Conception Centrée Utilisateur pour le Web

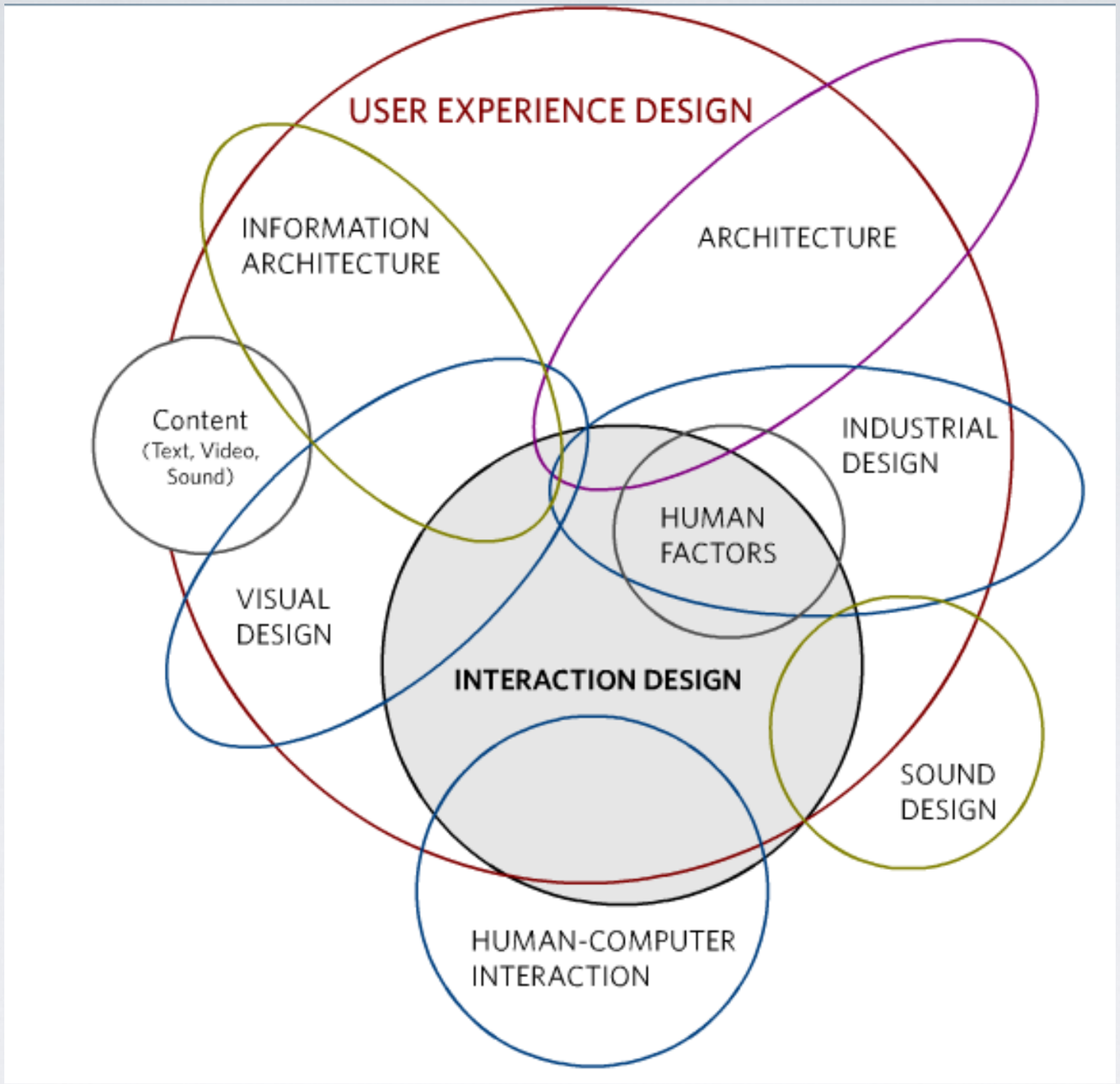
MNT
25 octobre 2012

James Eagan <james.eagan@telecom-paristech.fr>

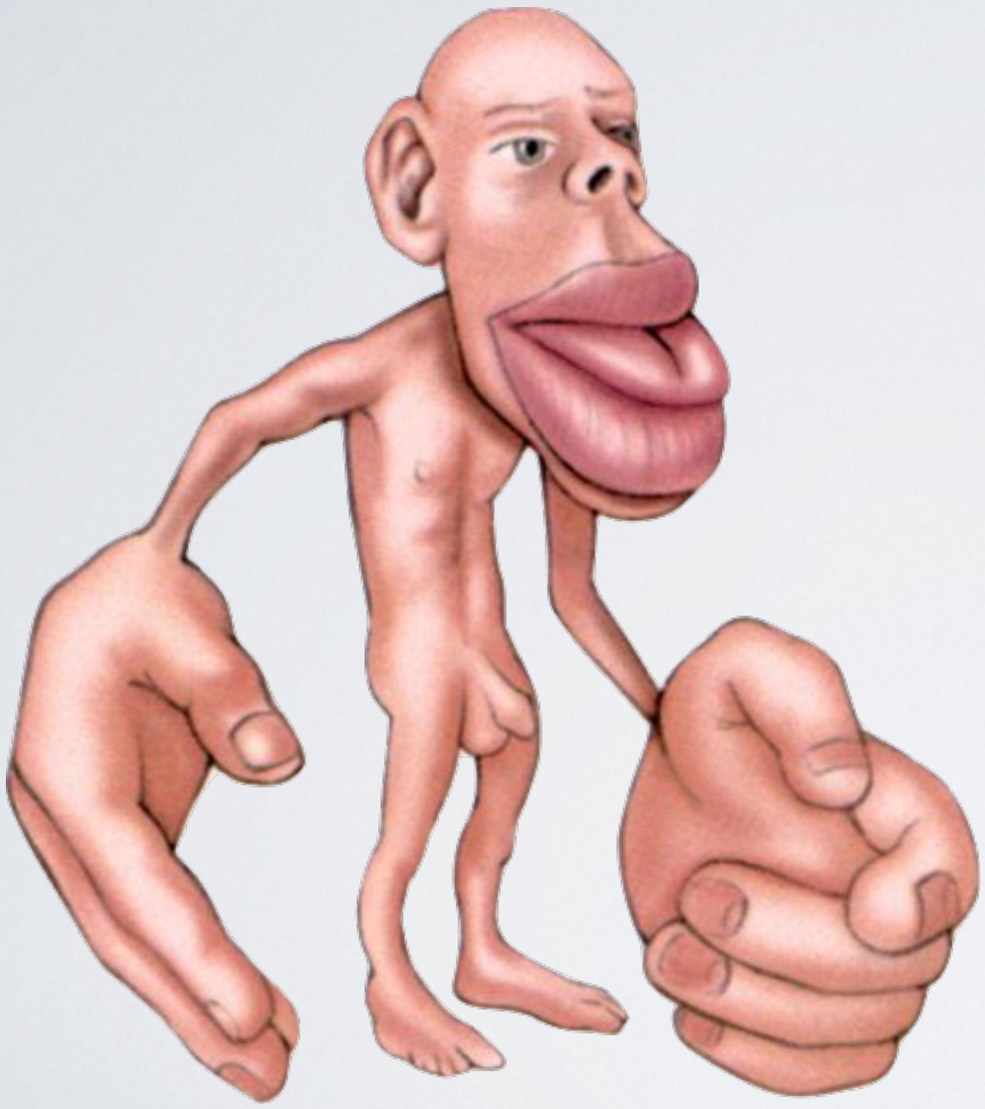
James Eagan

Maître de Conférences en Interaction Homme-Machine

- Maître de conférences en IHM à Télécom ParisTech
- Ph. D. en Informatique, Georgia Institute of Technology
- Recherche en Visualisation d'Information, Interaction Multi-surface


USER EXPERIENCE DESIGN
INFORMATION ARCHITECTURE
ARCHITECTURE
Content (Text, Video, Sound)
INDUSTRIAL DESIGN
HUMAN FACTORS
VISUAL DESIGN
INTERACTION DESIGN
SOUND DESIGN
HUMAN-COMPUTER INTERACTION

Why Do We Care?



Official Apple Store – Buy the new iPad, Apple TV, iPhone, Mac Computers and Notebooks, iPod and More – Apple Store (U.S.)

http://store.apple.com/us

Google

Store | Mac | iPod | iPhone | iPad | iTunes | Support

Apple Store

Call 1-800-MY-APPLE

Search Store

- Shop Mac
- Shop iPod
- Shop iPhone
- Shop iPad
  - Mac Accessories
  - Mac Software
  - iPod Accessories
  - iPhone Accessories
  - iPad Accessories
- Education Store
- Business Store
- International Stores
- Government & Military

Popular Accessories

For iPad

Welcome to the Apple Store | Help | Account | Cart

NEW

iPad
From $399

iPhone
From $0

iPod touch
From $199

iPod nano
From $129

iPod shuffle
Just $49

iPod classic
Just $249

NEW

Apple TV
Just $99

MacBook Air
From $999

MacBook Pro
From $1199

Mac mini
From $599

iMac
From $1199

Mac Pro
From $2499

Get fast, free shipping to your door on orders over $50 or buy online and pick up in store.

New to the Store

- The new iPad
- AppleCare+ for iPad
- Apple TV
- Apple Digital AV Adapter
- iPad Smart Covers
- iPhone 4S
- iPhone 4
- iPhone – AppleCare+
- iPod touch
- iPod nano
- OS X Lion USB Thumb Drive
- MacBook Air
- Mac mini
- Apple Thunderbolt Display (27-inch)

Store Services

- Mother's Day Shipping

Add/Update Shipping Information

We found an error while verifying your shipping address.
We've marked the problem in red for you.

Update the address book of

Required information is marked in GREEN CAPS.

HELP for questions about shipping.

NICKNAME: MYSELF

Please assign a "nickname" for the person you're shipping to.
You may change or delete this information at any time.

FIRST NAME: DOUGLAS **MIDDLE INITIAL:**

LAST NAME:

ADDRESS: 245 SAN JOSE RD

(International use only)

CITY: LOS GATOS

STATE/PROVINCE: California

Includes APO and FPO. Use "Other" if country is not USA or Canada.

ZIP/POSTAL CODE: 95333

COUNTRY: Select a country

SHIPPING METHOD:

In the U.S.: HELP

- **Standard UPS** (2 business days plus

International: HELP

- **Canada** Canada Post (4-10 business days)

IBM

- 1999 : « Most popular feature was ... search ... people couldn't figure out how to navigate the site »
  - « The 2nd most popular feature was the help button, because the search technology was so ineffective. »
- Après re-conception du site centrée utilisateur :
  - Utilisation du bouton « help » a baissé 84 %
  - Ventes ont augmenté 400 %

[New York Times, 30 août 1999]

Outline

- Principes de l'utilisabilité
- Perception
- Comprendre l'utilisateur
- Analyse de tâches
- Prototypage
- Evaluation & Expériences Utilisateur

Usability Principles

Usability Principles

- Many different kinds
- No cookbooks, checklists, magic recipes
- Shneiderman, *Designing the User Interface*
- Dix, Finlay, Abowd, Beale, *Human-Computer Interaction*

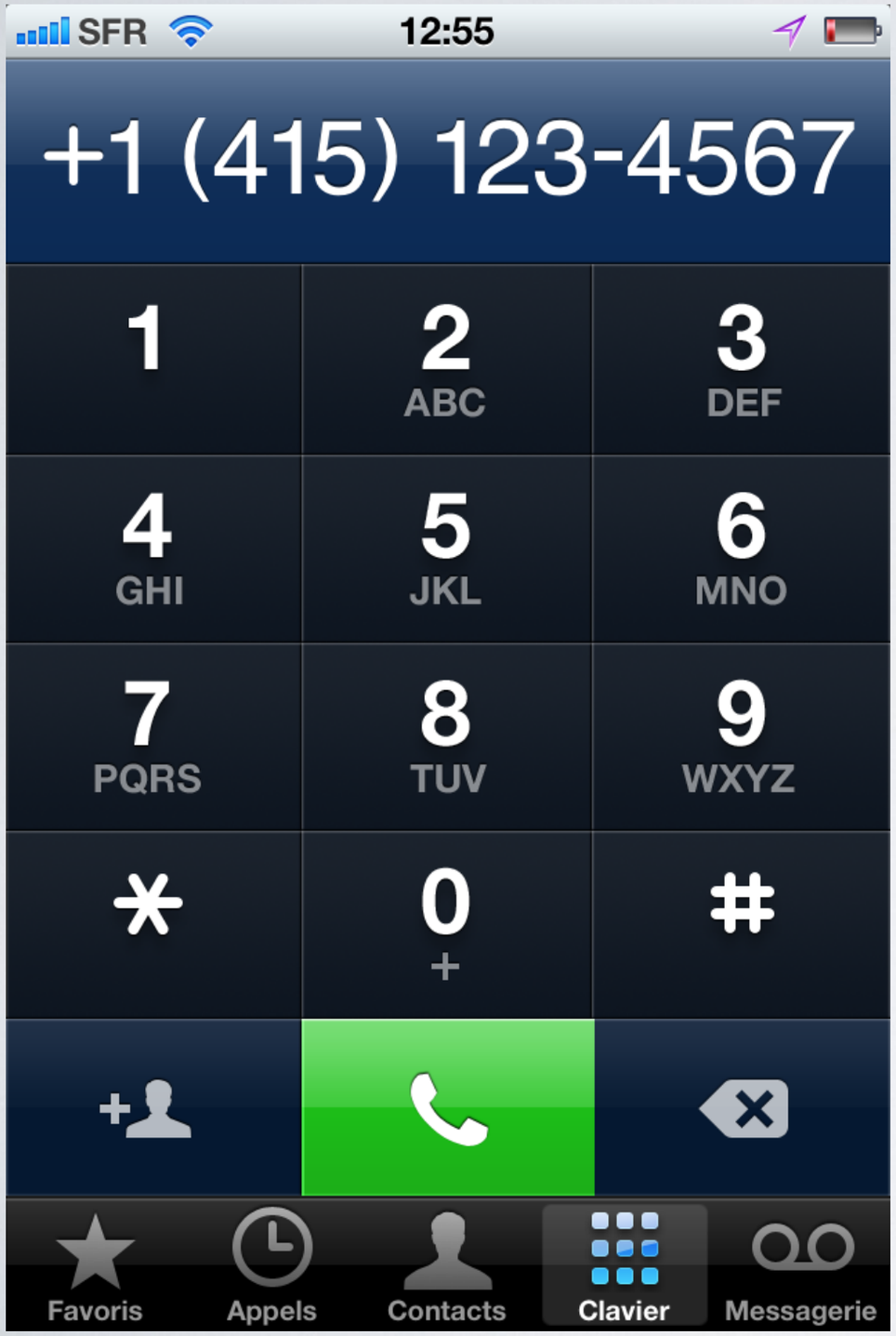
Usability Principles

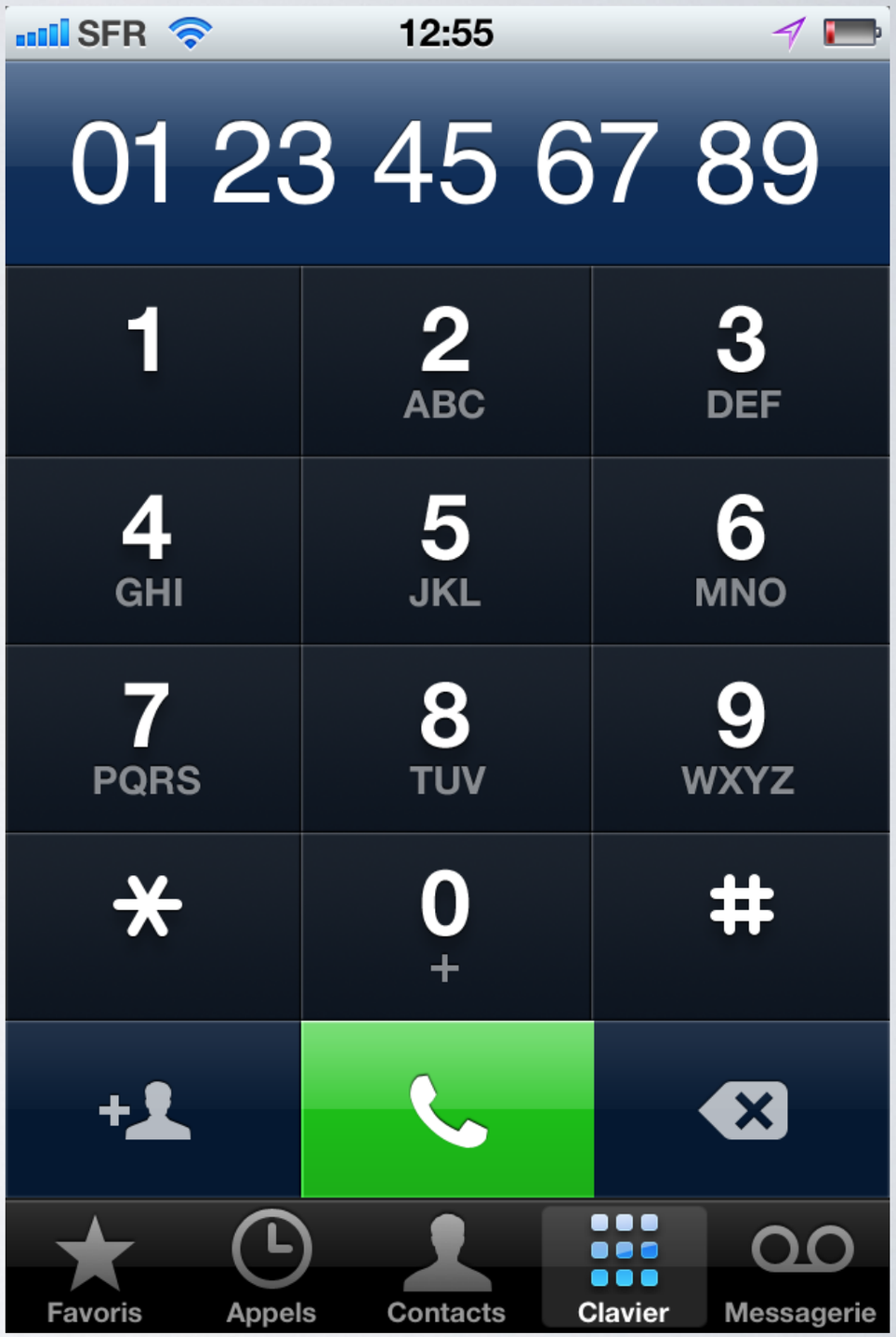
- Learnability
  - Support for learning for users of all levels
- Flexibility
  - Multiple ways for performing tasks
- Robustness
  - Support recovery

Learnability

- Ease with which new users can begin effective interaction
- Performance improvement from session to session
- Principles
  - Predictability, Synthesizability, Familiarity, Generalizability, and Consistency

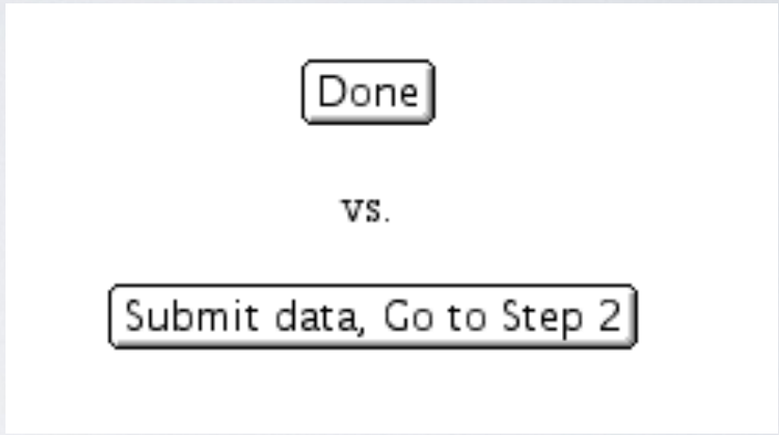
Chunking


SFR
12:55
+1 (415) 123-4567
1
2 ABC
3 DEF
4 GHI
5 JKL
6 MNO
7 PQRS
8 TUV
9 WXYZ
*
0 +
#
Favoris
Appels
Contacts
Clavier
Messagerie

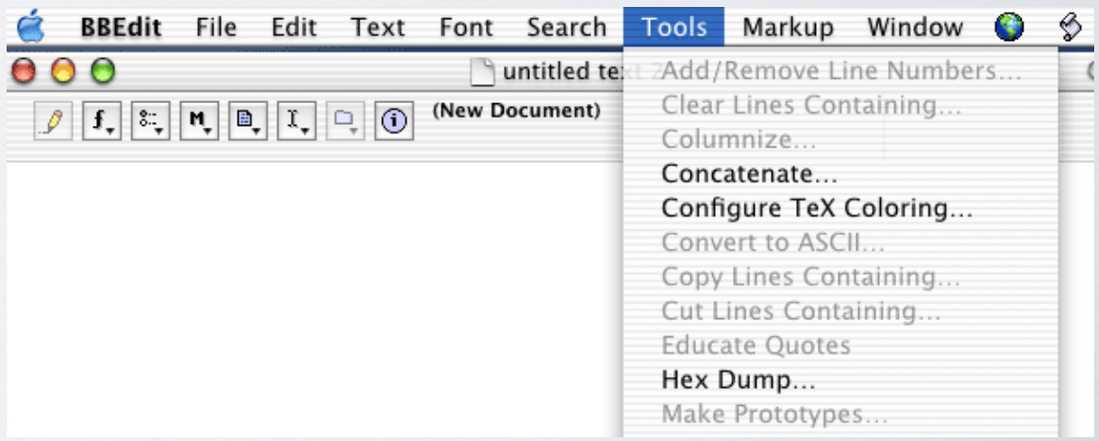

SFR
12:55
01 23 45 67 89
1
2 ABC
3 DEF
4 GHI
5 JKL
6 MNO
7 PQRS
8 TUV
9 WXYZ
*
0 +
#
Favoris
Appels
Contacts
Clavier
Messagerie

PREDICTABILITY

- I think that this action will do…



- Operation visibility – can see all available actions
  - e.g. menus versus command-line
  - Grayed menu items



PREDICTABILITY

VS.

Flexibility

- Minimize modality, Multithreading, Task Migratability, Substitutivity, Customizability

Robustness

- Observability
- Recoverability
- Responsiveness
- Task Conformance

OBSERVABILITY

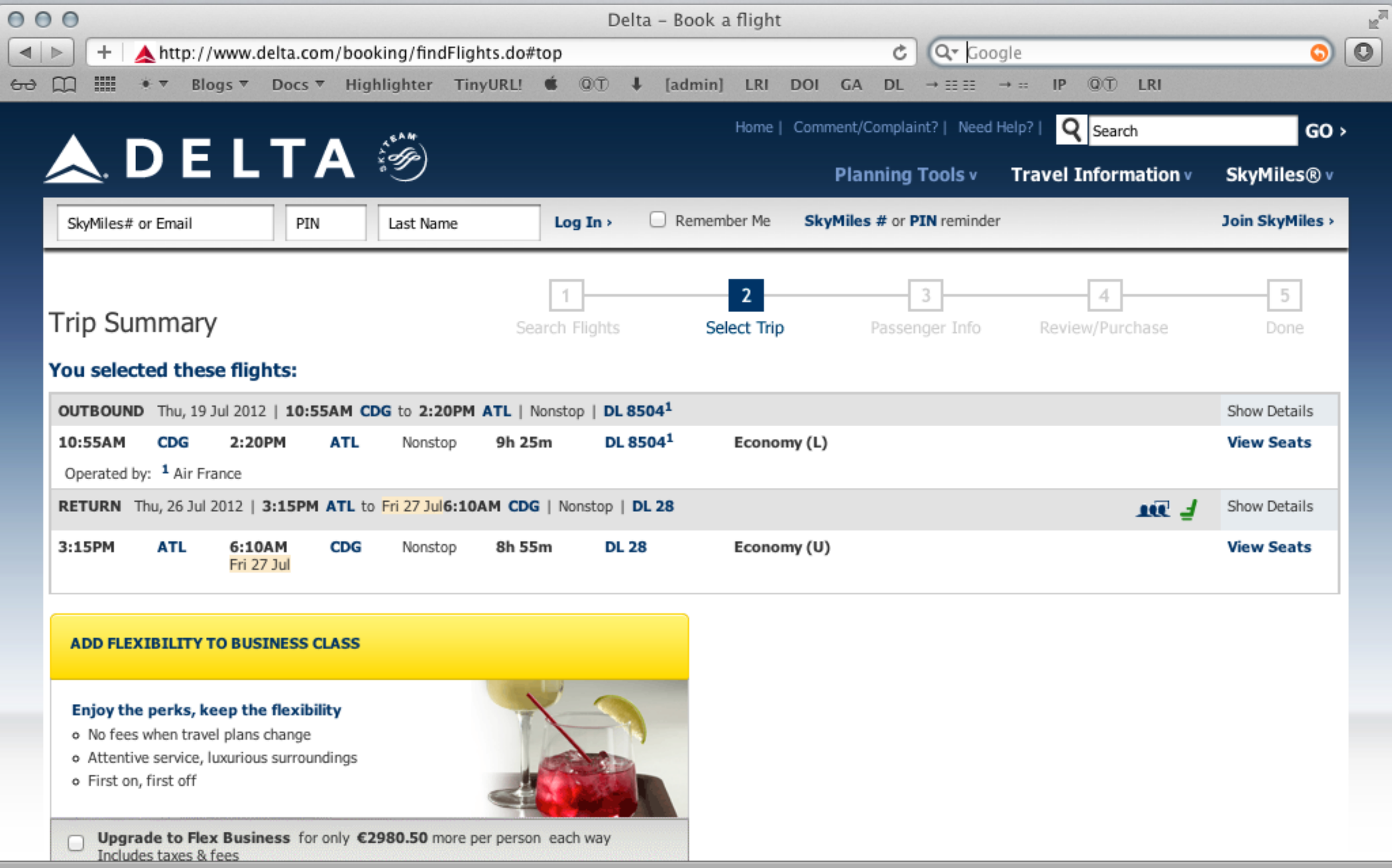
translator.py — UNREGISTERED

translator.py

```
1  # -*- coding: utf-8 -*-
2  #
3  # Python State Machines
4  #
5  # Copyright 2007-2011, Université Paris-Sud
6  # by Michel Beaudouin-Lafon (mbl at lri . fr)
7  # and James R. Eagan (code at my last name dot me)
8  #
9  # This program is free software: you can redistribute it and/or modify
10 # it under the terms of the GNU Lesser General Public License as published by
11 # the Free Software Foundation, either version 3 of the License, or
12 # (at your option) any later version.
13 #
14 # This program is distributed in the hope that it will be useful,
15 # but WITHOUT ANY WARRANTY; without even the implied warranty of
16 # MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
17 # GNU General Public License for more details.
18 #
19 # You should have received a copy of the GNU General Public License
20 # and GNU Lesser General Public License along with this program.
21 # If not, see <http://www.gnu.org/licenses/>.
22
23 from __future__ import with_statement
24
25 import os
26 from os import stat
27 import py_compile
28 import re
29 import sys
30
31 _indent_exp_str = ur'^(\s*)'
32 _indent_exp = re.compile(_indent_exp_str)
33 _state_exp_str = ur'^\s*State\s+(?P<name>[-A-Za-z0-9_]+)\s*(?:\(\s*(?P<parent>[-A-Za-z0-9_
34 _state_exp = re.compile(_state_exp_str)
35 _transition_exp_str = ur'^\s*Transition\s+(?P<name>[-A-Za-z0-9_]+)\s*' \
36                       ur'\(\s*self\s*,\s*(?P<args>.*)\)\s*(?:>>\s*(?P<target>.*?)\s*)?:'
37 _transition_exp = re.compile(_transition_exp_str)
```

Line 1, Column 1 — Spaces: 4 — Python

OBSERVABILITY



ENTONNOIR DE PROCESSUS

- Version simplifiée de l’interface
  - Adaptée pour focaliser sur le processus impliqué
  - Évite de distractions, confusion

Découvrez nos offres Éclair
Des promotions exceptionnelles, quelques heures pour en profiter !

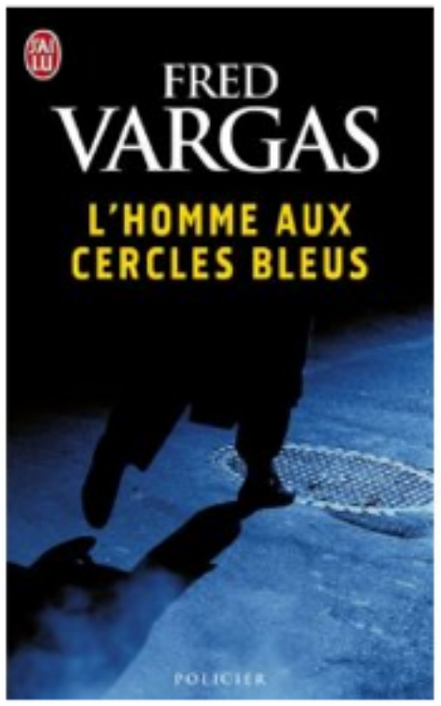
amazon.fr

Bonjour James Eagan. Découvrez nos conseils personnalisés. (Vous n'êtes pas James ?)

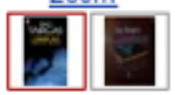
Chez James | Nos bonnes affaires | Chèques-cadeaux | Listes et idées cadeaux | Votre compte | Aide

Toutes nos boutiques | Rechercher | Livres en français | GO | Panier | Liste d'envies

Livres | Recherche détaillée | Nos rubriques | Actu du livre | Meilleures ventes | Livres anglais et étrangers | Bonnes affaires | Livres d'occasion | Cliquez pour feuilleter



ZOOMER
Zoom



Voir 1 image client

Partagez vos propres images client

Éditeur : découvrez comment les clients peuvent feuilleter et chercher au cœur de ce livre.

L'homme aux cercles bleus [Broché]

Fred Vargas (Auteur)

★★★½☆ (39 commentaires client) J'aime (5)

Prix conseillé : ~~EUR 5,60~~

Prix : EUR 5,32 LIVRAISON GRATUITE En savoir plus.

Économisez : EUR 0,28 (5%)

En stock.

Expédié et vendu par **Amazon.fr**. Emballage cadeau disponible.

22 neufs à partir de EUR 4,50 **40 d'occasion** à partir de EUR 1,61

Formats	Prix Amazon	Neuf à partir de	Occasion à partir de
⊞ Poche	EUR 4,75	EUR 3,00	EUR 2,00
Broché, 16 juin 2005	EUR 5,32	EUR 4,50	EUR 1,61
⊞ Poche	--	--	EUR 0,89

Quantité : 1

Ajouter au panier

ou

Identifiez-vous pour activer la commande 1-Click.

Ajoutez à votre liste d'envies

Plus de choix

62 neufs & d'occasion à partir de EUR 1,61

Vous l'avez déjà ? Vendez le vôtre

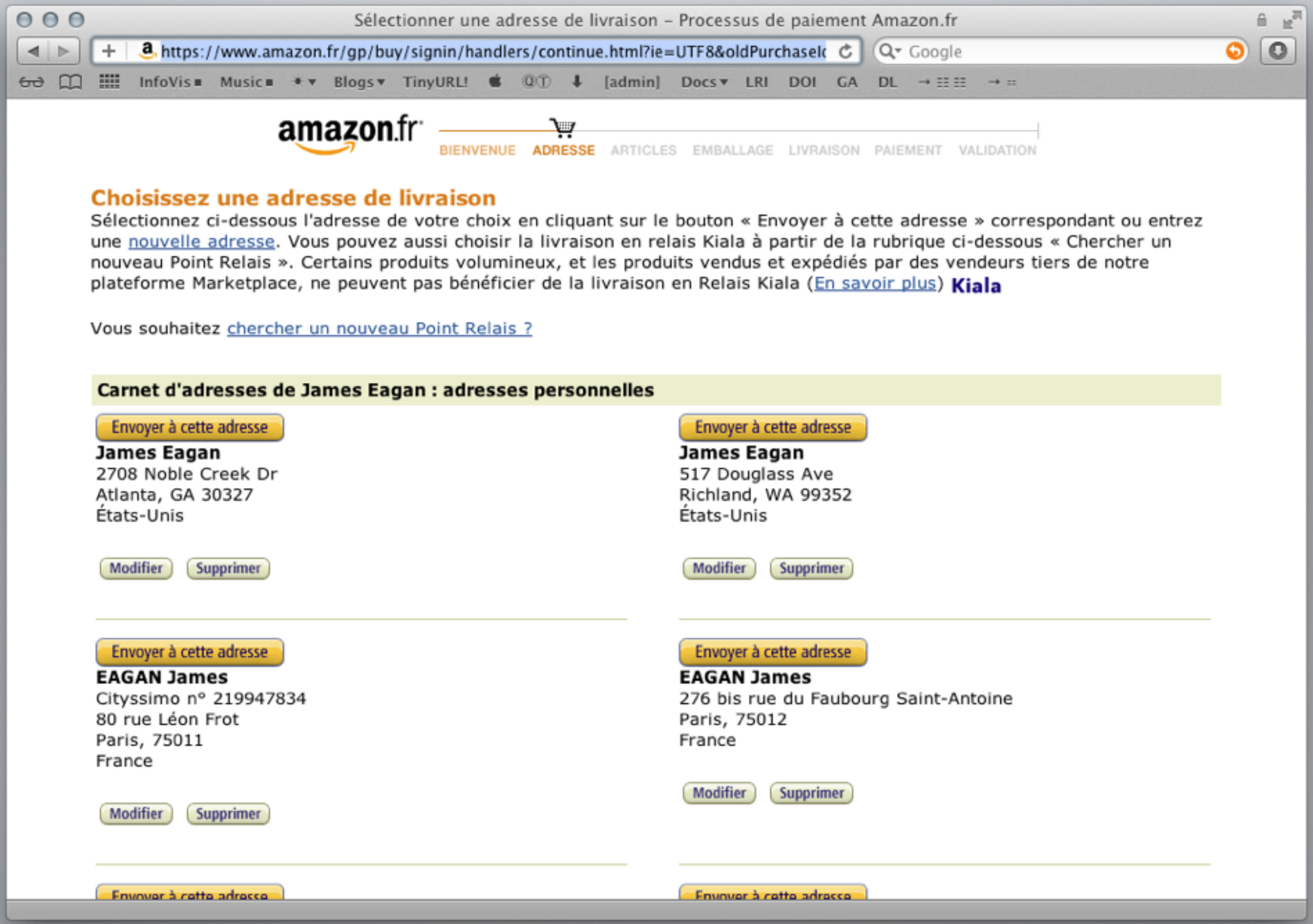
Partager

Produits fréquemment achetés ensemble

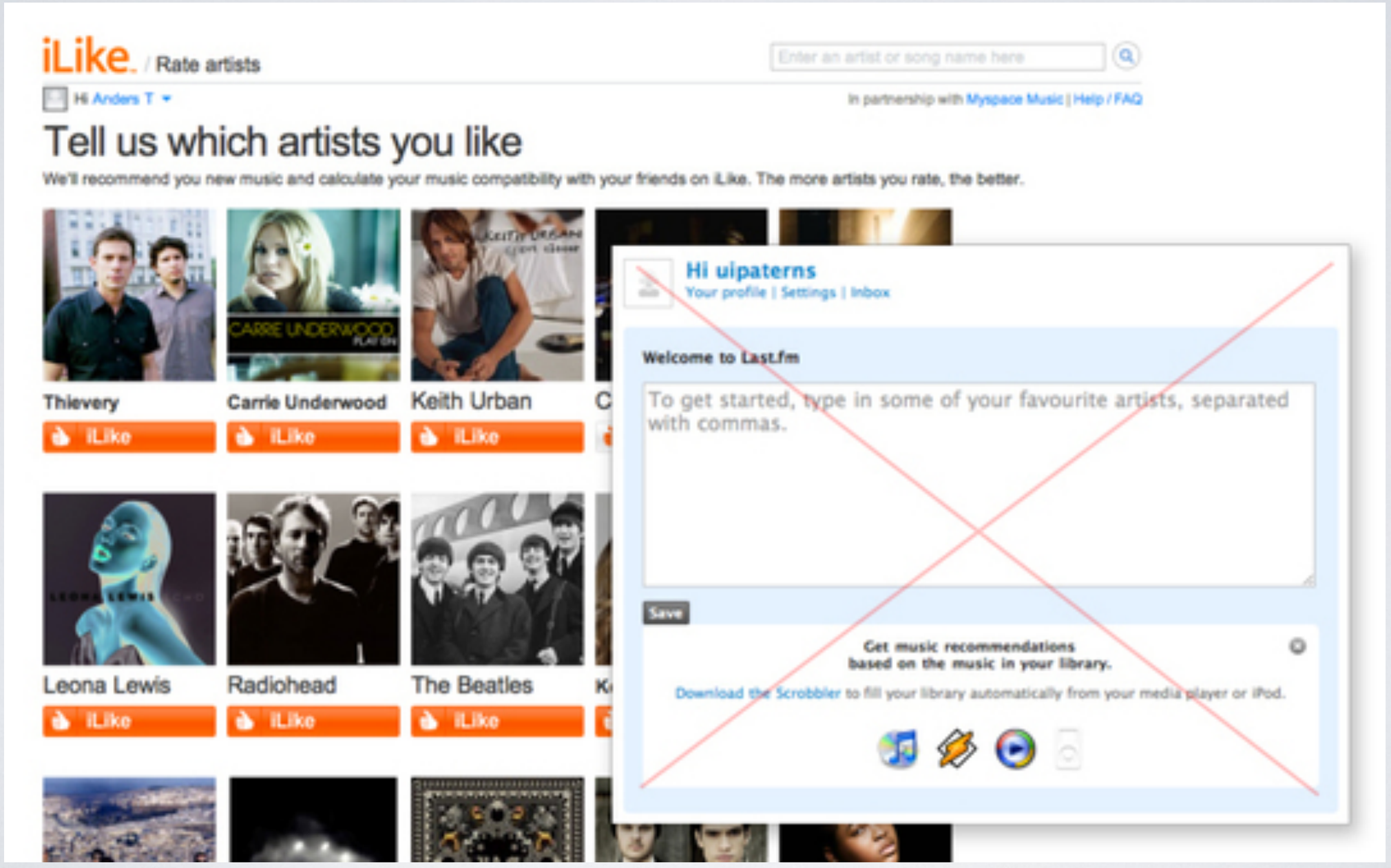
Prix pour les trois: EUR 14,06

Ajouter ces trois articles au panier

Afficher la disponibilité du produit et le mode de livraison


Sélectionner une adresse de livraison – Processus de paiement Amazon.fr
https://www.amazon.fr/gp/buy/signin/handlers/continue.html?ie=UTF8&oldPurchaseId
Google
InfoVis
Music
Blogs
TinyURL!
[admin]
Docs
LRI
DOI
GA
DL
amazon.fr
BIENVENUE ADRESSE ARTICLES EMBALLAGE LIVRAISON PAIEMENT VALIDATION
Choisissez une adresse de livraison
Sélectionnez ci-dessous l'adresse de votre choix en cliquant sur le bouton « Envoyer à cette adresse » correspondant ou entrez une nouvelle adresse. Vous pouvez aussi choisir la livraison en relais Kiala à partir de la rubrique ci-dessous « Chercher un nouveau Point Relais ». Certains produits volumineux, et les produits vendus et expédiés par des vendeurs tiers de notre plateforme Marketplace, ne peuvent pas bénéficier de la livraison en Relais Kiala (En savoir plus) Kiala
Vous souhaitez chercher un nouveau Point Relais ?
Carnet d'adresses de James Eagan : adresses personnelles
Envoyer à cette adresse
James Eagan
2708 Noble Creek Dr
Atlanta, GA 30327
États-Unis
Modifier
Supprimer
Envoyer à cette adresse
James Eagan
517 Douglass Ave
Richland, WA 99352
États-Unis
Modifier
Supprimer
Envoyer à cette adresse
EAGAN James
Cityssimo n° 219947834
80 rue Léon Frot
Paris, 75011
France
Modifier
Supprimer
Envoyer à cette adresse
EAGAN James
276 bis rue du Faubourg Saint-Antoine
Paris, 75012
France
Modifier
Supprimer

Recognition over Recall



Modèles Mentaux

- La représentation mentale de l'utilisateur du système
- Sa perception de comment marche le système

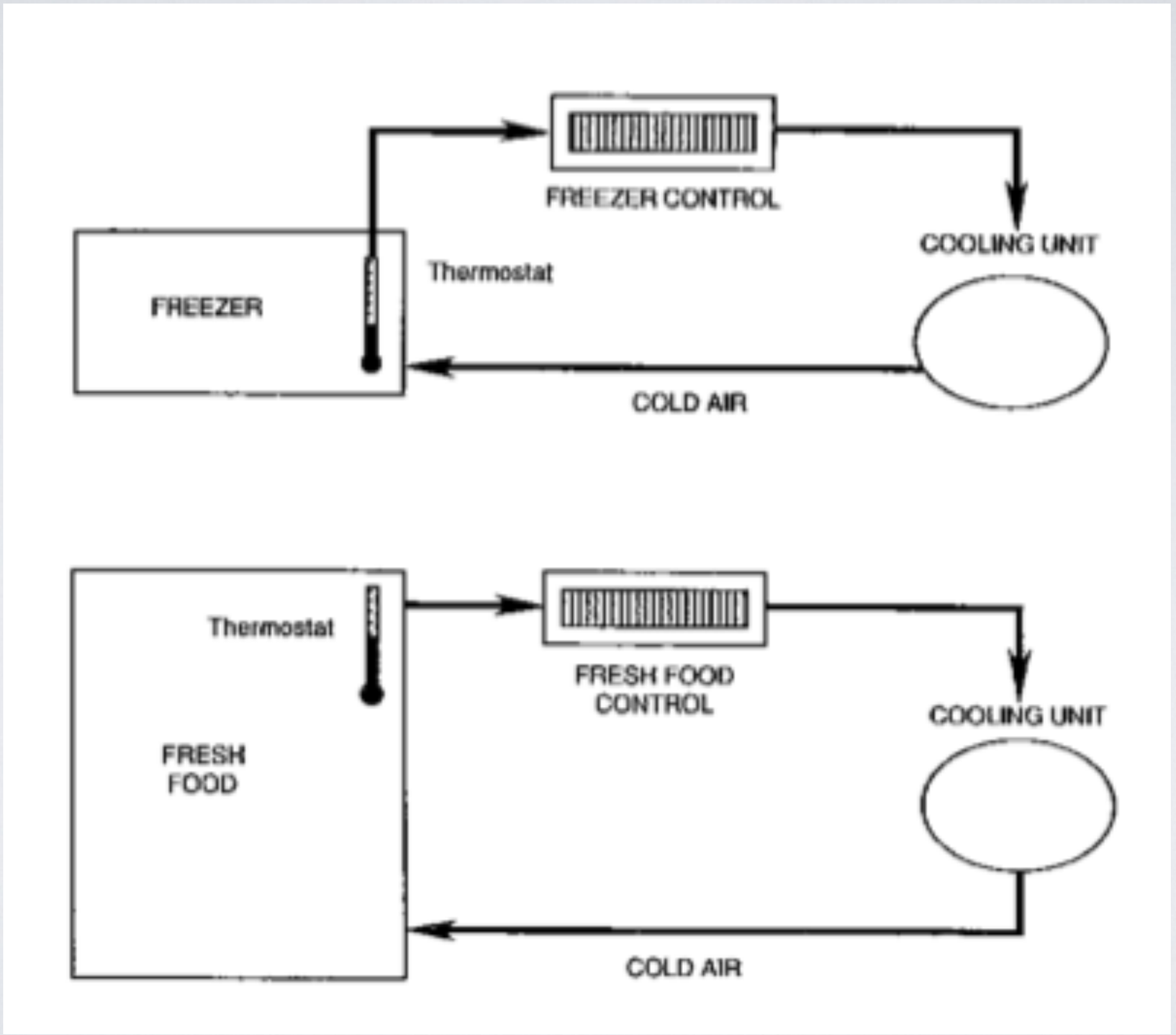
Don Norman

- Design of Everyday Things

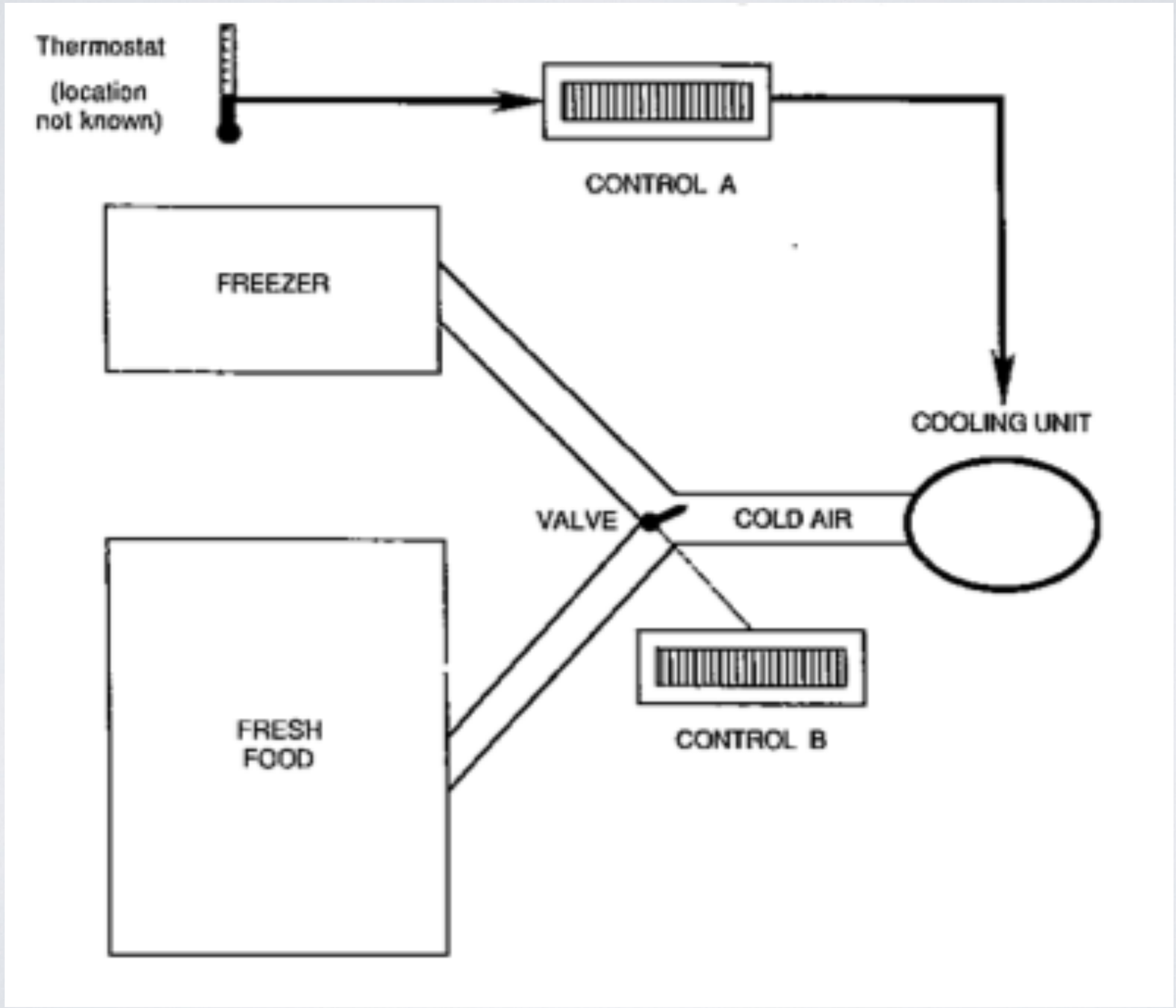
Interface d'un Frigo

NORMAL SETTINGS	C	AND	5	
COLDER FRESH FOOD	C	AND	6-7	1 SET BOTH CONTROLS
COLDEST FRESH FOOD	B	AND	8-9	2 ALLOW 24 HOURS
COLDER FREEZER	D	AND	7-8	TO STABILIZE
WARMER FRESH FOOD	C	AND	4-1	
OFF (FRESH FD & FRZ)			0	

Modèle d'un Frigo



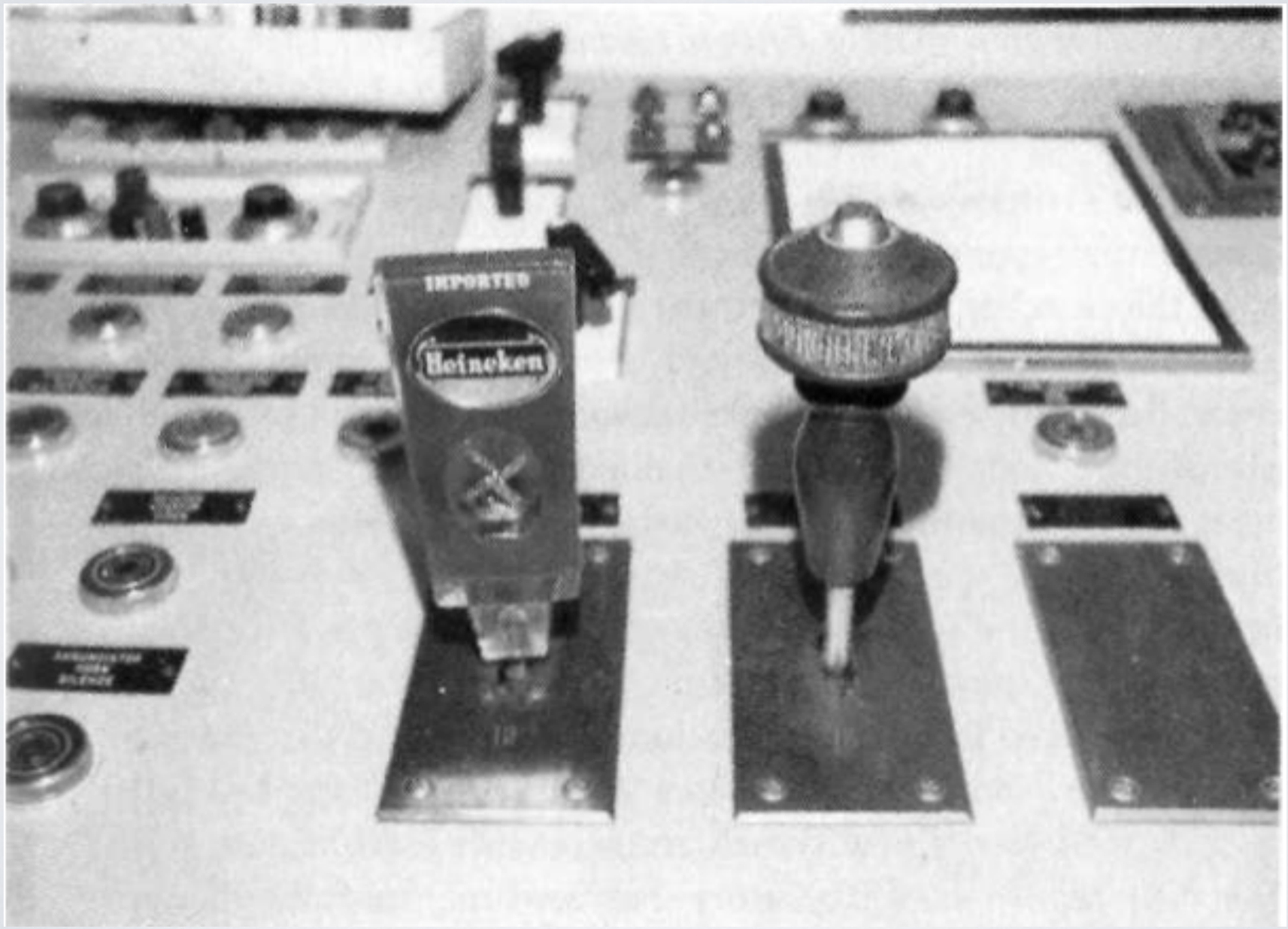
Modèle d'un Frigo



Interface d'un Frigo

NORMAL SETTINGS	C	AND	5	
COLDER FRESH FOOD	C	AND	6-7	1 SET BOTH CONTROLS
COLDEST FRESH FOOD	B	AND	8-9	2 ALLOW 24 HOURS
COLDER FREEZER	D	AND	7-8	TO STABILIZE
WARMER FRESH FOOD	C	AND	4-1	
OFF (FRESH FD & FRZ)			0	

Make Controls Look & Feel Different



Paradox of Choice

Mac – Shop Apple Notebook Computers & Desktop Computers – Apple Store (U.S.)

http://store.apple.com/us/browse/home/shop_mac

Google

Saved Tabs | Blogs | Docs | Highlighter | TinyURL! | [admin] | LRI | DOI | GA | DL | IP | Add to Amazon

http://intra.iam.hva.nl/content/1... | The Design of Everyday Things D... | Positive Psychology News Daily »... | Mac – Shop Apple Notebook Com...

Apple Store

Questions? Call 1-800-MY-APPLE

Departments

Shop Mac
Shop iPod
Shop iPhone
Shop iPad

Mac Accessories
Mac Software
iPod Accessories
iPhone Accessories
iPad Accessories

Mac Family

MacBook Air
MacBook Pro
Mac mini
iMac
Mac Pro

Mac Accessories

MacBook Air From $999 | MacBook Pro From $1199 | Mac mini From $599 | iMac From $1199 | Mac Pro From $2499

MacBook Air | Wireless Printing | New from Adobe | Office for Mac 2011

The new, faster MacBook Air.

Everyone should have a notebook this advanced. And now everyone can

New for Mac

OS X Lion USB Thumb Drive
Apple Thunderbolt Display (27-inch)
Apple Thunderbolt cable (2.0 m)
Microsoft Office for Mac Home and Student...
Apple HDMI to HDMI Cable (1.8 m)
Magic Trackpad
Apple Battery Charger
Apple 85W MagSafe Power Adapter (for 15- and...
Apple Magic Mouse
Apple Remote

Top Sellers

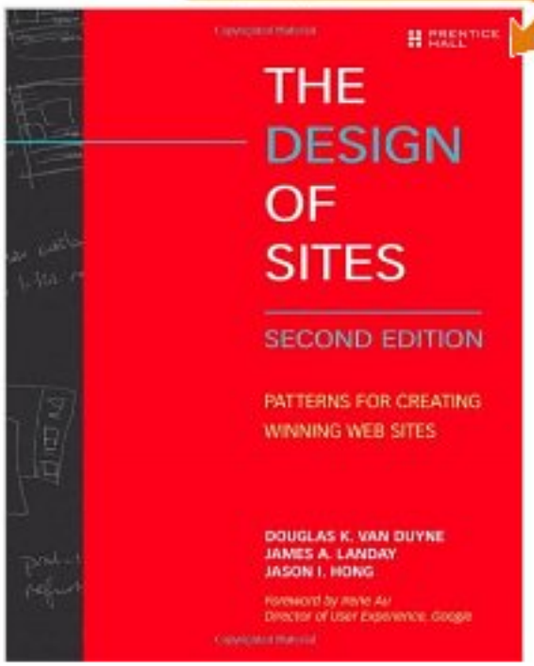
1. Apple Magic Mouse
2. Apple Remote

Invoke Scarcity

- If it costs a lot, it must be good!
- Only two left in this size!

Corona
Extra
LA
CERVEZA
MAS
FINA

Cliquez pour Feuilleter!



Partagez vos propres images client

Rechercher dans ce livre

The Design of Sites: Patterns for Creating Winning Web Sites [Anglais] [Broché]

Douglas K. van Duyne (Auteur), James A. Landay (Auteur), Jason I. Hong (Auteur)

★★★★★ (1 commentaire client) J'aime (0)

Prix : EUR 55,83 LIVRAISON GRATUITE En savoir plus.

En stock.

Expédié et vendu par Amazon.fr. Emballage cadeau disponible.

Plus que 1 ex (réapprovisionnement en cours). Commandez vite !

22 neufs à partir de EUR 55,39 6 d'occasion à partir de EUR 32,74

Quantité : 1

Ajouter au panier

ou

Identifiez-vous pour activer la commande 1-Click.

Ajoutez à votre liste d'envies

Plus de choix

28 neufs & d'occasion à partir de EUR 32,74

Vous l'avez déjà ? Vendez le vôtre

Partager

Descriptions du produit

Matrix – Flights

http://matrix.itasoftware.com/view/flights?session=d6bae5ea-16ef-4e2a-861d-7c892a9a4

Google

Round trip: Paris to San Francisco, juin 13-20

Complete trips | Individual flights | Time bars

PRICE	AIRLINE	DEPART	ARRIVE	DURATION	FROM/TO	STOPS	ADVISORY
737 €	US Airways	11:10am	7:10pm	17h 0m	CDG to SFO	CLT	
		7:25am	6:55am juin 21	14h 30m	SFO to CDG	CLT	

Matrix – Flights

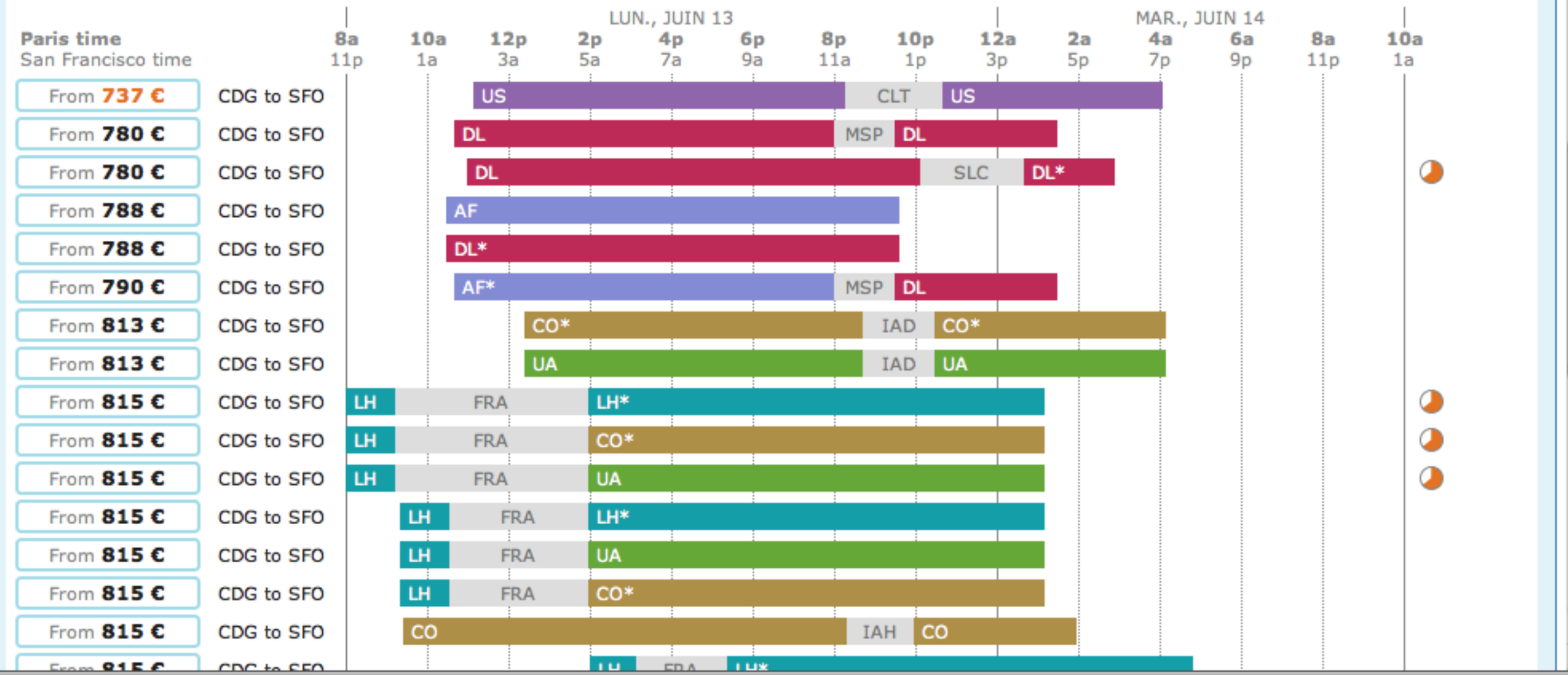
http://matrix.itasoftware.com/view/flights?session=d6bae5ea-16ef-4e2a-861d-7c892a9a4

Google

Flight 1: Paris to San Francisco - lun., juin 13

Complete trips | Individual flights | Time bars

PRICE | FROM/TO | AIRLINE | DEPART | ARRIVE | DURATION | STOPS | ADVISORY



[Source : James Hudson, PayPal]

[Source : James Hudson, PayPal]

[Source : James Hudson, PayPal]

33 % conversion

66 % conversion

[Source : James Hudson, PayPal]

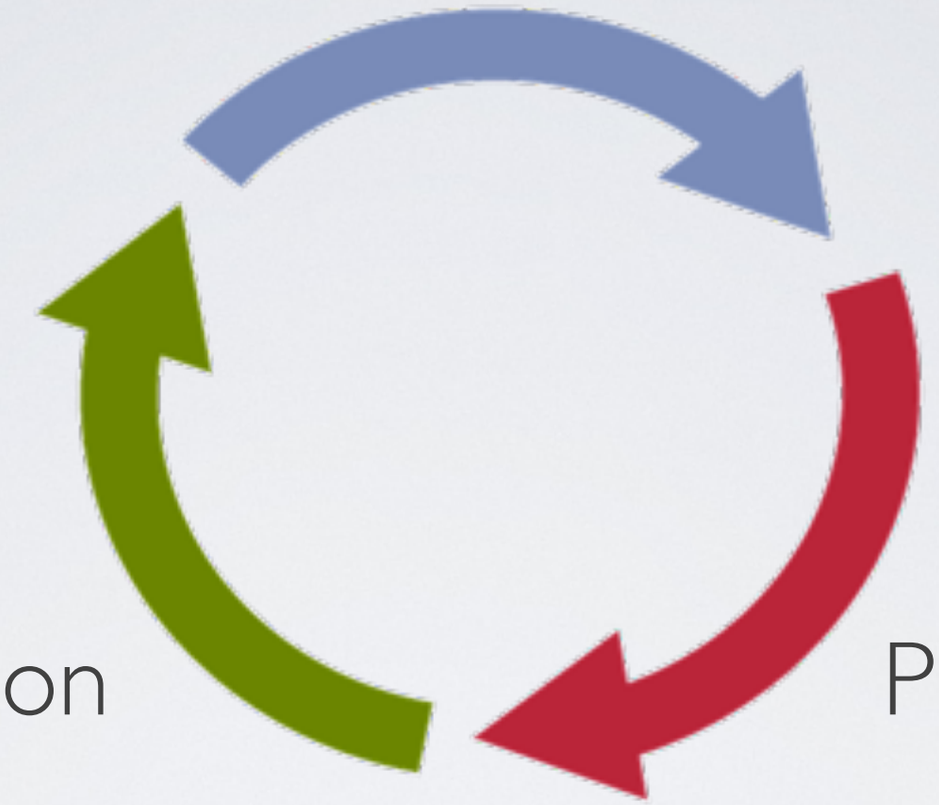
[Source : James Hudson, PayPal]

Conception Centrée Utilisateur

Why Do **We** Care ?

- Même si ce ne serait pas nous qui font tout ça, il faut pouvoir le comprendre, qu'est-ce qui est important, et comment le communiquer avec les experts
  - Fondamentalement une question de relations
- Vous et vos
  - Designers, ingénieurs, experts d'XU, chercheurs, marketing, …

Conception



Evaluation

Prototypage

- Qui est l'utilisateur ?
- Quels sont ses besoins ?
- Quel est le contexte d'utilisation ?
  - Sociale, dans l'organisme, environnement
- Pourquoi veut-il faire ces tâches ?

MYTHES DE LA CONCEPTION CENTRÉE UTILISATEUR

- Mythe 1 : Un bon design est juste du bon sens
  - Pourquoi y a-t-il autant de mauvais sites ?
- Mythe 2 : Seulement les experts peuvent créer des bons designs
  - Les experts sont plus rapides, mais tout le monde peut comprendre la CCU

- Mythe 3 : On peut toujours changer l'interface avant de déployer
  - Ça suppose que le site comporte déjà de la bonne fonctionnalité est des bonnes pratiques de développement
- Mythe 4 : Un bon design prend trop de temps/est trop cher
  - CCU aide à trouver des problèmes tôt dans le processus, réduisant le coût et le temps de développement

- Mythe 5 : Un bon design n'est que des jolies images
  - N'est qu'une part de l'identité de l'organisme
- Mythe 6 : Suivre des guidelines suffit pour créer un bon design
  - Guidelines s'occupe seulement de l'implémentation, pas de la fonctionnalité et son organisation

- Mythe 7 : Le client peut toujours se servir de la doc/aide
  - Si le client regarde la doc, il est déjà énervé !
- Mythe 8 : Market Research suffit pour comprendre les besoins du client
  - Montre ce que le client **dit**, pas ce qu'il **fait**.

- Mythe 9 : l'assurance de qualité/tests peuvent montrer si un site marche bien
- Le testing montre seulement si le site corresponde à la spécification, pas ce qui arrive avec des vrais clients

Processus de Développement

Clients, Produits, Entreprise, Marketing

Design Discovery

Clients :
- Rôles (Qui)
- Tâches (Quoi)
- Contexte

Marketing :
- Priorités
- Messages

Technologie :
- Produits
- Architecture

Design :
- L'état de l'art

Design Exploration

Définition du design
- Description de problèmes
- Utilisateurs ciblés
- Tâches utilisateurs

Storyboards

Proposal
- Démos
- Prototypes légers

Clients, Produits, Entreprise, Marketing

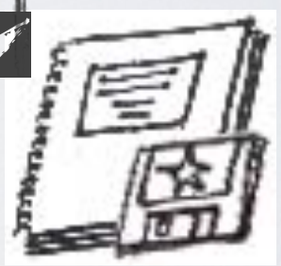
Evaluation

Itération

Clients, Produits, Entreprise, Marketing

Exécution

- Réaliser le design
- Évaluation avec utilisateurs

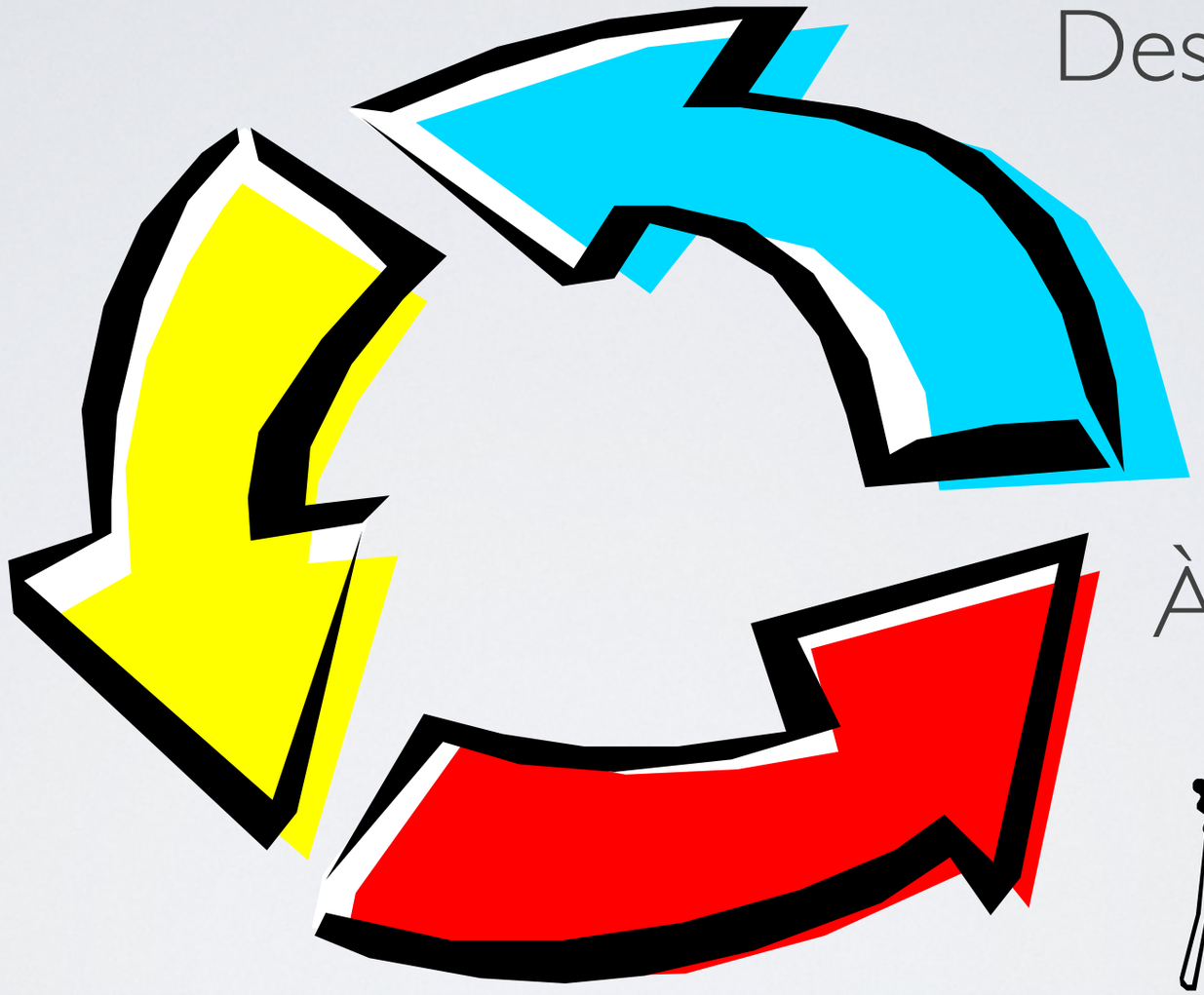


Spécification
- Design raffiné
- Description du design

[Source : Sara Redpath, IBM ; Thyra Trauch, Tivoli]

ITÉRATION

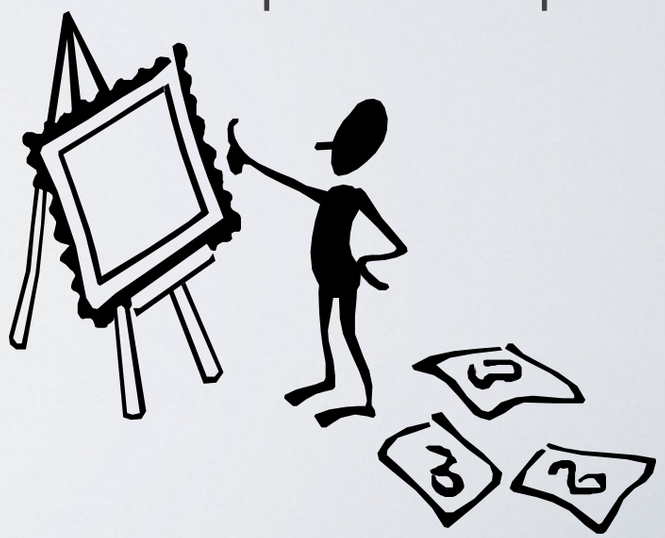
Design



Prototype

Évaluation

À chaque étape !

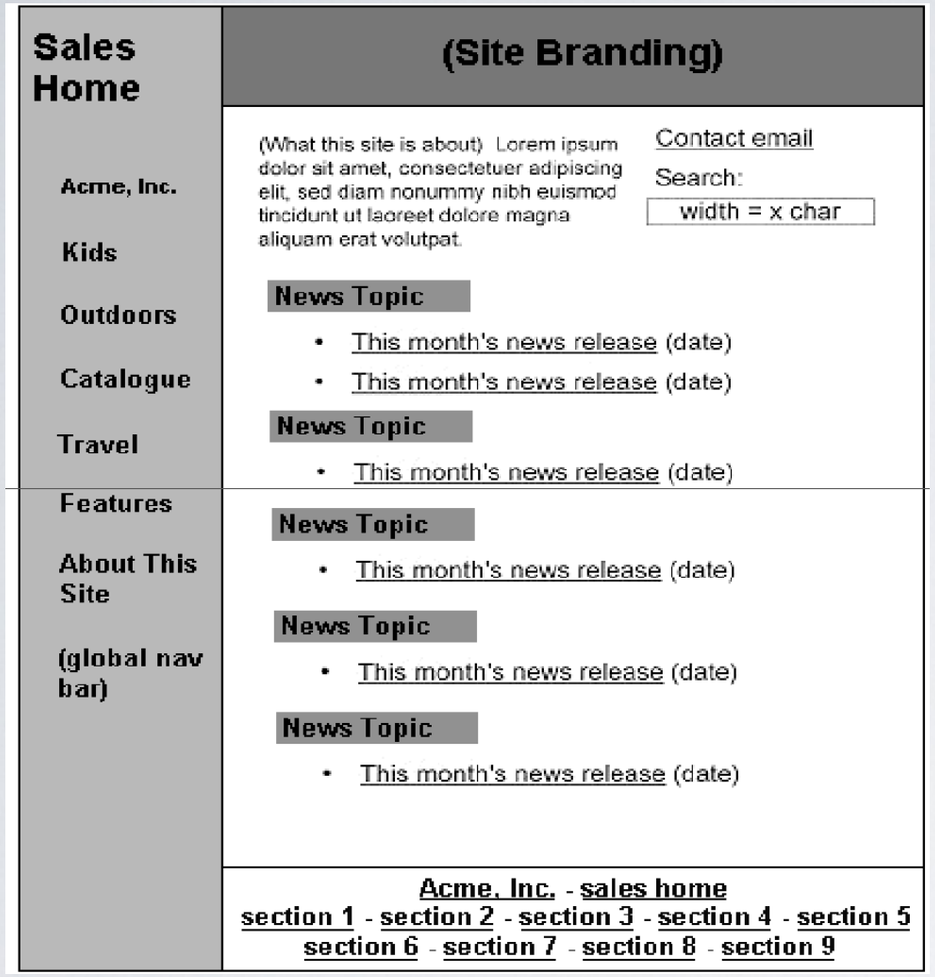


DESIGN

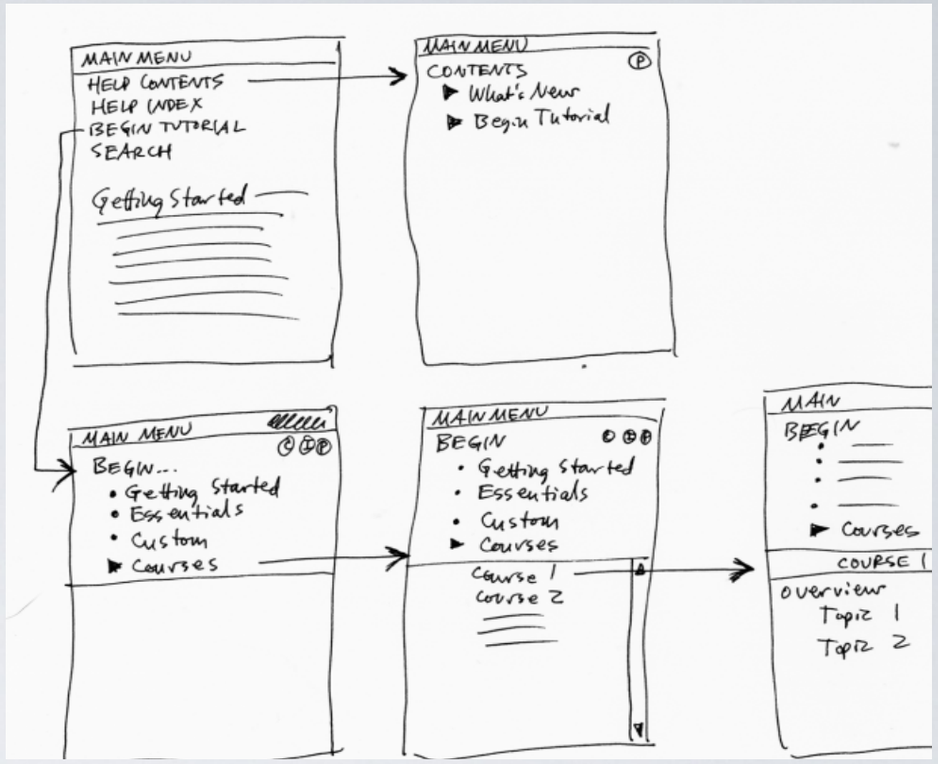
- Un bon design dépend des besoins
- Le but de l'objet
- Pas comment c'est implémenté
- e.g., téléphone mobile moins important que « app mobile »

DESIGN = REPRÉSENTATION

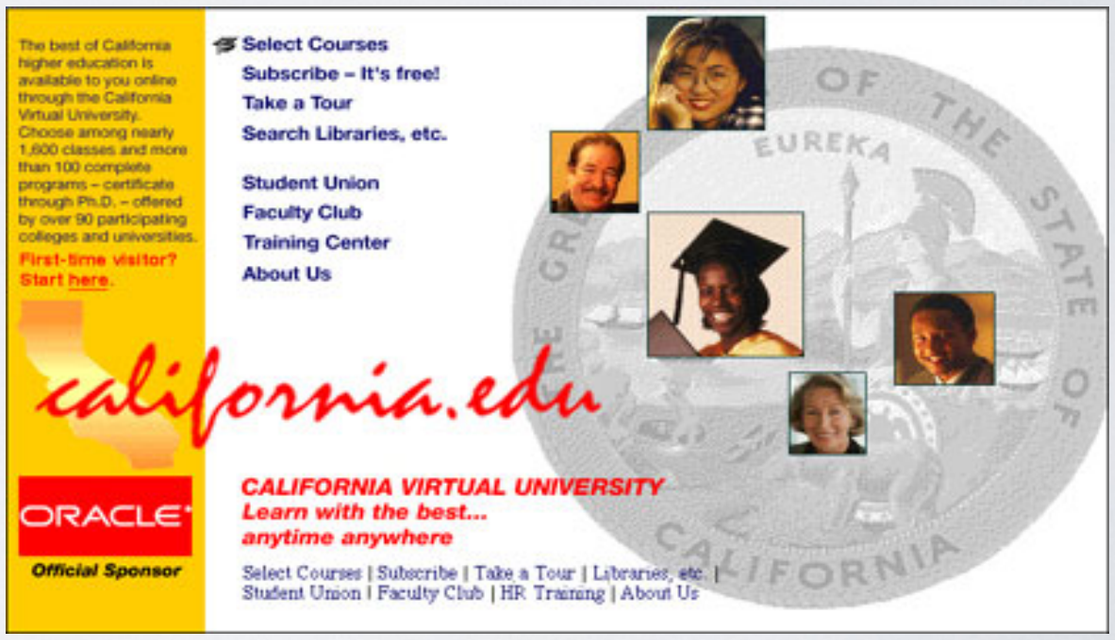
- Pour un interface, ça peut être :
  - sketches ou storyboards
  - outline / diagrammes de flux
  - prototypes exécutables



Schématiques



Storyboards



Mockups

Evaluation

Laboratoire d'Utilisabilité

Salle d'Observation

- Grand champ de vision, glace uni-directionnel, isolation de lumière et son

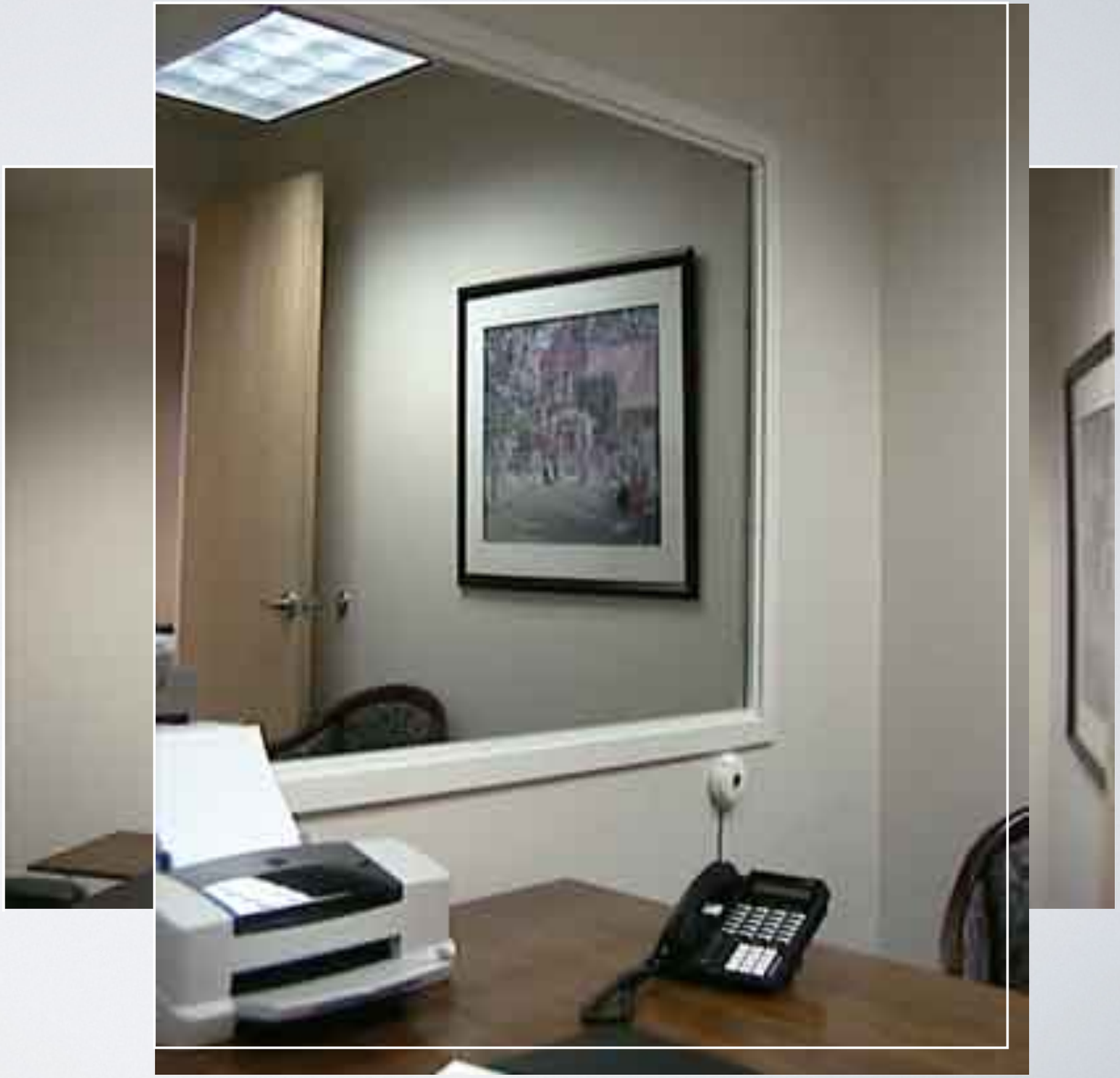
- Portes situées tel que le participant ne peut pas les voire en entrant dans la salle d'observation

Salle d'Observation

- Trois écrans pour voir le participant, l'écran du participant, et les deux à la fois
- Confortable pour plusieurs observateurs
- DVD-R pour enregistrer la séance

Salle du Participant

- Se ressemble à un bureau normale
- Caméra haute-résolution, contrôlable à distance, placée discrètement dans le coin
- Micro



La Théorie de Grande Unification

- Qui est {l'utilisateur, le client, le sujet, …} ?
  - Astuce : Il y en a probablement plusieurs
- Qu'est-ce qu'il ou elle essaye de faire ?
- Comment peut-on l'aider à le faire ? (Et gagner quelques €/$/¥ en le faisant.)
- L'interface, réussit-elle ces buts ?

Know Thy User

- You are not your user
- Who are your stakeholders?
  - Travel system: employee, manager, auditor
- What is the user's goal?
  - How is success defined?
  - What are the constraints? Real-world, technical, political?
- User characteristics

Real-World Constraints

- Time to market
- Cost/effort to design & implement
- Size/footprint/weight/price/power
- Computer power/memory
- Consistency with product line/brand image
- Backward compatibility
- Differentiation from competitive products

How to Understand the User

- Gather data
  - Interviews, observation, surveys & questionnaires, documentation, immersion
- Organize data
  - Notes, cards, brainstorming, computer tools
- Represent data
  - Lists, outlines, matrices
  - Narratives, Scenarios
  - Hierarchies, Networks, Flow Charts

What to Gather

- Three key components in how people work
  - Activities
  - Artifacts
  - Relations
- Not just computer system oriented!
- The context matters!
  - Office: papers, whiteboards, …
  - Phone calls: address book, note pad, dialer, …

Focus on *Observable Behaviors*

- What are the practices, methods, steps, objects, …, used?
- Learn *what* users do, *why* they do it, *how*, they do it, *when* they do it, with what *tools* or *people* they do it
  - Your new system may change some of this, especially *how*
  - Understanding the *how* and the *why* is what leads to deeper knowledge and insights

Data Gathering

- Tasks & Substasks
  - Physical
  - Cognitive
  - Communication
- Conditions under which these are done
- Results/outcomes of tasks

Task Requirements

- Requirements to perform task
- Information
- Communication with others
- Equipment

Must include
Should include
Could include
Exclude

Some Data Gathering Methods

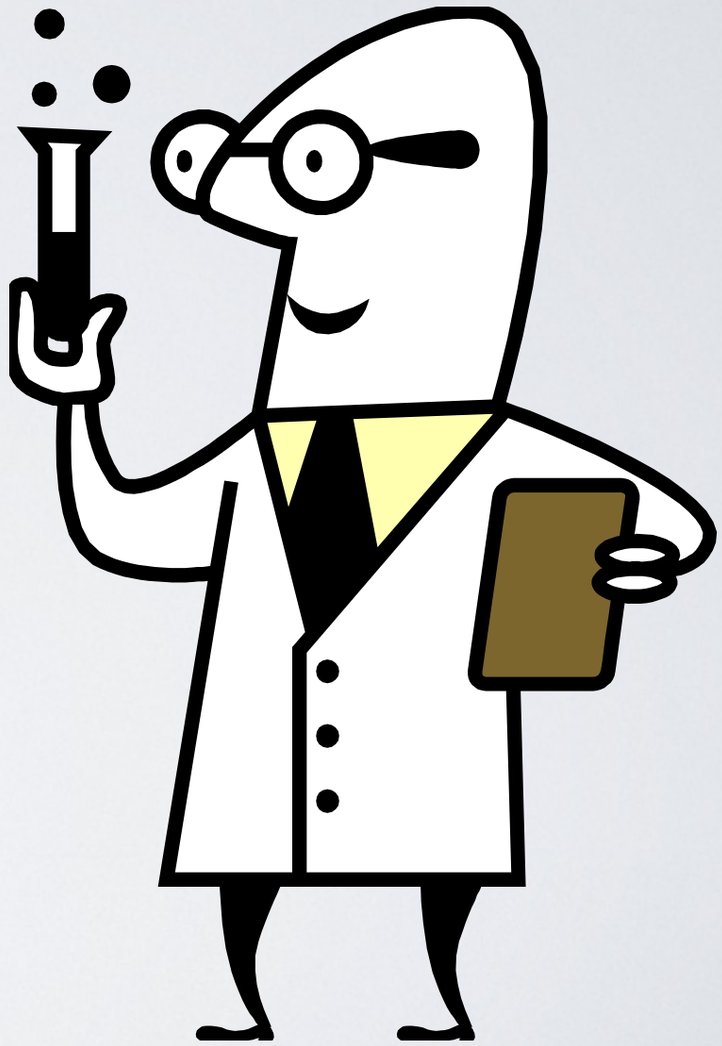
- Observation & Think-aloud
- Cooperative Evaluation
- Interviews
- Questionnaires & Surveys
- Focus Groups
- Study Documentation
- Competitive Product Analysis
- Ethnography

Interpretive Analysis

- Controlled Experiments: formal & objective
- Interpretive Analysis: more subjective
  - Concerned with humans, so no objective reality
  - Sociological approach

Controlled Experiments

- Great for objective performance
- But:
  - Lab is not the real world
  - Can't control all the variables
  - Context matters
  - Tasks are short, artificial



Interpretive Analysis Methods

- Field studies, contextual inquiry, ethnography
  - Inspired by anthropology (€¥$)
- Interviews
- Philosophy:
  - Formal environment of controlled study is artificial, so
  - Get into user's environment
  - Interpretation is primary over data

Objectives

- Understand the user
  - What are his or her goals & values?
  - Individual's or group's interactions within a culture
  - Make *tacit* domain knowledge explicit
  - Be *unbiased*
  - For UI designers: improve system by finding existing problems

Techniques

- In-person observation
- Audio/video recording
- Interviews
- "Wallow in the data"

Observation is Key

- Carefully observe everything about the users and their environment
- Think of describing it to someone who has never seen this activity before
- What users say is important, but also non-verbal details

OBSERVATIONS

- Things of interest to the evaluator
  - Structure & language used in work (domain vocabulary)
  - Individual & group actions
  - Work culture
  - Explicit & implicit aspects of work
- Example: Office environment
  - Business practices, rooms, artifacts, work standards, relationships between workers, managers, …

Interviews

- Have a question plan, but keep interview open
- Be specific
- Create interpretations together with users
  - Be sure to use *their terminology*
- At the end, ask if there's anything else you should have asked
- Record interviews

Steps

- 1. Preparation
  - Understand the organizational context
  - Familiarize yourself with system and its history
  - Set initial goals and prepare questions
  - Gain access and permission to observe & interview

During Interviews

- Establish rapport with users
- Observe/interview users in workplace and collect all different forms of data
- Follow any leads that emerge from visits
- Record the visits

Analysis

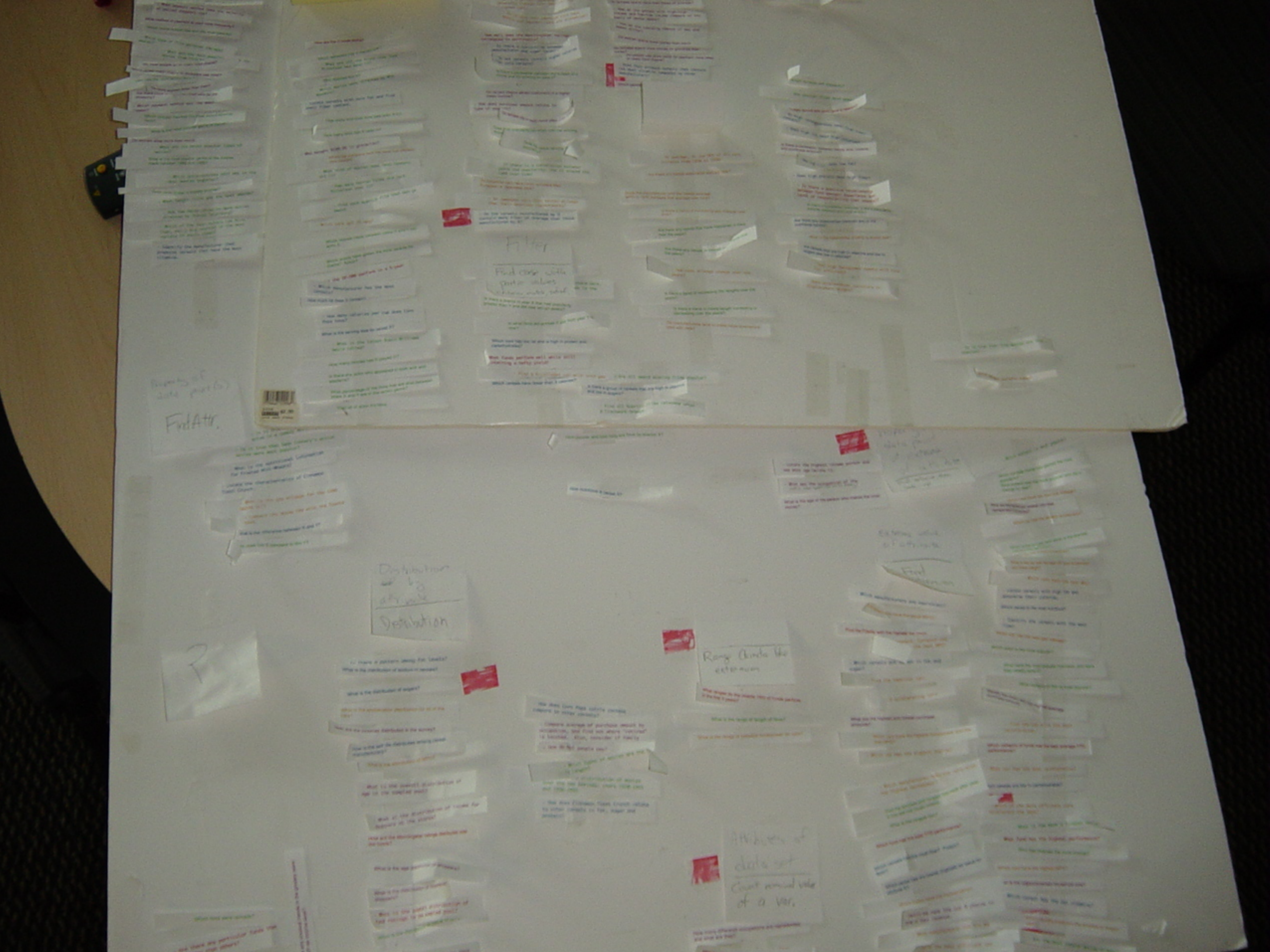
- Compile the data in numerical, textual, and multimedia databases
- Quantify data and compile statistics
- Reduce and interpret data
- Refine goals and process used

Reporting

- Consider different audiences and goals
- Prepare a report and present findings

Affinity Diagram

- Useful technique for qualitative data analysis
- Write each observation/quote on a slip of paper
- Put it on a board/wall
- Coalesce items that have affinity
- Give names/colors to groups
- Continue making subgroups
- May yield a hierarchy of groups


Filter
FindAttr.
Distribution

Range (kinda like extremum

What ranges do the middle 75% of funds perform in the first 3 years?

What is the range of length of films?

What is the range of possible horsepower for cars?

extreme value of attribute

Find extremum

- Which manufacturers are healthiest?

Do the heaviest cars have the worst MPG?

Find the Fidelity with the highest net asset

Japanese, European and have the best MPG?

- Which cereals a west in fat and sugar?

- Find the heaviest car.

5 accelerating cars.

What are the highest and lowest purchase amounts?

Which cars have the highest horsepower and the best MPG?

- Which car has the biggest engine?

- Which manufacturer has the cars with the highest horsepower?

Find the shortest and longest films made after year X that are not music videos.

What is the longest film?

Which is the

What is the car and lower weig

- Whic

- Locate cereals determine their

Which cereal is the

- Identify the c fiber.

Which car has the best

Which actor is the most pop

What were the most p they mostly recent?

What category

Identify the chain with the highest a purchase amount.

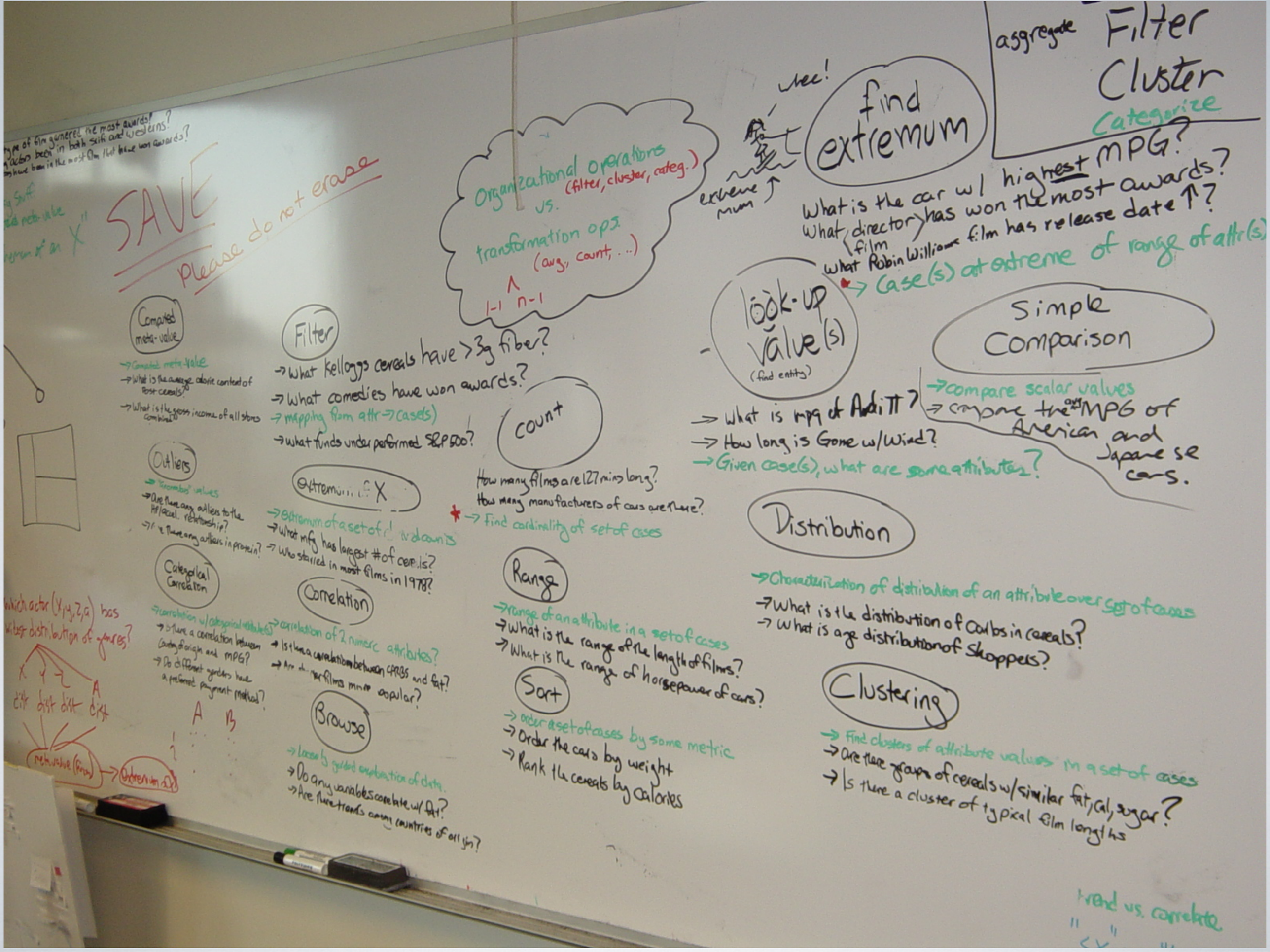
- Find the car with acceleration.

Which category of funds has the be performance?

- What car has the best accele

Which cereals are low in carbohydrates

Which of the more efficient accelerate the best?



aggregate
Filter
Cluster
Categorize
SAVE
Please do not erase
Organizational operations (filter, cluster, categ.)
vs.
transformation ops. (avg., count, ...)
1-1 n-1
find extremum
whee!
extreme mum
What is the car w/ highest MPG?
What director/film has won the most awards?
What Robin Williams film has release date ↑?
→ Case(s) at extreme of range of attr(s)
look-up value(s)
(find entity)
→ What is mpg of Audi TT?
→ How long is Gone w/ Wind?
→ Given case(s), what are some attributes?
Simple Comparison
→ compare scalar values
→ compare the avg MPG of American and Japanese cars.
Computed meta-value
→ Computed meta-value
→ What is the average calorie content of Post cereals?
→ What is the gross income of all stores combined?
Filter
→ What Kelloggs cereals have > 3g fiber?
→ What comedies have won awards?
→ mapping from attr → case(s)
→ what funds underperformed S&P 500?
count
How many films are 127 mins long?
How many manufacturers of cars are there?
→ Find cardinality of set of cases
Outliers
→ "anomalous" values
→ Are there any outliers to the HP/accel. relationship?
→ Are there any outliers in protein?
Extremum of X
→ Extremum of a set of [illegible] counts
→ What mfg has largest # of cereals?
→ Who starred in most films in 1978?
Categorical Correlation
→ correlation w/ categorical attribute(s)
→ Is there a correlation between Country of origin and MPG?
→ Do different genders have a preferred payment method?
Correlation
→ correlation of 2 numeric attributes?
→ Is there a correlation between CARBS and fat?
→ Are [illegible] films more popular?
Range
→ range of an attribute in a set of cases
→ What is the range of the length of films?
→ What is the range of horsepower of cars?
Distribution
→ Characterization of distribution of an attribute over set of cases
→ What is the distribution of Carbs in cereals?
→ What is age distribution of shoppers?
Browse
→ Loosely guided exploration of data.
→ Do any variables correlate w/ fat?
→ Are there trends among countries of origin?
Sort
→ order a set of cases by some metric
→ Order the cars by weight
→ Rank the cereals by calories
Clustering
→ Find clusters of attribute values in a set of cases
→ Are there groups of cereals w/ similar fat, cal, sugar?
→ Is there a cluster of typical film lengths
which actor (x,y,z,a) has widest distribution of genres?
X Y Z A
dist dist dist dist
meta-value (finds) → Extremum of X
trend vs. correlate

Why is this Useful?

- Can help gain a rich and true assessment of user needs
  - Helps to define requirements
- Uncovers true nature of user's needs
  - Discover things that are outside job description, documentation
- Allows you to put yourself in the role of an end-user
- Open-ended and unbiased nature promotes discovery

Types of Findings

- Qualitative
  - Observe trends, habits, patterns, …
- Quantitative
  - How often was something done, what percent of the time did something occur, how many errors, …

Drawbacks

- Takes a lot of time
- Scale : small numbers
- Qualitative results are subjective and difficult to generalize
- Acquired skill
  - Identifying and extracting meaningful and "interesting" things is challenging

Alternative: Observations

- Observe user performing activity of interest to you
- Record audio/video/screen (with permission)
-

Think-Aloud Observations

- Observe user performing activity of interest to you
- Record audio/video/screen (with permission)
- Encourage user to verbalize what they are thinking
- Not everyone is good at this
- Hard to keep it up for long; need breaks

Cooperative Evaluation

- User is viewed as a collaborator in evaluation, not a subject
  - "Friendly approach"
- Relaxed version of think-aloud
  - Evaluator and participant can ask each other questions

Think-aloud & Coop Eval

- Help to detect errors early in a prototype
- Experimenter uses tasks, also talks to participant throughout, asks questions
- Have a debriefing session at the end

Interviews

- Structured — "Just the facts"
  - Efficient
  - Training: interview process
- Unstructured — A conversation
  - Inefficient
  - Training: process + domain knowledge

Semi-Structured Interviews

- Start with focused questions, move to open-ended discussion
  - Good balance, often appropriate
  - Training: process + domain knowledge

Semi-structured Interview Questions

- Pre-determine data of interest — know why you are asking questions, don't waste time
- Plan for effective question types
  - How do you perform task *x*?
  - Why do you perform task *x*?
  - Under what conditions do you perform task *x*?
  - What do you do before you perform…?
  - What information do you need to…?
  - Whom do you need to communicate with …?
  - What do you use to…?
  - What happens after you…?
  - What is the result or consequence of…?
  - What is the result or consequence of NOT…?
- See Gordon & Gill, 1992; Graesser, Lang, & Elofson, 1987

Typical Open-ended Questions

- Why do you do this (whatever the task is you are studying)?
- How do you do this?
  - Gets at task-subtask structure
  - Then ask about each subtask
- Why do you do it this way rather than some other way?
  - Attempts to get user to explain method and rationale so you can assess importance of the particular way of doing task (onion)

More Open-ended Questions

- What has to be done before you can do this?
  - To get at sequencing issues
- Please show me the results of doing this
- Do errors ever occur when doing this?
- How do you discover the errors, and how do you correct them? (Adapted from Nielsen *et al.*, CHI '86).
- Encourage digressions; ask for elaborations
- What else should I have asked you?

Questionnaires

- General Criteria
- Make questions clear & specific
- Ask some closed questions with range of answers
  - Sometime also have a *neutral* or *other option*
- Do test run with one or two people

Likert Scale

Evaluation Questionnaire

Please complete the following questionnaire by indicating how strongly you agree or disagree with the following statements. Your responses will be kept confidential and will be used only for improving the interface that you worked with in this experiment.

1. I felt that the computer agent's help was **worthwhile.** 1-----2------3------4------5------6------7
   Strongly Disagree — Strongly Agree

2. I found the computer agent to be **intrusive.** 1-----2------3------4------5------6------7
   Strongly Disagree — Strongly Agree

3. I found the computer agent's **help** to be **distracting.** 1-----2------3------4------5------6------7
   Strongly Disagree — Strongly Agree

- Seven-point Likert scale (use odd #)
- Could also just use words (*e.g.*, strongly agree, agree, neutral, disagree, strongly disagree)

Other Typical Questions

- Rank the importance of each of these tasks
- List the four most important tasks that you perform (this is an open question)
- List the pieces of information you need to have before making a decision about X, in order of importance
- Are there any other points you would like to make? (open-ended opinion question; good way to end)
- Same questions can be used in interview and in questionnaire; difference is in follow-up opportunity

Focus Groups

- Group of individuals — 3 to 10
  - Use several different groups with different roles or perspectives
  - And to separate the dominant personalities from the others
  - Want to avoid few people dominating discussion
- Use structured set of questions
  - More specific at beginning, more open as progresses
  - Allow digressions before coming back on track

Study documentation

- Describes how things should be done rather than how they are done
  - Try to understand these discrepencies

Competitive Analysis

- Look at competing products
- Look for both good and bad ideas
  - Functionality
  - UI Style
- Do user task performance metrics to establish bounds for your system

Which Method to Use?

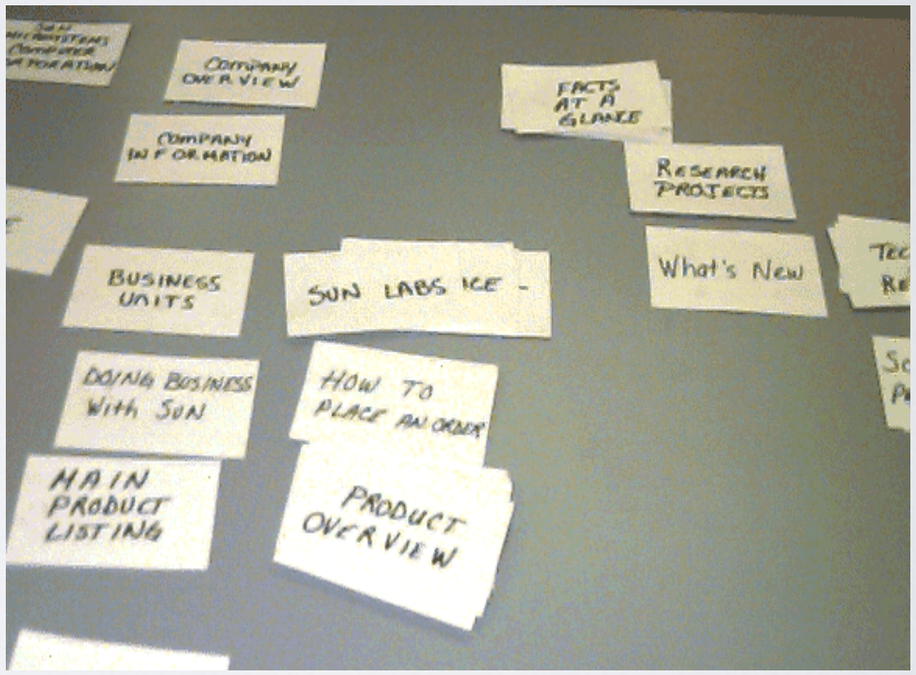
- Depends on your own resources ...
- Current knowledge of tasks & users
- Context
  - *E.g.*, can't use think-aloud if tasks involve two people working together

Organizing Observations

- Organizing the observations serves two purposes
  - Understand the data
  - Helps present the data

Tools for Sensemaking

- Card sorting – to create Affinity Diagrams
  - Also useful for web site organization
  - Do it with multiple users
- Flow charts
- Task analysis diagrams



Now What?

Now What?

- You have piles of notes, hours of video, surveys up to here…
- How can you digest and represent the *data*, to turn it into *information*?

Representing Data

- Essential use cases
- User characteristics + personae
- Task outlines
- Narratives
- Hierarchies & Network Diagrams
- Flow Charts

Essential Use Case (Scenario)

- Description of important or frequent user interactions
- Used to evaluate/walkthrough various design alternatives
- Three elements
  - Name
  - User intention
  - System responsibility
- *Do not make assumptions about the UI design*

Example Use Case

Arrange-Meeting

- User Intention
  - Arrange a meeting
  - Identify meeting attendees and constraints
  - Choose preferred date
- System Responsibility
  - Request attendees & constraints
  - Suggest potential dates
  - Book meeting

Get foreign currency

User's purpose	**System responsibility**
Identify self.	Validate user's identity. Display currencies available.
Select currency required.	Display exchange rate.
Enter amount of foreign currency required.	Calculate exchange (e.g. £ to $).
Confirm amount.	Request initiation of payment. Obtain authorisation for amount. Give money.
Take money and go.	

[From *User Interface Design and Evaluation*, The Open University]

User Characteristics & Persona

- Description of user and what he or she wishes to do
- Be specific/detailed, even give names and picture
- Three persona for ATM usage follow
  - Adapted from *User Interface Design & Evaluation*, The Open University
- Developed by Cooper (1999)

Age: 28-55

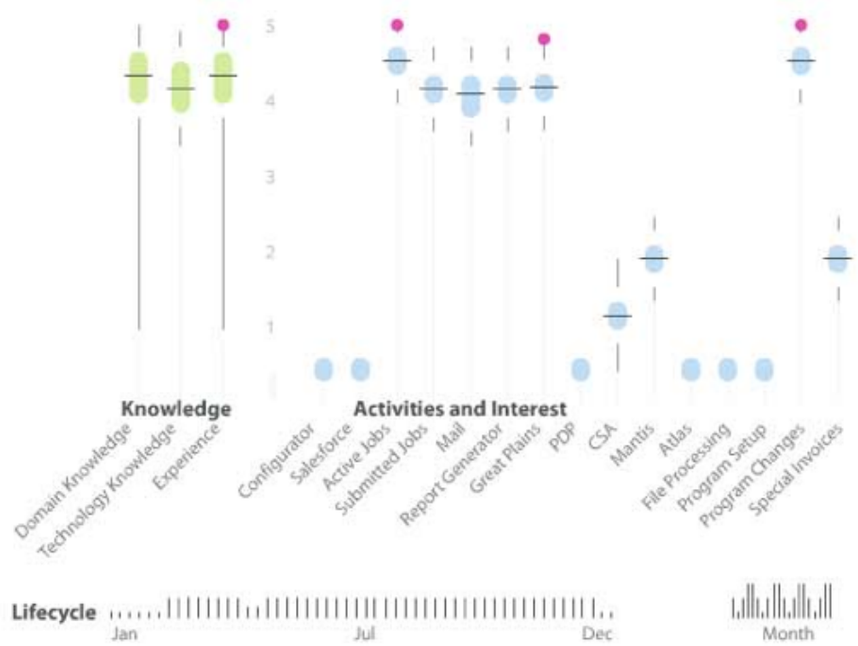
"Most of my time is spent figuring out if they have enough funds to run the file."

Alex has a ritual every morning—go through email and look for messages from finance about his regular clients he needs to process for that day. Then he signs into BMC, goes to the AJL, and starts working through his clients' files one-by-one. This is a process he repeats pretty much all day long.

As the day continues, more files from clients come in. In any given day, he might process 20-30 files. The system "works," but there are definitely areas Alex would like to see improved. For example, each file is typically a funding order, or a new card order, but those details are never available on the AJL—he has to click a link every time to see them.

Fortunately, he knows what to expect from his regular clients, but that still leaves him clicking a "detail" link about 10-15 times a day. And the AJL never shows whether or not funds are available. Instead, he has to go to into his email, look for an email from Finance with the Client invoice number, then go into Great Plains, which takes FOREVER to load, find the invoice number, locate the job number, then back into the AJL find the job number and give it the green light. And for some reason, he can't process more than one file from the same client at a time. So, he has to keep checking back.

At any given time, he's bouncing between 6-8 different windows. The ideal system for Alex? Well, he could skip Great Plains—just have they system tell BMC which jobs have funds and are ready to run. Also, it should just his clients and take him right to the AJL.



Key Characteristics

- Finding his files and processing them.
- Primarily works in Active Job List.
- Some work in Submitted Job List.
- Manages multiple clients at once.
- Serve as secondary contact with client.
- Determine if client has funds available to run their files.
- Learn their clients' schedules over time.
- Balances taking care of high-profile clients with lower-profile clients with immediate needs.

Goals

- Be able to see just their client files.
- Quickly respond to client issues.
- Better integration with finance to show funds are available.
- Possibly auto process files with available funds.
- Spend less time doing grunt work, things that could be automated and auto-populated from the system
- Balancing taking care of high profile clients with low profile clients that have an immediate need .

Questions

- Who are my clients?
- Are there funds available?
- What files are in my queue?
- Can the file be processed now?

Influencers

- Mandated.
- Availability of necessary information (e.g. financial, schedule).

Applications

- BMC (AJL, SJL)
- Email
- Great Plains
- Report Generator
- CSA
- Mantis

Frustrations & Pain Points

- Default view shows all files, when all he needs is his.
- Too much switching between BMC, Outlook, Great Plains, and Report Generator.
- No initial screen to show him what's in his queue for the day, or recent activity.
- Has to go through an extra screen before coming to his AJL.
- No file details available on screen, has to click details to see what kind of transaction it is (e.g. cardholder order, funding).
- Great Plains is painfully slow.

Felix (Teenage ATM User)

- Felix is 13 and gets pocket money each week. He spends it with his friends, so doesn't make regular deposits. He does receive gifts for his birthday, Christmas, etc. and saves that money for special purchases, such as a computer games console or trendy clothes. He has an ATM card allowing him to make withdrawals when needed for his purchases.

Sandra (Young Adult)

- Sandra is 30, is married to Jason, has two children Todd(6) and Carly (18 months). They live in a subdivision that is about three miles from the town center, where the bank and stores are located. Jason uses the car for work, and works long hours, leaving at 6:45 am and returning at 8:00 pm. Sandra does not drive, so has to use public transportation. She tries to run errands and shop while Todd is in school, so she does only has to take Carly to town with her. She typically needs to make two trips to town each week to get everything done. She uses a stroller with Carly, and the bank is one flight up via escalator, so she prefers to use the ATM outside the first floor, even though there is no canopy to protect customers from bad weather.

Grandpa Marvin (Older Adult)

- Marvin is 68 years old, and his social security is deposited into his bank account at the start of each month. He goes to the bank every week, withdrawing enough cash for the week - for miscellaneous expenditure. Regular bills are paid by check. He stands in line for a live teller, as he prefers the social interaction to using an ATM, even though his new artificial hip makes standing in line uncomfortable. He does not have an ATM card.

Task Outlines

- Lists, outlines, matrices
  - Use expanding/collapsing outline tool
  - Add detail progressively
  - Know in advance how much detail is enough
  - Can add linked outlines for specific subtasks
- Good for sequential tasks, not so good for parallel

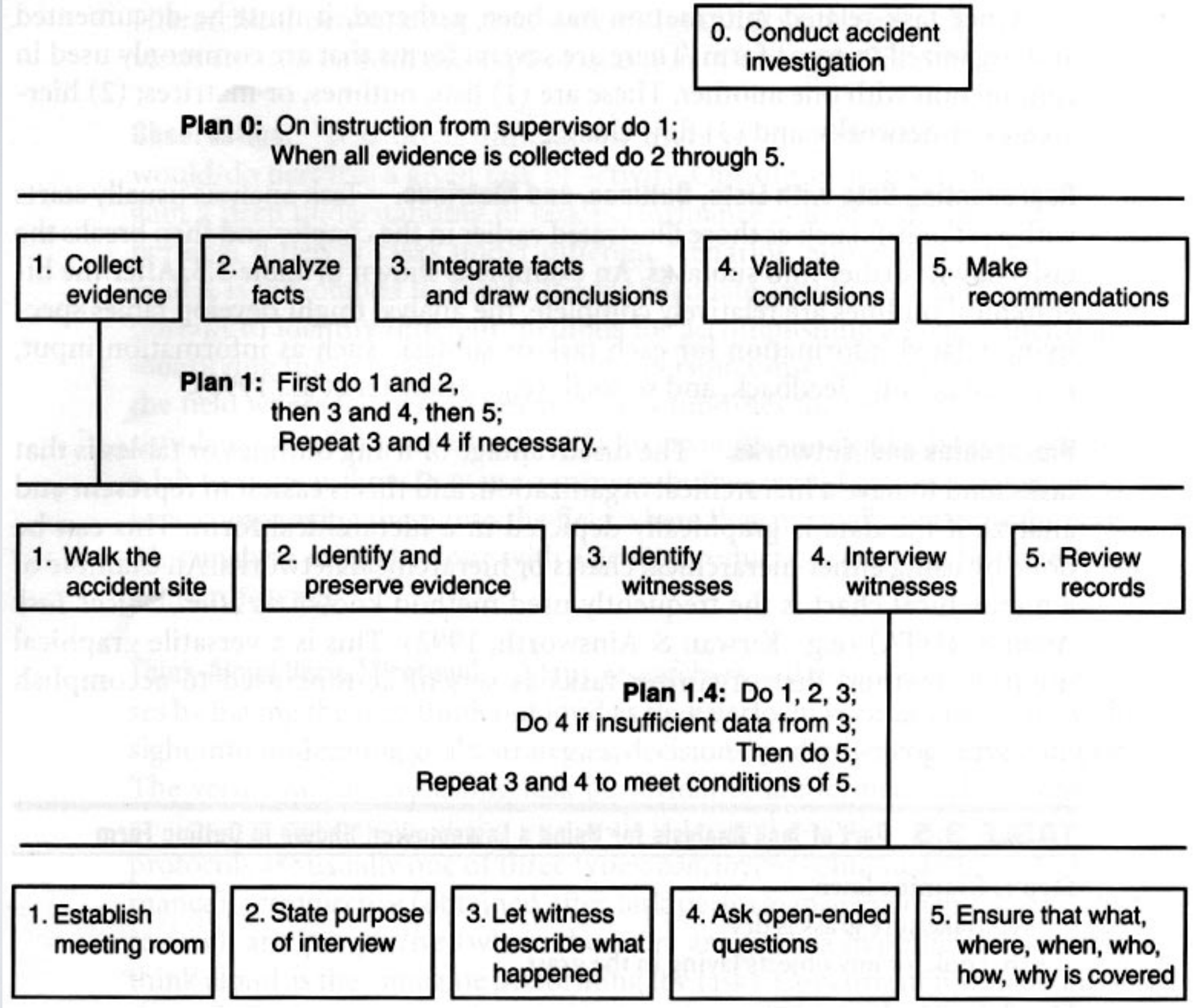
- Using a lawnmower to cut grass
    - Step 1. Examine lawn
        - Make sure grass is dry
        - Look for objects laying in the grass
    - Step 2. Inspect lawnmower
        - Check components for tightness
            - Check that grass bag handle is securely fastened to the grass bag support
            - Make sure grass bag connector is securely fastened to bag adaptor
            - Make sure that deck cover is in place
            - Check for any loose parts (such as oil caps)
            - Check to make sure blade is attached securely
    - Check engine oil level
        - Remove oil fill cap and dipstick
        - Wipe dipstick
        - Replace dipstick completely in lawnmower
        - Remove dipstick
        - Check that oil is past the level line on dipstick
        - …

Narratives

- Describe tasks in sentences
- Often expanded version of list or outline
- More effective for communicating general idea of task
- Not effective for
  - details
  - branching tasks
  - parallel tasks
- Great as introduction to diagrams or outlines

Hierarchies & Networks

- Goals – what the user wants to achieve
- Tasks – do these to achieve the goals
  - Sequential dependencies
    - Create new document before entering text
  - Multiple occurrences of tasks
  - Subtasks – lower-level tasks
- The lowest-level subtasks get mapped onto one or several UI commands
- *i.e.*, *move* done by a *copy* followed by a *paste*


0. Conduct accident investigation
Plan 0: On instruction from supervisor do 1;
When all evidence is collected do 2 through 5.
1. Collect evidence
2. Analyze facts
3. Integrate facts and draw conclusions
4. Validate conclusions
5. Make recommendations
Plan 1: First do 1 and 2,
then 3 and 4, then 5;
Repeat 3 and 4 if necessary.
1. Walk the accident site
2. Identify and preserve evidence
3. Identify witnesses
4. Interview witnesses
5. Review records
Plan 1.4: Do 1, 2, 3;
Do 4 if insufficient data from 3;
Then do 5;
Repeat 3 and 4 to meet conditions of 5.
1. Establish meeting room
2. State purpose of interview
3. Let witness describe what happened
4. Ask open-ended questions
5. Ensure that what, where, when, who, how, why is covered

Task Model — Borrow a Book

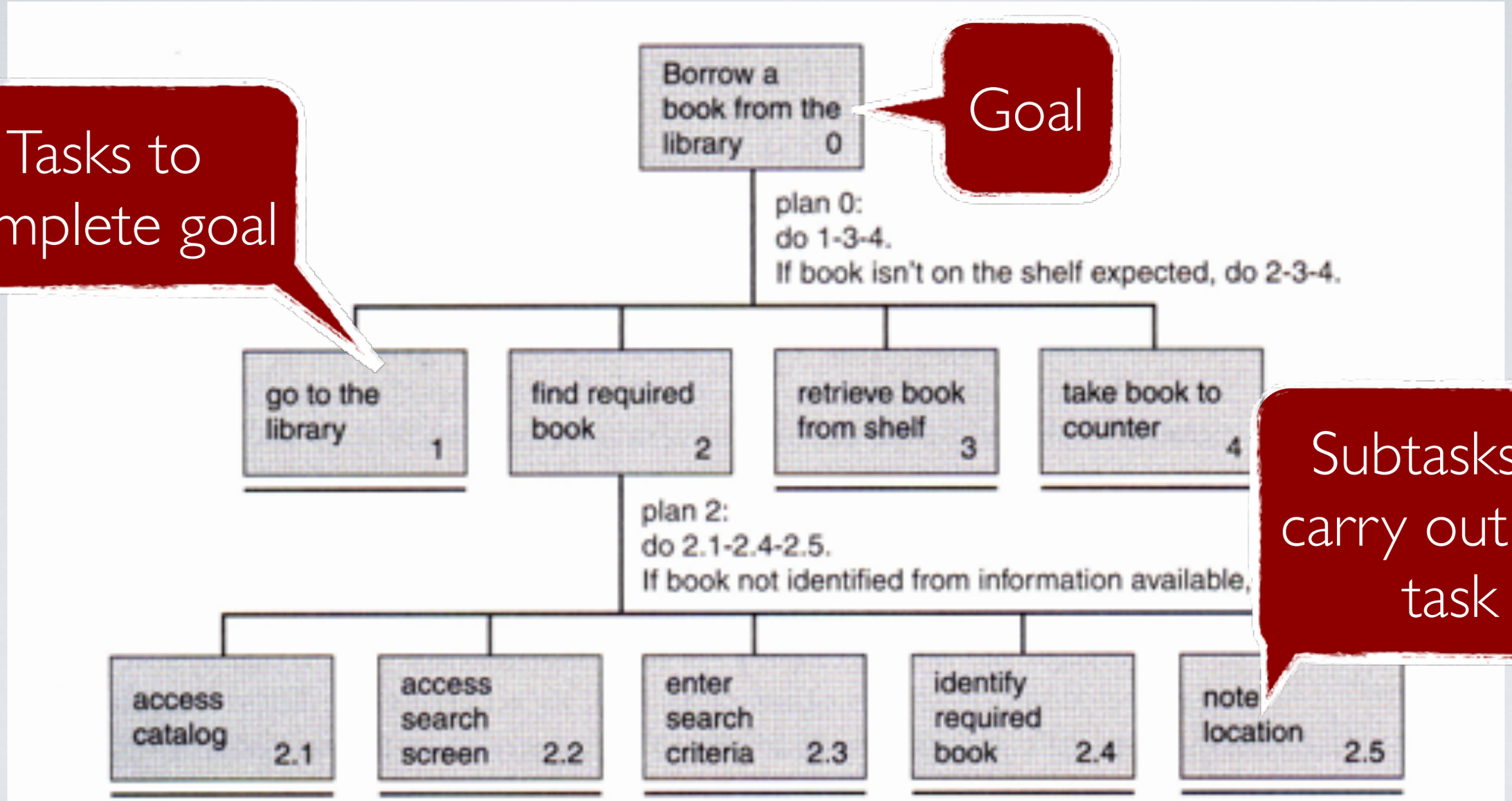
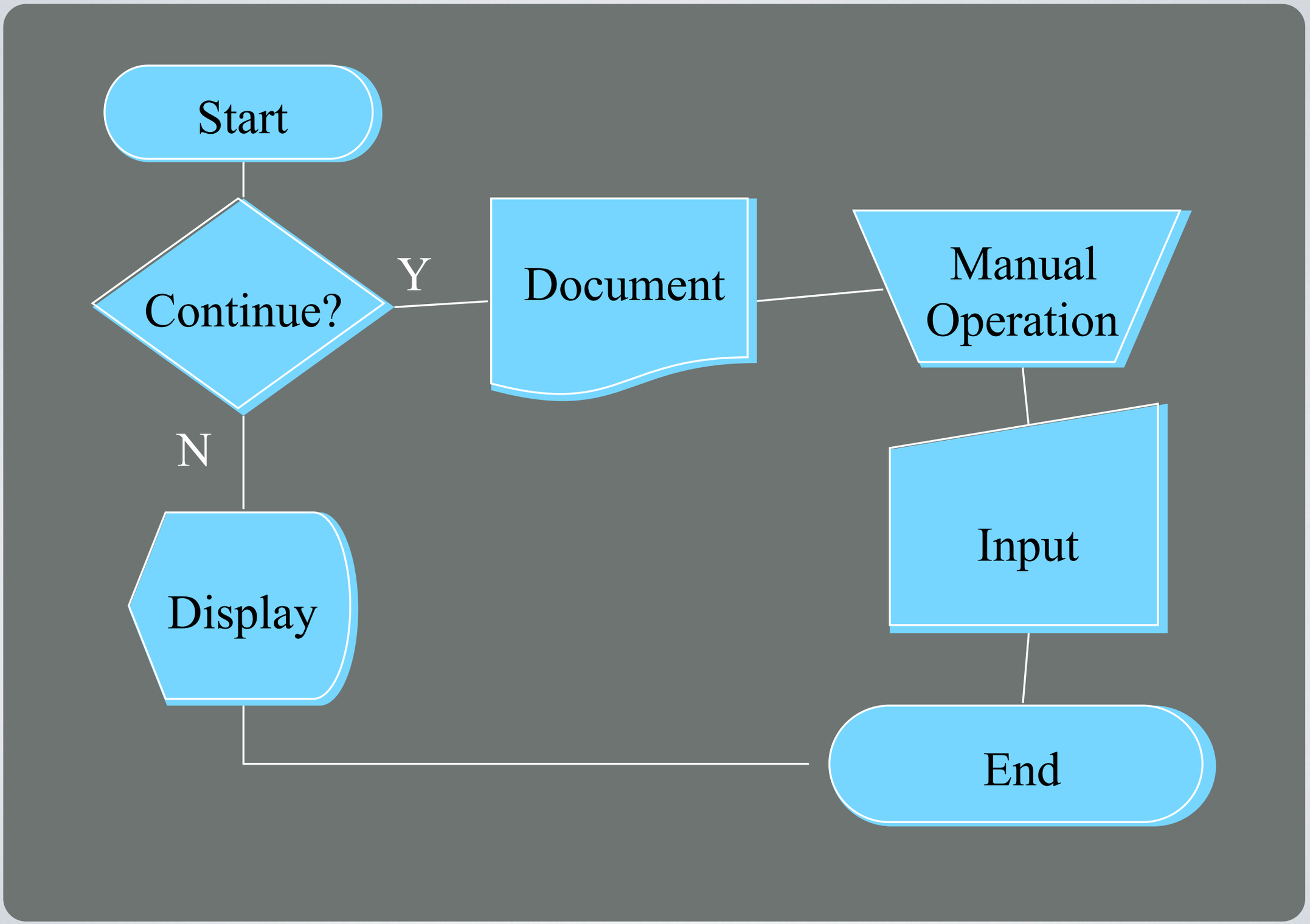


Figure 7.12 A graphical representation of the task analysis for borrowing a book.

Can be More Than One

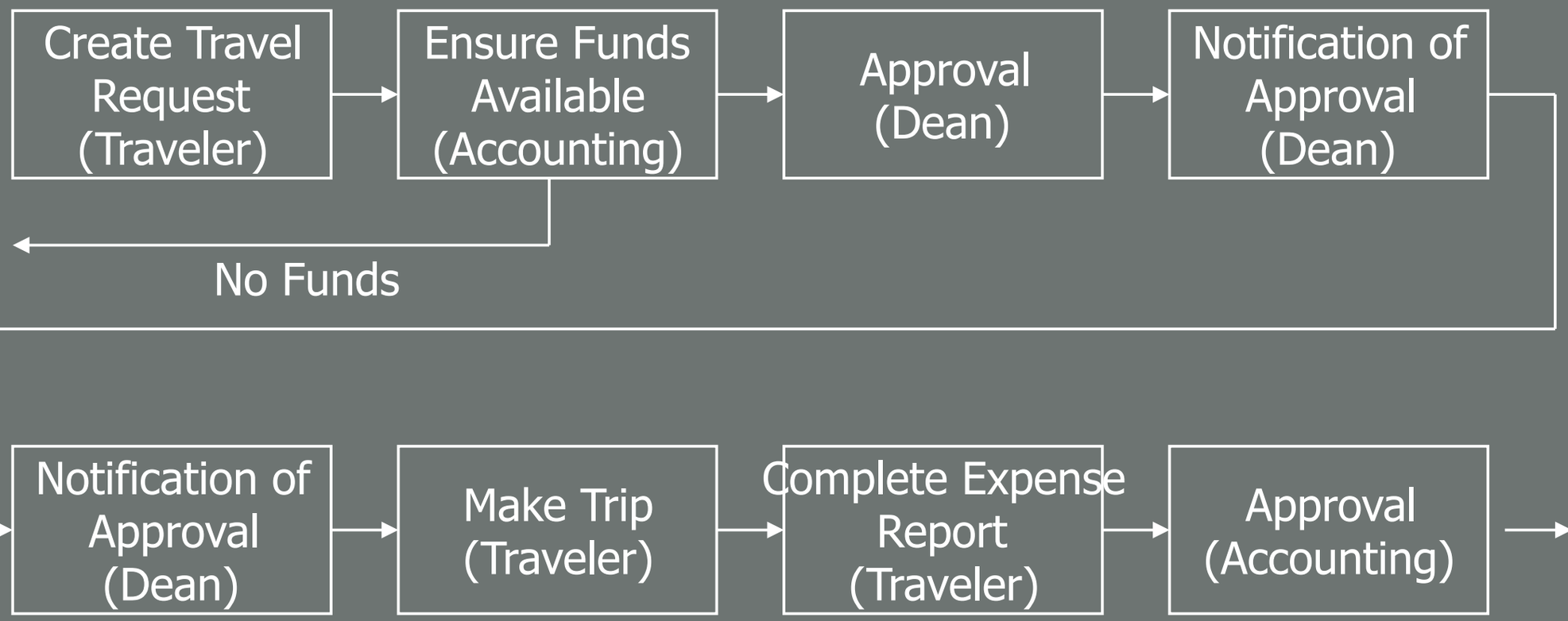
FLOWCHARTS


Start
Continue?
Y
N
Document
Manual Operation
Input
Display
End

Workflows

- Documents going from one person/organization to another
- Multiple participants in an activity
- Web page sequencing
  - Browsing, purchasing, checkout

Document Flow Example



Multiple Participants

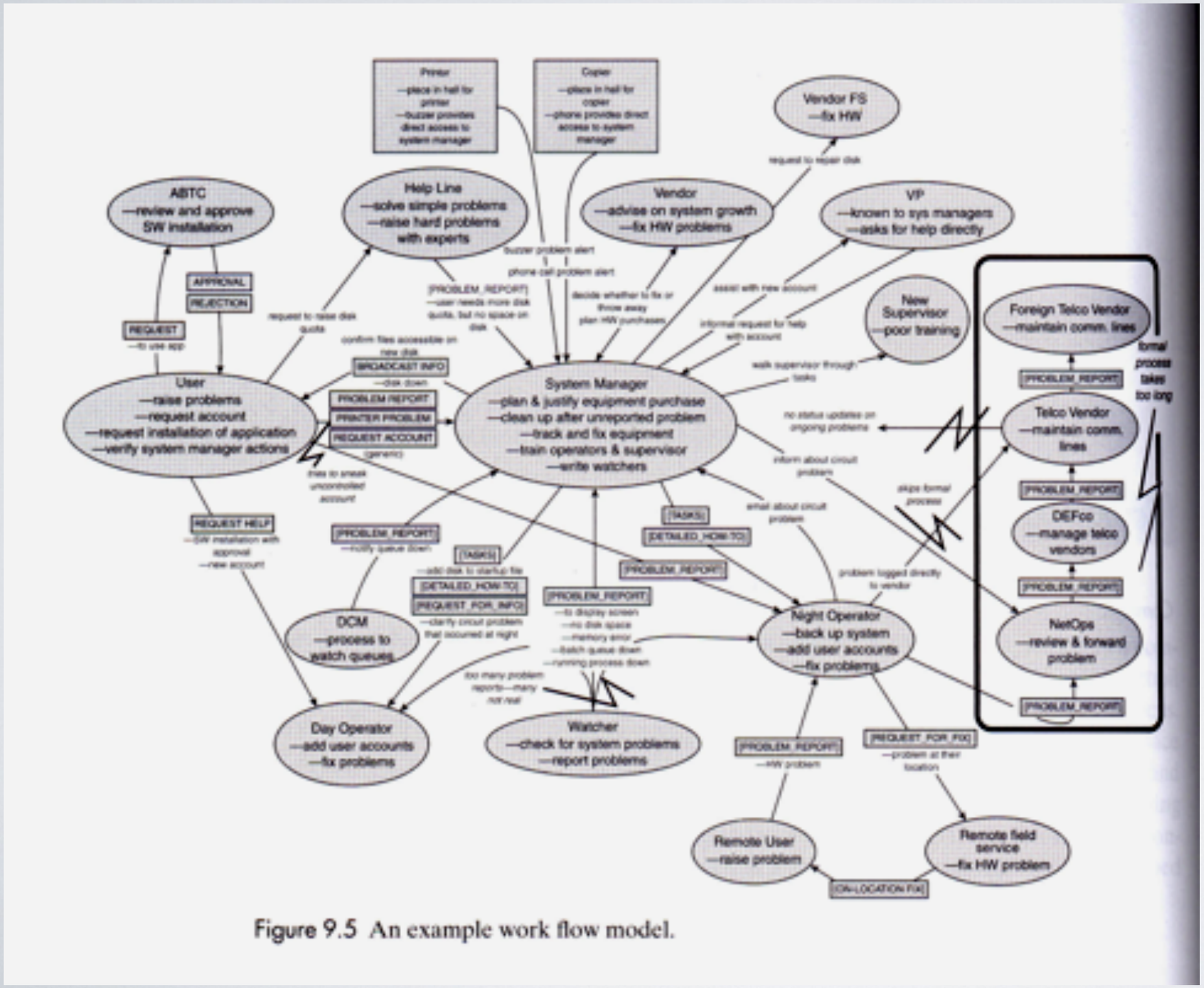


Figure 9.5 An example work flow model.

[From Interaction Design, Preece Rogers and Sharp]

Summary of Task Analysis

- Determine the data you need
- Gather it using various appropriate methods and techniques
- Represent the tasks and subtasks, plus other related information
- Use this data to improve design
- Note: be efficient!

Using What You've Learned

- How do attributes of users & their tasks influence the design of user interfaces?

- Are there some design guidelines we can derive from different attributes?

User Profiles

- Attributes:
  - attitude, motivation, reading level, typing skill, education, system experience, task experience, computer literacy, frequency of use, training, color-blindness, handedness, gender,…
- Novice, intermediate, expert
- Manager, employee, contractor, …

Motivation

- User
  - Low motivation, discretionary use
  - Low motivation, mandatory use
  - High motivation, due to fear
  - High motivation, due to interest
- Design goal
  - Ease of learning
  - Control, power
  - Ease of learning, robustness, control
  - Power, ease of use

Knowledge & Experience

Experience		
<u>task</u>	<u>system</u>	<u>Design goals:</u>
low	low	– Many syntactic & semantic prompts
high	high	– Efficient commands, concise syntax
low	high	– Semantic help facilities
high	low	– Lots of syntactic prompting

Job & Task Implications

- Frequency of use
  - High — Ease of use
  - Low — Ease of learning & remembering
- Task implications
  - High — Ease of use
  - Low — Ease of learning
- System use
  - Mandatory — Ease of use
  - Discretionary — Ease of learning

Define Tasks

- Consider the *whole* system
- Determine *who or what* should perform each task and each step : e.g. the system remembers the login, but the user remembers the password
- Determine criteria: efficiency, cognitive effort, time
  - Task *x* should take no more than *y* seconds
  - A new user should be able to create a new account in 5 minutes

Design & Prototyping

Prototyping the Interface

- Why prototype?
  - Creating the system is expensive
- Start with low-fidelity mockups
- Progress to prototypes
  - Storyboards, task diagrams, *etc.*

Design the Interface

Paper & Physical Prototyping

VARO

1 2 3 4 5

FILE

NUMBER 001

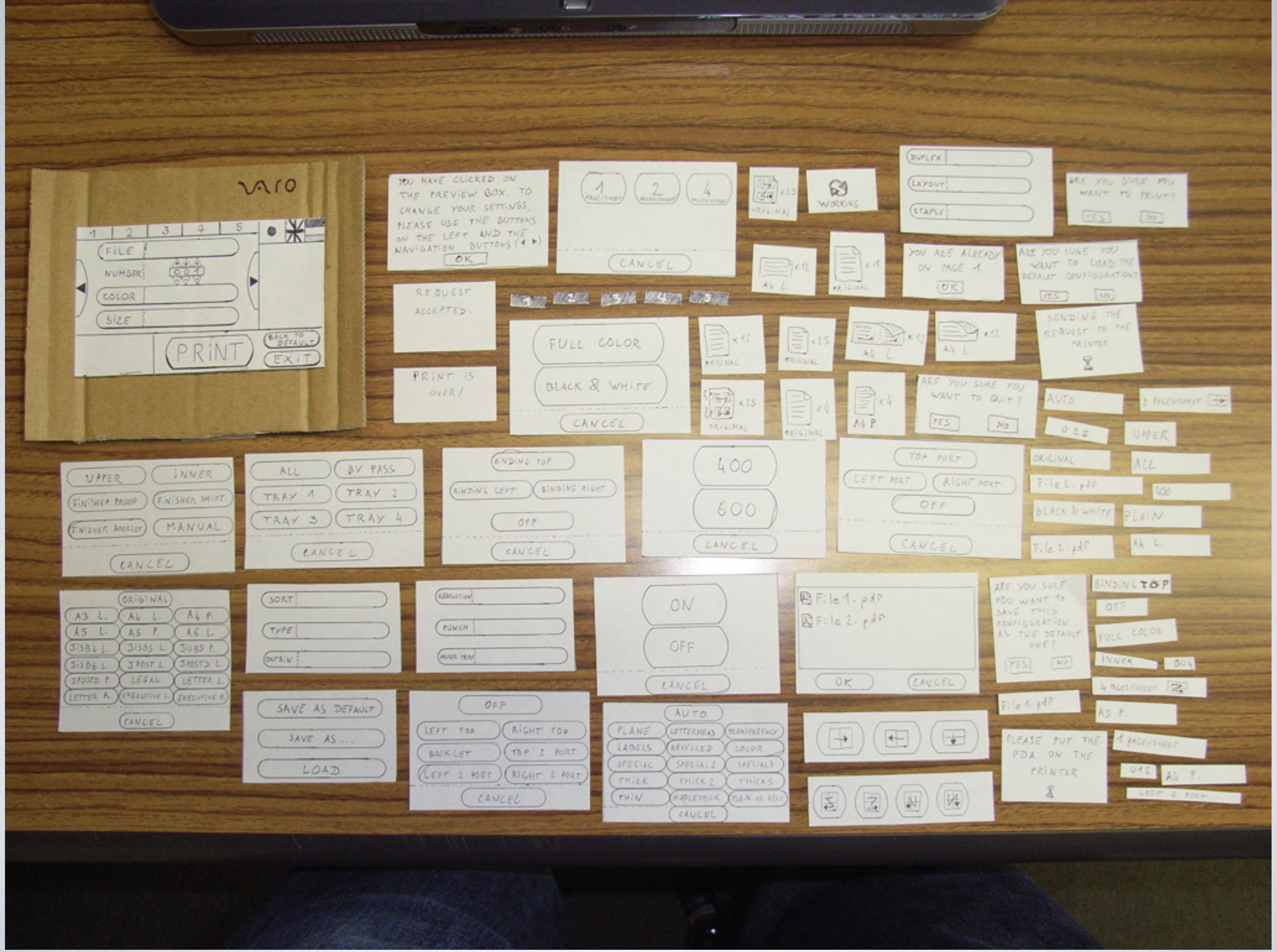
COLOR

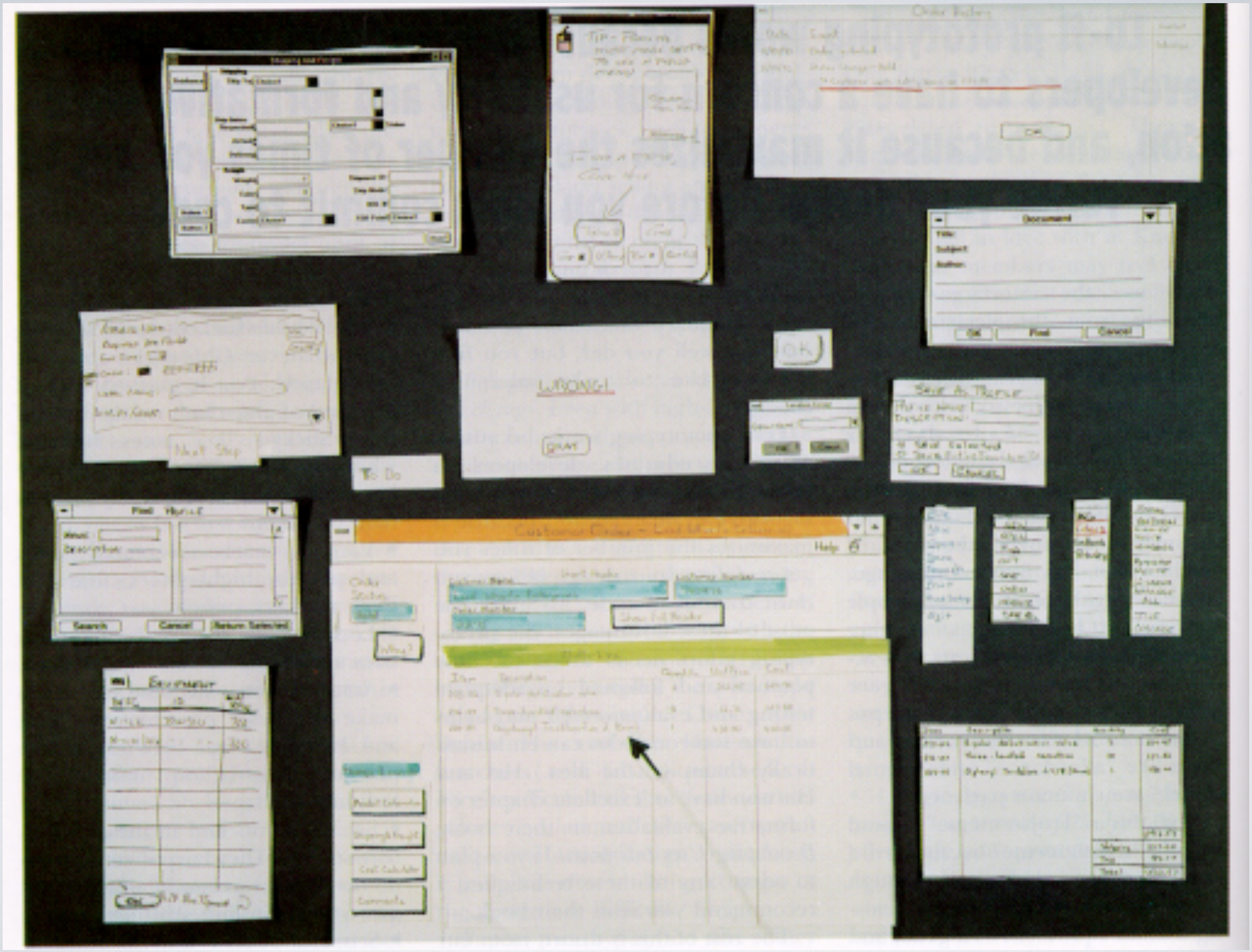
SIZE

PRINT

BACK TO DEFAULT

EXIT

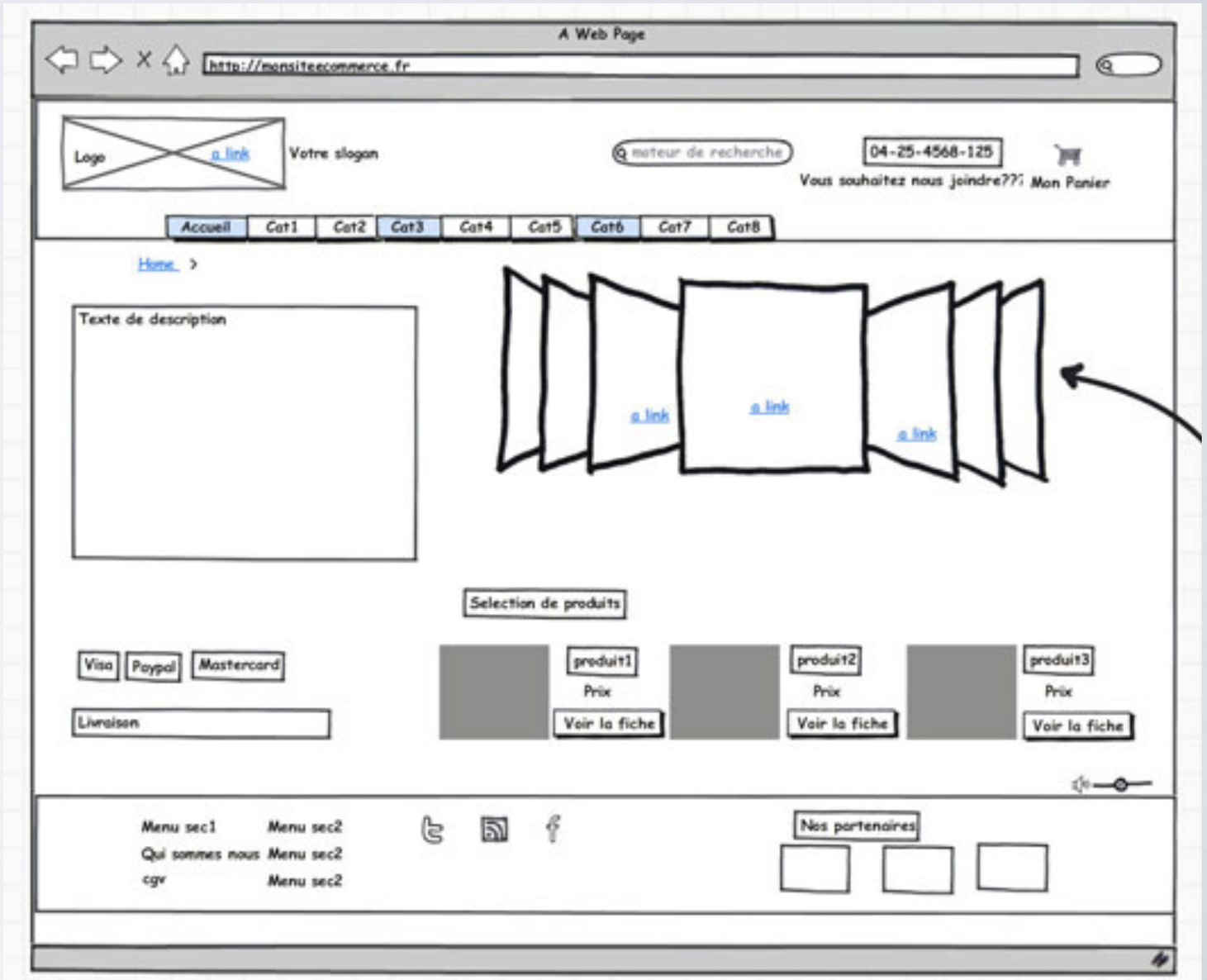

vaio
1 2 3 4 5
FILE
NUMBER
COLOR
SIZE
PRINT
BACK TO DEFAULT
EXIT
YOU HAVE CLICKED ON THE PREVIEW BOX. TO CHANGE YOUR SETTINGS, PLEASE USE THE BUTTONS ON THE LEFT AND THE NAVIGATION BUTTONS (◀ ▶)
OK
1 PAGE/SHEET
2 PAGES/SHEET
4 PAGES/SHEET
CANCEL
ORIGINAL
WORKING
DUPLEX
LAYOUT
STAPLE
ARE YOU SURE YOU WANT TO PRINT?
YES
NO
A4 L.
YOU ARE ALREADY ON PAGE 1
OK
ARE YOU SURE YOU WANT TO LOAD THE DEFAULT CONFIGURATION?
YES
NO
REQUEST ACCEPTED.
PRINT IS OVER!
FULL COLOR
BLACK & WHITE
CANCEL
SENDING THE REQUEST TO THE PRINTER
A4 P.
ARE YOU SURE YOU WANT TO QUIT?
YES
NO
AUTO
2 PAGES/SHEET
0.25
UPPER
ALL
UPPER
INNER
FINISHER PROOF
FINISHER SHIFT
FINISHER BOOKLET
MANUAL
CANCEL
ALL
BY PASS
TRAY 1
TRAY 2
TRAY 3
TRAY 4
CANCEL
BINDING TOP
BINDING LEFT
BINDING RIGHT
OFF
CANCEL
400
600
CANCEL
TOP PORT
LEFT PORT
RIGHT PORT
OFF
CANCEL
ORIGINAL
File 2. pdf
BLACK & WHITE
File 2. pdf
PLAIN
A4 L.
ORIGINAL
A3 L.
A4 L.
A4 P.
A5 L.
A5 P.
A6 L.
JISB4 L.
JISB5 L.
JISB5 P.
JISB6 L.
JPOST L.
JPOSTD L.
JPOSTD P.
LEGAL
LETTER L.
LETTER P.
EXECUTIVE L.
EXECUTIVE P.
CANCEL
SORT
TYPE
OUTBIN
RESOLUTION
PUNCH
PAPER TRAY
SAVE AS DEFAULT
SAVE AS ...
LOAD
OFF
LEFT TOP
RIGHT TOP
BOOKLET
TOP 2 PORT
LEFT 2 PORT
RIGHT 2 PORT
CANCEL
ON
OFF
CANCEL
AUTO
PLANE
LETTERHEAD
TRANSPARENCY
LABELS
RECYCLED
COLOR
SPECIAL
SPECIAL2
SPECIAL3
THICK
THICK 2
THICK3
TWIN
MIDDLETHICK
PLAIN OR RECY
CANCEL
File 1. pdf
File 2. pdf
OK
CANCEL
ARE YOU SURE YOU WANT TO SAVE THIS CONFIGURATION AS THE DEFAULT ONE?
YES
NO
File 1. pdf
PLEASE PUT THE PDA ON THE PRINTER
BINDING TOP
OFF
FULL COLOR
INNER
600
4 PAGES/SHEET
A5 P.
1 PAGE/SHEET
0.12
A4 P.
LEFT 2 PORT


Document
Title:
Subject:
Author:
OK
Find
Cancel
OK
WRONG!
Next Step
To Do
Save As Profile
Search
Cancel
Return Selected
Help
Show Full Header
Comments

Incident Forms' Book
Battalion 3412
Krispy Kreme
DOUGHNUTS
6/13/2002

Wireframe Prototypes

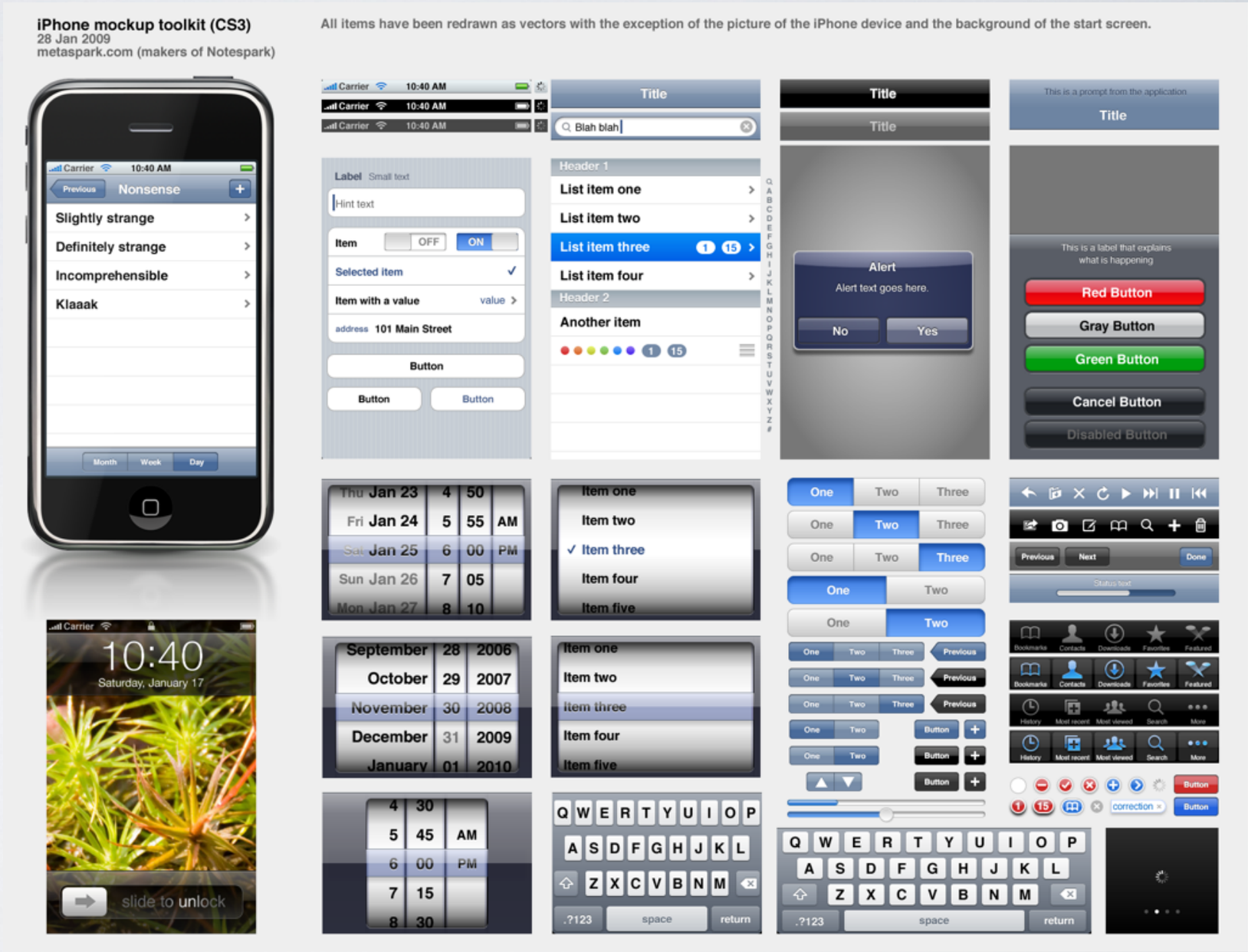
- Paper or digital
- Layout & functionality
- Tools :
  - OmniGraffle
  - Browser plugins
    - e.g. Pencil project



CONCEPTION : UCD

6. Prototypage : mockup

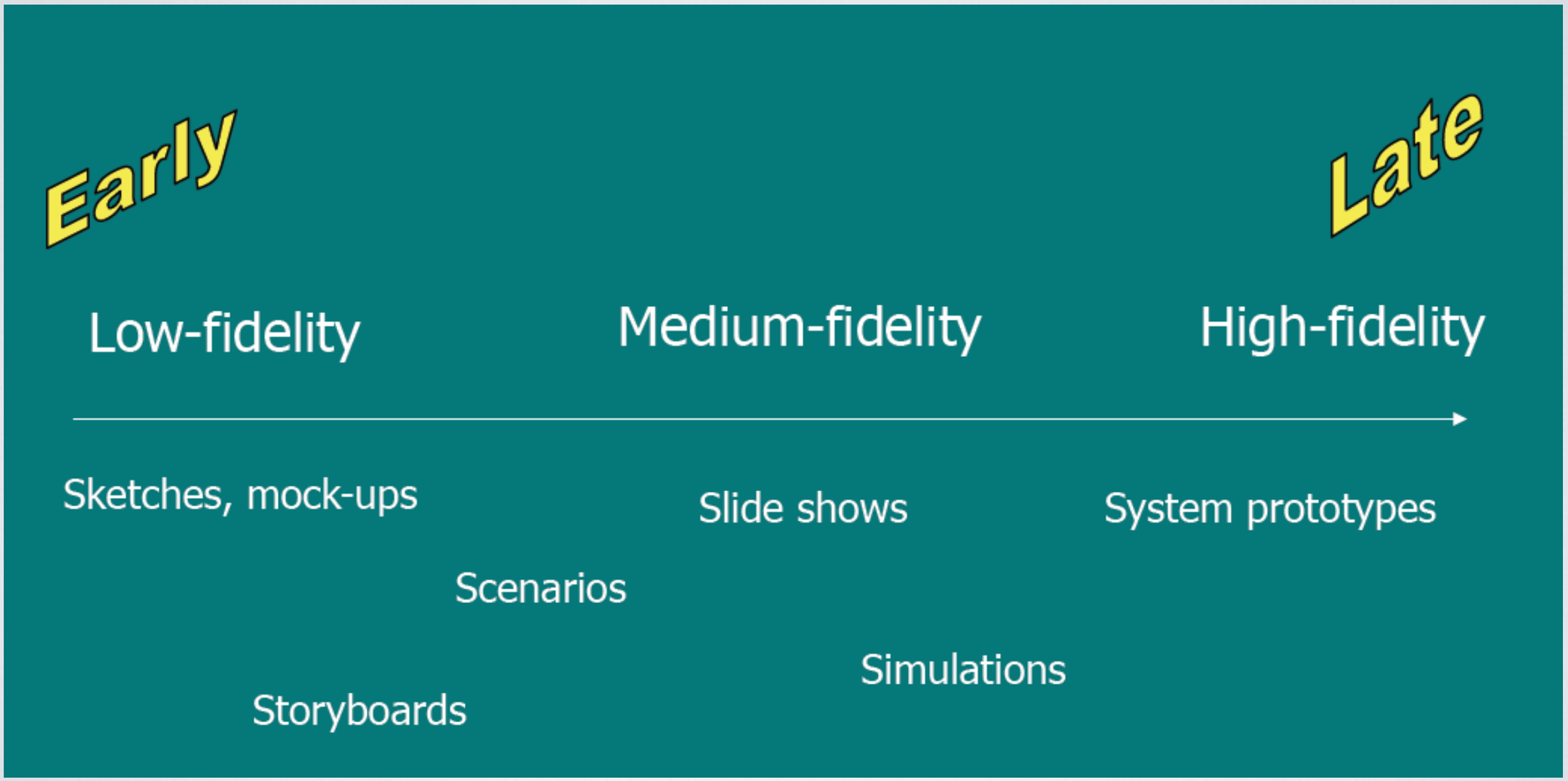
- plus fidèle
- look & feel
- pixel prêt
- Outils :
  - Suite Adobe CS
  - OmniGraffle



Wizard of Oz

- Simulate the system with a human wizard

Prototyping tools



User Testing & Evaluation

Why Test?

- Identify problems with software
- You are not your user
- The *earlier* you find your problems, the *cheaper* they are to fix

Evaluation Methods

- Experimental, Observational
  - Typically with users
  - Controlled experiments based on usability requirements
- Predictive
  - (without users)

Predictive Evaluation

- Idea:
- Observational studies are expensive, time consuming
- Let's predict rather than observe usage
- Save resources (quick, cheap)

Approach

- Expert review
  - HCI professional (not a real user) interacts with the system, tries to find usability problems
- Ideally:
  - Has not used previous prototypes
  - Knows the problem domain
  - Understands the user's perspective

Predictive Evaluation Methods

- Heuristic Evaluation
- "Discount" usability testing
- Cognitive Walkthrough

Heuristic Evaluation

- Developed by Jakob Nielsen (www.useit.com)

- Several experts evaluate the system according to simple and general heuristics

Method

- Determine inputs
- Evaluate the system
- Collect observations
- Rank by severity

Inputs

- Who are the expers?
  - Learn domain, practices
- What is the prototype to evaluate?
  - Mock-ups, storyboards, … or even a working system

Evaluation Method

- Reviewers evaluate system according to high-level usability principles :

- Use simple and natural dialog
- Speak user's language
- Minimize memory load
- Be consistent
- Provide feedback
- Provide clearly-marked exits
- Provide shortcuts
- Provide good error messages
- Prevent errors

Process

- Perform at least two passes
  - Look at each screen
    - Flow from screen to screen
- At each step, evaluate according to heuristics
- Look for problems:
  - Subjective (if you think its a problem, it is)

Debriefing

- Gather all identified problems
- Identify which ones aren't really problems
- Group, classify
- Document and record the problems

Order by Severity

- Scale from 0 to 4
- Based on:
  - Frequency
  - Impact
  - Persistence
  - Market impact

Advantages

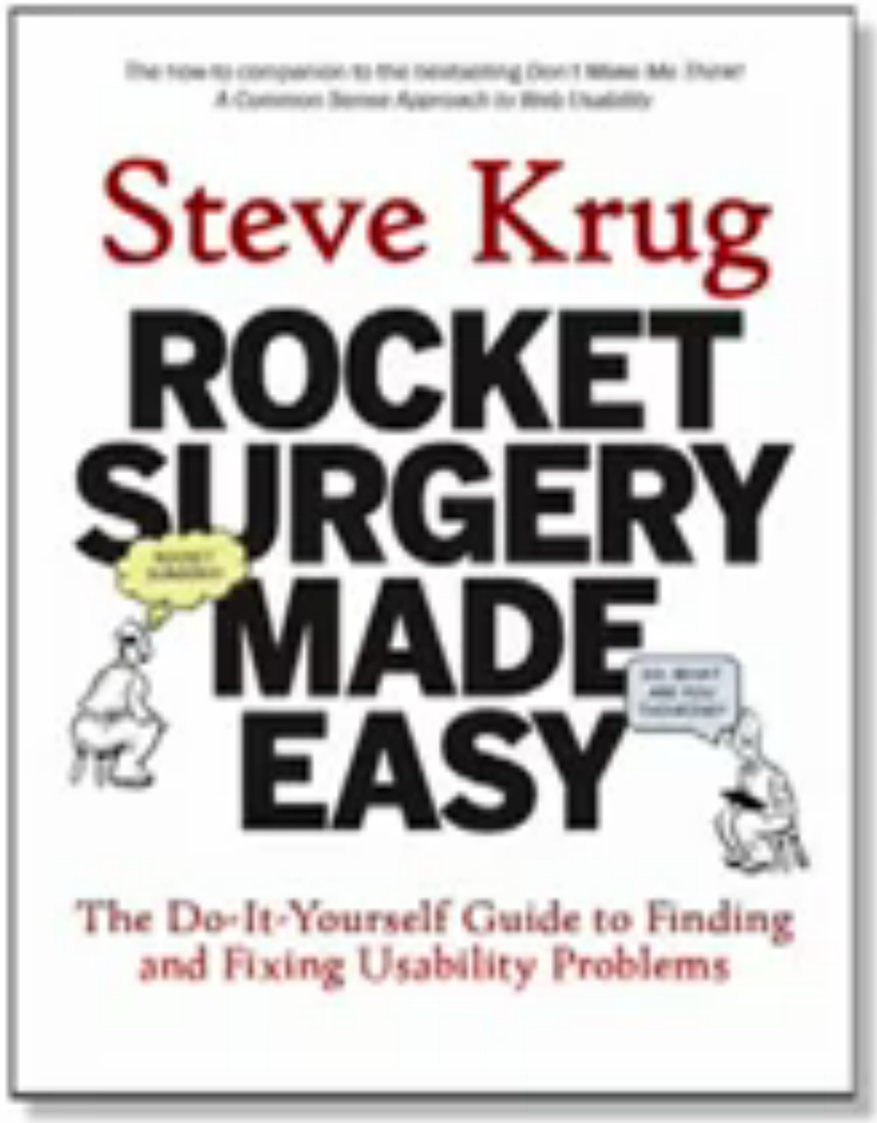
- Cheap, good for small companies that can't afford more
- Can be performed on mockups
- Experienced evaluators ideal
- According to Nielson, 5 evaluators finds 75% of problems

Limitations

- Evaluation is subjective, depends on reviewer expertise
- Are these the right heuristics?
- Are the identified problems really problems?

Demo Usability Test

for readers of



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