Topic 1.2:
A quality framework for digital resources: theory, requirements, development, management and evaluation

DIGITAL RESOURCES FOR TOURISM: CHANNELS, QUALITY, CO-CREATION, AND COLLABORATION

PROF. PIERLUIGI FELICIATI, AA 2022/23

unimc
UNIVERSITÀ DI MACERATA
l'umanesimo che innova

Sub-topics

«A quality framework for digital resources: evaluation»

- What does it mean “quality”?
- Definitions of quality of digital services
- Accessibility and usability
- How to evaluate, studying users experience and satisfaction?

Quality?

What is **quality**, according to you?

Quality of products, quality of services, quality of full experiences?

What criteria you figure out could be adopted to evaluate quality?

And who is in charge of this evaluation in a business context?

Quoting Plato…

MENO: And how will you enquire, Socrates, into that which you do not know? What will you put forth as the subject of enquiry? And if you find what you want, how will you ever know that this is the thing which you did not know?

SOCRATES: I know, Meno, what you mean; but just see what a tiresome dispute you are introducing. You argue that a man cannot enquire either about that which he knows, or about that which he does not know; for if he knows, he has no need to enquire; and if not, he cannot; for he does not know the very subject about which he is to enquire

Plato, *Meno, or Virtue,* 4th century BC

Some definitions

Service quality (SQ), in its contemporary conceptualisation, is a comparison of perceived expectations (E) of a service with perceived performance (P), giving rise to the equation SQ=P-E (Lewis, R.C. and Booms, B.H., 1983. The marketing aspects of service quality. *Emerging perspectives on services marketing*, *65*(4), pp.99-107).

Quality - This term is applied in a few different ways. For starters, quality can be represented by how time and energy are used to accomplish tasks.

Quality Management - This term refers to any activity being performed by an organisation to maintain or improve quality. This can include adopting *quality planning, quality policy, quality assurance, quality improvement*, and more. (ISO 9001: 1987 Terms and definitions)

Some definitions

ISO/IEC 25010:2011 - *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — System and software quality models*

1. A **quality-in-use model** is composed of characteristics that relate to the outcome of interaction when a product is used in a particular context. This system model applies to the complete *human-computer system, including computer systems and software products in use*.
2. A **product quality model** composed of eight characteristics relating to the software's static properties and the computer system's dynamic properties.

Quality of experience (**QoE**) is a measure of the delight or annoyance of a customer's experiences with a service (e.g., web browsing, phone call, TV broadcast) (Qualinet 2012, *White Paper on Definitions of Quality of Experience*)

Some definitions

The **ISO 9000 series standards** are based on **seven quality management principles** (QMP) http://www.iso.org/iso/pub100080.pdf :

1. QMP 1 – Customer focus
2. QMP 2 – Leadership
3. QMP 3 – Engagement of people
4. QMP 4 – Process approach
5. QMP 5 – Improvement
6. QMP 6 – Evidence-based decision making
7. QMP 7 – Relationship management

Some definitions

ISO 9126:1992 standard (*Software Quality Product Evaluation: Quality Characteristics and Guidelines for their use*) defines software quality as The totality of features and characteristics of a software product that bear on its ability to satisfy stated or implied needs.

Basic factors are:

- **Functionality:** the amount of "functions" contained in a delivered product.
- **Reliability:** the capability of a product to maintain its level of performance under stated conditions for a stated period of time".
- **Usability:** the extent to which a product is convenient, ease, and practical to use
- **Efficiency:** the amount of operations (and more generally, resources) to achieve a goal.
- **Maintainability:** the extent to which a product is easy to test, to modify, or to extend.
- **Portability:** the ability to move the product from one host environment to another; the level of compliance to standards.

Quality in use

What is Quality in Use? (see also Ergonomy)

1. The capability of the software product to **enable specified users to achieve defined goals with effectiveness, productivity, safety and satisfaction in specified contexts of use.**

2. **User**'s impression of a software product's **quality** (too generic?)

This implies that **quality** has to be based on specified **goals**, specified **users**, specified **contexts of use** and **four general criteria**: **effectiveness, productivity, safety and satisfaction.**

Quality is **not about the richness of functions** or **technical innovation.**

Quality is about **usability and accessibility according to the user's needs**.

Users and Contexts

- **Effectiveness** in using the product indicates the **accuracy** and **completeness** with which users can attain the specified results.
- **Productivity** in the use of the product indicates the use of resources about accuracy and completeness with which the users achieve specified results.
- **Safety** and **Security** refer to the respect of human functionalities and the attention to sensitive personal data.
- **Satisfaction** indicates freedom from unease and obligations and a favourable tendency in the user towards the product.
- **Context of Use** is the context of use, the goal or the task, the hardware resources and software used, and the physical and social environment in which the product is used.

Quality in use

World Wide Web software development is a challenge.

The need to provide **appealing and attractive user interfaces** is combined with the fact that the Web is **not merely an information transfer tool**. The capacity to offer additional services plays an important role. The Web makes these services available to more individuals (users) with different characteristics, knowledge and profiles (**contexts**).

Every Web project should decide whether to address just target users who play in target contexts or accept the challenge of **extending the target independently by the context**.

Accessibility

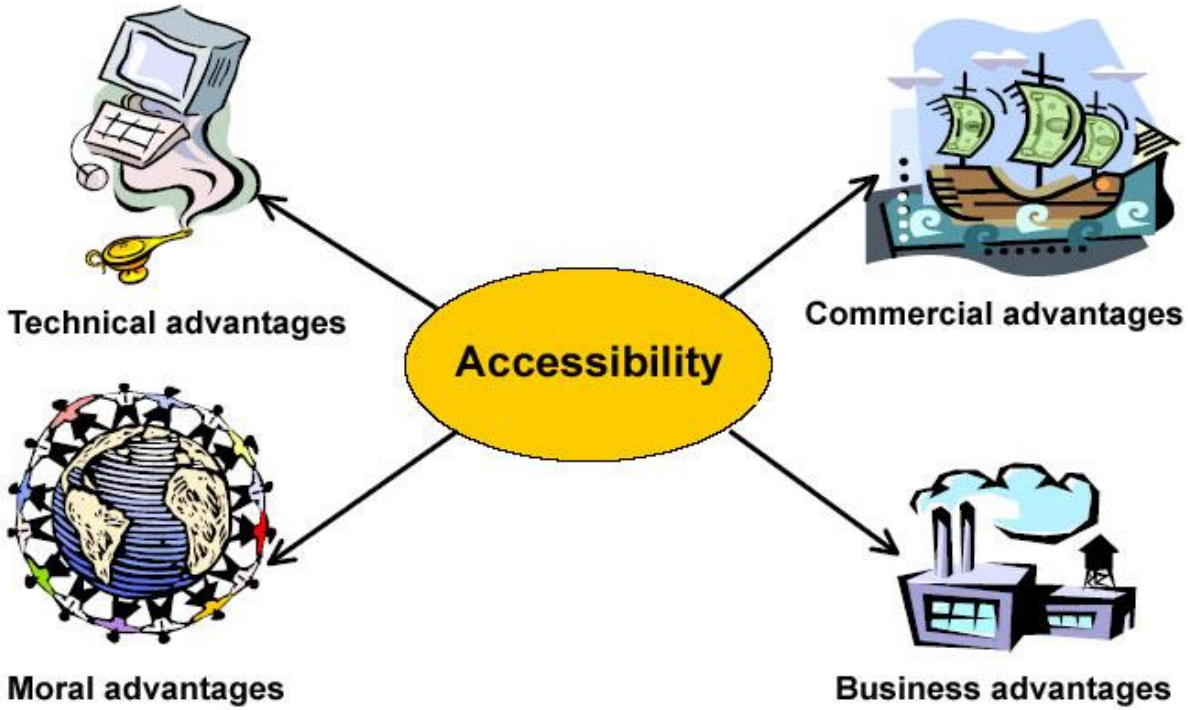
"A Web site is considered to be accessible when the informational content, navigational modes and all the interactive features present **are accessible to all users**, regardless of disabilities and independently of technology used to access the site and of the context in which they are working whilst accessing the site". (ISO TS 16071:2002)

The World Health Organisation, since 2001:

- refers to "human functions" in general and not simply disability.
- moves away from the consequences of a "dysfunction" to components of "health", grouping them together under the heading of "health domain"

Accessibility

The attention to **every user** includes users who may be defined **special**: because of their disabilities, because of they technological preferences/avaliability, because of their special needs/contexts. In most of the cases, digital services tend to be **addressed to everyone**, so we have to erase the limitative attribute “specified” referred to users and contexts from the definition of quality in ISO/IEC 9126-1.



Accessibility

The needs that web accessibility aims to address include the following:

- **Visual:** Visual impairments including blindness, various common types of low vision and poor eyesight, different types of colour blindness;
- **Motor/mobility:** e.g. difficulty or inability to use the hands, including tremors, muscle slowness, loss of fine muscle control, etc., due to conditions such as Parkinson's disease, muscular dystrophy, cerebral palsy, stroke;
- **Auditory:** Deafness or hearing impairments, including individuals who are hard of hearing;
- **Seizures:** Photo epileptic seizures caused by visual strobe or flashing effects.
- **Cognitive and intellectual:** Developmental disabilities, learning difficulties (dyslexia, dyscalculia, etc.), and cognitive disabilities (PTSD, Alzheimer's) of various origins, affecting memory, attention, developmental "maturity", problem-solving and logic skills, etc.

Those criteria are defined by W3C – Web Accessibility Initiative (ISO/IEC 40500:2012) and by National Laws, for example, in Italy

Usability

Once users have accessed our content/services, they must understand how to use them.

Usability is **a quality attribute that assesses how easy user interfaces are**. The word "usability" also refers to methods for improving ease of use during the design process.

For web services, Usability refers to the **criteria** of ISO/IEC 9126-1: **effectiveness, productivity, safety and satisfaction.**

The less energy we need to invest in understanding/using a service to achieve our goals, the more we will be satisfied

Usability

If accessibility features could be developed and evaluated using mostly technical tools, usability is a more qualitative criterion and asks qualitative methods to be evaluated. Those methods could be:

- Empirical (testing service prototypes with real users)
- Analytical (expert reviews - specialised personnel assess systems)
  - Heuristic evaluation
  - Cognitive walkthrough
  - Attribute by attribute
  - CASSM analysis

Evauluating quality

There are some general questions in any evaluation:

Why evaluate? **What** to evaluate? **How** to evaluate? **For whom/why** to evaluate?

Evaluation means an appraisal of the performance or functioning of a system about some objective(s). The performance can be evaluated as to:

- Effectiveness: how well does a system perform that for which it was designed?
- Efficiency: at what cost?
- A combination of these two (i.e. cost-effectiveness).

Evaluation goals could be: Assess system's functionality, Identify possible problems, Assess user experiences, Identify how the system could be made more effective/efficient, and Improve user experiences.

Empirical evaluation

This methodology is based upon the direct involvement of real sample users (tests). Typically, test organisers:

- define a limited number of tasks offered by the service (i.e. looking for information, interact with information, contact someone, perform an interaction…)
- in a controlled environment – ask users (one by one or in a focus group) to perform those tasks in a defined time-lapse. Users will be observed and recorded, even using advanced methids such as Eye-tracking.

(This part helps to evaluate the level of **effectiveness and productivity)**

Then, sample users could be asked to answer to qualitative questionnaires (cognitive experience) to evaluate their degree of satisfaction.

Heuristic evaluation

Checklist-based: a common sense list (1990, Nielsen and Molich).

Starting points:

- A system (better a prototype)
- Clearly defined scenario(s) of use
- User profiles (knowledge, experience, goals)
- A set of heuristics

Procedure: expert works through every screen of a system, asking ten questions:

1. Visibility of system status, 2. Match between the system and the real world, 3. User control and freedom, 4. Consistency and standards, 5. Error prevention, 6. Recognition rather than recall, 7. Flexibility and efficiency of use, 8. Aesthetic and minimalist design, 9. Help users recognise, diagnose, and recover from errors, 10. Help and documentation

Pros and cons of heuristic evaluation

Pros

- Widely used usability evaluation technique
- Good ratio: benefits vs low cost

Cons

- Big difference between the findings of different analysts
- Needs specialists who have the expertise
- Criteria should be updated according to ICTs evolutions

Cognitive Walkthrough

Cognition: The mental process of *knowing*, including aspects such as awareness, perception, reasoning, and judgment

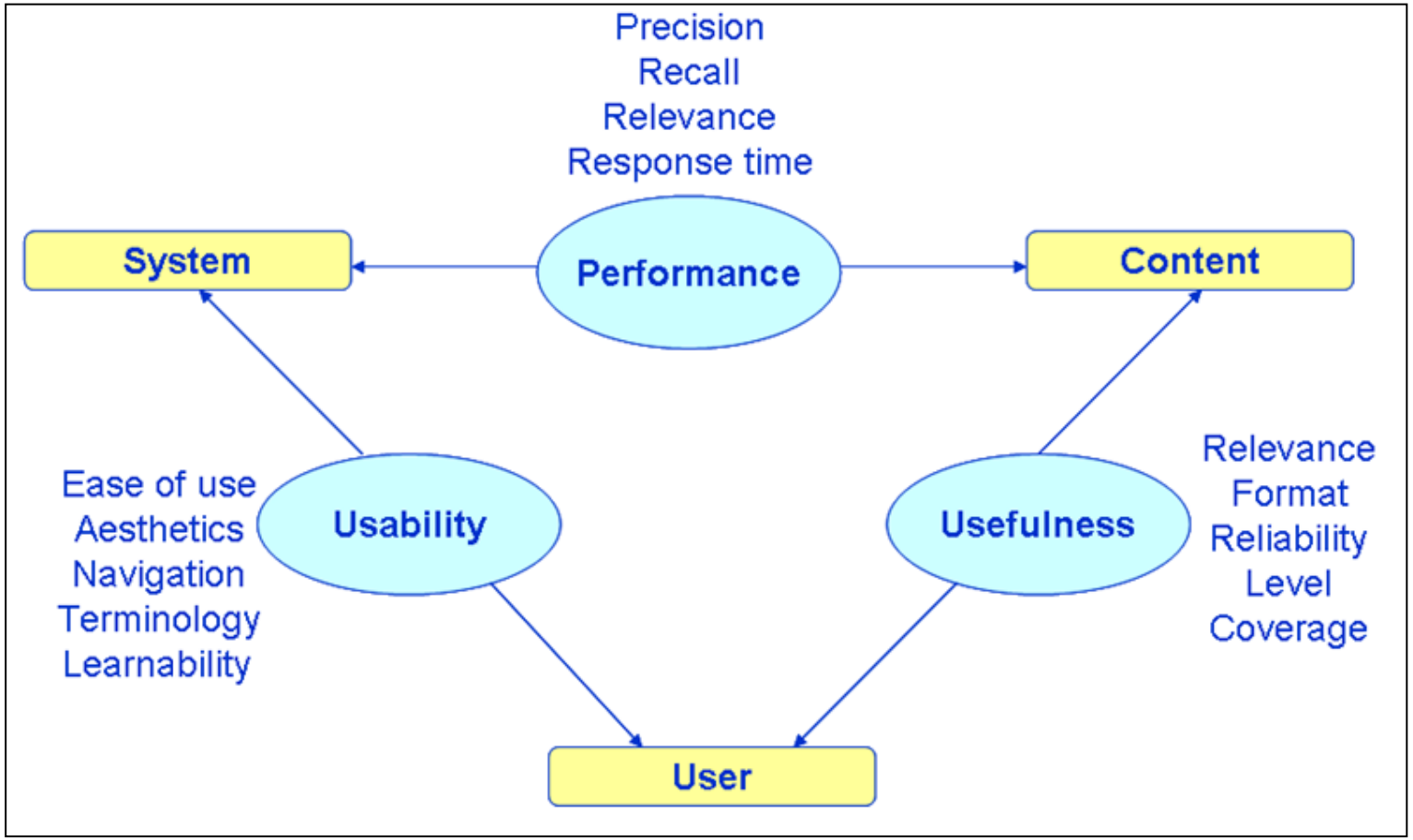
Walkthrough: a detailed review of a typical *sequence of steps/actions*

Starting points:

- A system (a prototype)
- Description of the task(s)
- A complete list of the actions needed to complete the task successfully, with a corresponding list of the system responses for each action
- User profiles (knowledge, experience, goals)

Attribute by Attribute

Split the interaction user-system into dimensions and general criteria.



Interaction triptych model Fuhr/ Tsakonas (2007)

CASSM analysis

CASSM (Concept-based Analysis of Surface and Structural Misfits)

The analysis focuses on the **fit quality between the user and system *concepts***. CASSM considers design in terms of **three points of view on concepts**:

- those the user is working with,
- those implemented within the system, and
- those represented at the interface.

Concepts are considered in terms of **entities and attributes**; the analyst determines for instance **how easy it is for a user to create or delete an entity**, or to set or **change the value of an attribute**. In addition, the analyst may identify **relationships between concepts**.

Summary on users evaluation

Different evaluation methods provide various points of view on the system.

- Metrics are not always clear.
- Testbeds and benchmarking have still to be developed.

They can involve USERS and offer a pragmatic approach: how the users communicate with a particular digital system. This is different from understanding the users in the broader sense! To have a more comprehensive picture we need to look at **information behaviour studies**

Let’s see at least Wilson’s model in information behaviour.

Information behavior: Wilson's model (2000)

Information Behavior is the totality of human behavior in relation to sources and channels of information, including both active and passive information seeking, and information use.

Information Seeking Behavior is the purposive seeking for information as a consequence of a need to satisfy some goal. In the course of seeking, the individual may interact with computer-based systems.

Information Searching Behavior is employed by the searcher in interacting with information systems of all kinds. The interactions may be at the level of human-computer interaction (i.e. use of the mouse and clicks on links) or at the intellectual level, judging the relevance of information.

Information Use Behavior consists of the physical and mental acts involved in incorporating the information found into the person's existing knowledge base.

The Google Generation report (2008)

It was exhaustive research on **digital information-seeking behaviour**. Some of the results:

- **Horizontal information seeking**. A form of skimming activity where people view just one or two pages from an academic site and then `bounce' out, perhaps never to return.
- **Navigation**. People spend much time simply finding their way around.
- **Viewers**. The average time users spend on e-book and e-journal sites is concise: typically four and eight minutes, respectively.
- **Squirreling behaviour**. Academic users squirrel away content in the form of downloads, especially when there are free offers. There is no evidence as to the extent to which these downloads are read.
- **Diverse information seekers**. One size does not fit all.
- **Checking information seekers**. Users assess authority and trust themselves in a matter of seconds.

Quality evaluation and users' experience – let's discuss

1. What is your opinion after this presentation of the issues related to **digital quality and its evaluation**?
2. What about **accessibility**? What impact on Touristic market?
3. …and **usability** as a general requirement? Does it need to be considered?
4. Do you think that any **user study** along a Digital Tourism Project has to be organised? And in case, adopting what approach(es)?