Proposal for a Set of Quality Attributes Relevant for Web 2.0 Application Success

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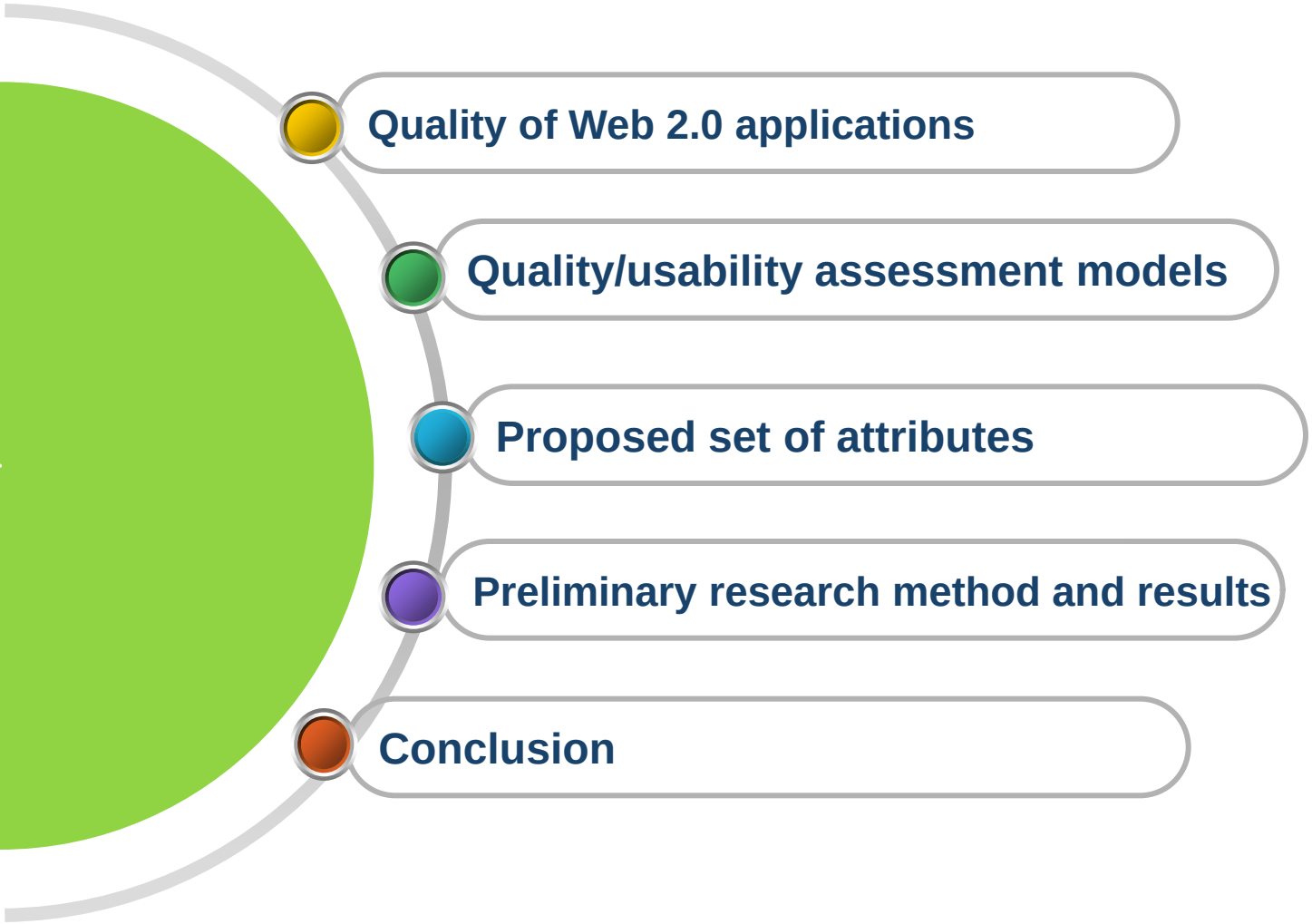
Agenda


Quality of Web 2.0 applications
Quality/usability assessment models
Proposed set of attributes
Preliminary research method and results
Conclusion

Web 2.0

- dynamic and flexible platform for creating users' content and knowledge exchange, as well as the easier management, organization and reuse of information
- is characterized by a focus on the user, openness, collaboration, collective intelligence, as well as decentralized creation and sharing of content
- users are no longer passive recipients of information but through the exchange of knowledge and experiences they create new knowledge
- has resulted in changes in terms of using the Internet in all areas of work (enterprise 2.0) and also in education (e-learning 2.0)
- Web 2.0 applications have a huge potential for the business performance of an organization

Quality of Web applications

- Goal: attract as many new users as possible
- Problem: organizations invest in the ‘ad hoc’ development of Web applications without a clear understanding of factors which contribute to quality and the measurement of their impact on the success of Web applications
- Outcome: unstable Web applications that are well known for their numerous usability problems
- Solution: developers have to understand how users perceive a Web application and which attributes contribute to their intentions regarding their retention or re-visit of the Web site

Quality assessment models

- most of them have a hierarchical tree structure, with the highest level characteristics or attributes placed in the root
- they are further decomposed into lower level criteria or attributes
- FCM (Factors, Criteria, Metrics), presented by McCall et al.
  - software quality is classified into 11 factors, 25 criteria and 41 metrics
- Boehm et al. presented a quality model which consists of 19 different attributes
- the classification of attributes in both of these models is based on three identical principles although they are used under different names.
- GQM (Goal, Question, Metric)
  - the main idea is to identify external quality attributes (goals) that we intend to achieve with a model, specify the goals by means of questions and finally define metrics that will provide the answers to questions

Usability assessment models

Nielsen	Constantine and Lockwood	Schneiderman	Preece et al.	Shackel	Dix
Efficiency of use	Efficiency in use	Speed of performance	Throughput	Speed	Flexibility
Ease of learning	Learnability	Time to learn	Ease of learning	Time to learn	Learnability
Memorability	Rememberability	Retention over time		Retention	
Errors/safety	Reliability in use	Rate of errors by users	Throughput	Errors	Robustness
Satisfaction	User satisfaction	Subjective satisfaction	Attitude	Attitude	

Quality and usability evaluation related ISO standards – ISO 9241-11

- proposes the use of the process-oriented approach based on the principles of user-centered design in order to evaluate software usability
- the measurement of usability depends on the context of the use of software and consists of three assessment attributes: efficiency, effectiveness and satisfaction
- advantages:
  - it facilitates the identification of attributes that need to be considered in usability assessment
  - it enables simple and direct usability measurement as well as comparison of software products within the context of their use
- disadvantages:
  - good usability assessment cannot be based on such a small set of attributes

Quality and usability evaluation related ISO standards – ISO/IEC 9126

- (derived from McCall's model) represents a binary framework for quality assessment from the product's perspective
  - the first part (internal and external quality) is used for modeling software quality by using six basic characteristics (functionality, reliability, usability, effectiveness, maintainability and portability), which are further decomposed into 21 sub-characteristics
  - the second part is used for measuring software quality in use and consists of four characteristics: effectiveness, productivity, security and satisfaction
- advantages:
  - it allows the development of a model for software quality assessment which can eliminate the gap between developers and users
- disadvantages:
  - overlap between some attributes, lack of guidelines and procedures for quality assessment, an ambitious definition of certain attributes, generic model for quality assessment

Quality and usability evaluation related ISO standards – SQuaRE

- Software Product Quality Requirements and Evaluation
- ISO/IEC 25000
- response to the shortcomings of the mentioned standards
- will replace and extend the existing standards:
  - 9126-1 (to become ISO/IEC 25010: Quality Model)
  - 14598-3 (to become ISO/IEC 25042: Evaluation process for developers)

Acceptability and success frameworks 1/2

- Technology Acceptance Model (TAM)
  - user acceptance of the system primarily depends on two attributes: perceived usefulness and perceived ease of use
  - focused on IT/IS adoption in business organizations
- TAM2
  - expanded with social and cognitive processes influencing perceived usefulness (Venkatesh and Davis)
  - extended with the playfulness attribute, which proved to be an important motivating factor in the acceptance of Web based systems (Moon and Kim)
- Unified Theory of Acceptance and Use of Technology (UTAUT)
  - was founded with the aim to consolidate previous TAM related studies and explain how individual differences affect the acceptance of technology
- mentioned models emphasize the importance of subjective factors in technology acceptance

Acceptability and success frameworks 2/2

- IS success model
  - identifies the objective attributes of system quality and information quality that may result in the increase in satisfaction, and thus in IS use
  - in its ten-year upgrade it was expanded with the *service quality* dimension

Proposed set of quality attributes 1/2

- shortcomings of previous approaches to Web applications quality and usability assessment:
  - the majority of them do not have a good theoretical basis or empirical validation;
  - the guidelines for their use do not exist or are aimed at general users;
  - they do not cover all the aspects of Web applications quality and the relationship between quality attributes;
  - there is no conclusive evidence that the existing models are suitable for assessing the quality of Web 2.0 applications
- it is noticed that most of the mentioned approaches have many overlapping items
- these seemingly separate frameworks were combined and a new modified model is created

Proposed set of quality attributes 2/2

- according to new model, Web 2.0 application quality can be addressed via six major dimensions:
  - system quality,
  - service quality,
  - information quality,
  - performance,
  - effort and
  - acceptability.
- based on their theoretical similarities, quality attributes were categorized into one of the six proposed dimensions
- proposed set of attributes can be used for the general assessment of Web 2.0 applications quality concerning the implementation of e-activities of any kind (education, business, commerce, etc.).

Preliminary research method

- a *questionnaires* or *checklists* for subjective assessment of Web 2.0 applications quality was created
- the participants in the preliminary study were undergraduate students of Information Science who use Web 2.0 applications for communication and entertainment on a regular basis
- they were asked to indicate their agreement or disagreement with the checklist statements using a five-point Likert-type scale
- the study was carried out with two Web 2.0 applications:
  - Google Docs, which students used to take notes during their laboratory sessions and
  - Gliffy, which they used to create a flowchart of a given task.

Preliminary research results

- Google Docs
  - ✓ it enables to perform e-activities efficiently
  - ✓ it has good built-in mechanisms which force users to create strong passwords and thus protect their privacy and data security;
  - ✓ it was available every time they needed to perform an e-activity with its interface functionalities;
  - x mechanisms to prevent errors are not sufficiently effective
- Gliffy
  - ✓ it was regularly available
  - ✓ users found its design simple and attractive
  - ✓ the visual presentation of the whole Web application was consistent
  - x lack of interactive interface elements and poor mechanisms for error prevention account for a relatively low intention to use of application in future

Conclusion

- Web 2.0 applications have not only affected the social aspect of our life, but also its professional sphere (particularly notable in e-learning and e-commerce)
- therefore, it is indeed important that the quality of these applications is at a high level
- in order to overcome the gap that still exists between users and developers, there is a need for a good methodology that will facilitate the evaluation of Web 2.0 applications quality
- as a first step towards this goal, this paper proposes a set of attributes that should be taken into consideration during the evaluation of quality and usability of Web 2.0 applications
- future work will be focused on the development of a model and methodology of total quality assessment of Web 2.0 applications as well as the empirical analysis of the importance of the proposed attributes and their relationships

Thank you for your attention !

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