Assessed Exercise 1

Domain Description

Introduction

Gaelic TV is a broadcasting company that offers a variety of television programmes for mainly Gaelic speaking audiences within Scotland. They rely upon advertising as their main source of income. In order to maximise advertising revenue, programme schedulers try to prepare a schedule that will give the largest amount of viewers. They achieve this by using historical data and knowledge of major events to predict viewing figures for future programmes. The advertising department then uses these figures to calculate the amount they will charge potential advertisers.

Currently the schedule and predicted viewing figures are calculated manually. This is time consuming and more prone to error than a computerised system. As such, senior management wish to implement an IT solution. It is believed that this will be more accurate and a more efficient use of resources.

Glossary

Head of TV Scheduling: Is in charge of the scheduling department. The responsibility to get the schedule finished effectively and on time is his. However, on a day-to-day basis, he will delegate most of the physical scheduling.

Administrator: Assistant to the head of scheduling. He is responsible for making the schedules and calculating the predicted viewing figures.

Head of IT support: Responsible for the maintenance of IT systems and for assigning user privileges.

Advertising team: They are responsible for arranging advertising.

Senior Management: They oversee all operations at the network and check that all aspects of the business are performing effectively.

Production Team: Technical specialists who are responsible for airing all programmes.

Genre: The type of programme that is to be broadcast. For example, documentary, drama or sport.

Major Event: Any event that will reduce the number of viewers watching the channel. This could be a sporting event or an awards ceremony.

Domain Knowledge

Gaelic TV only airs programmes during certain hours of the day. During airing times, they wish to maximise the number of viewers by careful arrangement of their schedule. They do not wish to have their high value programmes clash with major events such as football matches. As such, major events

are researched and factored into the schedule. Furthermore, each programme has a genre that can be used to more accurately predict viewing figures. The same is true for major events. Gaelic TV produces programmes that fall into a wide range of genres.

To calculate accurate predicted viewing figures, Gaelic TV rely upon historic figures supplied to them by a data tracking company. This data is received daily in the form of a spreadsheet. Viewing figures take roughly a month to be published by the tracking company. The figures offer some small demographic breakdowns. The final predicted viewing figures are calculated by considering historical data, programme genre and clashes with major events. Currently this is done by the head of scheduling and the administrator, who make use of spread sheets to perform their calculations.

There are some programmes that are broadcast on a regular time slot every week. The schedule must be completed a week before the date of airing. This allows the advertising and production departments enough time to perform their duties.

Customers and Users

The customer is the broadcasting company Gaelic TV. The users will be the head of TV scheduling, the administrator, IT support, the advertising team, senior management and the production team. The structure of the station can be seen in the organisation chart below in figure 1.

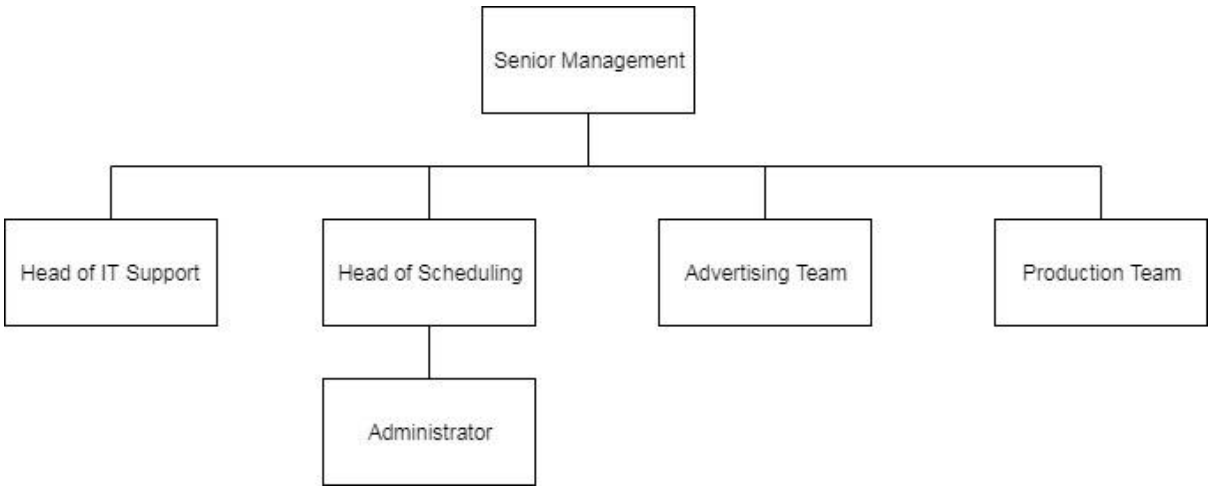

Figure 1. Organisation chart

Environment

Currently there is a selection of operating systems in operation at the Gaelic TV station. Windows, MacOS and Linux are all being used. The databases currently use Oracle as a database management system.

There is a corporate firewall maintained by IT support which any new applications need to sit behind. There is also already a user login and authentication system, again maintained by IT support, which all employees have an account for.

The historical viewing figures are received by email in the format of a spreadsheet. Currently finished schedules are emailed between staff.

Any new system must be able to work with these aspects of the existing system.

Existing Procedures

Currently the Head of scheduling receives historical viewing figures by email which he passes onto the administrator. The administrator does the majority of work on the schedules. Firstly, he makes notes regarding his plan for the schedule. Next, he completes a draft schedule. He manually does some analysis on this schedule to calculate predicted viewing figures. This analysis involves the historical viewing figures and information on major events. He then adjusts the schedule to try and optimise the predicted viewing figures. This is an iterative process.

Once the administrator is finished he will pass the schedule to the head of IT who will either finalise the schedule, or adjust it personally. Once the final version of the schedule is finished it is passed on the production team and the senior management team. The predicted viewing figures are passed to the advertising team and the senior management team. Finally, the schedule is passed onto the press at a time closer to the date of airing.

Competing Systems

During an interview with Ron Watson, the current head of Scheduling at Gaelic TV, he stated that the old manual system works perfectly well. However, he noted that it was a time-consuming process and that management think that it is old fashioned.

Ron Watson also stated that there was no commercially available system that would fit their needs. He said that although other broadcasters may have similar systems, they are closely guarded secrets.

This system would be welcomed by both the head of scheduling and the administrator. The current method is labour intensive, an IT solution would allow them to become more efficient. The system would be less welcome by the IT department who would have to configure and install the application into their existing system. It would also increase their workload due to the maintenance that the system would require, and because they are responsible for assigning user privileges.

Similarities with other domains and organisations

The broadcasting industry is distinct from any other domain. But, within the broadcasting industry there are several organisations that use, or would like to use, similar software.

It would be technically feasible to produce a generic system. However, within the broadcasting industry there is a huge range of different channels. Each channel has their own audience, different variations of viewer activity, separate programme genres and will be affected by major events in different ways. In short, there are many differences in the details. As such, it would be difficult to produce a system that would give accurate figures across different companies.

Use Cases

Below can be seen the use cases for the proposed system. They have been grouped into must-haves, should-haves, could-haves and would-like-to-haves. The must-haves will be implemented in version 1 of the software and the should-haves will be implemented in version 2. The full use case diagram of the proposed system can be seen in figure 2.

The use case diagram defines the scope of the system. As can be seen, the head of scheduling and administrator are responsible for uploading historical viewing figures and saving them to the stations database. They also enter programmes and major events into the schedule, as well as informing the system to perform calculations. These calculations include generating the predicted viewing figures and checking the accuracy of the figures. The user can split the predicted viewing figures into demographics.

The programme also interacts with the schedulers, reminding them of deadlines, as well as highlighting potential sources of error. This error could be, for example, an adult programme scheduled for before the watershed. Ideally the system will dynamically suggest scheduling changes to maximise viewing figures, although this is only a would-like-to-have. The head of scheduling will be able to view the accuracy of predicted figures; however, this is irrelevant to the administrator, who will be able to perform his job without this knowledge. The head of scheduling will also be able to mark a schedule as finalised.

The Senior management will have access to special views that will show the schedule, the predicted viewing figures, and the accuracy of past predicted viewing figures. As required, the advertising team will have access to the predicted viewing figures and the schedule so that they can arrange advertising. The production team will be able to view the finalised schedule so that they can perform their duties.

Finally, the IT support team will be responsible for assigning and revoking user privileges.

Must-haves

- Upload viewing figure spreadsheet
- Save viewing figures to database
- Enter programme in time slot
- Enter major event in time slot
- Calculate predicted viewing figures
- View predicted viewing figures
- Revise Programme schedule
- View finished schedule
- Assign user privileges

Should-haves

- Enter programme genre
- Enter major event genre
- View clash with major event
- Calculate accuracy of predictions
- View accuracy of predictions

Could-haves

- Set recurring programme
- Reminder of deadline
- Finalise schedule

Would-like-to-haves

- Highlight potential errors
- Suggest schedule change
- Split predicted viewing figures into demographics

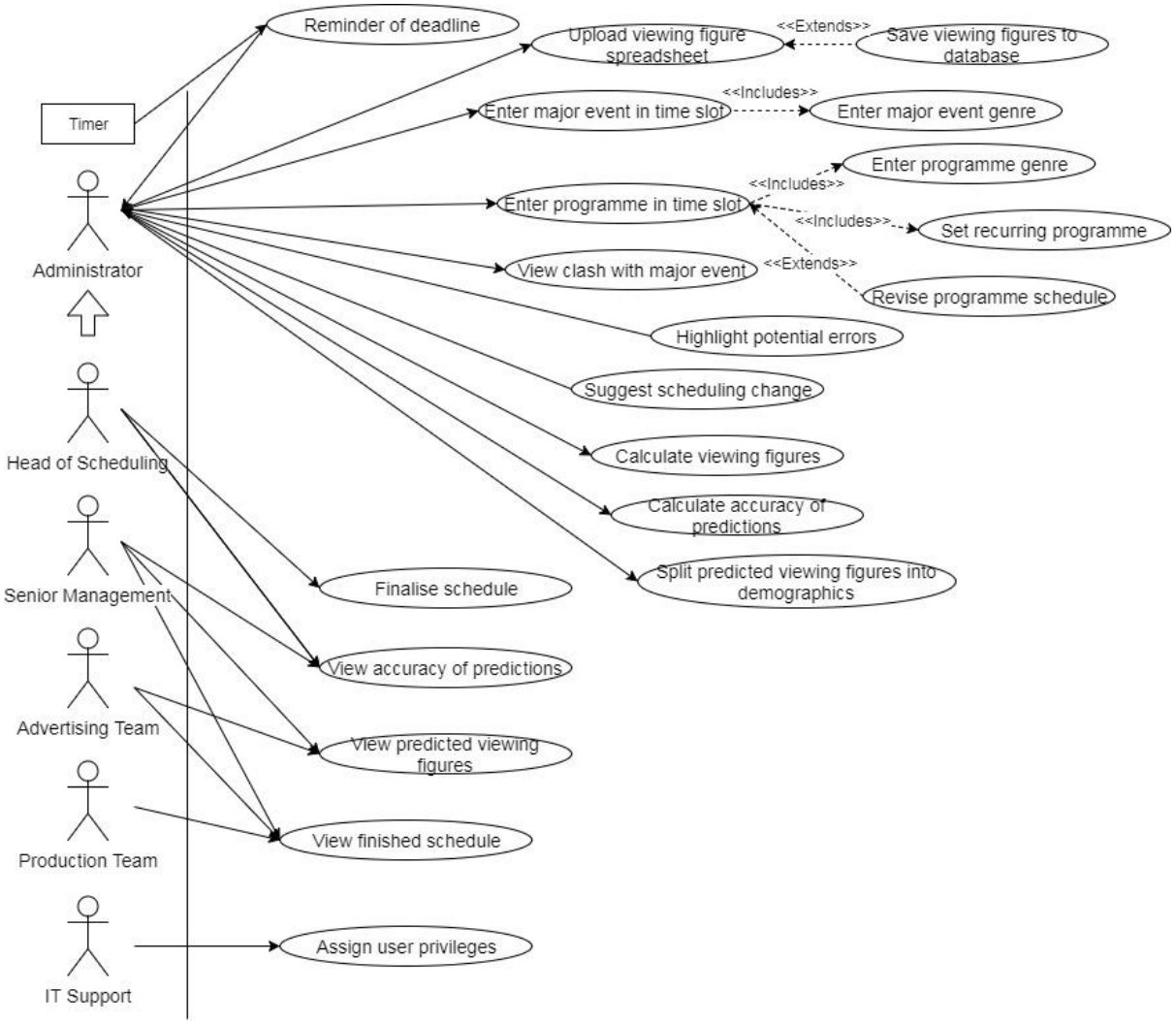

Figure 2. Use Case Diagram

Non-functional Requirements

Below are the non-functional requirements of the system. These are the requirements that cannot be met by defining use cases.

- The interface must be a GUI
- The system must be easy for the administrator to use
- The user must finish schedules a week before broadcast
- The programme must work on a mixture of operating systems. Windows, Mac OS and Linux are all used in the company
- Viewing figures must be obtained from the statistics company
- Authentication will make use of the user's current login details
- The administrator must search for major events to enter into the system
- The programme must be in English, not Gaelic
- The programme must be compatible with an oracle database, as this is the database management system used at the station

- Logs must be maintained regarding database entries
- The system must be updated and maintained by the IT staff
- System must be behind the corporate firewall
- The table structure of the proposed database must be provided to the IT staff
- The IT department must be able to maintain the system
- A list of programmes to be scheduled must be received from senior management
- The system must adhere to current security policies within the company

Use Case Details

Calculate predicted viewing figures

Happy day scenario
The programme administrator, Ron Kafka, logs into the system
Ron selects the schedule for Tuesday the 21st of November
Ron selects the "generate predicted viewing figures" option on the completed schedule
The system calculates the predicted viewing figures for each television programme that day
These figures are then displayed to Ron
Ron reads that there are a predicted 15,600 viewers for the 5pm-6pm timeslot

Schedule incomplete scenario
The programme administrator, Ron Kafka, logs into the system
Ron selects the schedule for Friday the 17th of November
The schedule is missing a programme for the timeslot 6pm-7pm
Ron selects the "generate predicted viewing figures" option
The system displays an error message warning him that the schedule is incomplete
The predicted viewing figures are not calculated or displayed
Ron is taken to the scheduling screen

No historical data available scenario
The senior management team decide to add a new broadcasting time slot at 11am-12pm
The programme administrator, Ron Kafka, logs into the system
Ron selects the schedule for Saturday 18th of November
The programme "Gardeners Delights" is scheduled for the new 11am-12pm timeslot
Ron selects the "generate predicted viewing figures" option
A message is displayed saying "no historical data is available for the 11am-12pm timeslot"
The predicted viewing figures are calculated for all other programmes
The predicted figure for the "Gardeners Delights" programme is left blank

Flow of events

1) Log into the system
2) Select the day you wish to see the figures for
3) Press the "generate viewing figures" option
4) If the schedule is incomplete
    a) Display error message
    b) Go to the scheduling screen
5) Else if historical data is unavailable
    a) Display message
    b) Leave viewing prediction blank
6) Else calculate predicted viewing figures
7) Display predicted viewing figures

Pre-condition
There is a completed schedule for the day which the figures will be calculated for.

Post-condition
Viewing predictions have been calculated and are available to view.

Rationale
This use case will make use of historical data on viewing figures to try and accurately predict the viewing figures for upcoming programmes. It will take into account the timeslot, the programme genre and any major events that will clash with it.

Having accurate predictions such as this allows schedulers to organise the schedule in such a way as to maximise viewers. It also allows the advertising department to choose the price at which they will sell slots to potential advertisers.

Actors
Administrator
Head of scheduling

Priority
This is a must have.

Status
Initial definition

Interface
The interface for this use case is a simple button on the scheduling screen labelled “generate predicted viewing figures”. There will also be pop up error messages to warn users of certain scenarios. When the calculations are completed, the predicted viewing figures will be displayed next to the scheduled programme.

Internal use cases
There are no internal use cases for this use case.

Enter programme in time slot

Happy day scenario
The programme administrator, Ron Kafka, logs into the system
He selects the schedule for Thursday 23rd of November
He chooses the 4pm-5pm timeslot
He enters the programme “Real police, real crimes” into the timeslot
The system asks whether the programme will recur every week
Ron selects no
The system prompts him to enter a genre for the programme
He specifies that the programme is a documentary
The programme is entered into the schedule where it can be viewed

Timeslot is not within channels current airing hours scenario
The station does not currently air programmes in the 4am-5am timeslot
The programme administrator, Ron Kafka, logs into the system
He selects the schedule for Friday 24th of November
He chooses the 4am-5am timeslot
A popup error message is displayed saying “The channel does not currently air programmes in this timeslot”
Ron is taken back to the scheduling screen where he can pick another timeslot

A programme is already scheduled scenario
The programme administrator, Ron Kafka, logs into the system
He selects the schedule for Sunday 12th of November
He chooses the 10pm-11pm timeslot
He enters the programme “Gaelic Politics” into the timeslot
He receives a popup error message saying, “The programme “news” is already scheduled for that timeslot, would you like to replace it?”
Ron selects yes
The system asks whether the programme will recur every week
Ron selects no
The system prompts him to enter a genre for the programme
He specifies that the genre is current affairs
Gaelic Politics replaces the news in the 10pm-11pm timeslot
Gaelic Politics appears on the schedule

Flow of events

1) Log into the system
2) Select the day you wish to schedule the programme for
3) Choose the timeslot you wish to schedule the programme for
4) If the timeslot is not within airing hours
    a) Display error message
    b) Return to the scheduling screen
5) Else enter the name of the programme
6) if a programme is already scheduled for that timeslot
    a) Display option to override programme
    b) If user selects yes
        a. Delete the old programme from timeslot
        b. Add the new programme to the timeslot
    c) Else

    a. Return to the scheduling screen
7) Else specify whether the programme is recurring or not
8) Enters the genre of the programme
9) The programme is added to the timeslot
10) The programme is displayed in the schedule

Pre-condition
The user logs into the system.

Post-condition
The programme is added to the timeslot and can be viewed in the schedule.

Rationale
This use case allows users to enter programmes into specific timeslots in the schedule for a certain day. Only one programme can be in a time slot at a time.

Having the programmes in the schedule allows the predicted viewing figures to be calculated. Furthermore, the finished schedule can be sent to the production team and the senior management so that the technical aspects of the programming can be arranged.

Actors
Administrator
Head of scheduling

Priority
This is a must have.

Status
Initial definition.

Interface
The interface will be a timetable with slots that can be clicked on. When the slot is clicked on, the user will be taken to a screen where they can enter the details of the programme. Once the programme details have been entered they will be displayed on the timetable. There will also be relevant popup error messages for scenarios such as when a programme already exists in the timeslot.

Internal use cases
There are 3 internal use cases. Two of the internal use cases include the external use case. These are enter program genre and set recurring programme, both of which are activated only after the programme has been entered in the time slot. The choose genre use case allows the user to enter the programme's genre to allow for more accurate predictions. The set recurring programme allows the programme to be entered in the same time slot in subsequent weeks. There is also one internal use case that extends the external use case, this is revise programme schedule. This is the case where programmes times are changed by the administrator or the head of scheduling to maximise predicted viewing figures.

Upload viewing figures spreadsheet

Happy day scenario
Gaelic TV receives a spreadsheet from a data tracking company with the viewing figures from Monday October 9th
The head of Scheduling, Ron Watson, forwards the spreadsheets to his administrator, Ron Kafka
Ron Kafka logs into the system
He selects the "upload data spreadsheet" option
He chooses the spreadsheet file entitled Monday 9th October
The programme reads the file and extracts the viewing figures
The figures are saved to the stations database

Wrong format scenario
Gaelic TV receives a spreadsheet from a data tracking company with the viewing figures from Tuesday October 10th
The data tracking company has switched from using Microsoft Excel to Apple Numbers
Gaelic TV was not informed
The head of Scheduling, Ron Watson, forwards the spreadsheets to his administrator, Ron Kafka
Ron Kafka logs into the system
He selects the "upload data spreadsheet" option
He chooses the spreadsheet file entitled Tuesday 10th October
The programme displays the error message "Invalid file type"
Ron is returned to the home screen and no figures were uploaded to the database

Cannot connect to database scenario
There is a power surge in the Gaelic TV office that takes the database servers offline
Gaelic TV receives a spreadsheet from a data tracking company with the viewing figures from Wednesday October 11th
The head of Scheduling, Ron Watson, forwards the spreadsheets to his administrator, Ron Kafka
Ron Kafka logs into the system
He selects the "upload data spreadsheet" option
He chooses the spreadsheet file entitled Wednesday 11th October
The programme reads the file and extracts the viewing figures
The programme attempts to save the figures to the stations database
The programme displays the error message "Cannot connect to database"
Ron is returned to the home screen and the figures are not saved

Flow of events

1) Receive spreadsheet from the data tracking company
2) Forward spreadsheet to relevant party
3) Log in to the system
4) Select the upload spreadsheet option
5) Pick the relevant spreadsheet from the file system
6) If the spreadsheet is in the wrong format
    a) Display "invalid file type" error message
    b) Return to home screen
7) Else upload file to system
8) The system extracts viewing figures from the spreadsheet
9) If database connection is unavailable
    a) Display "cannot connect to database" error message
    b) Return to home screen

10) Else save viewing figures to the stations database

Pre-condition
The data tracking company has sent the relevant statistics to Gaelic TV.

Post-condition
The historical viewing figures are saved to the stations database. They can now be used to help predict future viewing figures.

Rationale
The purpose of uploading the spreadsheet of historic viewing figures is so the system can extract them and use them to help predict future viewing figures. The more data that is gathered, the more accurate predictions will be.

The data tracking company distributes historical figures as a spreadsheet, hence why the system will accept this format. The purpose of uploading the spreadsheet is so the computer can synthesise it and save the relevant information to the stations database.

Actors
Administrator
Head of scheduling

Priority
This is a must-have.

Status
Initial definition

Interface
A button on the home screen labelled “upload spreadsheet” will allow the user to select a file from the file system. Relevant popup error messages will be displayed if the system encounters a problem. A message will also be displayed when the upload and saving of data has been successfully completed.

Internal use case
The save viewing figures to database use case extends this use case. Saving the figures is a separate use case because it accomplishes its own distinct purpose within the system boundary. However, it relies upon the spreadsheet being uploaded before it can be performed.