Proposal of a Computer Supported Collaborative Work Model for E-Commerce Web Sites Based on a Quality Guiding Framework

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University of Sousse
"Quality is never an accident; it is always the result of an intelligent effort"

John Ruskin

http://evene.lefigaro.fr/citations/john-ruskin

Quality focuses on an ultimate goal of customer satisfaction
1) Context & Motivation
2) State of art
3) Methodology
4) Production
5) Validation

PLAN
Context & Motivation > Context

- E-Commerce Web sites
- Quality / Continuous quality
  - Customer satisfaction
  - Attracting customers
  - Increasing traffic
  - Gaining customer trust
  - Retaining customer
  - Efficiency
  - Improving the turnover of e-commerce
  - Quality measurement tools
  - Generating competitive success.
  - Reaching Sustainability
Motivation > e-Commerce Observers

- OECD (Organization for Economic Co-operation and Development),
- FEVAD (Federation of e-commerce and distance selling),
- WTO (World Trade Organization),
- eMarketer
- newmediametrics

They disclose statistics.
Motivation > e-Commerce Indicators > Tunisia

• In 2014, the turnover of e-commerce in Tunisia is estimated at more than 100 million dinars, its annual growth is 2 digits.
• It is not in its real growth despite the technological and socio-economic infrastructures that are getting ready. The strong predisposition is proved by the following figures of 2015:
  ✓ 5.8 million Internet users out of a population of one can over 11 million.
  ✓ 78% of Tunisians who say they are ready to buy online.

Motivation > e-Commerce Indicators > France  USA

• Fevad 2015 to 2016:
  ✓ e-commerce in France: an increase of 15% of turnover, i.e. €72 billion
  ✓ 835 million of transactions online in 2015 | an increase of 19% compared to 2014.
  ✓ 1,029 billion online transactions in 2016 | + 23% compared to 2015

(fevad 2016–2017)

• eMarketer:
  ✓ Worldwide sales of BtoC e-commerce amounted to $1,671 billion in 2015, an increase of 25% compared to 2014.
  ✓ It weighs 7.4% of total retail sales worldwide.
  ✓ The eMarketer even has predicted turnover for e-commerce until 2019 where it will exceed $3,500 billion.

(journaldunet 2016)
State of art

- Quality in Management
- Quality in Software Engineering
- Quality according to Web Marketing Scholars and Practitioners
It is the industrial revolution and mass consumption that have raised management issues in terms of quality management.

- **Walter Andrew Shewhart** (a physicist and statistician researcher at Bell Laboratories), sought to understand the quality control of a mass-produced product.
- He invented in 1924 a method that statistically controls variations in the characteristics of a product and their impact on customer satisfaction.
- He had to specify in detail all the phases of production in order to stem the causes of the variations.
State of art > Birth of Quality

• At the beginning of the 20th century the quality appeared as one of the functions of the company among the theories advanced by Frederick Winslow Taylor.

✓ At that time, a person called quality controller had the responsibility of inspecting the quality of the employees’ work.
Quality has been hatched in the United States by the works of Walter A. SHEWART and W. Edwards DEMING.

But it flourished in Japan, its pioneers are Kaoru ISHIKAWA, Shoji SHIBA and Genichi TAGUCHI.
State of art > Quality in Software Engineering

• "The ability of a set of intrinsic characteristics to satisfy requirements". (ISO 9000)

Outmoded definition of quality
Subjective and Personal Vision
Demands (Requirement Engineering)

• ISO / IEC 9126, "Evaluation of Software Products - Quality Characteristics and Instructions for Use", was published by AFNOR in October 1992 (classification index Z 67-133).
State of art > Quality in Software Engineering

Models of Certification
- The ISO 9000 Certification
- France Telecom TQE
- DOD 2167A certification
- Software-Capability Maturity Model (SW-CMM)
- Trillium (from Bell Canada for Telecommunications
- Software Process Improvement and Capability Determination (SPICE)

Models of Maturity and Improvement
- Quality Model Families
State of art > Quality in Software Engineering
> Kano Diagram

Kano Diagram
E-commerce site’s levels of satisfaction

Towards total satisfaction

Attractive original needs
Virtual fitting
Price comparison
Virtual visit
Voting system
Customization
Remote assistance
Responsive site
Environmental protection

Performer needs expressed by the client

Missing features
Neutral satisfaction
Needs present on site

Basic needs
Do not deserve to be expressed
MUST BE
Product/Service catalog  prices
Search engine
Caddy’s management
Can not increase satisfaction but can reduce it

e-ComDecaQual  ICSEA 2017
Towards dissatisfaction
State of art > Quality according to Web-marketing Scholars

• The predecessors are Parasuraman, Zeithaml and Berry
  ✓ Off-line Quality Measurement Scale
• SERVQUAL:
  ✓ Promulgated and promoted as a technology through a series of publications:
    ▪ (Parasuraman et al., 1985; 1986; 1988; 1990; 1991a; 1991b; 1993; 1994);
    ▪ (Zeithaml et al., 1990; 1991; 1992; 1993);
• They had to adapt it later for the on-line context
## State of art > Formal Scales

<table>
<thead>
<tr>
<th>Scales/Author(s)</th>
<th>Scales’ Domains</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Webqual™</strong> Loiacono et al., 2000</td>
<td>(1) accommodation of information to the task, (2) trust, (3) response time, (4) attractiveness of design, (5) intuitiveness, (6) visual attraction, (7) creativity, (8) empathy, (9) integrated communication, (10) interactivity, (11) business process and (12) availability.</td>
</tr>
<tr>
<td><strong>SiteQual</strong> Yoo and Donthu 2001</td>
<td>(1) ease of use of the site, (2) site design, (3) speed of the order process and (4) security.</td>
</tr>
<tr>
<td><strong>WebQual</strong> Barners and Vidgen’s 2002</td>
<td>(1) quality of interactivity and service (trust, empathy), (2) site usability (design), (3) quality of the information presented on the site.</td>
</tr>
<tr>
<td><strong>PIRQUAL</strong> Francis and White 2002</td>
<td>(1) online store features, (2) design of the product sheet, (3) conditions of sale, (4) conformity of delivered products, (5) customer service, (6) security.</td>
</tr>
<tr>
<td><strong>e-ServQual</strong> Parasuraman et al., 1994</td>
<td>(1) reliability, (2) liability, (3) access, (4) flexibility, (5) navigational facility, (6) efficiency, (7) insurance / trust, (8) security, (9) knowledge of prices, (10) aesthetics, (11) customization.</td>
</tr>
<tr>
<td>Scales/Author(s)</td>
<td>Scales’ Domains</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>eTailQ scale Wolfinbarger and Gilly 2003</td>
<td>(1) reliability and compliance with commitments, (2) site design, (3) security / privacy, (4) services provided to consumers.</td>
</tr>
<tr>
<td>E-S-QUAL &amp; E-RES-QUAL Parasuraman, Zeithaml and Malhorta 2005.</td>
<td><strong>E-S-QUAL</strong> (1) efficiency of the site, (2) compliance with commitments, (3) system availability, (4) respect for the privacy of users.  <strong>E-RES-QUAL</strong> contains (1) reactivity, (2) compensation and (3) contact.</td>
</tr>
<tr>
<td>NetQu@l Grégory Bressolles 2006</td>
<td>(1) quality and quantity of the information presented on the site, (2) ease of use of the site, (3) design or the graphic style of the site, (4) reliability and compliance, (5) security and privacy of personal data, (6) offer proposed on the site, (7) interactivity and customization. 54 items were generated for these domains.</td>
</tr>
</tbody>
</table>
| eTransQual Bauer et al., 2006           | functional and hedonic elements:  
(1) features and design, (2) enjoyment (Pleasure), (3) business process,  
(4) reliability and (5) reactivity (responsiveness).                                   |
<p>| PeSQ Cristobal et al. 2007              | (1) website design, (2) customer service, (3) insurance and order management.                                                              |
| E-SELFQUAL Ding et al. 2011             | (1) Perceived control, (2) Service convenience, (3) Customer service, (4) Service fulfilment.                                                |</p>
<table>
<thead>
<tr>
<th>Quality Domain</th>
<th>Rate</th>
<th>Quality Domain</th>
<th>Rate</th>
<th>Quality Domain</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Design /Ergonomics</td>
<td>26</td>
<td>11-Privacy</td>
<td>7</td>
<td>21-Maintainability</td>
<td>2.5</td>
</tr>
<tr>
<td>2- Information variety</td>
<td>22</td>
<td>12-Access</td>
<td>6.5</td>
<td>22-Customer support</td>
<td>2</td>
</tr>
<tr>
<td>3- Reliability</td>
<td>17</td>
<td>13-Insurance</td>
<td>5.33</td>
<td>23-Customer loyalty/Fidelity</td>
<td>2</td>
</tr>
<tr>
<td>4- Security</td>
<td>17</td>
<td>14-Feeling</td>
<td>4.5</td>
<td>24-Incitement</td>
<td>2</td>
</tr>
<tr>
<td>5- Ease of use</td>
<td>16</td>
<td>15-Trust</td>
<td>4.16</td>
<td>25-Ease of terms</td>
<td>1</td>
</tr>
<tr>
<td>6- Reactivity</td>
<td>14.33</td>
<td>16- Ease of ordering</td>
<td>4</td>
<td>26-Ease of responding</td>
<td>1</td>
</tr>
<tr>
<td>7- Service quality</td>
<td>12.33</td>
<td>17-Structure</td>
<td>3.5</td>
<td>27-Speed of delivery</td>
<td>1</td>
</tr>
<tr>
<td>8- Performance/Efficiency</td>
<td>11.5</td>
<td>18-Interactivity</td>
<td>3</td>
<td>28-Community for e-reputation</td>
<td>1</td>
</tr>
<tr>
<td>9- Reputation</td>
<td>10.33</td>
<td>19-Web store policies</td>
<td>3</td>
<td>29-Storage capacity</td>
<td>1</td>
</tr>
<tr>
<td>10- Customization</td>
<td>9</td>
<td>20- Ease of contact</td>
<td>2.5</td>
<td>30-Low prices</td>
<td>0</td>
</tr>
</tbody>
</table>

State of art > Synthesis and classification of quality domains
Methodology for a Quality Approach

• Step 1 Gathering domains and items
• Step 2 Structuring domains in a scale
• Step 3 Enriching the scale (slide 20)
• Step 4 Associating control tools to job profiles (slide 21)
• Step 5 Integrating in PDCA wheel (slide 22)

Production

• A Framework composed by:
  ✓ A scale e-ComDecaQual
  ✓ Two axes
• An Object Model Abstraction (Slide 23)
• A Detailed Specification of e-ComDecaQual Scale
• One Prototype of a Groupware
Production > Scale

- Compliance with Standards
  - Reliability
- Performance & Efficiency
  - Maintainability

- Security
  - Confidence
  - Insurance
  - Loyalty

- Accessibility
- Access

- Compatibility
- Content Structure & Information Richness
  - Variety & Information Quality
  - Structure

- Referencing, Positioning & E-Reputation
  - Reputation
  - Community

- Functionality
  - Customer Support
  - Speed of Delivery
  - Ease of Terms
  - Storage Capacity

- Loyalty
- Sensation
  - Ease of Ordering
  - Ease of Contact

- Incitement
- Ease of Use
- Reactivity
- Interactivity

- Quality of Design
Life Cycle Axis

E-commerce site’s life cycle

**Development**
- Requirements definition
- Design of the graphic charter
- Creation of the graphic model
- Retrieval of content from the client
- Media processing
- Technical integration
- Referencing
- Launch phase of the site

**Operating**
- Hosting/ Monitoring
- Webmastering
- Technology watch
- Support and training

**ROI**

**Investment costs**
- Analysis
- Prototyping
- Design
- Re-design
- Programming
- Validation
- Integration

**Final delivery**
- Component 1
- Component 2
- Component n
- e-ComDecaQual
- ICSEA 2017

**Time**
- End

**Ergonomics**
- Features
- Content structure and information richness
- Compliance with law
- Sustainable development

**Compatibility**
- Security
- Accessibility
- Compliance with standards

**SEO**
- Positioning
- E-Reputation

**Merchandising**
- Gain
- Flow attraction

**Maintenance**
- Team work
- Corrective
- Upgradability
- Adaptive

**Peak of the project quality**

**Decline**

**Sales animations**
- Interaction
- Off-cataloging of certain products
- Highlighting some products
- Price change/Stocks/
Bundles/Promotion bunnler

**Interface with ERP**
- Integrate the e-commerce site with new services

**Overhaul of the platform**
PDCA Axis

PDCA : E-commerce site’s continuous improvement cycle

Plan
1) Design of the general architecture
2) Proposal of a prototype
3) Detailed design
4) Risk forecasting
5) Coding, Test, Integration
6) Documentation

Act
1) Turn e-Commerce on all domains
2) Collect the results of monitoring tools
3) Evaluate the control results with regards to objectives
4) To feed different domains’ repositories
5) Meeting with the client

Check
1) Understand project requirements
2) Definition of the overall project’s needs
3) Elaboration of specifications
4) Splitting into iterations
5) Prioritization
6) Cost estimate
7) Distribution of tasks

Do
1) Make necessary corrections
2) Learn
3) Capitalize
4) Standardize new processes
5) Feed the e-ComDecaQual general reference system
6) Deliver part of project
7) Switch to another PDCA iteration

Quality Repository

Iteration 1 component 1
Iteration n for component n
Iteration Maintenance

23/11/2017
Validation

- Validation of quality guidance Framework by a Computer Supported Collaborative Work
  - Computer-Supported Cooperative Work (CSCW)
  - Groupware

- Collaboration, Cooperation, and Communication (3C) specification of e-ComDecaQual’s CSCW
Validation
<table>
<thead>
<tr>
<th>Admin</th>
<th>QC</th>
<th>Quality Control Administrator /Project Manager</th>
<th>2</th>
<th>2- Direct communication between team member with the same profile: Computer-Mediated communication (CMC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM</td>
<td>A Team Member : can have different or same speciality with another TM</td>
<td>2’</td>
<td>2’- Coordinate</td>
<td></td>
</tr>
<tr>
<td>Art</td>
<td>Art: Artefact of work of domain and its items</td>
<td>3</td>
<td>3- Collaboration: Working using platforms, APIs, languages, design tools, frameworks etc…</td>
<td></td>
</tr>
<tr>
<td>GA</td>
<td>Global Artefact</td>
<td>4</td>
<td>4- Control quality with dedicated tools, retrieving control report and feedback with shared work objects (versioning Domain quality report) (feedback mistakes weaknesses and warnings)</td>
<td></td>
</tr>
<tr>
<td>QDR</td>
<td>QDR: Quality Domain Repository. To be verified</td>
<td>5</td>
<td>5- Cooperate</td>
<td></td>
</tr>
<tr>
<td>GR</td>
<td>GR: Global Repository: to be verified and to feed through for communication of awareness.</td>
<td>6</td>
<td>6- Knowledge management by gathering and collecting final quality control reports to constitute the Global Repository</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>23/11/2017</td>
<td>26</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend

- TM: A Team Member
- Art: Artefact of work of domain and its items
- GA: Global Artefact
- QDR: Quality Domain Repository
- GR: Global Repository
- Admin QC: Quality Control Administrator /Project Manager
- Understanding: meeting and decision support systems for common understanding
- Direct communication between team member with the same profile: Computer-Mediated communication (CMC)
- A Team Member: can have different or same speciality with another TM
- Coordinate
- Collaboration: Working using platforms, APIs, languages, design tools, frameworks etc…
- Control quality with dedicated tools, retrieving control report and feedback with shared work objects (versioning Domain quality report) (feedback mistakes weaknesses and warnings)
- Cooperate
- Knowledge management by gathering and collecting final quality control reports to constitute the Global Repository
<table>
<thead>
<tr>
<th>Techniques</th>
<th>Items</th>
<th>Tools (Hardware / Software) / Tips</th>
</tr>
</thead>
<tbody>
<tr>
<td>User tests</td>
<td></td>
<td>Tools / Tips</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="http://www.userzoom.co.uk">http://www.userzoom.co.uk</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="http://www.loop11.com/">http://www.loop11.com/</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="http://theclicktest.com/">http://theclicktest.com/</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="http://www.keynote.com/">http://www.keynote.com/</a></td>
</tr>
<tr>
<td>Statistics analysis</td>
<td>Items</td>
<td>Bounce rate / Abandon rate / Click rate / Loyalty rate / Redemption rate / Renewal rate / Transformation rate / time spent on site / Unique visitors / Loyal visitors / Most viewed pages / Keyword</td>
</tr>
<tr>
<td></td>
<td>Tips</td>
<td>The correct correlation between keywords entered and proposed content is the guarantee of obtaining quality visits.</td>
</tr>
<tr>
<td>Eyetracking</td>
<td>Assiduous / Distracted / Stealthy</td>
<td>Tools / Tips</td>
</tr>
<tr>
<td></td>
<td>TOBII, Eye Tracking Glasses: Eyetrackers based on contrast analysis algorithms, colours and human faces, record jerks, movement and duration of each eye fixation. The analysis of the look on a screen allows the software to subsequently produce several types of interpretable graphs (Nicola B. 2011). As a user manual, it is necessary to make a copy of the web page and then upload the image file to the feng-gui site.</td>
<td></td>
</tr>
<tr>
<td>Mousetracking</td>
<td><a href="https://www.clicktale.com/">https://www.clicktale.com/</a></td>
<td></td>
</tr>
</tbody>
</table>
## 2- Sub-Domain: Structural study

<table>
<thead>
<tr>
<th>Structures / Objects</th>
<th>Items / Tools / Tips</th>
</tr>
</thead>
</table>
| **The site tree**          | Organization and presentation of the headings must be reasoned according to user's logic.  
Intelligent distribution of contents according to the zones (customer space right up just below caddy, just below sharing social networks, sharing redundancy on the footer)  
Grouping and intuitive theme and according to the user's expectations  
Catalog Categorization  
Logic behind categorization redundancy  
**Tools** Microsoft Visio allows you to represent the site tree [https://www.microsoft.com/fr-fr/evalcenter/evaluate-visio-professional-2016](https://www.microsoft.com/fr-fr/evalcenter/evaluate-visio-professional-2016) |
| **The home page**          | Logo / Attractive and distinctive hook line in comparison to other pages  
The perceptible and obvious zoning (or cutting header, footer, center, advertising areas, poll area ...) /  
Promotions at the central block / Main functions accessible by links / Actuality and useful information up to date  
**Tools** [https://www.screamingfrog.co.uk/seo-spider/](https://www.screamingfrog.co.uk/seo-spider/) |
| **The structure of the site** | The e-commerce sites are generally not deep; all the expertise lies in the design of the template and the presentation of the catalog in an intuitive form.  
**Tools** [http://alyze.info/](http://alyze.info/) |
| **The structure of the page** | Consistency of page blocks / Optimized width / Standard nomenclature for graphics / Standard nomenclature for text / Left block for navigability and advanced search function / Right block if available for advertisements or for survey actions / Le Zoning or blocking respects the associated content.  
**Tools** [http://alyze.info/](http://alyze.info/) |
| **The navigation system**  | Possibility of returning to the homepage always present. Breadcrumbs offer (for user experience) / Sitemap locator. Evident main navigation / Distinguished secondary navigation / Ubiquitous search engine  
**Tools** [https://fr.majestic.com/ScreamingFrog](https://fr.majestic.com/ScreamingFrog) |

### Stage of approach:
Design / Retrieval content / Media processing / Integration

### Responsibility of whom?
Graphic Designer / Web Designer / Model Designer / Content Editor / Project Manager
<table>
<thead>
<tr>
<th>Items</th>
<th>Characteristics</th>
<th>Tools / Tips</th>
</tr>
</thead>
</table>
|                     |                                                                        | seoyastwordpress plugins  
|                     |                                                                        | semrush  
|                     |                                                                        | seo majestic  
| First paragraph     | Presentation of the company's activities                                | [http://www.yakaferci.com/analyse-seo-site/](http://www.yakaferci.com/analyse-seo-site/) |
|                     | Legal Notice                                                           | semrush  
|                     | Product datasheet                                                      | seo majestic  
|                     |                                                                        | google tendances  
|                     |                                                                        | google analytics  
|                     |                                                                        | google keyword tool  
| Internal titles     |                                                                        | seoyastwordpress plugins  
|                     |                                                                        | semrush  
|                     |                                                                        | seopowersuite  
|                     |                                                                        | seo quake  
|                     |                                                                        | seo majestic  
|                     | Use the link read more                                                 | semrush  
|                     |                                                                        | seo majestic  
| Employed tone       | Not too professional                                                   | google keyword tool  
|                     | Do not require the user to open a dictionary to understand             | semrush  
|                     |                                                                        | bing keyword  
|                     | Writing in columns                                                    | seoyastwordpress plugins  
|                     |                                                                        | semrush  
|                     |                                                                        | seo majestic  
| Visual              | Provide qualitative complement to textual content                     | getblueshift  
| Length of pages     | If the site has an abundant product catalog it’s recognized to categorize it well to spread on pages of suitable size (e.g. two screens) | Getblueshift  

**Table 3** Domain 3 Quality Control Scale of Content Structure and Information Richness

1- Sub-Domain: General aspect of informational content
### Visual

Provide qualitative complement to textual content

| getblueshift |

### Length of pages

If the site has an abundant product catalog it’s recognized to categorize it well to spread on pages of suitable size (e.g. two screens)

| Getblueshift |

### Responsibility of whom?

Content Writer / Editor-in-Chief / Journalist / Marketer

### Stage of approach

Writing the presentation content of the company during the development of the site or at the time of change of its activities

Writing of product sheets throughout the life cycle of the merchant site

### 2 - Sub-Domain: Effort to highlight information content

<table>
<thead>
<tr>
<th>Items</th>
<th>Characteristics</th>
<th>Tools / Tips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pace of updates</td>
<td>Important to date publications and deadlines of promotions and offers</td>
<td>analytics</td>
</tr>
<tr>
<td>Content Grouping</td>
<td>It is a relevant aid for searching</td>
<td>getblueshift</td>
</tr>
<tr>
<td>Cross-sectional links</td>
<td>Help for navigation/ Do not let run away the surfer</td>
<td>widget wopress</td>
</tr>
<tr>
<td></td>
<td>Assistance with learning and improving the user experience</td>
<td></td>
</tr>
<tr>
<td>Proximity Links</td>
<td>Like &quot;Know more&quot;, &quot;Related subjects&quot;, &quot;Those who saw it also consulted ...&quot;</td>
<td>getblueshift</td>
</tr>
<tr>
<td></td>
<td>These links are used to implement cross-selling and Up-selling</td>
<td></td>
</tr>
</tbody>
</table>
THANK YOU FOR YOUR CONCERN