IT and usability in radio therapy

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A bit about a lot..

- Insight in the radio therapy area
- Insight in how it is to work with usability in this area
- Questions!
Nucletron

- Dutch company
- Nucletron ww ~700 pers.
- Uppsala R&D ~40 pers.

- Build and sell medical cancer treatment equipment to hospitals

Ways to treat cancer

- Surgery
- Chemotherapy
  - Radiotherapy
    - Brachytherapy
    - External Beam
Brachytherapy

External Beam – The accelerator
External Beam – The beam

Workflow model 1

• Cancer is diagnosed by a doctor
• Treatment type is decided
• Patient starts the treatment
Workflow model 2

Images from CT Scanner

Dose planning system

Accelerator

Images

Plan

fractions x n

Dose planning software - Oncentra
Treatment and dose planning workflow

**Patient**
- Take CT images

**Oncentra User**
- Creates treatment plan

- Import CT images
- **Draw organs (ROI)**
  - to treat/radiate
  - to avoid

- **Set up beams**
- **Calculate dose**
- Adjust
- Export

• Receive treatment fraction \( x \ n \)
Usability and Design
Development Process

- Oncentra
- Scrum
- Disorderly (messy) system (Oncentra)
- Usability Specialist

Disorderly (messy) system

Several components
- TPP
  - BM
  - EM
- Raysearch
  - OM
  - MBS
  - VMAT
- Tatramed
- MIM
- Database
- DICOM
  - toolkit

Several develop sites
- Slovakia (~7)
- Holland (~10)
- Sweden (~30)
Improve usability – achieve:

- Recognition
  - User can reuse knowledge (from Oncentra, but also other Windows systems)
- Minimal cognitive workload
  - Let the system do the “thinking work” (calculations)
  - Present information
  - Let the user make the decisions
- Easier to “navigate around the interface” to “new areas”
- Easier to learn new functionality
- Quicker and easier training
- Easier to learn for new personnel
- A system that is:
  - Less complex to use
  - Pleasurable to use (user understands, don’t feel lost)

Organizational effects of usability

- Increased productivity
- Increased “job satisfaction”
- Less employee turnover
- Less sick leave
- Lower cost for support (internal/external)
- Less need of documentation and manuals
- Shorter education
- Shorter learning time
- The user can learn other parts in the system without further education
Organizational effects of absent usability

- Frustration – user has to find workarounds
- Easier to make errors (Hazards!)
- Less trustworthy system
- Cognitive workload
- Physical problems
  - Tensions in neck
  - Stress (and related symptoms)
- High sick leave
- High staff turnover

My Usability Work

- Decide on new functionality
  - Application Design Team
- QA – Regulatory
  - Medical Device
  - Fulfill standards and regulations
- GUI Design
- User centered system development
User Centered System Design at Nucletron

- Application Specialists
- Gamma sites – Hospitals for formal validation testing
- Alfa sites – Hospitals for informal tests
- User meetings
- MARIA – an in-house end user
- Field studies

User centered design:
Contact with end users
GUI Design

- **Support**
  - Be a resource for developers making GUIs
- **Educate**
  - Do right from the beginning
- **Design**
  - Prototypes
- **Evaluate**
  - With users
  - According to guidelines and heuristics

GUI Design: Prototypes

- A common understanding
- Make right from the start
Support developers in GUI design

- Frequently urged:
  - Support the user
  - Provide right information
    - Make users feel confident
  - Emphasize often used information and functionality
    - Hide what is seldom used
  - Follow standards
    - Windows standards
    - GUI Guidelines
    - Consistency!

- Prevent GUI flaws

Prevent GUI flaws

- Which ROIs?
- Why are they not suitable?
- What will happen if I “continue anyway”?
Follow basic standards!

- Change background image
- Zoom

Be consistent in the design

- Are these icons representing the same kind of objects?
Questions?

Thank you for your attention!

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