

User-Centered Design

Part of the Human Computer Interaction Course Notes

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Steps in the task analysis process

- **Task analysis Part I**
 - Brainstorm the product you want to design
 - State what the software product is (product statement)
 - State the business and functional goals of the software provider
 - Perform demographic analysis of users
 - Establish Persona
 - Recruit users that correspond to persona
 - Design need assessment questions
 - Interview them with need assessment questions
 - Identify User Needs (or goals) from interviews
- **Task analysis Part II**
 - Develop scenarios and task model
 - Establish a task table for each persona
 - Establish the overall task frequency table
 - List tasks ordered by their priorities
 - Establish usability goals

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Scenario development

- Choose 3 personas from the most significant user category from the demographic graph
- write scenarios for these users who are engaged in tasks that your system is trying to support
- base scenarios on your interview data

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Task Scenario example: Jacques

- Jacques Boutin is a IT manager at a software company. He meets many clients and frequently travels. He has significant knowledge about wines although he is by far an expert. However, he is quite confident when buying a wine.
- Jacques is almost a daily wine consumer. Drinking wine has for him a social aspect. He likes drinking among other people or during meals if he is not alone.
- Jacques has developed personal preferences for wines. However, he still likes discover new wines, from restaurants, hotel bars, wine tasting tours, and wine shows.

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Conti... (Jacques)

- He doesn't want to spend too much for a bottle of wine, except for very rare special occasions. He likes price comparisons in order to locate the best deals.
- He is inviting some friends at his place for a dinner on November 5th. He would like to find a good bottle of wine to go with the roast beef that he is preparing. He knows that a "Châteauneuf-du-Pape", from the domain "Clos des Papes" of the year 2003 would be great at this dinner. However, he just had this wine 2 days before, and would like to find a similar wine.

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Conti... (Jacques)

- After the dinner, he wants to provide feedback about the wine he finally chose because he liked these fruity and woody savors. He would like to remember this wine for further occasions. He took out his portable PC, retrieved his past purchases, selected the wine, rated it and provided a comment.
- Ex. Of Jacques' favorite application: wines.com, linternaute.com/vin

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Task Scenario example: Kate

- Kate Austen is an editor for a fashion magazine in New York city. She is very dynamic, friendly and extroverted. She is not an expert about wines. She just enjoys drinking wines during parties and social events.
- Kate drinks wine several times per week. She likes tasting new wines from different countries.
- She doesn't feel very confident when buying a bottle, and needs advises from her friends and family.

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Conti... (Kate)

- Kate is also a fan of new technologies and killer applications. She has bought an iphone several weeks ago.
- During a party, she discovered a great new wine. She surfed on the internet with her iphone and learned more details about the wine.
- She decided to log in from the iphone on this wine recommendation website. She successfully found, puts a rating/comment. She also decided to suggest this wine to her friends (whose profiles have been imported from Facebook a few months ago) and exchanges some asynchronous messages with them about this wine.
- Ex. of Kate's favorite applications: facebook, twitter, smooth.com ...

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Task Scenario example: Eugene

- Eugene Huang is an expatriate and works as a sales person in a multinational company in Hong Kong. He became an aspirant wine consumer while studying and working in Europe. He wants to learn more about wine.
- Eugene is a weekly wine consumer. He likes tasting new wines in social events or re tasting those he liked in order to drink during meals.
- Eugene is not yet familiar with recommender systems. He prefers reading comments, talking with wine makers, and sommeliers from restaurants in order to develop his wine knowledge. He doesn't feel very confident when buying a bottle, and needs explanations before taking the purchase decision. But he is opened to novelty, accepting the risk of being disappointed.

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Conti... (Eugene)

- He wants to buy a good wine for a special occasion. He logs on and started searching. He would like to find a French red wine.
- He reads the ratings and comments. Three wines got his attention. He recognizes one of these wines (an icon shows that he already bought it) and remembers that he liked it. This increases his trust in the system and he wants to compare these 3 wines. He selects them and clicks on "compare". He finally chooses the second one, because he never tried it and notices it is similar to the one he liked but is cheaper.
- Ex. of Eugene's favorite applications: shopping.yahoo.com, duojiao, critiquing-based Recommenders [Chen, UM07] [Zhang, AH06]

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Task Scenario example

- George Smith is a senior sales/marketing manager in a medium-size company. His secretary makes all travel arrangements for him, including car rentals and hotel reservations.
- George travels once a week. Some of the trips have the same destination, but they also vary.
- George has many personal preferences, as well as tight constraints imposed by business reasons, such as arriving in a destination at a particular time. His priority is to respect business constraints, and then try to be economical if he can help it.

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Conti...

- He is traveling to Berlin from Geneva on December 4th. He would like to spend at least 6 hours there. He would like to be back in Geneva before 22h. He needs a car while in Berlin.
- While he was in Berlin, he learned that his meeting would take longer to finish than expected. He took out his portable PC, retrieved his current trip itinerary, requested a change to a later flight, got confirmation, got gate information.

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Task model

- Definition: a task model is an abstract structure (tree, graph, flowchart, etc.) where a set of main tasks are outlined. Each main task can be further divided into subtasks.
- From the scenarios for each persona
 - List all tasks at a higher level
 - activities (verbs) users want to accomplish
- create a task model
 - show relationships among tasks
 - Option: use arrows to indicate directions of data flow if the model is a graph

Task model for online wine recommender

- List of tasks (classic)
 - Searching and Selecting
 - Define wine characteristics (country, region, varietal)
 - Search what fits well With the food
 - " " " For the occasion (party, valentine's day...)
 - " " " With the user's mood
 - " " " With the tastes of people the user is with
 - " " " For a gift (in accordance with the tastes of the person)
 - Retrieve the wines the user has already bought
 - Select wines and Compare the features of different wines (prices, year...)
 - Refine
 - Login
 - Basket and Purchase
 - Provide ratings, comments, keywords

Searching & selecting

Define wine characteristics
 food pairing
 user's mood
 people the user is with
 Search and browse options
 already bought
 compare wines
 for a gift
 Filter options based on user criteria
 Choose
 Refine

Basket

Temporarily put a wine in a
 Place for later revisit

Purchase

Payment process

Login

Create an account
 Connect
 Retrieve password

How often do users perform the tasks?

- Frequent users remember more details
- Infrequent users may need more prompting
- Which function is performed
 - most frequently? Define wine characteristics
 - by which users? All user categories
 - optimize system for tasks that will improve perception of its performance

Task frequency tables

- Jacques
- Eugene
- Kate

Jacques's task table

Task	importance	frequency	details
Provide ratings, comments, ...	somewhat	sometimes	Jacques comes back from a wine tasting, login, searches the wine he has tasted, rates it and writes a comment to explain this rating
Get advises from friends	somewhat	sometimes	Jacques searches a new idea of wine, login, goes in the chat room to discuss with his online friends, asks for some ideas, and then searches for the wines suggested by them
Ask for recommendation from experts	very	very	Jacques feels more confident with advises from an expert, he logins, specifies his expectations (food, type of wine,...), and then read the comments of experts, makes his choice and buys this wine

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Eugene's task table

Task	importance	frequency	details
Compare wines	very	very	Ming is hesitating between several wines, he selects them by crossing the corresponding boxes and then click on "compare" to see a tab with all the features of these wines in order to compare
Read the reviews	somewhat	often	Ming is curious to know the opinions of other people about a wine that has retained his attention, he clicks on the name of the wine to see the whole description and see the comments on the bottom of the page
Ask for recommendations from similar users	not quite	almost never	Ming is not very interested by receiving recommendations since he doesn't trust automatic systems and prefers to communicate with others in order to make his own opinion

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Eugene's task table

Task	importance	frequency	details
Receive information about wine	very	sometimes	Ming is not an expert in wine and wants to learn more about it, thus he likes to read articles about wine, production and videos of wine tasting
Provide feedback	somewhat	often	Ming agrees to provide a feedback and suggests them to friends only if he has tasted an excellent wine, in this case he goes back on the website, searches for this wine and clicks on the button "add comment"
Ask for recommendations from my personality	somewhat	almost never	Ming is just curious to see what is a personality quiz and if it reveals his preferences, he then tries to complete the personality quiz once and asks for recommendations in accordance with the result

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Task vs. frequency of usage table

Country	Searching & selecting	Educational	Discovery (website)	Discovery (social network)	Basket & Purchase
Europe	40%	8%	29%	12%	11%
USA	35%	4%	26%	25%	10%
China	50%	10%	15%	20%	5%

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- ### What's important for Jacques
- Find wine from advanced features (type, region, varietal, year, ...), food pairing or guests' preferences
 - Easy to retrieve wines
 - Chat with winemakers or read their reviews
 - Easy to put in basket, and purchase
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- ### What's important for Kate
- Find wine from simple features (type, country), family's tastes or guests' preferences
 - Chat with friends, and get recommendations from similar users, personality quiz...
 - Able to show to friends that she enjoyed a wine
 - Write and read comments from a PC or iphone ...
 - Easy to put in basket, and purchase
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- ### What's important for Eugene
- Find wine from simple features (type, region)
 - Easy to retrieve wines
 - Learn more about wines and wine tasting in order to get more familiar and understand his own preferences
 - Easy to compare wines
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Summarize what's important

- Prioritize objectives
- Refine task model
- Enumerate constraints

List of tasks and their usage frequencies

Task	Persona	Searching & selecting	Educational	Discovery (website)	Discovery (social network)	Basket & Purchase
40%	Jacques	40%	8%	29%	12%	11%
35%	Kate	35%	4%	26%	25%	10%
10%	Ming	50%	10%	15%	20%	5%
15%	Others					
Total		42%	7%	23%	19%	9%

List of tasks ordered by priority

Searching and Selecting	Discovery (website)	Discovery (social network)	Basket and Purchase	Educational
42%	23%	19%	9%	7%

Prioritize tasks

- Retrieve and refine trips using Desktop, and portable PC
- Browse alternatives and select suitable trips, or refine them
- Define trips
- Basket
- Purchase
- Memorize

Task model for online wine recommender

- List of tasks (classic)
 - Searching and Selecting

Define wine characteristics (country, region, varietal)
 Search what fits well With the food
 " " " For the occasion (party, valentine's day...)
 " " " With the user's mood
 " " " With the tastes of people the user is with
 " " " For a gift (in accordance with the tastes of the person)
 Retrieve the wines the user has already bought
 Select wines and Compare the features of different wines (prices, year...)
 Refine

- Login
- Basket and Purchase

• Educational

Receive additional information about Wine characteristics and wine tasting
 " " " History and production of wine
 Receive invitations for wine tasting to the user

Refined task model

Task model for online wine recommender

- List of tasks (new features)
 - Discovery (provided by the website)

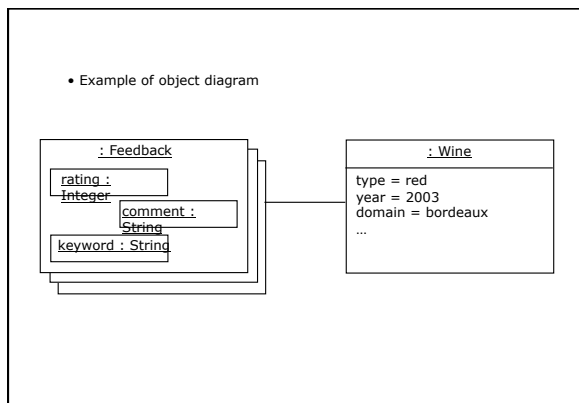
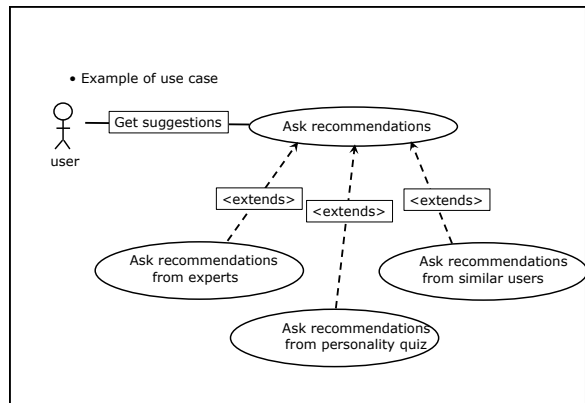
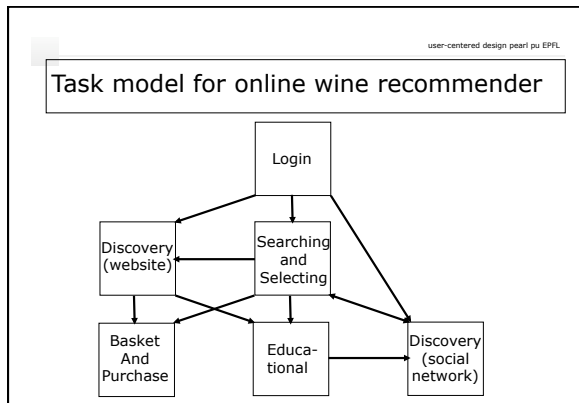
Ask for recommendations as regards The reviews of other users
 " " " " " Expert reviews/ratings
 " " " " " Similar users' preferences
 " " " " " The music the user listen to
 " " " " " A personality quiz
 " " " " " The user's preferences (personal experience, e.g.: after virtual wine

View advertisements and special offers

- Discovery (by social network)

Get advises from friends
 Chat with winemakers (chat rooms, instant messaging, forums)
 Create, join, quit and invite for groups of customers
 Provide ratings, comments, keywords
 Get videos of wine tasting

Refined task model



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- ### constraints
- PCs
 - Also works with a plug-in for mobile devices
 - Response time < 5 sec for all interactions with the system
 - Time < 5 minutes before being able to chat with a winemaker
 - Takes an average time of 10 minutes to choose a wine
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- ### Usability goals
- Based on task analysis, enumerate usability goals for each of the prioritized tasks.
 - Make sure to attach quantitative goals whenever possible
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- ### Usability goals for wine recommender
- Wines put in the basket or previously bought can be quickly retrieved (1 minute to retrieve, including login)
 - Wines satisfying different search criteria can be easily found (measure accuracy : popularity, trust, rank)
 - Users can browse wine cards and compare them easily (at least three wines can be compared simultaneously)
 - Friends can be easily found in the system (possibly linked with e-mail, facebook profiles and so on, within 5 minutes)
 - Purchase should be easily (one-click check out)
 - Bought wines are saved automatically and can be easily commented during the next session (within 3-5 minutes)
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Assignment U1 – step 1 of design project

- Task analysis part I
 - Product statement
 - Population analysis
 - Persona development
 - Needs assessment questionnaire
 - Task vs. frequency of usage table
 - Identify most important tasks
 - Task table for priority users
 - Usability goals

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Steps involved in choosing projects

- Identify partners
- Brainstorm on ideas
- Interface challenges ?
 - User diversity
 - Many features?
 - What is the interaction complexity?
 - Functionality complexity vs. simplicity in interaction.
 - A good compromise between these two elements usually give rise to creativity.

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Brainstorming techniques

- Take turns to express ideas
- Take turns to take notes
- Idea builds ideas, rather than critiquing
- Structure ideas
- Organize them into alternatives
- Choose an idea to implement

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Start with the product statement

Once you have a product statement, please work out solutions on the following design steps:

1. population segmentation table for your targeted users
2. identify 3 personas from your user group
3. Needs assessment questionnaire
4. Write task scenarios for each of the personas
5. Establish task model and task frequency table
6. **List of tasks ordered by priority**
7. **Usability goals**

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Usability design cycle

- Conceptual design
 - task analysis
 - design specification
 - The objective here is to go from task analysis and usability goals to a design specification
 - Design spec should be detailed enough for the (paper) prototype
 - Semantic, syntax, and layout design
- Evaluation
- Resign

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Semantic design

- Meanings of items in a user interface
 - windows
 - scrolling, paging
 - menu items
 - tools, widgets
 - content items
 - example: text box to type in names of airports (SMT)

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Syntactic design

Arrangement and order of items in a user interface

- contents of menus
- wording of text
- locations of tools, widgets, icons
- order of actions
- example: Dates, or Select Dates (SMT)

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Layout (Pixel-level) design

Presentation of items in a user interface

- icons
- graphics
- fonts
- colors
- pixels
- example: calendar consists of a row of months
- alternatives: consists of a column of months

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Design Specification Procedure

- Establish a central concept
 - Few lines describing the compelling factor of your product
- Base first level design on task or action model, or hybrid model
- organization of UI
 - use metaphor, grid design
- deliverables: high-level design specification

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UI based on tasks, or actions

- Based on tasks (most travel e-commerce website)
 - Adopt an appropriate mental model
 - Suitable for novices as well as experts
- Based on actions (OS, MS Word, etc)
 - A sequence of actions comprise user tasks
 - The sequence is not fixed for the users
 - Suitable for diverse users tasks (document processing)
 - Exercise – think about a task-based product for document processing

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Task-based UI structure

- Define a navigational structure of tasks that corresponds to task model
- Organize UI around primary tasks
- Each page, screen, menu, or dialog is a task
- Actions are then organized within tasks
- Establish sub-navigational structure if necessary
- Write design specification task by task

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User task	User action	Variation
Define origination & destination	Many types airport names	She uses an interactive map and clicks on airport names
Specify dates	Many types in dates	Uses calendar or Outlook
Browse a set of flights	She views a list of flights sorted by price	She Views possible routes on a map
Filter	Specify criteria in original query GUI	Critique flights by adding constraints
Retrieve past trips	By reference number	By departure date, or desti..

Task table of user tasks

User tasks	User actions	object
Registered user Login	Type in my user id and password	User id password
Select reserved trips to rebook	Click on push button Rebook And go to reservation step (screen 7)	
Select past trips to reserve	Click on push button View basket and go to basket view step (screen 6)	Basket name
Set preference for new trips (expect system to fill fields with default values)	Drop down list showing major airlines with default value Another drop down list showing airline alliances with default value	Preferred airline for this particular session

Screen 1: user login

Task	How to do	object
Current user Login	Html page and text boxes	User id password
Initial preference specification	Drop down list showing major airlines Another drop down list showing airline alliances	Preferred airline for this particular session
New user login	Html page	
New user registration	Html page and form filling	User name, Address, Email address, Frequent mile program,

Screen 2: itinerary definition for new trips

Task	How to do	object
Define departure airport	Text box Or Map and click on airport	Departure airport
Define departure date	Calendar Or Drop down lists, one for month, one for days	date
Define arrival airport	Same as depart. time	
Define arrival date	Same as depart date	
Provide multi-leg trip widget	Push button if more legs are required	
Define hotel requirement	Check box for Star category Check box for Proximity to airport	Hotel
Define car rental requirement	Check box for size of car Check box for major car rental companies	Rental car

Screen 3: results visualization

Task	How to do	object
Visualize 10 best solutions in world map with explicit GUI control on each solution	10 solutions on map as current design (but lock map interactions), the selected solution is highlighted in bright color	
Visualize selected solution in the best solution list in a detailed flight table	Flight table together with hotel and car rental info. In detail.	
Keep itinerary	Push button to put current solution in basket	
Customize itinerary	Push button to switch from the current viewing mode to customization mode. The current selected solution is the starting point for customization	

Screen 4: customization of itinerary (drop down menu version)

Task	How to do	object
Customize the respective total price for flight, hotel, and car	Pop up scale slider to specify price range	
Customize departure and arrival airports (if any)	Drop down Option menu that reads Never geneva Never zurich etc	
Customize departure and arrival dates (if any)	Drop down option menu that reads Never oct 12 Never oct 13	
Customize carriers	Drop down option menu that reads Never fly Swissair Only fly swissair	
Customize departure and arrival time	Pop up scale slider to specify range, and Text box to feedback time selected, or allow direct type-in	
Customize intermediary airport	Pop up check box to allow specification of undesirable intermediary airports	
Customize car rental choices	Pop up check box to allow specification of undesirable car rental choices	

Screen 5: overview

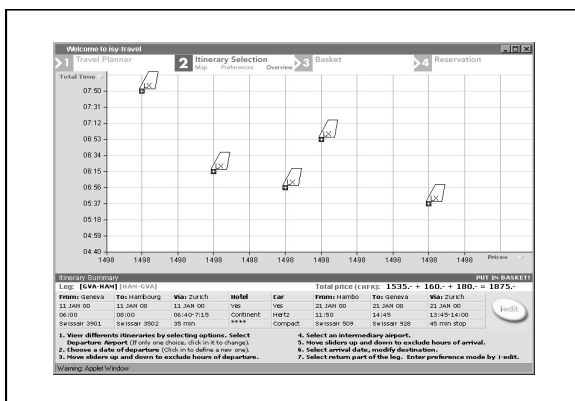
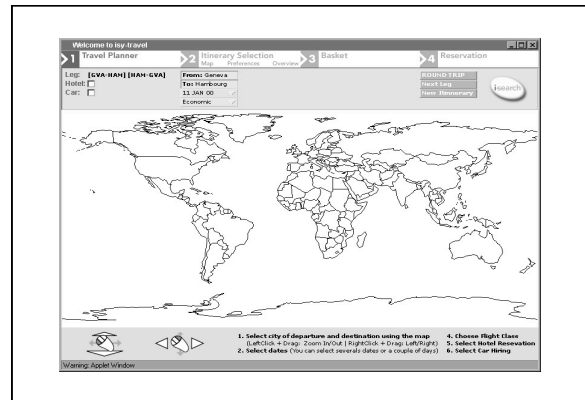
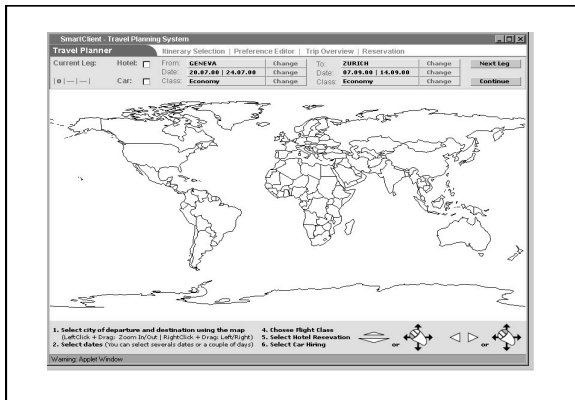
task	How to do it	object
Visualization of 10 best solutions in terms of price and total price Selection of one solution	Scatter plot in 2D	
Trip table	table	One solution

Screen 6: selected trips

Task	How to do it	object
Visualization of all selected solutions		
Selection for hold, that is, keep for near future	Push button or check box	
Selection for reservation, that is, user is taken through reservation process.	Push button	

Screen 7: reservation hold process

Task	How to do it	object
Visualization of selected solution for reservation, or for hold		
Confirm reservation process		
Fill form of user information if new user		
Hold and logout	Big hold letter on push button	
Reservation and Log out button	Big hold letters on push button	



Action-based UI structure

- Group actions - organize UI around primary actions
- Name groups of actions (File, Edit, View, Insert, ...)
- Write design document for each group of actions

Sorry no example of action-based UI

Summary of usability design cycle

- Important steps
 - Product statement
 - Population analysis and personas
 - Needs assessment
 - Scenarios and Task analysis
 - Design specification based on task or action

