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
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

**Ginnie**

**BACKGROUND**
- 15, Female
- Chasing Private Education
- Ambitious
- Comfortable using technology in communication

**MOTIVATIONS**
- Keeping in touch with her network
- Fashion/looks cool
- Keeping up with peers.

**FRUSTRATIONS**
- Sad people using to be 'friends' on Facebook
- Having to be in bed at 11pm
- Being swamped in friends updates
- Missing important status updates

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 San 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 NIM to her cousin who is at University in Leeds.

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

“I want to easily hook up with my friends whilst watching TV”
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
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
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.

My school continuously strives to be a premier educational institution in the state of Georgia. Technology is a part of our everyday lives, so can technology and the Internet in my classroom. I have 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.

At home, I use the Internet to do research for the book I am writing, to maintain my blog, and to communicate with friends. I have a cable Internet service, so I don't have to worry about troubleshooting problems when I need. 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 classrooms or at home by herself.

Features and functionality by persona type

User Insight

The University of Georgia is a public research university located in Athens, Georgia, United States. The university was founded in 1859 and is one of the top-ranked public universities in the United States. It is a member of the Association of American Universities and is home to many well-known programs, including the School of Architecture, the School of Business, the School of Education, the School of Engineering, and the School of Public Policy.

The University of Georgia is the flagship institution of the University System of Georgia, a state-sponsored system of higher education that includes 28 public colleges and universities.

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The Environmentalist

Megan Lucas

affirmative  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 researcher on agriculture. She is an avid gardener, and now works as a part-time horticulturist. She first purchased her free Rhode Island Red Hens after deciding how beneficial it would be for her family as a way to access fresh eggs (she’s an eco-conscionable eater) 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 rich 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.

Ages: 57
Education: B.S.
Occupation: Horticulturist
Neighborhood: Valrona, KCMO

Hobbies: Gardening, Camping, Biking
Household: Husband & 3 Children
TIM the ESCAPIST
SKILLFUL  SOLITARY  IMMERSIVE
“Perfecting audio settings is a stress reliever.”

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.

MEGAN the ENTERTAINER
COMMUNITY  ATMOSPHERE  COMPATIBILITY
“I want to be in the middle of the action with my friends and neighbors.”

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

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 TIM, DOLBY MEANS ALGORITHMS.
DOLBY SHOULD MEAN:
Perfectly calibrated sound for complete escape.

TO MEGAN, DOLBY MEANS THEATER STUFF.
DOLBY SHOULD MEAN:
A way to provide the next best thing to being there.

CORE DIMENSIONS OF TIM’S PERSONALITY

<table>
<thead>
<tr>
<th>TECH CAPABILITY</th>
<th>EXPERT</th>
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<tbody>
<tr>
<td>SHOPPING</td>
<td>EVALUATIVE</td>
</tr>
<tr>
<td>ENTERTAINMENT MOTIVATION</td>
<td>SELF</td>
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</table>

CORE DIMENSIONS OF MORGAN’S PERSONALITY

<table>
<thead>
<tr>
<th>EQUIPMENT DESIRES</th>
<th>LATEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTERTAINMENT MOTIVATION</td>
<td>SOCIAL</td>
</tr>
<tr>
<td>TYPE OF QUALITY</td>
<td>EXTREME</td>
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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.

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.

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.
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

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

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 (cont)

Political issues within organization

Communication

- Effectiveness
- Willingness
- Capability

Business environment changes

Balancing functional demands with usability demands
Data gathering considerations (cont)

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

Travel agent

- Update travel details
- Identify potential vacations
- Retrieve visa requirements
- Retrieve vaccination requirements

Traveler
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

<table>
<thead>
<tr>
<th>USER INTENTION</th>
<th>SYSTEM RESPONSIBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>find visa requirements</td>
<td>request destination and nationality</td>
</tr>
<tr>
<td>supply required information</td>
<td>obtain appropriate visa information</td>
</tr>
<tr>
<td>obtain personal copy of visa information</td>
<td>offer information in different formats</td>
</tr>
<tr>
<td>choose suitable format</td>
<td>provide information in chosen format</td>
</tr>
</tbody>
</table>

retrieveVisa
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