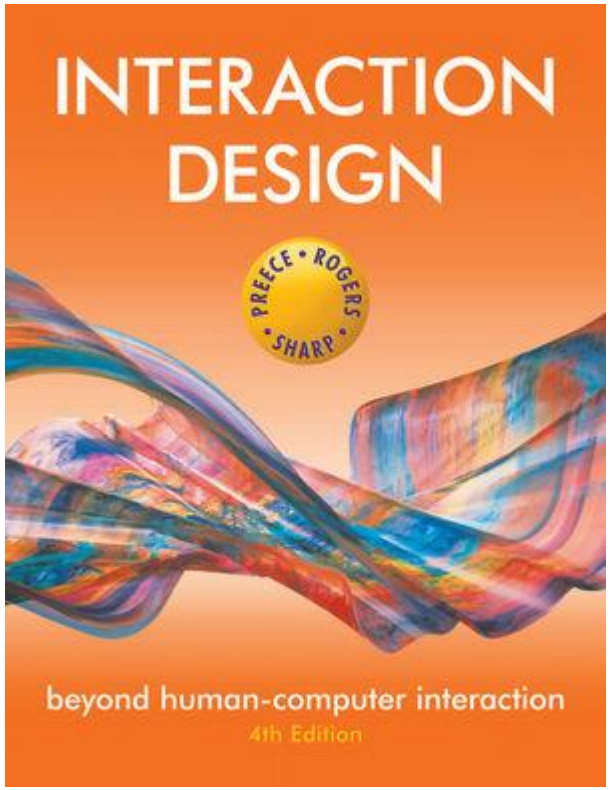


Chapter 10

ESTABLISHING REQUIREMENTS

Chapter 10

10.1 Introduction

- The importance of requirements
- Different types of requirements
- Data gathering for requirements (ch.7)
- Data analysis and presentation (ch.8)
- Task description: Scenarios

  Use Cases

  Essential use cases
- Task analysis

Examples

1. Smart phone, tablet
2. Reader
3. Smart watch
4. Máy ATM
5. Máy bán hàng tại siêu thị 24h
6. Thiết bị cầm tay của nhân viên phục vụ ăn uống
7. Thiết bị cầm tay của nhân viên giao hàng

14:38 PM
10:23
12:24
10:10

CHAPTER 1
PROLOGUE
CHAPTER I
kindle
BIBOX
LỜI GIỚI THIỆU
Highlight
Note
Share

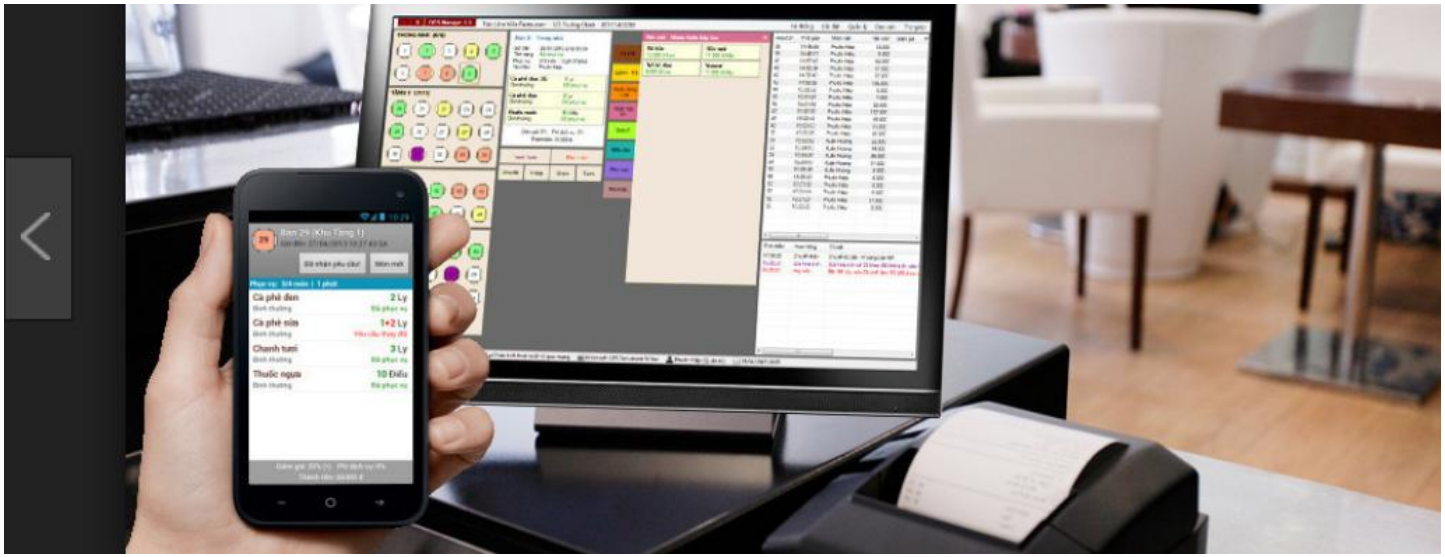

ATM
ATM
bitcoin
ATM24Hrs
K ATM
LASER
ZONE


MBH Market
Phần Mềm Quản Lý Siêu Thị
Giảm: 500.000 chỉ còn


» Preloaded with Microsoft Point of Sale or load your own Software
HP USB thermal receipt printer
HP USB mini stripe reader
HP rp5000 Point of Sale base system
Core Pack services


Medicines


LifePOS
Ứng dụng Ipad trong phần mềm
quản lý nhà hàng Lifepos




PETTINO

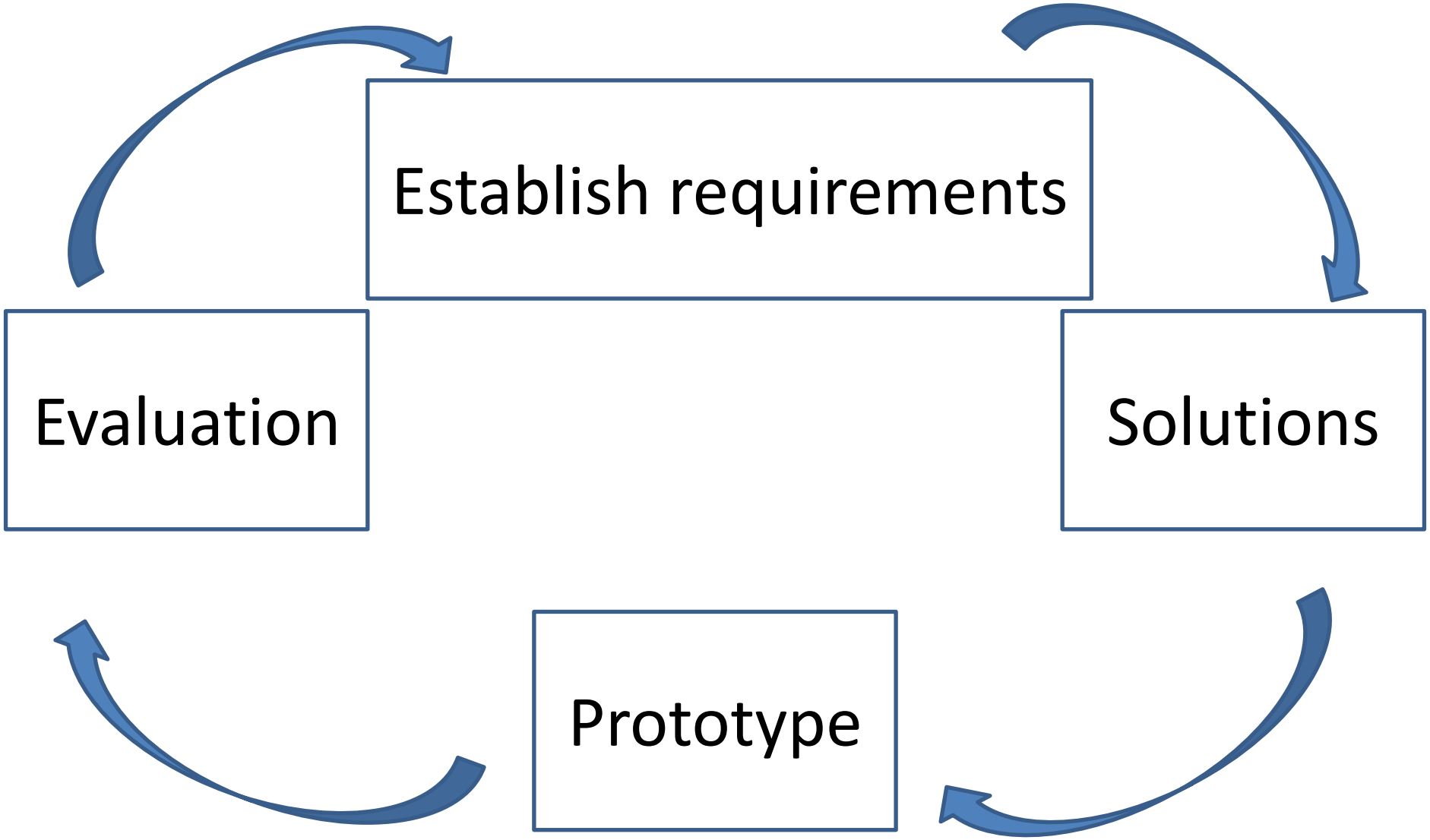
https://logisticsmgepsupv.wordpress.com/2014/03/26/improving-logistics-and-shipping-the-scanner/

https://store.optori.com/product/pda-gia-re-may-kiem-kho-nhanh-va-chinh-xac-may-quet-ma-vach-android-chat-luong-chainway-c61/?gclid=CjwKCAjwvrOpBhBdEiwAR58-3K-AiuT2cY3dt3MVp4erDqYi2dRqJRqVbGcgHtMUlEzNDdGpcNfnuxoCIcEQAvD_BwE#iLightbox[product-gallery]/1


Zing.vn

- Figma – tạo prototype (thiết kế giao diện phần mềm)
- Sketch up (thiết kế giao diện phần cứng)

Process of ID



10.2 What, how and why?

10.2.1 What needs to be achieved?

1. Understand as much as possible about **users, activity, context of activity**
2. Produce a **stable set** of requirements

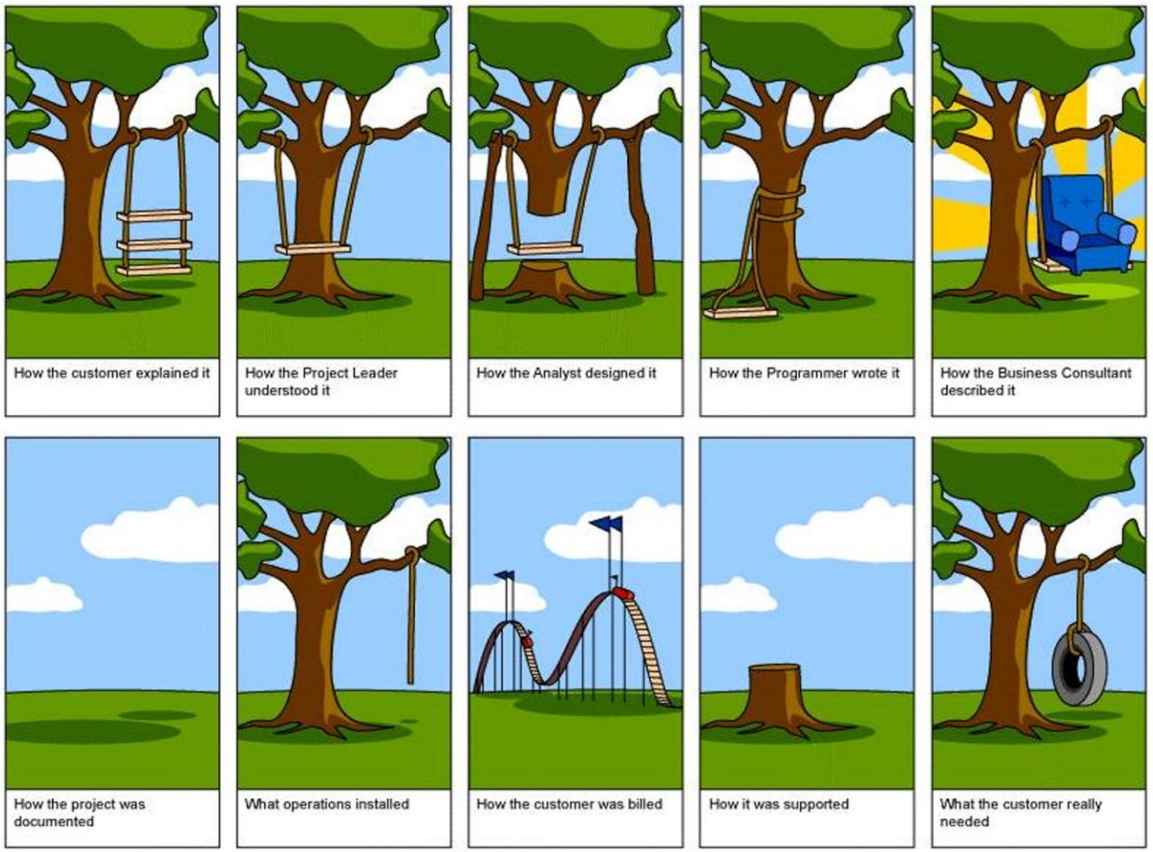
10.2.2 How can this be done?

- Data gathering activities (ch.7)
- Data analysis activities (ch.8)
- Expression as ‘requirements’
- All of this is iterative

10.2 What, how and why?

10.2.3 Why bother?

Requirements definition is the stage where failure occurs most commonly



Getting requirements right is <u>crucial</u>

10.2 What, how and why?

10.2.4 Establishing requirements

- What do users want? What do users ‘need’?

  Requirements need clarification, refinement, completion, re-scoping

  Input: Requirements document (maybe)

  Output: stable requirements

- Why ‘establish’?

  Requirements arise from understanding users’ needs

  Requirements can be justified & related to data

10.3 What are requirements

- Requirements: specific, unambiguous, clear
  - Ex: smartwatch GPS app
- Example requirement: atomic requirement sell (next slide)

Volere shell

Requirement #: **75** Requirement Type: **9** Event/use case #: **6**

Description: **The product shall issue an alert if a weather station fails to transmit readings.**

Rationale: **Failure to transmit readings might indicate that the weather station is faulty and needs maintenance, and that the data used to predict freezing roads may be incomplete.**

Source: **Road Engineers**
Fit Criterion: **For each weather station the product shall communicate to the user when the recorded number of each type of reading per hour is not within the manufacturer's specified range of the expected number of readings per hour.**

Customer Satisfaction: **3** Customer Dissatisfaction: **5**

Dependencies: **None** Conflicts: **None**

Supporting Materials: **Specification of Rosa Weather Station**

History: **Raised by GBS, 28 July 99**

Volere

10.3.1 Different kinds of requirements

1. Functional:
   - —What the system should do
   - —Ex: new video game challenging for a range of user abilities
2. Non-functional:
   - —Constrains
   - —Ex: many platforms, security, response time,…
   - —Ex: telecare system
3. Data:
   - —What kinds of data need to be stored?
   - —How will they be stored (e.g. online database, banking,…)?

Volere requirements template

PROJECT DRIVERS

1. The Purpose of the Product
2. The Stakeholders

PROJECT CONSTRAINTS

3. Mandated Constraints
4. Naming Conventions and Definitions
5. Relevant Facts and Assumptions

FUNCTIONAL REQUIREMENTS

6. The Scope of the Work
7. Business Data Model and Data Dictionary
8. The Scope of the Product
9. Functional and Data Requirements

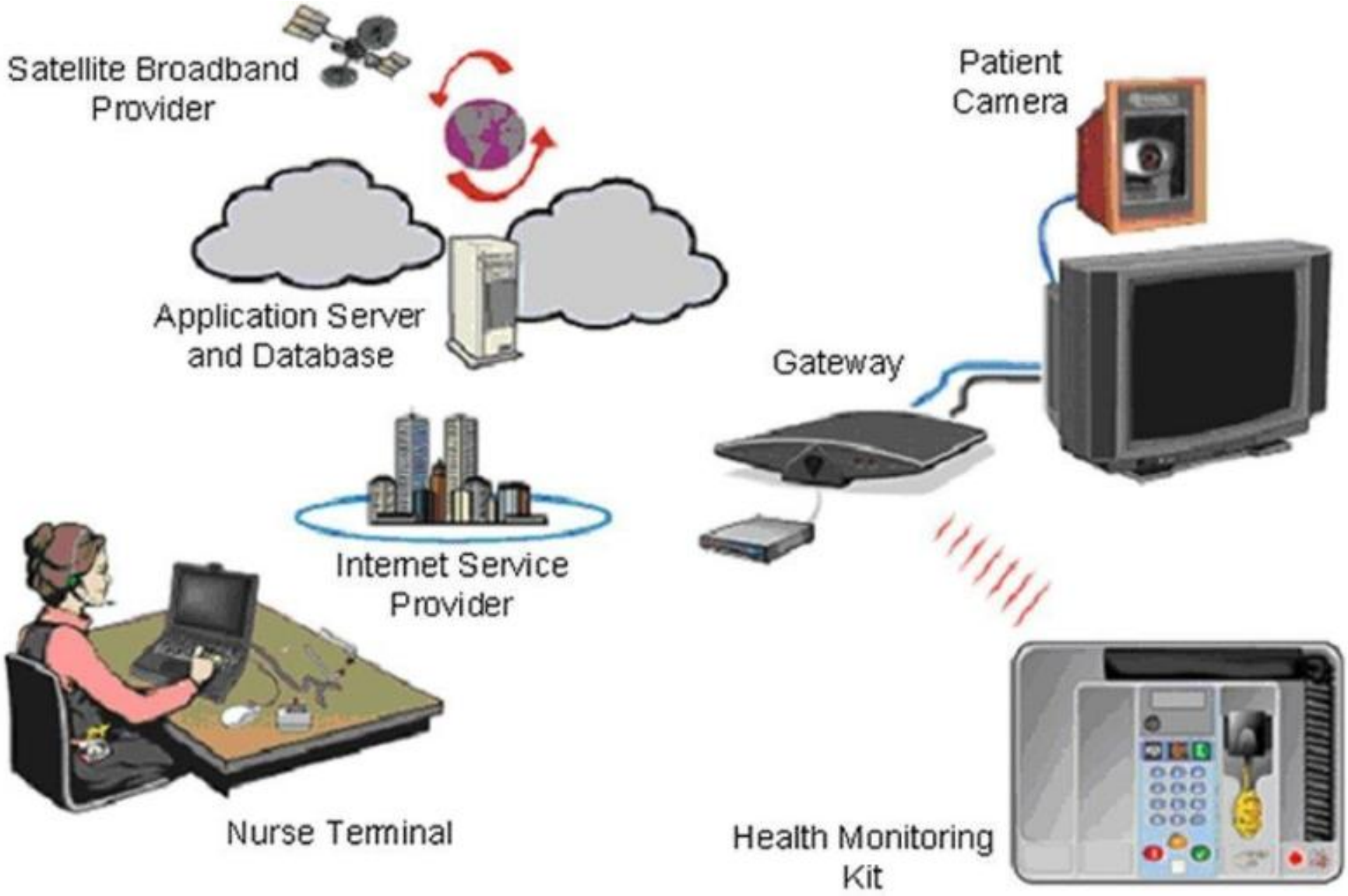
NON-FUNCTIONAL REQUIREMENTS

10. Look and Feel Requirements
11. Usability and Humanity Requirements
12. Performance Requirements
13. Operational and Environmental Requirements
14. Maintainability and Support Requirements
15. Security Requirements
16. Cultural and Political Requirements
17. Legal Requirements

PROJECT ISSUES

18. Open Issues
19. Off-the-Shelf Solutions
20. New Problems
21. Tasks
22. Migration to the New Product
23. Risks
24. Costs
25. User Documentation and Training
26. Waiting Room
27. Ideas for Solutions

TeleCare™ Solutions


Satellite Broadband Provider
Application Server and Database
Internet Service Provider
Nurse Terminal
Patient Camera
Gateway
Health Monitoring Kit


ATM
ATM
bitcoin
ATM
LASER
ZONE

10.3.1 Different kinds of requirements

4. Environment or context of use:
    - physical: dusty? noisy? vibration? light? heat? humidity? …. (e.g. ATM)
    - social: sharing of files, of displays, in paper, across great distances, synchronous, privacy for clients
    - organisational: hierarchy, IT department's attitude and remit, user support, communications structure and infrastructure, availability of training
5. User Characteristics

Box 10.1

Environmental requirements: Underwater computing

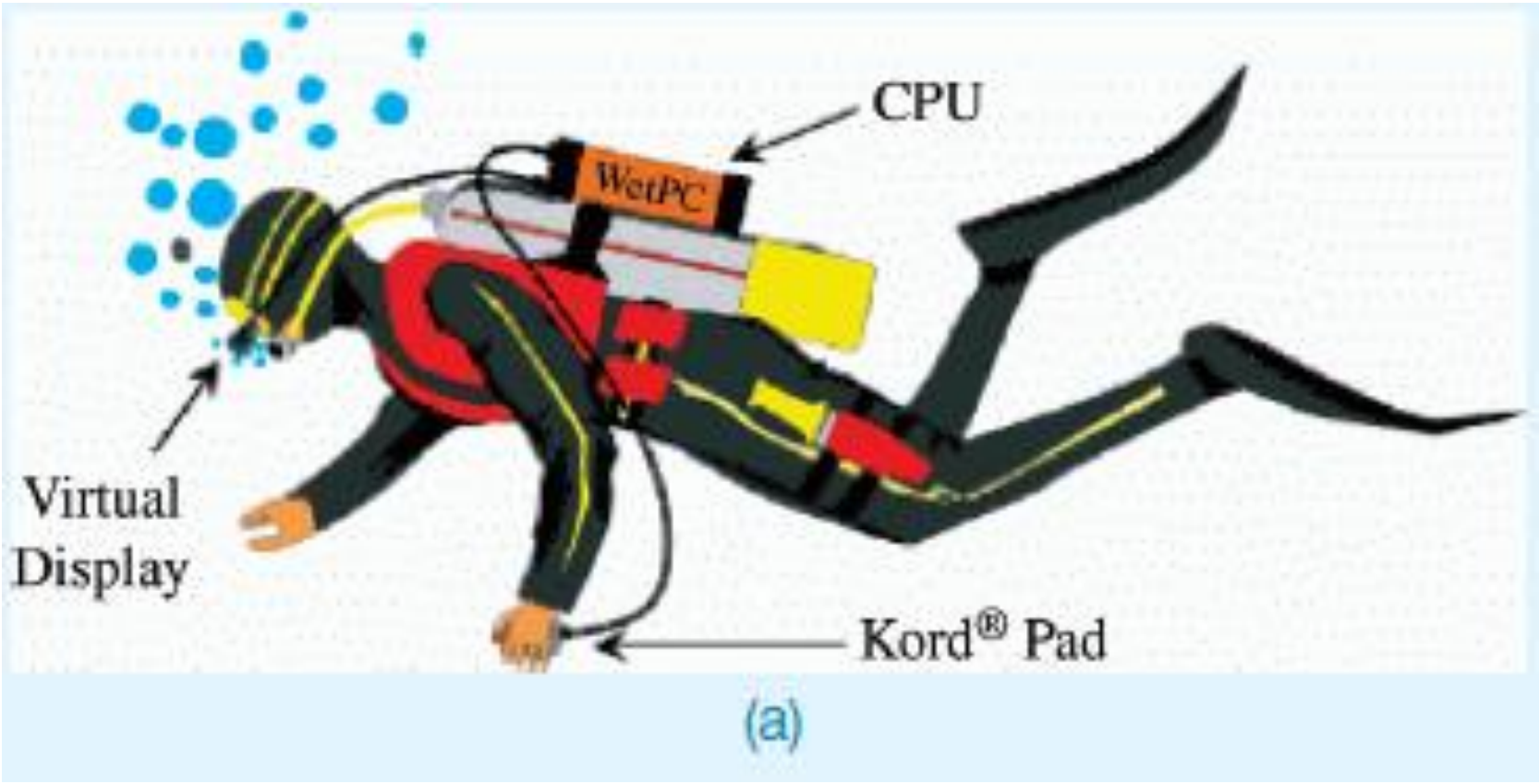
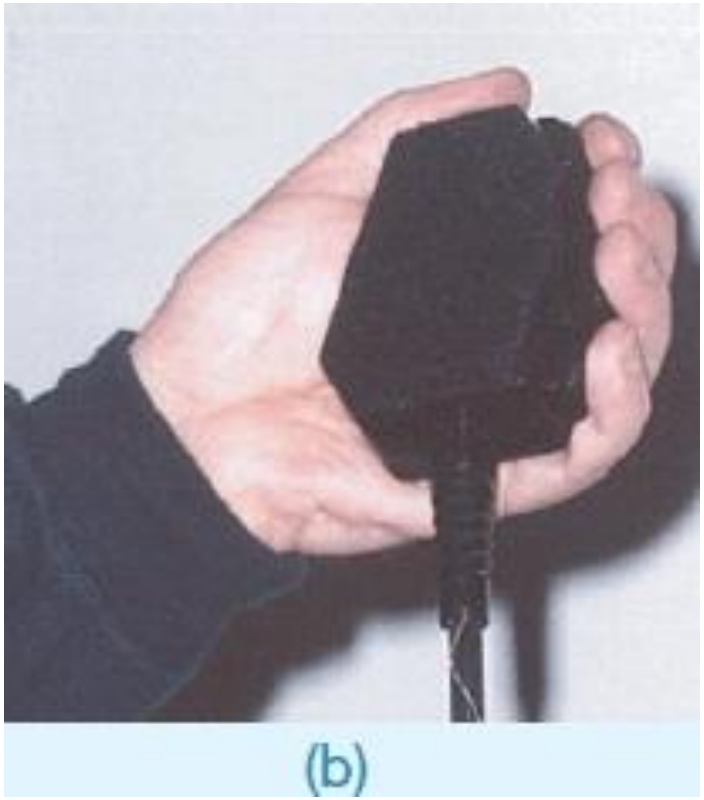
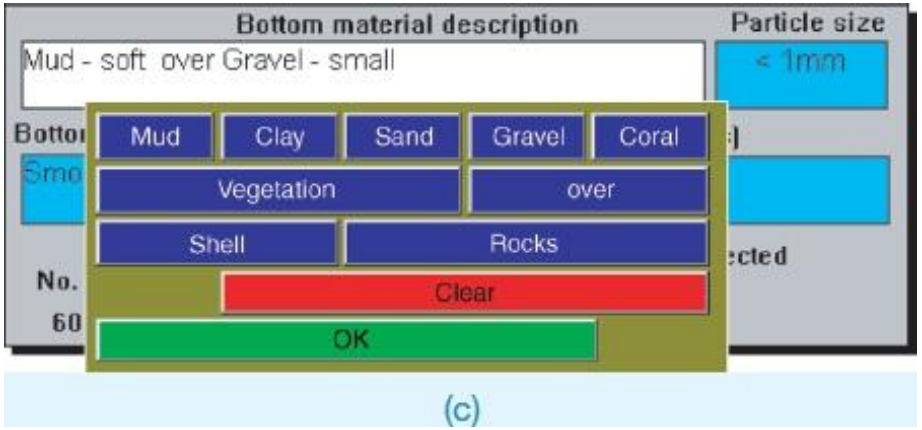


Figure 10.2 (a) The components of WetPC's underwater computer.

Source: Reproduced by permission of WetPC Pty Ltd. http://www.wetpc.com.au/WetPC.



(b)

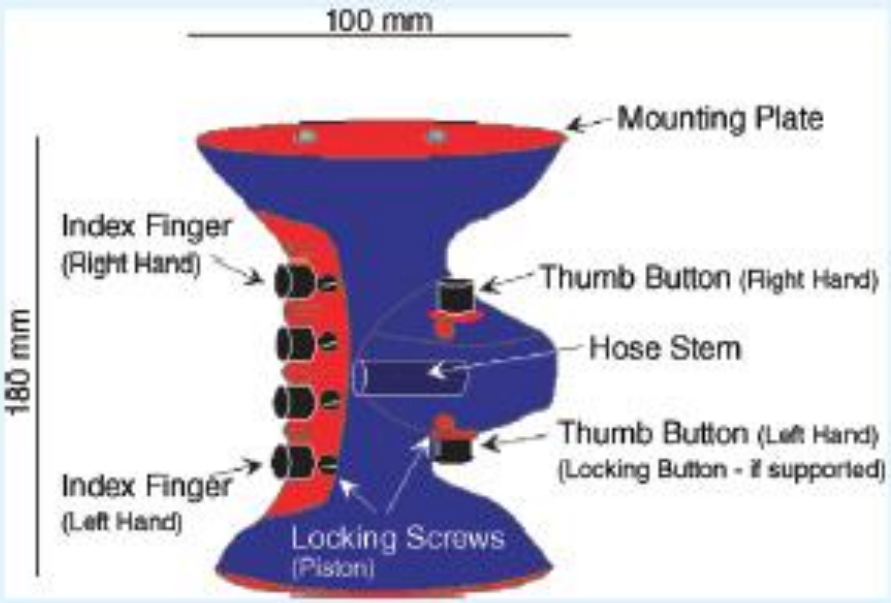


(c)

Display “what you see is what you press”

Kord Key Pad

Underwater computing – SeaSlate



(a)

(b)

Figure 10.3 (a) The KordGrip interface and (b) the KordGrip in use underwater

Source: (a) Reproduced by permission of WetPC Pty Ltd (b) Reproduced by permission of the Australian Institute of Marine Science.

10.3.1 Different kinds of requirements

Users: Who are they? (user profile)

- — Characteristics: nationality, educational background, attitude to computers
- — System use: novice, expert, casual, frequent
  - — Novice: prompted, constrained, clear
  - — Expert: flexibility, power of control
  - — Frequent: short cuts
  - — Casual/infrequent: clear menu paths

What are the users' capabilities?

Humans vary in many dimensions:

— size of hands may affect the size and positioning of input buttons

— height if designing a physical kiosk

— strength - a child's toy requires little strength to operate, but greater strength to change batteries

— disabilities (e.g. sight, hearing, dexterity)

Personas

- Capture a set of user characteristics (user profile): skill, attitudes, tasks, enviroments.
- Not real people, but synthesised from real users
- Should not be idealised
- Bring them to life with a name, characteristics, goals, personal background
- Develop a small set of personas with one primary

Box 10.2 Example Persona

CAPLIN

Ginnie

Receives private tutoring in Maths and English as these are not her strong subjects. Enjoys playing for the school's 2nd teams for netball and Lacrosse and is good at art.

She loves recording her favourite shows: ER and Sun Valley High on Sky+ and spends some of her time on her Laptop that Daddy bought her watching videos on YouTube, downloading music, keeping up to date with her friends on Facebook and chatting via MS IM to her cousin who is at University in Leeds.

She loves Ugg boots and Abercrombie & Fitch and uses the Internet to shop and find the cheapest prices.

"I want to easily hook up with my friends whilst watching TV"

BACKGROUND

- 15, Female
- Ongoing Private Education
- Ambitious
- Comfortable using technology to communicate

MOTIVATIONS

- Keeping in touch with her network
- Fashion/street cred
- Keeping up with peers.

FRUSTRATIONS

- Sad people trying to be 'friends' on Facebook
- Having to be in bed @ 11pm
- Being swamped in friends updates
- Missing important status updates

Box 10.2 Example Persona

Activity 10.1

An interactive product for use in a university's self-service cafeteria that allows users to pay for their food using a contactless card or smartphone.

Suggest some key requirements in each category:

1. **Functional requirements**
2. **Non-functional requirements**
3. **Data requirements**
4. **Environmental or context of use**
5. **User Characteristics**

10.4 Data gathering for requirements

- Interviews:
  - Props, e.g. sample scenarios of use, prototypes, can be used in interviews
  - Good for exploring issues
  - Development team members can connect with stakeholders
- Focus groups:
  - Group interviews
  - Good at gaining a consensus view and/or highlighting areas of conflict
  - But can be dominated by individuals

10.4 Data gathering for requirements

- Questionnaires:
  - — Often used in conjunction with other techniques
  - — Can give quantitative or qualitative data
  - — Good for answering specific questions from a large, dispersed group of people
- Researching similar products:
  - — Good for prompting requirements

10.4 Data gathering for requirements

- Direct observation:
  - — Gain insights into stakeholders' tasks
  - — Good for understanding the nature and context of the tasks
  - — But, it requires time and commitment from a member of the design team, and it can result in a huge amount of data
- Indirect observation:
  - — Not often used in requirements activity
  - — Good for logging current tasks

Data gathering for requirements

Studying documentation:

— Procedures and rules are often written down in manuals

— Good source of data about the steps involved in an activity, and any regulations governing a task

— Not to be used in isolation

— Good for understanding legislation, and getting background information

— No stakeholder time, which is a limiting factor on the other techniques

Some examples

Figure 10.5 A cultural probe package

Source: B. Gaver, T. Dunne and E. Pacenti (1999): "Cultural Probes" from *Interactions* 6(1) pp.21–29.

Cultural probes

Some examples

Ethnographic study, interviews, usability tests, and user participation

(a) (b)

Figure 10.6 (a) Exploring mouse gene expression using G-nome Surfer 2.0 (b) G-nome Surfer Pro displaying the chromosome visualizations, an aligned sequence, and publications

Source: Shaer *et al* (2012) The design, development, and deployment of a tabletop interface for collaborative exploration of genomic data, *International Journal of Human–Computer Interaction* 70, 746–764. ©2012 Association for Computing Machinery, Inc. Reprinted by permission.

Contextual Inquiry

- An approach to ethnographic study where user is expert, designer is apprentice
- A form of interview, but
  - — at users' workplace (workstation)
  - — 2 to 3 hours long
- Four main principles:
  - — Context: see workplace & what happens
  - — Partnership: user and developer collaborate
  - — Interpretation: observations interpreted by user and developer together
  - — Focus: project focus to understand what to look for

Considerations for data gathering (1)

- Identifying and involving stakeholders: users, managers, developers, customer reps?, union reps?, shareholders?
- Involving stakeholders: workshops, interviews, workplace studies, co-opt stakeholders onto the development team
- ‘Real’ users, not managers
- Political problems within the organisation
- Dominance of certain stakeholders
- Economic and business environment changes
- Balancing functional and usability demands

Considerations for data gathering (2)

- Requirements management: version control, ownership
- Communication between parties:
  - —within development team
  - —with customer/user
  - —between users… different parts of an organisation use different terminology
- Domain knowledge distributed and implicit:
  - —difficult to dig up and understand
  - —knowledge articulation: how do you walk?
- Availability of key people

Data gathering guidelines

- Focus on identifying the stakeholders' needs
- Involve all the stakeholder groups
- Involve more than one representative from each stakeholder group
- Use a combination of data gathering techniques
- Support the process with props such as prototypes and task descriptions

10.5 Data interpretation and analysis

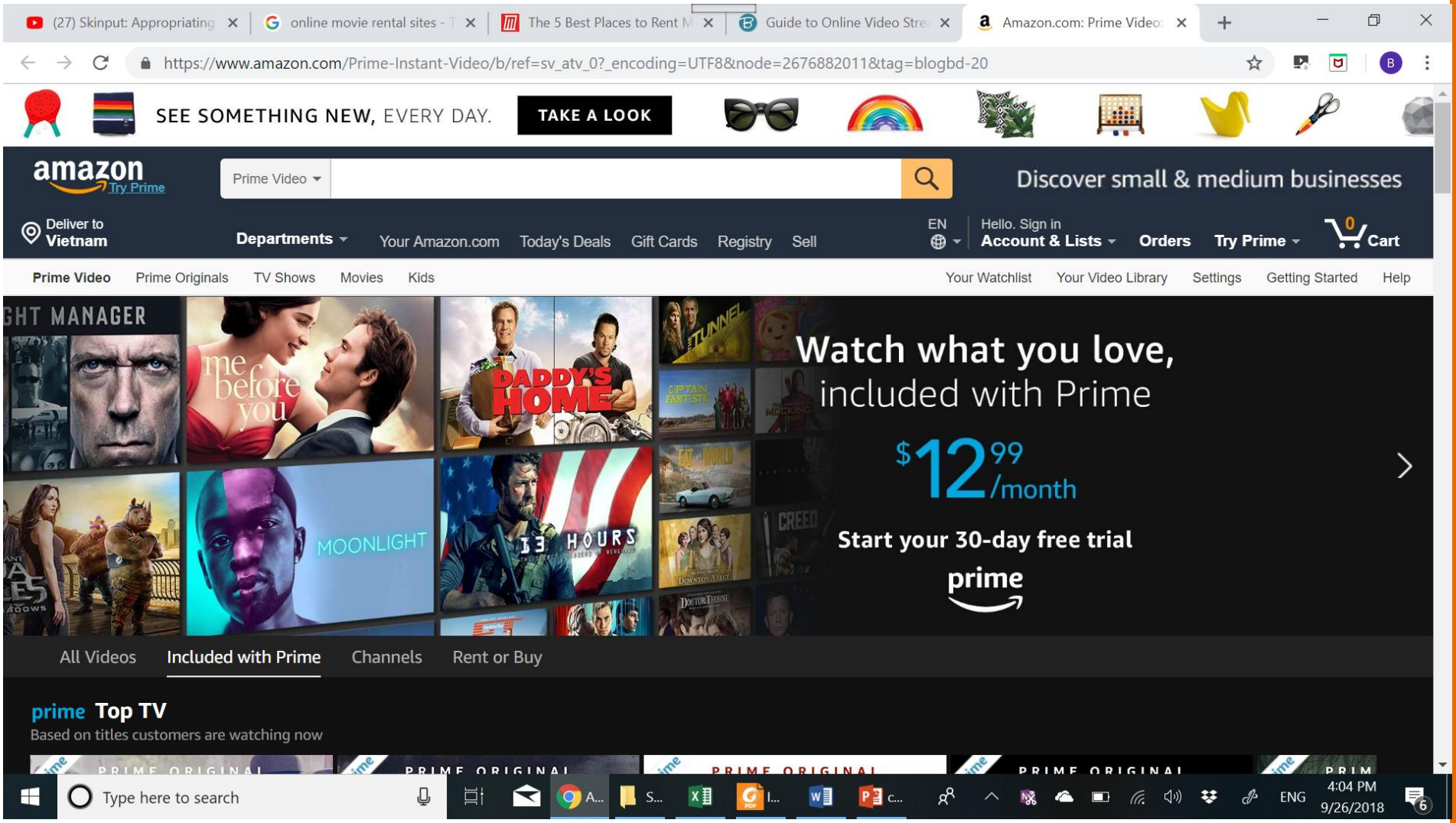
- Start soon after data gathering session
- Initial interpretation before deeper analysis
- Different approaches emphasize different elements e.g. class diagrams for object-oriented systems, entity-relationship diagrams for data intensive systems

10.6 Task descriptions

- Scenarios
  - an informal narrative story, simple, ‘natural’, personal, not generalizable
- Use cases (activity 10.4)
  - assume interaction with a system
  - assume detailed understanding of the interaction
- Essential use cases (task case) (activity 10.5)
  - abstract away from the details
  - does not have the same assumptions as use cases

Scenario for University admissions office

Scenario for movie rental service



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 saved so everyone can consider them tomorrow. The travel organizer emails them a summary of the different options available.”


13
14
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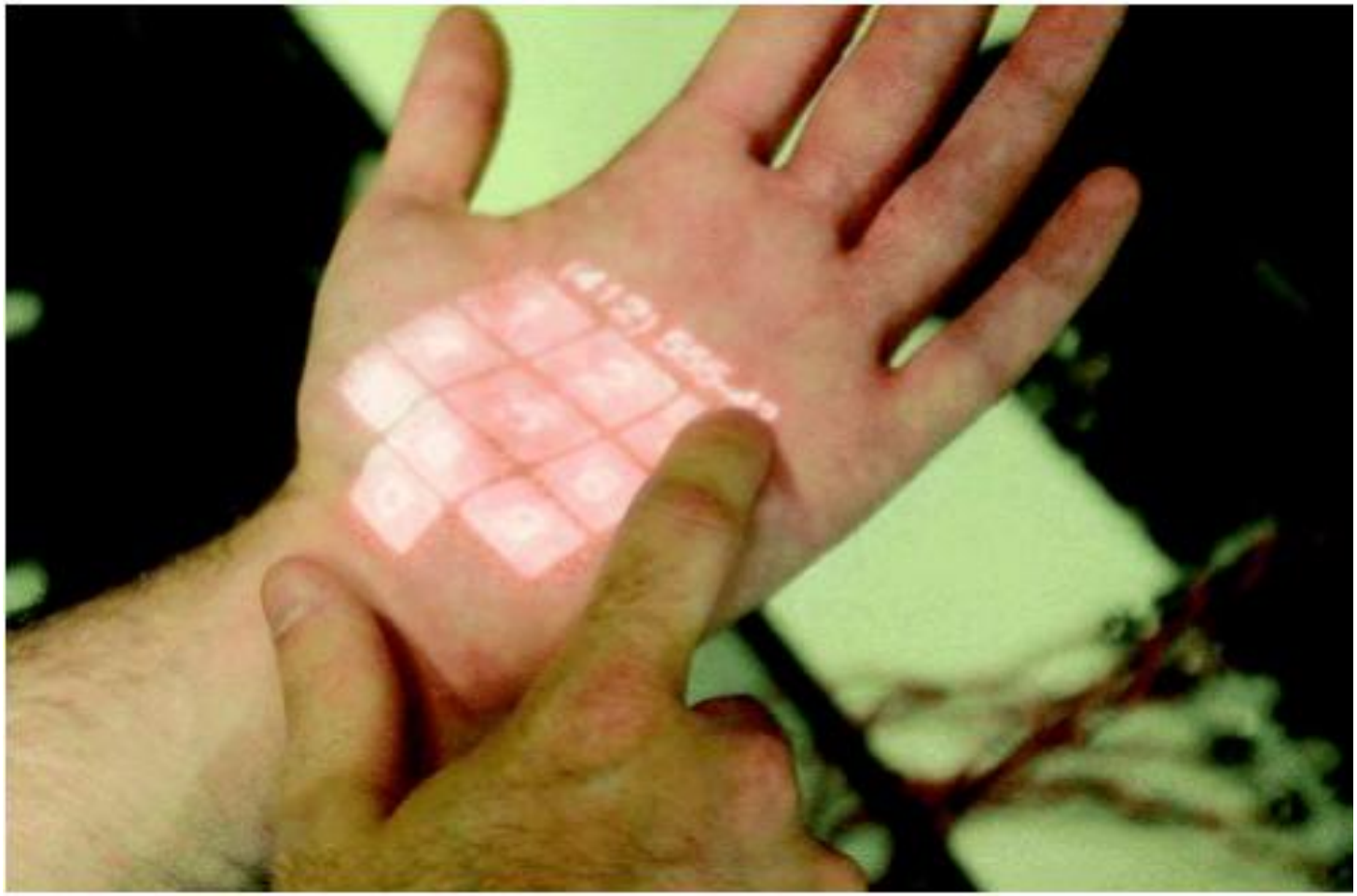
7
27


36

Scenario for skinput

http://youtu.be/g3XPUdW9Ryg



Scenarios and Personas

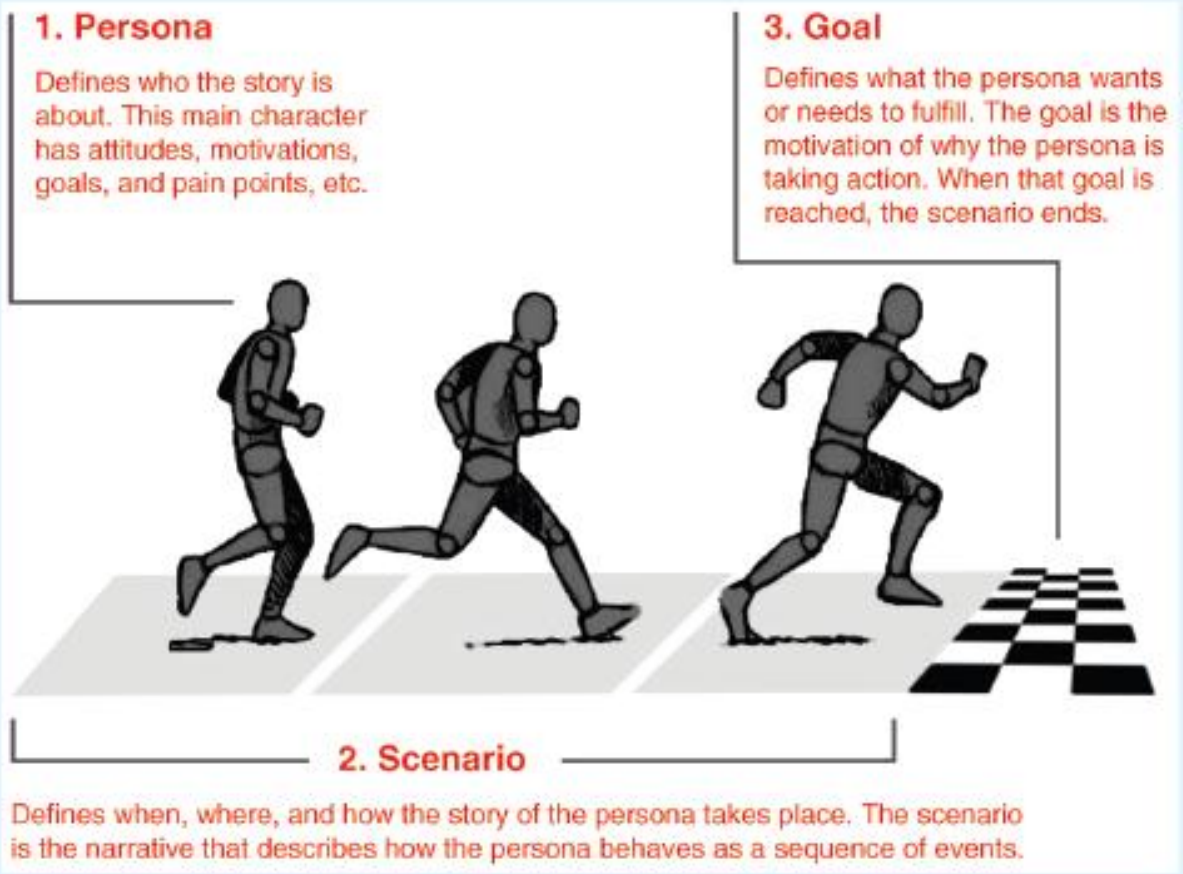


Figure 10.10 The relationship between a scenario and its associated persona

Source: http://www.smashingmagazine.com/2014/08/06/a-closer-look-at-personas-part-1/

Activity 10.3 for scenario

1. Hãy viết 1 kịch bản/ngữ cảnh về việc bạn đi chọn mua một chiếc xe hơi mới. Có thể là mua 1 chiếc hoàn toàn mới hoặc mua xe cũ.

Trong lúc viết, hãy nghĩ các khía cạnh quan trọng của việc bạn ưu tiên điều gì và thích cái gì (*).

2. Sau đó tưởng tượng ra một sản phẩm (có tính tương tác) hỗ trợ bạn đạt được mục tiêu mua xe và quan tâm đến những vấn đề bạn đặt ra (*).

3. Viết một kịch bản cho thấy sản phẩm đó hỗ trợ bạn như thế nào.

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

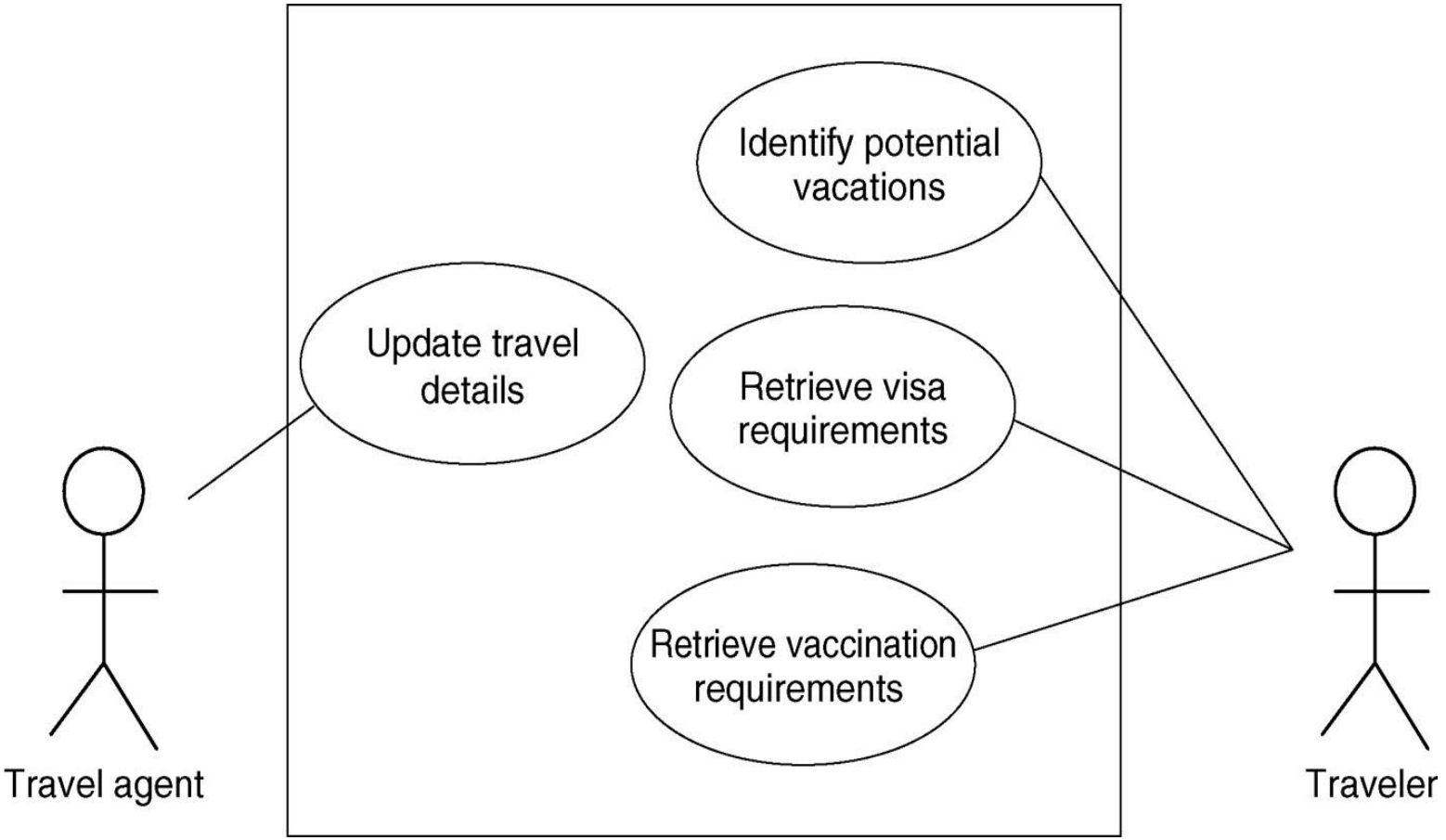
Some alternative courses (case):

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



Activity 10.4 for use case

Ví dụ về dịch vụ cho thuê phim. Một use case là “thuê phim” và nó liên quan đến actor Subcriber.

1. Hãy xác định một actor quan trọng khác
2. Liệt kê use case “thuê phim” bao gồm các normal course và alternative course. Có thể giả thiết normal case là cho user vào website để tìm kiếm phim theo đạo diễn.
3. Vẽ biểu đồ use case cho hệ thống này

Essential Use Cases (task case)

- To combat the limitation of scenarios and Use Case
- Essential Use Cases represent abstractions from scenarios, more general and more structured than scenarios
- Essential Use Cases avoid certain assumption of “Use Case” (technology to interact, the user interface, the kind of interaction)

Example **essential use case** for retrieving visa requirements in travel organizer

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

Activity 10.5 for essential use case

Hãy xây dựng một essential use case (task case) cho user role “Subscriber” của dịch vụ thuê phim đã được đề cập trong activity trước.

10.7 Task analysis

- Task descriptions are not 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 which specify how the tasks might **grouped as plans** e 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 **H**ierarchical **T**ask **A**nalysis (HTA)

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 **H**ierarchical **T**ask **A**nalysis (graphical) - HTA

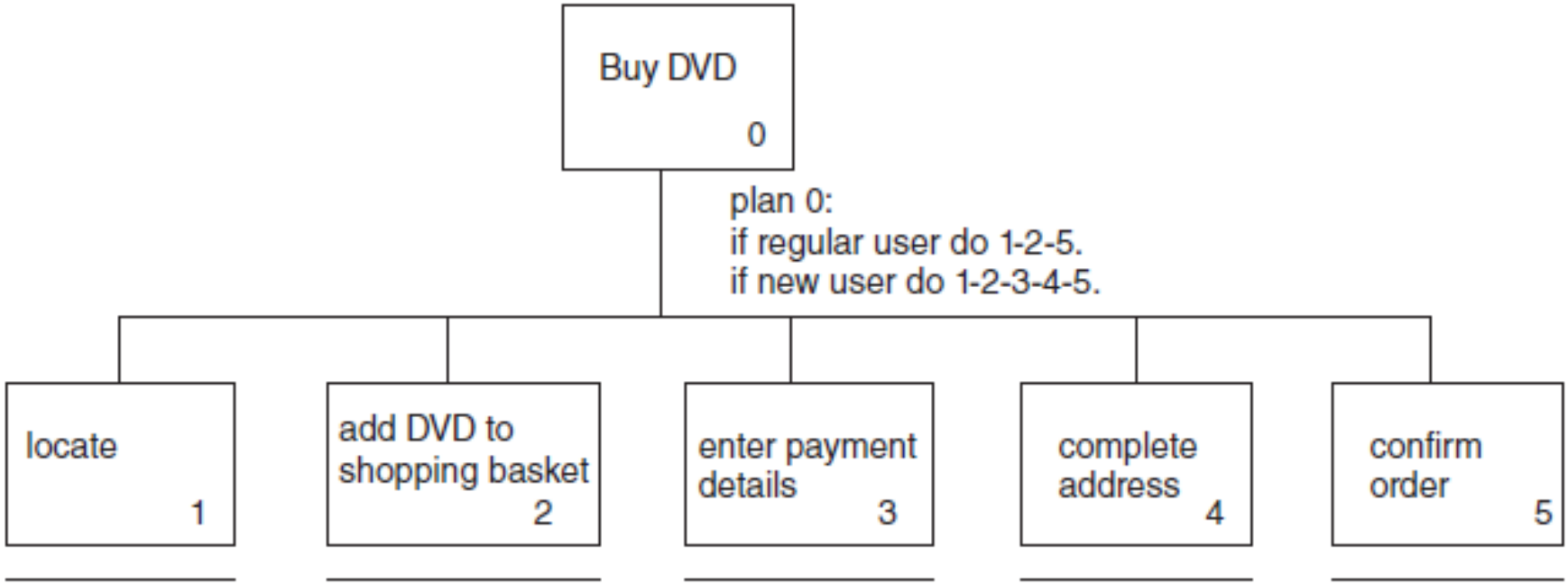
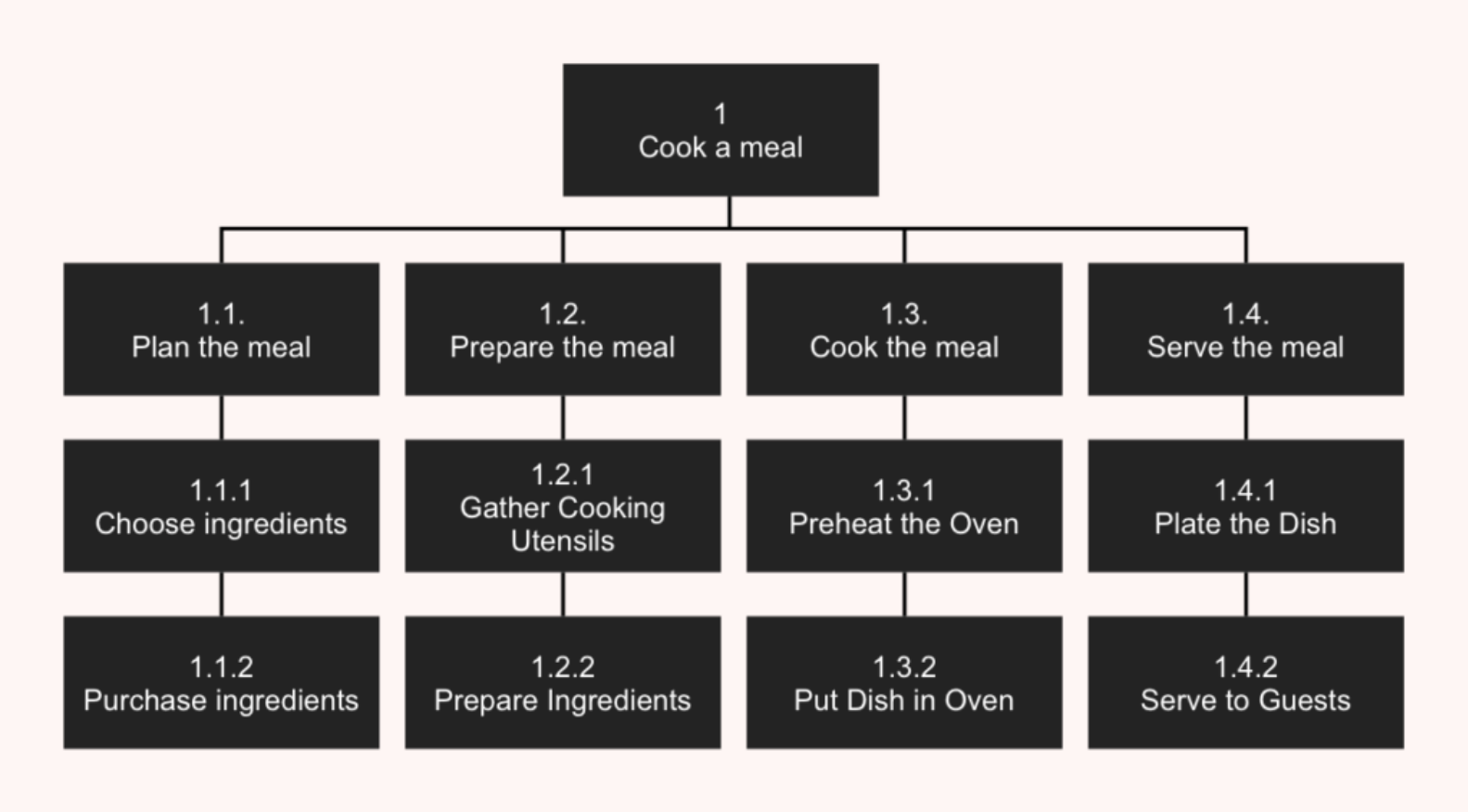
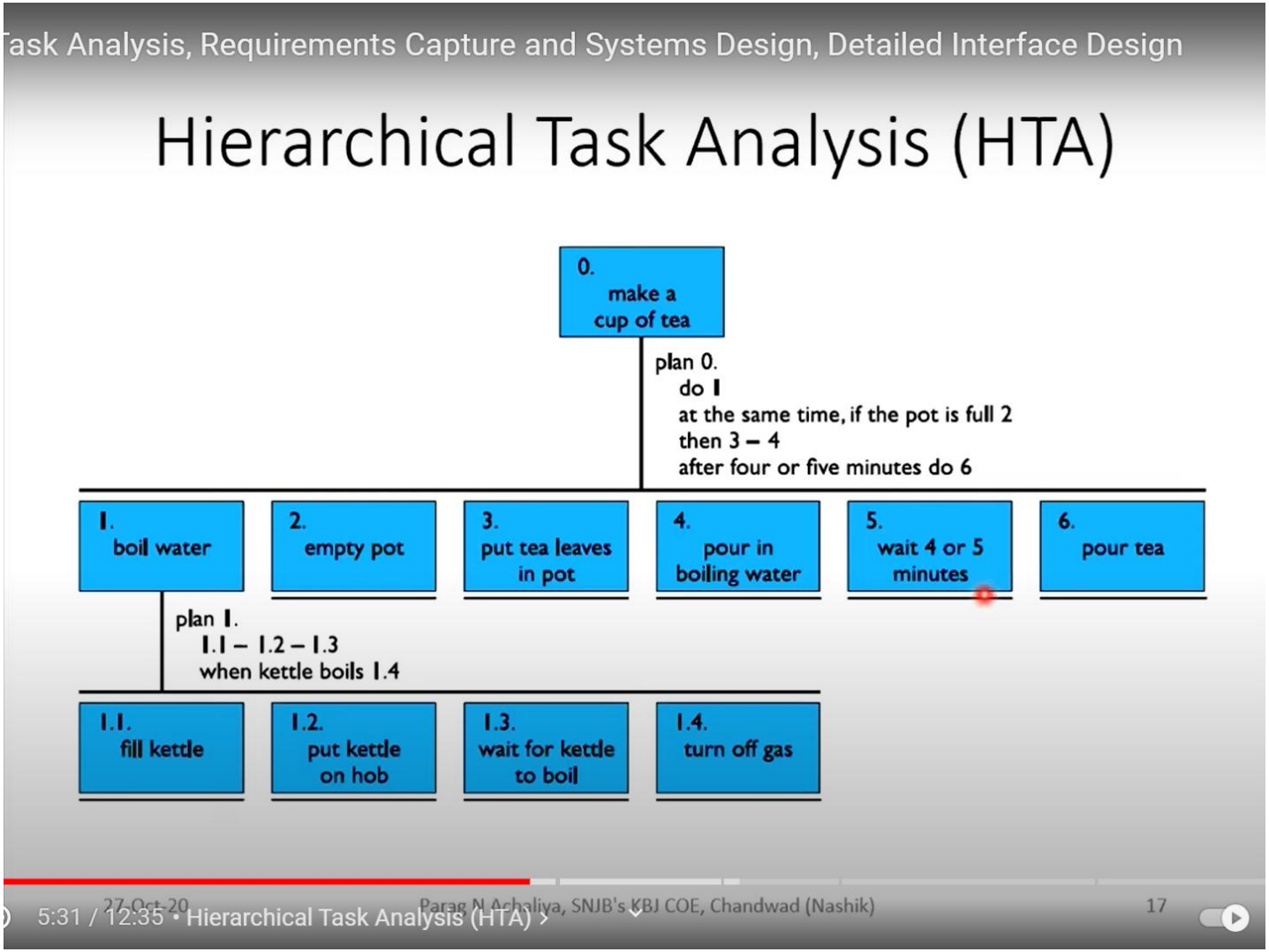


Figure 10.15 A graphical representation of the task analysis for buying a DVD

Example Hierarchical Task Analysis (graphical) - HTA



https://makeiterate.com/a-simple-guide-to-hierarchical-task-analysis/

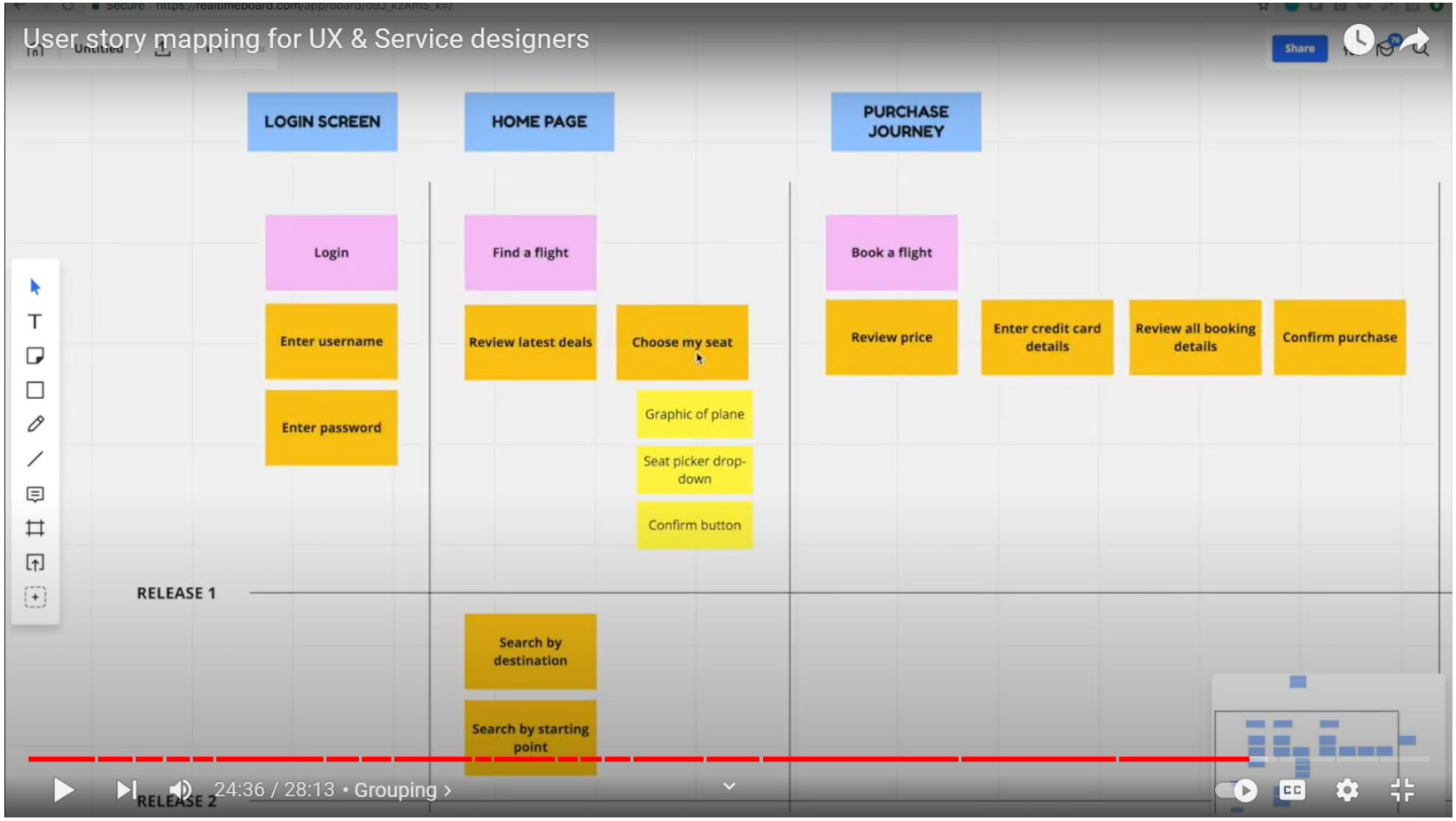


HTA example

https://www.youtube.com/watch?v=MYCIK45W0TQ

User story mapping for UX designers

https://www.youtube.com/watch?v=CyGRdC27QqY



User story mapping for UX designers

https://www.youtube.com/watch?v=YumNf61xn5E

Activity 10.6 for HTA

Xét ví dụ về công ty tổ chức du lịch.

Hãy dùng mô hình phân tích tác vụ HTA với mục đích **xác định vacation của người dùng** sẽ có những gì.

HTA phải bao gồm plan.

Diễn đạt sự phân tích tác vụ bằng văn bản và đồ họa.

Summary

- Getting requirements right is crucial
- There are different kinds of requirement, each is significant for interaction design
- The most commonly-used techniques for data gathering are: questionnaires, interviews, focus groups, direct observation, studying documentation and researching similar products
- Scenarios, use cases and essential use cases can be used to articulate existing and envisioned work practices.
- Task analysis techniques such as HTA help to investigate existing systems and practices