

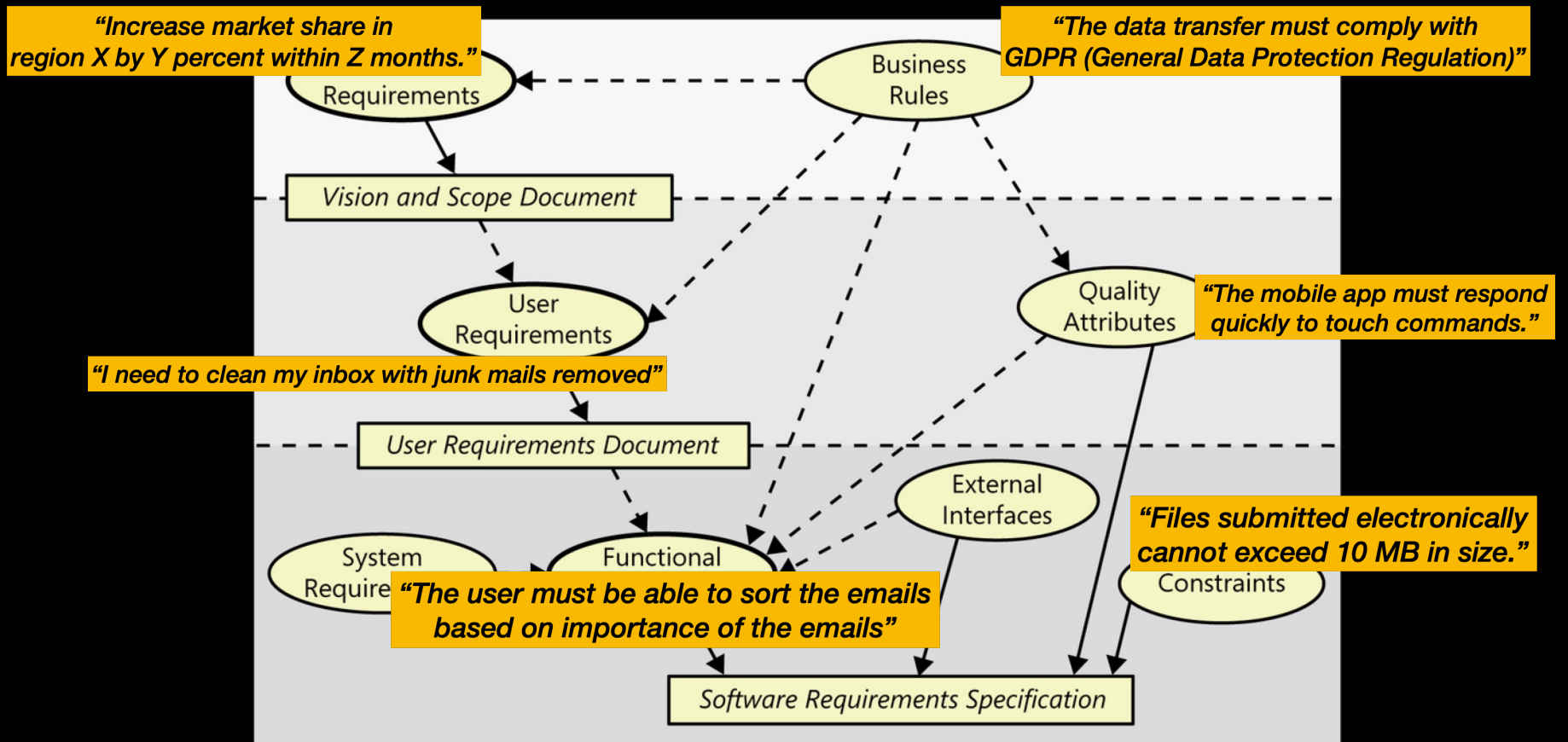
# Requirements and Intelligent Systems

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# Requirement Definition

- Requirements are a specification of what should be implemented.
- They are descriptions of how the system should behave, or of a system property or attribute.
- They may be a constraint on the development process of the system.

Sommerville, Ian, and Pete Sawyer. 1997. *Requirements Engineering: A Good Practice Guide*.  
Chichester, England: John Wiley & Sons Ltd.



Software Requirements by Karl Eugene Wiegiers, Joy Beatty, Microsoft Press, 2013

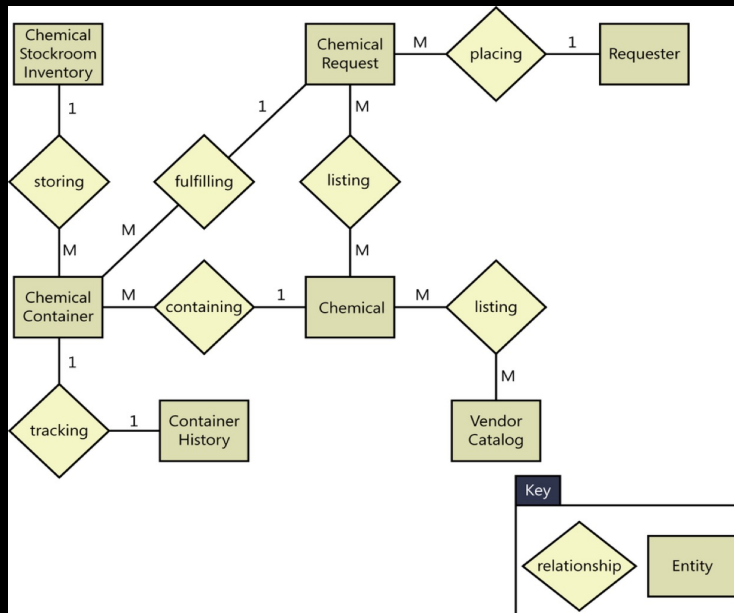
# Example Requirement Specification

“Global Personal Marketplace SRS” (shared on slack)

- What sections are included in this document?
- How are the Functional Requirements (FRs) organized in this example?
- What kind of information is included in the FRs?

# Data Requirements

***“An order consists of the customer’s identity, shipping information, and one or more products, each of which includes the requested chemical name, number of units, unit price, and total price.”***



Data Element	Description	Composition or Data Type	Length	Value
Chemical Request	request for a new chemical from either the Chemical Stockroom or a vendor	Request ID + Requester + Request Date + Charge Number + 1:10{Requested Chemical}		
Delivery Location	the place to which requested chemicals are to be delivered	Building + Lab Number + Lab Partition		
Number of Containers	number of containers of a given chemical and size being requested	Positive integer	3	
Quantity	amount of chemical in the requested container	numeric	6	
Quantity Units	units associated with the quantity of chemical requested	alphabetic characters	10	grams, kilograms, milligrams, each
Request ID	unique identifier for a request	integer	8	system-generated sequential integer, beginning with 1
...	...	...	...	...

# Data Requirements

Entity \ Use Case	Order	Chemical	Requester	Vendor Catalog
Place Order	C	R	R	R
Change Order	U, D		R	R
Manage Chemical Inventory		C, U, D		
Report on Orders	R	R	R	
Edit Requesters			C, U	

**FIGURE 13-5** Sample CRUD matrix for the Chemical Tracking System.

*CRUD: Create, Read, Update, and Delete*

# User Stories

As a <type of user>, I want <some goal> so that <some reason>.

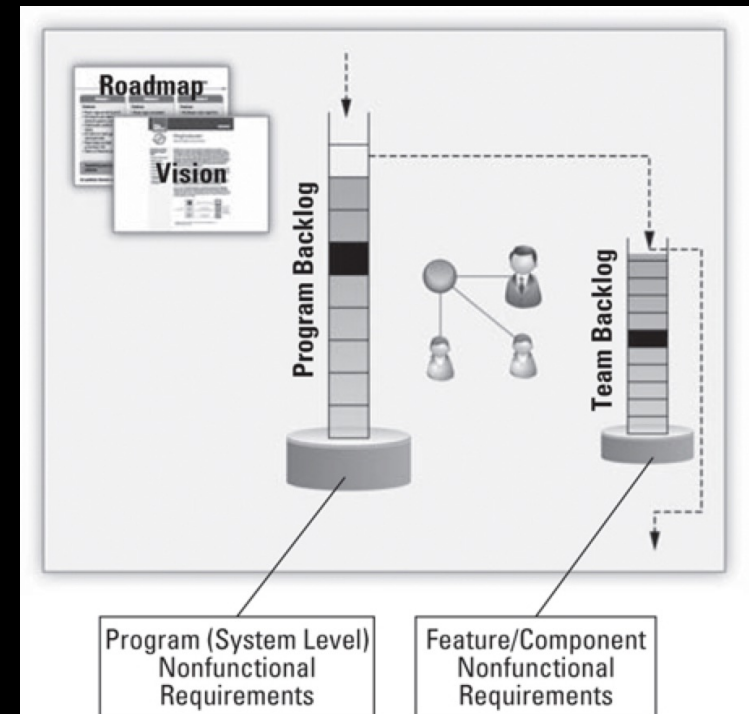
## Use cases

- Update Customer Profile
- Search for an Item
- Buy an Item
- Track a Shipped Package
- Cancel an Unshipped Order

***As a customer, I want to update my customer profile so that future purchases are billed to a new credit card number.***

# Feature

- A feature consists of one or more logically related system capabilities that provide value to a user and are described by a set of functional requirements.



Agile Software Requirements Lean Requirements Practices for Teams, Programs, and the Enterprise, by Dean Leffingwell



Identifying the product's expected user classes and other stakeholders. Understanding user tasks and goals and the business objectives with which those tasks align.



## Elicitation

Reviewing the documented requirements to correct any problems before the development group accepts them. Developing acceptance tests and criteria to confirm that a product based on the requirements would meet customer needs and achieve the business objectives.



## Validation



Decomposing high-level requirements into an appropriate level of detail; Deriving functional requirements from other requirements information; Understanding the relative importance of quality attributes; Allocating requirements to software components defined in the system architecture  
Negotiating implementation priorities

## Analysis



Translating the collected user needs into written requirements and diagrams suitable for comprehension, review, and use by their intended audiences.

## Specification



# Identify Users

- Users vs Stakeholders
  - Examples? What are the differences?
- Classifying users
  - Access privilege or security level
  - The tasks they perform
  - The features they user
  - Domain expertise
  - ...

**Are different classes of users equally important  
for the system you are building?**



# Classifying Users

- Favored user classes

*Receive preferential treatment when resolving conflicts between requirements from different user classes or making priority decisions*

- Disfavored user classes

*Might deliberately make it hard for the disfavoured users to do things they aren't supposed to do*

- Indirect user classes

*Access its data or services through other applications or through reports*

# Activity

- Who are the user classes for the GitHub pull request (PR) management system?
  - [Example PR1, PR2](#)
  - How do you classify them and why?
  - How is such classification going to impact the requirements for this system?

# Indirect Stakeholders



*"Janice is in her office, writing a report. She's trying to conceptualize the report's higher-level structure, but her ideas won't quite take form. Then she looks up from her desk and rests her eyes on the fountain and plaza area outside her building. She notices the water bursting upward, and that a small group of people are gathering by the water's edge. She rests her eyes on the surrounding pool of calm water. Her eyes then lift toward the clouds and the streaking sunshine. Twenty seconds later she returns to her writing task at hand, slightly refreshed, and with an idea taking shape."*

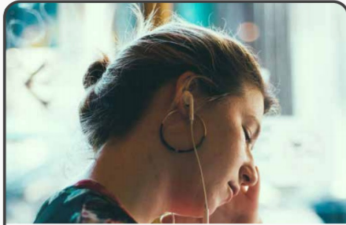
Friedman, Batya, Peter H. Kahn, and Alan Borning. "Value sensitive design and information systems." *The handbook of information and computer ethics* (2008): 69-101.

# Indirect Stakeholders



Friedman, Batya, Peter H. Kahn, and Alan Borning. "Value sensitive design and information systems."  
*The handbook of information and computer ethics* (2008): 69-101.

# User Personas



**Rebecca**  
Casual audiophile

**Age** 26  
**Occupation** Frontend developer  
**Education** Bachelor degree  
**Marital status** Single  
**Location** Mountain View

**Online locations** Work and mobile  
**Computer(s)** iPhone and MacBook Pro  
**Internet usage** 8-9 hours

TECHNOPHOBIC ————— TECH WIZ  
CDs ————— MUSIC STREAMING  
CASUAL LISTENER ————— HARDCORE GEEK

**Music is essential to Rebecca's life. She is listening to tunes almost every second of her life, particularly while working.**

**Obstacles Rebecca faces:**

- Too busy to explore new music artists she might like
- Streaming music consumes a lot of data

**How will Rebecca interact with Spotify?**

**Questions Rebecca will ask:**

- How do I keep updated on new releases by artists I follow?
- How do I learn of new artists I haven't heard of?
- Can I listen to music in a data-efficient manner?
- How can I listen on both my MacBook and my iPhone?

**Who influences Rebecca?**

Ads, Music charts, Her own tastes, Friends, Co-workers

**Rebecca's situation**

**Goals, motivations:**

- Listen to great music to keep her productive at work
- Relax and unwind at the end of the day
- Superior music quality for full enjoyment of tracks
- Expand the circle of music artists she listens to

**Key words**  
music, jazz, r&b, pop, artists, new releases, top charts, background music

**Rebecca's story**

Music is a big part of my life; I like to think that I always have a "background music" running in each scene of my life. I love working while listening to music; somehow, it gives me a lot of focus on my task.

I regularly talk to my co-workers about music and singers — that's what we like to talk about over lunch. We're constantly looking for new artists to inspire us and to expand our music library, but lately it seems a little tough to do that. Everything seems to have a "filter bubble" effect, and we keep listening to the same genres and artists.

I really enjoy finding new artists that match my subjective taste, and most of the times I get those from my close friends. I wish there were a way to find more music and artists without having to rely on the serendipity of life!

Example of a persona that shows the six main elements you should include. Name, age, gender, tag line, experience and skills are placed on the left-hand side. The middle column focuses on the context to indicate how they would interact with a product or service. Finally, on the right-hand side some goals and concerns are shared, as well as a short scenario to indicate the persona's attitude.



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<https://www.interaction-design.org/literature/topics/personas>

# User Personas

- Discovered during the requirements discovery and user story development process

*As a <type of user>, I want <some goal> so that <some reason>.*

- Represent *real* behavior patterns, attitudes, skillset, motivations and goals within the product's domain.
- Design for primary personas



On Next Tuesday:

More on Requirements for intelligent systems