Inf2-SEPP 2021-22

Coursework 1

Capturing requirements for an events app during the COVID-19 pandemic

SAMPLE SOLUTION

1 Task 1: Stakeholders

The core stakeholders, and how the system impacts them, are as follows (note: when we talk of 'organisations' or 'companies' these refer to groups of people, as stakeholders are always human):

- **Consumers:** Individual members of the public who would like to attend various events while also being safe from COVID-19. They would be able to search for events on the app based on preferences, book them, cancel them, and request various supporting features that help them get to the event safely.
- **Entertainment companies/providers:** Organisations that run entertainment events that could advertise and sell tickets for them through our app, thus increasing their exposure, but also apply for and receive government sponsorship which can help them remain in business during the pandemic. Examples of these include tourist attractions, theatres, sports venues, cinemas, pubs, etc.
- **The Government:** The Scottish Government is who requested the system and pays for it. It has come up with the scheme to fulfil its responsibility towards public health in Scotland, and to support the economy. It also directly participates in the system as it decides which events get sponsorship.

- **Payment service provider:** The company whose system is used by the app to process ticket payments and refunds, and which thus gains profit from this.
- **Taxi companies:** Companies whose systems are being used by the app to book taxis for events, who thus attract customers and gain profit.
- **Weather forecast provider:** We need an external system to give us information on the weather during (and before) events, which is relevant for the consumer both getting to the venue and attending outdoor events. The forecast provider will get traffic from us, thus benefiting from this interaction.
- **Map provider:** We may use a company's external system to provide maps, which can then be shown to the user to help them get to their event. It is possible this could just be provided by the government.

Additional, more peripheral stakeholders could include:

- **Performers, guides, etc. in the attended events:** Their jobs and livelihood depend on whether people attend the events, thus our app could help them.
- **Companies that manage venues; food and drink providers:** Entertainment providers will often need to hire venues or request food and drink, thus the companies which provide these services would profit from the events being organised.
- **The NHS:** Can track and control the spread of COVID-19 through our app.
- **VisitScotland, the national tourism organisation for Scotland:** Has an interest in maintaining the Scottish tourism industry afloat.
- **Charities, conservation trusts, etc.:** Some events sponsor them, therefore it is in their interest for the events to take place.
- **Environmental organisations:** May have something to say about pollution and greener means of travel for people resuming travelling.
- **Individuals who attend the events but don't use the app:** If the app helps with controlling the spread of COVID-19, then even people without the app will become safer from the virus.
- **Public transport companies; car rental companies:** The app would encourage people to travel more, which would increase their number of customers and impact their profits.

Other stakeholders could be listed and should be assessed based on their relevance to the scheme and the justification given.

2 Task 2: Ambiguities and addressing them

Note: Whenever we've used "We assume ...", that assumption applies to the rest of these sample answers. You may have assumed something different, which is perfectly fine as long as it is still a reasonable assumption.

Some potential ambiguities (there are many more possible ones) are as follows:

- Venues in practice are often a separate entity from the organiser of the event (e.g. people who own the stage vs. the people who perform on that stage). The description currently does not mention any separation between the two. We would need to clarify this with the entertainment providers and with relevant venues (via interviews, facilitated meetings, perhaps observation whilst the two work together). For now, we assume that the handling of the venues is entirely the entertainment providers' responsibility outside of the app, and the venues should not be set as a separate entity in our app.
- Do consumers set up their profile (i.e. COVID-19 preferences) during account registration or afterwards, or both? We assume it is after account registration.
- How does the system get updates on the number of tickets left for an event? Up-to-date information on ticket availability is necessary when the consumer views and attempts to book events. As such, it would be best if our system integrates with each entertainment provider's system, to be able to automatically retrieve that information from them. This possibility should be discussed both with the government and potential entertainment providers. Here we assume that our system will indeed integrate with the system of each entertainment provider, and it will request remaining ticket quantities from them before showing the list of available events, when the consumer requests to view an event, and right after the consumer has chosen the number of tickets while booking the event.
- How do entertainment providers find out about events booked / cancelled with them? We assume that our system will notify the correct entertainment provider's system automatically each time one of its events is booked or cancelled by a consumer, again benefiting of the fact that the systems are integrated.
- There are two ways we can think of an entertainment provider: 1) as an entertainment provider representative (one person amongst their staff) who actively registers their company, creates / cancels events (including requesting sponsorship or not), and gets notifications of government sponsorship decisions; and 2) as an entertainment provider system that automatically provides dynamic information to our app about remaining ticket quantities, and is informed by it of bookings made and cancelled. Since these two entities interact with our system in different (but both important) ways, we assume that we should model them as separate entities. The integration between our system and that of the provider will be done outside the app, and upon registration, the representative will confirm the integration.

- What happens in case of unsuccessful payment? We assume that the consumer is redirected to the app where they can try again, with the app also making another check of whether the wanted tickets are still available, but this would need to be clarified with the government and providers.
- When booking / canceling an event, do we immediately send the relevant booking record to the government, or do they need to somehow request it? This can be discussed with the government. We assume the government needs to explicitly request the records related to specific events.
- Do consumers get refunds when they cancel a booking? We assume that yes as long as the cancellation is at least 24 hours in advance of the event's time.
- What happens in between the request for sponsorship being submitted and the government making the decision? Will the event still show with the full price, or not show at all? If it's the former, will the government also pay for the consumers already booked to the event by refunding them? We've assumed the event will show up to consumers immediately upon creation with full price, and already-booked customers will not get a refund if the sponsorship is accepted.
- Can the government be the one to provide digital maps for the consumers? This should be a quick question towards the government. We assume the government and map provider are different entities.
- Who provides directions to the venue? We assume the map system does that, as usually these systems have that functionality, but the team should still confirm that whatever map system we are using does indeed have it.

A good answer doesn't have to propose requirement elicitation techniques and who to talk to for every single identified ambiguity, but it should be enough to show that the student understands the idea.

3 Task 3: Use case diagram and use case prioritisation

A use-case diagram is shown in Fig. 1.

You will note that many of the features of the system are not immediately obvious in the diagram. However, they will be mentioned in the detailed use case descriptions in the next part.

For the prioritisation, we expected a discussion based on criteria such as customer requirements, aims and impact of the system, what end-users want, and technical feasibility. Also, we should note that this prioritisation discussion should also involve the customer (the government). Any reasonable reply was accepted.

Below is one a way of proposing this prioritisation, with justifications:

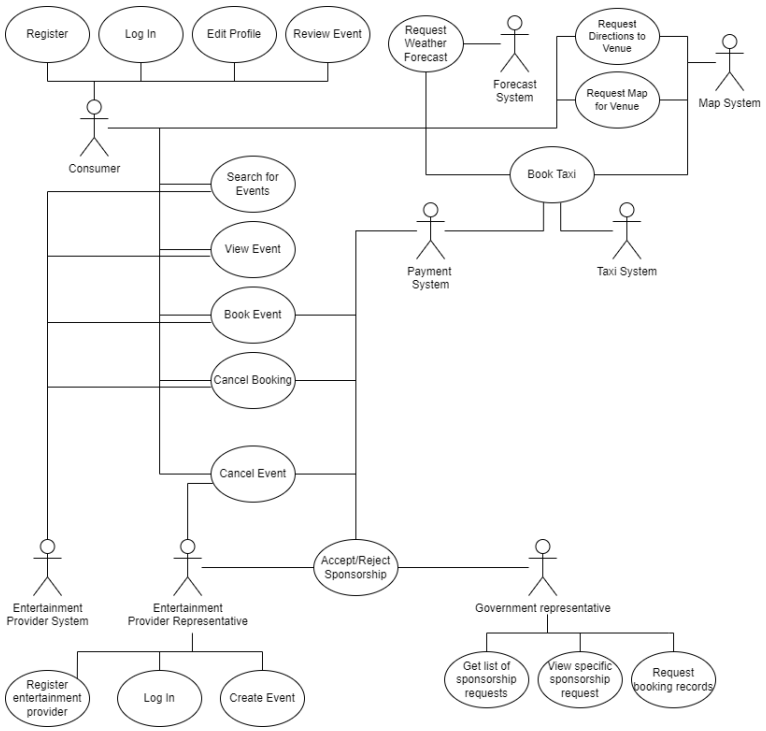

Figure 1: UML Use Case Diagram.

- High-priority: all the use cases derived from the system description as they are core features expected by the customer; use cases derived from a majority of end-users proposing the same features; use cases derived from around half of the end-users but also which are very related to the aim of the system.
- Low-priority: everything else.

4 Task 4: Use case descriptions

Below are some use cases (some use cases from the diagram were omitted for brevity):

4.1 Register (Consumer)

Primary actor: Consumer
Supporting actor: N/A
Summary: The consumer requires to register, the system prompts the consumer to fill in necessary information (full name, email address, phone number and password), consumer provides it, and system confirms. If some of the information is missing, invalid, or account with given email address already exists, system informs consumer and returns to first step.

4.2 Log in (Consumer)

Primary actor: Consumer
Supporting actor: N/A
Summary: Consumer requires to log in, system requires email and password, consumer provides them and if they are correct the system gives them access to their account so that they can browse events. If not, system informs about this and requires information again.

4.3 Edit Profile

Primary actor: Consumer
Supporting actor: N/A
Summary: The consumer (provided they are logged in) requests to update their preferences, then changes preferences as desired (these include COVID-19-related ones like social distancing, air filtration, capacity limits, size of venue, whether the venue is outside, and preferences about transportation to the event like what vehicle is available, maximum walking distance). System confirms change.

4.4 Register Entertainment Provider

Primary actor: Entertainment Provider Representative
Supporting actor: N/A
Summary: Entertainment provider representative requires to register; system prompts for their name, organisation name, organisation main address, email and password, phone number, other representative name(s) and their email addresses, a username or email address for a company account on the payment system (where bookings shall be paid, booking refunds shall be processed from). The rep is also required to confirm integration between their system and ours when ready. If some of the information is missing, invalid, or account with given email address already exists, system informs representative and returns to first step. If an account already exists for the same entertainment provider (organisation name and address), system gives error message.

4.5 Log in (Entertainment Provider Representative): similar to "Log in (Consumer)"

4.6 Create Event

Primary actor: Entertainment Provider Representative
Supporting actor: N/A
Summary: Entertainment provider representative (provided they are logged in) requests

to create a new event. After a prompt by the system, they need to specify: title; type (e.g. music, theatre, dance, movie, sports); any performer names; date(s), time(s) and venue(s); COVID-19 measures like any social distancing, air filtration, capacity limits, size of venue; whether it's ticketed or not; number of tickets available if ticketed; price of ticket if ticketed. The provider representative also needs to specify if they are requesting government sponsorship. If all the fields were correctly provided and an event with the same name did not already exist for some or all of the same dates and times, the system confirms, the event is then in the system and will show up to users who perform a search. Else, the system gives an error message.

4.7 Search for Events

Primary actor: Consumer
Supporting actor: Entertainment Provider System
Summary: The consumer (provided they are logged in) requests to see events for a certain date. The system requests information on the availability for those events of their entertainment providers' system, then offers the (potentially sorted) list of available events and non-ticketed events that meet the consumer's profile.

4.8 View Event

Primary actor: Consumer
Supporting actor: Entertainment Provider System
Summary: After having obtained a list of events from the Search for Events use case, the consumer chooses an event with an event number to look into for more detail. The system provides all available details about the event, including ticket availability (for which we would need to query the provider's system).

4.9 Book Event

Primary actor: Consumer
Supporting actor: Entertainment Provider System, Payment System
Summary: Consumer books a specific ticketed event, specifying requested number of tickets. Consumer then pays for the event and is given confirmation.
Precondition: Consumer is logged onto the system.
Trigger: Consumer requests to book a specific event with an event number.
Success Guarantee: Consumer is given confirmation of the booking with a unique booking number.
Main Success Scenario:

1. Consumer specifies number of tickets requested.

2. System checks with entertainment provider system that enough tickets available to meet the consumer's request.
2. System redirects consumer to payment system for payment.
3. System confirms the booking to the consumer and gives them a unique booking number.
4. System notifies the entertainment provider system of the booking (so that they can update their numbers of tickets left, and issue the consumer with the tickets).

Extensions:

1a If the event number is incorrect .1 System notifies the consumer and requires another action. Use case terminates.
1b If the event was non-ticketed
.1 System notifies consumer that there is no need to book a non-ticketed event as it is free.
2a Not enough tickets available (e.g. if they were literally just sold out).
.1 System shows error message to user.
3a The payment is unsuccessful, and the payment system sends an error message to our system.
.1 System relays the error message to consumer.
.2 Resume at step 2.

4.10 Cancel Booking

Primary actor: Consumer
Supporting actor: Entertainment Provider System, Payment system
Summary: (Provided they are logged in)The consumer requests to cancel their booking, providing a booking number. The booking is more than 24 hours away, so the system confirms the cancellation, requests the payment system to refund the consumer and notifies the entertainment provider's system of the cancelled booking so that they could update their stocks (which may impact ticket availability) and possibly also send a second confirmation of ticket cancellation to the consumer. If the booking number was incorrect, the system requires it again. If the booking is less than 24 hours away, the system notifies the consumer that cancelling the booking is not possible.

4.11 Cancel Event

Primary actor: Entertainment Provider Representative
Supporting actor: Consumer, Payment System
Summary: Entertainment provider representative cancels an event, which notifies all the consumers with tickets and refunds them.

Precondition: Entertainment provider representative is logged in.
Trigger: Entertainment provider representative requires to fully cancel and entire event, providing the event number and a message for the consumers.
Success Guarantee: The consumers are all notified of the cancelled event and refunds are being processed.
Failure Guarantee: The event remains unchanged in the system (i.e. is still planned to go on, still accepts bookings if ticketed
Main Success Scenario::

1. System requires payment system to process all refunds.
2. System confirms refunds are being processed and cancellation to the entertainment provider representative.
3. System notifies all consumers, including message from entertainment provider.

Extensions:

1a If the event number is incorrect
.1 System notifies the entertainment provider representative and requires another action. Use case terminates.
1a Entertainment provider representative gives an empty message
.1 System requires it again
6a Payment system notified of unsuccessful processing of refunds
.1 Entertainment provider representative is notified, event is not cancelled (entertainment provider representative will need to do this outside of the system).

4.12 Accept/Reject Sponsorship

Primary actor: Government representative
Supporting actor: Entertainment Provider Representative, Payment System
Summary: The government representative makes a decision (accept or reject) for an event for which sponsorship had been requested, providing an event number. If the decision was accept, the government representative is required to specify the percentage of the ticket price to be covered and then requests to process payment (this is handled outside of the system, by the payment system). The government representative gets a notification of the successful payment; the provider representative is given notification of sponsorship acceptance and percentage of ticket price covered; and the price of future tickets is appropriately adjusted. If the payment was unsuccessful, the government representative is asked to provide new account information and is forwarded to the payment system for this purpose. If the decision was reject, the entertainment provider representative is notified of rejection and the government representative is returned to the list of sponsorship requests.If the event number was incorrect, the system gives out an error asking the government representative to try again.

4.13 Request Booking Records

Primary actor: Government representative
Supporting actor: N/A
Summary: The government representative requires all the bookings for a specific event (past or future), providing the event number. The system provides a list of these including booking numbers, names and contact details of consumers booking them, numbers of tickets booked, status (active/cancelled). If the event number was incorrect, the system requires it again.

4.14 Request Map for Venue

Primary actor: Consumer
Supporting actor: Map system
Summary: (Provided they are logged in) The consumer requests a map to be provided with location of venue for an event, also providing the event number. The system requires the Map system to provide this information. If the event number was incorrect, the consumer is asked to provide it again.

4.15 Book taxi

Primary actor: Consumer
Supporting actors: Taxi system, Payment system, Map system
Summary: The consumer (provided they are logged in) requests to book a taxi for the venue of an event, also providing the event number. The system checks the distance and duration to the venue with the Map System and informs the consumer of the fare and the pick-up time. The consumer accepts the fare and is directed to the payment system to pay. If the payment system confirms, the taxi system is notified of the booking. If the payment system informs of unsuccessful payment, or the consumer rejects the fare, go back to the beginning.
Priority: Low.

5 Task 5: Non-functional requirements

An answer should select some categories, relate them to the system described, and identify some concrete details of them which could be measured.

Some examples of requirements in each category are:

- **Security:**
  - ◇ The system shall protect the personal information of its users.

- **Privacy:**
  - ◇ A consumer's personal information shall not be leaked to third parties.
- **Performance:**
  - ◇ The system shall provide a response for bookings, cancellations of bookings, etc. within a reasonable time frame, e.g. within 15 seconds.
- **Data retention:**
  - ◇ Information on orders shall only be retained for e.g., 6 months, and should be compliant with relevant legislation.
- **Scalability:**
  - ◇ The system shall scale to handle e.g., 500 entertainment companies.
  - ◇ The system shall be able to handle e.g., 10000 consumers viewing events and/or booking tickets at the same time.
- **Platform Compatibility:**
  - ◇ The system shall work similarly on computers and mobile devices.
  - ◇ The system shall work similarly on all major operating systems.
- **Interoperability:**
  - ◇ The system shall be compatible with existing computer systems that are used by the government, entertainment providers, payment system, weather forecast system, map system, and taxi system.
- **Accessibility:**
  - ◇ The system shall be accessible to people with physical disabilities.
- **Availability:**
  - ◇ The system shall be available 24/7, with at most short (e.g. 2-hour long) periodic maintenance during low periods.
- **Usability:**
  - ◇ Consumers shall easily be able to register, update their preferences, find events, make bookings, cancel bookings, and use additional features like weather forecasts.
  - ◇ It shall be clear to consumers which events are sponsored, and how much the discount is.

6 Task 6: The software development

1. The answer is software project engineering. Reasons: existing external customer (government) by whom we are contracted, there is a system description which we must respect. This is opposed to software product engineering which is used for systems without an external customer where your company has a vision to develop a system and decides what to do.

2. The answer is plan-driven software development process. Reasons: requirements are being done thoroughly before proceeding with design and implementation (i.e. we don't just analyse part of them, prioritise and proceed to design and implementation doing them more in parallel like in agile); the documentation that we produce is more heavyweight than in agile; we use UML formally and not just for communication like in agile.

3. The answer here is debatable. Given that we are doing software project engineering, plan-driven is the recommended approach and 'pure' agile could not work (e.g. customer came with a clear system description which is incompatible with the idea of continuous collaboration of agile). However, less pure agile (agile with some modifications e.g. system description not being included in the contract) could work, because it could result in quicker releases which is relevant in the context of COVID-19, and end-users (consumers, entertainment providers) who are consulted more frequently and may be happier in the end.

4. If we were using agile, requirements would have been gradually identified, with requirements engineering activities being done in parallel with design and implementation in each iteration. At the start of each iteration, features are prioritised and a subset of them is chosen for implementation in that iteration. User stories are often used, and customers are frequently consulted about features and prioritisation.