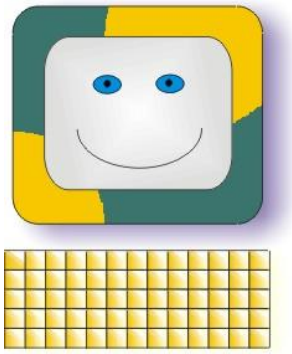
Process of interaction design

User-centred design

dr Kristina Lapin





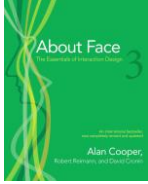
Contents

- The nature of interactive systems design
- The four processes involved in design:
  - understanding, design, envisionment, evaluation
- The centrality of evaluation in human centred design
- Understand the scenario-based design approach
- Develop scenarios and personas
- Understand the scenario-based design method.

Digital products …

- are rude
  - ask patronizing questions like “Are you sure”, “Do you really want”?
- require people to think like computers
- Why is so?
  - ignorance about users
  - conflicting interests
  - the lack of a process

The evolution of the software development process



Programmers build / test

Managers Initiate

Programmers build / test

Ship

Managers Initiate

Programmers build

QA test

Designers "look and feel"

product

Managers Initiate

mandate

Designers design

specs

Programmers build

code

QA test

users

feasibility

bug report

users

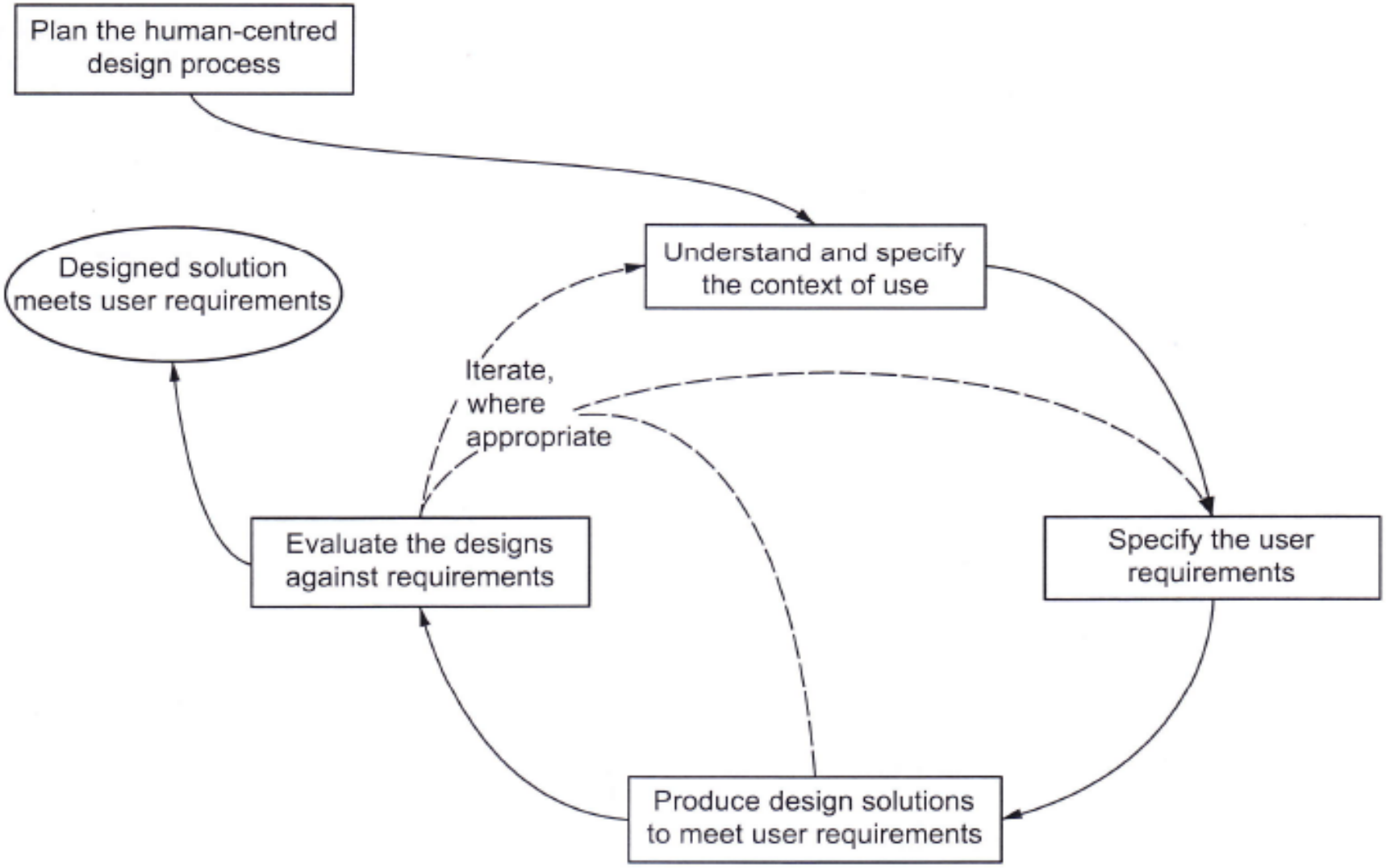


Figure 1 — Interdependence of human-centred design activities

ISO 9241-210:2010

What is human-centered design?

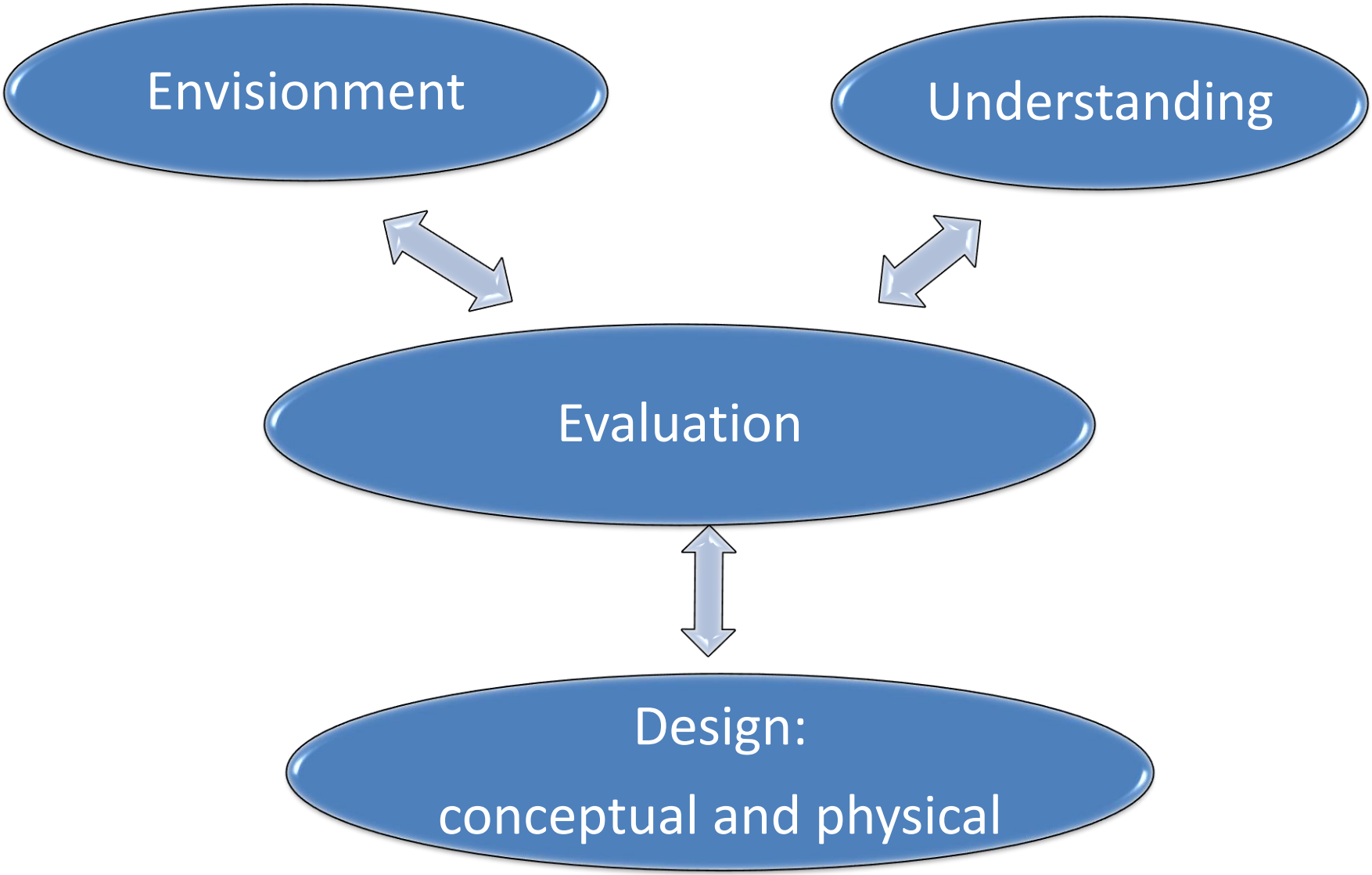
- Approach to systems design and development that aims
  - to make interactive systems more usable
  - by focusing on the use of the system and
  - applying human factors/ergonomics and usability techniques
- Human-centred term is used to emphasize the impacts on a number on stakeholders
  - „user-centred“ and „human-centred“ are used synonymously

What is a user-centered approach?

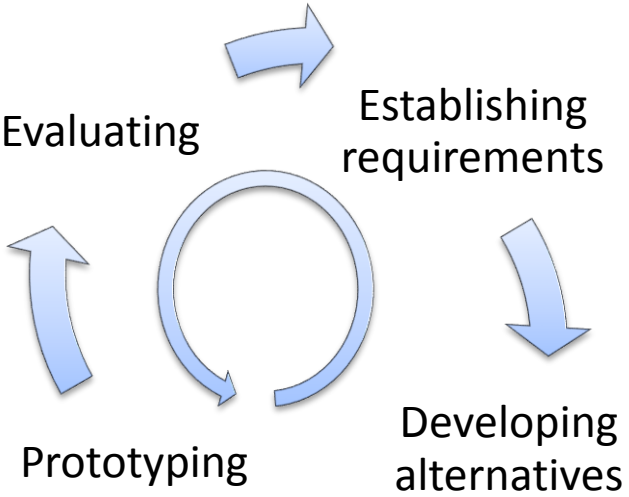
User-centered approach is based on:

- Early focus on users and tasks
  - User's strength, limitations, preferences and expectations are taken into account when specifying which activities are carried out
- Empirical measurement
  - users' reactions and performance to scenarios, manuals, simulations & prototypes are observed, recorded and analysed
- Iterative design
  - problems are found in user testing, fix them and carry out more tests

The processes of user-centered design (UCD)



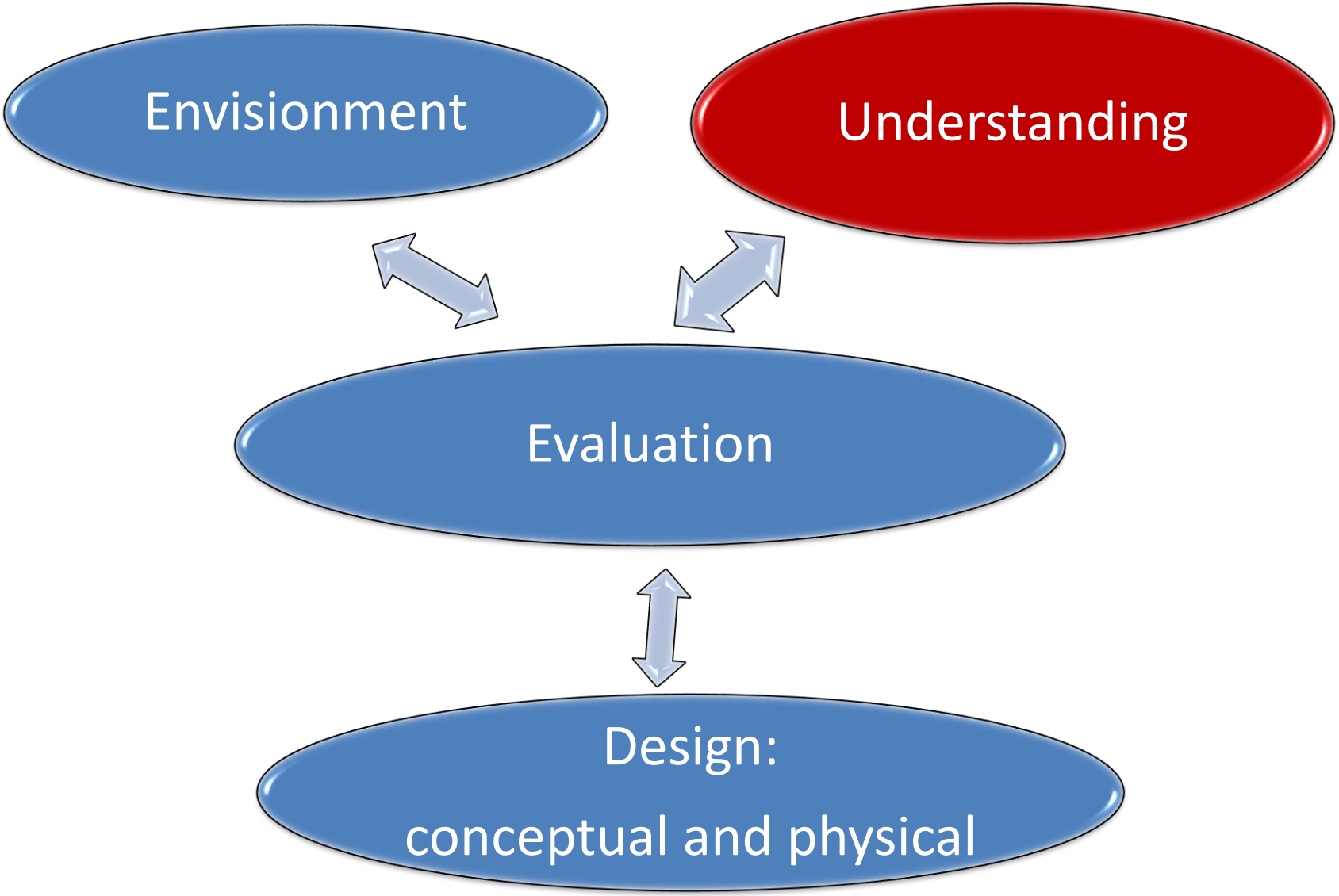
Core characteristics of UCD



Users involved through the development

Crearly documented user goals

Iterations


Envisionment
Understanding
Evaluation
Design:
conceptual and physical

Degrees of user involvement

- Member of the design team
  - Full time: constant input, but lose touch with users
  - Part time: patchy input, and very stressful
  - Short term: inconsistent across project life
  - Long term: consistent, but lose touch with users

- Newsletters and other dissemination devices
  - Reach wider selection of users
  - Need communication both ways
- User involvement after product is released
- Combination of these approaches

Importance of involving users

- Expectation management
  - Realistic expectations
  - No surprises, no disappointments
  - Timely training
  - Communication, but no hype
- Ownership
  - Make the users active stakeholders
  - More likely to forgive or accept problems
  - Can make a big difference to acceptance and success of product

Understanding users' needs

- Taking into account
  - what people are good and bad at
  - what might help people in the way they currently do things
  - what might provide quality user experiences
- Listen to what people want and get them involved
- Use tried and tested user-centered methods

Some practical issues

- Who are the users?
- What do we mean by ‘needs’?
- How to generate alternatives
- How to choose among alternatives
- How to integrate interaction design activities with other models?

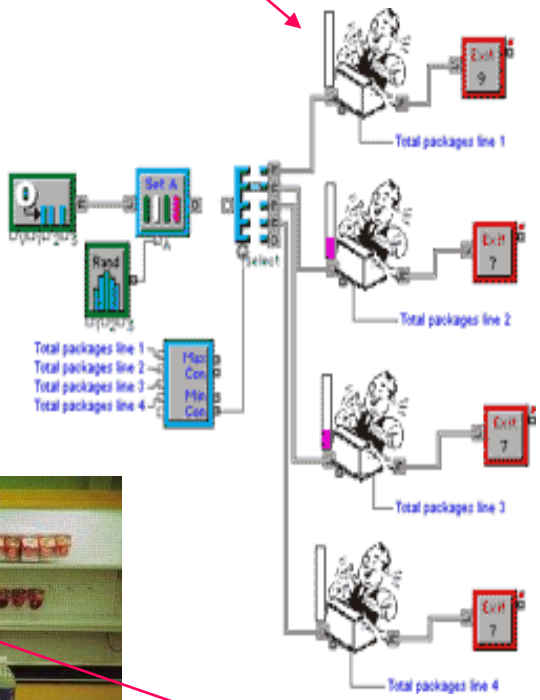
Who are the users/stakeholders?

- Stakeholder
  - individual or organization having a right, share, claim or interest in a system or in its possession of characteristics that meet their needs and expectations (ISO 9241-210:2010)
- Not as obvious:
  - those who interact directly with the product
  - those who manage direct users
  - those who receive output from the product
  - those who make the purchasing decision
  - those who use competitor's products
- Three categories of user (Eason, 1987):
  - primary: frequent hands-on
  - secondary: occasional or via someone else
  - tertiary: affected by its introduction, or will influence its purchase

Who are the stakeholders?

- Suppliers
- Local shop owners

Check-out operators

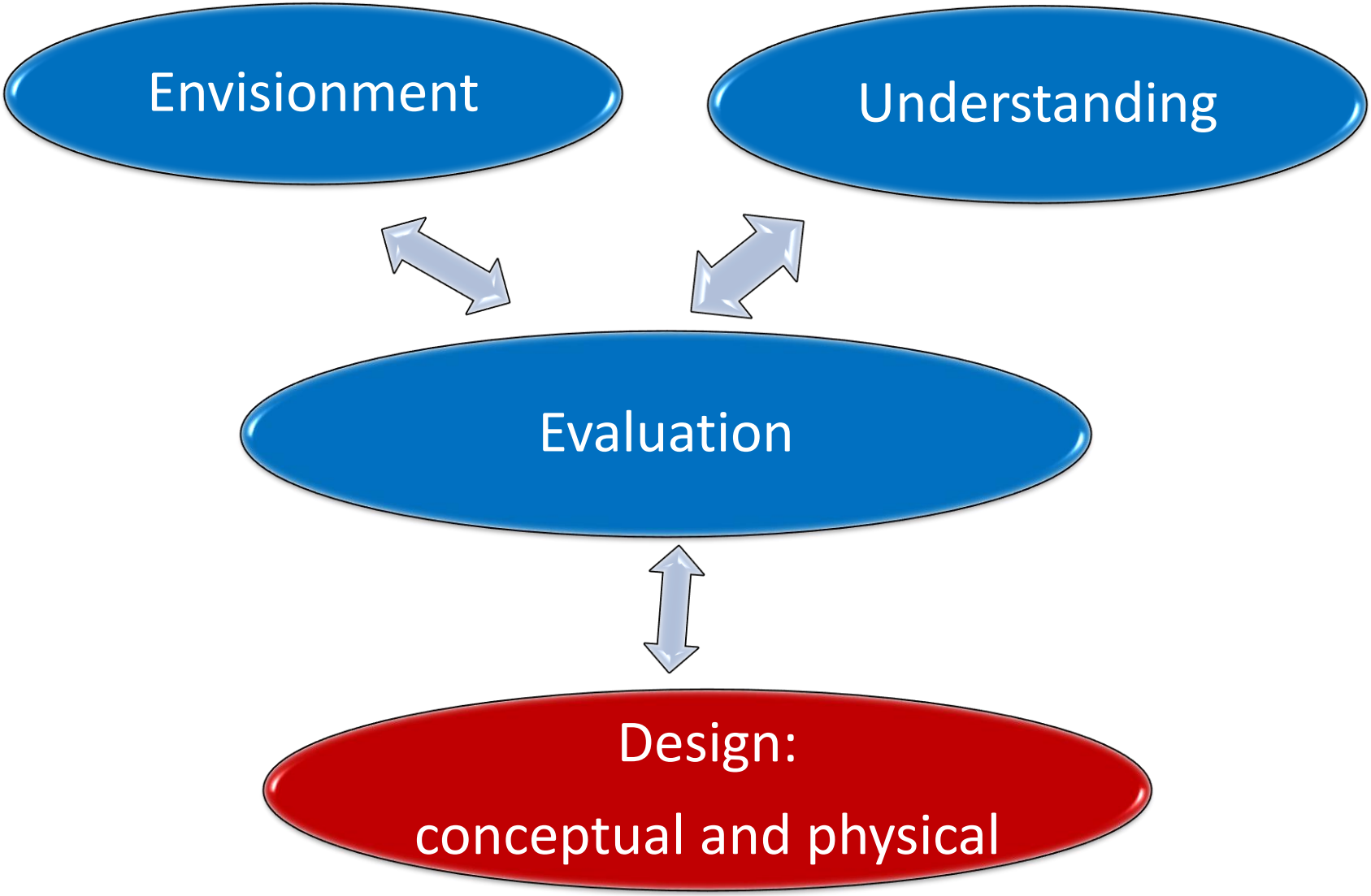


Managers and owners

Customers

What do we mean by 'needs'?

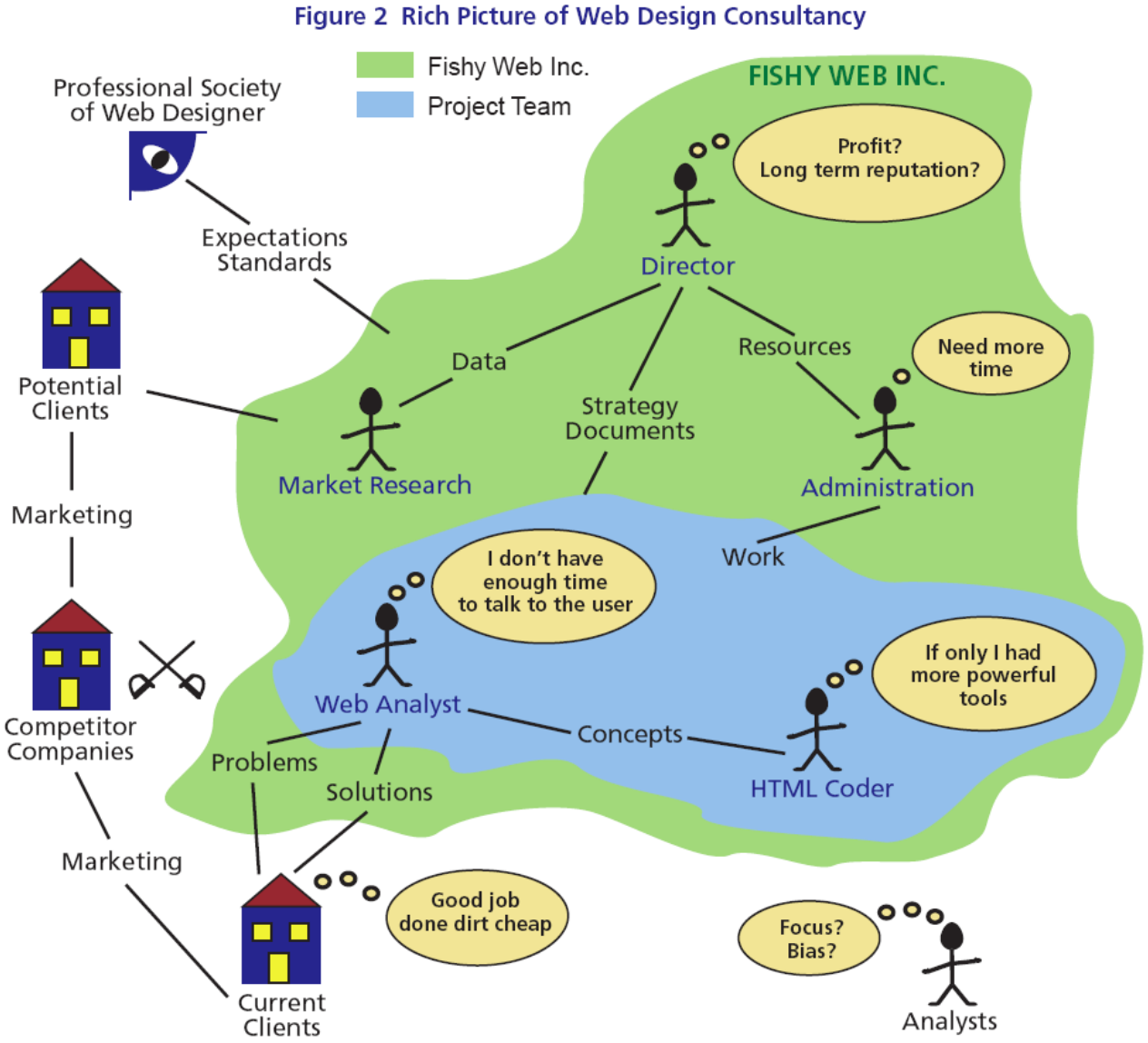
- Users rarely know what is possible
- Users can't tell you what they 'need' to help them achieve their goals
- Instead, look at existing tasks:
  - their context
  - what information do they require?
  - who collaborates to achieve the task?
  - why is the task achieved the way it is?
- Envisioned tasks:
  - can be rooted in existing behaviour
  - can be described as future scenarios


Envisionment
Understanding
Evaluation
Design:
conceptual and physical

Conceptual design

- What?
  - what information and functions are needed for the system to achieve its purpose
  - what someone will have to know to use the system.
- Clear conceptualization of a design solution and how that conceptualization will be communicated to people
  - User story, rich picture
  - Use-cases, entity-rellationship models

Conceptualization of needs: rich picture



Physical design

- How?
  - how peaple will work: the look and the feel
  - structuring interactions into logical sequences
  - clarifying and presenting the allocation of functions and knowledge between people and devices.

Envisionment

- Designs need to be visualized
  - to help designers clarify their own ideas
  - to enable people to evaluate them
- Appropriate medium for
  - the stage of the process,
  - the audience and
  - available resources
- Sketches, mockups, prototypes

PERSONAS AND SCENARIOS

Personas

- Personas are concrete representations of the different types of people that the system or service is being designed for.
- Indicate aims, meaningful activities
- Designers create personas so that they can envisage whom they are designing for.

Mari

- age 23
- aerobics instructor
- training seriously for first marathon
- her usual training partner has moved away
- she leads a wild social life and tends to burn the candle at both ends
- she's got a targeted schedule
- companion is very proactive in pace making and motivation

1. She's set up a long-term schedule with her HFC to enable her to run her first marathon in under 4 hours.
2. This includes target goals such as what times she should be running long distances by which stage of the regime.
3. The HFC adapts to maintain the regime when Mari's social circumstance impacts her ability to train.
4. If she runs too far or too fast the companion will advise that this may have a negative impact on her training and may result in potential injury.
5. Explicit instructions in real time run ('ok, now we're gonna push hard for 2 minutes....ok, well done, let's take it easy for the next 5....etc.')
6. The HFC has access to her social schedule (through social companion?) and suggests going to a party the night before a long run may not be a great idea.
7. At the actual marathon her HFC becomes a motivating force and gives her real-time advice (eg, 'there's a hill coming up, pace yourself', it knows this from a run plug-in she bought for the HFC).

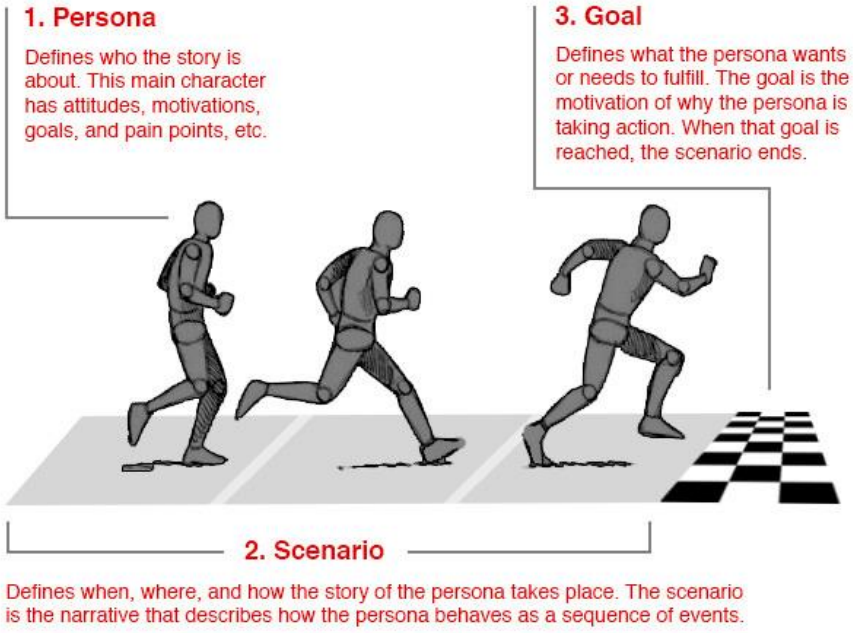
[2] D. Beyon. chapter 3. Personas and scenarios

The types of personas

- Goal-directed persona
- Role directed persona
- Egaging persona
- Fictional persona

Goal directed persona

- What user will do while using product?
  - the process of achieving their goals



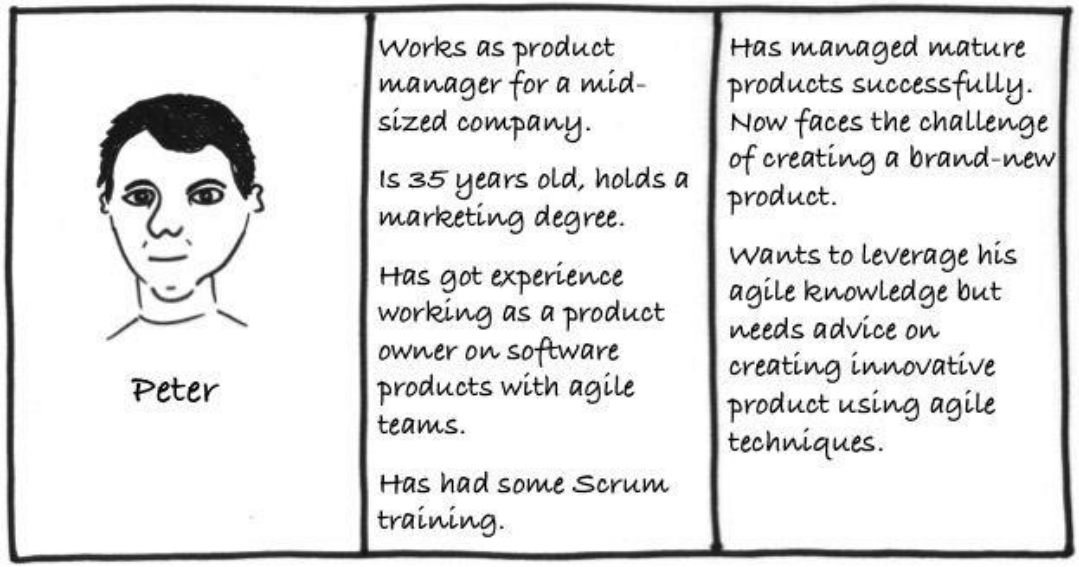
https://www.interaction-design.org/ux-daily/48/four-different-perspectives-on-user-personas

Role persona

- reflects the part that users play in their organizations or wider lives
- Where will the product be used?
- What's this role's purpose?
- What business objectives are required of this role?
- Who else is impacted by the duties of this role?
- What functions are served by this role?

Engaging personas

- incorporate both goal and role directed personas
  - examine the emotions of the user, their psychology, their backgrounds and make them relevant to the task in hand



https://www.interaction-design.org/ux-daily/48/four-different-perspectives-on-user-personas

Fictional Personas

- Emerges from the experience of the UX design team
- Designer makes assumptions based on the past interactions with the user and products to deliver a picture of what, perhaps, typical users look like.
- An initial sketch of user needs rather than a detailed portrait

USING SCENARIOS THROUGHOUT DESIGN

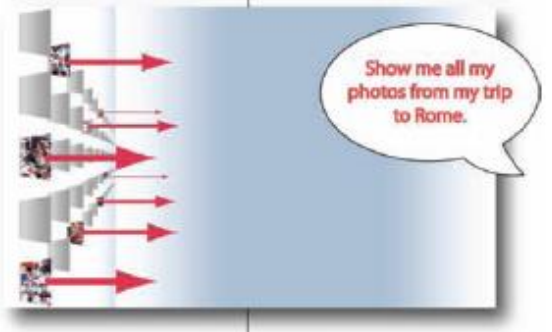
Scenarios

- Scenarios are stories about people undertaking activities in contexts using technologies.

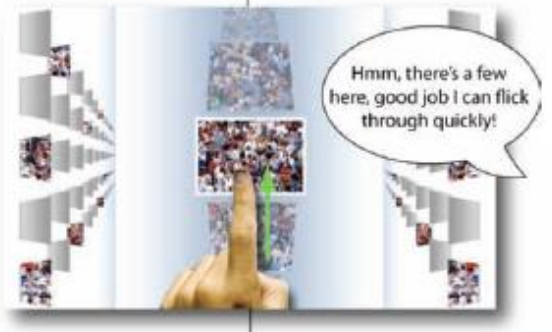
[2] D. Beyon. chapter 3. Personas and scenarios.

1. The user is moving from a standard view of their photos to a search mode. This is a **voice** driven function.

2. Here the user narrows down the field by establishing a search parameter again by voice. Note that the user could search for any metadata parameter or combination of parameters that the system has established. Indeed the system could proactively suggest additional ones.



3. Having used voice to establish the smaller field, the user now applies **touch** to quickly flick through the pictures. Additional touch functionality could include scaling, cropping or editing.



4. Having found the photo they want to send, the user now combines speech with touch to indicate that the gesture of flicking to the left means email that specific image to the user's uncle.

Figure 3.7 An scenario of multimodal interaction with a Photo Companion

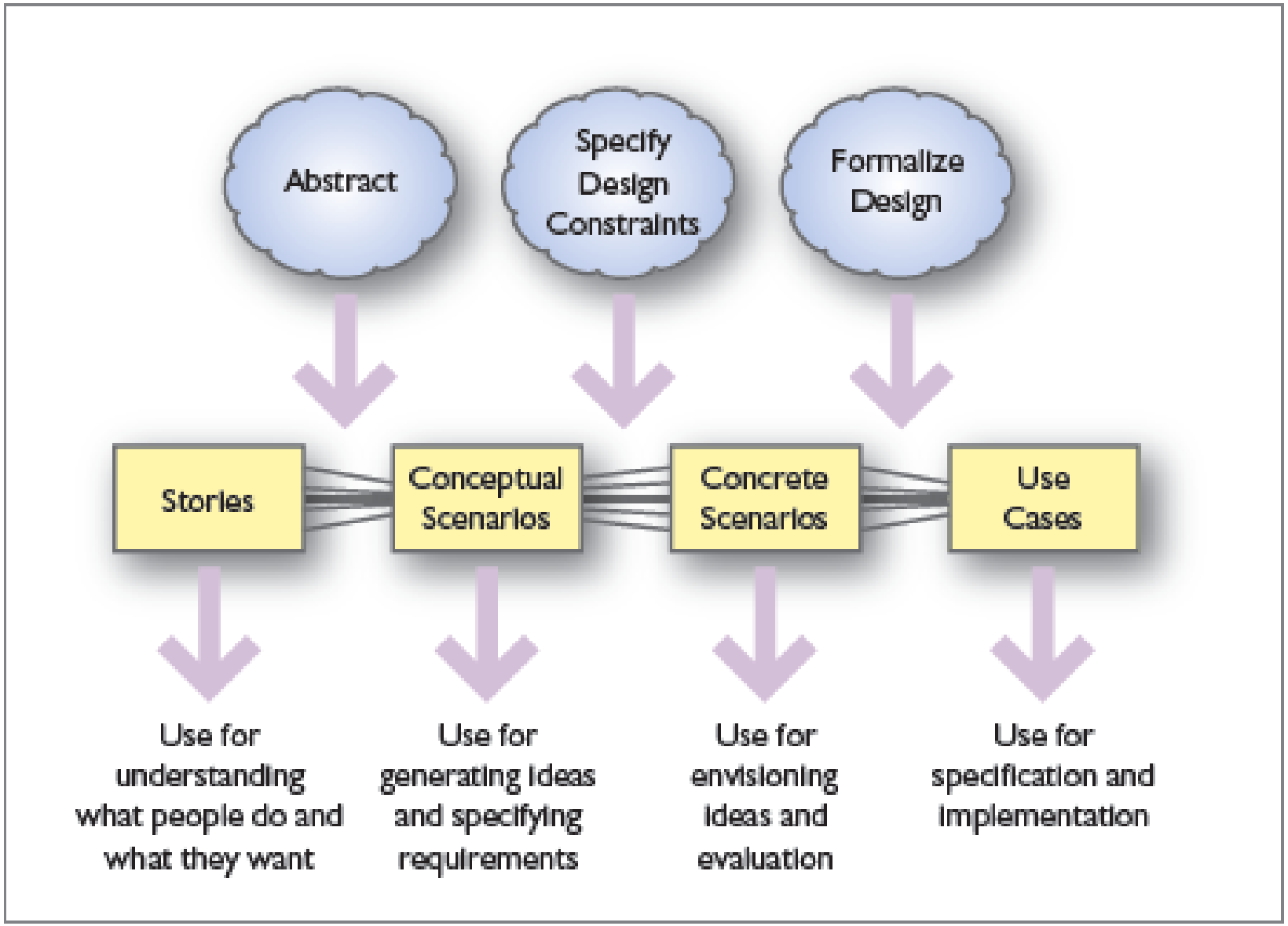
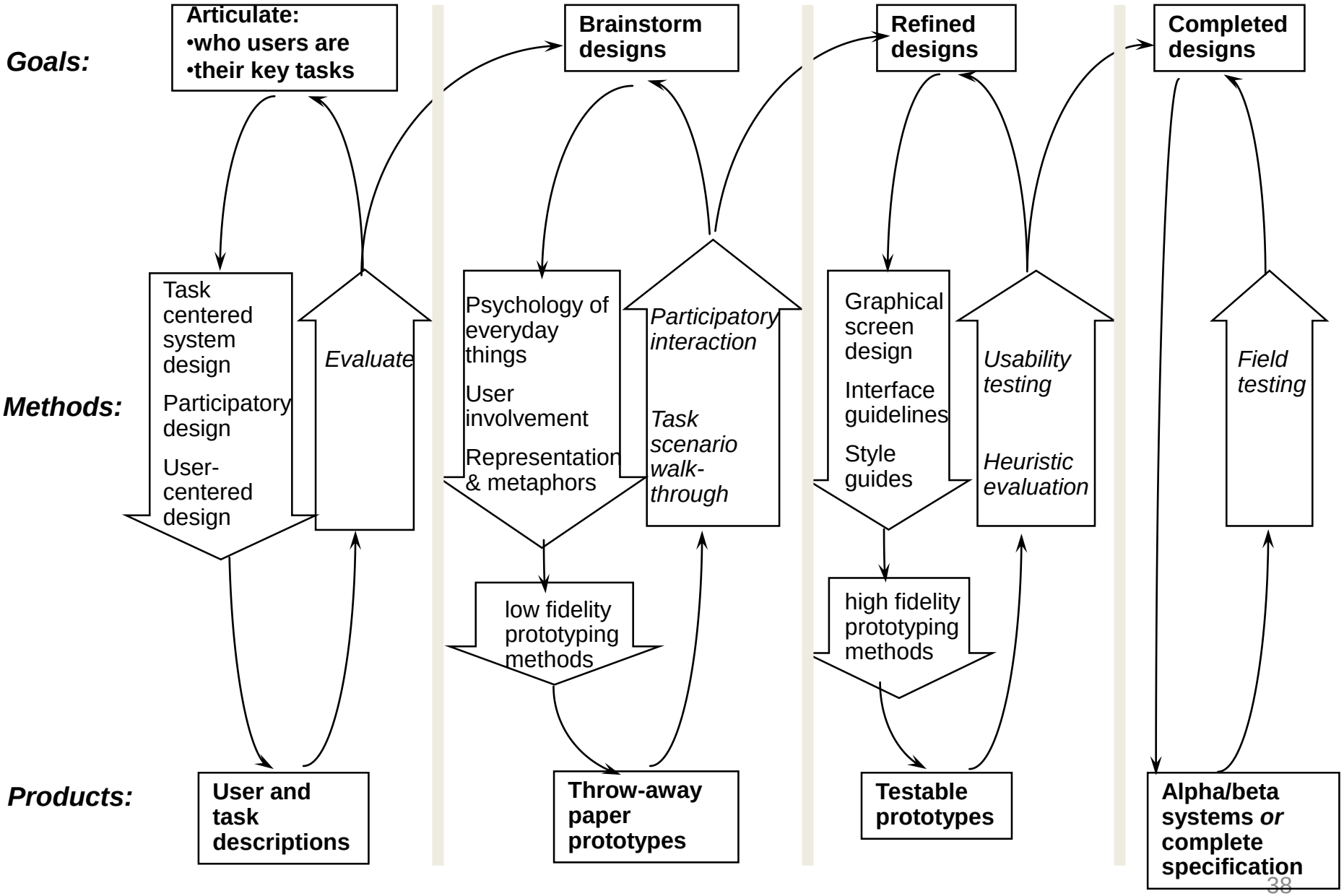


Figure 3.10 Scenarios throughout design

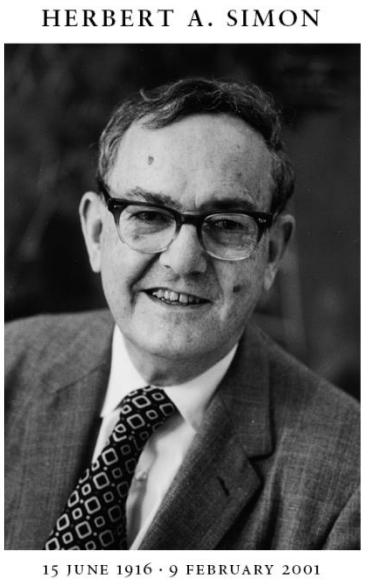
[1] p.65

Usability engineering life cycle (Soul Greenberg)



TASK ANALYSIS

Herbert Simon and behavior



- if we change the environment, we change the behavior.
- Design transforms existing situations into (hopefully) preferred ones.

http://www.amphilsoc.org/sites/default/files/proceedings/213.pdf

All design is redesign

- We ought to have a really good sense of what the existing situations are and
- what preferred means for the users.
- “Preferred” has to do with both the user’s goals and the point of view of a designer.

Explicit activity analysis

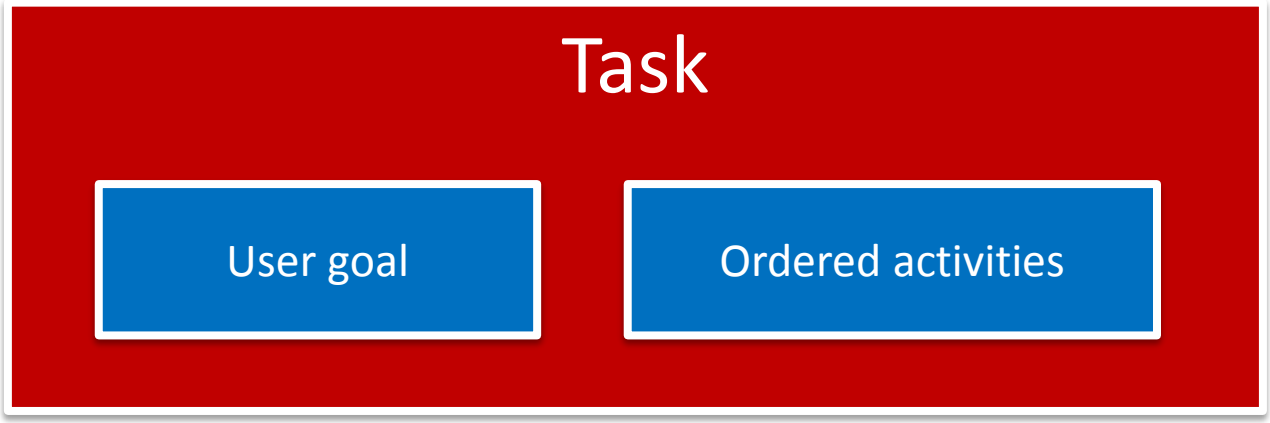
- Gives a *conceptual representation*
- This helps to understand the domain, and helps you communicate and discuss with other stakeholders
- Having this intermediate, conceptual representation makes it easier to be creative because you're taking a couple small leaps instead of one big one

Envisionment process

1. Review conceptual scenarios
2. Develop design ideas
   - Concrete scenarios
   - Interaction sequences
   - Experiment with different metaphors
3. Explore design ideas with potential users
4. Develop wireframes
5. Iterate and gradually make more concrete the design through prototyping and evaluations

Goals, tasks, actions

- Task is
  - user goal
  - ordered actions with which user achieves the goals



The outcome of activity analysis

- What are the steps?
- What are the artefacts?
- What are the goals?
  (how you'll measure success)
- What are the pain points?

Example: steps

- Unlock driver's door
- Take a seat behind the wheel
- Insert key in ignition switch
- Turn key fully clockwise
- When engine starts, release the key
- Artefacts
  - key, car, door-lock, ignition switch

Example: pain points

- In the narrow version:
  - necessary to put the key in? It's already in the car. Why not just drive off?
- In the slightly broader framing, the pain point could be
  - needing a car to get bread. (Alternatively, bread could be delivered, or you could walk/bike/...)

Task analysis

- A *task is the sequence of steps a user will follow to achieve a specific goal.*
- Job analysis is
  - the identification of all tasks
  - a person performs as part of a job role
    - or to achieve some overall goals.

Task analysis

- Task descriptions are often used to envision new systems or devices
- Task analysis is used mainly to investigate an existing situation
- It is important not to focus on superficial activities
  - What are people trying to achieve?
  - Why are they trying to achieve it?
  - How are they going about it?
- Many techniques, among others popular is Hierarchical Task Analysis (HTA)

Activity analysis is easiest for...

- Workflows like doing taxes or travel
- planning
- Repeated activities, like scheduling (why does it take 17 emails?)

Task analysis techniques

- Stories
- Storyboards
- User cases
- Hierarchical task analysis
- Navigation maps

Task descriptions

- Stories, scenarios
  - an informal narrative story, simple, ‘natural’, personal, not generalisable
- Use cases
  - assume interaction with a system
  - assume detailed understanding of the interaction
- Essential use cases
  - abstract away from the details
  - does not have the same assumptions as use cases
- Storyboards

Scenario for travel organizer

"The Thomson family enjoy outdoor activities and want to try their hand at sailing this year. There are four family members: Sky (10 years old), Eamonn (15 years old), Claire (35), and Will (40).
One evening after dinner they decide to start exploring the possibilities. They all gather around the travel organizer and enter their initial set of requirements – a sailing trip for four novices in the Mediterranean. The console is designed so that all members of the family can interact easily and comfortably with it. The system's initial suggestion is a flotilla, where several crews (with various levels of experience) sail together on separate boats. Sky and Eamonn aren't very happy at the idea of going on vacation with a group of other people, even though the Thomsons would have their own boat. The travel organizer shows them descriptions of flotillas from other children their ages and they are all very positive, so eventually, everyone agrees to explore flotilla opportunities. Will confirms this recommendation and asks for detailed options. As it's getting late, he asks for the details to be printed so everyone can consider them tomorrow. The travel organizer prints out a summary of the different options available."

Use case for travel organizer

1. The system displays options for investigating visa and vaccination requirements.
2. The user chooses the option to find out about visa requirements.
3. The system prompts user for the name of the destination country.
4. The user enters the country’s name.
5. The system checks that the country is valid.
6. The system prompts the user for her nationality.
7. The user enters her nationality.
8. The system checks the visa requirements of the entered country for a passport holder of her nationality.
9. The system displays the visa requirements.
10. The system displays the option to print out the visa requirements.
11. The user chooses to print the requirements.

Alternative courses for travel organizer

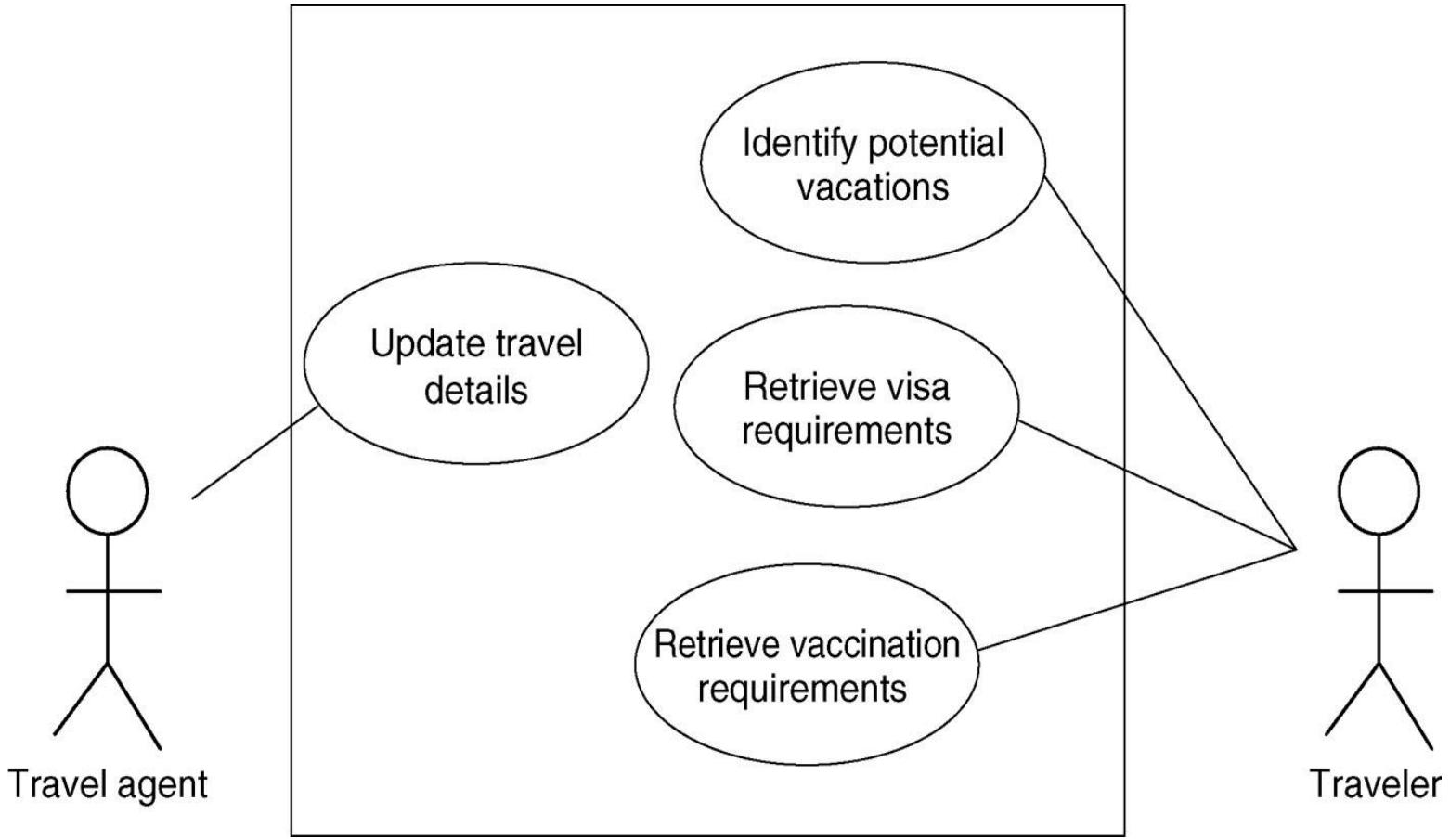
Some alternative courses:

6. If the country name is invalid:
6.1 The system displays an error message.
6.2 The system returns to step 3.

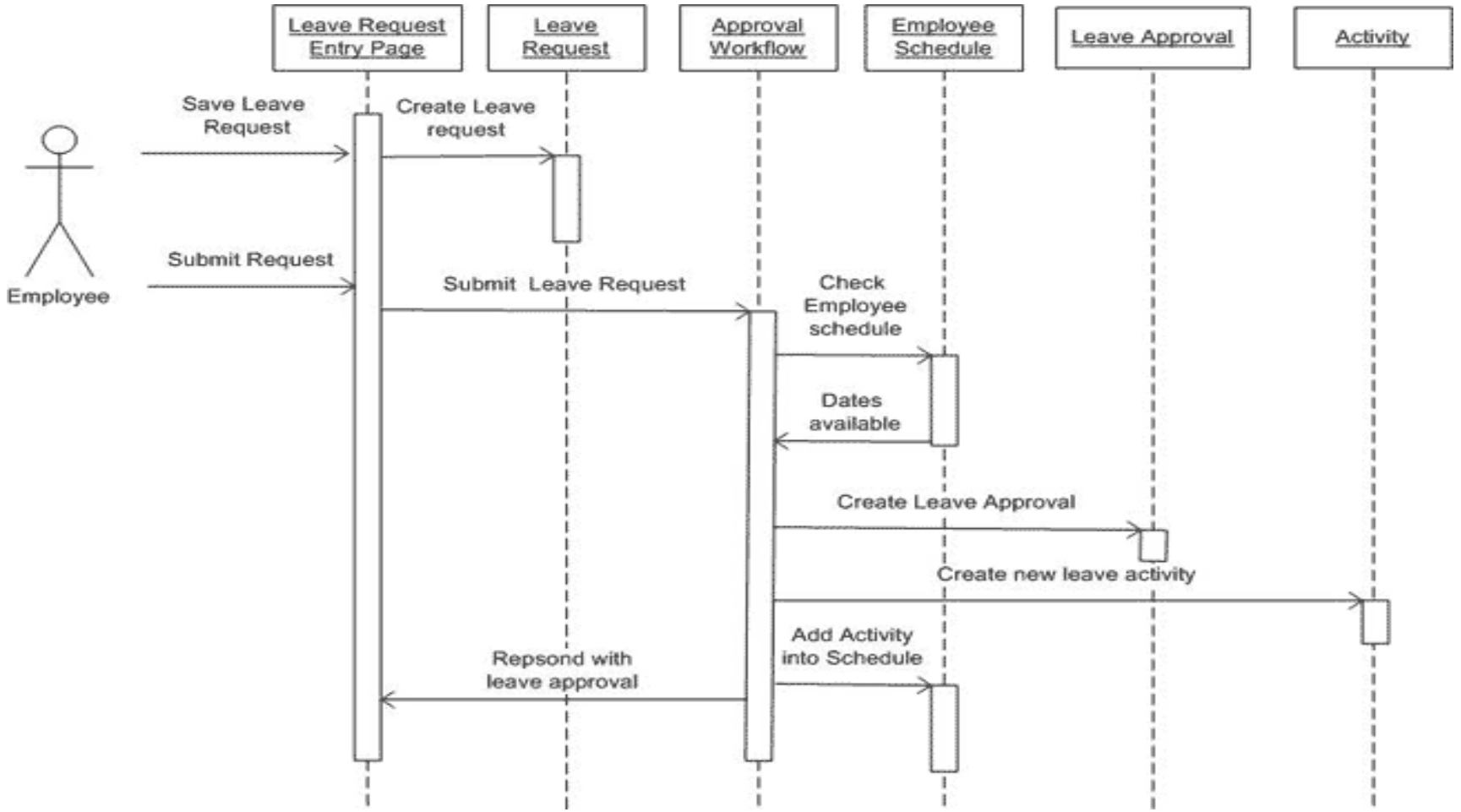
8. If the nationality is invalid:
8.1 The system displays an error message.
8.2 The system returns to step 6.

9. If no information about visa requirements is found:
9.1 The system displays a suitable message.
9.2 The system returns to step 1.

Example use case diagram for travel organizer



Example of sequence diagram



Sequence diagrams decompose use case

2017.10.03 09:08

Example essential use case for travel organizer

retrieveVisa

USER INTENTION	SYSTEM RESPONSIBILITY
find visa requirements	
	request destination and nationality
supply required information	
	obtain appropriate visa info
obtain copy of visa info	
	offer info in different formats
choose suitable format	
	provide info in chosen format

Task analysis

- Task descriptions are used to envision new systems or devices
- Task analysis is used mainly to investigate an existing situation
- It is important not to focus on superficial activities
  - What are people trying to achieve?
  - Why are they trying to achieve it?
  - How are they going about it?
- Many techniques, the most popular is Hierarchical Task Analysis (HTA)

Hierarchical Task Analysis

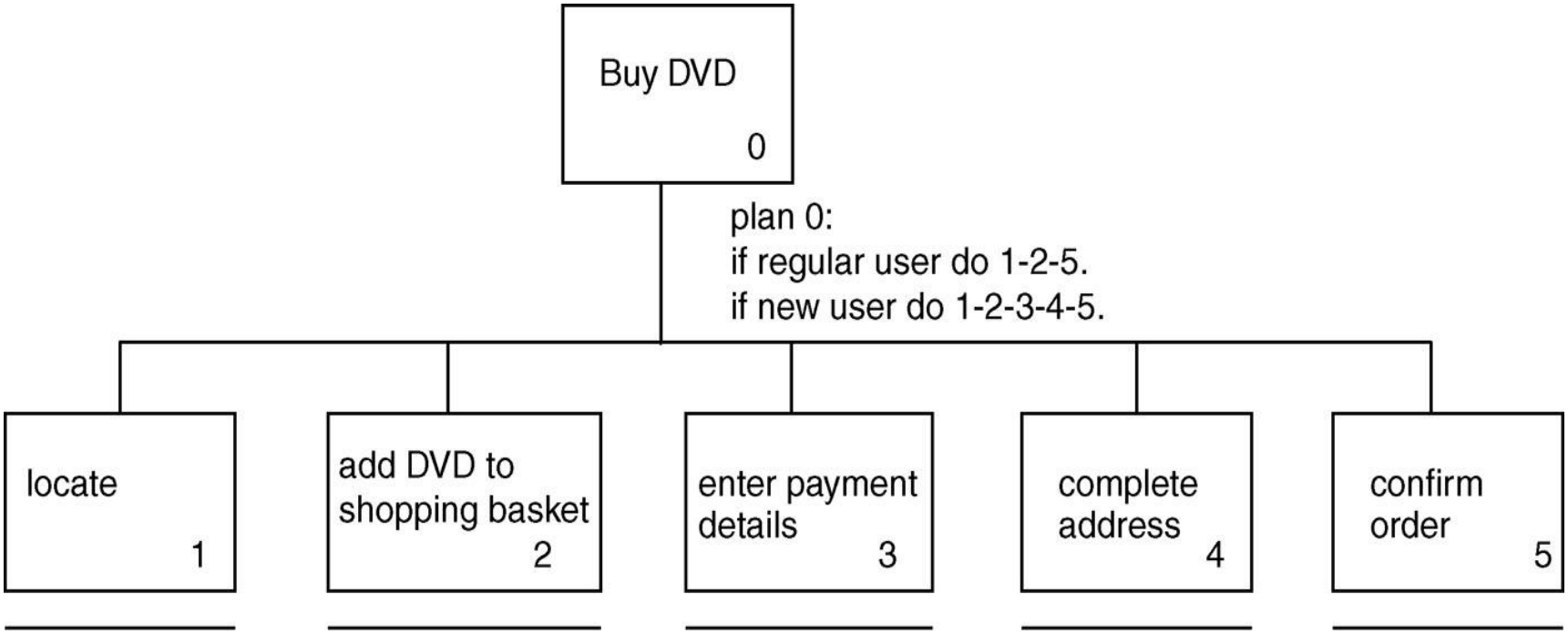
- Involves breaking a task down into subtasks, then sub-sub-tasks and so on. These are grouped as plans which specify how the tasks might be performed in practice
- HTA focuses on physical and observable actions, and includes looking at actions not related to software or an interaction device
- Start with a user goal which is examined and the main tasks for achieving it are identified
- Tasks are sub-divided into sub-tasks

Example Hierarchical Task Analysis

0. In order to buy a DVD
1. locate DVD
2. add DVD to shopping basket
3. enter payment details
4. complete address
5. confirm order

plan 0: If regular user do 1-2-5.
If new user do 1-2-3-4-5.

Example Hierarchical Task Analysis (graphical)



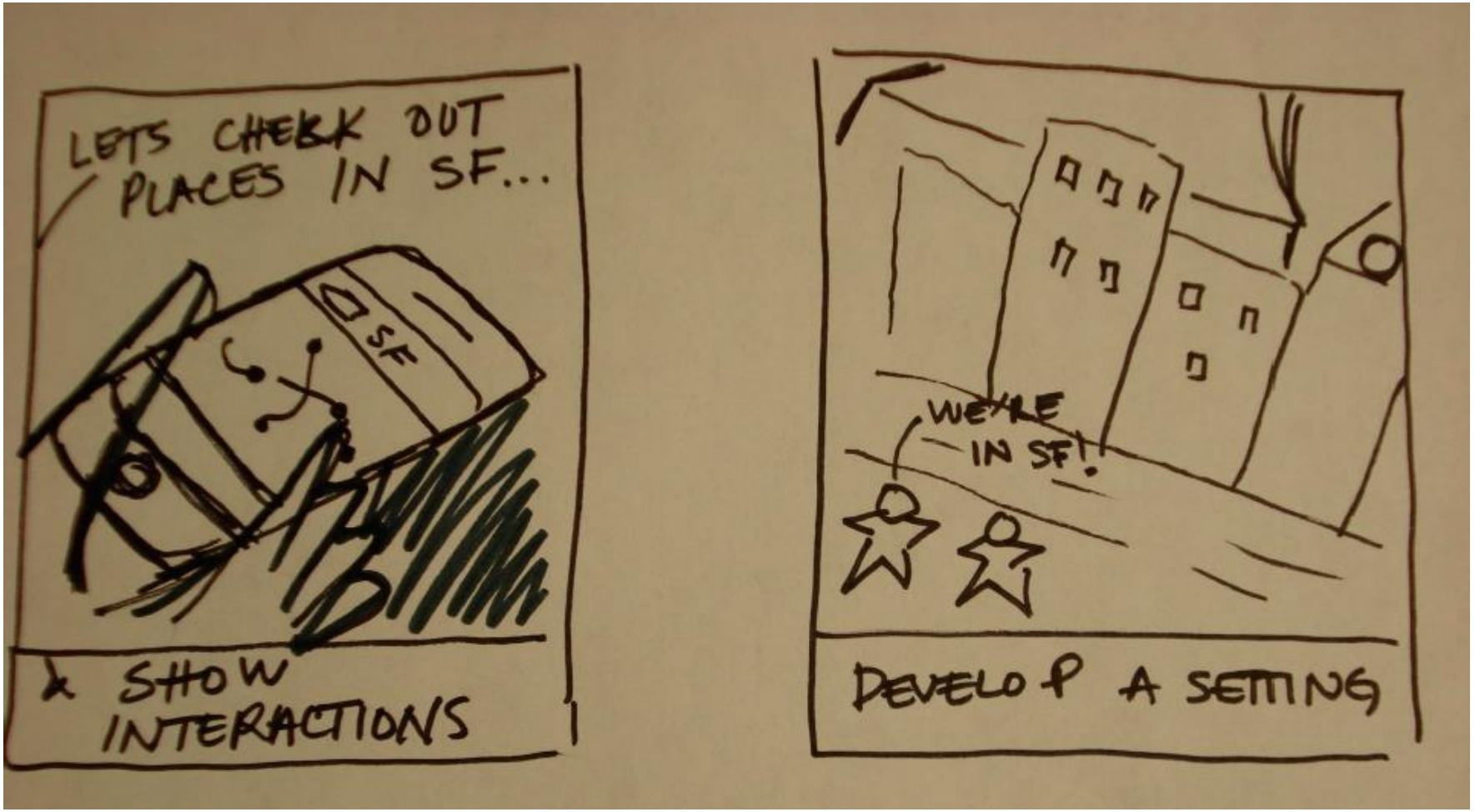
Storyboards

- Often used with scenarios, bringing more detail, and a chance to role play
- It is a series of sketches showing how a user might progress through a task using the device
- Used early in design

Storyboards

Storyboarding isn’t about “pretty pictures”

it’s about communicating ideas



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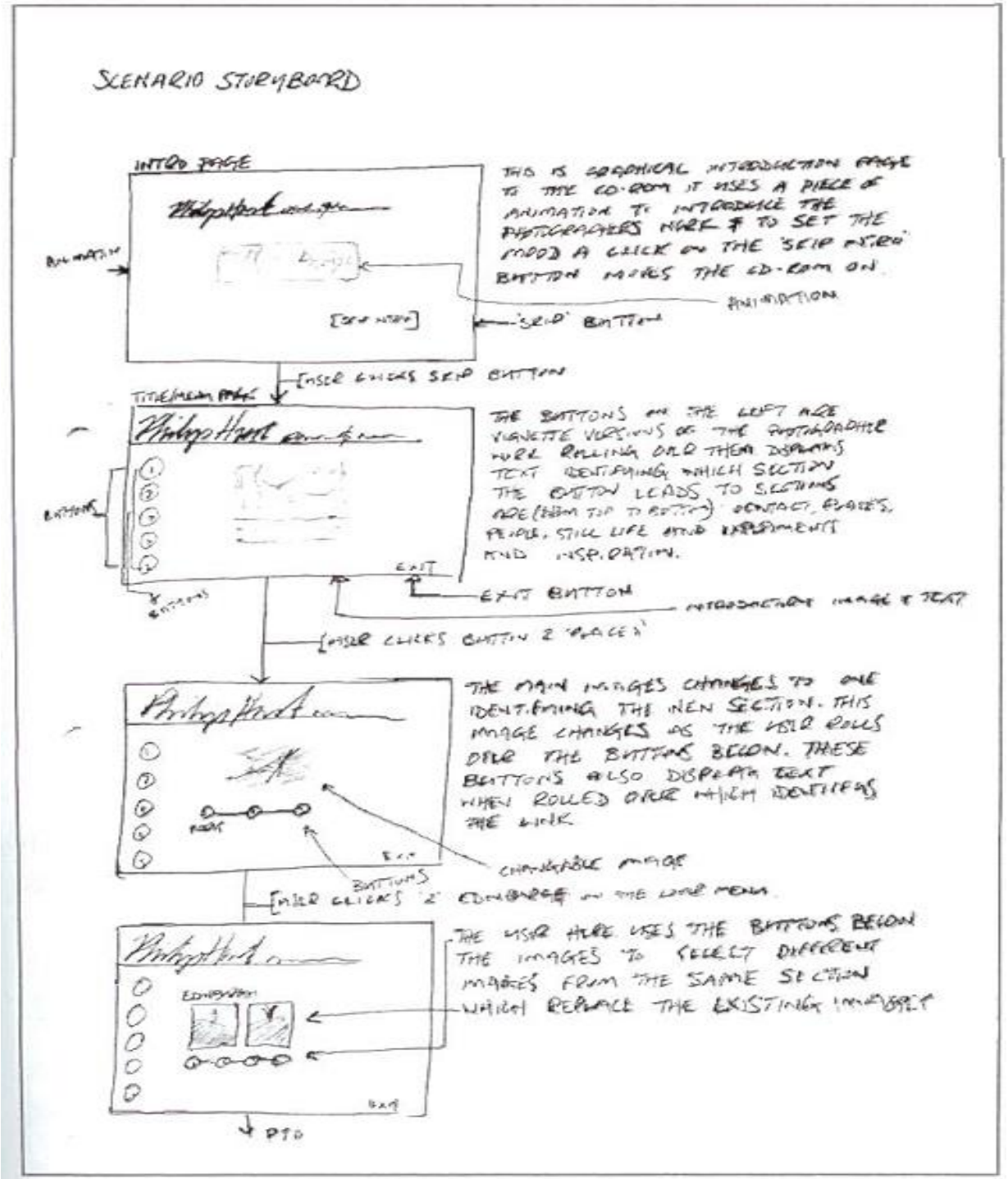
Scenario storyboard

Part of the storyboard for a photographer's website



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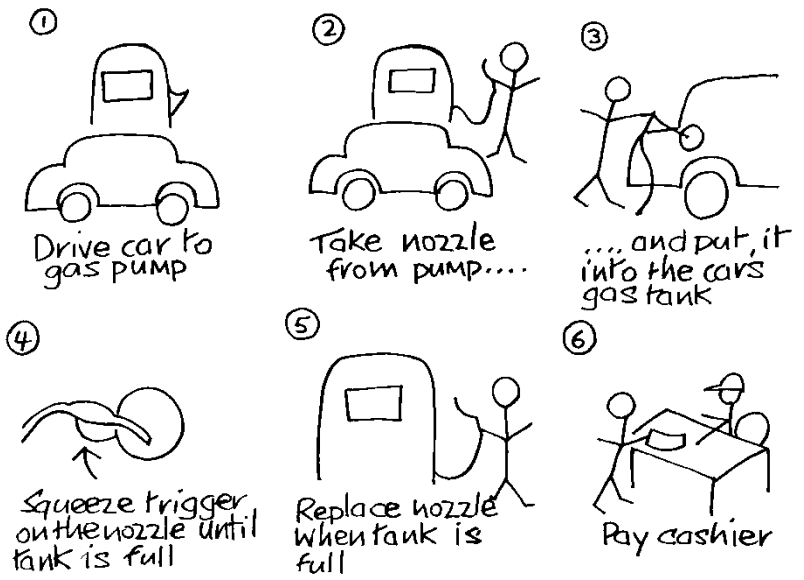
Storyboards Should Convey

- Setting: people involved, environment, task being accomplished
- Sequence:
  - What steps are involved?
  - What leads someone to use the app?
  - What task is being illustrated?
- Satisfaction
  - What's motivates people to use this system?
  - What does it enable people to accomplish?
  - What need does the system fill?

Amal Dar Aziz, Guide to Storyboarding, http://hci.st/story

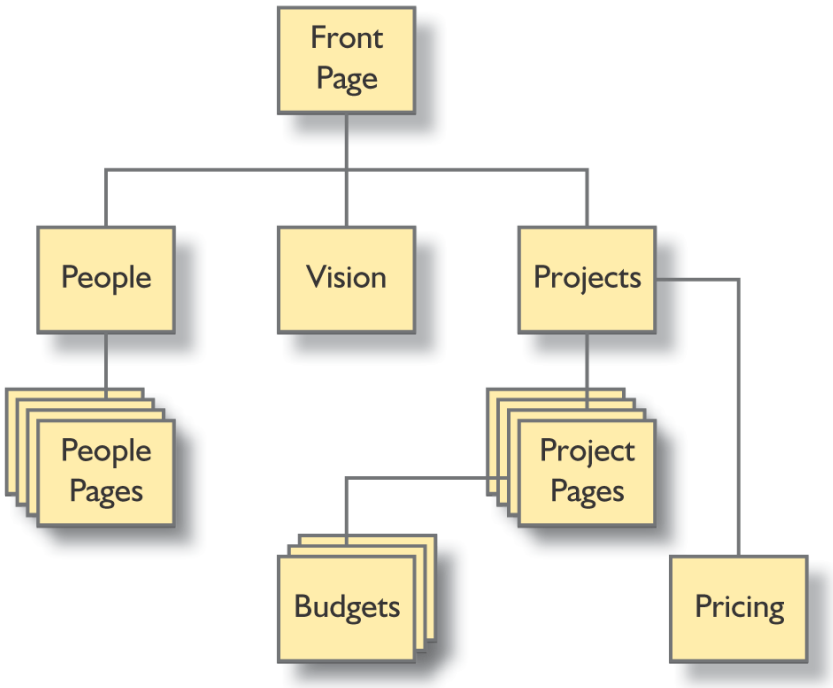
Sketching

- Sketching is important to low-fidelity prototyping
- Don’t be inhibited about drawing ability. Practice simple symbols



Hartfield, Winograd, 1996

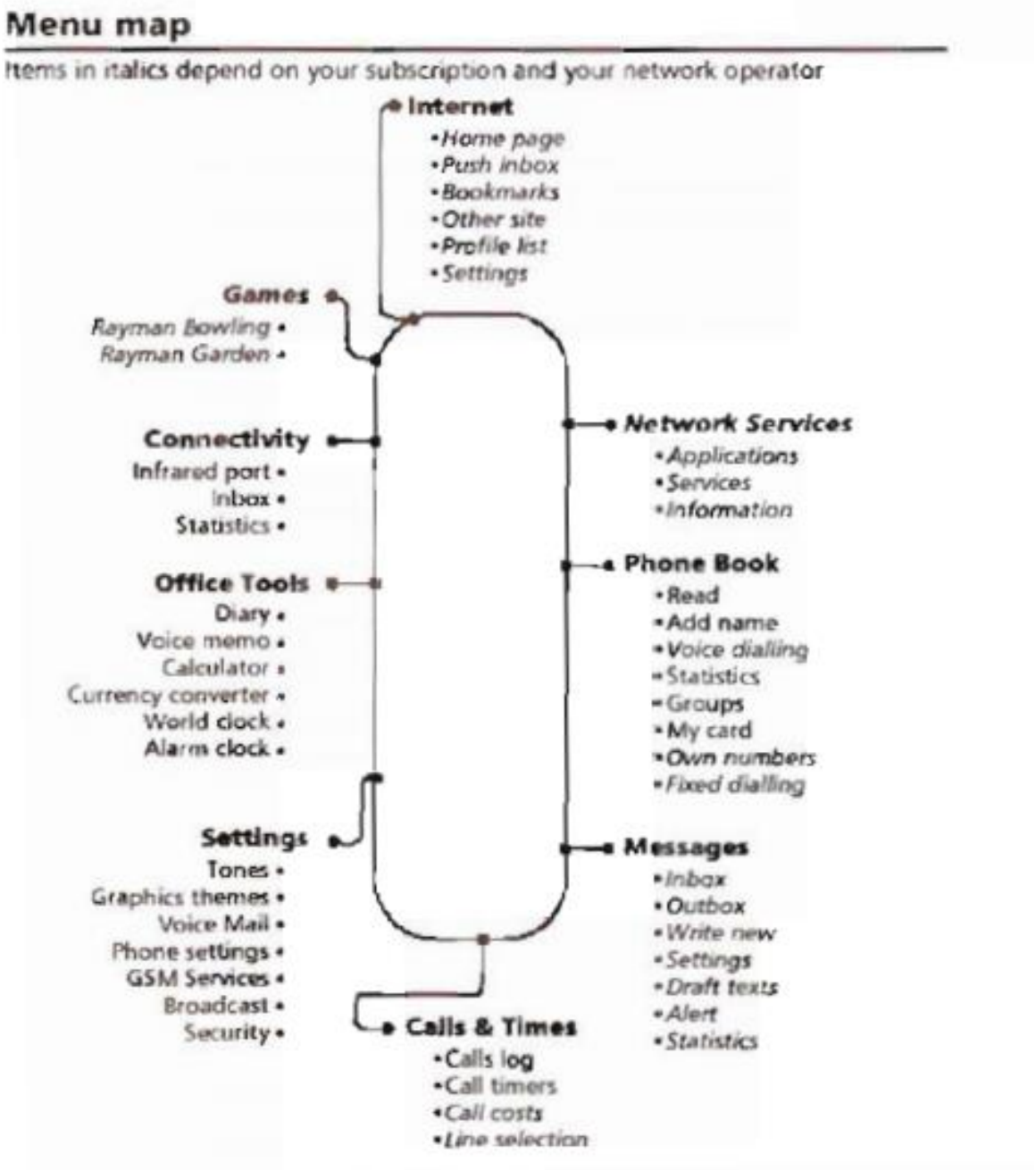
Navigation maps



- Focus on how people move through the site or application
- Each page is a box or heading

Picture from Benyon

Example of mobile phone annotated navigation map



A comparison of task analysis techniques

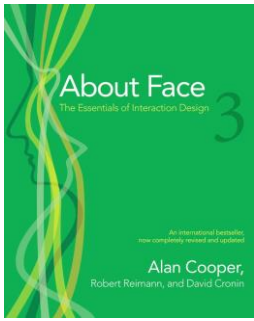
	Steps	Motivation: Why?	Who is acting?	Context: where?	Satisfaction condition
Story	Yes	Yes	Yes	Yes	Yes
Storyboard	Yes	Yes	Yes	Yes	Yes
HTA	Yes	No	Yes	No	No
Use case, sequence. State charts	Yes	Charts – no, description – yes	Yes	No	Charts – no, description – yes

Mobile Apps Life Cycle

1. Discovery
2. Adoption
3. Trial
4. Abandonment or Long-Term Usage
   many apps are abandoned

MTV Networks' Mobile Apps Study Reveals the Life Cycle of an App: From Discovered to Discarded

Bibliography



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  - chapter 1. Goal-directed design
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