Conception de Systèmes Interactifs

Méthodes d'inspection

Evaluation Heuristique, Cognitive Walkthrough, GOMS KLM

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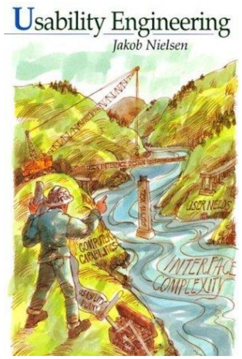
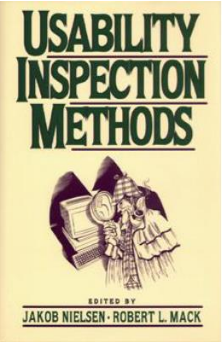
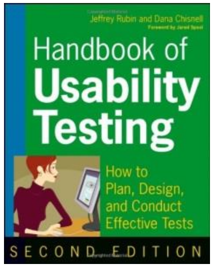
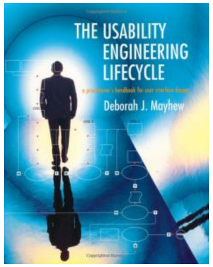
Useful References

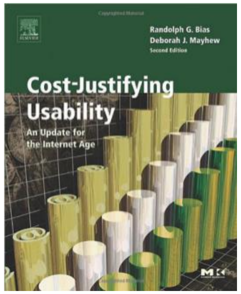
- Nielsen, J. (1993) Usability Engineering. Academic Press, 362 p.
- Nielsen, J., Mack, R.L. (1994) Usability Inspection Methods. John Wiley & Sons, 448 p.
- Rubin, J. Handbook of Usability Testing: How to Plan, Design and Conduct Effective Tests. John Wiley & Sons. 330 p.
- D. Mayhew (1999) The Usability Engineering Lifecycle: A Practitioner's Handbook for User Interface Design. Morgan Kaufmann. 542 p.
- Bias and Mayhew (eds) (1994) Cost Justifying Usability. Morgan Kaufmann. 334 p.



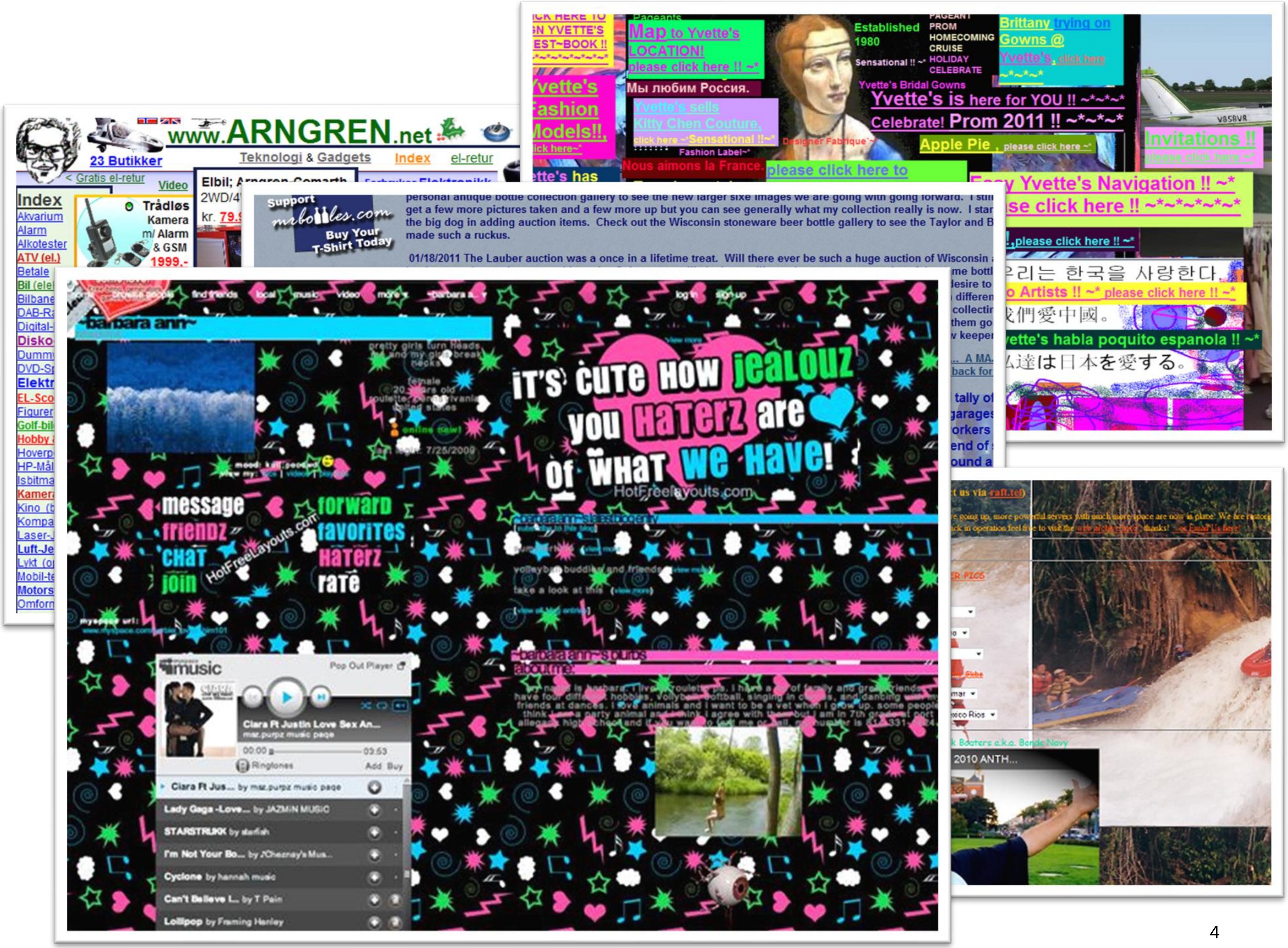



Jeffrey Rubin and Dana Chisnell
Handbook of Usability Testing
How to Plan, Design, and Conduct Effective Tests
SECOND EDITION





Examples of Usability Problems

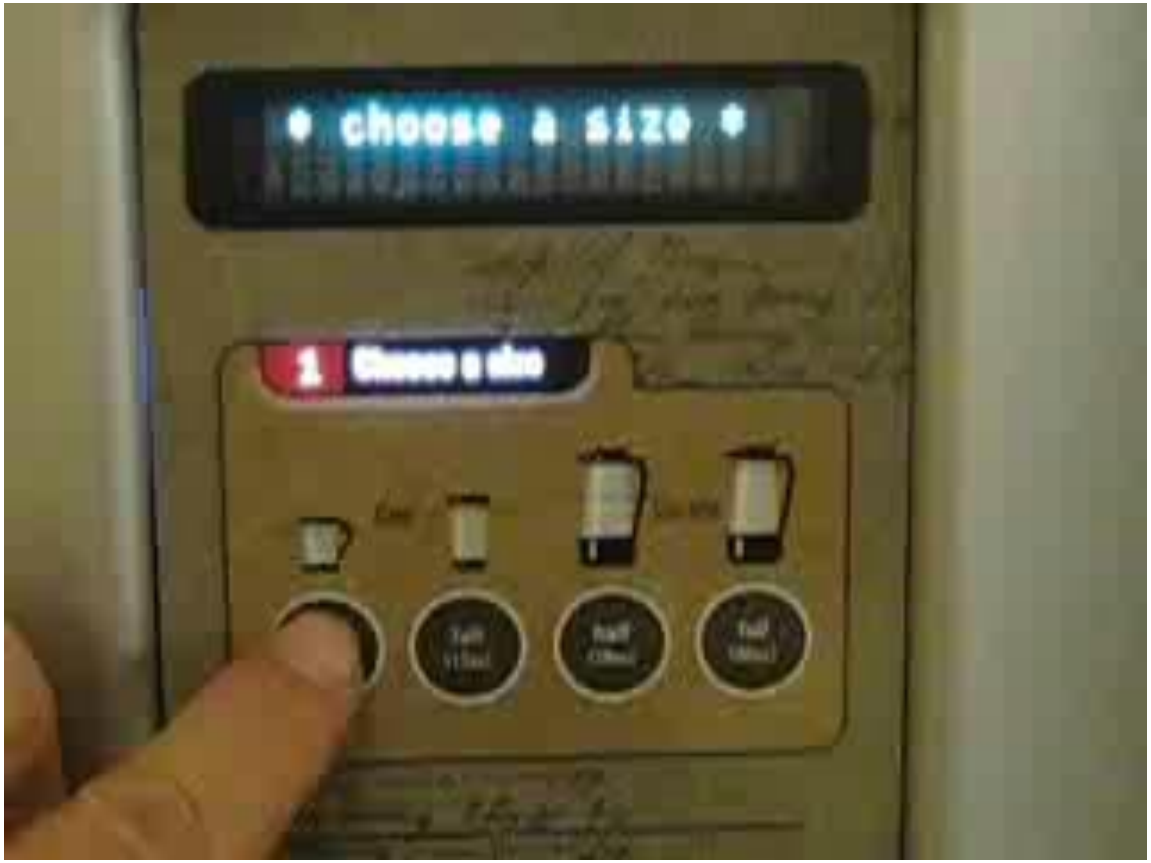


personal antique bottle collection gallery to see the new larger sixe images we are going with going forward. I still get a few more pictures taken and a few more up but you can see generally what my collection really is now. I start the big dog in adding auction items. Check out the Wisconsin stoneware beer bottle gallery to see the Taylor and B made such a ruckus.

01/18/2011 The Lauber auction was a once in a lifetime treat. Will there ever be such a huge auction of Wisconsin a

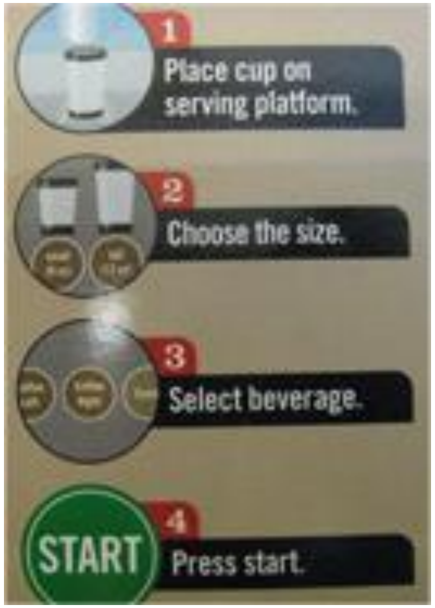
Map to Yvette's LOCATION! please click here !! ~*
Yvette's Fashion Models!!
Мы любим Россия.
Yvette's sells Kitty Chen Couture, click here ~*Sensational !!~*
Fashion Label~*
Nous aimons la France.
please click here to
Established 1980
Sensational !! ~*
PAGEANT PROM HOMECOMING CRUISE HOLIDAY CELEBRATE
Yvette's Bridal Gowns
Yvette's is here for YOU !! ~*~*~*
Celebrate! Prom 2011 !! ~*~*~*
Designer Fabrique~*
Apple Pie , please click here ~*
Brittany trying on Gowns @ Yvette's, click here ~*~*~*
Invitations !! please click here ~*
Easy Yvette's Navigation !! ~* ase click here !! ~*~*~*~*~*
!, please click here !! ~*
우리는 한국을 사랑한다.
o Artists !! ~* please click here !! ~*
我們愛中國。
vette's habla poquito espanola !! ~*
私達は日本を愛する。
~barbara ann~
message
friendz
chat
join
forward
favorites
haterz
rate
IT'S CUTE HOW JEALOUZ YOU HATERZ ARE OF WHAT WE HAVE!
HotFreeLayouts.com
myspace url:
music
Pop Out Player
Clara Ft Justin Love Sex An...
00:00
03:53
Ringtones
Add
Buy
Clara Ft Jus... by maz.purpz music page
Lady Gaga -Love... by JAZMIN MUSIC
STARSTRUKK by starfish
I'm Not Your Bo... by Chezney's Mus...
Cyclone by hannah music
Can't Believe I... by T Pain
Lollipop by Framing Hanley
~barbara ann~'s blurbs
about me:
2010 ANTH...

Usability problems: coffee machine



Problème en image…

La solution…



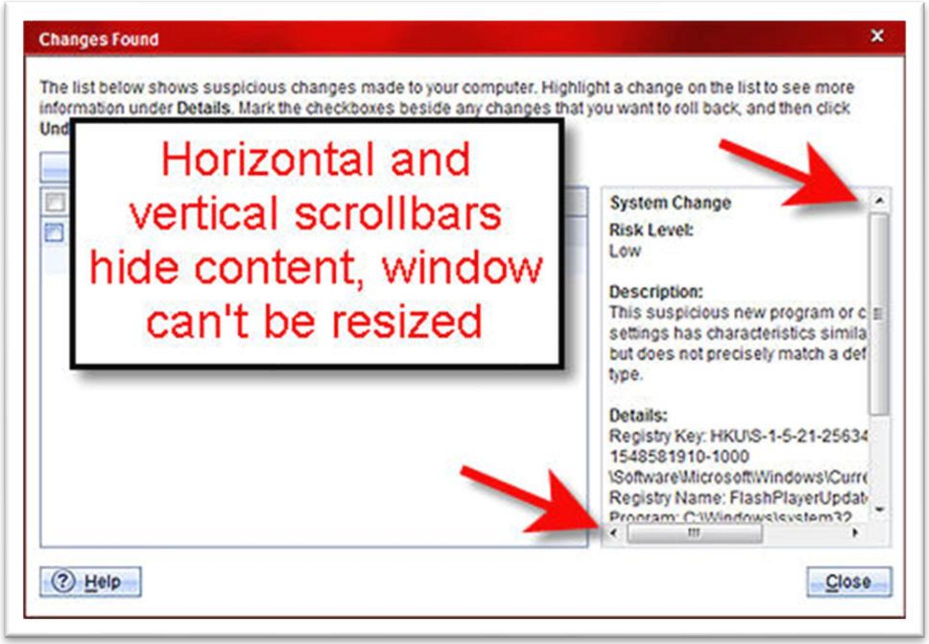
1 Place cup on serving platform.

2 Choose the size.

3 Select beverage.

4 START Press start.

Usability problems: exampling usability problems



Changes Found

The list below shows suspicious changes made to your computer. Highlight a change on the list to see more information under **Details**. Mark the checkboxes beside any changes that you want to roll back, and then click

Und

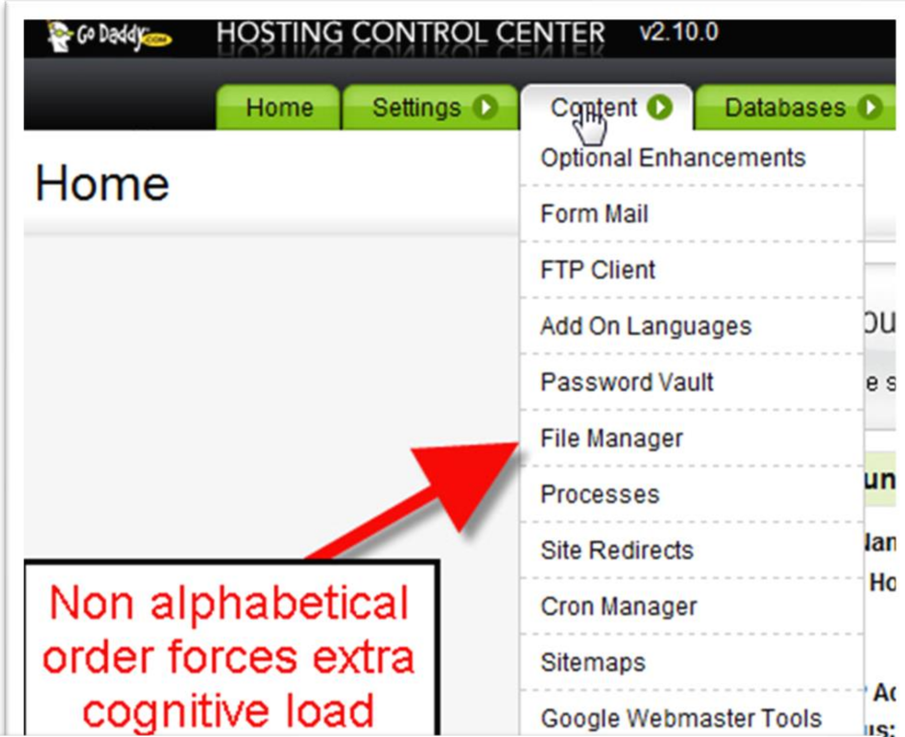
System Change

Risk Level:
Low

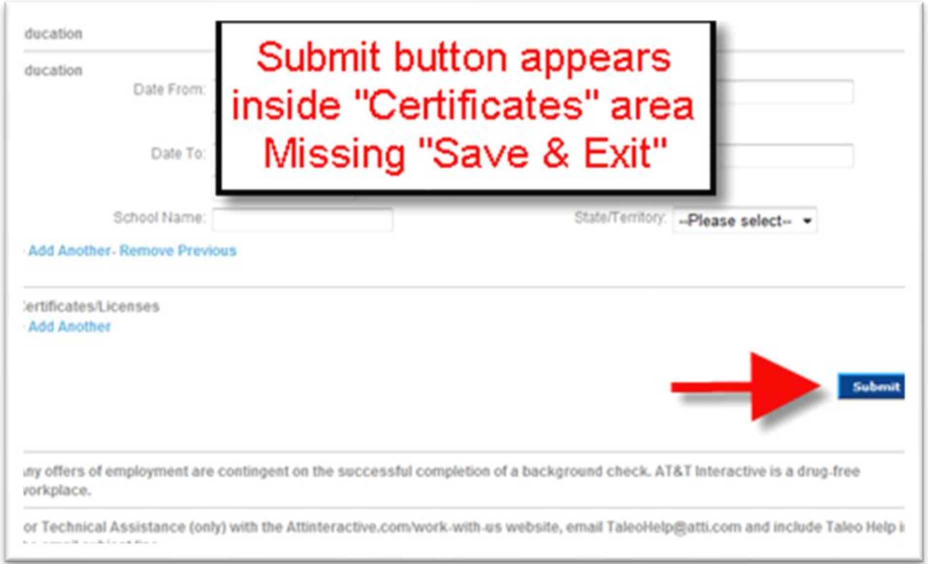
Description:
This suspicious new program or c
settings has characteristics simila
but does not precisely match a def
type.

Details:
Registry Key: HKU\S-1-5-21-25634
1548581910-1000
\Software\Microsoft\Windows\Curr
Registry Name: FlashPlayerUpdat
Program: C:\Windows\system32

Horizontal and vertical scrollbars hide content, window can't be resized



Non alphabetical order forces extra cognitive load



ducation

ducation

Date From:

Date To:

School Name:

State/Territory: --Please select--

Add Another- Remove Previous

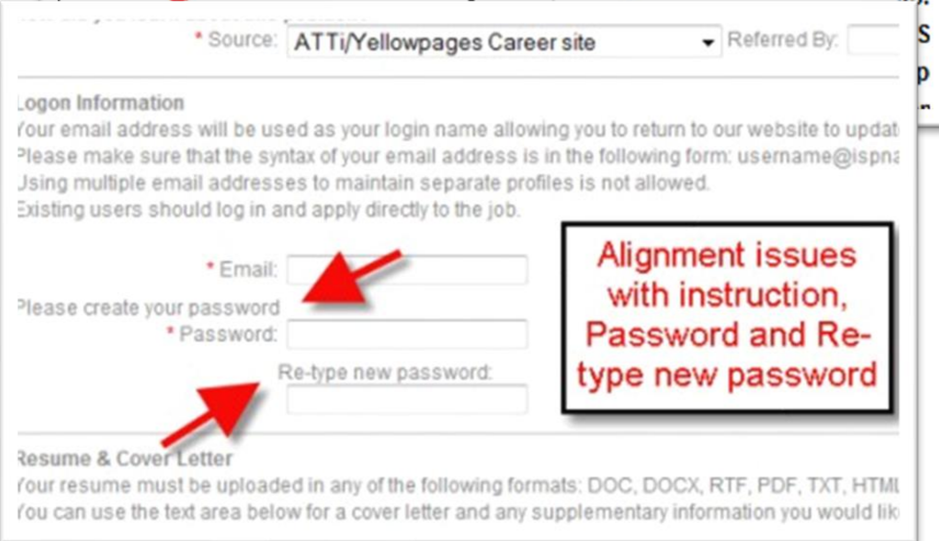
ertificates/Licenses

Add Another

ny offers of employment are contingent on the successful completion of a background check. AT&T Interactive is a drug-free vorkplace.

or Technical Assistance (only) with the Attinteractive.com/work-with-us website, email TaleoHelp@atti.com and include Taleo Help i

Submit button appears inside "Certificates" area Missing "Save & Exit"



* Source: ATTi/Yellowpages Career site

Referred By:

Logon Information

Your email address will be used as your login name allowing you to return to our website to updat

Please make sure that the syntax of your email address is in the following form: username@ispn

Using multiple email addresses to maintain separate profiles is not allowed.

Existing users should log in and apply directly to the job.

* Email:

Please create your password

* Password:

Re-type new password:

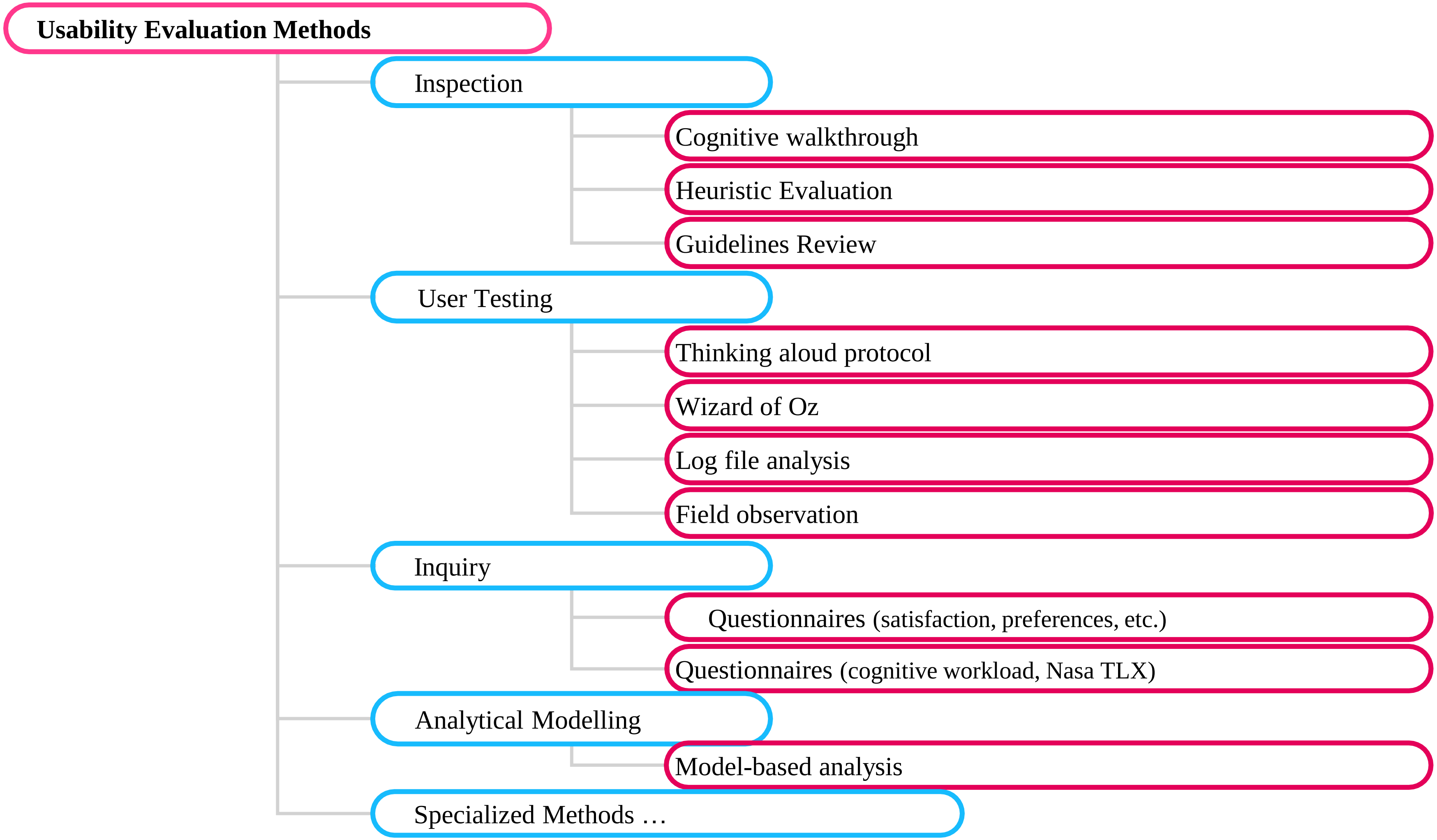
Resume & Cover Letter

Your resume must be uploaded in any of the following formats: DOC, DOCX, RTF, PDF, TXT, HTML

You can use the text area below for a cover letter and any supplementary information you would lik

Alignment issues with instruction, Password and Re-type new password

Classification of Usability Evaluation Methods



- **Usability Evaluation Methods**
  - Inspection
    - Cognitive walkthrough
    - Heuristic Evaluation
    - Guidelines Review
  - User Testing
    - Thinking aloud protocol
    - Wizard of Oz
    - Log file analysis
    - Field observation
  - Inquiry
    - Questionnaires (satisfaction, preferences, etc.)
    - Questionnaires (cognitive workload, Nasa TLX)
  - Analytical Modelling
    - Model-based analysis
  - Specialized Methods …

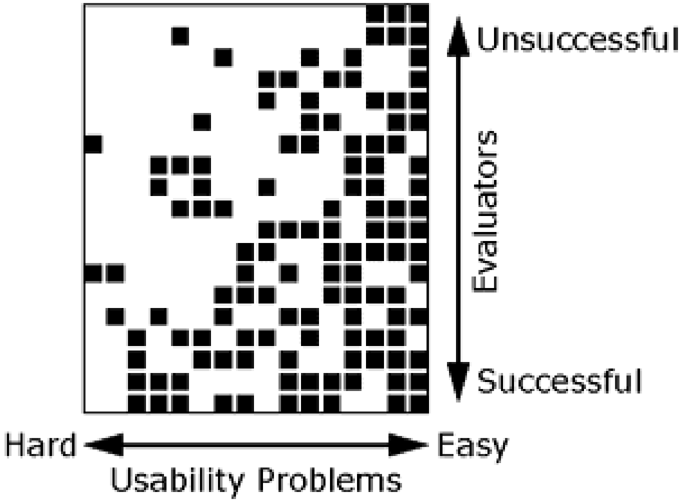
Evaluating Design (early phases)

- Usability Inspection Methods (Conducted by experts, are based on experts opinion)
  - Cognitive Walkthrough, Pluralistic Walkthrough
  - Heuristic Evaluation
  - Guideline Review: evaluation of the design following guidelines
  - Standard Inspections: evaluation following norms (ISO)
- Model-based Evaluations (design phases)
  - Task models-based analysis
  - GOMS, KLM

Heuristic Evaluation (inspection method)

« Evaluation Heuristique »

- Méthode proposé par Nielsen et Molich (1993)
- Le principe: plusieurs évaluateur vérifient l'interface avec l'aide de seulement 10 règles heuristiques
- Les heuristiques aident l'évaluateurs a se rappeler des aspects importants a évaluer

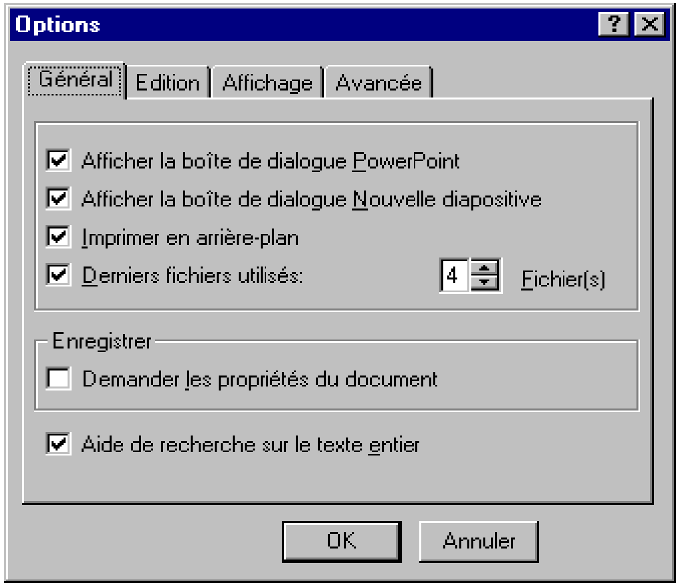


Les 10 heuristiques…

1. Utiliser de dialogues simples et naturels
2. Parler le langage de l’utilisateur
3. Minimiser la charge cognitive
4. Cohérence
5. Donner du feedback
6. Fournir de sorties explicites
7. Fournir des raccourcis
8. Fournir de messages d’erreurs
9. Concevoir pour les erreurs
10. Aide et documentation

1. Utiliser de dialogues simples et naturels

- Utiliser une logique d’utilisation et pas de fonctionnement
  - Concevoir en fonction de la tâche
  - Réduction du gouffre de l’exécution
- Présenter seulement les informations pertinentes
  - «Less is more»
  - Groupage logique des informations
  - Peu de fenêtres et de navigation



☑ Afficher la boîte de dialogue PowerPoint
☑ Afficher la boîte de dialogue Nouvelle diapositive
☑ Imprimer en arrière-plan
☑ Derniers fichiers utilisés: 4 Fichier(s)

Enregistrer
☐ Demander les propriétés du document

☑ Aide de recherche sur le texte entier

2. Parler le langage utilisateur

- Terminologie inspirée du langage de la tâche, et pas du système
  - «Ce produit n’est pas référencé dans le stock» ***plutôt que***
  - «Foreign key not found in table T_STOCK»
- Présenter l’interaction du point de vue de l’utilisateur
  - «Vous venez d’acheter 100 actions de la société XYZ» ***plutôt que***
  - «Nous venons de vous vendre 100 actions de la société XYZ»
- Mnémoniques, abréviations, icônes
  - S’assurer qu’elles sont significatives pour l’utilisateur

3. Minimiser la charge cognitive

- Pallier la faible capacité de la mémoire à court terme
- Privilégier la reconnaissance par rapport à la mémoire
  - Menus, icônes, choix explicites
  - Attention : Less is more !
- Décrire les formats d'entrée
  - Date de naissance : ___/___/___ (JJ/MM/AA, ex : 12/12/70)
- Utiliser un petit nombre de commandes génériques
  - cut, copy, paste, drag'n drop
  - Utilisables pour un mot, un paragraphe, un document...

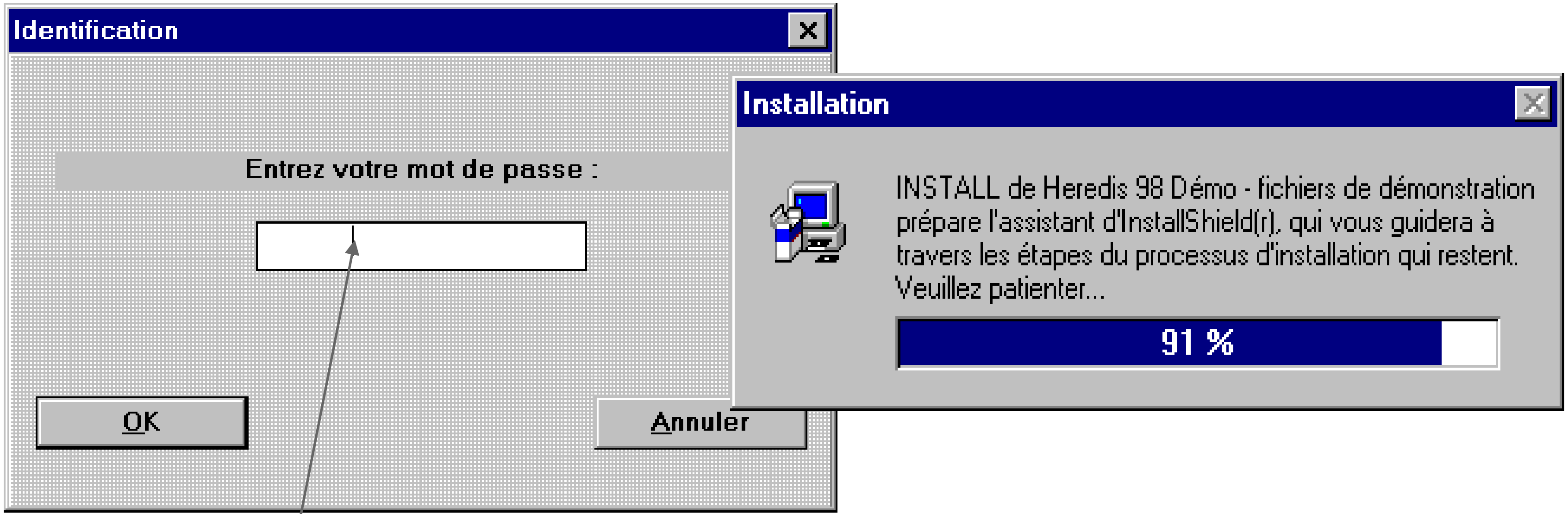
4. Cohérence

- Cohérence des effets
  - La même commande aura toujours les mêmes effets dans des situations comparables
  - Prédictibilité de l'interface
- Cohérence du langage et des graphiques
  - Dispositions spatiale des contrôles et texte des étiquettes
  - Apparence visuelle des contrôles (ex: scrollbars)
- Cohérence des entrées
  - Même syntaxe dans l'ensemble du système

5. Donner du feeback

- Minimiser le gouffre de l’évaluation
- Etre le plus spécifique possible
  - «Enregistrement du fichier ‘Toto’ dans le répertoire ‘bidon’ en cours...» plutôt que
  - «Enregistrement en cours...»
- Temps de réponse
  - 0,1 seconde max : perçu comme instantané
  - 1 seconde max : Le dialogue n’est pas interrompu, mais le délai est perçu
  - 10 secondes : limite pour conserver l’attention de l’utilisateur sur le dialogue
  - >10 secondes : L’utilisateur souhaite faire qq. chose d’autre

Feedback immédiat



INSTALL de Heredis 98 Démo - fichiers de démonstration prépare l'assistant d'InstallShield(r), qui vous guidera à travers les étapes du processus d'installation qui restent. Veuillez patienter...

Non

Oui

Saisie non visible

6. Fournir de sorties explicites

- Stratégies
  - Bouton «Annuler» pour les dialogues modaux
  - «Undo» universel (retour à l'état précédent)
  - «Interrompre» pour les opérations longues
  - «Quitter» le programme n'importe quand
  - «Défauts» pour réinitialiser des propriétés

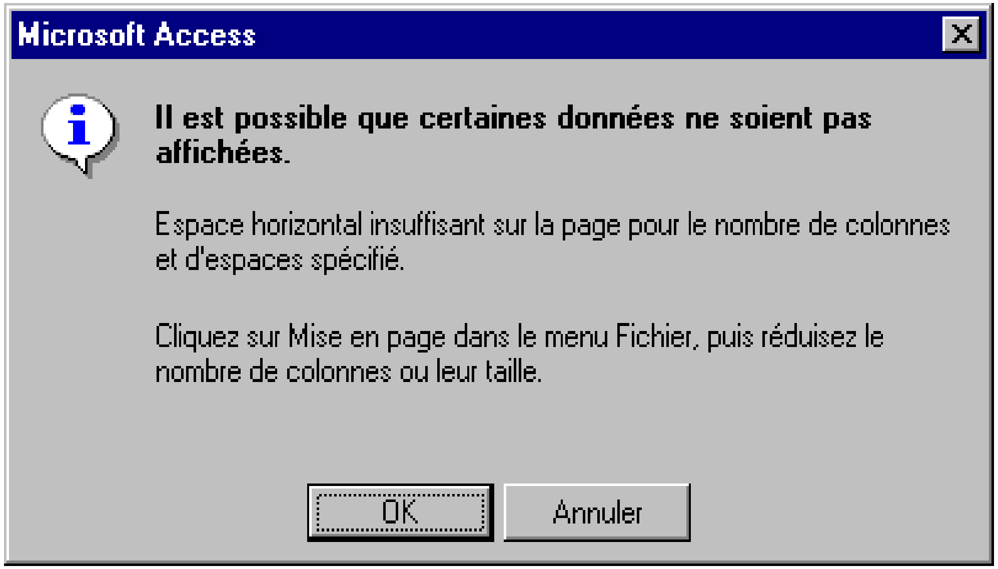
7. Fournir des raccourcis

- Adaptabilité aux utilisateurs experts
- Stratégies :
  - Accélérateurs clavier et souris
  - Complétion automatique des commandes
  - Touches de fonctions
  - Réutilisation
    - «History» du système Unix : 75% des commandes ont déjà été tapées auparavant
  - Barre d’outils personnalisable

8. Fournir de messages d’erreurs

- Les phrases doivent être concises, completes et claires
  - « cannot open this document » X « cannot open this document because the application is not on the disk »
- La document de doit pas être une priorité pour comprendre l’erreur
- Proposer de solutions
  - « … because the MS Word is not on the disk »
- Respecter l’utilisateur
  - « illegal user action, job abort »

Qualité des messages d ’erreurs

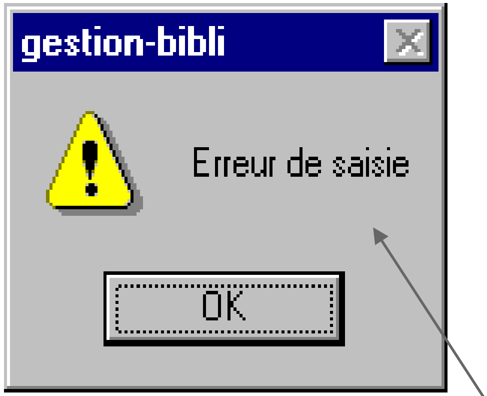


Microsoft Access

Il est possible que certaines données ne soient pas affichées.

Espace horizontal insuffisant sur la page pour le nombre de colonnes et d'espaces spécifié.

Cliquez sur Mise en page dans le menu Fichier, puis réduisez le nombre de colonnes ou leur taille.



gestion-bibli

Erreur de saisie

Oui

Non

Message peu détaillé

9. Concevoir pour les erreurs

- Deux types d’erreurs
  - Mistakes :
    - Une décisions consciente qui conduit à une action erronée
  - Slips :
    - Comportement inconscient qui conduit à une mauvaise séquence d’actions
    - Fréquent chez les utilisateurs expérimentés

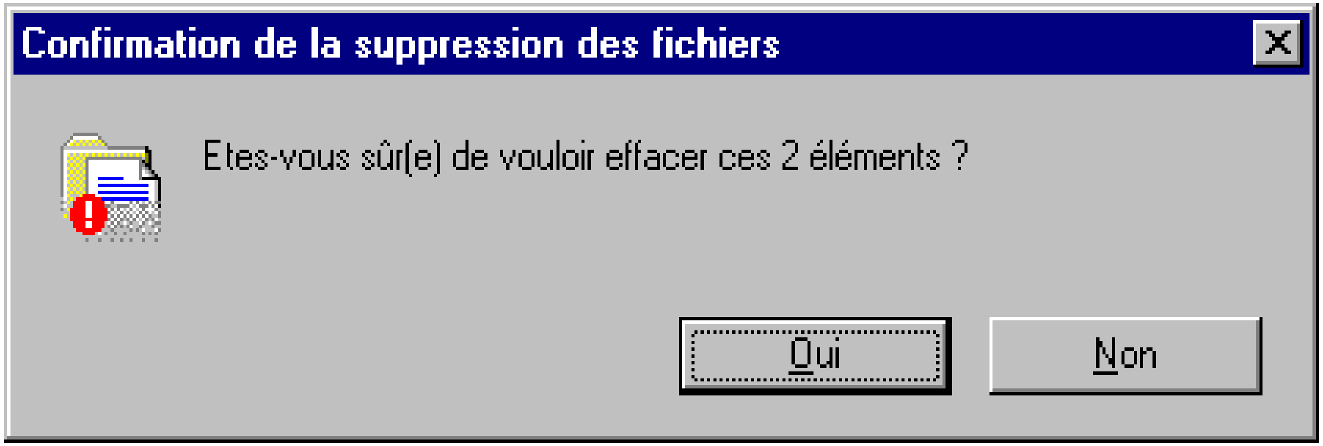
Types de «Slips»

- Erreur de capture
  - L'activité la plus fréquente est déclenchée, au lieu de celle désirée
    - ex : confirmer la suppression d'un fichier, alors qu'on ne voulait pas le supprimer
    - Prévention : au lieu de confirmer, permettre le «Undo»
- Erreur de description
  - Quand deux actions possibles ont beaucoup en commun
    - ex : glisser un fichier dans la poubelle au lieu de la disquette
    - Prévention : différencier les icônes, disposition spatiale étudiée
- Erreur «Data driven»
    - ex: téléphoner à quelqu'un pour lui donner un numéro de chambre, et composer le numéro de chambre
- Activation associative
    - ex: le téléphone sonne, on crie «Entrez!»

Types de «Slips» (suite)

- Perte d'activation
  - Oublier le but final lorsqu'on exécute une séquence d'actions
    - ex: «Qu'est-ce que je fais ici ?»
    - Prévention : rendre le but explicite (si le système le connaît), rendre le cheminement explicite
- Erreurs de mode
  - Action effectuée dans un contexte inadéquat
    - ex: VI, référencer un fichier qui est dans un autre répertoire, ...
    - Prévention : minimiser les modes, rendre les modes visibles

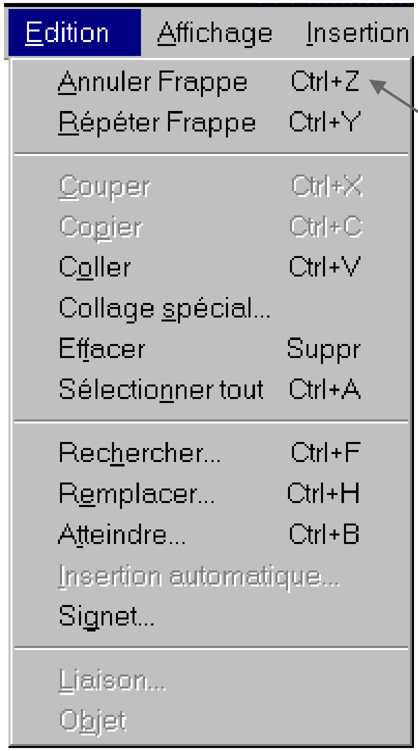
Protection contre les erreurs



Confirmation de la suppression des fichiers

Etes-vous sûr(e) de vouloir effacer ces 2 éléments ?

Correction des erreurs



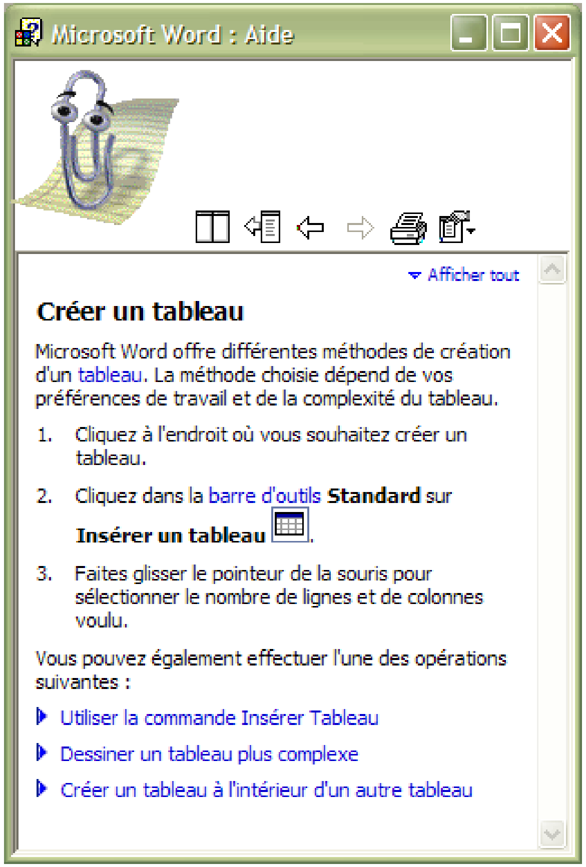
Commande Annuler

Oui

10. Aide et documentation

- Fournir de renseignement par écrit (où en ligne) sur le fonctionnement de l'application
- Les utilisateurs souvent ne lisent pas la doc…
- La documentation doit aider l'utilisateur àa:
  - Chercher l'info
  - Comprendre l'info
  - Appliquer la procédure

Exemple d’aide et documentation



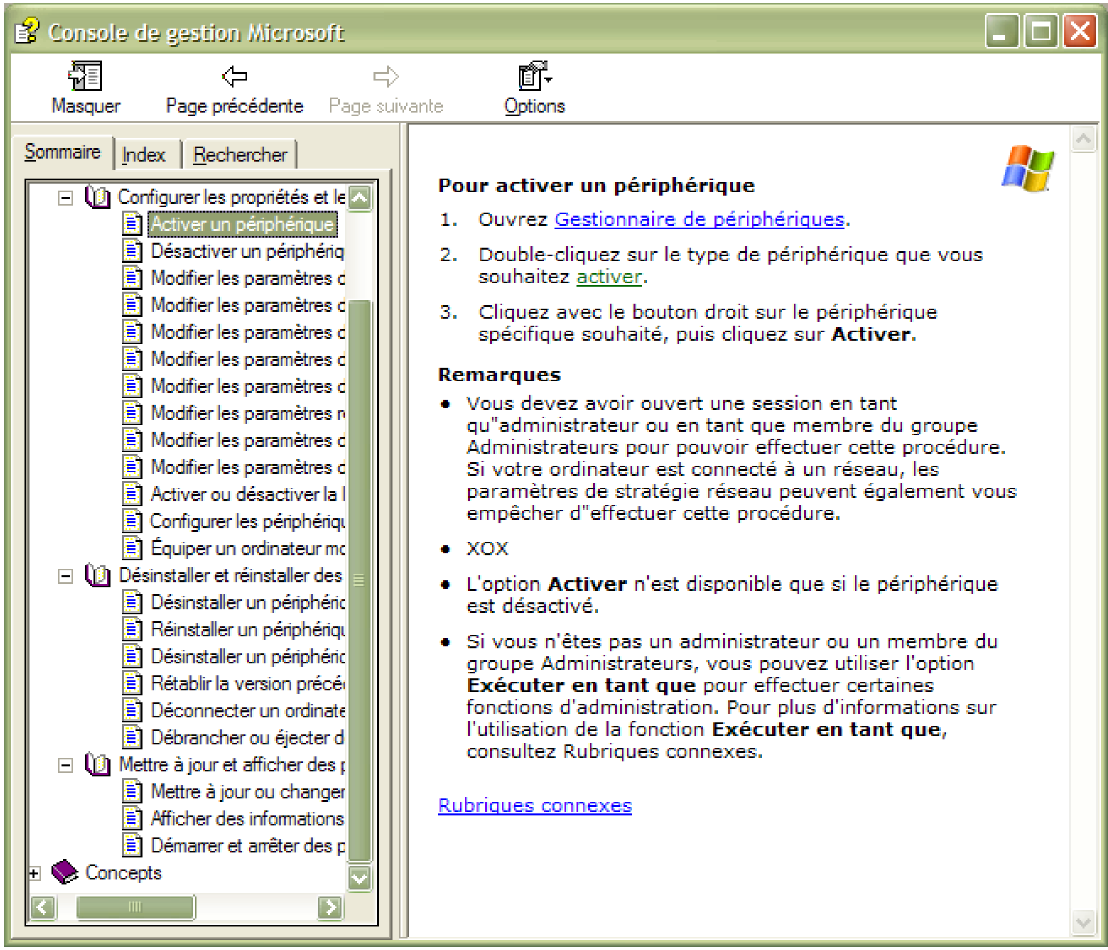
Créer un tableau

Microsoft Word offre différentes méthodes de création d'un tableau. La méthode choisie dépend de vos préférences de travail et de la complexité du tableau.

1. Cliquez à l'endroit où vous souhaitez créer un tableau.
2. Cliquez dans la barre d'outils **Standard** sur **Insérer un tableau** ▦.
3. Faites glisser le pointeur de la souris pour sélectionner le nombre de lignes et de colonnes voulu.

Vous pouvez également effectuer l'une des opérations suivantes :

- Utiliser la commande Insérer Tableau
- Dessiner un tableau plus complexe
- Créer un tableau à l'intérieur d'un autre tableau


Console de gestion Microsoft
Masquer
Page précédente
Page suivante
Options
Sommaire
Index
Rechercher
Configurer les propriétés et le
Activer un périphérique
Désactiver un périphériq
Modifier les paramètres c
Modifier les paramètres c
Modifier les paramètres c
Modifier les paramètres c
Modifier les paramètres c
Modifier les paramètres r
Modifier les paramètres c
Modifier les paramètres c
Activer ou désactiver la l
Configurer les périphériqu
Équiper un ordinateur mc
Désinstaller et réinstaller des
Désinstaller un périphéric
Réinstaller un périphériqu
Désinstaller un périphéric
Rétablir la version précé
Déconnecter un ordinate
Débrancher ou éjecter d
Mettre à jour et afficher des p
Mettre à jour ou changer
Afficher des informations
Démarrer et arrêter des p
Concepts

Pour activer un périphérique

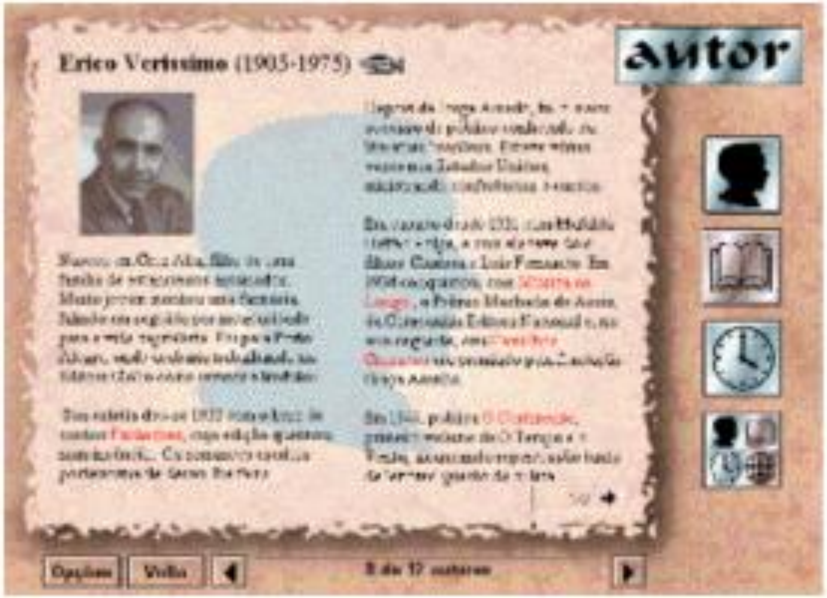
1. Ouvrez Gestionnaire de périphériques.
2. Double-cliquez sur le type de périphérique que vous souhaitez activer.
3. Cliquez avec le bouton droit sur le périphérique spécifique souhaité, puis cliquez sur **Activer**.

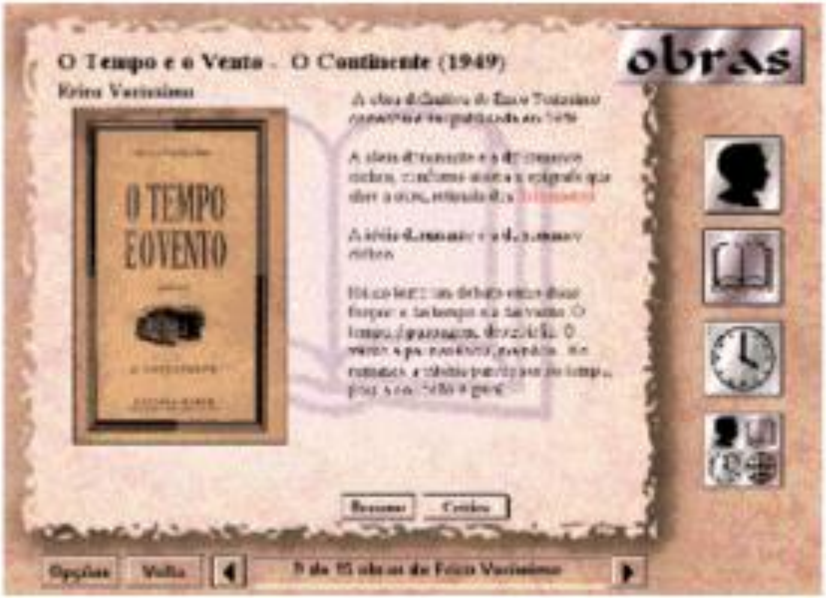
Remarques

- Vous devez avoir ouvert une session en tant qu"administrateur ou en tant que membre du groupe Administrateurs pour pouvoir effectuer cette procédure. Si votre ordinateur est connecté à un réseau, les paramètres de stratégie réseau peuvent également vous empêcher d"effectuer cette procédure.
- XOX
- L'option **Activer** n'est disponible que si le périphérique est désactivé.
- Si vous n'êtes pas un administrateur ou un membre du groupe Administrateurs, vous pouvez utiliser l'option **Exécuter en tant que** pour effectuer certaines fonctions d'administration. Pour plus d'informations sur l'utilisation de la fonction **Exécuter en tant que**, consultez Rubriques connexes.

Rubriques connexes

Example




obras
O Tempo e o Vento - O Continente (1949)
Erico Verissimo
O TEMPO E O VENTO
Resumo
Crítica
Opções
Volta
9 de 15 obras de Erico Verissimo

Description du problème: dans la rubrique sur le livre “*O tempo e o Vento*”, le bouton « critique » semble active mais il ne fournir aucun retour;

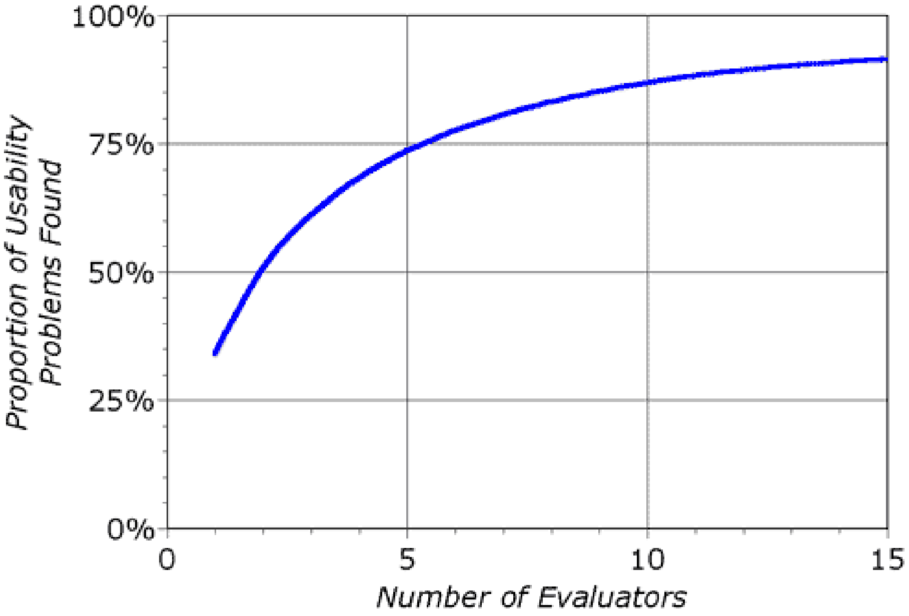
Séverité (1-3): 3

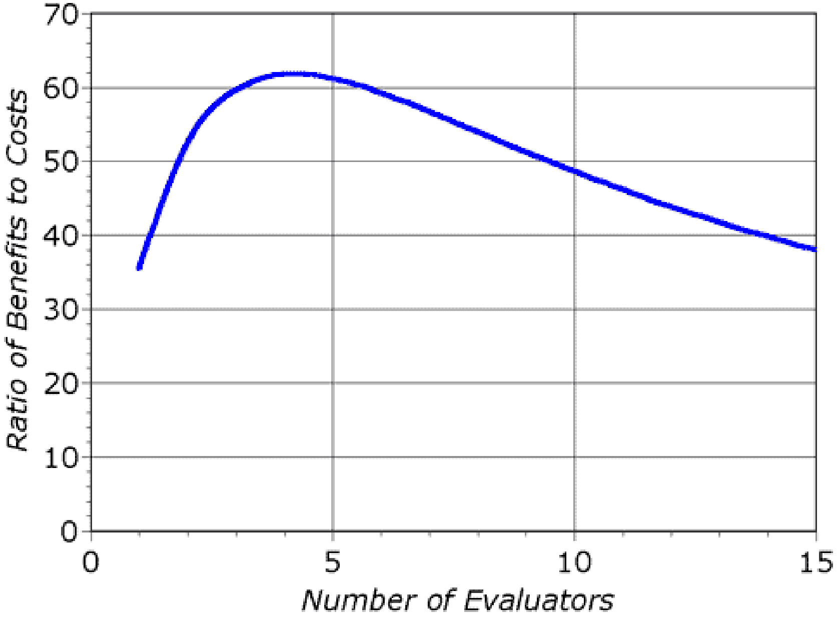
Heuristique violée: *feedback* (H5).

Le processus d’évaluation

- Nombre d’évaluateurs
- Expertise des évaluateurs
- L’approche Walkthroughout
- Description détaillé des problèmes
- Classification de problèmes par rapports a leur sévérité et les heuristiques

Nombre d'évaluateur [discount method]





Planifier l'évaluation

- Proposer aux évaluateur les tâches principales à inspecter
- Expliquer aux évaluateurs la raison d'être de l'outil pour qu'ils puisse réaliser leurs tâches
- Demander aux évaluateurs d'évaluer l'interaction avec le système
- Sélectionner les évaluateurs:
  - 5 évaluateur expérimentés trouverons 81%-90% des problèmes avec l'interface…
  - 5 évaluateurs novices (ex. des étudiants) trouverons 22%-29% de problèmes …

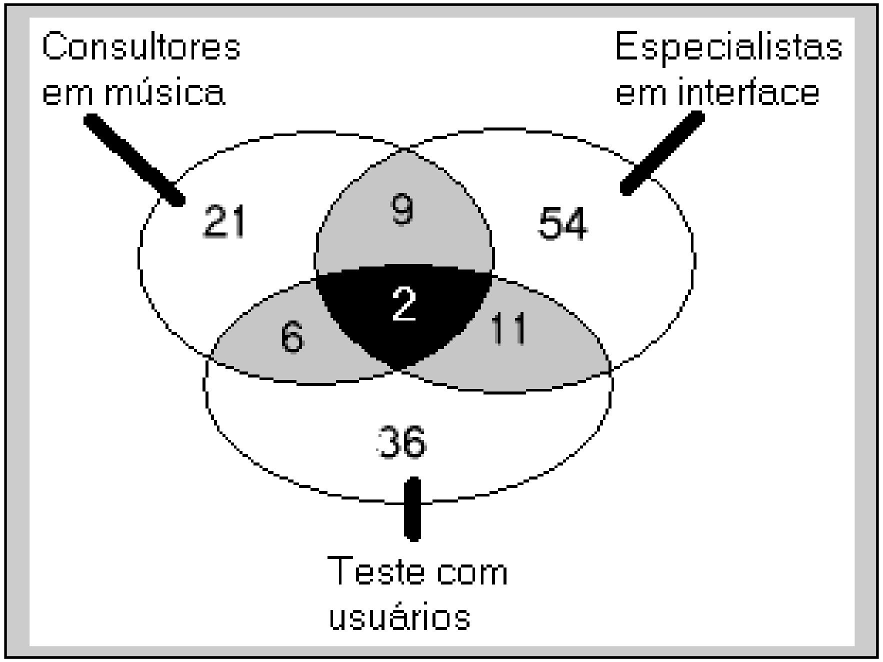
L’approche Walkthroughout …

- Il faut un coordinateur et des évaluateurs…
- Le coordinateur sélectionne les évaluateur et fait la synthèse des évaluations individuelles
- Les évaluateurs ne doivent pas communiquer avant la fin de l’évaluation
- 1-2 heure pour chaque session de test
- L’évaluateur doit d’abord se familiariser avec l’outil avant de se lancer dans l’évaluation
- Chaque problème doit être classé selon une (ou plusieurs heuristique), une sévérité doit également être attribué
- Si aucune heuristique ne correspond au problème trouvé, l’évaluateur peut proposer une nouvelle heuristique et la justifier..

Les Heuristiques pour le Web, les jeux, les téléphone portables, l'interaction avec les robots,...

- Nielsen, J. Designing Web Usability. Peachpit Press Publications. 432 pages.
- Pinelle, D., Wong, N., and Stach, T. 2008. Heuristic evaluation for games: usability principles for video game design. In *Proceeding of the Twenty-Sixth Annual SIGCHI Conference on Human Factors in Computing Systems* (Florence, Italy, April 05 - 10, 2008). CHI '08. ACM, New York, NY, 1453-1462. DOI= http://doi.acm.org/10.1145/1357054.1357282
- Clarkson, Edward C. Arkin, Ronald C. Applying Heuristic Evaluation to Human-Robot Interaction Systems. GVU Technical Report;GIT-GVU-06-08
- Bertini, E., Gabrielli, S., and Kimani, S. 2006. Appropriating and assessing heuristics for mobile computing. In *Proceedings of the Working Conference on Advanced Visual interfaces* (Venezia, Italy, May 23 - 26, 2006). AVI '06. ACM, New York, NY, 119-126. DOI= http://doi.acm.org/10.1145/1133265.1133291

Evaluation Heuristique X Test utilisateurs



Heuristic Evaluation

[Comments]

+ easy to apply
+ anyone could be traing for using this method (!!!)
+ costs X benefits

- results are directly related to evaluators experience
- it covers only some kind of usability problems...

Inspection Methods

(The Cognitive Walkthought Method)

Wharton, C., Rieman, J., Lewis, C., and Polson, P. (1994). The cognitive walkthrough method: A practitioner's guide. In Nielsen, J., and Mack, R. (Eds.), Usability inspection methods. New York, NY: John Wiley & Sons, Inc.

Cognitive Walkthrough

- Formalized way of imagining people's thoughts and actions when they use an interface for the first time.
- First select a task that the design is intended to support.
- Then try to tell a believable story about each action a user has to take to do the task.
- To make the story believable, you have to motivate each of the user's actions, relying on the user's general knowledge and on the prompts and feedback provided by the interface. If you can't tell a believable story about an action, then you've located a problem with the interface.

What’s it good for?

- Question assumptions about what the users will be thinking
  - Will the user try to achieve the right effect?
  - Will the user notice that the correct action is available?
  - Will the user associate the correct action with the effect to be achieved?
  - If the correct action is performed, will the user see that progress is being made toward solution of the task?
- Identify controls that may be missing or hard to find
- Note inadequate feedback
- Suggest difficulties with labels and prompts

How to do it

Prior to doing a walkthrough, you need four things:

1. You need a description of a prototype of the interface. It doesn't have to be complete, but it should be fairly detailed. Things like exactly what words are in a menu can make a big difference.
2. You need a task description (for a representative task).
3. You need a complete, written list of the actions needed to complete the task.
4. You need an idea of who the users will be and what kind of experience they'll bring to the job.

Some caveats

- Don't merge step 3 into the evaluation process. The walkthrough should look at the exact sequence, to identify problems users might encounter when following it.
- The walkthrough does not test real users on the system. With a walkthrough you can potentially evaluate the interface by imagining the behavior of entire classes of users, not use one unique user.

Performing the Cognitive Walkthrough

- Define the inputs
  - Identify users and tasks
  - Create a description (screenshots, storyboard) or implementation (rapid prototype) of the interface
  - Define the action sequences for completing each task
- Gather the team
  - Facilitator maintains the pace of the discussion
  - Scribe records information
    - problems (and suggested solutions)
    - assumptions (about tasks and user’s skills)

Performing the Walkthrough, cont.

- Gather the team, cont.
  - Participants walk through (discuss) the tasks with respect to the interface (prototypes or screenshots) and action sequences
  - They try to tell a credible story
    - What is the user trying to achieve at this point? What is the user's goal and why is it their goal?
    - What actions are obviously available in the interface?
    - Does the label for the correct action match the user's goal?
    - If the user performs the correct action, will they get good feedback?

Performing the Walkthrough, cont.

- Record critical information
  - The credible success (or failure) story
  - Assumptions (about tasks and user's skill)
  - Problems (and suggested solutions)
- Revise the interface to fix the problems
  - Re-implement rapid prototype or create new screenshots
- Repeat
  - Designing the "correct" interface requires iteration
    - Proposed solutions may turn out to be wrong!

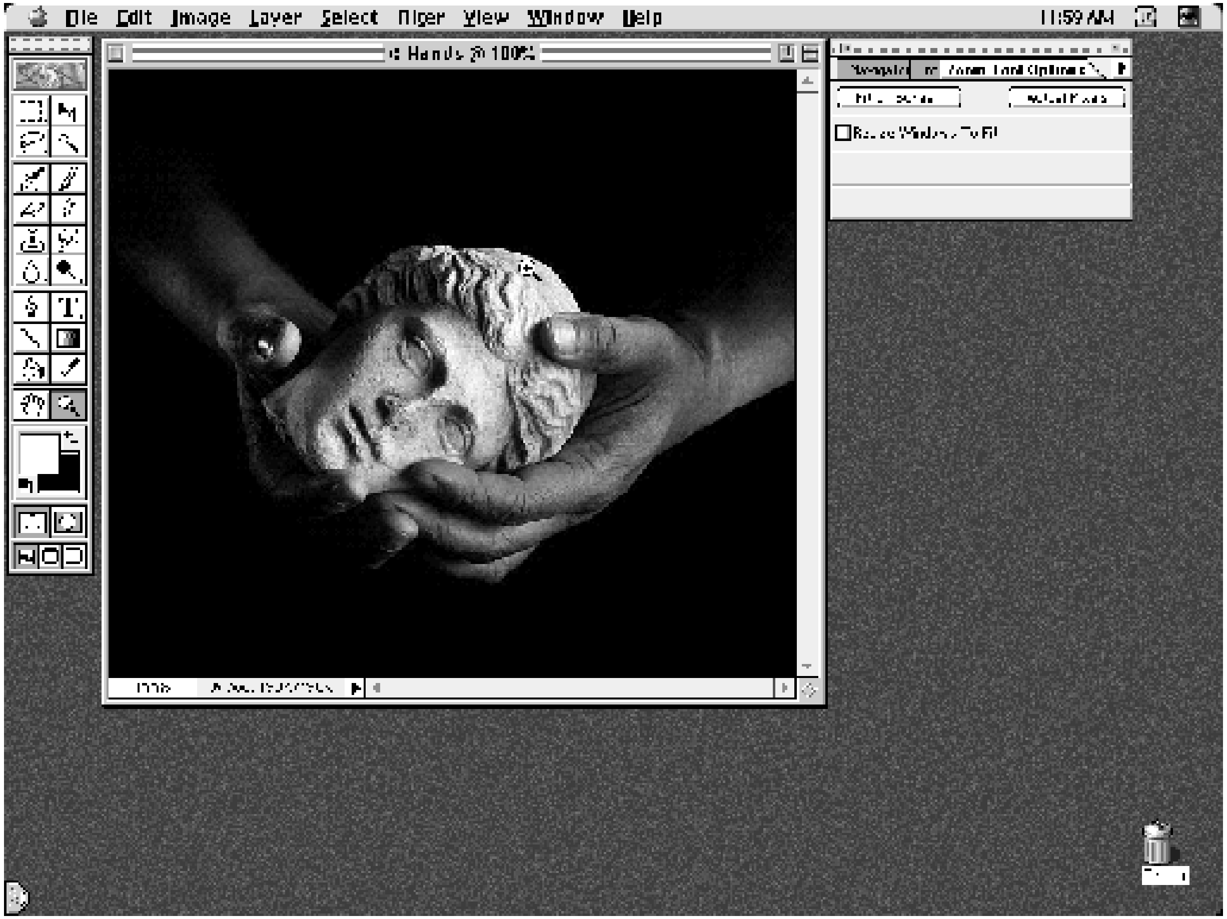
Inverting a portion of an image (Example)

- Users
  - We want novice users of Photoshop to be able to invert selections of an image with little or no training;
  - Assume that user’s have had experience with other imaging programs
- Tasks
  - Select a subregion of an image and invert it
- Interface
  - We have screenshots from the latest version of the product

Example, cont.

- Action Sequences
  - Zoom display to area of interest
  - Select the Lasso Tool
  - Select the subregion of the image
  - Select Inverse from the Image menu

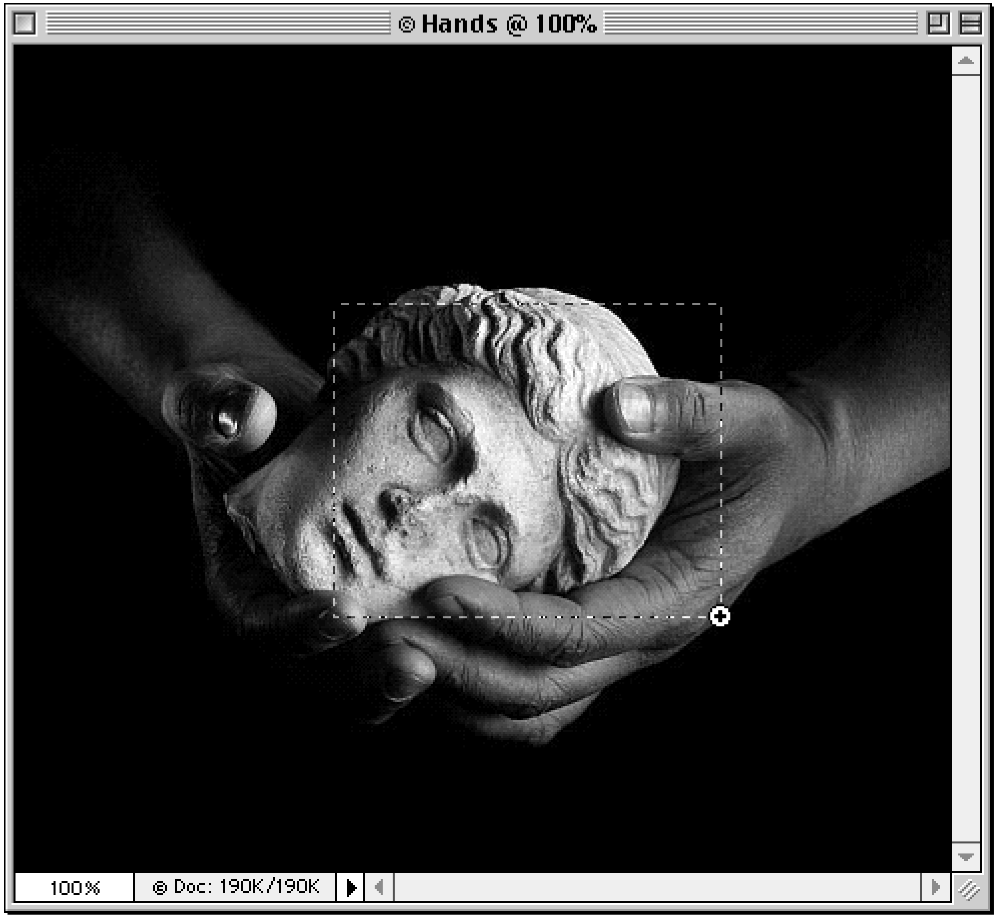
Photoshop Interface



Description of Interface

- Photoshop presents
  - a toolbar (far left)
    - vertically arranged
    - Assume that novice users are unfamiliar with the toolbar’s icons
  - the image (center)
  - a control panel (far right)
    - Assume that novice users are unfamiliar with the operation and purpose of the control panel

Zoom in on Face



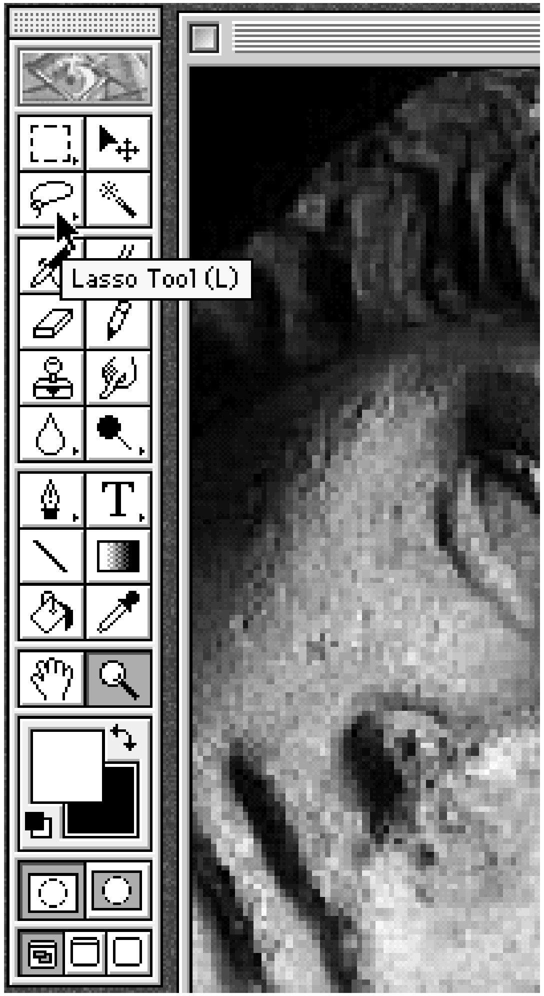
Action: Zoom in on Image

- What’s the user’s goal, and why?
  - The user wants to specify the portion of the image to invert exactly. Zooming in on the region of interest helps to increase the accuracy of the selection
  - Is the action obviously available?
  - The default tool in Photoshop is the Zoom tool; if the user has just started Photoshop its the current tool
  - Novice users may have to search for this tool on the toolbar if they need it later on
  - This tool uses the magnifying glass as its icon

Zoom in on Image, cont.

- Does the action or label match the goal?
  - No label involved here, however magnifying glass icon represents task well
  - Clicking on image, zooms the tool
  - Dragging on image, specifies zoom region more accurately
  - Assume: novice users will click rather than drag (despite screenshot!)
- Is there good feedback?
  - Yes, Photoshop instantly zooms the image

Select Lasso Tool



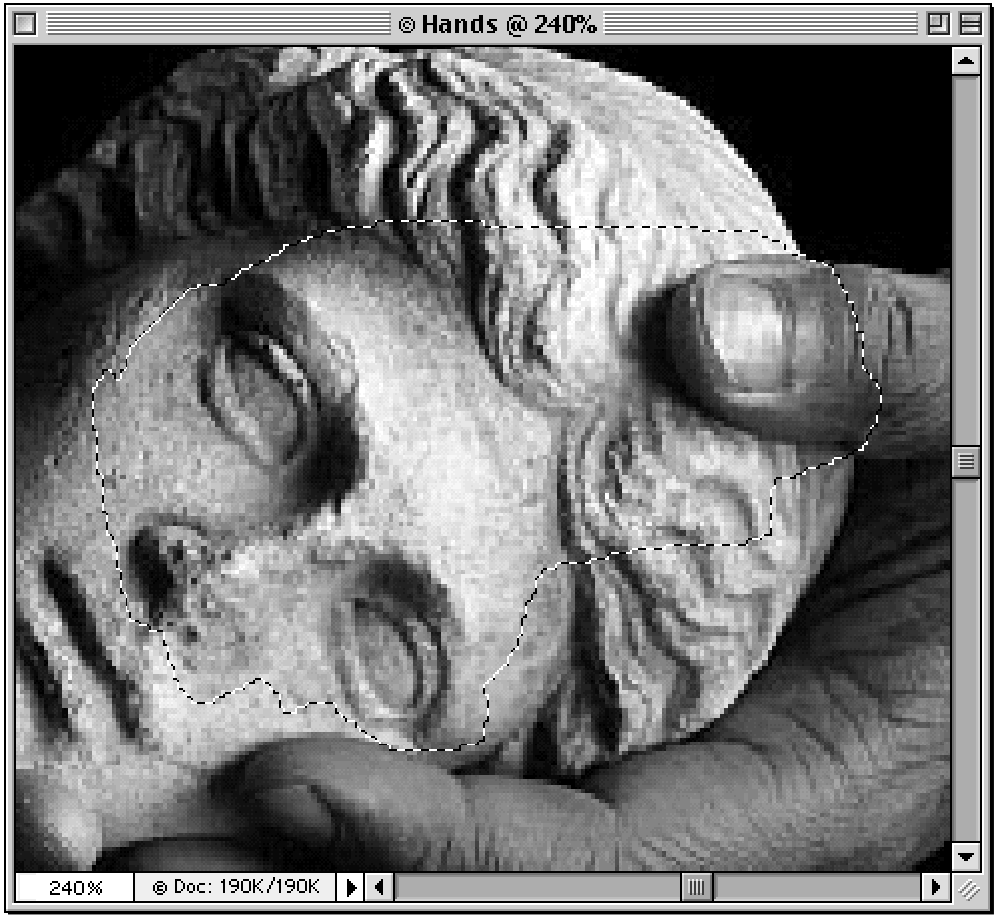
Select the Lasso Tool

- What’s the user’s goal, and why?
  - They need a tool to select a portion of the image
- Is the action obviously available?
  - They are familiar with the lasso tool from other image programs
  - The lasso icon is available at the top of the toolbar (increasing the chance that it will be seen)
  - The tooltip provides confirmation of the icon’s information

Select the Lasso Tool, cont.

- Does the action or label match the goal?
  - Tooltip serves as label and confirms the meaning of the familiar lasso icon
- Is there good feedback?
  - Not shown but toolbar icon highlights when selected

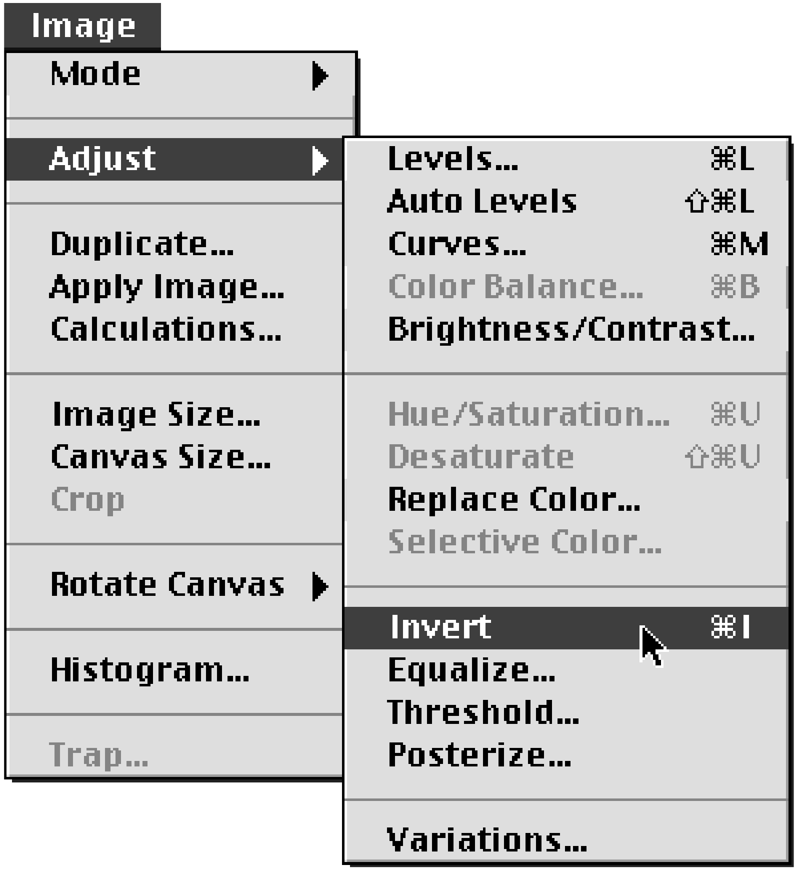
Select Image



Select the Image

- What’s the user’s goal, and why?
  - Select a portion of the image
- Is the action obviously available?
  - Assume novice user is familiar with using the lasso tool
- Does the action or label match the goal?
  - Yes, the lasso tool’s sole purpose is selecting regions
- Is there good feedback?
  - Yes, the lasso tool produces a “rubber-band” that indicates the current selection

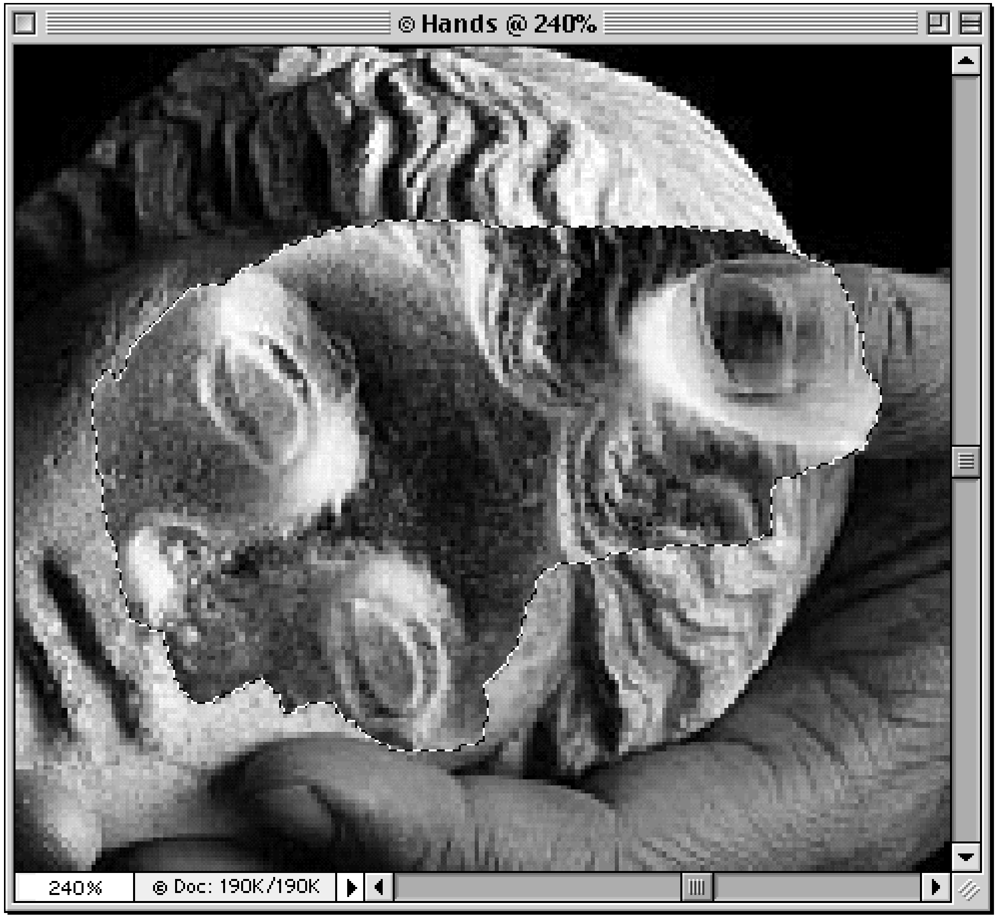
Select Invert Operation



Invert the Image

- What’s the user’s goal and why?
  - The overall task is to invert a region of the image
- Is the action obviously available?
  - No, previous experience will lead them to look for action in the menus
- Does the action or label match the goal?
  - Yes, but the invert operation is buried in a submenu called Adjust within the Image menu; novice users may look for the command in the “Edit” menu
  - Is there good feedback? Yes, the image inverts

Operation Complete



Example Wrap-up

- Action 1: Zoom In
  - Available as default tool; novice users may have to search for tool on subsequent operations
- Action 2: Select Lasso Tool
  - Lasso Icon is located in prominent place on toolbar; novice users are familiar with this tool
- Action 3: Select Image
  - No problem here
- Action 4: Invert Image
  - Invert command is buried in submenu

Possible Improvements?

- The Invert selection command is a common operation yet it is buried in a submenu
  - Note: It is assigned an intuitive keyboard short-cut (I) which is good!
- Suggestions
  - Move Invert up one level into the Image menu?
  - Place a command for inverting the selection on one of the toolbars?

Walkthrough results

- A walkthrough does not necessarily generate a lot of suggestions per task
  - Location within requirements phase
    - More suggestions common at the beginning
  - Task Dependent
    - Certain problems may only be revealed by a particular type of task
  - User skill level
    - Does the program try to support both novice and expert users?
    - Photoshop for example has traditionally focused on expert users...

Analytical
(GOMS - KLM)

GOMS

- Describe the user behavior in terms of
  - Goals
    - i.e. edit manuscript, locate line
  - Operators
    - Elementary perceptual, motor, or cognative acts
  - Methods
    - Procedure for using operators to accomplish goals
  - Selection rules
    - Used if several methods are available for a given goal

- Family of methods
  - KLM, CMN-GOMS, NGOMSL, CPM-GOMS

GOMS Example

- Goal (the big picture)
  - Go from home to the airport
- Methods (or subgoals?)
  - Take BART, taxi, airport shuttle
- Operators
  - Go to BART station, wait for BART…
- Selection rules
  - BART is cheaper, but I’m running late…

GOMS How-To:

- Generate task description
  - Pick high-level user Goal
  - Write Methods for reaching Goal (may invoke sub-goals)
  - Write Methods for sub-goals
  - Iterate recursively until Operators are reached
- Evaluate description of task
- Apply results to UI
- Iterate

GOMS Calculations

- Execution time
  - Add up times from operators
  - Assume experts (have mastered tasks)
  - Assume error-free behavior
  - Very good rank ordering
  - Absolute accuracy (~10%-20%)

Using GOMS Analysis

- Check that frequent goals can be achieved quickly
- Making operator hierarchy is often the value
  - Functional coverage & consistency
    - Does UI contain needed functions?
    - Are similar tasks preformed similarly?
  - Operator Sequence
    - In what order are individual operations done?

Keystroke Level Model (KLM)

- Describe the task using the following Operators
  - K: pressing a key or a pressing (or releasing) of a button
    - T(K) = 0.08~1.2 seconds (~0.2 avg)
  - P: pointing
    - T(P) = 1.1 seconds (without button presses)
  - H: homing (switching device
    - T(H) = 0.4 sec
  - D(n,L): drawing segmented lines
    - T(D) = 0.9n + 0.16L
  - M: mentally prepare
    - T(M) = 1.35s
  - R(t) : system repsonse time
    - T(R) = t

Exemple

Description	**Operation**	**Time (sec)**
Reach for mouse	H[mouse]	0.40
Move pointer to "Replace" button	P[menu item]	1.10
Click on "Replace" command	K[mouse]	0.20
Home on keyboard	H[keyboard]	0.40
Specify word to be replaced	M4K[word]	2.15
Reach for mouse	H[mouse]	0.40
Point to correct field	P[field]	1.10
Click on field	K[mouse]	0.20
Home on keyboard	H[keyboard]	0.40
Type new word	M4K[word]	2.15
Reach for mouse	H[mouse]	0.40
Move pointer on Replace-all	P[replace-all]	1.10
Click on field	K[mouse]	0.20
Total		**10.2**

KLM Heuristic Rules (Raskin)

0: Insert M
- in front of all K
- in front of all P’s selecting a command (not in front of P’s ending a command)

1: Remove M between fully anticipated operators
- MPK → PK

2: if a string of MKs belong to a cognitive unit, delete all M’s except the first
- 4564.23: MKMKMKMKMKMKMK → MKKKKKKK

3: if K is a redundant terminator, then delete M in front of it
- [enter] [enter]: MKMK → MKK

4a: if K terminates a constant string (command name) delete the M in front of it
- cd [enter]: MKKMK → MKKK

4b: if K terminates a variable string (parameter) keep the M in front of it
- cd class [enter]: MKKKMKKKKMK → MKKKMKKKKKMK

Using KLM

- Encode using all physical operators
  - K, M, P, H, D(n,l), R(t)
- Apply Raskin’s KLM rules
- Transform R followed by an M
  - If $t \le T(M)$: $R(t) \rightarrow R(0)$
  - If $T(M) < t$: $R(t) \rightarrow R(t - T(M)\ )$
- Compute the total time by adding each time cost

Applications of GOMS

- Compare different UI designs
- Profiling (time)
- Building a help system? Why?
  - Modeling makes user tasks & goals explicit
  - Can suggest questions users will ask & the answers

What GOMS Can Model

- Task must be goal-directed
  - Some activities are more goal-directed then others
  - Creative activities may not be as goal-directed
- Task must be a routine cognitive skill
  - As opposed to problem solving
  - Good for machine operators
- Serial and parallel tasks (CMP-GOMS)

Advantages of GOMS

- Gives qualitative and quantitative measures
- Model explains the results
- Less work then a user study- no users!
- Easy to modify when UI is revised

Disadvantages of GOMS

- Not as easy as other evaluation methods
  - Heuristic evaluation, guidelines, etc.
- Takes lots of time, skill & effort
- Only works for goal-directed tasks
- Assumes expert performance
- Does not address several UI issues
  - Readability, memorizability of icons, etc

In conclusion (about GOMS)

- Know your users capabilities and limits
- Models such as Fitts’s and GOMS can help you test your UI without real users
- But there’s still no substitute for user studies

Exercise

Rationale for the exercise: make the link between task models and inspection based evaluation

- User the scenarios previously extracted from task models
- Perform each scenario using your prototype
- Whilst performing the scenario observe any usability problem
- Report usability problems using the heuristic evaluation
- IMPORTANT: see how report usability problems…

Reporting Findings

Some criteria for identifying usability problems

- Matching interface with user's needs (ex. task analysis)
- User performance:
  - Task execution (successful, unsuccessful, partial execution)
  - Time to complete a task
  - Error occurrence
- User satisfaction, stress, etc
- Conformance with ergonomic rules, guidelines, recommendations, etc

Classifying usability problems

[Why to do this?]

- determine the severity of problems
- solve most critical problems first
- identify recurrent problems and try to avoid them

Classifying usability problems

- Impact:
  - critical (+ 2 min., frustration, user give up)
  - important (still 2 min., success, lost in quality of interaction)
  - Less important (user can solve problems by themselves)

X

- Frequency:
  - big (3-5 users)
  - medium (2-3 users)
  - small (1 user)

Common Industry Format (CIF)

- Standard format for reporting usability problems
- US National Institute of Standards and Technology (NIST)

Formative test	Summative test
• During the development process • To mould or improve the product • Virtually anywhere (don’t need a lab) • With the test administrator and the participant co-present	• At the end of a development process • To measure or validate the usability of a product • To answer the question: "How usable is this product" • To compare against competitor products or usability metrics • To generate data to support marketing claims about usability • In a usability lab • With the participant working alone
• Participant comments in the form of a "thinking aloud" narrative (ex. attitudes, sources of confusion, reasons for actions) • Photographs and highlights videos • Usability problems and suggested fixes	• Statistical measures of usability (for example, success rate, average time to complete a task, number of assists) • Reports or white papers

Session test form

Summary report