Use Cases

CSE 403 Software Engineering

Autumn 2023

Today's Outline

1. What are techniques used to specify requirements?
   - Use cases
   - Personas and user scenarios
   - Storyboarding
   - Paper prototyping
   - Prototyping
   - UML
   - Feature list
   - …

It helps to start with a template

Cockburn's requirement template

1. Purpose and scope
2. Terms (glossary)
3. **Use cases (the central artifact of requirements)**
4. Technology used
5. Other
   a. Development process: participants, values (fast-good-cheap), visibility, competition, dependencies
   b. Business rules (constraints)
   c. Performance demands
   d. Security, documentation
   e. Usability
   f. Portability
   g. Unresolved (deferred)
6. Human factors (legal, political, organizational, training)

https://alistaircockburn.com/

Be it the Cockburn requirements template or another – central to all – in one form or another – are **Use Cases**

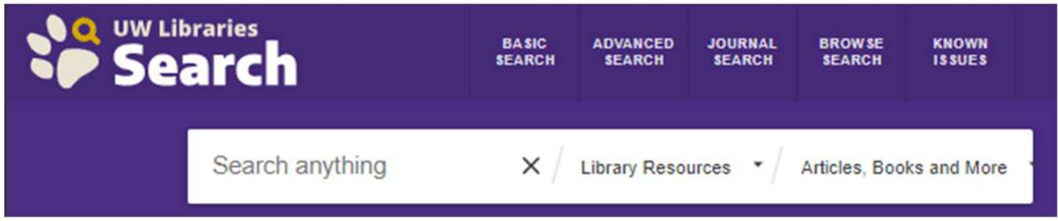
So, what is a use case?

A **use case** is a written description of a **user's interaction** with the **software system** to accomplish a **goal**

Let’s start with some terminology

- **Actor**: user interacting with the system (may be another system)
- **System:** the software product
- **Goal**: desired outcome of the primary actor
- **Flow:** interactive steps to achieve the goals

Here’s an example



Goal	Reserve a book in the library app
Actor	Library patron
Main (success) flow	1. Patron selects the search screen 2. System presents a search box (with filters) 3. Patron types in the book title 4. System presents the books that match and branch locations 5. Patron selects location and reserves 6. System confirms and re-presents home page

So, what is a use case?

Use cases capture the **functional requirements** of a system

- A use case is an **example behavior** of the system
- Written from an **actor's point of view**, not the system’s
- **3-9 clearly written steps (flow)** lead to a “main success scenario”
- Also used to describe “variation” and “exception” scenarios

Try it with a use case for your project

Goal	
Actor	
Main (success) flow	1. 2. 3. 4. …

- Capture your thoughts –
We'll rotate today through groups to discuss your use cases

Use cases are hugely valuable

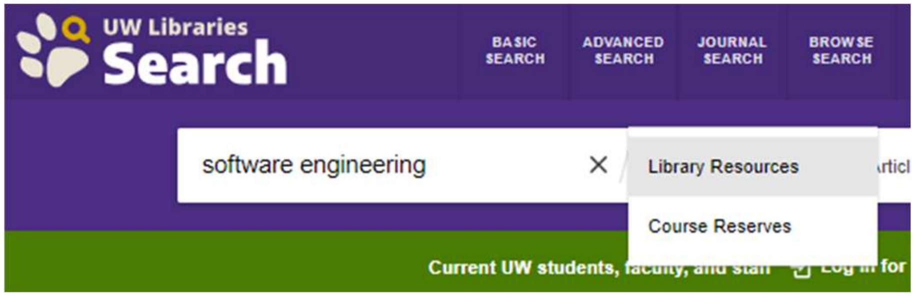
- Capture a level of functionality (**list of goals**)
- Establish an understanding between the customer and the developers of the requirements (**success scenarios**)
- Alert developers of **variations** (extensions) and **exceptions** (errors) cases to test

Let’s double click on these other flows

Variations and exceptions can be thought of as **branches** in a use case useful for identifying other situations that need to be handled

Variation (alternate) flows:

- These paths describe extensions on the main theme
- Another way to meet the goal
- Library search - Patron enters an author or subject or category

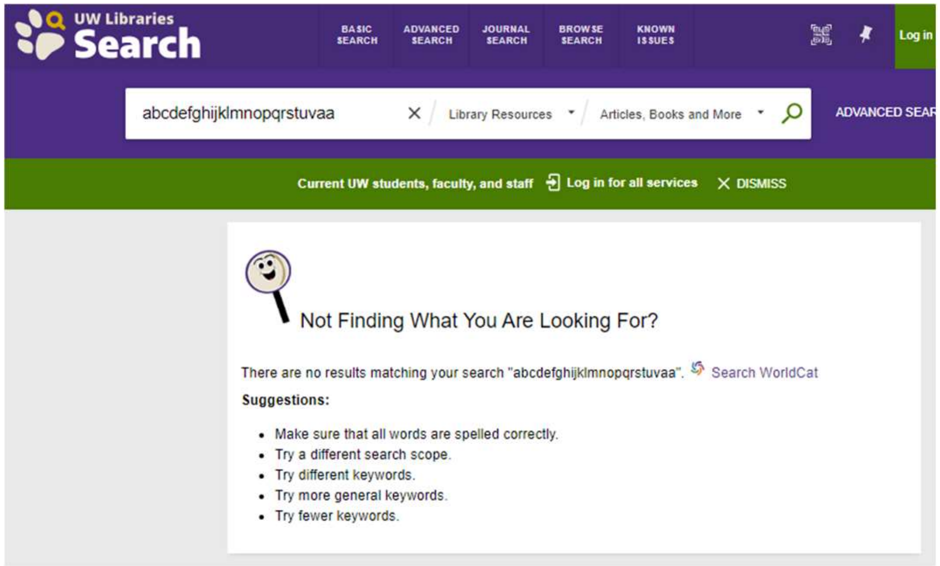


software engineering

Let’s double click on these other flows

Exception (error) flows:

- These paths describe failure conditions
- What happens when the goal is not achieved
- Library search - no book is found, system times out



abcdefghijklmnopqrstuvaa

Not Finding What You Are Looking For?

There are no results matching your search "abcdefghijklmnopqrstuvaa".

Suggestions:

- Make sure that all words are spelled correctly.
- Try a different search scope.
- Try different keywords.
- Try more general keywords.
- Try fewer keywords.

We can capture this in our template

Goal	Reserve a book in the library app
Actor	Library patron
Main (success) flow	1. Patron selects the search screen 2. System presents a search box (with filters) 3. **Patron types in the book title** 4. System presents the books that match and branch locations 5. Patron selects location and reserves 6. System confirms and represents home page
Variation (alternate) flow	**(In step 3)** **3.1 Patron types in an author …** **3.2 Patron types in a subject …**

These other flows are hugely valuable

Do

- Think about how every step of the use case could be enhanced or fail
- Give a plausible response to each extension from the system
- Response should either jump to another step of the case, or end it

Don’t

- List things outside the scope of the use case ("User's power goes out")
- Make unreasonable assumptions ("DB will never fail")
- List a remedy that your system can't actually implement
- Go overboard

Here’s another example – ATM machine

Goal	Withdraw money
Actor	Bank patron
System	ATM
Main (success) flow	1. System displays account types 2. User chooses type 3. System asks for amount to withdraw 4. User enters amount 5. System debits user’s account and dispenses money 6. User removes money 7. System prints and dispenses receipt …
Exception flow	(In step 5) 5.1.a System notifies that account funds are insufficient 5.1.b System displays current balance [and returns to step 1]

Precondition	Authenticated in
Trigger	Select withdraw

Back to basics – 4 steps for writing a use case

1. Identify actors and their goals

- Actors: What users and (sub)systems interact with our system?
- Goals: What does each actor need our system to do?

4 steps for writing a use case

1. Identify actors and goals
2. **For each goal, identify what each actor needs the system to do**

   Main success scenario is the preferred "happy path”

   - Easiest to read and understand

   Capture each actor's intent and responsibility, from trigger to goal

   - State what information passes between actors
   - Number each step (line)

4 steps for writing a use case

1. Identify actors and goals
2. For each goal, identify what each actor needs the system to do
3. **List the variations to the main (success) flow**
    - These are alternate branches from the main path
    - What are some options/enhancements that the user might want/expect
    - Label with step number (success scenario line)
        - Example variation to step 5:
            - 5.1 <variation>; 5.1 <steps>; 5.1<continue at step 6>

4 steps for writing a use case

1. Identify actors and goals
2. For each goal, identify what each actor need our system to do
3. List the variations to the main flow
4. **List the exception (error) flows**
    - Many steps can fail
    - Describe failure-handling
    - Label with step number (success scenario line)
        - 5.1<failure condition>; 5.1 <actions>; 5.1<continue at failure step 7>

Try it with a use case for your project

Goal	
Actor	
Main (success) Flow	
Variation (alternate) Flow	
Exception (error) Flow	

- Capture your thoughts –
We'll hear from another few teams

Summing up use cases

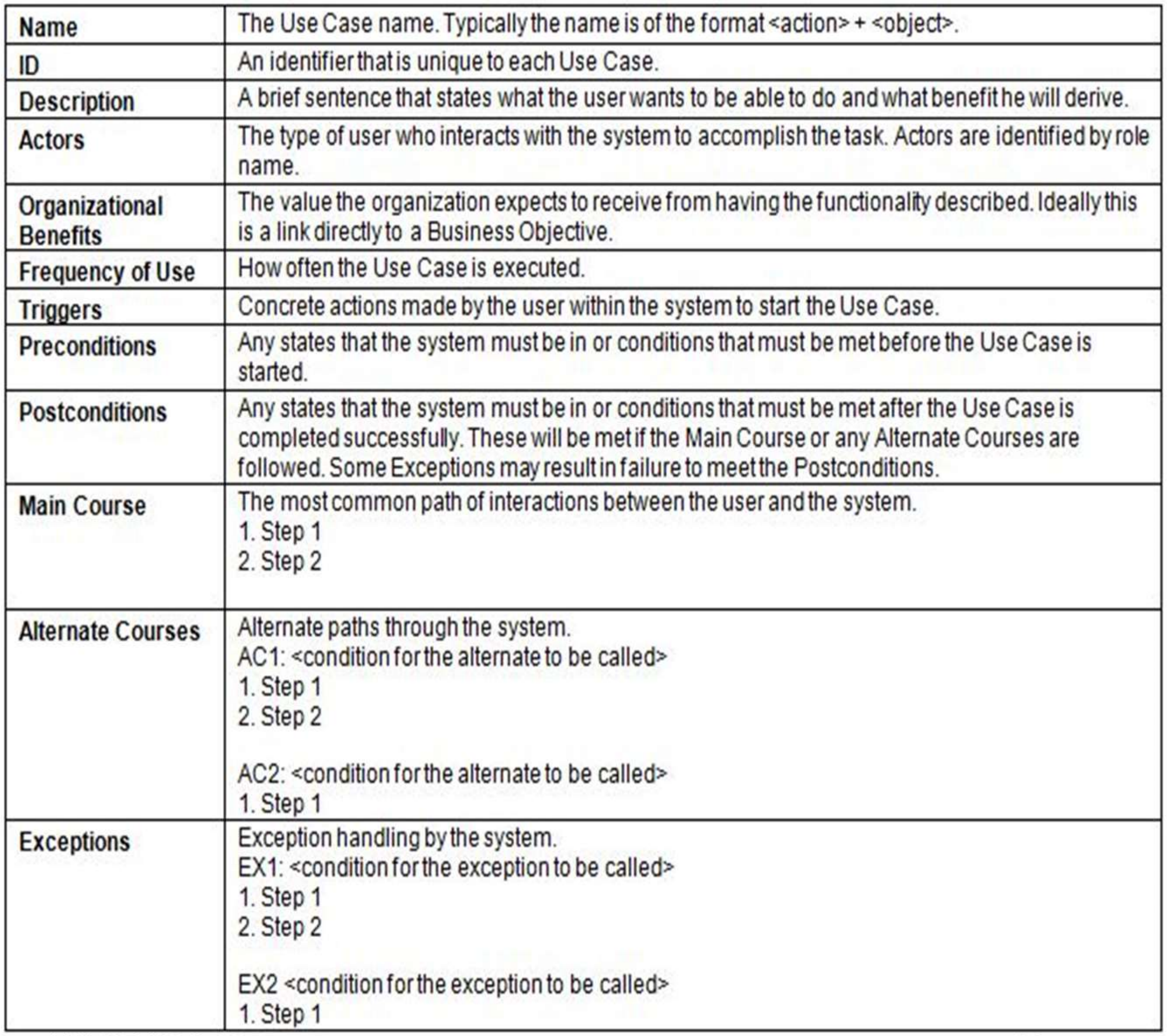
- Focus on interaction
  - Start with a request from an actor to the system
  - End with the production of all the answers to the request
- Focus on essential behaviors, from actor’s point of view
  - Don’t describe internal system activities
  - Don’t describe the GUI in detail
- Be concise, clear, and accessible to non-programmers
  - Easy to read
  - Summary fits on a page
  - Main success scenario, and variations and exceptions

Some references

Basic Use Case Template (Cockburn)
https://canvas.uw.edu/courses/1680496/files/folder/UseCase%20Template?preview=110607742

and/or

Use Cases (Usability.gov)
https://www.usability.gov/how-to-and-tools/methods/use-cases.html



Name	The Use Case name. Typically the name is of the format <action> + <object>.
ID	An identifier that is unique to each Use Case.
Description	A brief sentence that states what the user wants to be able to do and what benefit he will derive.
Actors	The type of user who interacts with the system to accomplish the task. Actors are identified by role name.
Organizational Benefits	The value the organization expects to receive from having the functionality described. Ideally this is a link directly to a Business Objective.
Frequency of Use	How often the Use Case is executed.
Triggers	Concrete actions made by the user within the system to start the Use Case.
Preconditions	Any states that the system must be in or conditions that must be met before the Use Case is started.
Postconditions	Any states that the system must be in or conditions that must be met after the Use Case is completed successfully. These will be met if the Main Course or any Alternate Courses are followed. Some Exceptions may result in failure to meet the Postconditions.
Main Course	The most common path of interactions between the user and the system. 1. Step 1 2. Step 2
Alternate Courses	Alternate paths through the system. AC1: <condition for the alternate to be called> 1. Step 1 2. Step 2 AC2: <condition for the alternate to be called> 1. Step 1
Exceptions	Exception handling by the system. EX1: <condition for the exception to be called> 1. Step 1 2. Step 2 EX2 <condition for the exception to be called> 1. Step 1

Switching gears to another technique …

1. What are techniques used to specify requirements?
   - Use cases
   - Personas and user scenarios ← we are here
   - Storyboarding
   - Paper prototyping
   - Prototyping
   - UML
   - Feature list
   - …

Personas

A **persona** is a description of a person who is representative of a population using your system

Each persona may have a different perspective of what they need

Example: Library catalog service (UW Libs)

Persona: Admin

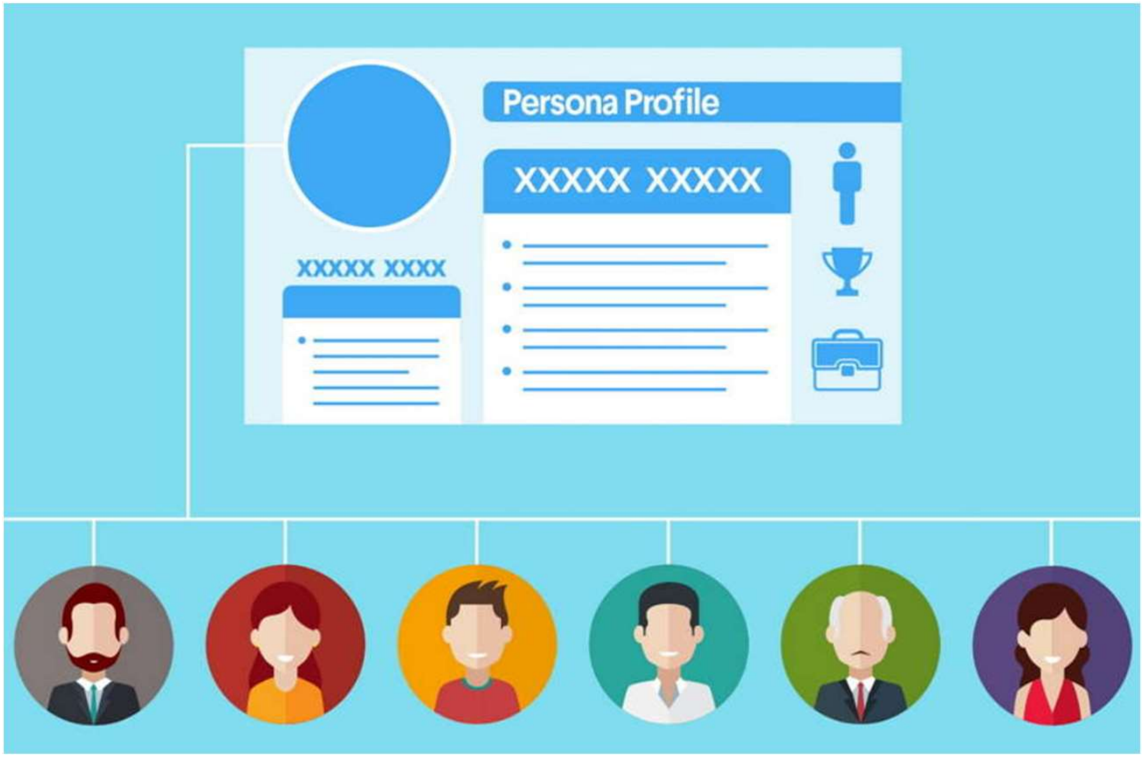
Persona: Librarian

Persona: Student

Persona: Instructor

What might be an analogy to a persona in a use case?

Personas can be described with cards

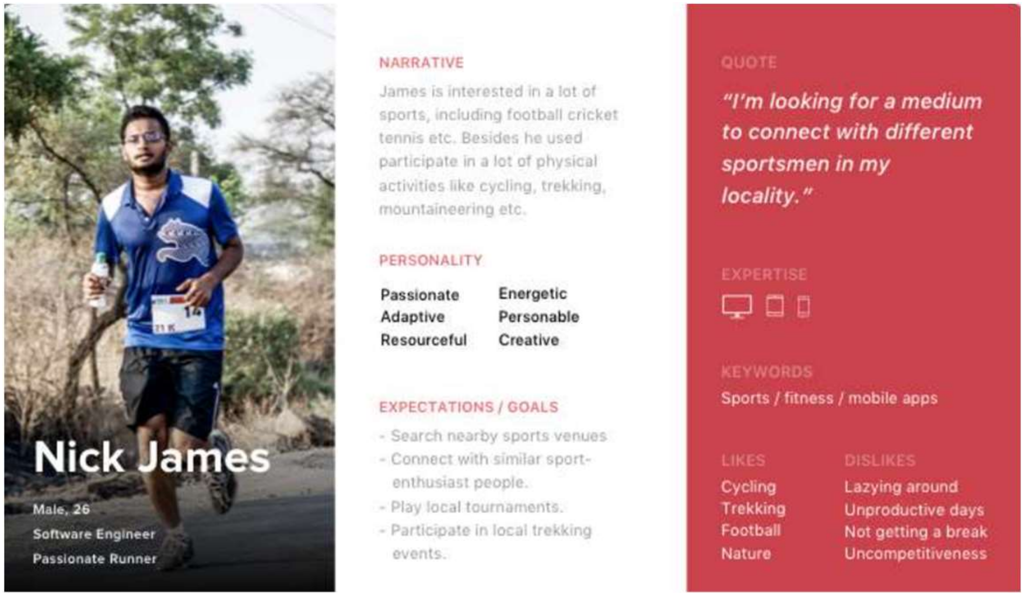


Mockplus: User Persona Templates for Free Download

Cards typically include:

- Persona name and photo/image
- A quote that captures their goals and motivations
- Demographics (group they represent)
- Computer competence and usage
- Wants and needs
- Frustrations and pain points

Lots of great examples on the web



Nick James

Male, 26
Software Engineer
Passionate Runner

NARRATIVE

James is interested in a lot of sports, including football cricket tennis etc. Besides he used participate in a lot of physical activities like cycling, trekking, mountaineering etc.

PERSONALITY

Passionate	Energetic
Adaptive	Personable
Resourceful	Creative

EXPECTATIONS / GOALS

- Search nearby sports venues
- Connect with similar sport-enthusiast people.
- Play local tournaments.
- Participate in local trekking events.

QUOTE

"I'm looking for a medium to connect with different sportsmen in my locality."

EXPERTISE

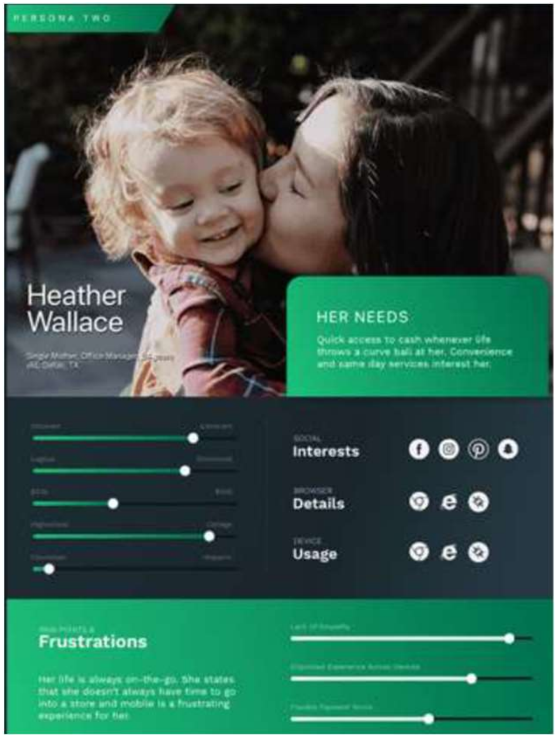
🖥 ▯ ▯

KEYWORDS

Sports / fitness / mobile apps

LIKES	DISLIKES
Cycling	Lazying around
Trekking	Unproductive days
Football	Not getting a break
Nature	Uncompetitiveness

[Mockplus: User Persona Templates for Free Download]



PERSONA TWO

Heather Wallace

Single Mother, Office Manager, 34 years old, Dallas, TX

HER NEEDS

Quick access to cash whenever life throws a curve ball at her. Convenience and same day services interest her.

SOCIAL
Interests

BROWSER
Details

DEVICE
Usage

PAIN POINTS &
Frustrations

Her life is always on-the-go. She states that she doesn't always have time to go into a store and mobile is a frustrating experience for her.

User scenarios

For each persona you can define the requirements from that person's perspective through a user scenario

Example: As an instructor, I am constantly looking for class resources that are relevant and up to date. Moreover, when I find a resource, I want to know it's available free-of-charge for the students and comes with online access.

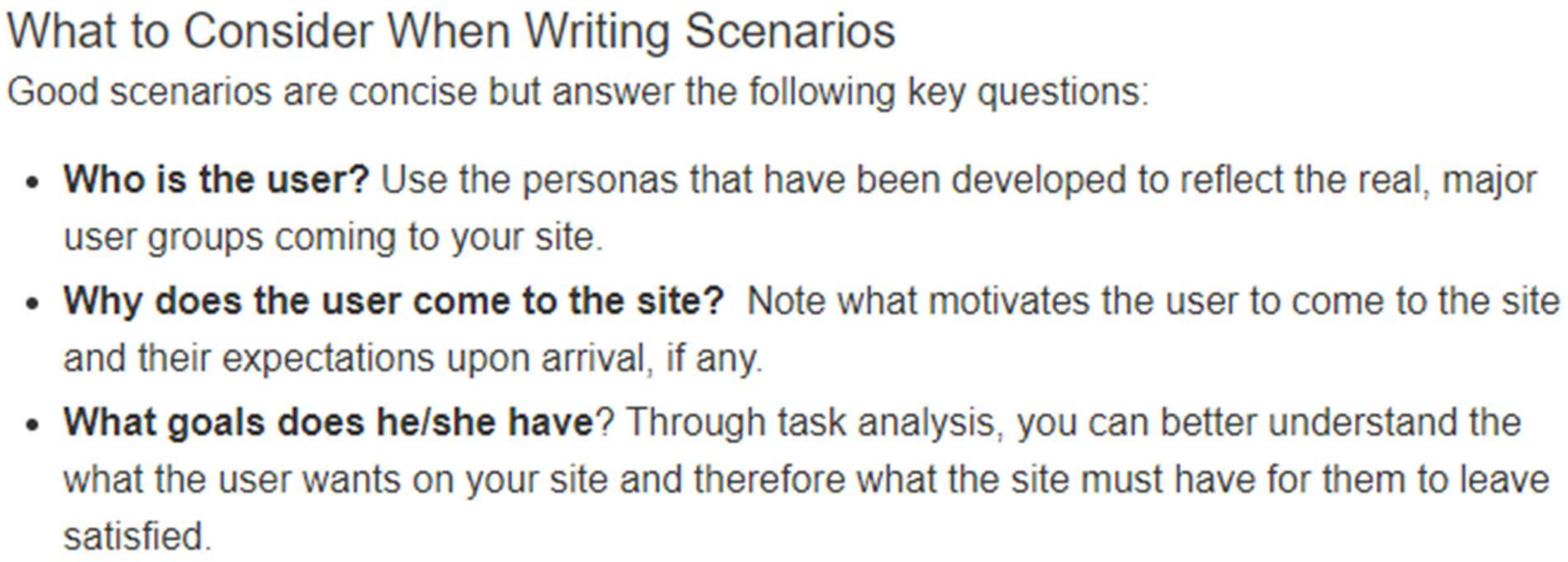
Example: As a student, I want to be able to have the search provide smart results, so that I don't spend hours wading through irrelevant matches. I'd like to prioritize results that are timely, in-the-news, most-popular, and most-referenced across the industry. I'd also like each result to come with a summary for quick scanning.

Writing user scenarios

Doesn't this sound like use cases!

persona ~= actor

scenario ~= goal (w/ flow insights)



What to Consider When Writing Scenarios

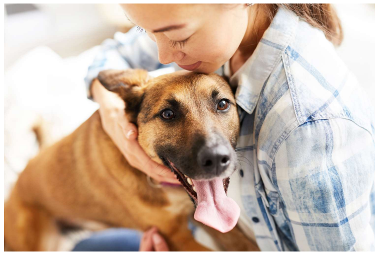
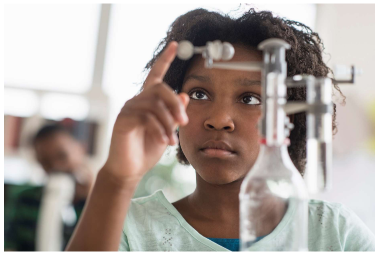
Good scenarios are concise but answer the following key questions:

- **Who is the user?** Use the personas that have been developed to reflect the real, major user groups coming to your site.
- **Why does the user come to the site?** Note what motivates the user to come to the site and their expectations upon arrival, if any.
- **What goals does he/she have**? Through task analysis, you can better understand the what the user wants on your site and therefore what the site must have for them to leave satisfied.

From: https://www.usability.gov/.../scenarios.html

Personas and scenarios are hugely valuable

- **They tap into a fundamental human skill—the ability to make predictions about how other people will react based on mental models of them**
- Enable us to capture inferences about the needs and desires of audience segments
- Draw attention to “pain points” and opportunity for new solutions
- Serve to communicate user characteristics and their individual types of requirements in a compact and easily understood way

Questions?

Use case wrap up (time permitting)

Which of the following requirements could be directly represented as a use case?

- Special deals may not run longer than 6 months
- Customers only become preferred after 1 year
- A customer has one and only one sales contact
- Database response time is less than 2 seconds
- Web site uptime requirement is 99.8%
- Number of simultaneous users will be 200 max