and should motivate and animate them. To be able to do so we first have to understand the depth of the human cognition and know how a customer usually thinks, with regard to different interests and cultures.

I. Human Cognition & Design Issues

1. Cognition

The term cognition derives from the Latin term "cognoscere" ("to know" or "to recognize") referring to the faculties of information processing, changing preferences and applying knowledge. The cognitive process can be conscious or unconscious, natural or artificial. Depending on the contexts and perspectives, these processes can be analyzed differently, like in the fields of philosophy, psychology, neurology, anesthesia, systematic and computer science.

Although the concept of cognition can be used by different disciplines in different ways, it mainly describes the process of thoughts. In cognitive science and psychology it describes how an individual processes information from his point of view depending on his psychological functions. In other fields the term cognition can also be interpreted as the development of concepts. Larger coalitions of entities like organizations, individual minds or groups can be described as societies cooperating to form collective concepts. These elements of each 'society' show certain behaviors in the face of some situations or opportunities. Cognition can also be described as the "understanding and trying to make sense of the world".

The terms "cognitive architecture" and "cognitive modeling" are often used as synonyms for human cognition. As a study of how a human brain thinks, human cognition tends to be more than only theoretical, for its theories lead to working models demonstrating behaviors similar to human thoughts. These working models can be measured similarly or indistinguishably like human thoughts. Artificial Intelligence (AI) and the study of "natural language understanding" are often referred to as subfields of human cognition, seeking to model the way of how the human mind processes and understands things.

The human cognition of the environment is subject to certain principles. If one considers these principles, the user accessibility to the content can be remarkably eased.

There have been a lot of studies dealing with this subject and analyzing the main cognition aspects that define our everyday life. The following study is extracted from Anneke Wolfs' research of human cognition. [Wolf03]

1.1. Form and Fields

A principle of human cognition states, that the respectively recognized part of the environment is divided into single objects in the background.

To satisfy this principle, one should always separate objects and background by distinct contrasts. This can mainly be achieved by the assigned colors.

In the left graphic you can clearly see how the object distinct from the background, while in the right one a lack of color- and brightness-contrast prevents this. [Wolf03].

Figure 1: Color contrast [Wolf03]

After dividing the forms and fields another question pops out. How do objects behave mutually to each other? This is what the following principles deals with.

1.2. The principle of Proximity

Objects that lie near to each other are perceived as belonging together. Therefore it is reasonable to group the content together. Similar content should be composed together and different separated. This principle can be shown in the example of link lists.

The space line in the following graphic allows a faster cognition of the different subject areas, for it separates the cultural part from the sports part.

Musik
Kunst
Literatur

Hockey
Fussball
Schwimmen

Figure 2: Space line grouping [Wolf03]

1.3. The principle of Affinity

Similar objects can also be recognized as belonging to each other. The similarity can be based on the coloring or the form it is written in. Thus the previous graphic can also be divided like this:

Musik
Kunst
Literatur
Hockey
Fussball
Schwimmen

Figure 3: Color grouping [Wolf03]

Here the coloring allows the visual division into the different subject areas.

1.4. The principle of Closeness

Optical groupings can also be achieved by putting an object in a closed outline or a framing. For example by framing a text with a black background, you get a closed area contrasting to the rest of the text.

Figure 4: Frame grouping [Wolf03]

1.5. The principle of good Continuance

Objects can be grouped, by giving them a sequential characteristic. This is done via arrangement on vertical or horizontal lines or also on curves. A good example for this is in the following links below. The individual words (objects) are connected to a unit not only by their corresponding succession, but also by the underlining (horizontal line).

Figure 5: Underlining [Wolf03]

Importantly here is that the lines do not have to be actually visible - as in the above example, it is enough to arrange the elements on an imaginary line or curve.

1.6. The principle of Conciseness

Simple symmetric forms can be perceived and memorized better than complex shapes. This is especially relevant at the creation of logos, for logos should be injected easily and memorized for the longest time possible.

Figure 6: Shapes [Wolf03]

1.7. Identification and Classification

Apart from the optical characteristics of an object also its classification into a corresponding connection plays a role with the perception. Here the experience of the viewer and his expectation are decisive.

For example: If one inserts the image of an automobile into a road illustration, then this can be noticed and arranged by the viewer fast. The object is in its "natural" environment. Likewise it would be possible, to put the automobile "alienated" on a sofa. Such fractions can be used in individual cases as additional stimulation, however restrain the classification ability of the viewer. [Wolf03]

2. Colors in Screen presentation

Also the correct employment of colors is of great importance. Since, as well known, screen handling exhaust, the eye load can be reduced by purposeful color employment in the screen Design and therefore the usability can be improved. The meaning of colors should not be ignored at the planning. Already Johann Wolfgang von Goethe occupied himself for decades with chromatics.

"Auf alles, was ich als Poet geleistet habe, bilde ich mir gar nichts ein…Dass ich aber in meinem Jahrhundert in der schwierigen Wissenschaft der Farbenlehre der Einzige bin, der das Rechte weiß, darauf tue ich mir etwas zugute, und ich habe daher ein Bewusstsein der Superiorität über viele…"

„I don't fancy myself on everything that I have achieved as a poet… but the fact that in my century I am one of the only persons with a knowledge of the sophisticated science of colors makes me proud, and gives me a superior awareness above many… " [Univ05 - 2]

Some principles, from color-recognition/feeling over color-properties and their effect on color-psychologies and the monitoring system are discussed in the following section. [Büch03 - 2]

2.1. Color-recognition and the Eye

A color impression results from the beam of light in the eye and its transformation on the retina. Depending on quantity and angle of the incident light, the lens of the eyeball opens or closes. It adjusts in such way the quantity of light and focuses the retina picture. The nerve cells (receptors) of the retina differentiate between colors, contrasts and structures.

The different wavelengths of the colors cause differently strong stimulations in the eye. The eye is part of the brain - everything that we see, loads the brain. Full, white light strongly load the brain. Warm colors (yellow, orange, red) load the brain more than cold tones (blue, violet) or non-saturated colors.

Screen perception is a kind of flashlight thunderstorm for the eye and brain. The impulse takes place directly, fast and without protection for the eye and brain. Monitor colors are light waves, which radiate directly in the eye, in contrast to the more gentle reflections of the pigment colors on paper, fabric or wall.

2.2. Color-Perception and Psyche

Colors awaken feelings. Red works up attractive, warm, active and near. Yellow is energizing, warm, bright, energetic, cheerful and friendly. Green is calming down, harmonious and without tension. Blue works cold, far, calm, romantic and mental. Brown is recognized as earthly, boring and not erotic.

Depending on the tone the feelings vary: the sunny yellow works warmly, friendly etc., lemon-yellow however feels like sour, a sharp yellow as alarming. Colors are mood maker, secret energies and stimulants. Everyone knows that. In fashion and advertisement this knowledge is constantly used.

Color feeling is coupled to sensual impressions - like a tasting and a smelling. Color meaning is shaped by observation and culture. "Blood-red" and "red = love". Grass-green and "green = hope". "Crow-black" and "black = death".

Color names are subjective. Red and red does not mean the same, blue goes from the light seawater to the night sky.

For example: Association to the color red
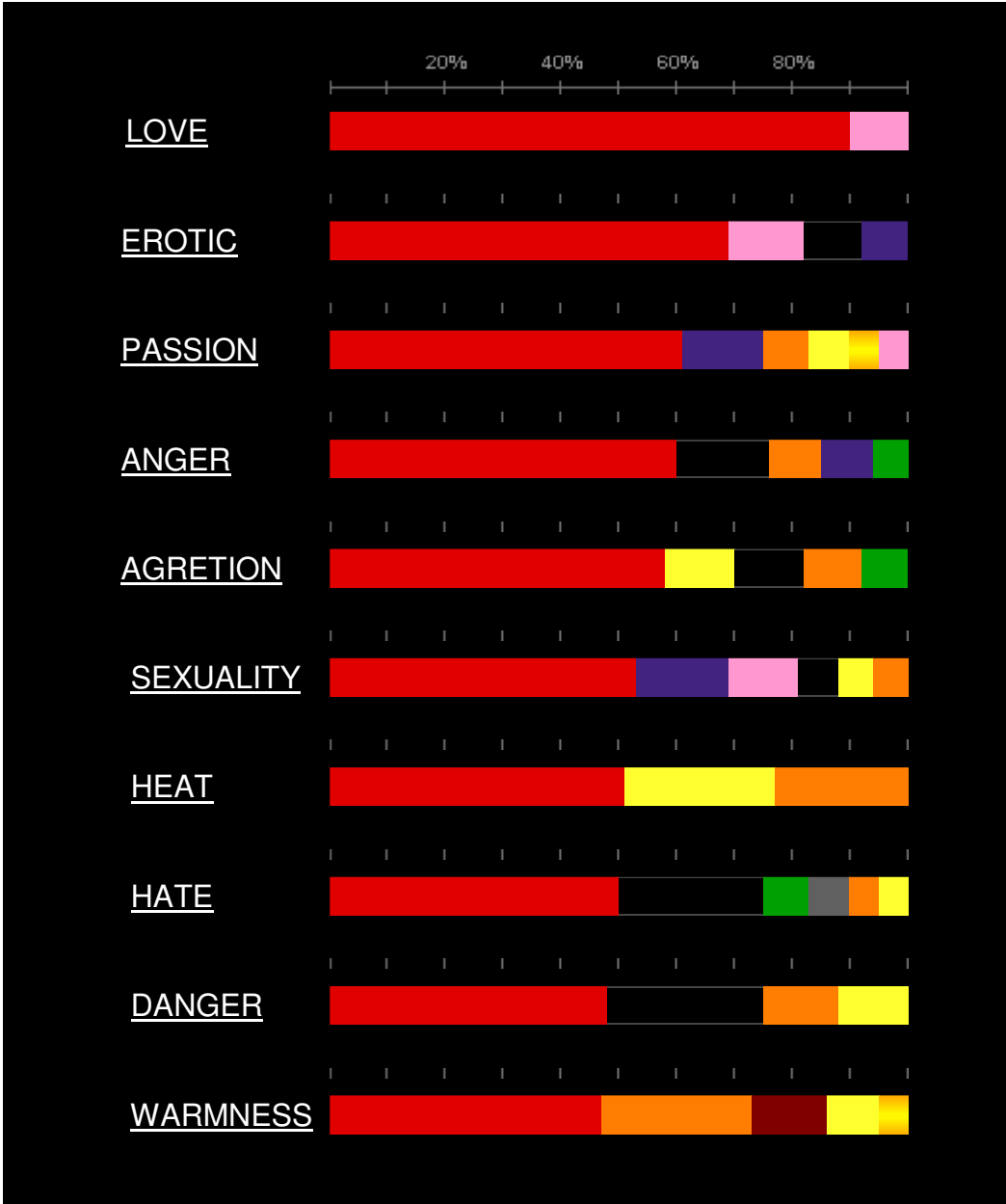
Figure 7: Association to the color Red [HaRu05]

2.3. Science of Colors: Coloring properties and their effect in the Design

We differentiate colors in: Red, yellow, blue, green, orange etc. each of these colors has many variety of nuances or tones.

Each color can be changed in five ways:

- In Character/ Nuance - warm or cold.
- In the luminance - to white or black.
- In the quality – Saturated colors are fuller compared to blur ones.
- Through the surrounding field – The background affects the perception.
- Through proportion / amount

2.3.1. Cold/Warm -Contrast

Compare:

- Tomato-red and Magenta-red.
- Egg-yellow and Lemon-yellow.
- Apple-green and Bottle-green.
- Sky-blue and Ice-blue.

The **first** mentioned always work **warmer** than the second.

Different colors are well combinable with similar color temperature (warm red, warm blue, warm yellow or cold red, cold blue, cold yellow). On the other hand a color can be pointed out, if it differs in the temperature from the surrounding field.

2.3.2. Luminance contrast

Independent of the tone and saturation, colors have different brightness values. Yellow is brighter than red, green brighter than violet. Each color can be lightened or darkened independently – while keeping the cold/warm value

Luminance contrast is important for good legibility. Bright colors step in the area (apparent) forward, darker yield back.

2.3.3. Quality- or saturation-contrast

The quality contrast is based on the contrast between a pure primary color and a blur color with reduced saturation. High color saturation is achieved, when one or two primary colors (red, green, blue) dominate. The higher the color saturation on the monitor is, the stronger the eye is stressed. Therefore pastel backgrounds are more appealing, for they preserve the eyes.

2.3.4. Complementary contrast

Color pairs, which are opposite in their effect - red and green; Blue and orange; Yellow and violet - are called complementary, thus opposite. In direct neighborhood they increase each other. In small forms (writings or points) they optically "destroy themselves" mutually to grey. Complementary colors demand attention and therefore stress the eyes.

2.3.5. Simultaneous contrast

It is based on the simultaneousness of contrasts in the viewing process. A pure grey appears on a red background as greenish-grey, the same grey on an orange background as bluish-grey. The eye projects the complementary color. This is why a yellow in a web animation can appear greenish.

2.3.6. Quantities, proportions, space behavior

The space behavior of colors depends particularly on the light/dark and cold/warm behavior of colors. Warm colors have the tendency to come towards the viewer cold tones yield rather back.

With same font and size, white writing on black background appears fatter than black writing on a white background.

2.3.7. Screen versus Paper, RGB and CMYK

Colors on the screen are assembled differently than printed color pigments. Screen colors are rays of light from the primary colors red/green/blue (RGB). The combination of red, green and blue results in white. The pigment colors in the four-color print: Cyan+ Magenta + Yellow + K (=contrast= black), on white background, reflect rest light and printed together result in black. Therefore screen representation and printed results are not identical.

The visualization of content and support of the goals belong to the tasks of colors in the screen Design, for example:

- Recognizability of the appearance
- Good readability of text and images
- Navigation and user-guidance through systematic color usage
- Animates and appeals the end user.

[Hell04]

2.3.8. Popularity of colors:

The favored-colors of women

36%	Blue
20%	Red
12%	Green
8%	Pink
8%	Black
5%	Violet
4%	Yellow
3%	White
2%	Brown
1%	Gold
1%	Orange
0%	Gray
0%	Silver

The favored-colors of men

40%	Blue
20%	Red
12%	Green
8%	Black
5%	Yellow
3%	White
3%	Gray
2%	Pink
2%	Gold
1%	Violet
1%	Brown
1%	Silver
0%	Orange

The non-favored-colors of women

30%	Brown
14%	Orange
10%	Violet
9%	Black
8%	Green
7%	Gray
7%	Pink
6%	Yellow
3%	Gold
3%	Red
2%	Silver
1%	Blue
0%	White

The non-favored-colors of men

24%	Brown
12%	Violet
12%	Pink
10%	Green
10%	Gray
9%	Orange
7%	Black
5%	Yellow
4%	Gold
2%	Silver
2%	Red
2%	Blue
1%	White

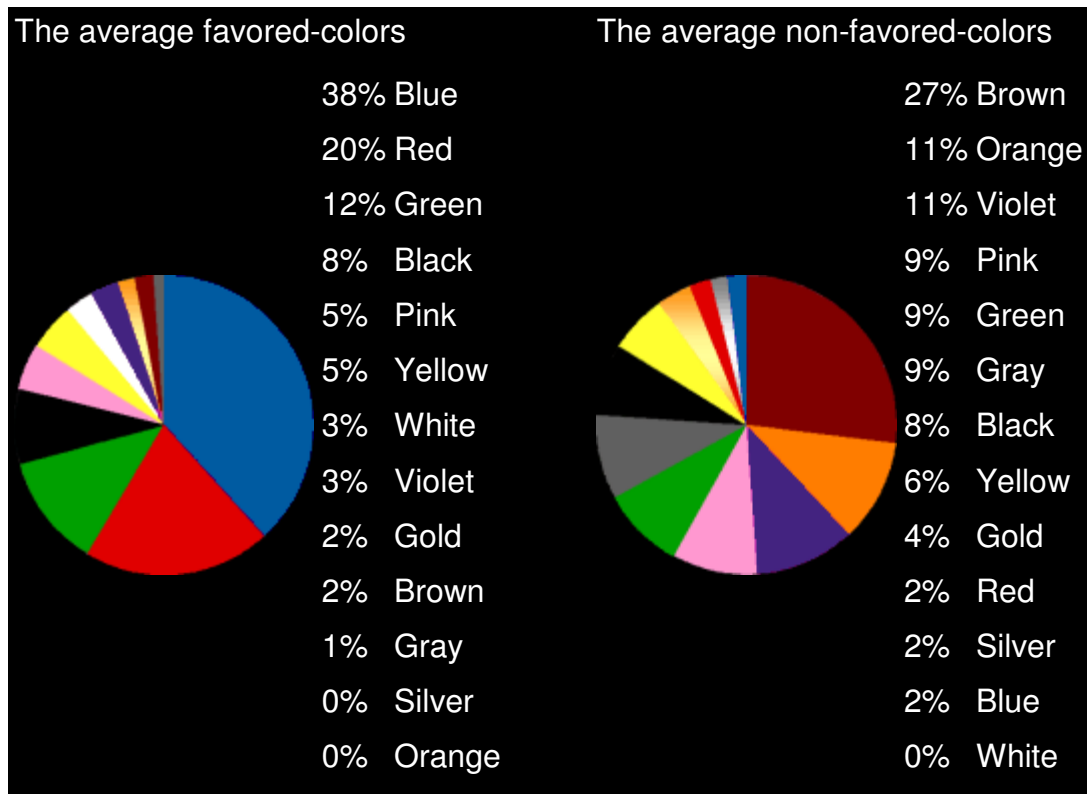| The average favored-colors	The average non-favored-colors
38% Blue	27% Brown
20% Red	11% Orange
12% Green	11% Violet
8% Black	9% Pink
5% Pink	9% Green
5% Yellow	9% Gray
3% White	8% Black
3% Violet	6% Yellow
2% Gold	4% Gold
2% Brown	2% Red
1% Gray	2% Silver
0% Silver	2% Blue
0% Orange	0% White

Figure 8: Popularity of colors [HaRu05]

2.4. Rules of use of colors on a monitor

1. **Less is more**. Multicolor diverts and generalizes. A certain color climate of two basic colors is more effective. This eases the recognition (Corporate Design) and orientation (navigation.)
2. **Eye friendly arranging**: reading of large background surfaces demand radiation-poor colors to avoid stressing the eyes.
3. **Avoid colors of the same wavelengths**, where it concerns legibility. The wavelengths of the primary colors RGB lie so near together that they produce vibration in the eye, it "flickers".
4. Good legibility needs **light/dark contrast**. That does not have to be the hard black and white or the sharp black and yellow; the contrast can lie within one color: dark-blue on light-blue, yellowish-green on bottle-green.
5. Consider contents and target group **acceptance**!

6. **Color quantities**. Warm, bright colors should be used reluctantly and purposefully: small surfaces, short periods, high attention stage.

7. **Select the colors** from the 256 screen colors, this save memory and load time.

8. **Text and color**: Test legibility and color effect at different systems and screens. Optimize for black-and-white monitors and printings.

9. Black on white results in a clearly readable font. With same font and size white writing on black background appears fatter, the letter distances appears smaller, in particular during screen rendition and overthrow distortion.

2.5.   Culture-Specific Color meanings

To the effect of colors one has to consider that the color cognition and interpretation is culture dependent. Following table gives a short overview of it:

	Western Europe	Japan	China	Arab. Region
red	Danger	Aggression Danger	Happiness festive Mood	Death
yellow	Attention Cowardice	Dignity Royalty		Luck Prosperity
green	safe Jealousy	Future Youth Energy	Ming Dynasty Sky, Clouds	Fertility Strength
blue	Manhood Cold Authority	Peasant	Sky, Clouds	Goodness Trust Truth
white	Purity Goodness	Death Mourning	Death Mourning	Happiness
black	Death Mourning			

Figure 9: Culture specific color meanings [KuLa04]

As we can see there are big differences in the perception of colors. Red for Europeans means something completely different than for Chinese. Depending on the user groups and culture websites want to communicate with, the colors should be chosen respectively.

3. How animation affects the perception

The use of animations on web pages can also have negative effects (comp. [Wirt02] [Dilt04]). The reasons for that lie beyond the used techniques, taste, vision and aesthetics it has more to do with the psychology of perception. The following facts should be always considered in this matter.

3.1. One Field of View – two Systems

The field of view through a human eye seems smooth, consistent and without transitions. In fact the field of view of humans is divided in two separate parts. It is connected with two separate nerve tracts and brain centers with different functionality.

- **The central Area:**
  Is the Area of our field of view that in a given moment can focus on something. The content and information in the central area are analyzed and consciously perceived. It's the point with the highest visual acuity.

- **The peripheral Area:**
  Here we talk about the border area of the viewable field. The perceived peripheral area is unconsciously analyzed. The brain is forced through certain impulses in this area to divert the conscious perception. Movement is for example one of these impulses.
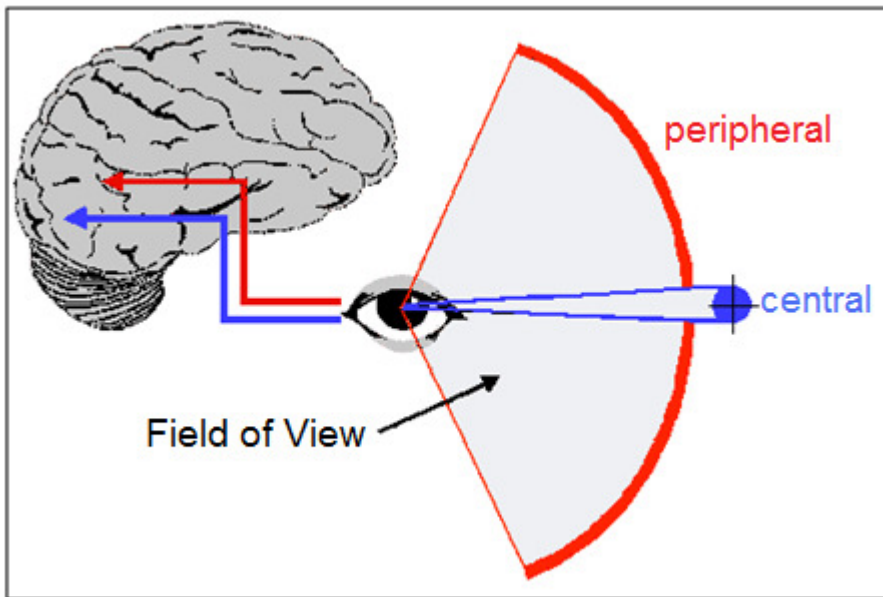
Figure 10: Field of view [Wirt02]

Criteria	Central System	Peripheral System
Localization	Fixation point	Outer field of view
Absolute light-sensitivity	Low	High
Color-sensitivity	High	Low
Sharpness (areal resolution)	High	Low
Movement-sensitivity (timing resolution)	Low	High
Specialized in	Perception of details	Movement, changes
Function	Content analyses of events	"alarm-reflex", control the eye (visual) movement

Figure 11: Criteria [Wirt02]

The visual system of the human interprets animation in the peripheral area as movement and by this derives the concentration to another part. If the user is concentrating on a center part of a page, his concentration is pulled to the animation in the border part unconsciously. This reflex can be suppressed to a certain level but

not completely. Animations demand more concentration and therefore limit the efficiency of consuming the offered content.

This interruption of concentration can be reduced by using following methods:

- **Constant animations**:
  A constant blinking or a continuing movement is less disturbing than irregular movement.

- **The amount of animation**:
  One shouldn't combine too many animations at the same time.

- **Synchronization**:
  If more than one animation is necessary at the same time, one should at least try to synchronize their movement (e.g. synchronized blinking of the different buttons)

- **Control**:
  The animation should stop automatically after its cycle or the user should be able to control the activity of the animation.

- **Sensible Animation**:
  Animation and content can be combined sensibly when the animation movement contains the content message at the same time.

Through the use of animation a number of disadvantages can occur that shouldn't be underestimated, therefore we should only use animations when necessary or when they are the center of concentration themselves.

4. Web Design

The content of a website is usually a collection of information about a specific subject or topic. Designing such a website is defined as the process of creating single web pages and arranging them to make up the whole website. Websites can be compared to books, where each page of the book stands for a web page that contains information the website is developed for.

Many concepts and design aspects play a role in the process of creating a website. For private, informative or non-commercial websites there may be different concepts and goals depending on the purpose of the website. A typical ecommerce website, which concerns us more, has some basic design aspects which have to be considered:

- **The content**: The information and substance on the website should target the users the site is concerned with, giving them good information about the products it offers.
- **The usability**: A site should always offer a user-friendly interface with an easy and reliable navigation system and structure.
- **The appearance**: The website should have a consistent, professional, appealing and relevant layout that supports the brand. Text and graphics should be kept in a consistent style.
- **The visibility**: It is important for a commercial website to be found by search engines, when searching for topics the site deals with.

4.1.   Typographic Layout

The following chapter will deal with the typographic layout [Büch03]. Text is the main part of web content representation. Studies have confirmed that reading of a monitor is harder and more exhausting than reading off paper. People reading from paper usually last longer and can read faster and remember more of what they read than others reading from a display. Web designer should consider how the text content of

their pages is arranged. The reading procedure, the reading way, the expectation of the user and the technical limitations of the medium should be considered.

While reading, word sets are recognized and sent to the brain as an impulse. In the memory the recognized words are compared to already known terms and encrypted.

With long or complex words this procedure takes longer than with short words. Unknown words are interpreted through the context and memorized. Therefore people read faster, the more terms are already known by their brains. For this the word selection and the significance of word sets determine the readability of a text, and the understanding comes from reading in the context. The Language, text structure and text orientation/organization determine the readability and usability.

4.1.1. Language

Familiar words and clear sentences make a text easier to understand and faster and easier to read. Therefore one should take the receiver in consideration. Acceptance and memorization of the things we read increases, the better we choose the language of the target audience.

4.1.2. Text Organization

Text organization contains the font type, font size, line distance and the tracking length of the font (letter distance) line length (characters per line). As mentioned in the previous chapter the color selection of font and background plays a big role in the readability. And of course the resolution of the monitor defines the sharpness of the words

4.1.3. Font

For reading texts system fonts like Arial, Helvetica, Courier, und Times are suitable. They can be displayed correctly by almost every system and optimized for the display so they don't need much memory space.

It is usually so, that small font size and fine lines result to a bad representation on the screen. Therefore fonts with wide characters are a good choice, like e.g. Courier.

With some fonts the characters are too close to each other for a proper screen representation, so that it looks like they are touching. The readability is extremely difficult in this case. Through spacing of the text this can be avoided. Spacing is a term from the typography and describes the use of spaces between the characters and words for a better readability. This is especially necessary with bright text on dark backgrounds, for the irradiation on the screen optically narrow the distance between the characters. Also fitting word spacing is important for a fluent reading. Big and irregular spaces on the other hand are user 'unfriendly'.

Easy reading is also disturbed by narrow line distance. Through the narrowness the words are recognized harder and the jump from one line to another is more difficult.

4.2.   The Golden Ratio

While designing a layout you are always faced with the fact to divide the area you are using. Here comes the golden ratio that promises harmony in the optic. The golden ratio is a mathematical dividing proportion.

"A segment is divided in two different segments, while the longer part stands in relation to the shorter one like the whole section to the longer segment. Mathematical it stands in a ratio of about **3:5** or **1:1,618** or **38:62%**" [Drwe03]

This proportion was verified by the Italian mathematician Leonardo Fibonacci (around 1180 - 1240). Already Euklid (325 – 270 BC) noticed the segment ratio we know now as "golden ratio", while studying the platonic bodies. Later on the monk Luca Pacioli di Borgo San Sepolcro (1445-1514) took interest in Euklids' work. He called this esthetically perfect segment division "the divine division". The golden ratio got then propagated since the renaissance especially from architects, typographer, painter, musicians and other artists as the ideal number combination in the sense of classicism. [Behl04]

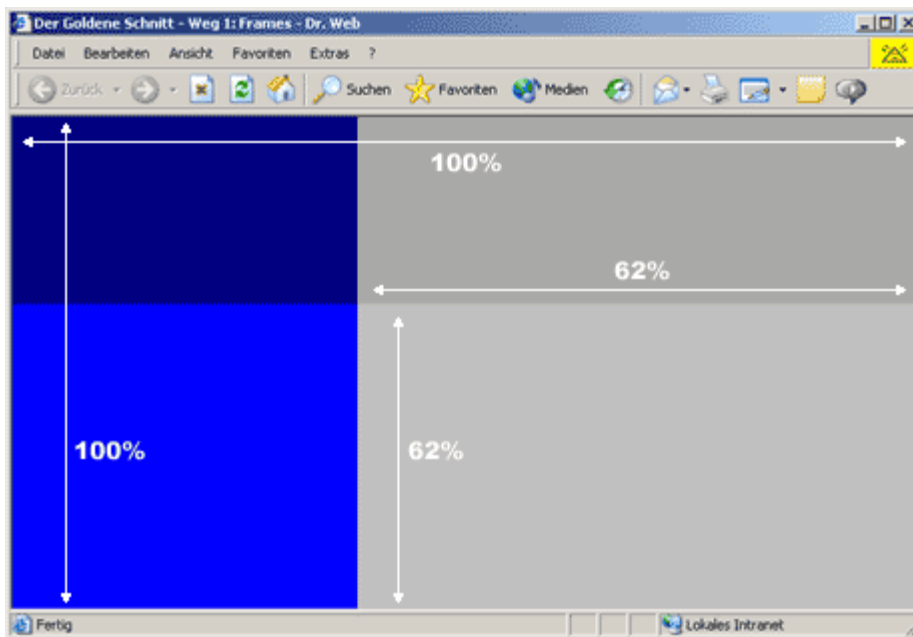Exactly this asymmetry has a harmonically effect, that can be often found in nature too.

Figure 12: The golden ratio [Drwe03]

4.3. Virtual Haptics

Haptical recognition (greek: haptikos = tangible) describes the sense recognition of creatures, which allows to recognize certain mechanical impulses. The entire haptical recognition allows the brain to localize and evaluate contacts, pressure and temperature. There is a difference between tactile recognition (surface sensibility) and kinesthetic recognition (depths sensibility). [Wiki05]

Because of the electronic media almost only the visual and acoustic senses of humans are targeted. The skin, the biggest sense organ of the human body and the sense of touch is losing its meaning more and more in the era of computers and internet.

The turning away from the "physicalness" is not just a phenomenon of the digital media. Telephone, radio and TV already demanded from the human body only the push of a button.

To diminish the loss of one of the existential senses in the virtual world there are possibilities to stimulate the sense of touch with the help of audio-visual simulation, to give the user the feeling of a physical interaction. It is clear that those feelings cannot compare with the real sense of touch, but the absorption of information can be increased by this. [Bähr01].

In the following some techniques for visual and acoustic simulation are described.

One should mention that other than in film or TV, internet animations, especially Flash animations, are closely related to interaction. This is why some of the following techniques like mouse-cursor-manipulation or drag & drop- delay shouldn't be disregarded.

4.3.1. Dimensions of touching and the possibilities for the Visual-Acoustic Simulation

DIMENSION	CONDITION	POSSEBILITIES OF SIMULATION
Figure	- smooth - edged	- visual: through contours, 3D - mouse movement: from smooth to jolting - enhancement of the contour of the mouse over - reaction of the object - acoustic: from smooth to jolting
Surface-Structure	- smooth - rough	- visual structure - acoustic: realistic sound at mouse over - smooth or delayed mouse movement - visual extra effects: sandy pixel, smooth shadows, 3D - moving mouse shadow
Temperature	- warm - cold	- visual association: red= warm, blue= cold >>color temperature

	- mild	- visual extra effects: steam, ice, etc.
		- acoustic association: "clanking cold", "comforting warmth"
Humidity	- dry	- acoustic: realistic sounds, atmosphere
	- wet	- visual extra effects: drops, rings, trace, glance
	- slippery	- "slippery" object movement
Mightiness	- big	- acoustic association: dark= big/ mighty,
	- small	bright= small/ fine
	- fine	- visual presentation, 3D
	structured	- size change of the mouse cursor
	- massive	- mobility of the object
		- delay at drag & drop
Hardness /	- hard	- acoustic association: short/long sound;
Stiffness	- soft	modulation
	- bendable	- visual extra effects: smooth/slow = soft,
	- elastic	rough/fast= hard
		- realistic sounds: "boing"
		- dynamic size change of the mouse cursor
		- natural object movement
Mass /	- heavy	- delayed/accelerated object movement (drag & drop)
Weight	- light	- visual/acoustic: dark/ bright
	- very light	- gravitation
Ability for	- moving	- moving ability: drag & drop / by jolt
Movement	- fixed	- acoustic association: modulation at movement
	- gluey	- mouse cursor pointing up or down
Flexibility	- vibrating	- Visual extra effects: vibration, waves..
/ Rest	- flexible	- acoustic association / natural sounds
	- stiff	
Material	- woody	- acoustic association: characteristic material sounds at
	- metalloid	Mouse over/ Mouse Down
	- wooly	- visual structure
		- changing the mouse cursor
		- visual extra effects

Figure 13: Virtual haptics [Bähr01]

4.4. Media Files

The web still demands smaller files, this leads to the fact that a big part of the conception deals with saving on the image-, video- and sound objects.

In the case of audio it is useful to use so called "sound loops", that are melodically or rhythmical sequences that can be repeated arbitrarily. By this method you can create a long background sound off a small sound file and the user doesn't have to wait for loadings.

Videos are usually displayed using the Flash video format (.flv), which reduces the size of videos remarkably, but on the other hand demands special plug-ins and players.

Regarding the mentioned cognitive and design aspects and keeping them in mind, we can move on to the actual usability criteria.

Website usability respectively relies on human cognition and design. Web developers using the human cognition facts while developing, have less effort optimizing their sites for usability afterwards.

II.   USABILITY

1. How we really use the Web

The article derives from [Kru01]

"Why are things always in the last place you look for them?
Because you stop looking when you find them!"
  —Children's riddle

There's a difference between how web designers think users are using their websites and how they actually perceive them. Designers tend to believe that visitors are going to read every detail on each web page, figuring out how the content and links are organized and realizing the optimal options for the links or functions they need.

In reality it is usually different. Users tend to take a look at each page, scanning some of the content, and click on the first link that resembles something they are looking for (like "webmail" or "login") or eventually catches their interest. Respectively big parts of the content aren't even recognized by the visitor.

Designers are often proud of what they've created and the content they added thinking "great literature that is very interesting", but users actually see this content like a "billboard going by at 60 miles an hour".
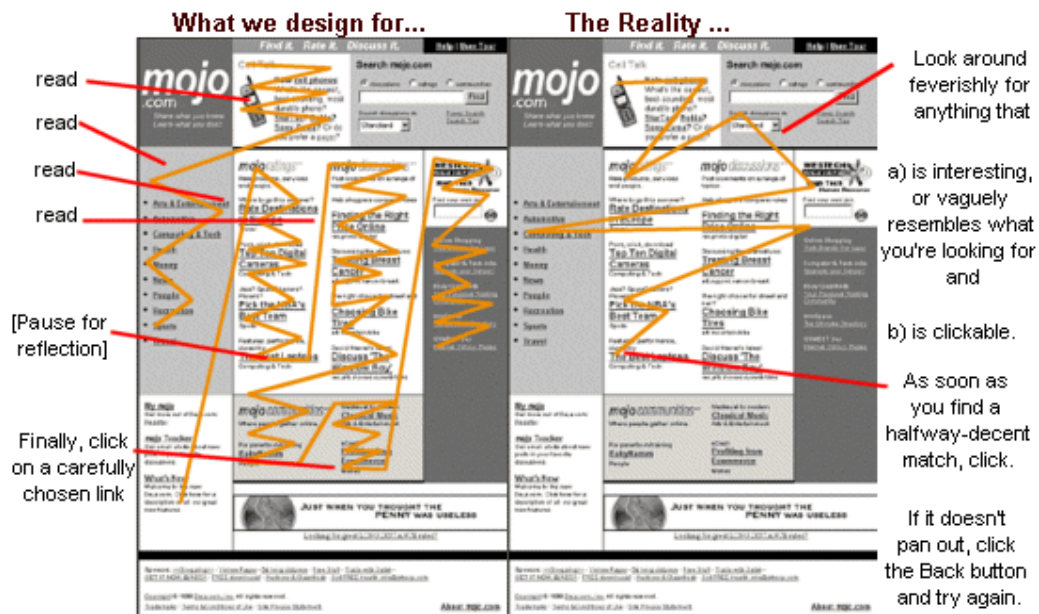
Figure 14: Design and reality [Kru01]

Of course it's not just that simple and always depending on many aspects, like what the visitor actually wants from the site, how much time he has and what type of website it is. But still, this view is so close to reality than a lot of people can imagine.

It is only natural to believe that our way of thinking is "the normal way"; and that everybody else is using the Web as we do as designers. Unfortunately it's not that easy.

There are three main facts about web usage a designer should always think about, if he wants to create an effective website.

Fact 1:
"Users don't read web-pages. They scan them."

One of the known facts about web usage that is well documented is that users usually don't spend much time reading web pages. Instead they "scan" (or "skim") them, trying to look for phrases or words that interest them and catches their eyes.

Of course there are few exceptions like online news reports, e-books or product descriptions. But even then, users are likely to print out a document if it is longer than

a few pages. It is a fact that reading on paper is easier and faster than reading on a monitor or screen.

Why do users scan?

- **They're usually in a hurry**. One of the main motivations for web usage is to "save time". Users don't want to spend much time reading a text that is not important or necessary for them. It's a bit exaggerated, but they somehow act like sharks:"they have to keep moving, or they'll die".
- **They know they don't need to read everything**. Scanning helps finding relevant content and ignoring irrelevant parts. Most of the pages contain much more information and content than users actually need. Usually they are only interested in a fraction of this content.
- **They're good at it**. People tend to scan things all of their lives, like newspapers or even supermarket-shelves, finding things of interest.

"The net effect is a lot like Gary Larson's classic Far Side cartoon about the difference between what we say to dogs and what they hear. In the cartoon, the dog (named Ginger) appears to be listening intently as her owner gives her a serious talking-to about staying out of the garbage. But from the dog's point of view, all he's saying is "blah blah GINGER blah blah blah blah GINGER blah blah blah"." [Kru01]

Depending on what they have in mind, users tend to see web pages differently. But usually it is only a fraction of what the page really has to offer.

Figure 15: What we see [Kru01]

Users usually focus on phrases and words that seem to match **(a)** "the task at hand" or **(b)** "the current or ongoing personal interests". And of course, **(c)** "the trigger words that are hardwired into their nervous systems", like "Sale, Sex and Free."

Fact 2:
"Users don't make optimal choices. They satisfice!"

Web designer often believe that users scan their pages considering all possible options and choosing the optimal one for their needs.

It is commonly known that people tend to choose the first reasonable option rather than the best one. This procedure is also known as satisficing[1]. There's a big chance that users will click the first link that looks as if it's going to lead them to what they are looking for, as soon as they find it.

"I'd observed this behavior for years, but its significance wasn't really clear to me until I read Gary Klein's book, Sources of Power: How People Make Decisions[2]. Klein has spent fifteen years studying naturalistic decision making: how people like fire fighters, pilots, chess masters, and nuclear power plant operators make high-stakes decisions in real settings, with time pressure, vague goals, limited information, and changing conditions.

Klein's team of observers went into their first study (of field commanders at fire scenes) with the generally accepted model of rational decision making: faced with a problem, a person gathers information, identifies the possible solutions, and chooses the best one. They started with the hypothesis that because of the high stakes and extreme time pressure, fire captains would be able to compare only two options, an assumption they thought was conservative. As it turned out, the fire commanders didn't compare any options. They took the first reasonable plan that came to mind

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[1] Economist Herbert Simon coined the term (a cross between satisfying and sufficing) in Models of Man: Social and Rational (Wiley, 1957).

[2] The MIT Press, 1998.

and did a quick mental test for problems. If they didn't find any, they had their plan of action." [Kru01]

So why don't Web users look for the best choice?

- **They're usually in a hurry**. As Gary Klein points out "Optimizing is hard, and it takes a long time. Satisficing is more efficient."
- **Guessing wrong doesn't have much penalty**. If web pages load fast, the penalty of making the wrong choice or clicking the wrong link is usually a couple of clicks on the "back-" button. So unlike Klein's' example with the firefighters, it's not a big deal, unless the pages don't load fast. In this case clicking gets to be a more careful choice.
- **Weighing options may not improve users' chances**. If a website is not designed well, it often isn't helpful to try to find the best option, for guessing and clicking the back button when wrong, is usually more productive.
- **Guessing is more fun**. Guessing takes less effort than weighing options trying to find the optimal choice. And if the user guesses right, he might be faster than making a choice. Also it opens the option of running into something surprisingly good.

This doesn't mean that users never weight options while dealing with the Web. It is subject to factors like their lag of time, their frame of mind and their confidence in the website.

Fact 3:
"Users don't figure out how things work. They muddle through!"

When doing usability testing –whether it's on a website, a software or even on daily appliances- it becomes obvious how many people keep using things every day, with completely wrong-headed concepts, or without really understanding how they work.

Instead of reading the instructions on how some technologies really work, a lot of people just muddle through and forge ahead, making up their own plausible stories why the things they do actually work.
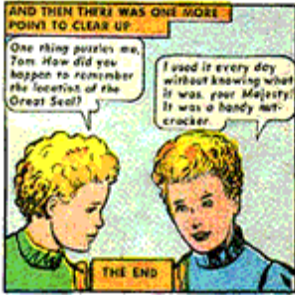
"It often reminds me of the scene at the end of The Prince and the Pauper where the real prince discovers that the look-alike pauper has been using the Great Seal of England as a nutcracker in his absence. (It makes perfect sense—to him, the seal is just this great big, heavy chunk of metal.)

And the fact is we get things done that way. I've seen lots of people use software and Web sites effectively in ways that are nothing like what the designers intended." [Kru01]

A way to illustrate this example, are the dozens of people who insist on putting a website's entire address ("URL") in a search field every time they need to access the site even when it's many times a day. Asking them why they do this, some of them are really convinced that this is the right way to use Yahoo which is the Internet for them.

Figure 16: URL in search box [Kru01]

Not only beginners, even technically savvy users often muddle through. Some of them also have gaps in understanding how things really work, others just don't care and stick to the ways that works for them.

Why does this happen?

- **It's not important to them**. Most of the users don't bather too much about understanding how certain things work, as long as they fulfill their needs for them. This is not a lacking intelligence, they just don't care.

- **If users find something that works, they stick to it**. As soon as a user finds something that works for him - even if it's bad – he tends to stick to it and not

look for something that does the same job better. Only if he stumbles over a better working way, he might give up the old one.

"It's always interesting to watch Web designers and developers observe their first usability test. The first time they see a user click on something completely inappropriate, they're surprised. (For instance, when the user ignores a nice big fat "Software" button in the navigation bar, saying something like, "Well, I'm looking for software, so I guess I'd click here on 'Cheap Stuff' because cheap is always good.") The user may even find what he's looking for eventually, but by then the people watching don't know whether to be happy or not. The second time it happens, they're yelling "Just click on 'Software'!" The third time, you can see them thinking: "Why are we even bothering?" " [Kru01]

This is a good question: should we even care about people "getting it" or not, if muddling through works out fine for them too? The answer is "Yes, we should care about people getting it right, for muddling through tend to be inefficient and error prone!" If users "get it,"

- The chance of finding what they are looking for is much better, which is good for both parties.
- It helps them in understanding the full range of the site and what it has to offer – instead of only the parts they stumble across.
- The developer can steer them to the important parts of the site they shouldn't miss.
- The site will make them feel smart and in control of things, which is one of the main facts that will bring them back. Users will muddle through a site only as long, as another site comes out that makes them feel smart and in control.

2. Web Usability

By stating these simple facts on how users really use the web, we can proceed to explain what web usability actually aims and what methods are available to evaluate websites.

2.1.   What is Web Usability

Web Usability is the procedure of making websites easily to handle by web-users, without asking them to have special knowledge or training. Users should intuitively relate the functions and actions on the website with real life actions they are used to, like the pressing of a button should lead to an action. The wide goal of web usability can be explained as followed:

- Information should be presented in a concise, simple and clear way.
- Users should be given the right choice in an obvious way
- Eliminate several ambiguities regarding the results of specific actions, like: "clicking on delete/add/purchase"
- Placing important information and functions in the right and obvious place on a website or application

In ecommerce, we can narrow down the term of web usability to efficiency: achieving online actions that are valuable for the business in the best way possible. This demands a high attraction of users to keep up a successful business.

Web Usability evaluation can be done by a number of different inspection- and test methods that all aim to determine the quality of a web page. Generally we differentiate between **formative** and **summative** evaluation.

Formative evaluation is usually done during the development process and aims to optimize the quality of use of a product. It mainly utilizes qualitative methods e.g. usability tests, inspections and methods of user participation.

Summative evaluation is done at the end as a concluding quality evaluation. It uses quantitative methods for that, like questionnaire and forms.

For its significance in a user-centered development process we will be interested in the qualitative Methods.

2.2.   Usability Evaluation Methods

Through the utilization of "Usability Inspections" combined with "Usability Tests" we can get an almost complete image of how good the usability of software, or in our case a web pages, is. But first we have to know the different inspection and test methods that can be used to determine the quality of our products while looking at their advantages, disadvantages and how good they actually solve the problems of a website:

Usability Inspections

method	advantages	disadvantages	difficulties	quantity of problems	quality of problems	users needed
heuristic	complete design evaluation applies known principles	no real users involved doesn't consider unknown users' needs	needs well qualified evaluators needs 3-5 evaluators	more than other methods, up to 90%	not as severe as usability tests more severe than CW	none
cognitive walkthrough	detailed examination of specific tasks finds reasons for errors less effort than user testing	no real users involved	can be exhausting and too much concerned with low-level details more effective when performed by a group	about 40%	less severe	none

Figure 17: Usability Inspections Methods [HAW08]

Usability-Tests[3]

method	advantages	disadvantages	difficulties	quantity of problems	quality of problems	users needed
thinking aloud	pinpoints users' misconceptions very efficient	unnatural for users	should be recorded	about as many as cognitive walkthrough	most severe	3-5
constructive interaction	more natural for users than thinking aloud	?	should be recorded	like thinking aloud	ditto	ditto
video confrontation	Statements are more informative than thinking aloud	Video recording can irritate the test person	more extensive than Thinking Aloud	More than in Thinking Aloud	Less waste than thinking aloud	ditto
coaching method	more natural to the user than thinking aloud incentive for the test person	does not show users' problems when using the system on their own	needs trainer and observer	less than other methods	?	3 to 5
observations	reveals users' real tasks in natural surroundings	no experimenter control	appointment hard to set up should be videotaped or notes taken	?	severe problems	3 or more
focus groups	spontaneous reactions and group dynamics	hard to analyze low validity	appointment hard to set up	presumably low	?	6 to 9 per group
Question-naires	finds subjective user preferences countable	indirect method: low validity	needs sufficient recall to be significant	presumably low	?	at least 30

Figure 18: Usability Tests Methods [HAW08]

We conclude following facts:

• Usability inspections should be combined with usability tests for a more thorough result

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[3] „? " means it is "NOT DEFINED"

- Usability tests demand more effort and work than usability inspections, but they can identify more usability problems.

- A cognitive walkthrough can be combined with "task-independent" methods such as heuristic evaluation. It demands the empathy of developers with the users.

- Indirect methods, such as questionnaires and interviews, should be added to usability tests like "thinking aloud".

As cognitive walkthrough evaluates a site based on the anticipation of the developer or usability expert on how the user would react, it demonstrates a very good method regarding this research.

In the following chapter we will explain "Cognitive Walkthrough" in detail while showing some examples to demonstrate the evaluation process.

After that we will show a practical example combining some usability test methods. The test compares HTML vs. FLASH demonstrating their ease of use and usability features on an ecommerce site.

3. Cognitive Walkthrough

3.1.   What is a Cognitive Walkthrough?

A Cognitive Walkthrough is a job oriented Usability inspection method; it gets along without test persons. The Usability expert explores the functions of the web site in the interest of an imaginary user. He assumes the user explores the web site and will go **the way of the smallest cognitive complexity**. Therefore the Usability expert determines the importance of the "learnability" of the website and determines for each possible action the prospective cognitive effort.

3.2.   When is a Cognitive Walkthrough meaningful?

A Cognitive Walkthrough should precede a Usability test, so that the obvious Usability problems can be repaired before the test.

Cognitive Walkthroughs should be accomplished by the developers during the software design. That presupposes that the developers are informed about the behavior and foreknowledge of the users. Cognitive Walkthroughs can be accomplished therefore also by coworkers with good customer contact. It is also possible to read literature about the information-behavior of Web users.

3.3.   What do we know about Web users

There are studies about the successful use of e-Commerce Sites, search Engines and Online Public Access Catalogs (OPACs). The following results are common to all studies:

- Users are only interested in their own problems – not in those the developers and information experts have.
- They know their own Terminology - not however those of the developer and information expert.
- They believe that developers and information experts steal their time, if they have to train themselves or read help texts. Therefore they don't do it.
- Visitors are in a hurry and not interested in the fancy ideas of designers or other clever features. If the site does not construct itself fast, they go elsewhere. If after 10 seconds they do not understand, that the Site "gives them something", they go elsewhere.

    - **Briefly:**
        - Web Site visitors are egoistic.
        - They go the way of the smallest "cognitive" effort.
        - Exceptions confirm the rule.

3.4.   Walkthrough procedure:

1. Define the behavior of a typical visitor of your web site - or put the realizations specified above to reason.
2. Define 2 typical tasks, which the imaginary visitor on your web site wants to carry out. Consider which foreknowledge your visitor needs, in order to solve the task, and which he must learn during the solving-process of the task.
3. Specify for each of the tasks, which ideal steps the user has to take, in order to carry out his task or find his information.
4. Go on behalf of the imaginary user through these steps, asking at **each single necessary step**:

   - With what reasonable reason will the user go through this necessary step? (success story)
   - With what reasonable reason will the user avoid this necessary step? (failure story)

     Thus:

   - Will the user want to select the correct function?
   - Will he recognize that the correct function is available?
   - Will he connect the function that he aims with the one that exists?
   - If the correct function were triggered, will the user recognize that a procedure runs, that will get him closer to the solution he needs? (feedback)

3.5.   Why users are successful or fail

In order to be able to derive improvement ideas from a Cognitive Walkthrough, it is worthwhile to regard the reasons for the resulting "success" or "failures" of stories:

Will my visitor want to select the correct function? If not, it is because of the fact that

   - He doesn't have the foreknowledge

- or the website doesn't tell him that

Example: The visitor needs an essay from a magazine. He doesn't know that he has to look in the OPAC for the title of the magazine - and not for the author of the essay.

Will he/they recognize that the correct function is available? If not, it is because of the fact that

- he/they don't have the foreknowledge
- or no appropriate representation of the necessary action is available (Button, menu point)

Example: The visitor knows that he needs the OPAC now, but he can't see a link to there.

Will he connect the function that he needs, with the available function? If not, it's because of the fact that

- he/they don't have the foreknowledge
- the label/the button/the menu point are not designated in a way that he/they can recognizes it as the desired function
- the labels/buttons/menu points differ too little from each other

Example: The visitor knows that he needs the local catalog, but he doesn't know the meaning of the existing button with the label ' OPAC '.

If the correct function is released, will the visitor recognize that a procedure runs, that brings him nearer to the solution of his problem? If not, it's because of the fact that

- the system feedback is not recognizable
- the system message cannot be associated with the desired problem solution, and therefore not understandable.

Example: The visitor made an input in the OPAC; the feedback of 0 hits appears at the bottom of screen and therefore is not seen.

3.6.   Problem solutions

A lot of usability problems that are discovered during a cognitive walkthrough could be solved like following:

- Remove the complex cognitive steps:
  Example: Reduction of options that are hard to distinguish to few understandable ones at the selection of search fields in OPACs

- Visualize the system feedback
  Example: If an operation lasts somewhat longer, the system gives back a waiting message on the screen.

- Explicitly guide through the necessary steps (dialogue)
  Example: Link text: "*I look for an essay*" - next screen: "please enter the title of the magazine, that contains the essay" - next screen: "*your magazine can be found here: Signature*"

- Colloquial rename of links/buttons/menu points
  Example: instead of "keyword search" - "search for literature to a topic"

4. Usability Evaluation: A Practical Usability Test

4.1. Usability Testing:

In the following chapter we will discuss the effectiveness and usability of website designs overall. Through this practical experiment we can see how the different test methods work together and how the results are analyzed.

 The following test was taken from [Dack00] and compares the usability and ease of use of a website (www.tiffany.com) between Flash and HTML.

Although it is not a tourism portal, it still has some similarities that make this test and its results meaningful for this paper. Besides that it is an international e-commerce site, it also lets us compare the, nowadays more and more used Flash with the good old HTML.

Some test methods have been put together for this test and combined in a way to show the effectiveness of them together and different results of each. In the following experiment following test methods were used:

- Questionnaires
- Video confrontation
- Thinking aloud

The goal of the following experiment is to test the hypothesis that websites developed in HTML are still more usable than similar ones build in Flash. As a test object **Tiffany.com** is chosen, for they have developed a Flash version of their site that is very similar to their old HTML version. The following results will show that the HTML version of Tiffany.com has been better rated in every objective measure compared to the Flash version. Also the subjective criteria have shown that 11 out of 12 testers rated the Flash site inferior to the HTML website.

Tiffany.com Screen Shots

Are You Sure?

Even after choosing to see the "enhanced" site, Tiffany.com asks the visitor **again** to choose between the HTML and the FLASH version.

Figure 19: [Dack00]

Home Page

The layout of the home-pages is very similar; the only difference is that the flash site has a **rotating** diamond ring upon entering. (In the following figures the HTML site is always on the left unless otherwise noted.)
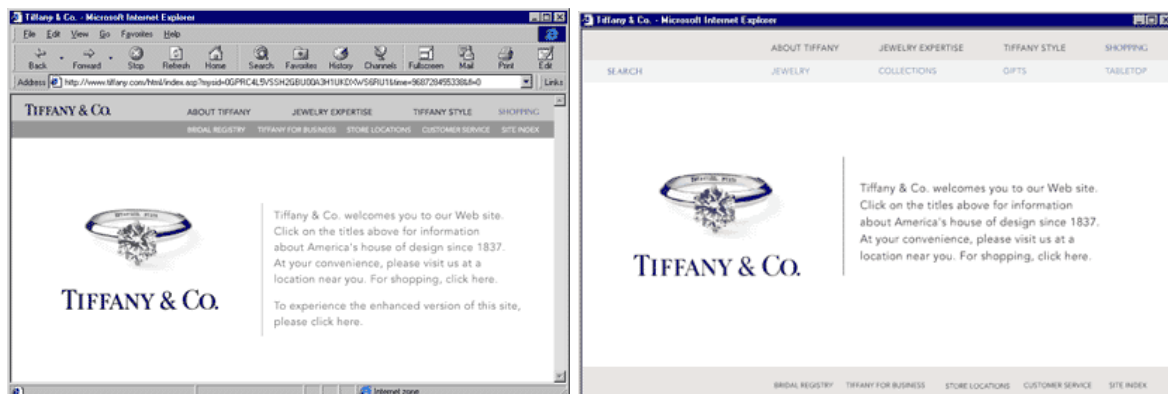
Shopping Home Page

Also the shopping pages are very similar with both using drop-down menus to navigate through the different product sections.
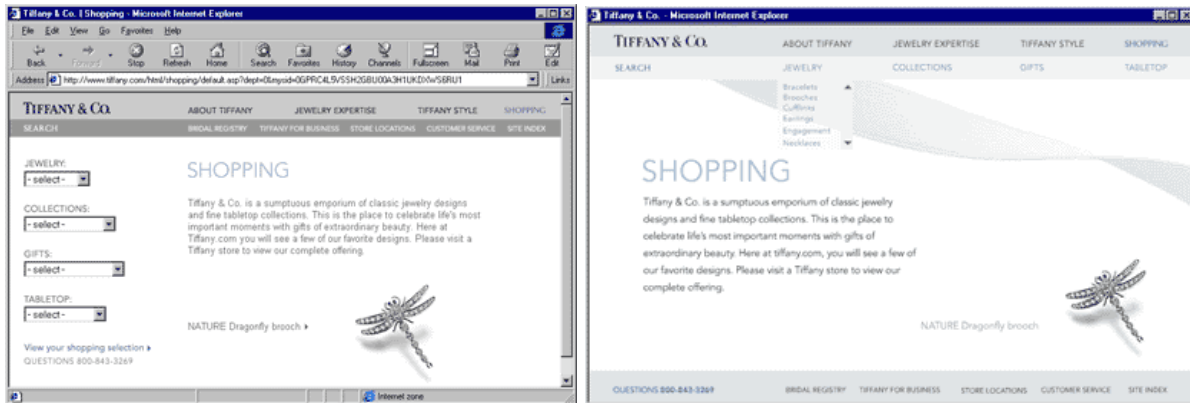
Figure 21: [Dack00]

Item List Page

On the item list page there is a difference between the two versions. While the HTML version has a page count at the top of each page, the Flash site has only back and forward arrows making the users loose orientation on the product list. In addition, the Flash site doesn't offer product information in the list mode. To see more details of a product or even the name, one has to click the product itself to get to the product info.
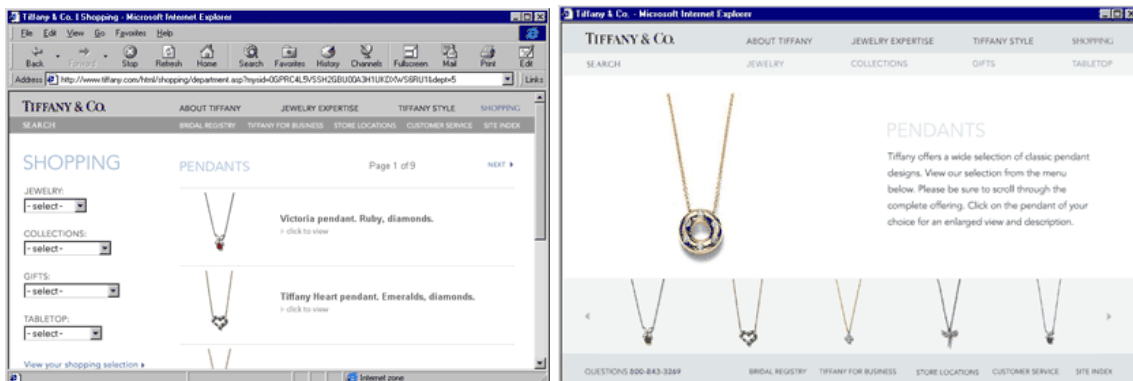
Figure 22: [Dack00]

Item Detail Page

Some testers had trouble using the Flash based shopping cart which is a bit non-standard. Having to add products to the cart again after they thought they already did, made them a little frustrated.
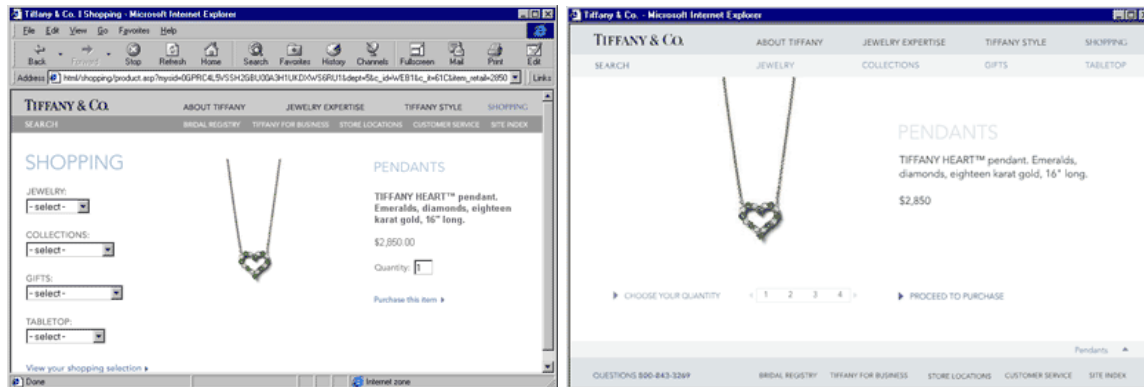

Figure 23: [Dack00]

Shopping Cart Page

The shopping cart page itself is the same for both sites and is built in HTML. Testers had some problems returning to the shopping because they couldn't find the appropriate button, which is on the upper right corner of the page.
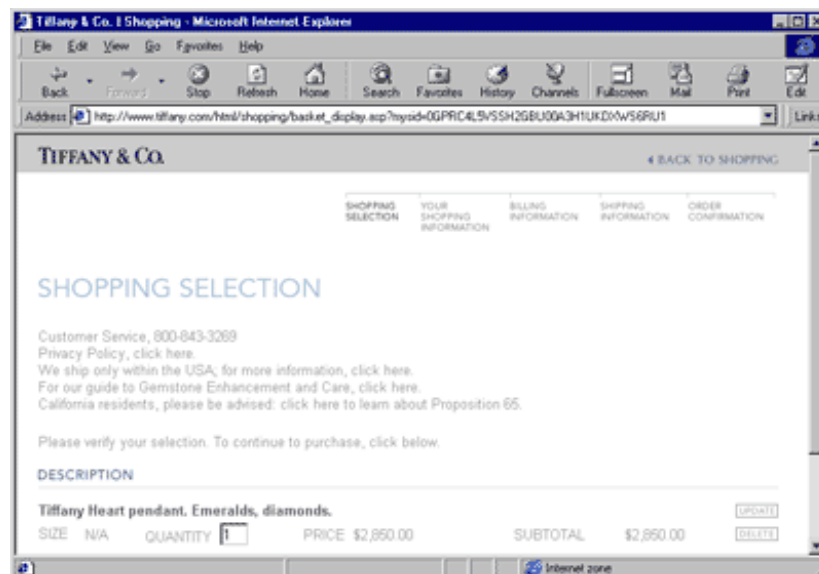

Figure 24: [Dack00]

The Testers

The testers consist of eight persons. These eight testers are divided into two groups, where every four testers are given the task to test the HTML or the Flash version exclusively. The testers are not told that the test is to compare the two versions of Tiffany.com.

Tester Details

- There are six male and two female testers all between the age of 24 and 37.
- All the testers are employed in a web design company.
- Seven of the testers have been browsing the Web for more than five years.
- Four of the testers have a degree in computer science.

The Test

Testers are asked four questions: **(1.)** "*a simple fact question*", **(2.)** "*a judgment question*", **(3.)** "*a comparison of fact question*", and **(4.)** "*a comparison of judgment question*".

The "*simple fact question*" and the "*comparison of fact question*" are **timed**, to have some sort of quantitative measure while comparing both sites. Every tester is informed about this before the questions are asked. For the "*judgment question*" and the "*comparison of judgment questions*", the testers are asked to **think out loud** while they are giving their answers.

For Tiffany.com is an ecommerce site, the testers are finally given an ecommerce-related task (to add certain items to a shopping cart), which is also timed.

The Post-Test Survey

At the end of the questioning, the testers are given a post-test survey consisting of 12 different criteria. Every tester can rate these criteria on a scale between 1 (very unsatisfying) and 5 (very satisfying), based on their subjective opinion.

Disclaimers

There **may** have been a number of reasons that have influenced the test results and therefore have to be considered. The four testers testing the Flash site **might be**:

- Subjectively grading things lower than the others in the HTML group.
- Less intelligent.
- Less web-savvy than those in the HTML group.
- Having a bad day.

It also might be possible that the slight differences in layout between the Flash and the HTML websites are the reason for the following test results, and not the issue of the two different development languages.

4.2.   Detailed Test Results

[Dack00]

Timed Questions

(The results are all **average** times)

Question 1: "How much is the men's fish tie?"

- ☑ HTML (46 sec)
  Flash (67 sec)

Question 2: "Which is more expensive, the Garland diamond necklace in platinum or the Garland diamond necklace in gold?"

- ☑ HTML (43 sec)
  Flash (91 sec)

Timed Task

(Results are **average** times)

Task: "Add the following items to your shopping selection: (I.) any heart pendant, (II.) any gold bracelet, (III.) any item from the Paloma Picasso collection."

☑ HTML (1:32 min)
   Flash (2:36 min)

Think Out Loud Questions

The testers are videotaped during the task of "thinking out loud". These recordings are reviewed afterwards and the comments are summoned in the following. The comments are more informative on how the testers think about an ecommerce website like Tiffany.com overall, and not specifically the Flash or HTML version.

Question 1: "You need a new set of china. What Tiffany china pattern best suits your style?"

   HTML:
   "I expected to click on the thumbnail photo to get more detail"

   Flash:
   "I'm looking for an easier way to scroll through the china."
   "Usually what I would look for is a collection of thumbnails or a quick reference rather than scrolling through a bunch of different pages."
   "I don't know where I am. Is this the start (of the china list)?"

Question 2: "Your father wants to buy your mother a Tiffany watch. He can't afford the most expensive one, but doesn't want to look like a cheapskate, either. Which watch would you recommend he buy?"

   HTML:
   "I wish I was able to sort between women's and men's watches."
   "It would be nice to have the watch and the price together. There's too much drilling. I'm shopping and I'm interested in the price."

Flash:

"There is no information here."

"The product list has no information. I suppose I could click on each item to get more detailed information, but that's not how I shop. I like the search page. It produces the list output that I like; it gives information about the watches."

"I don't have any idea what each one of these watches are."

"I wish I had a Back button."

Post-Test Survey

The testers are given a post-test survey consisting of 12 different criteria. Every tester can rate these criteria on a scale between 1 (**very unsatisfying**) and 5 (**very satisfying**), based on his/her subjective opinion. (The following are average results)

Criterion	HTML	Flash
Readability of content	4.0	4.25
Logic of navigation	3.5	2.0
Ease of finding specific information	3.75	2.5
Appearance of the website	4.5	4.0
Quality of graphics	4.25	4.25
Reinforcement of the Tiffany brand	4.25	3.75
Speed of site	5	3.75
Fun to use?	3.5	2.75
Explanations of how to use the website	3.0	1.75
Overall ease of use	4.25	2.5
Your overall productivity with the site	3.75	2.75
A cool site?	3.5	3.25
Total Score	**47.25**	**37.5**

Figure 15: Tiffany.com test results [Dack00]

4.3.   Observations and Conclusion

In this test the HTML site has been much better rated than the Flash site in the objective and subjective measurement. Still, we cannot assert that the test-results are perfect, for we only compare two sites.

Objective Measurement

In both, "timed questions" and "comparison of facts questions" testers using the HTML site are on average twice as fast as the once testing the Flash site answering the given questions.

The resulting time to answer the questions would have been even longer, if the Flash testers wouldn't have given up the browsing and headed for the search page that is HTML-based.

Also with the timed task, the HTML testers were over **40% quicker** than the Flash-testers in completing their task. In addition to that, two of the four Flash testers had trouble adding items to their cart - believing that the items were added while they were not, which is a big problem especially for an ecommerce site that wants to sell its products.

Subjective Measurement

Just relying on the timed questions and tasks is not enough to compare two sites against each other. It is also important to grade the ethereal qualities of the sites like the graphics, the appearance, the speed and the logic of navigation. This has been the idea behind the survey.

Only in the *Readability of Content* the Flash site has been better rated than the HTML site. On all other criteria like *Quality of Graphics* and *Logic of Navigation* the HTML scored higher. Even in criteria where Flash should excel in like *Appearance* and *Reinforcement of the Brand* the HTML site has been graded higher.

Reinforcement of the Brand

It is often asserted that Flash sites are better in reinforcing a company's brand than HTML sites. But in our previous test the HTML site is obviously rated better in "*reinforcing the Tiffany brand*" than the Flash website. Of course this might have other reasons, like the small test pool or wrong tasks and questions. But the fact that the testers were more or less experts in this area, eliminates these possibilities.

"The strength of a company's brand **on the Web** — even for a so-called "branding site" — is not just about animation, rollovers, and a pulsating soundtrack. It is also about the ease of finding information, speed, and overall ease of use. This **Complete User Experience** is unfortunately something most Flash sites just don't provide as well as their HTML equivalents." [Dack00]

5. Web Usability Guideline

"Web usability means designing for your visitors instead of yourself or your client. A site that conforms to user expectations makes visitors more comfortable and more apt to visit again and recommend the site to their friends. Good usability is critical to your site's success and can guarantee the accessibility, the user friendliness, the readability and the supporting of the brand." [Web01]

The following facts should be considered in the process of creating a website. They can also be used to evaluate the usability and design of an existing site. These guidelines are taken from [Web01]:

1. **Design a clear and simple navigation system.** Quoting Web-usability expert, Jakob Nielsen, "*a good navigation system should answer three questions*":

   - *"Where am I?"*
   - *"Where have I been?"*
   - *"Where can I go?"*

   Considering the following elements while creating a website's navigation system can be the answer to all three questions:

   a. **Keep it consistent.** It is very important to keep the navigation system in the same format and place on every page, to avoid frustration and confusion of the visitors if links disappear and appear unpredictably.
   To make sure the main navigation system stays consistent, developers should use Server side Includes.

   b. **Use appropriate text inside links.** The text inside a link or navigation button should be precise making the visitor anticipate the link's destination by reading it. Visitors shouldn't have to be guessing where a link is going lead to and if there's still any doubt about a links destination, it should be clarified with a TITLE attribute explaining the destination exactly.

c. **Use CSS to emphasize text links.** Although users usually expect the links to be underlined – some designers avoid underlining their text links. In this case of removing the important visual navigation aid, they should style their links using CSS. By this, designers can replace the underlining by another consistent style like text- or background-coloring or a different font indicating a hyperlink.

d. **Always include text links.** Although a web designer could create some very good looking navigation menus using scripting languages like Action Script or JavaScript, he should avoid relying entirely on these "*dynamic menu systems*". Disabled visitors could be using a screen reader to listen to the page; others could just have problems using the mouse. In any case each webpage should include basic text links, linking to the important parts of the website.

e. **Add a text-based site map. C**reating larger and more complex websites, developers should always include a "*text based*" sitemap in addition to the text links. A link to this sitemap should be included on every page so that lost visitors can use it to find their way. Also a reliable access to all the pages for search engines spiders is given this way.

f. **Include a "home" link inside your main navigation system.** If a user enters the website through an internal page or just want to go back to the home page, there should always be a home link in the main navigation.

g. **Site-logo links to home page.** Commercial websites typically have their logo somewhere on the page- usually on the top, left-hand corner. A lot of visitors are used to the fact that this logo is linked to the "home" page of the site and often use it more than they use the "home" link in the main navigation menu.

h. **Include a site search box.** Having a good search feature on the website can help the users locate the information they are looking for

more efficient and quickly. Therefore the search box should be placed in an obvious place. It is important to make sure that the search is limited to the own site and not a "web search". You don't want the visitors to leave the site when searching for something they need.

2. **Keep the content clear and simple.** Even though design can attract the visitors to your site, it is still the content that interests them the most and encourages them to come back. The content of a site is also the main way to get higher rankings at search engines.

Although one should not neglect search engines while writing the content of a website, it is very important to keep in mind that the actual visitor is human.

   a. **Don't save the best for last.** Like at newspapers where the top story is always presented prominently on the front, one should always place the currently most important content of a website high on the page. It is necessary that this important content is visible at different screen resolutions and browsers, to make sure that visitors see it when they enter the site.

   b. **Make page content easy to scan.** Although it takes a long time to write the entire page content, visitors don't usually read more than half of it. Therefore it is important to format the content so that it can be scanned easily. Colors, header tags, bold type or lists can help emphasizing important points.

   c. **Avoid using text inside images if possible.** Presenting the text inside images makes it unscannable for "*search-engine spiders*" and to a number of visitors. Visitors may be using assistive tools like screen readers or just have the images turned off in their browsers.

   d. **Add "ALT" and "TITLE" attributes to all images.** Especially images that are linked to other pages should include a descriptive ALT and

TITLE attribute. That way, the visitor can jump to the desired page without having to wait for the current page to entirely load.

e. **Contrast!** A web designer has to choose the background images and colors wisely. There has to be a very good reason to abandon the visible and traditional "*dark text on a bright background*", for a customer won't buy the product if he can't read it.

3. **Support your brand.** If a website is strongly branded, it will lead the users to think of it as soon as they want to shop for the product or service offered by the site. In this way good branding is creating or reinforcing visitors' impressions of websites. But branding is not easy. Besides effort, it takes time and close attention to layout and page-design.

a. **Keep colors and typefaces consistent.** Web designer should choose their colors and fonts in a way that supports the brand and use them in a consistent way throughout the entire website. A visitor entering a subpage should not be left wondering if he is still on the same website.

b. **Keep page layout consistent.** Using templates to create a uniform page structure makes visitors get more familiar with the site. Visiting one page can tell them where the important elements of the site are on all other pages.

c. **Custom error page.** If a user should enter an incorrect URL or click on a broken link he should always get to a useful and informative custom error page. This error page should be kept in the same style and layout of the rest of the site, reflecting it's colors, structure and type while providing useful information to the customer.

d. **Create a "good tagline" and use it on every page.** It is not easy to create a unique, memorable, short and reinforcing tagline for your brand. A good tagline concisely and clearly presents the "value proposition" of a site.

4. **Provide for visitor feedback.** Forms are not only crucial for ecommerce sites in shopping carts and reservations; it is also important to give the visitor the possibility for feedback. A "feedback-form" protects the site from "email-spiders" and provides a uniform formatted structure that can be better controlled. When creating feedback forms, "websites and developers should:

   a. **Keep feedback forms short and clearly note which information is required to successfully submit the form.** Take care to design accessible forms that all visitors can use.

   b. **Remember international users and don't require information they may not have - like area codes or ZIP codes.**

   c. **Present complete contact information including business phone numbers and postal address."** Although visitors usually prefer contacting through email or a form, one should always provide a street address or a PO Box if it's a home-based business. This increases the visitors' confidence to the website.

5. **Test the site on real users.** A web designer should always keep in mind that due to the fact that he created the site, he knows his way around best. He has no problem using the "*navigation-system*", loves the "*content*" and understands the "*value proposition*". But it's the visitor that is important. That's why it is necessary to test the site on real user getting their feedback, before the site goes online.
   "Usability testing **helps estimating the experience of the average Web site user and correcting problems before the real online visitors finds them.** It also gives valuable answers to other questions:

   a. **Do visitors enjoy using the site?** If so, they'll read more content and stay longer.

b. **Do they understand the purpose of the site?** If not, there's no reason for them to return.

c. **Is there any incentive to return after the first visit?** A website should always aim to be the ultimate authority for the topic it's dealing with on the web. A good site encourages the visitor to bookmark it and recommend it to others interested in the same topic.

d. **Can they recover from errors?** Usability testing is the best way to test how well the elements of the site like site search, forms, site map, and custom error pages function. All the elements should work together to guide a visitor through the site and get him where he wants to go." [Web01]

6. Web Content Accessibility

The last part we mention in this chapter is the web content accessibility. Web content accessibility is a procedure done by the developer before and during the development process of a website, to guarantee an easy and usable access to information and content.

It is best done by checklist to have a systematic and clear overview of the status of the site. In Appendix A you can find a checklist that has been reviewed by W3C Members and other interested parties and has been endorsed by the Director as a W3C Recommendation.

In the next chapter we are going to use the information and facts we collected during the previous two chapters on some practical cases of tourism websites. Of course we can't use all the mentioned methods and guidelines on each and every test site, therefore only certain methods and aspects are dealt with as seen appropriate.

III. eTourism & Usability

1. eTourism

Tourism has undergone a structural change. Already in 1999 Hannes Werthner and Stefan Klein described the change of customer behavior in tourism industry as following [WeKl99]: Customers

- ask for "better" services,
- want more specific offers, both with regard to content as well as to the entire arrangements,
- ask for better information, about the product itself as well as the entire destination and additional services,
- are becoming more mobile and critical but less loyal,
- are more price sensitive, comparing more and more offers,
- tend to make more but shorter vacations,
- decide later leading to decreased time span between booking and consumption.

"Like many other industries, the online travel industry is in transition, adapting to new technologies and trends available on the Internet. Travelers, for their part, are becoming increasingly more interested in finding the opinions and reviews of their fellow travelers in lieu of professional travel advice. This impact is significant given the travel sector's economic influence on the Internet, indeed more money is spent on travel than anything else online. The online travel industry breaks down into several different categories: online travel agents, online travel guides, online travel planners, and online travel communities and forums. Together, these four groups make up the bulk of what are considered eTourism companies." [WeKl99]

These facts have brought out some challenges for the tourism industry as well as the IT industry and academia. The following figure shows how different characteristics work together, leading to the challenges that have to be mastered by the tourism and IT industries.
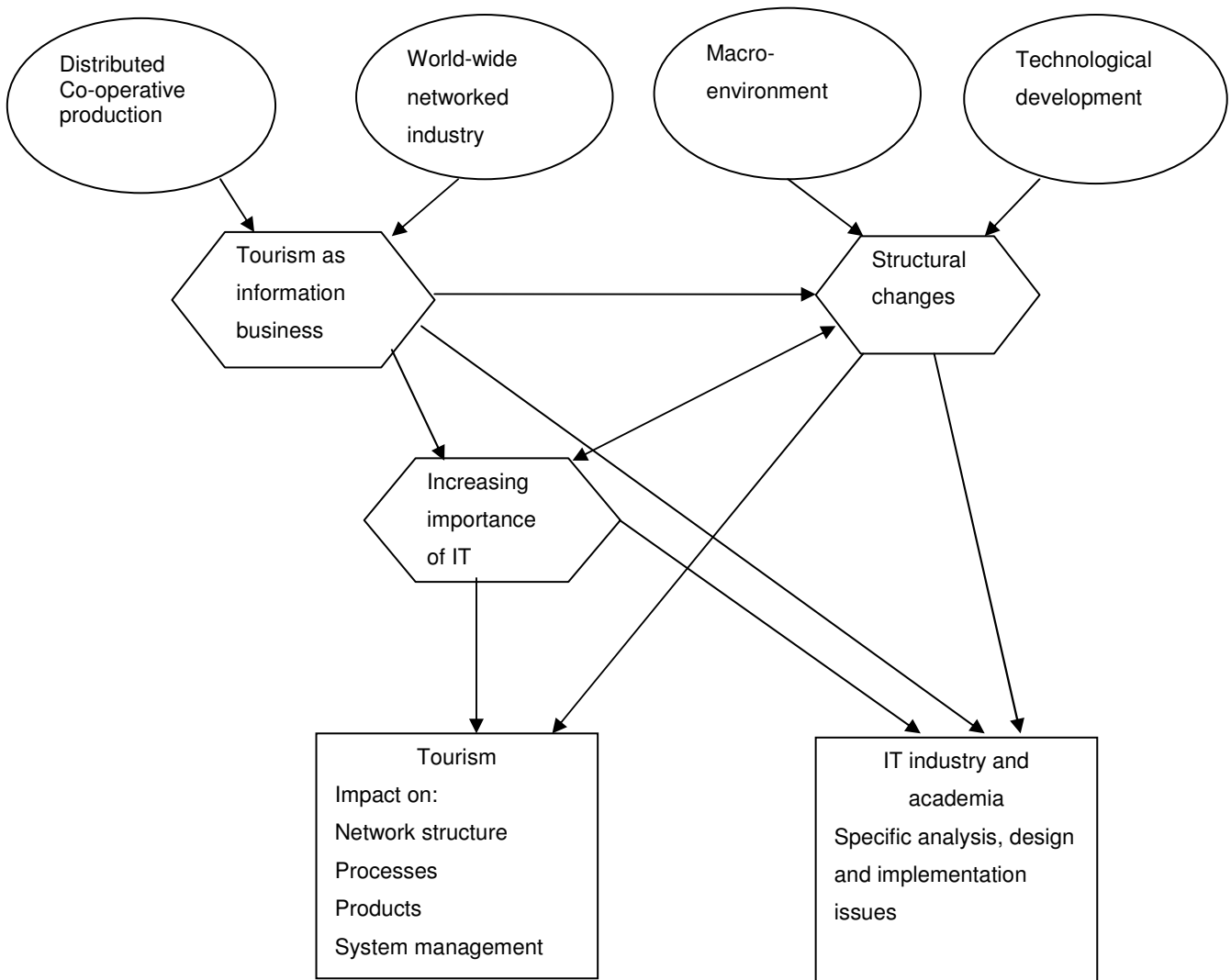
Figure 26: Challenges to be mastered [WeKl99]

The supply and the demand side of the industry have specific qualities. The demand consists of nearly unlimited and worldwide distributed individuals, with completely different national, region, social, cultural and language backgrounds. Nearly everybody is a potential consumer and tourist, they have specific and changing needs, and they are non-frequent users. Tourists want support and information before and during the travel, this information has to be easy accessible at low cost, well structured and with detailed information when necessary. This information has to be topical, providing the latest news in order to make the right decision at, if possible, low risk. Consumers are becoming more demanding and more active, defining the product themselves, leading to a new and more interactive relationship between demand and supply. [WeKl99]

These insights lead to following five tenets for an eTourism market, described in 2006 by Phillip Wolf, president and CEO of PhoCusWright Inc., a travel research firm:

1. The rapid evolving of the eTourism market has lead to a total **transparency** in content, pricing, imagery and data. Being one click away from the consumer, forces the destinations to compete and avoid goofy pricings and fake information. The transparency in this case stands for truth: *"A funny thing about the truth, the more you stretch it, the easier it is to see through it.*[4]*"*

2. Customers to customer ("C2C") relationships are much easier nowadays, allowing people to communicate and interact in a number of ways. **Peer collaborations** by social networks have opened the doors for a positive force with great benefits for the tourism. The tourism companies are the enablers for the "*Customer Relationship Management (CRM)*", helping the customers communicating with each other and exchanging information and experiences in many ways.

3. Creating travel blogs or online diaries and posting pictures and clips are basic things a lot of people tend to do, that are becoming easier by the day. Sharing information with friends and recommending destinations is not as **time-honored** as it was before and can be accomplished in a click.

4. In earlier days of the internet the **speed** has been a big limitation, making some skeptics argue about the traditional old way of getting travel information being faster. But with the broadband speed we have today finding specific information, pricings and advice about a destination can be as simple as a Google search.

5. **Predictive information**. "This final tenet is the most elusive but may prove the most powerful. Intelligent systems with personal advisory features tailor responses in uncanny ways. If we all searched the keyword phrase "luxury hotel New York City", everyone would receive the same results, despite some thinking $250 per night is luxury, some thinking $590 is and some thinking $2,500 is luxury. Whichever technique is deployed, user profiling, vertical search, tag cloud matching or click-stream analysis, applying predictive information will make a huge difference."

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[4] *Chinese proverb*

In the following parts we will discuss, analyze and evaluate three different tourism websites using some previously stated techniques like usability tests, cognitive walkthrough, cognitive and design aspects and finally the usability checklist we defined on page 55 ff.

2. Choosing the Websites

2.1. Approach

In this chapter we will first focus on the current state of different types of tourism sites that represent three of the main ways of an online tourism representation. Depending on their goals, they all differ in one way or the other in the content offered:

- Official government based tourist information portal
  - o This type of web representation should offer a wide amount of information to its visitors. Facts and attractions are stated in detail as well as news and upcoming major events. The user should be able to use this portal as a reference to touristic information and as a virtual tour guide. On the other hand it shows the best side and image of the represented area making it even more attractive and develops the tourism. The user should be impressed of what the site and therefore the area (country/city) has to offer.
- Commercial non government tourism portal
  - o Is a type of agent between the end user (tourist) and the local tourism market. It provides marketing and technology solutions for the tourism industry and a portal for travel information and online booking. The portal, similar to the previous official type, offers semi- objective tourism information and attraction descriptions with the possibility of online booking. Booking is mostly done by having different partners and tourist agencies in the different areas. It also provides a possibility to create sub-sites for different regions that offer touristic attractions. This way the user can collect a large amount of information about a country, an

area or a region he wants to visit, comparing different offers and picking out the most suitable one for him.

- Private tourist office website
  - ○ A basic website of a tourist office, presenting their current offers and advantage over other agencies. Depending on their activities, they offer the customer different packages from flight reservation to complete and detailed tour plans. Should offer a close and competent customer relation to provide each customer an individual care feeling.

2.2. Experiment Setting

As at the same time we should regard the cultural and geographical differences of online tourism, I decided to use eTourism providers from different areas for this comparison. For the government type we will analyze the official site of the **Egyptian tourism authority** (www.egypt.travel). For the commercial part the **leading provider and portal** of travel information and booking in Austria (www.tiscover.at). And finally for the private tourist office I chose the- not so perfect tourist office site of **Goldstars Touristic** (www.goldstars.at).

At the beginning of the analysis of each website, we will discuss the current state and some of the features and cognitive aspects the sites have to offer. This will result in extracting some advantages and disadvantages/lags of the features offered. This analysis is based on the previous knowledge of human cognition and design aspects that we discussed in the first chapter.

In the next step there will be a short cultural analysis based on the previously explained human cognition facts and cultural aspects like color perception. Some of the cultural aspects mentioned are subject to personal experience and subjective assumption from my side, due to the fact, that I was raised in both, the European and Egyptian culture.

The third part of each analysis is going to be a usability testing using the test criteria that are defined in the second chapter at the "usability test" on page 51 and which

combine some usability test methods like questionnaires and thinking aloud. The test setting is the same for all three sites and consists of the following:

Test Setting:

The test setting is always the same and conducted on the same five persons. The independent testers were asked to grade the site, using the same 12 criteria as in the previous chapter on page 51, with 5 point as a maximum satisfaction grade, with a maximum total of 60 points. All testers are average to intensive web users, using the internet on a regular basis. All criteria are important to determine the quality and usability of a website.

The test persons were of different age classes and genders:

- Two testers are between 20 and 30. One male, one female

- Two testers are between 30 and 40. One male, one female

- One tester is over 50. One male

An average test table is presented and a short analysis is done on each, summing tester's comments and opinions that were given after the tests.

At the end of the third test the results of all three tests are compared, discussing possible reasons for the different test results.

At the end we are conducting a thorough usability testing on the third site "Goldstars.at" using the previously defined usability guidelines from page 57 ff. This is done after determining that the site has a number of usability problems, which makes it a good demonstration for utilizing the usability guidelines and showing their importance.

3. Websites

3.1. egypt.travel

"The Egyptian Tourism Authority was the first organization to launch a website utilizing the .travel domain. The site was launched in March of 2006 and is intended to be a one-stop shop for information on Egypt. The new portal, available in English, German, French, Italian, Spanish, Russian and Arabic is one of the key initiatives of Egypt's new integrated marketing campaign designed to double the number of global visitors to Egypt by 2014." [Gar06]

Current state:

The 'new' portal of the Egyptian Tourism Authority offers its visitors information on many travel topics regarding Egypt, starting from the cultural and historical attractions through the wonderful beaches and activity-based holidays like safaris, diving, golfing and yachting.

The site provides NO booking information or even links to booking sites, but offers traveler information like useful phone numbers, visa requirements and other good tips, to ensure a pleasant and enjoyable visit in Egypt.

There is also a news section being offered, informing visitors with lots of highlights taking place in Egypt from events and festivals through archaeological discoveries and other topics.

An interactive newsletter provides the website users with additional information regarding individual requests about locations and requirements that are not available on the website

The site has adapted a lot of guidelines for web development, uses some new technologies that has not been used for its' old portal in the past and offers the user an easy to use interface with lots of goodies. Each of the new features can be discussed in detail for its' own presenting the advantages and sometimes the lacks that can be prevented / improved:

- Color separation for different topics
- Flash implementation for extra features
- Visible various information, depending on different cities or topics
- Different language versions, depending on the region you're logging from
- 'Goodies' for the user, as screensaver, desktop background
- Arabic lessons: written and by sound
- Fan clubs
- Trip ideas for planning a tour in Egypt and making the right preparations for it
- Weather information
- Mini multimedia subpage where you can watch live streams of commercials or download brochures of Egypt

This is only an overview of some of the features the site has to offer and as told before, they really offer a lot of information and goodies. Still a portal is hard to make perfect, and in our case it has some lacks too:

- The site is not compatible with all browsers:
  Running it on a browser without the Flash-plug-in you cannot use the flash features of the page and unfortunately a lot of very important links and features are hidden or can't be used.
    - Language and local website selection
    - Links and subpages as: 'Home'; 'Trade & Press'; News… etc
    - The map feature where you can choose to view different information on each city and see the weather forecast.
    - And the most regrettable thing are the goodies and special feature links such as:
        - Travel guide
        - Learning Arabic
        - Fan club
        - ….etc
- The color themes aren't really consistent:
    - By dividing the site in different colors for the different topics, they should have created the subpages of each topic with the same scheme using the same colors and layouts.

- Though the site is hosted by a good host in London it has some noticeable latency (April 2008) that can't be neglected, especially if you need to use it from a **non** broadband internet connection such as a 56kbit Modem or GPRS. Reason for this could be the large flash movie that has to load each time you switch from one page to another.
- A small beauty problem of the page, that is more annoying for the eye is, that they used left writing instead of block writing. This makes the layout looks a bit defusing and inconsistent.

Cultural Aspects[5]

There are a number of cultural aspects presented on the website that can be related to the fact that this is an Egyptian site:

- **Colorful site**: knowing the mentality of Egyptians, we can see how it is represented by the colorful interface. Egyptians tend to use a lot of colors in different aspects of their life, showing their friendliness, happiness and generosity.

- The **sun** plays a big role in Egyptian culture and is therefore displayed in many ways. The sunny images, the bright colors and the logo of the website underline this aspect.

- The **music** played on the site has a big role of influencing the atmosphere of the website.

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[5] Subject to personal assumptions

Figure 27: Egypt.travel

Usability Test[6]

As done in a previous chapter, five independent persons were asked to grade the site, using the same 12 criteria as before, with 5 point as a maximum satisfaction grade, with a maximum total of 60 points.

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[6] Test setting details on page 68

Criterion	Egypt.travel
Ease of finding specific information	4.00
Readability of content	4.50
Logic of navigation	4.25
Appearance of site	5.00
Quality of graphics	4.75
Reinforcement of Egyptian Tourism	4.50
Speed of site	3.75
Fun to use?	4.50
Explanations of how to use site	4.00
Overall ease of use	4.25
Your overall productivity with the site	3.75
A cool site?	4.50
Total Score	**51.25**

Figure 28: Egypt.travel usability test

This site has been the first site to be graded and from the total score seems like a very good site. Nevertheless we have to consider that the users didn't have any expectations before starting the test and therefore might have graded the website a bit high, for they didn't have a specific comparison reference in mind.

They all understood it as an informative site about Egypt containing news and highlights of the country. The extra features like the language part gave the site an extra interesting touch.

3.2. Tiscover.at

After we analyzed "Egypt.travel" as an example for an official government-based tourist information portal, it's time to take a look at a private-based one. In this case I decided to choose "tiscover.com":

Tiscover.com represents nine countries (summer 2008) and offers a subpage for each of these countries.

- Germany
- UK
- Italy
- Austria
- Scotland
- Lichtenstein
- Montenegro
- Swiss
- South Africa

Although the different subpages have the same structure- except Scotland, they differ slightly from the offered content. In the next part we'll going to analyze the Austrian site.

Current state:

From the first look you can notice, that this site has another point of view. It concentrates on the commercial part of the tourism business that consists of hotel information, booking, special occasions and tour guides. Besides having these preferences as the main eye catcher there are side links diverting to subpages that deliver sightseeing-, culture- and lifestyle- information.

Next to the main page there are eight main navigation subpages:

- Home
  - Main Page including some ad's, quick reservation, hotlines and region links
- Guide
  - Region maps, images, accommodations and other information about each region
- Special Interest
  - Event Search with: type, Features and who it is suitable for
- Hotel / Accommodations
  - Accommodation Search and Hotel information
- Packages
  - Travel Packages search and booking
- Route Planner / Getting There
  - Rout planning and useful information about the region.
  - Car rental, train and flight reservation links
- Weather / Reports
  - Weather information of the country with sub information about each region
- Store
  - Shop page for the main Partners and advertisers

Another feature of the site is "mytiscover" where you can adjust your own page depending on your interests and demands. This is a major advantage and recommended feature, as the user can decide by himself what is important for him and what is useless. Every user can create his own page layout and therefore knows where to look at when he's looking for something.

Figure 29: tiscover.at

Cultural Aspects[7]

Although this portal is an international one, it still has some distinguish characteristics showing this is a European site:

- **Simple structure** is a typical method representing the European simple way of life.

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[7] Subject to personal assumptions

- **Fewer colors** are also a part of the simple representation, but should be mentioned separately for its importance of presenting the website.
- Europeans are used to **individual services** and therefore the member area "mytiscover" plays a big role in addressing their needs.
- Having clear and direct **contact information** is a European must, to make a website more trustworthy and reliable.

Usability Test[8]

Again five persons were asked to grade the site, using the same 12 criteria as before, with 5 point as a maximum satisfaction grade, with a maximum total of 60 points.

Criterion	Tiscover.at
Ease of finding specific information	3.75
Readability of content	4.00
Logic of navigation	4.00
Appearance of site	3.75
Quality of graphics	4.00
Reinforcement of Austrian tourism	3.75
Speed of site	5.00
Fun to use?	3.50
Explanations of how to use site	3.50
Overall ease of use	4.00
Your overall productivity with the site	4.25
A cool site?	3.50
Total Score	**47.00**

Figure 30: tiscover.at usability test

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[8] Test setting details on page 68

Although it is actually a very good result, it is still lower than the Egypt.travel "Flash" site. Asking the testers why they graded the first site better than this one, I discovered an interesting fact:

Egypt.travel is actually a purely informative and interactive site, that doesn't really offer customer services like booking and ordering. It offers fix content that is, with the help of Flash, presented in a nice appealing way.

Tiscover.at on the other hand offers a lot of functions and options, like booking, creating an individual account and showing partner offers. Although these are really interesting functions, for some users they can be too much and lead to a bit of confusion if they don't need them. Still Tiscover is a very informative and helpful tourism portal giving a serious and reliable impression.

3.3. Goldstars.at

„Goldstars Touristik" is a tourist agency located in Vienna. Besides offering their customers flight tickets worldwide, they also organize hotel reservations at home and abroad, rental car reservation and holiday traveling overall.

As the owner is an Austrian citizen with Egyptian background, the main transfer is to and from Egypt. This makes their website even more interesting, as they combine the two previously discussed countries together with offers for both types of users.

The website has been under construction for a while now, and although it is online, it is still far from finished. This makes it even more interesting to see what mistakes developer and owners can do on their web representation.

Current state:

At this time (August 2008) the website concentrates mainly on the flight booking and a few travel packages they have to offer. A lot of links are still inactive and only lead to the home part of the site.

The header of the main page shows the user main areas the agency is specialized in, in a nice illustrated way. Unfortunately if you scroll down the site gets more inconsistent in the content part. Different links are wildly put together and fonts are chosen in a bad way.

Also some menu points like catalogue or contact lead to pages that are under construction for month or don't offer the desired content.

Figure 31: goldstars.at

Design:

The site has been created with "Joomla", a Content Management System (CMS) that is open source and for everyone to use. Joomla offers a large amount of modules and templates to create different types of websites. From blogs to commercial templates a lot of different designs are offered for free. This gives the site a bit of a homemade status and limits its functionality on the options the CMS has to offer. Still,

this is not an excuse for the inconsistency on the homepage, for the main template is nicely chosen. The real problem lies in the fact that the first structure of the website was made by a "professional", but as he couldn't continue the site the untrained staff of the office took it on their own hand.

This is a very good example for what can go wrong between wanting to present something on a website and the result of it, if you don't follow usability and design rules.

As the previous sites are pretty much covering the offers they should provide, we are going to use the knowledge we got from them combined with the main usability guideline facts to determine lags and missing offerings on goldstars.at and try to reuse these aspects on the site for modification and improvement possibilities.

Cultural Aspects[9]

Due to the fact that this website is offered by Egyptians addressing the Austrian community makes it an interesting cultural pool:

- It starts up **colorful, bright** and with **a lot of information** packed in the header. This is a typically Egyptian way we mentioned before.

- In the content part the site tries to be simple and clearly presented, which makes it somehow collide with the colorful part.

- The **contact information** is displayed in a clear way, making it easy to contact the office.

- As the office works directly in the Austrian market, they know which information the customers want to see/know and reconsider this in their offers.

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[9] Subject to personal assumptions

Usability Test[10]

And finally the last site is tested by the same five persons, using the same 12 criteria as before, with 5 point as a maximum satisfaction grade, with a maximum total of 60 points.

Criterion	Goldstars.at
Ease of finding specific information	2.25
Readability of content	3.50
Logic of navigation	3.25
Appearance of site	3.00
Quality of graphics	3.75
Reinforcement of Goldstars Touristik	3.00
Speed of site	3.75
Fun to use?	2.50
Explanations of how to use site	2.25
Overall ease of use	2.50
Your overall productivity with the site	2.75
A cool site?	2.00
Total Score	**34.50**

Figure 33: Goldstars.at usability test

From the low test results it is obvious that the site has a lot of usability problems. The testers had hard time locating information on the website and when they did it wasn't really interesting for them. Some testers commented that the site has good potential, if the topics and features that it offers were really working or presented in a nice way.

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[10] Test setting details on page 68

Unfortunately the complex way of navigating through the site made them loose interest and reconsider if they would like to use this site at all instead of just calling the office and getting a direct recommendation.

Test Conclusion

As a conclusion of our three tests we can conduct some facts:

- The more options a site has to offer, the more complicated it gets and the better the usability has to be.

- Purely informative sites without direct commercial offers are very appealing for a lot of users, for they don't try to sell something directly and therefore have a more honest status.

- If a site is badly presented, it destroys the good image of the company represented. It is better not to have a website at all, than having one that weakens the customers' trust in the product being sold.

- A website designed in an authentic way (like colorful) and offering rare interesting features, makes it more probable that the user will visit it again.

3.3.1. Offers & Demands

To determine what a website like this should offer and what is actually missing, we have to know what the user logging onto "goldstars.at" expects from it and what makes him come back. This is best shown in a comparison

Demands	Offers
Current best offers	There is no distinct part showing the current offers of the agency. Only a couple of links in the middle of the page linking to tour programs with no pricing.

Booking and reservation	There is an online booking tool offered from Amadeus that allows flight, hotel and car bookings. Other than that there is no information on how to book the internal offers of the agency.
Contact	Contact information are really badly placed, which makes it hard for the customer to get more information.
Clear structure	There is no clear structure of the entire site. Links are often empty. User can't know where he's going to end up by clicking

Figure 32: goldstars.at offers & demands

3.3.2. Reuse & Modify

Having determined some offer and feature lags, we still didn't talk much about the usability status of the site. For this testing we are going to use the previously defined "Web Usability Guideline" from page 57ff, stating some flaws in the system of goldstars.at and possibilities to solve them.

1. **Navigation**

   a. **Keep it consistent**: the navigation system of the site has a lot of inconsistencies. **For example** the top menu of the home screen disappears on every other subpage, leaving a blank black header.

   b. **Use appropriate text inside links**: some link texts are badly chosen making it unclear where this link is leading to. **For example** on the head menu of the home screen there is a menu point called e-Commerce; what does this mean for the customer and where does it lead. Also when you choose English as the default language, some menu points are still in German like "online Buchen".

c. **Use CSS to emphasize text links:** as the site is built using Joomla, the CSS are already included in the templates. It's only the question of choosing the right one.

d. **Always include text links:** the menu is built with JavaScript and has no text links. The upper menu has alternative text, which is missing on the side menu.

e. **Add a text-based site map:** a text based sitemap is automatically generated and includes all main menu points.

f. **home page link inside your main navigation system:** is included and clickable from every page

g. **Site logo links to home page:** the site logo only refreshes the current page without linking to the home page.

h. **Include a site search box:** a search tool is included on the site and has its own menu point.

2. **Content**

a. **Don't save the best for last:** with its big header the site makes sure to show where the agency's specialty lies. Illustrating the branches they mainly deal in makes it easy to know what it's going about. The displacement of links on the other hand ruins the image.

b. **Make page content easy to scan:** it's almost impossible to locate a specific content or information on the first glance at the website. The content is mixed up and not in the same style. This should be solved by using fitting style sheets.

c. **Avoid using text inside images whenever possible:** there is no text inside images on the site.

d. **Add ALT and TITLE attributes to all images:** as the images are uploaded using a CMS, they automatically get alternative text and title attributes associated with them.

e. **Contrast:** the contrast of the content is readable. The font size might be a bit small for the chosen blue color.

3. **Brand Support**

   a. **Keep colors and typefaces consistent:** the colors of the website are overall consistent, except when you get to the online booking part, that links to Amadeus and therefore has another layout.

   b. **Keep page layout consistent:** the use of Joomla as a CMS, brings modules and templates that offer a consistent layout.

   c. **Custom error page:** there is no such page.

   d. **Good tagline:** unfortunately there is no tagline at all for the entire company, which makes it loose the friendly touch or the special value.

4. **Feedback forms**

There is only one type of 'feedback' form on the website. When you get into the contacts and click on a certain staff member, you get a message form and the contact details, but no email address. Otherwise the form is short and clearly showing the information required.

IV. Conclusion

As we have shown in this paper, there are many aspects that have to be considered in the process of creating a website. Especially in the tourism branch, there are more factors that play a role in the development process, compared to other local e-commerce sites.

„Engineering a great web-solution is a real Renaissance task. You ought to be a great technician, a high profile usability engineer, a good designer, an exceptional entertainer, an experienced communitarian and a true culture-voyeur. A super generalist in perfection: The vision of art plus the eyes of a child scaled to perform in real business..." [WebE03]

Experienced web developers can intuitively create appealing websites that offer exactly what the user needs in an easy and accessible way. But even the most experienced ones make mistakes. It is always recommended for the developer/designer to constantly do usability tests during and after the development process. In this cases the checklists and guidelines, discussed in chapter two can come very handy. Using these additives can easily clarify the status of the website, showing the usability lags the developer might have missed.

Still, it is not enough to rely only on usability guidelines and checklists. Although the usability tests usually rely on known human cognition aspects, it is almost impossible to consider them all. Before you start creating a website, you have to ask yourself some questions, like:

- What do I want to offer? What does my customer need?
- Who is my customer, and where does he/she come from?

And most important and difficult:

- How does my customer usually think?

In the first chapter we discussed some of the most common human cognition facts that can ease users' accessibility to the content. Amongst others we described the

importance of colors, its perception and its psychological effect on users. Also the typographic layout and virtual haptics play a big role in the acceptance of websites.

As mentioned before, all this is really important for the tourism sector, because users of the same site can come from different parts of the world. How do you respect their different cultures, habits and therefore perception?

At the end, this work cannot be used as a rough rule of thumb in creating 'tourism' websites that consider every human and perception aspect. It can be used though, to ease the process of developing and enhancing websites, by showing the factors that should be considered to optimize them for the customer needs.

Appendix

A. Checklist for Web Content Accessibility Guidelines 1.0

A.1.   Status of this Chapter

This chapter is an appendix to a document that has been reviewed by W3C Members and other interested parties and has been endorsed by the Director as a W3C Recommendation. This is a stable document and may be used as reference material or cited as a normative reference from another document. W3C's role in making the Recommendation is to draw attention to the specification and to promote its widespread deployment. This enhances the functionality and universality of the Web. [W3C05]

A.2.   Priorities

Each checkpoint has a priority level assigned by the Working Group based on the checkpoint's impact on accessibility.

[Priority 1]

> A Web content developer **must** satisfy this checkpoint. Otherwise, one or more groups will find it impossible to access information in the document. Satisfying this checkpoint is a basic requirement for some groups to be able to use Web documents.

[Priority 2]

> A Web content developer **should** satisfy this checkpoint. Otherwise, one or more groups will find it difficult to access information in the document. Satisfying this checkpoint will remove significant barriers to accessing Web documents.

[Priority 3]

> A Web content developer **may** address this checkpoint. Otherwise, one or more groups will find it somewhat difficult to access information in the document. Satisfying this checkpoint will improve access to Web documents.

Some checkpoints specify a priority level that may change under certain (indicated) conditions.

A.3.   Priority 1 checkpoints

In General (Priority 1)	Yes	No	N/A
Provide a text equivalent for every non-text element (e.g., via "alt", "longdesc", or in element content). *This includes*: images, graphical representations of text (including symbols), image map regions, animations (e.g., animated GIFs), applets and programmatic objects, ascii art, frames, scripts, images used as list bullets, spacers, graphical buttons, sounds (played with or without user interaction), stand-alone audio files, audio tracks of video, and video.			
Ensure that all information conveyed with color is also available without color, for example from context or markup.			
Clearly identify changes in the natural language of a document's text and any text equivalents (e.g., captions).			
Organize documents so they may be read without style sheets. For example, when an HTML document is rendered without associated style sheets, it must still be possible to read the document.			
Ensure that equivalents for dynamic content are updated when the dynamic content changes.			
Until user agents allow users to control flickering, avoid causing the screen to flicker.			
Use the clearest and simplest language appropriate for a site's content.			
And if you use images and image maps (Priority 1)	Yes	No	N/A
Provide redundant text links for each active region of a server-side image map.			
Provide client-side image maps instead of server-side image maps except where the regions cannot be defined with an available geometric shape.			

And if you use tables (Priority 1)	Yes	No	N/A
For data tables, identify row and column headers.			
For data tables that have two or more logical levels of row or column headers, use markup to associate data cells and header cells.			

And if you use frames (Priority 1)	Yes	No	N/A
Title each frame to facilitate frame identification and navigation.			

And if you use applets and scripts (Priority 1)	Yes	No	N/A
Ensure that pages are usable when scripts, applets, or other programmatic objects are turned off or not supported. If this is not possible, provide equivalent information on an alternative accessible page.			

And if you use multimedia (Priority 1)	Yes	No	N/A
Until user agents can automatically read aloud the text equivalent of a visual track, provide an auditory description of the important information of the visual track of a multimedia presentation.			
For any time-based multimedia presentation (e.g., a movie or animation), synchronize equivalent alternatives (e.g., captions or auditory descriptions of the visual track) with the presentation.			

And if all else fails (Priority 1)	Yes	No	N/A
If, after best efforts, you cannot create an accessible page, provide a link to an alternative page that uses W3C technologies, is accessible, has equivalent information (or functionality), and is updated as often as the inaccessible (original) page.			

A.4. Priority 2 checkpoints

In General (Priority 2)	Yes	No	N/A
Ensure that foreground and background color combinations provide sufficient contrast when viewed by someone having color deficits or when viewed on a black and white screen. [Priority 2 for images,			

Priority 3 for text].			
When an appropriate markup language exists, use markup rather than images to convey information.			
Create documents that validate to published formal grammars.			
Use style sheets to control layout and presentation.			
Use relative rather than absolute units in markup language attribute values and style sheet property values.			
Use header elements to convey document structure and use them according to specification.			
Mark up lists and list items properly.			
Mark up quotations. Do not use quotation markup for formatting effects such as indentation.			
Ensure that dynamic content is accessible or provide an alternative presentation or page.			
Until user agents allow users to control blinking, avoid causing content to blink (i.e., change presentation at a regular rate, such as turning on and off).			
Until user agents provide the ability to stop the refresh, do not create periodically auto-refreshing pages.			
Until user agents provide the ability to stop auto-redirect, do not use markup to redirect pages automatically. Instead, configure the server to perform redirects.			
Until user agents allow users to turn off spawned windows, do not cause pop-ups or other windows to appear and do not change the current window without informing the user.			
Use W3C technologies when they are available and appropriate for a task and use the latest versions when supported.			
Avoid deprecated features of W3C technologies.			
Divide large blocks of information into more manageable groups where			

	Yes	No	N/A
natural and appropriate.			
Clearly identify the target of each link.			
Provide metadata to add semantic information to pages and sites.			
Provide information about the general layout of a site (e.g., a site map or table of contents).			
Use navigation mechanisms in a consistent manner.			
And if you use tables (Priority 2)	**Yes**	**No**	**N/A**
Do not use tables for layout unless the table makes sense when linearized. Otherwise, if the table does not make sense, provide an alternative equivalent (which may be a linearized version).			
If a table is used for layout, do not use any structural markup for the purpose of visual formatting.			
And if you use frames (Priority 2)	**Yes**	**No**	**N/A**
Describe the purpose of frames and how frames relate to each other if it is not obvious by frame titles alone.			
And if you use forms (Priority 2)	**Yes**	**No**	**N/A**
Until user agents support explicit associations between labels and form controls, for all form controls with implicitly associated labels, ensure that the label is properly positioned.			
Associate labels explicitly with their controls.			
And if you use applets and scripts (Priority 2)	**Yes**	**No**	**N/A**
For scripts and applets, ensure that event handlers are input device-independent.			
Until user agents allow users to freeze moving content, avoid movement in pages.			
Make programmatic elements such as scripts and applets directly accessible or compatible with assistive technologies [Priority 1 if functionality is important and not presented elsewhere, otherwise Priority 2.]			

	Yes	No	N/A
Ensure that any element that has its own interface can be operated in a device-independent manner.			
For scripts, specify logical event handlers rather than device-dependent event handlers.			

A.5.   Priority 3 checkpoints

In General (Priority 3)	Yes	No	N/A
Specify the expansion of each abbreviation or acronym in a document where it first occurs.			
Identify the primary natural language of a document.			
Create a logical tab order through links, form controls, and objects.			
Provide keyboard shortcuts to important links (including those in client-side image maps), form controls, and groups of form controls.			
Until user agents (including assistive technologies) render adjacent links distinctly, include non-link, printable characters (surrounded by spaces) between adjacent links.			
Provide information so that users may receive documents according to their preferences (e.g., language, content type, etc.)			
Provide navigation bars to highlight and give access to the navigation mechanism.			
Group related links, identify the group (for user agents), and, until user agents do so, provide a way to bypass the group.			
If search functions are provided, enable different types of searches for different skill levels and preferences.			
Place distinguishing information at the beginning of headings, paragraphs, lists, etc.			
Provide information about document collections (i.e., documents comprising multiple pages.).			

Provide a means to skip over multi-line ASCII art.			
Supplement text with graphic or auditory presentations where they will facilitate comprehension of the page.			
Create a style of presentation that is consistent across pages.			
And if you use images and image maps (Priority 3)	**Yes**	**No**	**N/A**
Until user agents render text equivalents for client-side image map links, provide redundant text links for each active region of a client-side image map.			
And if you use tables (Priority 3)	**Yes**	**No**	**N/A**
Provide summaries for tables.			
Provide abbreviations for header labels.			
Until user agents (including assistive technologies) render side-by-side text correctly, provide a linear text alternative (on the current page or some other) for *all* tables that lay out text in parallel, word-wrapped columns.			
And if you use forms (Priority 3)	**Yes**	**No**	**N/A**
Until user agents handle empty controls correctly, include default, place-holding characters in edit boxes and text areas.			

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