Human-Computer Interaction

REQUIREMENTS GATHERING

Requirements gathering

What needs to be achieved?
- Understand about users, task and context
- Produce a stable, valid requirements set

How can this be done?
- Data gathering activities
- Data analysis activities
- Expression as requirements
- This process, like all development, is iterative

Requirements gathering

Who cares?
◦ The problem is, this is the stage where failure most commonly occurs
◦ It is absolutely mandatory requirements determination is done properly
◦ The cost of fixing errors here later on is significant
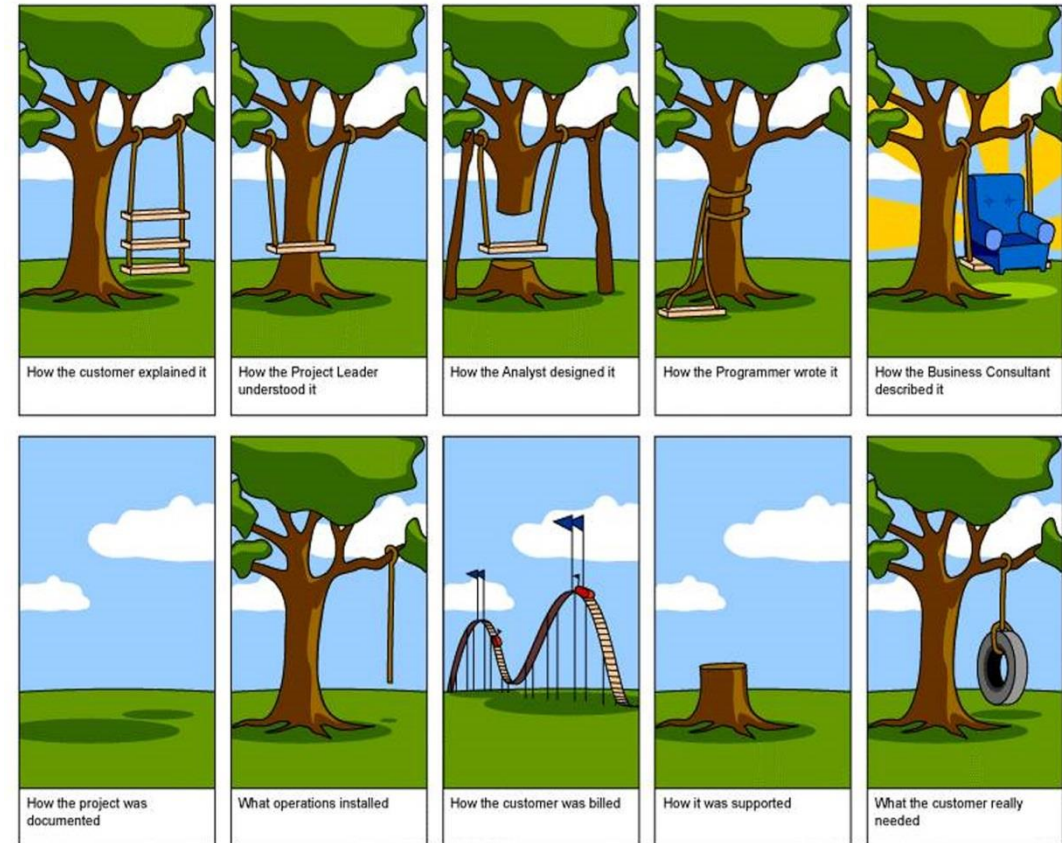
Establishing requirements

What do users want? What do they need? It's important to:

- Iterate
- Clarify
- Verify
- Refine
- Rescope

We need to establish requirements because they are derived from users' needs

They can be tied back to various types of data

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

Different types of requirements

Functional
- ◦ What the system should do

Non-functional
- ◦ Security
- ◦ Response time
- ◦ Theme
- ◦ Etc.

Data
- ◦ What type of data will be stored
- ◦ How will that data be stored
- ◦ In what format will that data be stored
- ◦ Who will have access to that data

Different types of user

Users: Who are they?
- Characteristics
  - Nationality
  - Educational background
  - Technology position
- Familiarity with technology
  - Novice: Prompted, guided, constrained, hand-held, clear
  - Expert: Flexibility, access, control
  - Frequent: Short cuts
  - Casual / infrequent: Clear paths ahead and back

Personas

Capture a set of user characteristics (a profile)

Not real people, but an amalgamation of real users

Should not be idealized, should be realized

Be detailed, make them real: Name, characteristics, background, goals, interests, etc.

Develop a small set of personas (perhaps two to represent each user group, have one be the primary user)

Personas

Personas

Kyle Fisher - Potential Drake Motors Small SUV Buyer

Personal Profile

Kyle is a 42-year-old and owner of a late model Ford Escape.

He's an active father of two, still plays team sports and is always connected to friends and family through the internet and his mobile phone.

Kyle is looking for a vehicle that offers outstanding fuel economy since he commutes approximately 90 miles round trip each day.

He's also considering the Ford Escape Hybrid, Toyota Highlander, the Honda CR-V and the Ford Flex.

He uses a variety of review and third party print research sites in addition to dealer catalogs.

Background
- 42-year-old caucasian male
- Father of two
- Plays drop in hockey 3 mornings a week
- Uses vehicle daily for commuting, picking up kids from sports, weekend coaching and vacations
- Drives long distances and puts 20,000 miles on vehicle every year

Attributes
- Upper Middle class
- Smartphone and laptop user
- Influenced by online reviews, heavy user of print
- iPod and Smartphone user
- Spends time reading in social media researching, but less time contributing

"I want a vehicle with outstanding fuel economy, smart features and enough space for me and my family."

Kyle's Product-Content Needs
- Information supporting fuel economy
- Photos and video that highlight vehicle's technology and styling features
- Guidance, education and reassurance that the brand can be trusted
- Competitive comparisons to his current vehicle
- Ability to gather and share information easily

From Existing Assets
- Running Footage
- Still Photography
- Build Your Own Material
- Catalog Images
- Longform video
- 'Other' Images

Media Mix
- Digital/Online
- Broadcast
- Catalog
- Targeted Print
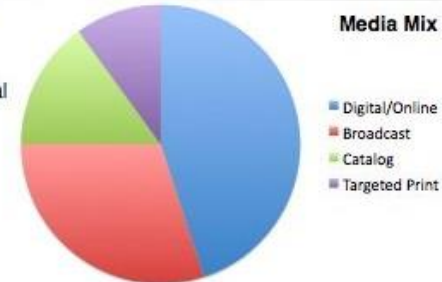
| Buyer Persona Profile | Priority Initiative | Success Factors | Perceived Barriers | Decision Criteria | Buyer's Journey |

Persona name — Amanda

Roles — Digital Marketing Manager, Marketing Manager, Agency Owner

Education — Bachelors in Marketing, Advertising, Communications, or equivalent experience

Industry, geographic or other segments — B2B

Reports to — VP Marketing or Agency Owner

Solutions, Sales Play or Campaign — Email Marketing

MY RESPONSIBILITIES

- Effective planning and implementation of marketing content
- Establishing and adjusting strategies to meet goals
- Engaging in business partner relationships with clients and/or cross- functional resources
- Project management, executing reporting and presenting results
- Delivering work product and staying current with industry standards and trends.

HOW I AM EVALUATED

- Knowledge of marketing project workflow process and digital process lifecycle
- Attention to detail and accuracy
- Quality of written, presentation and verbal communication skills
- Knowledge of digital and social media analytics
- Budget management, metrics and reporting, especially demand generation
- Ability to work as a member of a persuasive and effective member of a team

INFORMATION RESOURCES I TRUST

- Business professionals (peers)
- Consultants
- Internet / websites
- Business social media
- Events / conferences
- Personal social media

Teach Me
TINA

LEARNING FOCUSED Teacher

title
Science Teacher

company name
Crabapple Middle School

industry
Education

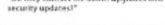location
Roswell, Georgia

"Tell me more! I need Internet at home and in my classroom. So, it's got to work. When I do have trouble, though, I want to be able to fix it quickly on my own."

description

Crabapple Middle School has enjoyed twenty plus years of excellence in education since its opening in 1983. In 1988, Crabapple Middle became Fulton County's first National School of Excellence and a Georgia School of Excellence. In 2003, Crabapple Middle was recognized as one of the first Georgia Lighthouse School to Watch for excellence in middle level education.

My school continuously strives to be a premier educational institution in the state of Georgia. Technology is now a part of our everyday lives, so I use technology and the Internet in my classroom. I use it for personal projects, but also for classroom projects with all of my students. When in a classroom with 30 middle school kids, I don't have time to call the DSL provider if I have trouble with the connection. So, I need to be able to troubleshoot problems on my own, right there on site. If I have too many connection problems, I will report it to our school principal and recommend that we use a differnt DSL provider. As Teachers, we don't have a lot of time to deal with extra problems, outside of our everyday chaos.

At home, I use the Internet to do research for the book I am writing. I am also an avid cook, so I connect almost every evening to pick out recipes and view the recipes I've saved online. When I am at home, I have a little bit more time to troubleshoot if needed. And, I do prefer to fix the problem myself, if possible.

This user has a high need for connection and a moderately high willingness to troubleshoot problems when they arise. She is interested in what is happening and why the function is being performed. She wants to learn about her computer and DSL. Tina will study simple wiring diagrams, try to check connections and will download DSL software. She wants to learn more computer jargon, but explanations may be needed. She may also use a chat for customer support, to learn how to fix her DSL connection in her classroom or at home by herself.

USER TYPE

KEY VALUES

- Learning
- Educating and Innovating
- Autonomy

CONNECTION NEEDS

In her classroom, for both personal and classroom use.

At home, for research, web browsing and checking email

Connection needs to work most of the time or Tina will move to a new company

QUESTIONS ASKED WHEN CONSIDERING A PROVIDER

"How reliable is this service in providing a connection in my room and at home?"

"Do they provide information to me on my connection?"

"Do they provide online chat and an online troubleshooting tools?"

"Do they contact me about upgrades and security updates?"

EMPLOYMENT
- Medium sized middle school - Science teacher - Southeastern United States

TECH SAVVY
- Knows some computer jargon, but may need further explanations for some terms and concepts

COMMUNICATION PREFERENCES
- Likes seeing connection speed and other detailed information pertaining to her DSL connection
- Appreciates being able to learn about updates and new services from the main webpage
- Wants to be exposed to relevant articles pertaining to her internet connection
- Wants to be notified about key updates and upgrades and will update her computer when prompted. May look at detailed information about the update if it interests her

SUPPORT PREFERENCES
- Writes an email or chat to customer support with questions or problems
- Will use a tutorial, espcically on first visit to a tool or site and will read it carefully, applying knowledge to other areas of the company's products
- Expects a self-help tool and will troubleshoot on her own whenever possible, using the tool
- Will only call customer support via telephone as a "last resort"

SECURITY CONCERNS
- Implements security tools and likes that they are provided for her
- Wants to be sure that her passwords are secure and appreciates any information that helps her with password security

FEATURES AND FUNCTIONALITY BY PERSONA TYPE

Megan Lucas

efficient   *pragmatic*   *eco-minded*

"It's important for me to know where my family's food is coming from"

Megan settled down in Kansas city after working as a field research on agriculture. She is an avid gardener, and now works as a part-time horticulturist. She first purchased her five Rhode Island Red Hens after deciding how beneficial it would be for her family as a way to access fresh eggs (she's an ovo-lacto vegetarian) and as a learning tool. She and her husband built their chicken coop out of recycled material found in a garbage dump. One thing she really enjoys about her chickens is how nutrient filled their waste is, which she puts in her compost that feeds her garden.

She lets her children interact (chase and feed) with the chickens and hopes that one day they will be as eco-minded as she is, making things like "recycling" a part of the day rather than just something to "try out." Megan is also involved in her neighborhood association and loves spending time with her kids.

Age: 37

Education: B.S.

Occupation: Horticulturist

Neighborhood: Valentine, KCMO

Hobbies: Gardening, Camping, Biking

Household: Husband & 3 Children

MARY
Pragmatic
user of services

patient optimistic
conscientious measured
in comfort zone
stable considered
approachable

CHRIS
Overloaded
seeker of support

burdened frustrated
self-critical striving
fatigued worried
pessimistic dedicated

JULIAN
Confident
navigator of services

driven early adopter
analytical informed positive
resourceful
expects the best savvy

SHONA
Disenfranchised
critic of the system

disengaged sceptical
anxious struggling
jaded resistant
headstrong

NING
Unfamiliar
seeker of services

daunted achiever
determined willing
adaptable new hopeful
unsure unassuming

NIKKI
Self-focused
maximiser of services

under the radar aimless
social unfocused
ingenious fickle
self-centred casual

AMIIR
Isolated
user of services

hopeful insular
stunned anxious
bewildered grateful
unaccustomed
resigned grappling

FRED
Reluctant
navigator of the system

in crisis pressured confused
overwhelmed
vulnerable distressed
emotionally depleted

TIM the ESCAPIST

SKILLFUL   SOLITARY   IMMERSIVE

"Perfecting audio settings is a stress reliever."

▶ DEVICES TIM USES

GAMES
Tim plays immersive games online for a couple of hours to unwind.

MOVIES
Another immersive experience Tim loves is playing movie Blu-rays on his surround system.

AUDIO
He's looking for perfectly tuned settings and a clean sound.

MOBILE
Even his headphones sound awesome. He'll put these on when working.

TO TIM, DOLBY MEANS **ALGORITHMS.**

DOLBY SHOULD MEAN:
Perfectly calibrated sound for complete escape.

▶ CORE DIMENSIONS OF TIM'S PERSONALITY

TECH CAPABILITY	**EXPERT**
SHOPPING	**EVALUATIVE**
ENTERTAINMENT MOTIVATION	**SELF**

MEGAN the ENTERTAINER

COMMUNITY   ATMOSPHERE   COMPATIBILITY

"I want to be in the middle of the action with my friends and neighbors."

▶ DEVICES MEGAN USES

TV & MOVIES
She hosts parties to watch the big game or the latest Blu-ray on her flatscreen and surrounds.

MOBILE
Occasionally she'll listen to music on-the-go.

GAMES
Sometimes she'll play casual games when groups of friends come over.

AUDIO
She uses her nice quality surround system to play the game on TV or for background music.

TO MEGAN, DOLBY MEANS **THEATER STUFF.**

DOLBY SHOULD MEAN:
A way to provide the next best thing to being there.

▶ CORE DIMENSIONS OF MORGAN'S PERSONALITY

EQUIPMENT DESIRES	**LATEST**
ENTERTAINMENT MOTIVATION	**SOCIAL**
TYPE OF QUALITY	**EXTREME**

Scenarios

Informal narrative description

A story
- Allows for exploration and discussion
- Doesn't necessarily describe use of technology
- Uses the language of the user, as opposed to the designer / developer
  - User tells *you*
- Often the first investigatory step in requirements gathering
- Very natural human activity
- Rich detail
- Often goal oriented
- Allows designer / developer to identify additional stakeholders and participants
- Can be used to describe future use cases

"Say I want to find a movie directed by Martin Scorsese. I don't remember the title but I know it came out in the theater around '06 or '07. I go to the website and choose the director option. A huge list of directors is displayed – I had no idea there were so many directors whose last names begin with S! After scrolling through the list, I find Martin Scorsese and choose to see further details about him. Another long list of movies eventually leads me to the movie I was looking for; The Departed. As an existing subscriber, I need to log into be able to rent the movie. Once my login has been confirmed, I can choose the rental period and payment method. I have my preferences already registered in the system, so I just choose the defaults and download my movie."

- Adapted from Preece, Rogers, Sharp "Interaction Design," 2015

"*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), Martin (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 Martin 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.*"
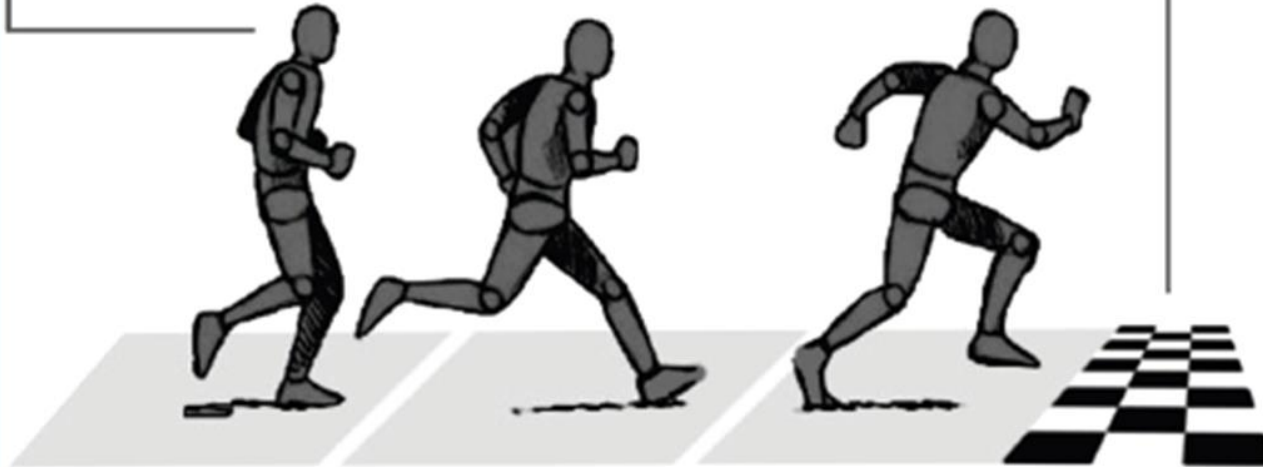
- Adapted from Preece, Rogers, Sharp "Interaction Design," 2015

1. Persona

Defines who the story is about. This main character has attitudes, motivations, goals, and pain points, etc.

3. Goal

Defines what the persona wants or needs to fulfill. The goal is the motivation of why the persona is taking action. When that goal is reached, the scenario ends.

2. Scenario

Defines when, where, and how the story of the persona takes place. The scenario is the narrative that describes how the persona behaves as a sequence of events.

Paul - the online student
Ordering flowers for his Mum's birthday

Paul navigates to **flowersrus.com**	Paul selects the birthday flowers option in the menu	Paul filters the flowers shown by price. He can't afford more than £25	Paul selects a bouquet of Freesias that he thinks his Mum will like	Paul takes a look at the information for the Freesias, including whether delivery is possible before his Mum's birthday
Will Paul know the URL or use a search engine?	We will want to show seasonal and most popular flowers on the homepage	How many flowers is Paul likely to be presented with? Will they fit on the one page?	Will want to show an image, price, title and perhaps short description for each set of flowers	What sort of information will Paul need to know? E.g. How long flowers will last?
	We will want to show delivery info on the homepage e.g. next day delivery, delivery costs	We will probably want to initially show flowers by popularity (i.e. best sellers first)	A quick guide to flowers in case there are flowers shown that Paul is unsure of (e.g. Lisianthus)	Will need to show delivery costs and available delivery slots
	We could provide Paul with a flower finder (like a gift finder but for flowers)			Show alternatives in case Paul feels these aren't right for his Mum

Key | Step | Question | Comment | Idea

Data gathering

Interviews
- ◦ Sample scenarios and prototypes can be used
- ◦ Good for exploring issues
- ◦ Development team members can connect with stakeholders
- ◦ Gives those affected a sense of ownership and involvement
- ◦ That leads to vested interest in the success of the system

Question types
- ◦ Open-ended
- ◦ Closed

Data gathering

Interview Question types
- Open-ended
- Closed
- Binary
- Concerns / Biases

Interview Structures
- Pyramid
- Funnel

Data gathering

Setting up
- ◦ Time (and time requirement)
- ◦ Place

Recording the interview
- ◦ Notes
- ◦ Audio recording
- ◦ Video recording

Data gathering

Questionnaires / surveys
- Often used in conjunction with other techniques
- Can give qualitative or quantitative data
- Good for getting general ideas, reaching a group of dispersed people

Question types
- Open-ended
- Closed
- Likert (ratios, balance, biases, neutral responses)

Statistical Measurement Scales

Data gathering

Questionnaires / surveys
- ◦ Often used in conjunction with other techniques
- ◦ Can give qualitative or quantitative data
- ◦ Good for getting general ideas, reaching a group of dispersed people

Question types
- ◦ Open-ended
- ◦ Closed
- ◦ Likert
- ◦ Bad questions / Bad responses

Statistical Measurement Scales

Data gathering

"Should the plan of agreement be accepted, which was submitted by the European Commission, the European Central Bank, and the International Monetary Fund in the Eurogroup of 25.06.2015 and comprises of two parts, which constitute their unified proposal? The first document is entitled "Reforms For the Completion Of The Current Programme And Beyond" and the second "Preliminary Debt Sustainability Analysis".

NOT ACCEPTED / NO

ACCEPTED / YES

Data gathering

Questionnaires / surveys
- Often used in conjunction with other techniques
- Can give qualitative or quantitative data
- Good for getting general ideas, reaching a group of dispersed people

Question types
- Open-ended
- Closed
- Likert
- Bad questions / Bad responses

Statistical Measurement Scales

Data gathering

Researching similar products
- Novel or standard domain / application?
- If novel, data gathering is more important
- If done before, note similarities / differences / evolution

Direct observation
- Gain insight into specific tasks
- Can get significant information from body language / verbal and non-verbal cues
- Requires dedicated notetaking
- Time-consuming

Data gathering

Evaluating documentation and manuals
- Repository of all related knowledge about system
- Procedures and rules are well-documented
- Steps involved are delineated
- Regulations, if any, are also presented
- Can be used as a sole requirements-gathering source
- Can be done without requiring involvement from users / stakeholders, which is a limitation of the other techniques

Contextual inquiry

Ethnographic observation
- ◦ User is expert
- ◦ Designer is novice

An interview, however
- ◦ At workstation
- ◦ 2 – 3 hours long

Four main drivers
- ◦ Context (see workplace and what happens – verify)
- ◦ Partnership (User and designer are collaborators)
- ◦ Interpretation (User and designer evaluate results as a team)
- ◦ Focus (Be aware of what you are trying to discover or learn)

Concerns of Data Gathering

Identifying stakeholders
- Who are they

Involving stakeholders
- Through data gathering
- Make them part of the team

Users v. managers and others
- Their needs are often very different

Dominance of certain stakeholders
- May need to be leveled

Domain info difficult to acquire, articulate, or very new

Concerns of Data Gathering (continued)

Political issues within organization

Communication
- Effectiveness
- Willingness
- Capability

Business environment changes

Balancing functional demands with usability demands

Concerns of Data Gathering (continued)

Communication between parties
- Within development team
- With / between users
- Between users and developers

Domain knowledge
- Implicit
- Explicit

Availability and commitment of key people
- Especially managers / executives

Data gathering guidelines

Focus on determining stakeholder needs

Involve all the stakeholder groups

Involve more than one representative from each group

Use a combination of data gathering techniques

Support the process with props, prototypes, task descriptions, etc.

Data interpretation and analysis

Don't wait, start soon after data gathering

Do a cursory interpretation and analysis
- Doesn't need to be in-depth
- Doesn't need to be a formal process
- Indicate some general, initial thoughts and impressions

Sometimes will need to diagram underlying system to determine / clarify user involvement
- Class diagrams
- Entity Relation diagrams
- Data flow diagrams

Use cases

Focused on:
- ◦ User-system interaction
- ◦ Still user perspective (In use cases referred to as "actors")
- ◦ Goal-oriented
- ◦ Normal course
- ◦ Alternative course

Use case (Normal course)

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.

Use case (Alternative courses)

6. If the country name is invalid:

◦ 6.1 The system displays an error message.

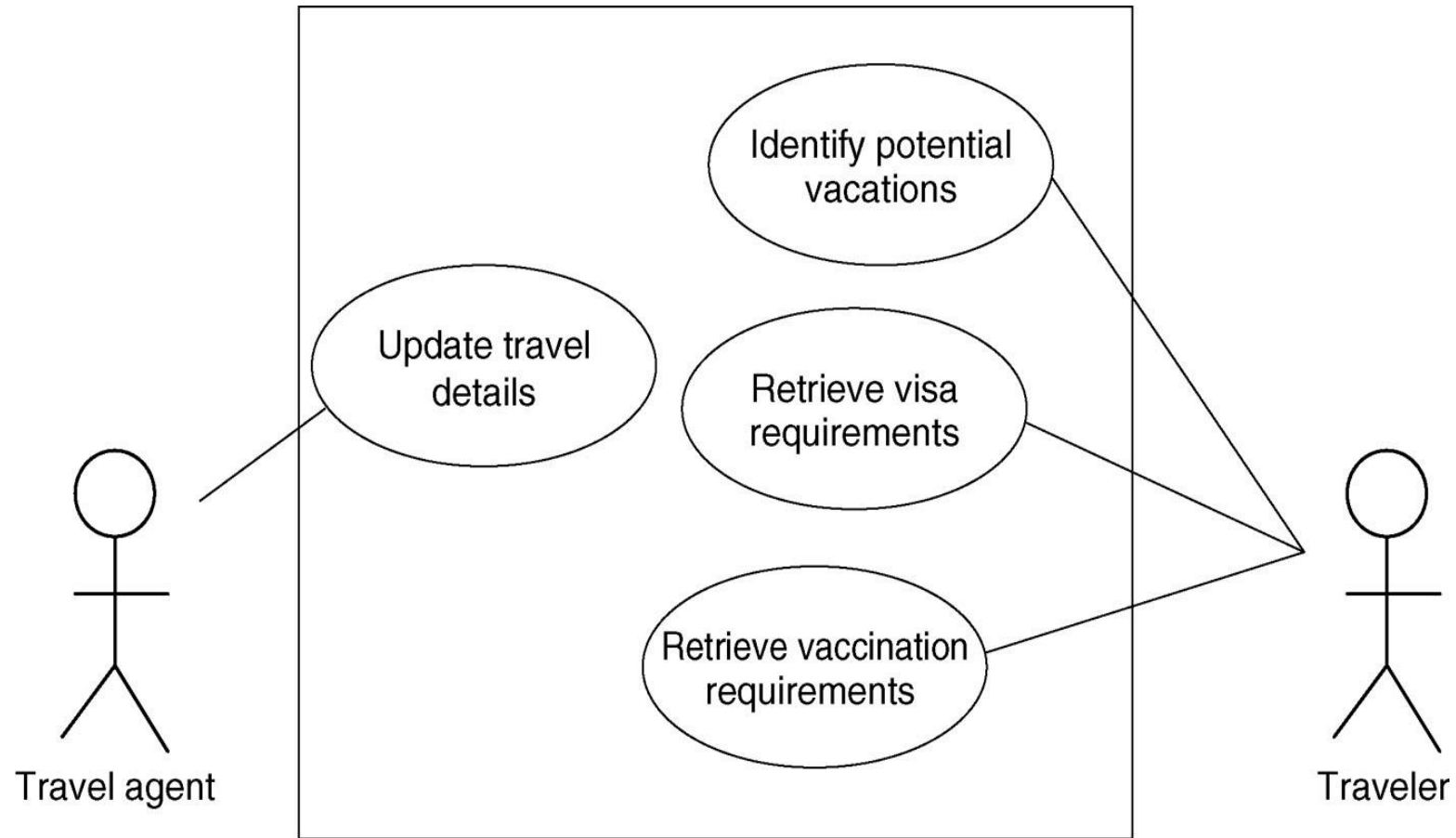◦ 6.2 The system returns to step 3.

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.

Use case diagram

Essential use cases

Constantine and Lockwood, 1999

Based on limitations of scenarios and use cases

Broad, avoids generalities of a scenario and assumptions of a use case

Three parts:
◦ Name expressing user intention
◦ Sequence of user actions
◦ Sequence of system responsibilities

This divides user from the system, while maintaining relationship

Helps with task allocation and system scope: Which component does what?

Essential use cases

retrieveVisa

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

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 approaches, the most popular being Hierarchical Task Analysis (HTA)

Task Analysis (Example)

0. 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.
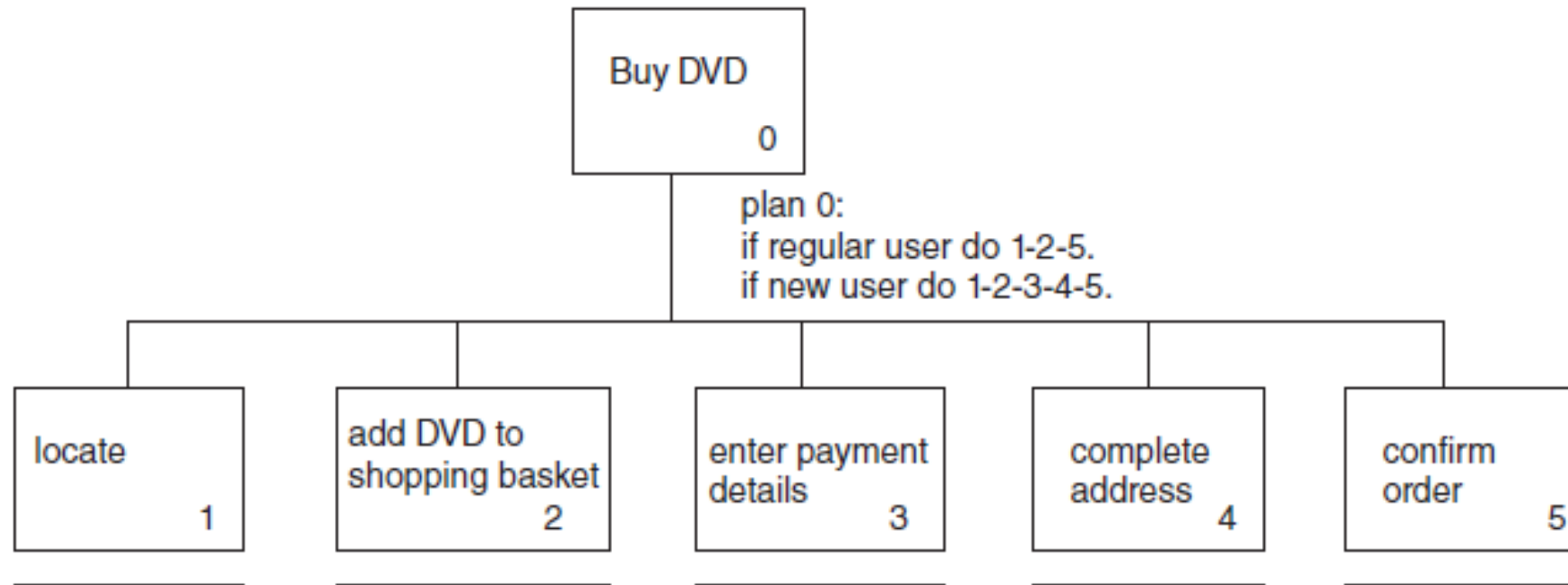
Hierarchical Task Analysis (Example)

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

Hierarchical Task Analysis (Example)

Getting requirements right, and early on, 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

Requirements gathering

1 Understand your users

2 Know what your users want / need

3 Understand and ideate on how they can achieve those goals

4 Use that as a framework for your design

5 Be aware of pitfalls