CHALMERS |  UNIVERSITY OF GOTHENBURG

# DIT045/DAT355
# Requirements and User Experience

# Lecture 5: Elicitation, Personas, Scenarios

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# Agenda

Requirements Elicitation

Personas

Requirements Scenarios

# Requirements Elicitation

- Where do requirements come from?
  - The users (or other stakeholders)
  - Constraints on the system
- Right, but how do we get them?
  - Ask?
  - “What are your requirements?”
  - …
  - “What is a requirement?”

# Requirements Elicitation circa 1999 ☺

- https://www.youtube.com/watch?v=n3Sle_o1bcs

# Why is Elicitation Difficult

- Thin spread of domain knowledge (Easterbrook)
  - It is rarely available in an explicit form (i.e. not written down)
  - …distributed across many sources
  - …with conflicts between knowledge from different sources
- Tacit knowledge (The “say-do” problem)
  - People find it hard to describe knowledge they regularly use
  - Limited Observability
  - The problem owners might be too busy coping with the current system
  - Presence of an observer may change the problem
- Bias
  - People may not be free to tell you what you need to know
  - People may not want to tell you what you need to know
    - The outcome will affect them, so they may try to influence you (hidden agendas)

# Example: Loan Approval

- Loan approval department in a large bank (Easterbrook)
  - The analyst is trying to elicit the rules and procedures for approving a loan
- Why this might be difficult:
  - Implicit knowledge:
    - There is no document in which the rules for approving loans are written down
  - Conflicting information:
    - Different bank staff have different ideas about what the rules are
  - Say-do problem:
    - The loan approval process described to you by the loan approval officers is quite different from your observations of what they actually do
  - Probe effect:
    - The loan approval process used by the officers while you are observing is different from the one they normally use
  - Bias:
    - The loan approval officers fear that your job is to computerize their jobs out of existence, so they are deliberately emphasizing the need for case-by-case discretion (to convince you it has to be done by a human!)

# Stakeholder Identification

(Berenbach et al.)

- Who are the stakeholders that are relevant to the problem?
- “All the relevant stakeholders must be identified if requirements are to be properly defined and prioritized”
- Missing stakeholders means missing requirements, view, goals, qualities, conflicts…

- Wrong stakeholders:
  - Is the expert speaking for the entire organization?
  - Are there differences of opinion regarding functionality or issues that have not been resolved?
  - Are the stakeholders knowledgeable about the domain under discussion?

# “Smart Ignoramus” (D. Berry, 1995, 2002)

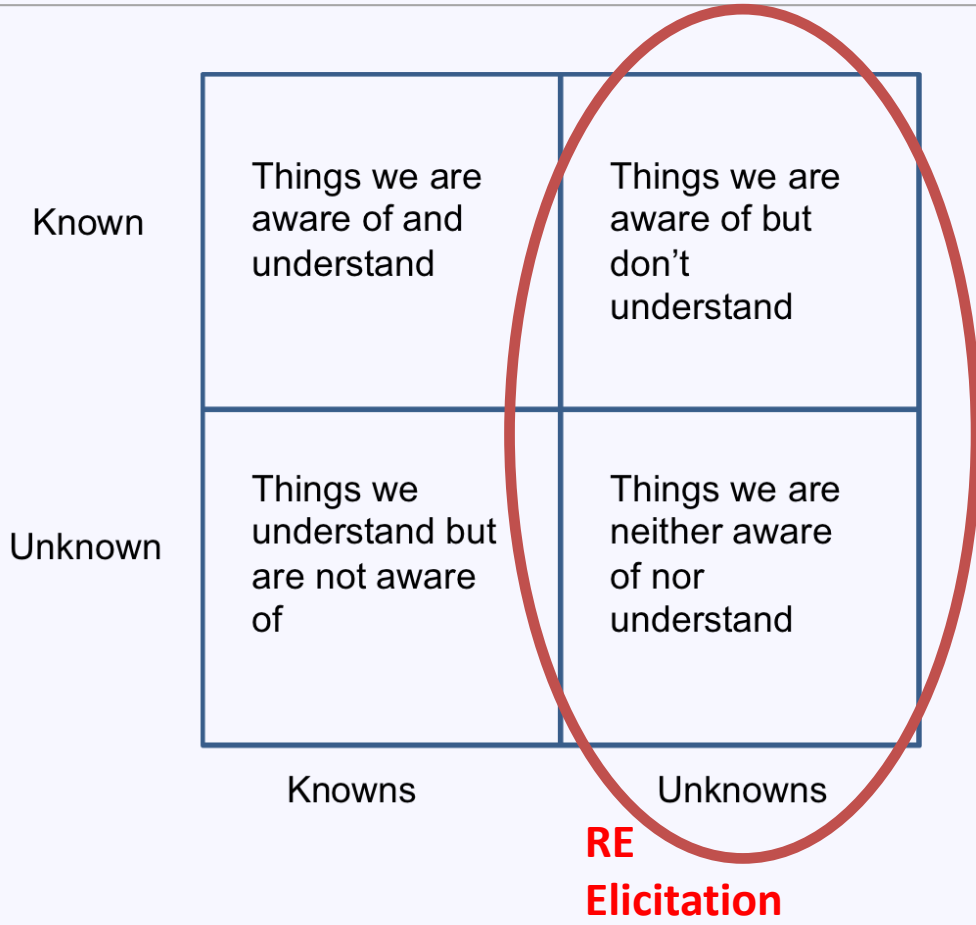
- You want a requirements engineer (systems analyst) who is generally smart, has good tech knowledge, can follow explanations, but who is ignorant of the specific domain
- Smart vs. ignorant:
  - Ask questions which are smart but ignorant (in the domain)

- Examples
  - What do you mean by sales?
  - What is a transaction?
  - Who can submit a report?
  - What is a customer in this context?
  - What do you mean by danger? Error? Failure?
  - What happens when this (normal path) doesn’t happen?

# Known and Unknown Unknowns

Reports that say that something hasn't happened are always interesting to me, because as we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns – the ones we don't know we don't know. And if one looks throughout the history of our country and other free countries, it is the latter category that tend to be the difficult ones.

– United States Secretary of Defense Donald Rumsfeld, 2002




https://dojo.ministryoftesting.com/lessons/not-sure-about-uncertainty

# Assigned Reading

- Sutcliffe, Alistair, and Pete Sawyer. "Requirements elicitation: Towards the unknown unknowns." *Requirements Engineering Conference (RE), 2013 21st IEEE International*. IEEE, 2013.

# (a selection of) Elicitation Techniques

(Easterbrook)

- Traditional Techniques
  - Documentation
  - Data Sampling
  - Interviews
  - Surveys/Questionnaires
- Collaborative Techniques
  - Focus groups
  - Prototyping
- Contextual (social) approaches
  - Participant Observation
  - …
- Cognitive techniques
  - Think aloud protocol
  - …

# Documentation

- Any paper or electronic documentation used in the system to be modified or replaced:
  - Reports, screens, printouts, forms, instruction manuals, receipts, user documentation, internal documentation….
- Can be used to better understand the current system and the need for a new/modified system
- Benefits
  - Can read on your own time
  - Don’t need stakeholder resources
- Drawbacks:
  - May reflect an ideal version of reality
  - May be out of date
  - May have lots of domain-specific vocabulary and be hard to understand

# Example

- (Office Template)

## Expense Report

**Tailspin Toys**
**123 South Main Street, Ocean View, MO 12345**

**EXPENSE REPORT TOTAL** $1,290.70

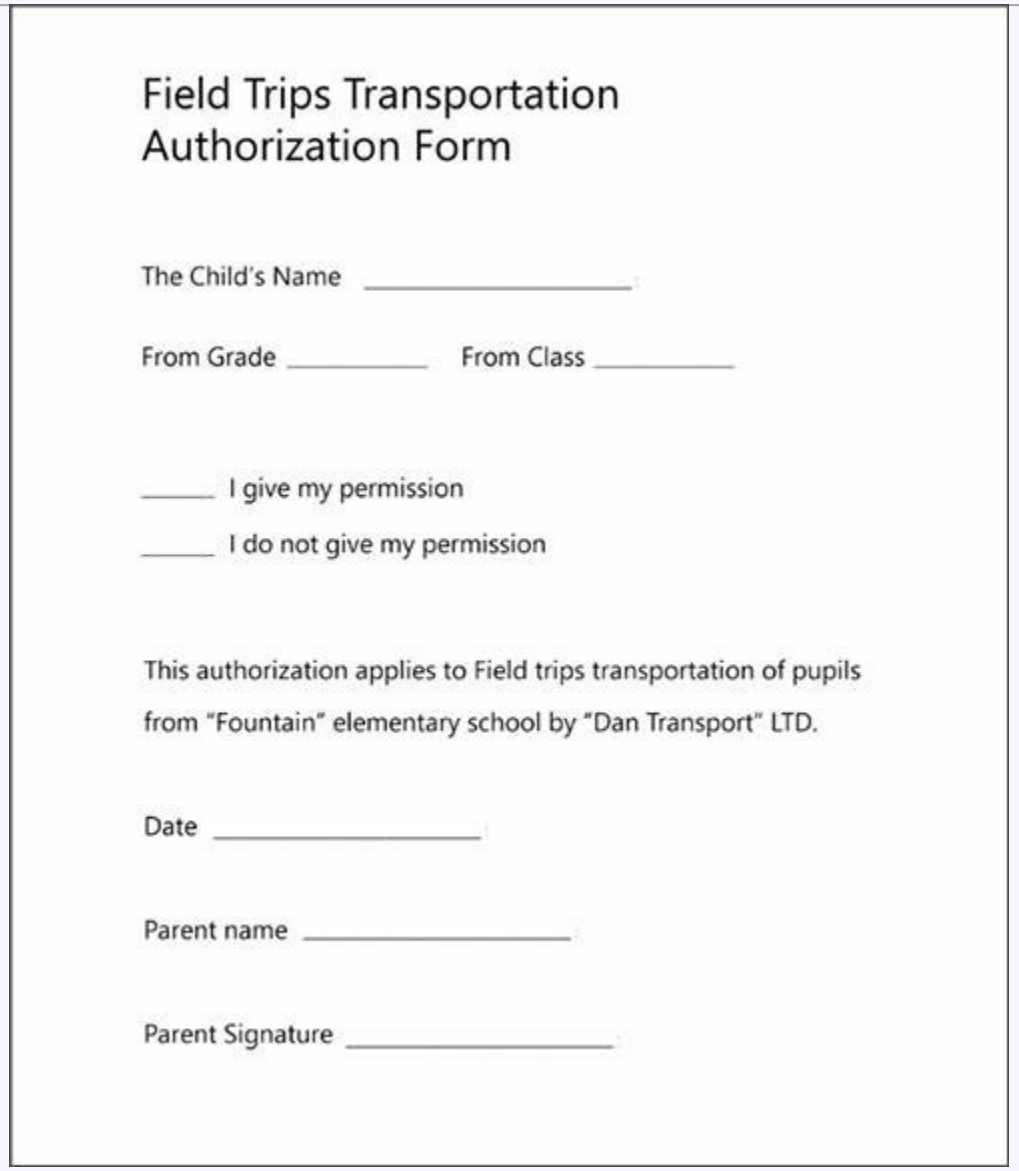
| | | | | | |
|---|---|---|---|---|---|
| Name: | Mike Gragg | Purpose: | Annual Sales Seminar | Mileage Rate: | $0.50/mile |
| Dept: | Sales | Start Date: | 4/5/2016 | Meal Rate: | $30.00/day |
| Position: | Managing Director | End Date: | 4/8/2016 | Hotel Rate: | $200.00/night |
| Manager: | Janine Mendoza | Approved By: | Janine Mendoza | | |

| HOTEL | TRANSPORT/MILEAGE |
|---|---|
| $445.00 | $745.70 |
| **MEALS** | **OTHER** |
| $75.00 | $25.00 |

| Date | Account | Description | Hotel | Meals | Transport | Start | End | Mileage | Other | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/4/2017 | Sales & Marketing | Drive to airport/flight | | | $428.00 | 11,378.5 mi. | 11,456.2 mi. | $38.85 | | $466.85 |
| 5/4/2017 | Sales & Marketing | Hotel (2 nights) | $445.00 | | $225.00 | | | | | $670.00 |
| 5/4/2017 | Sales & Marketing | Convention Fees | | | | | | | $25.00 | $25.00 |
| 5/4/2017 | Sales & Marketing | Meals | | $30.00 | | | | | | $30.00 |
| 5/5/2017 | Sales & Marketing | Meals & Taxi | | $30.00 | $15.00 | | | | | $45.00 |
| 5/6/2017 | Sales & Marketing | Meals | | $15.00 | | | | | | $15.00 |
| 5/7/2017 | Sales & Marketing | Drive from airport | | | | 11,456.2 mi. | 11,533.9 mi. | $38.85 | | $38.85 |

# Example

- https://support.formtitan.com/faq/formbuilder/How_do_i_use_the_Paper_Form_Mapping



Field Trips Transportation Authorization Form

The Child's Name _____

From Grade _____ From Class _____

_____ I give my permission

_____ I do not give my permission

This authorization applies to Field trips transportation of pupils from "Fountain" elementary school by "Dan Transport" LTD.

Date _____

Parent name _____

Parent Signature _____

# Data Sampling

(Easterbrook)

- Take a sample of facts and figures
  - Forms, invoices, financial information
  - Reports
  - Survey results, marking data
  - Transactions, sales
  - Click data, navigation data
- Sampling – select a representative set from a population
- Sample size
  - Balance between cost of data collection and required significance
- Process:
  - Select data to sample
  - Select population (whole set of possible samples)
  - Sample (pick subset)
  - Choose sample size

# Interviews

- Types of interviews:
  - Structured: strict set of questions
  - Semi-structured: set of questions, but with allowance for divergence
  - Open-ended: no set of questions, open agenda

- Advantages
  - Rich source of data
  - Can probe interesting areas, ask follow-up questions
  - Get individual perspectives
- Disadvantages
  - Hard to analyze large amount of qualitative data
  - No convergence between interviewees
  - Sometimes hard to conduct

# Questionnaires (Surveys)

- List of set questions, usually conducted online
- (Hopefully) a large number of people fill it out

- Advantages
  - Lots of responses
  - Can have statistical significance
  - Can be used remotely (you don't have to be there)

- Disadvantages
  - Have to be very carefully designed, piloted, proofread
  - If questions are misunderstood, no chance to clarify
  - No chance to ask follow-up questions
  - Broad but shallow
  - Hard to get people to answer, hard to get long answers

# Group Elicitation Techniques

- Examples:
  - Focus groups
  - Creativity Workshops
- Advantages:
  - Interesting discussions and convergent thinking
  - Saves time to talk to many stakeholders at once
- Disadvantages:
  - Group think:  people tend to follow, not diverge
  - Power dynamics:  some may be afraid to speak
  - Some are just quiet, hard to involve everyone

# Group thinking

- https://www.youtube.com/watch?v=jK-1fYhpq2Y

# Observation

- Spend time watching the stakeholder perform their daily tasks
  - Can be for a short or long time
  - Longer, more data gathered

- Advantages
  - Maybe see how things are really done (see things people won't tell you)
  - Really get to know the working environment
  - Spent time, maybe gain trust?

- Disadvantages
  - Takes a lot of time
  - Bias:  observer may act differently when being observed
  - May not be possible

# Agile Elicitation/Participatory Design

- Work very closely with stakeholder
- A stakeholder is part of your team
- They write the user stories
- Are available for conversations to flesh out user stories

- Benefits:
  - Frequent feedback
  - Joint ownership of requirements and development process
    - “we” are doing this
- Challenges:
  - In really your stakeholders are often too busy to do this
  - What if you get the wrong stakeholder?  Can one speak for many?

# Models as Elicitation Technique

- All the models we draw can be used for elicitation
  - Show completed models to the stakeholder, walk them through them
  - Create the model interactively with the stakeholders, ask them questions

- Advantages
  - Find gaps in knowledge
  - Makes tacit knowledge explicit
  - (When done collaboratively) stakeholders “own” the models, are more comfortable with them
- Disadvantages
  - Stakeholders have to learn some of the modeling language
  - Time consuming
  - Maybe hard to convert to model to requirements
  - Not everyone likes models ☺ Some people think visually, some do not.

# Social Media

- Mine requirements from:
  - Tweets
  - Facebook posts
  - Discussion forums
  - Reviews, etc.
- Can also mine sentiment (do they like it?  Are they happy?)

- Advantages
  - Much available data
  - Easy access to user opinions
- Disadvantages
  - Computational linguistic techniques still imperfect, can get data with a certain degree of accuracy
  - Users may not be representative
  - Hard to follow-up with feedback questions

# Elicitation: Who and How?

| Bike Rental | | Virtual Museum | |
|---|---|---|---|
| **Who?** | **How?** | **Who?** | **How?** |
| Bike Renter | Surveys<br>Interviews<br>Social Media | Virtual visitor | Survey<br>Focus group<br>Social media<br>Data sampling |
| Maintenance Personnel | Interviews<br>Focus Groups<br>Observation | Museum staff | Interviews<br>Focus groups<br>Observation<br>Documentation |
| Management | Documentation<br>Interviews<br>… | Museum expert | Interviews<br>Focus group<br>Observations |
| | | External Experts | Interviews<br>Surveys |
| | | Artists | Surveys<br>Interviews |
| | | Museums (competitors) | Social Media |
| | | … | |

# Personas

# Personas

- Who are your users?
- Instead of thinking generally (student, registered users), identify very specific people
- What do they want and need?
- Helps to come up with new requirements, view the system in a new way
- Comes from the world of UX, but also used in RE
- Also used in marketing to understand potential users

# Example Persona

**USDA Senior Manager Gatekeeper**

**Fictional name:** Matthew Johnson

**Job title/ major responsibilities:**

Program Staff Director, USDA

From www.usability.gov

**Demographics:** 51 years old, Married. Father of three children, Grandfather of one child. Has a Ph.D. in Agricultural Economics.

**Goals and tasks:** He is focused, goal-oriented within a strong leadership role. One of his concerns is maintaining quality across all output of programs.

**Spends his work time:** Requesting and reviewing research reports, preparing memos and briefs for agency heads, and supervising staff efforts in food safety and inspection.

**Environment:** He is comfortable using a computer and refers to himself as an intermediate Internet user. He is connected via a T1 connection at work and dial-up at home. He uses email extensively and uses the web about 1.5 hours during his work day.

**Quote:** “Can you get me that staff analysis by Tuesday?”

# Example Persona


- From: https://blog.bufferapp.com/marketing-personas-beginners-guide (more examples here)
- More examples: http://uiaccess.com/accessucd/personas_eg.html

# What's in a Persona

- Elements of a Persona  (from usability.gov)
- Personas generally include the following key pieces of information:
  - Persona Group (i.e. web manager)
  - Fictional name
  - Job titles and major responsibilities
  - Demographics such as age, education, ethnicity, and family status
  - The goals and tasks they are trying to complete using the site
  - Their physical, social, and technological environment
  - A quote that sums up what matters most to the persona as it relates to your site
  - Casual pictures representing that user group

- Nice resource: https://www.usability.gov/how-to-and-tools/methods/personas.html
  - From the US government (!?)

# Where do Personas Come from?

- “But remember: your personas are only as good as the data-driven research that goes into them. They should be based on a combination of qualitative and quantitative data collected from multiple sources—not from the opinions and assumptions of your team.”
  - https://www.usertesting.com/blog/2016/02/19/customer-personas/

- Should be based on user research (similar to Elicitation)
- Ideally, don’t make them up
- In this course it’s hard to allow you to do elicitation with real users
- Try to make up realistic users using your knowledge of the domain

# Virtual Museum Persona?

- Persona Group (i.e. web manager): Virtual Visitor
- Fictional name: Sam West
- Job titles and major responsibilities
  - Painter, paints houses, but aspires to be a commercial artist. Works on art in spare time
- Demographics such as age, education, ethnicity, and family status
  - 28, Bachelor degree (arts), American, single, male
- The goals and tasks they are trying to complete using the site
  - They would like inspiration on art, to understand what art is popular, and how to create good art that can sell.
- Their physical, social, and technological environment
  - They are not very tech savvy, works mostly with hands, uses phone and internet socially, but not often for business. Has stable internet connection
- A quote that sums up what matters most to the persona as it relates to your site
  - “I want to be inspired”
- Casual pictures representing that user group

# Scenarios

# Scenarios

- Viewing the interactions between the user(s) and the system considering:
  - Time
  - Ordering
  - Pre and post conditions
- Can do this via text or models
- There are many methods for this, we pick two:
  - Text:  Use Case templates
  - Models:  Customer Journey maps
- Previous methods (context, use cases, goal models) don’t deal explicitly with time
- Can have time information in text requirements, but usually a fragmented picture, not a full sequence

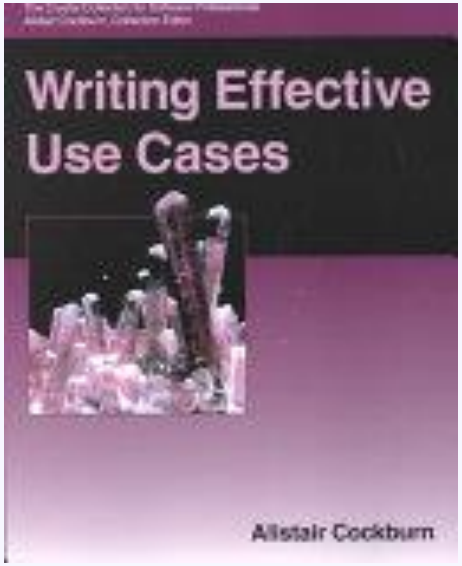
# Scenarios

- Why do we bother?
  - Thinking about the temporal flow often helps us to find missing important requirements
  - Another way to view the system

| Method/ Dimension | Data Flow | Actors | Functions | Qualities | Depend-encies | Flow/Order /Time |
|---|---|---|---|---|---|---|
| Text Requirements | | | | | | |
| Context Diagrams | | | | | | |
| Use Cases | | | | | | |
| Goal Models | | | | | | |
| Customer Journey Maps | | | | | | |

# Use Cases (again, text part)

- Each use case in the model has a corresponding template that captures more information
  - A bit like the Volere template, but focusing on time and flow
- More than one type of Use Case Template
- We'll use the one recommended by Cockburn



# Cockburn's Use Case Template (part 1)

**Use Case:** <number> <the name should be the goal as a short active verb phrase>

CHARACTERISTIC INFORMATION

Goal in Context: <a longer statement of the goal, if needed>

Scope: <what system is being considered black-box under design>

Level: <one of: Summary, Primary task, Subfunction>

Preconditions: <what we expect is already the state of the world>

Success End Condition: <the state of the world upon successful completion>

Failed End Condition: <the state of the world if goal abandoned>

Primary Actor: <a role name for the primary actor, or description>

Trigger: <the action upon the system that starts the use case, may be time event>

# Cockburn's Use Case Template (part 2)

MAIN SUCCESS SCENARIO

<put here the steps of the scenario from trigger to goal delivery, and any cleanup after>

<step #> <action description>

EXTENSIONS

<put here there extensions, one at a time, each referring to the step of the main scenario>

<step altered> <condition> : <action or sub.use case>

SUB-VARIATIONS

<put here the sub-variations that will cause eventual bifurcation in the scenario>

Error, failure

<step or variation # > <list of sub-variations>

# Cockburn's Use Case Template (part 3)

RELATED INFORMATION (optional)

Priority: <how critical to your system / organization>

Performance Target: <the amount of time this use case should take>

Frequency: <how often it is expected to happen>

Superordinate Use Case: <optional, name of use case that includes this one>

Subordinate Use Cases: <optional, depending on tools, links to sub.use cases>

Channel to primary actor: <e.g. interactive, static files, database>

Secondary Actors: <list of other systems needed to accomplish use case>

Channel to Secondary Actors: <e.g. interactive, static, file, database, timeout>

OPEN ISSUES (optional)

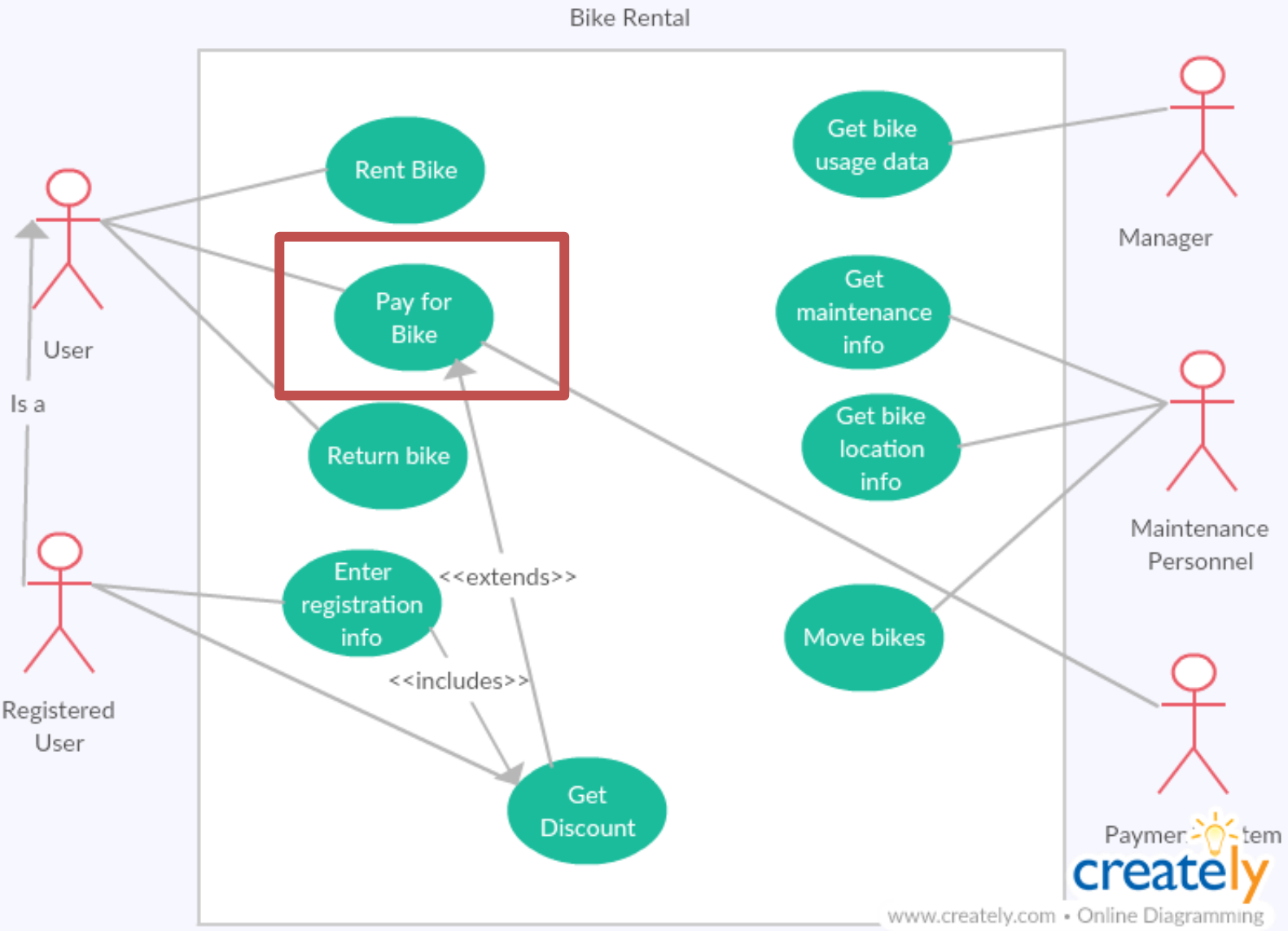
<list of issues about this use cases awaiting decisions>

SCHEDULE

Due Date: <date or release of deployment>

…any other schedule / staffing information you need…

# Example: Bike Rental



# Example: Pay for Bike (part 1)

**Use Case:** #2 pay for Bike

CHARACTERISTIC INFORMATION

Goal in Context: To give payment in order to rent a bike

Scope: For the bike rental system, paying only for bike rentals

Level: Primary Task

Preconditions: User has indicated they would like to rent bike, has selected a bike.

For registered users, user has logged in.

Success End Condition: payment transaction successful

Failed End Condition: payment failed, payment aborted

Primary Actor: User (bike renter)

Trigger: The user tries to rent a bike

# Example: Pay for Bike (part 2)

MAIN SUCCESS SCENARIO

1. User is prompted to pay for bike rental, showing payment amount
2. User Oks amount
3. User chooses form of electronic payment (Debit, Credit, Touch payment)
4. User uses card to pay for bike
5. User enters card PIN
6. Payment confirmation is received from Payment System, confirmation shown to user

EXTENSIONS

1. <registered users> Payment amount shows registration discount

# Example: Pay for Bike (part 3)

SUB-VARIATIONS

2. User does not OK amount, bike rental cancelled
3. User does not choose form of electronic payment, bike rental cancelled
4. User does not provide card after 60 seconds, user notified, bike rental cancelled
5. User does not provide correct PIN, bike rental cancelled
6. Payment confirmation is not received from Payment system, user notified, bike rental cancelled

RELATED INFORMATION (optional)

Priority: Coming later in the lecture (could be high/medium/low, or a number)

Performance Target: less than 30 seconds

Frequency: often, once every 5 minutes during peak periods

Superordinate Use Case: N/A

Subordinate Use Cases: N/A

Channel to primary actor: interactive

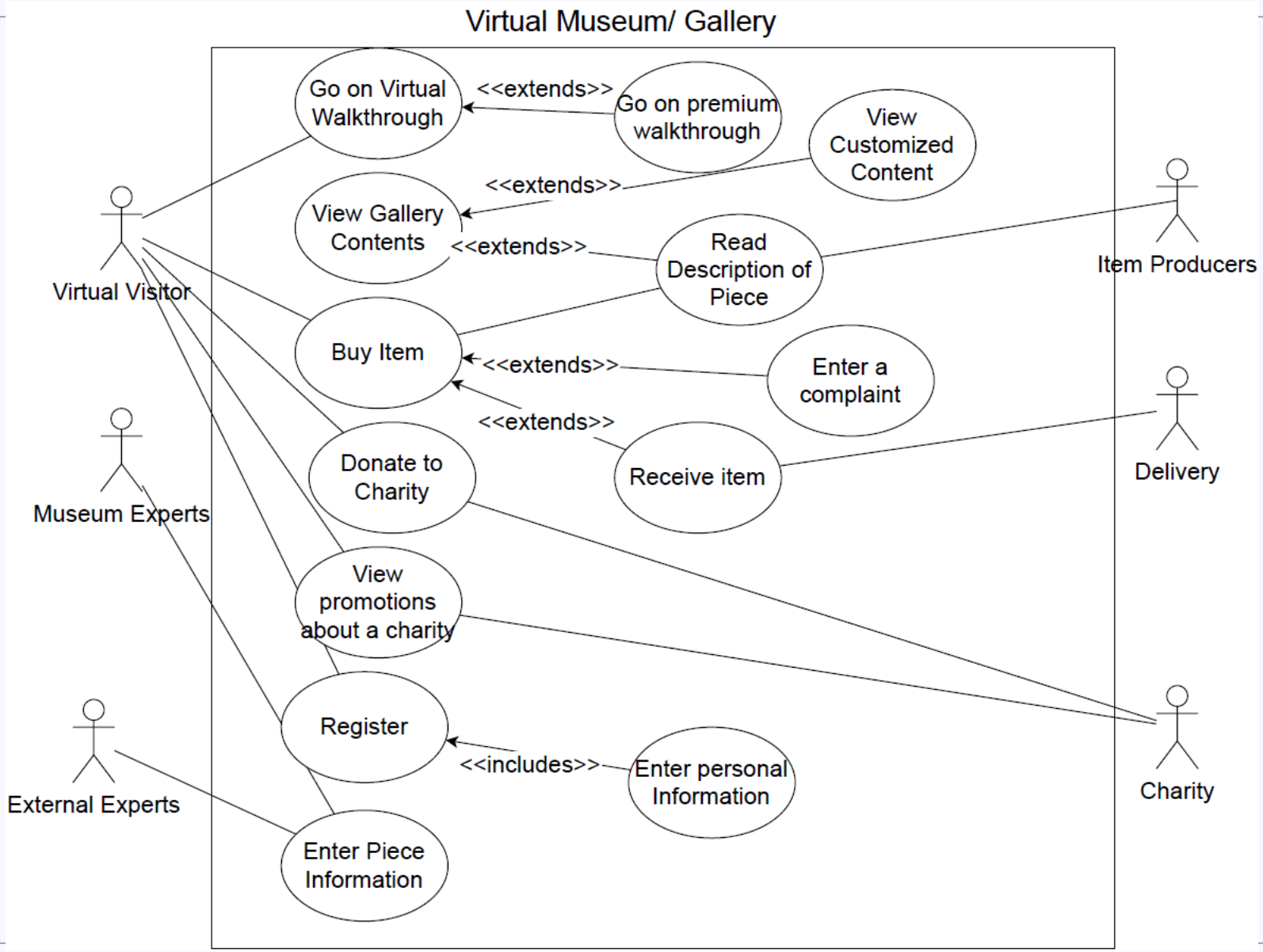
Secondary Actors: Payment System

Channel to Secondary Actors: network transaction

SCHEDULE

Due Date: Before System deployment, Spring, 2020

# Virtual Museum Scenario



# Virtual Museum Scenario

**Use case name:** #6 Register

**Context of use:** User wants to register to enter some personal information so that the gallery can customize content and remember history.

**Scope:** Virtual Museum/Gallery, both app and web-site

**Level:** primary

**Primary Actor:** virtual vistor

Preconditions: Need access to site or app

Success End Condition: user is registered, they have credentials

Failed End Condition: user is not registered, they do not credentials

Trigger: ---

**Main Success Scenario:**

1. **Open site or app**
2. **go to registration location**
3. **Indicate you are a new user**
4. **Enter new credentials**
5. **Received confirmation**
6. **Directed to app or site with login status**

**Extensions:**

4. Choose to login with existing credentials from external source (e.g., Google, Facebook)

4 Credential selected could be already taken, pick new credentials

SUB-VARIATIONS

1. Site does not load

1. App does not have internet connection

5. Registration failed with system

# Questions?

# Sources

- Easterbrook, Eliciting Requirements http://www.cs.toronto.edu/~sme/CSC340F/slides/07-elicitation.pdf (Slides)
- Sutcliffe, Alistair, and Pete Sawyer. "Requirements elicitation: Towards the unknown unknowns." *Requirements Engineering Conference (RE), 2013 21st IEEE International*. IEEE, 2013.
- Berry, Daniel M. "The importance of ignorance in requirements engineering." *Journal of Systems and Software* 28.2 (1995): 179-184.