NWO CATCH: CHIP Project

Cultural Heritage Information Personalization

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NWO CATCH: Continuous Access To Cultural Heritage

- Digitisation of the Dutch cultural heritage
- New solutions to get access to the data
- Innovative tools to:
  - connect knowledge and cultural objects
  - integrate scattered digitised cultural objects
  - increase the accessibility of and the interaction with our cultural heritage
  - supporting and improving the work of the professionals
- Scientifically relevant methods:
  - to acquire new fundamental and applied knowledge about these processes and their IT-based solutions
- Demand-pull rather than technology-push
CATCH: Challenges

- Multidisciplinary cooperation between cultural heritage and IT research
- Excellent research contributions
- Intelligent and personalised tools
CATCH: Users

- Collection managers in cultural heritage institutes
  - located in the “back office”
  - services and products (e.g. exhibitions, catalogues, and websites) presented to the end users

- End users of services of cultural heritage institutes
  - Research: scientific staff from disciplines like History, History of Art, Archaeology, Cultural Studies
  - Education: teachers at universities, high schools, Art Academies
  - Media: journalists, publishers, editors, marketeers of cultural heritage institutions
  - Entertainment and edutainment: the general public
CATCH: Themes

- Semantic interoperability through metadata
- Knowledge enrichment through automated analyses
- Personalisation through presentation
CATCH: Projects

- STITCH
- CHOICE
- RICH
- SCRATCH
- MITCH
- CHIP
CATCH: Personalisation through presentation

- CHIP Project: Cultural Heritage Information Personalisation
- Dutch Cultural Heritage now
  - predefined presentations
  - institutions determine the ways a user may view objects and their metadata
  - personalisation of the presentation hardly used
  - more research into HCI and user modelling is needed
  - Need for efficient and personalised collection access support

- Methods & tools for generating presentations of semantically related cultural-heritage objects
  - User-modelling & user-control issues
    - interests, goals, background, emotions and knowledge of the user
    - contextual information (e.g. physical location, orientation, time, day, the device and network)
  - Semantic relations between objects
    - Searching and browsing of semantics enriched objects
    - Generate personalized and coherent presentations
  - Find an “optimal” mix of:
    - System proactive behaviour based on the user’s known interests
    - Automatic selection & presentation of of information based on other users’ interests
CHIP: Research Team

- **Principle investigator**
  - Prof. dr. P.M.E. De Bra (TU Eindhoven)

- **Main project location**
  - Rijksmuseum

- **Research team**
  - Peter Sigmond & Peter Gorgels (RMA)
  - Paul De Bra, Lora Aroyo, Natalia Stash (TU/e)
  - Mettina Veenstra, Rogier Brussee & Lloyd Rutledge (TI)
CHIP: Research Domains

- **Selection of information**
  - answer incomplete information requests
  - information retrieval techniques based on (potential) NL understanding of textual contents
  - information retrieval techniques based on metadata using ontologies
  - selection of objects based on descriptive metadata
  - database integration methods

- **Automatic generation of presentations**
  - “combine” selected information objects of different media types into a single virtual hypermedia (Web) presentation
  - different types of navigational or semantic relationships
  - adapt the result to the device and network capabilities of the user’s environment

- **Adaptation or personalisation**
  - deriving additional specifications of the information or objects to be selected from past user behaviour
  - clustering users in groups (e.g. similar interests, background, expertise)
Research Objectives (1)

- Integration of users’ interaction and the presented content
- Personalized navigation and presentation
  - On museum web site & museum displays
  - On handheld devices
Research Objectives (2)

- Integrating information
  - from multiple collections
  - from other related information sources
- Provide structure over the collection
  - Metadata
  - Grouping of art objects
  - Relations between art objects
  - Links to background information
Research Objectives (3)

- Multi-branched story lines
  - Precooked
  - Automatically generated
- Navigation support
  - Navigation structure
  - Browsing
  - Search
- Two-stage personalization
  - Collecting information about the user
    - Direct input
    - Selection choices
  - Deduce information about the user
    - Navigation, browsing, searching behaviour
  - User profile (model) construction
Presentation

- Semantic integration of DBs
- Identification of the object source (institution)
- Sensible information sequencing
  - Narrative smoothing
  - What information to be provided
Navigation

- Two (or more) level hypermedia architecture
  - move between concept level to content level
  - Translate DB relations into navigation relations
- Seamless integration of Search & Browse
  - Interfaces
Personalization

- User model based
  - Creation, maintenance & update
  - Multiple stakeholders
  - Provision of user-related information
    - Without redundant storage
    - Without privacy violation
  - Efficiency in performance
  - Translation of semantics

- Stereotype based
- Adaptation at conceptual level
Output Goals

- **A generic architecture** for the adaptive delivery of information from a huge collection of richly (semantically) annotated information items
- **A software platform** for automatic personalization of the interaction with cultural heritage information
- **An adaptive information system (gateway)** serving Rijksmuseum collection both on the museum web site, displays and handhelds
Use Case: Mijn Eigen Rijks

- Personalized Rijksmuseum
  - Personalized access to the RM collection
  - Social forum (e.g. friends, colleagues, hobby buddies, etc.)
  - Tailored visits to RM
  - Favourites
  - Task-based search for objects
  - Personal experience and emotional perspective
  - User-centred recommendations
Use Case: Goals

- Generate personalized presentation of art objects and other information
- Provide an adaptive/personalized navigation in Rijksmuseum collection
  - personalized museum tours
  - shared museum tours
- Improve user’s experience on:
  - museum website
  - museum kiosk displays
  - PDAs
Use Case: Approach

- Enhance current RM information model with:
  - user & context modeling
  - adaptation components
  - semantics & common vocabularies (from other CATCH projects)
  - vocabulary mappings to link the Rijksmuseum content to other collections (from other CATCH projects)

- Implement semantics in user & presentation model

- Provide semantic-based content filtering and reasoning components for:
  - Context and user-aware presentation & navigation
CHIP: Pilot Demo

- Enhance user experience on the Rijksmuseum web site
- Tailor collection navigation and presentation to user’s preferences, interests and (to the largest degree possible) emotions
- Collect user data unobtrusively
- Provide simple methods to validate/verify system assumptions about the user and context
- Use semantics for the modeling of the user, context and adaptation of presentation
- Provide semantics-based reasoning about the user, context and presentation
- Achieve first version of the semantics-based content filtering functionality in order to generate user and context aware content recommendations and presentations of them
CHIP Pilot Demo: Approach

- Specify concrete application scenario and use cases based
  - Users/Actors
  - Desired functionality and interaction
  - Desired personalization and adaptation functionality
- Specify set of requirements for the scenario and use cases
- Explore and analyze the current information model of Rijksmuseum
- Identify main components and their interdependencies
- Identify user attributes that should be used for personalization
- Identify user and context data collection mechanisms
- Specify first user and context models (consider emotional aspects from the TU Delft emotional model)
- Identify vocabularies and metadata sets/models to be used (use input from STITCH and CHOICE for their RDF/OWL specifications and vocabulary mappings)
- Define first personalization/adaptation models using domain, content, user and context semantics (e.g. semantics-based selections and formats)
- Define presentation styles and patterns depending on the user and context (e.g. formats)
- Evaluate first prototype and analyze the results; on this basis define a follow-up pilot
Input for the pilot

- **Rijksmuseum website information model:**
  - Selection
  - Objects
  - Object-object relationships (objective)
  - Object-user relationships (subjective)
  - Formats
  - Presentations

- **User and context data collection:**
  - Login information
  - User browsing, searching, shopping, reading activities log
  - User explicit preferences (e.g. styles, artists, etc.)
  - User model inspection
  - User feedback (e.g. rating of search results according to various criteria – relevance to the user goal, emotion, etc.)
  - User input from tests
Search everything from one text field

- Single search string field
  - with optional extras
- Search checks all fields for this string
  - optional extras are set
- Simplifies access for the user
- Global search also unifies access to different types of data
Visualization Search Results

- Clustering of search results
- Showing relations between clusters
- Search results as Table of Contents
  - Sorts by ranking
  - Groups into a hierarchy
  - Groups have titles showing reason for group
  - Shows as navigation bar
  - Science: ranking and clustering
Table of Contents as Tour

- Can save search results as a “Tour”
- Can load tour as navigation bar
- Not just search generates tours
  - Also history, recommendation, editing
- Can share tour with others as personal exhibition
- Unshared private tour serves as bookmarks
- Collection of shared tours helps guide search and structuring
Individual artefact and topic display

- Clicked to from tour bar and from links in other displays
User Model/profile

- (Generate) Questionnaire
- Select friends to get shared data from
- Directly set parameters (ala Topia)
- Changes can be just for current tour generation or permanent
Personalizing Presentations

- Personalized tour generation
  - Search match rank from:
    - recommend rating, user set parameters
    - Grouping based on weights of group properties (ala Topia)
- Add discussion to artefact or topic
  - Can be discussion of a group of artefacts (or topics) in a tour
  - Appears in generated tours as search match or as group
- Indicate emotional response to artefact
  - Registered as (shared) data, same as other data
  - Helps with recommendation
  - Affects search and structuring (for friends too if shared)
Previous Work

- Rijksmuseum.nl
  - Current website for the Rijksmuseum
- Topia
  - Search and structure for the Rijksmuseum
- SWALE
  - Interactive user modeling
- AHA!
  - Adaptive hypermedia architecture
Related Work

- **MuseumFinland**
  - Semantic interoperability of Finnish museums

- **Simile**
  - Multi-tool project unifying semantic access

- **Clusty.com**
  - Clustering (text) search results