Slide 1

Introduction à la Conception Centrée Utilisateur

James Eagan

james.eagan@telecom-paristech.fr

TELECOM ParisTech

Ce cours a été développé en partie par des membres des départements IHM de Georgia Tech et Télécom ParisTech. La liste de contributeurs inclut Gregory Abowd, Al Badre, James Eagan, Jim Foley, Elizabeth Mynatt, Jeff Pierce, Colin Potts, Chris Shaw, John Stasko, et Bruce Walker. Ces matériaux peuvent être utilisés avec attribution pour des buts non-lucratifs.

UPMC SORBONNE UNIVERSITÉS

Dernière mise à jour : février 2015.

1

Slide 2

Who am I? James EAGAN

MAÎTRE DE CONFÉRENCES EN INTERACTION HOMME-MACHINE

Assistant Prof. at Télécom ParisTech
Adjunct Researcher at CNRS LTCI

Ph.D. 2008 — Georgia Tech

B.A. 2000 — Lawrence University
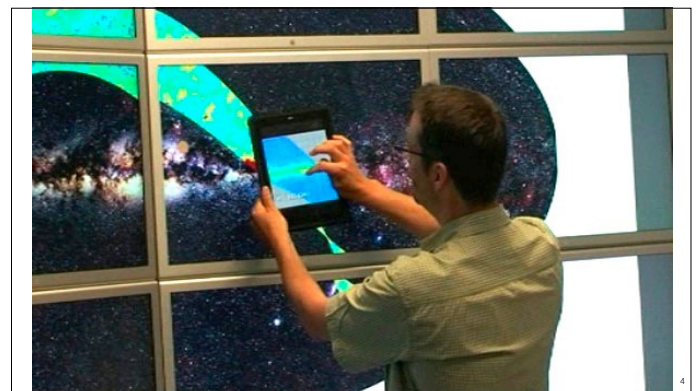
james.eagan@telecom-paristech.fr
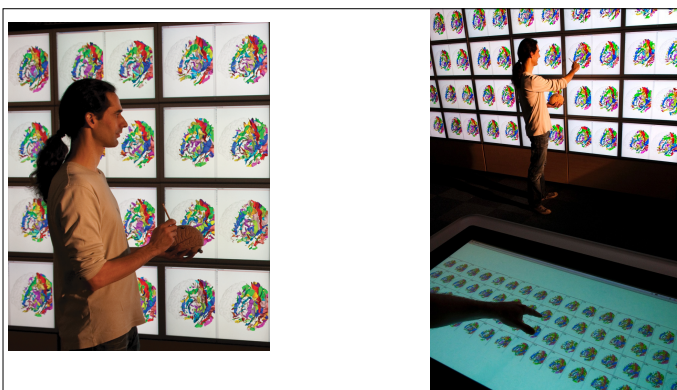
2

Slide 3

Research

Human-Computer Interaction

Information Visualization   Multi-surface Interaction

3

Slide 4

4

Slide 5

5

Slide 6

Quentin Roy
Thésard en Interaction Homme-Machine

Thésard en IHM à Télécom ParisTech

Recherche en Interaction Gestuelle pour Surface Tactile

6

Slide 7

IBM

1999 : « La fonctionnalité la plus utilisée était ... recherche. Les personnes n'arrivaient pas à naviguer le site. »
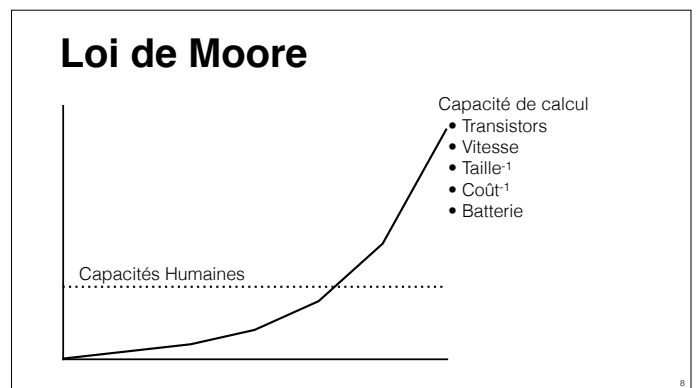
« La deuxième fonctionnalité était le bouton 'help', car le moteur recherche était si inefficace. »

Après re-conception du site centrée utilisateur :

Utilisation du bouton « help » a baissé 84 %

Ventes ont augmenté 400 %

[New York Times, 30 août 1999]

7

Slide 8

Loi de Moore

Capacité de calcul
- Transistors
- Vitesse
- Taille^{-1}
- Coût^{-1}
- Batterie

Capacités Humaines

8

Interaction Homme-Machine
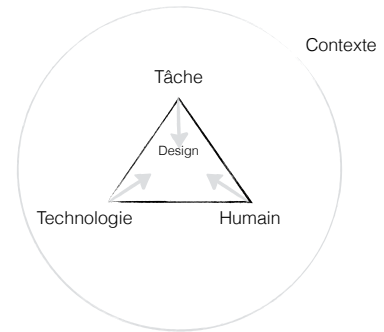
9

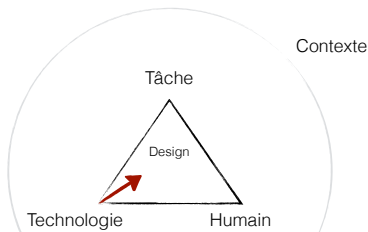# Human-Computer Interaction

10

Human-Computer Interaction

Human
  L'utilisateur final du système
  Autres personnes dans l'organisme

Computer
  La machine qui tourne le logiciel
  Y en a souvent plusieurs

Interaction
  L'utilisateur exprime ce qu'il veut
  L'ordinateur communique les résultats

11

Contexte
Tâche
Design
Technologie   Humain

12

Contexte
Tâche
Design
Technologie   Humain

Dans un smartphone avec écran tactile, on peut supposer une interaction multi-touch

13

Contexte
Tâche
Design
Technologie   Humain

Les connaissances d'une personne changent lorsqu'elle agisse… elle apprend.

14

Interaction Homme-Machine

Un métier qui s'intéresse :

au design,
à l'implementation, et
à l'évaluation

de systèmes informatiques à usage par un être-humain

Design
Prototype
Évaluation

15

Conception de Design & Ingénierie de l'Utilisabilité

Buts :

Identifier :
• qui est l'utilisateur
• quelles sont ses tâches principales

Méthodes :

• Conception centrée tâche
• Conception participative
• Conception centrée utilisateur

Évaluation

Produits :

• Descriptions des tâches et des utilisateurs

16

Slide 17

Conception de Design & Ingénierie de l'Utilisabilité

Buts : Descriptions des tâches et des utilisateurs — Brainstorming des designs

Méthodes :
- Psychologie des choses
- Participation utilisateur
- Représentations & métaphores
- Interaction participative
- Analyse des scénarios et tâches
- Méthodes de création de prototypes basse-fidélité

Produits : • Prototypes sur papier

17

Slide 18

Conception de Design & Ingénierie de l'Utilisabilité

Buts : Prototypes sur papier — Raffiner les designs

Méthodes :
- Design graphique
- Guidelines d'interface
- Guides de style
- Tests d'utilisabilité
- Évaluation heuristique
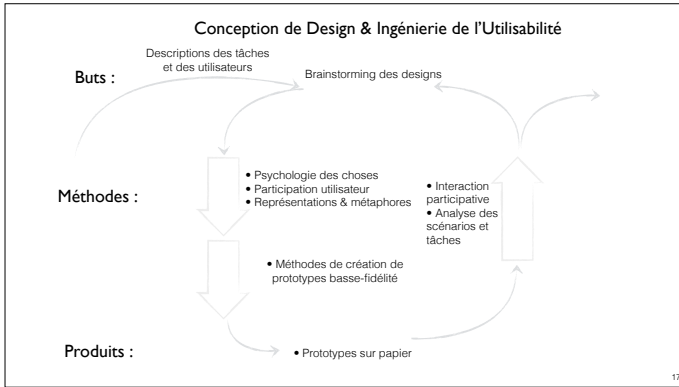- Méthodes de création de prototypes haute-fidélité

Produits : • Prototypes testables

18

Slide 19

Conception de Design & Ingénierie de l'Utilisabilité

Buts : Prototypes testables — Compléter le design

Méthodes :
- Tests déployés

Produits : • Systèmes α/β ou spécification complète

19

Slide 20
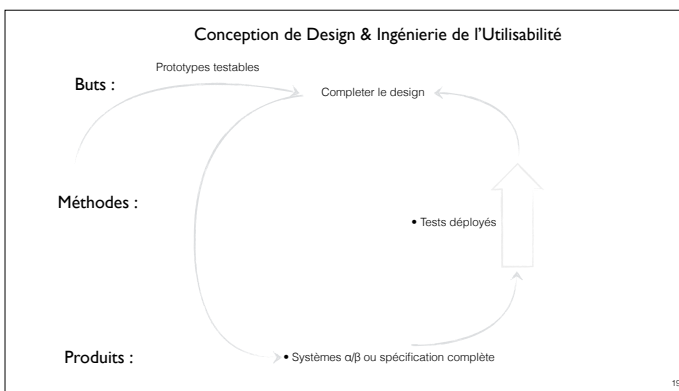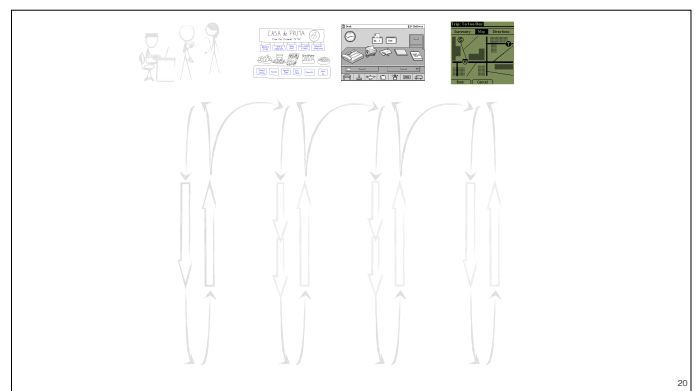

20

Slide 21

Pourquoi Suivre une Méthode de Design ?

63% de gros projets explosent leur budget

4 raisons principales :

Clients ont demandé des améliorations au design
Tâches/besoins loupées
Utilisateurs ne comprenaient pas leurs propres besoins
Communication entre développeur et utilisateur insuffisant

21

Slide 22

L'Utilisabilité = Genie Logiciel !

~Deux fois plus chère après déploiement

Trop facile à commencer un design détaillé qui … :

… est basé sur des fausses suppositions des besoins

… n'est pas suffisamment flexible

… n'est pas facile à utiliser

… n'a jamais été testé

22

Slide 23

Principes de Bases pour la Conception d'Interfaces

Overvue
- Introduction au cours et à l'IHM

Comprendre l'utilisateur et ses besoins
- Conception centrée tâche
- Développer des tâches indicatives
- Personae et scénarios utilisateurs

Design avec l'utilisateur
- Conception centrée utilisateur
- Conception participative
- Evaluer l'interface avec l'utilisateur

23

Slide 24

Principes de Bases pour la Conception d'Interfaces

Design d'interfaces visuelles
- Psychologie des choses de la vie quotidienne
- Au-delà du design sur l'écran
  – Représentations et métaphores
- Design graphique
  – Comment mettre en place les éléments graphiques sur l'écran

Principes de design
- Guidelines, heuristiques, etc.
- Comment découvrir des problèmes d'utilisabilité avant développement

THE DESIGN OF EVERYDAY THINGS

24

Objectifs du Cours

Buts de ce module :
Savoir comment récolter des besoins utilisateur et faire une analyse de tâches

Avoir de l'expérience avec la conception centrée utilisateur

• Connaître plusieurs méthodes d'évaluation
– … quand les utiliser
– … pour quels buts

Déroulement du module

Travaux dirigés :
2 heures de cours suivies par 2 heures de TD

Devoirs à maison :
À faire seule, à rendre avant la séance suivante

Projet :
À faire par groupes de 5
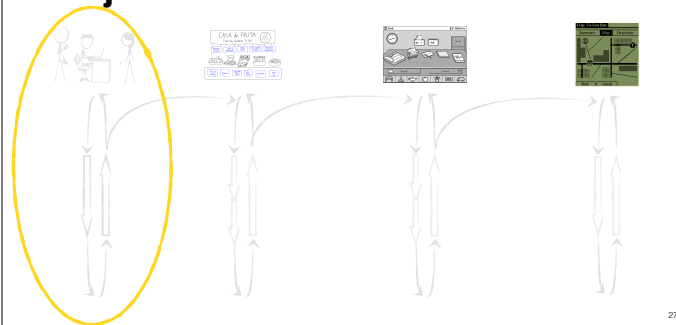Une partie conception, une partie réalisation
50 % de la note finale
Détails à suivre…

Aujourd'hui

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, affinity diagrams, computer tools

Represent data

Lists, outlines, matrices

Narratives, Scenarios, Use cases

Hierarchies, Networks, Flow Charts

How to Understand the User

Gather data

Interviews, observation, surveys & questionnaires, documentation, immersion

Organize data

Notes, cards, affinity diagrams, computer tools

Represent data

Lists, outlines, matrices

Narratives, Scenarios, Use cases

Hierarchies, Networks, Flow Charts

Data Gathering

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

---

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

---

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, …

Who, What, Where, When, Why

Some Data Gathering Methods

Observation & Think-aloud

Cooperative Evaluation

Interviews

Questionnaires & Surveys

Focus Groups

Study Documentation

Competitive Product Analysis

Ethnography

Data Gathering

Tasks & Substasks

Physical

Cognitive

Communication

Conditions under which these are done

Results/outcomes of tasks

Techniques

In-person observation

Audio/video recording

Log analysis

Interviews

"Wallow in the data"

Techniques

- In-person observation

Audio/video recording

Log analysis

- 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

Interviews

Participants

Recruitment

Questions

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

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?

Good idea / Bad idea

« Is the daily update an important feature to you? »

Better : « How do you use the daily update feature? »

Even better : « The log shows you don't use the daily update. Why? »

Good idea / Bad idea

« What would you like in a tool? »

Better : « What are you trying to do? »

Good idea / Bad idea

« How often do you read your mail? »

« How often do you read your mail in a typical day? »

« How often did you read your mail *today*? »

Measure

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

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

---

Sense-making

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

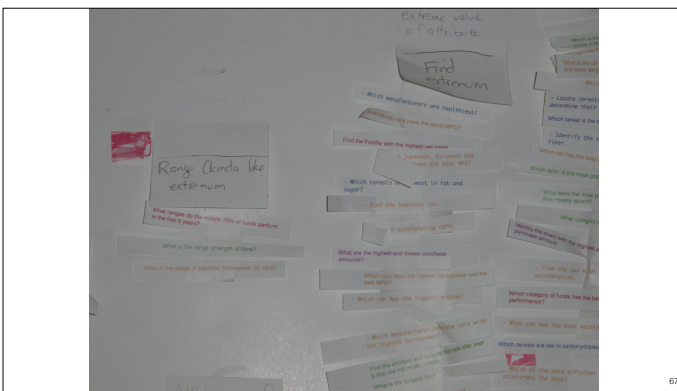Consider different audiences and goals

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

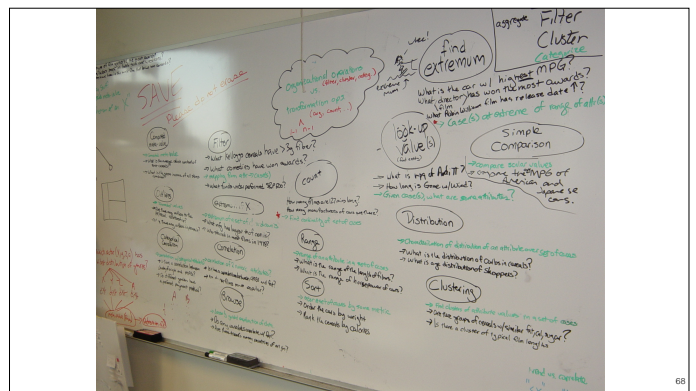Continue making subgroups

May yield a hierarchy of groups

65

66

67

68

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

69

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, …

70

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

71

Organizing Observations

Organizing the observations serves two purposes

Understand the data

Helps present the data

72

73

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?

74

Representing Data

Essential use cases

User characteristics + personae

Task outlines

Narratives

Hierarchies & Network Diagrams

Flow Charts

75

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

76

Example Use Case

- Jean regularly commutes by métro. He likes to get off a few stops early and finish the trip on a Vélib. As he approaches the métro station Jussieu, he wants to check if any bikes are free. He also wants to see which station near his home has free space to park.

77

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]

78

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)

79

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.

80

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.

81

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.

82

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

83

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
            ...

84

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

85

Hierarchies & Networks

Goals – what the user wants to achieve

Tasks – do these to achieve the goals

    Sequential dependencies

        Create new document before entering text
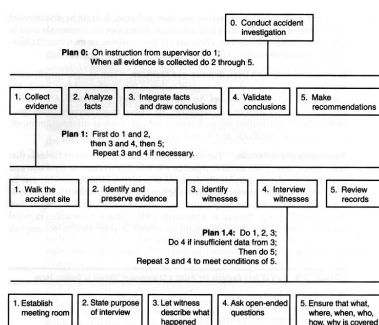
    Multiple occurrences of tasks

    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
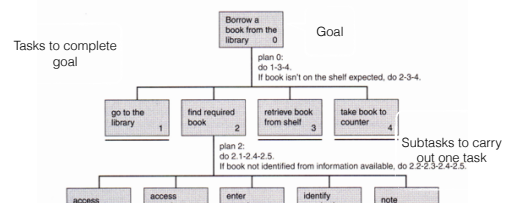
86

87

Task Model — Borrow a Book

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

88

Workflows

Documents going from one person/organization to another

Multiple participants in an activity

Web page sequencing

  Browsing, purchasing, checkout

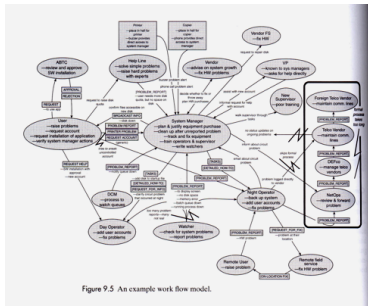# Document Flow Example

---

Multiple Participants

[From Interaction Design, Preece Rogers and Sharp]

Figure 9.5 An example work flow model.

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, …

Knowledge & Experience

Experience

task	system	Design goals:
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

97

Projet

98

Interface Tactile Pour un Restaurant

Un restaurateur vous approche demandant de créer une interface numerique pour mettre à disposition des clients dans un restaurant pour prendre les commandes.

Vous allez faire un récolte de besoins et analyse de tâches

Créer plusieurs prototypes bas-fidélité

Construire un prototype haut-fidélité

99

100