

**National College of Ireland**  
**Project Submission Sheet – 2020/2021**



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**Lecturer:** Shilabhadra Parida

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I hereby certify that the information contained in this (my submission) is information pertaining to research I conducted for this project. All information other than my own contribution will be fully referenced and listed in the relevant bibliography section at the rear of the project.

ALL internet material must be referenced in the references section. Students are encouraged to use the Harvard Referencing Standard supplied by the Library. To use other author's written or electronic work is illegal (plagiarism) and may result in disciplinary action. Students may be required to undergo a viva (oral examination) if there is suspicion about the validity of their submitted work.

**Signature:** Ross Currid, Mark Doggett, Colin Fox, Thalles Reis, Richard Glennon

**Date:** 18/12/2020

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5. All projects must be submitted and passed in order to successfully complete the year. **Any project/assignment not submitted will be marked as a fail.**

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# BI-BOT



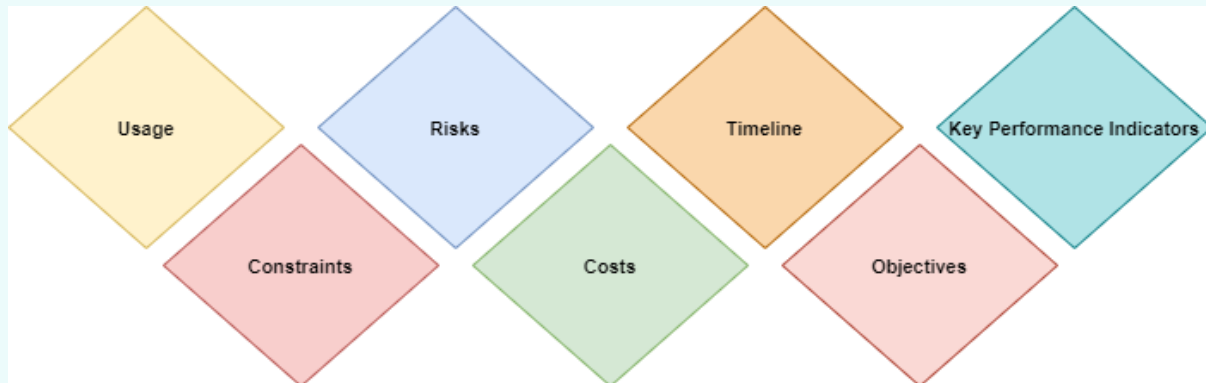
*New Horizons Program*

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## Introduction

Within this report, you will find outlined the approach we feel is best suited for the design, and implementation of 'BI-Bot' with consideration given to its anticipated:



*Figure 1: Project Considerations*

We anticipate the tool will take a year to be developed and have created our report with this in mind. Regarding our vision for the tool, we have identified four audiences. We understand and acknowledge the importance of aligning the tool with the values of BICC and in addressing existing employee dissatisfaction with the HR function and as such have incorporated this line of thinking into our vision of BI-Bot, the problems it will address and the opportunities it will subsequently create.

Due to the current social and financial climate BICC faces as a result of Covid-19, we have outlined an adaptive business analysis approach via four iterations (of BI-Bot). We have also suggested appropriate data storage (Amazon Web Services) and change controls with these factors in mind. Given BICC's 'One-Boru' value and in careful consideration of existing and anticipated factors, we have proposed the use of collaborative elicitation techniques such as Data Mining, Document Analysis, Interface Analysis and Surveys/Questionnaires.

With the scope of the project in mind, we sought to identify potential risks and carefully outline and extrapolate on their implications within a Risk Register; the outcome of which is outlined on pages 35-37. Coinciding with our adaptive method, we have elected to treat estimation as an iterative process that we will update through the life cycle of the project.

The estimation technique as outlined on pages 31 - 32 begins with a Rough Order of Magnitude (ROM).

Our Business Management Process Notation Diagram and Use-Case Diagram illustrate how the tool will work, with careful consideration given to the interactions between and relevance of stakeholders to each process within the tool.

While it is relatively simple to identify the strengths and weaknesses of BI-Bot, it can be difficult to deduce the threats to BI-Bot and the potential opportunities it will create.

Careful consideration has been given to the competitiveness of the employer market in which BICC operates, and how this tool could potentially help drive innovation and enable the transfer of HR resources from answering employee queries, to increasing our ability to hire high-quality staff, including best-of-class graduates.

At all times throughout the development of this report, we have had cohesion in mind when considering the design and implementation of BI-Bot. We understand it is imperative our report enables the creation of not only a functioning HR chatbot, but also addresses the project goals and objectives whilst simultaneously mitigating against potential risks and threats.

## High Level Vision

*'In an era of unprecedented change, with increasing levels of change on the horizon, governance must be designed to enhance innovation capabilities. It is not enough to design governance to cope with today's challenges—in a changing environment, the governance must evolve to stay relevant.'* (Knapp, M., Killen, C. P., Stevens, C., & Sankaran, S. (2019). *Governance of innovation in portfolios, programs, and projects. PMI White Papers*)

Our vision is to be automotive and innovative in every aspect of how we operate as a business. We are committed to achieving a new standard of user experience by providing the most accurate Machine Learning / artificial intelligent models.

Our aim is to ensure that each user of the Bi-Bot will receive a definitive answer to their query and in turn, bring down the re-contact rate with the HR department, amongst other benefits outlined on pages 8, 15 & 29-30.

Our purpose is to provide a service that can be utilized by anyone and for that person to receive their answer without long waits, 24 hours a day, 7 days a week.

We seek to enrich relations between people and machines. Through defined testing programs we aim to provide a practical solution for the task at hand. Further to the above, we strive is to help users discover the power of Machine Learning and Artificial Intelligence through the fun of Data Science. This is achieved by regularly sending update emails to stakeholders of a mentioned project to show what is new, how to find it and how to use it. This in turn coincides with our rigorous testing and feedback portals, such as JIRA.

Finally, we seek to attract a diverse and international faculty to support research and development on company-wide issues, and to further enhance or create new relationships with our stakeholders. Part of our vision is to enhance the employee relationships with HR and or other departments by providing an accessible user-friendly experience. This can be achieved by the relating of autonomous data requested by a user.

Any user will be provided with automatic responses that contain the quality and warmth that one would expect from a human-to-human interaction.

We will expect of our teams no more and no less than what the company would expect from us.

## Business Project Case and Concept

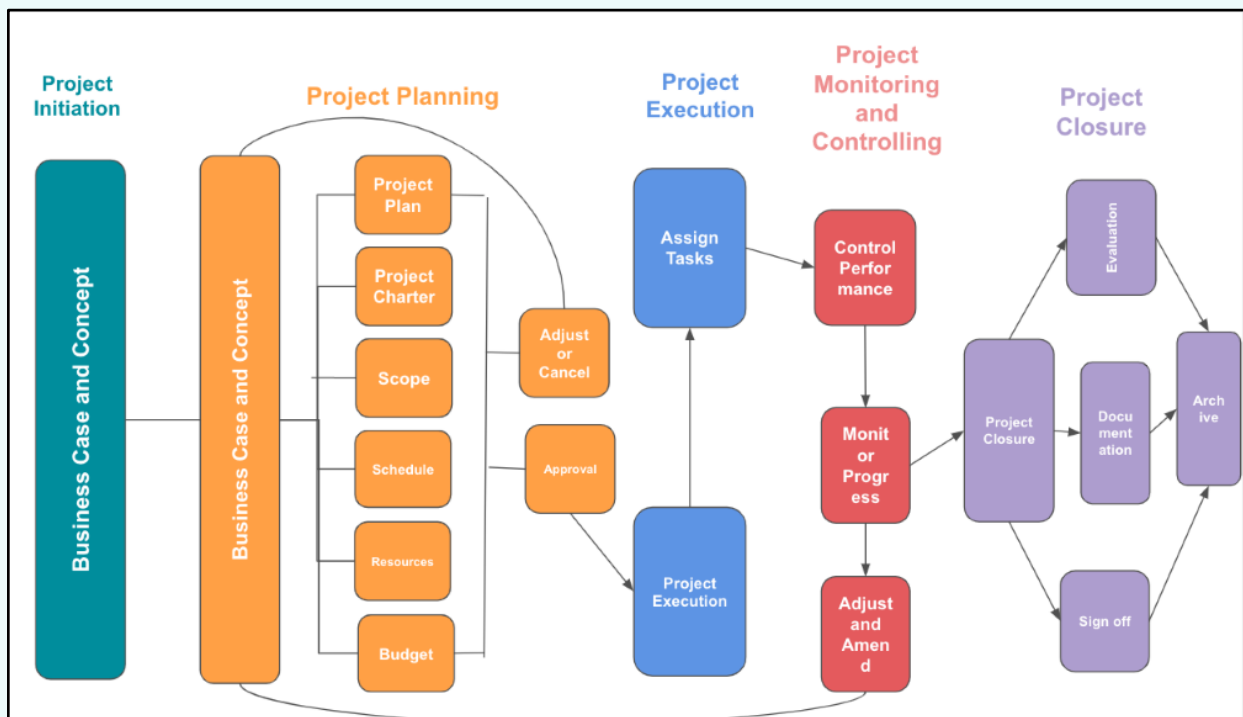


Figure 2: Project case and concept

Our Project Case is to implement a HR chatbot (BI-Bot) for the HR function. This tool will be able to answer users queries with the most detailed and appropriate response after one or more keywords are selected by the user. For further insights on this tool, and how it is anticipated it will be used, please see pages 14 & 33.

### Alternative options that could have been considered were the:

- Training / upskilling additional staff to monitor HR queues and queries
- Outsourcing of certain elements of the HR function to clients to help reduce the workload of the HR function
- Overhaul of the HR system - rebuilding it with software engineers
- Building a bot to automatically respond to selected keywords (**Approved**)

## Benefits

There are several benefits when it comes to the implementation of BI-Bot such as its cost effectiveness, potential to increase employee satisfaction with the HR function, reduce the HR function's workload and finally ease the accessibility of HR/Governance information within our employee's countries/regions.

Considering most users have a difficult time interacting with HR in general with long ticket times for simple questions, BI-Bot stands to resolve these difficulties. Further to this, BI-Bot could potentially save on the hiring of new HR personnel and the need to upskill employees working within the HR function.

## Timeline

We have given this project a 1-year implementation timeframe as illustrated below. This is due to the Machine Learning and Artificial Intelligence training the model will have to go through before being effective in a live environment. If the model is not trained correctly, the wrong information could be provided so it is imperative we account for this and have chosen to do so by using an agile methodology as outlined on pages 15-21.

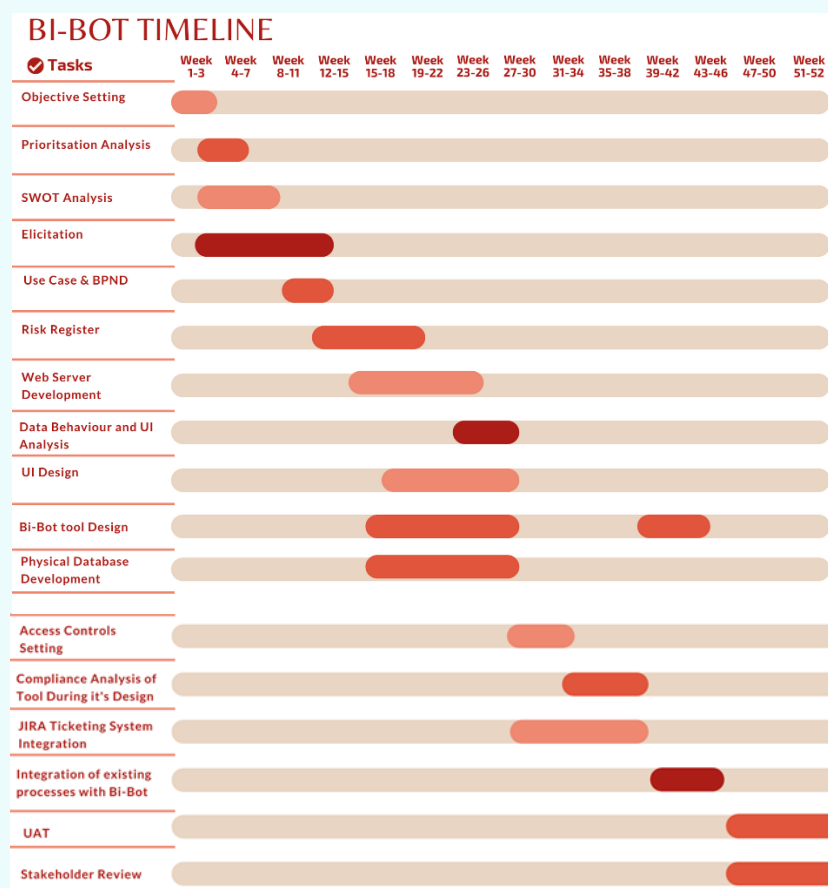


Figure 3: BI-Bot Timeline



## Cost (Budget)

We have outlined two separate routes that the client can choose from: one which is based on the outsourcing of all server hosting to the relevant system owner (i.e., Softext would host the BI-Bot and Jira would host the Jira server), while the other is that these systems are hosted internally on BICC servers maintained by the IT department. A Rough Order of Magnitude estimate was used when calculating the below budgets. Please refer to page 31 for clarification on the reasons why this method was used, and the justification for it.

Outsourced	High (€)	Low (€)	Frequency
Chatbot building	100,000.00	50,000.00	Once off
Chatbot maintenance/ consulting	50,000.00	30,000.00	Recurring per annum
Creation of HR Profile/ Interface for Chatbot	20,000.00	10,000.00	Once off
Jira Cloud subscription (standard v premium)	13,000.00	5,000.00	Recurring per annum
Additional training as a result of Grad program & HR software usage	60,000.00	40,000.00	Recurring per annum
<b>Total YE 1</b>	<b>243,000.00</b>	<b>135,000.00</b>	
<b>Total to YE5</b>	<b>735,000.00</b>	<b>435,000.00</b>	

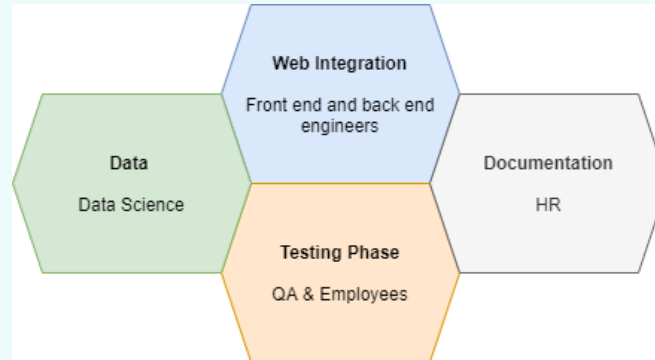
Internal	High (€)	Low (€)	Frequency
Chatbot building	100,000.00	50,000.00	Once off
Chatbot maintenance/ consulting	10,000.00	6,000.00	Recurring per annum
Creation of HR Profile/ Interface for Chatbot	20,000.00	10,000.00	Once off
Jira Software Server (Local)	45,000.00	32,000.00	Once off
Additional training as a result of Grad program & HR software usage	60,000.00	40,000.00	Recurring per annum
Additional IT staff member for server maintenance	40,000.00	-	Recurring per annum
Purchasing Servers	20,000.00	10,000.00	Once off
<b>Total YE 1</b>	<b>295,000.00</b>	<b>148,000.00</b>	
<b>Total to YE5</b>	<b>735,000.00</b>	<b>332,000.00</b>	

Figure 4: Budget Overview

## Expected Cost Savings (Long-Term)

As can be seen above, there are greater potential cost savings in the long-term (to year 5) if the servers were to be hosted and maintained by BICC employees, however we recognize that this is more labour intensive to the business. This budget will be revised in later iterations based on the decision of the BICC hierarchy on the direction they wish to take.

## Project Execution



*Figure 5: Project Execution*

### Documentation

The gathering past and current HR documents would help build the relevant database for the Bot. When building the bot, there needs to be a sufficient number of articles inputted into the database so as to address the majority of employee queries.

### Data

Importing and exporting data to and from the bot is crucial. We need to have processes in place to ensure we can retrieve data on users' questions and queries, while also importing new documents (updated HR documentation) to the Bot for it to be as efficient as possible. Querying the database for the Bot can show areas of improvement, what it is doing well and if the answers being provided are correct.

### Testing Phase

Like all machine learning and Artificial Intelligence software, it needs to be tested repeatedly. Without continuous testing the bot would not be able to provide best solutions for the end user. Quality Assurance analysts and the IT department will test and find potential flaws or bugs within the bot as part of the iterative build design outlined on pages 15-21.

### Web integration

BI-Bot will need to be implemented on a live website. This requires server providers, increase in hard disk space and service maintenance. To this end, we have recommended the use of Amazon Web Services to host such a server. Controls on access to this are outlined on page 21.

## Assignment of Tasks

We have assigned the tasks referred to above to the following functions:

**Documentation:** Assigned to HR:

HR would be best suited finding, sourcing, and building the documentation together, as they will have access to archives of queries employees have forwarded to HR and be best placed to analyze these into categories of importance for the tool.

**Data:** Assigned to the Data Science function:

Data Analysts are a necessity during this process. The analysts can locate the data being produced by the BI-Bot and illustrate it using a chart or develop detailed reports on key areas that can be improved in the future.

**Web Integration:** Assigned to Frontend and Backend engineers:

Backend engineers will build the bot into the website. This consists of integrating it with server scripts and APIs (if required). Frontend engineers will construct the graphical user interface (GUI) that will interact with the backend scripts or API.

**Testing Phase:** Assigned to QA and a small sample of employees as part of alpha build

QA or Quality Assurance testers would interact with the bot on a very regular basis when there are updates or continuous testing is involved. QA will document and provide feedback to Softtext, the Web Integration team or the Compliance function via an escalation tool such as JIRA where bugs, flaws, crashes, or critical issues are identified such as providing PII data (Personal Identifiable information) to the wrong user.

## Control Performance and Monitoring

Not all teams assigned to the project will actively monitor the bot. Departments such as the Data Science team, Quality Assurance team and HR function are expected, however, to regularly monitor the BI-Bot for consistencies, bugs and the background data tables being generated from use of the bot by employees.

This monitoring and screening process includes data being sent to and from employees, the types of data being sent (for GDPR reasons), active users, bugs, updating of information, auto-responses, users disengaging without an answer and user time.

This step would be repeated until a satisfactory level of usage is met. This percentage is set at 95%+ for our bot.

## Project Closure

### Evaluation

Once a level of achievement, development effectiveness, efficiency and sustainability are met across all teams, the findings are to be presented back to the stakeholders and eventually to the company.

This consists of the gathering and illustration of all data generated from the project or alternatively a presentation on the beginning to end of the project life.

### Documentation

All documentation is to be gathered and stored in a SOP (Standard operating procedure) file on the companies' helpdesk.

Data and documentation containing sensitive information will be sectioned off and only available to certain functions such as the HR and Compliance Function.

### Archive

All documentation created relating to this project will be archived. Archiving will secure the documents can be accessed at a later date(s) if the project is to be re-opened or updated/upgraded.

### Sign off

Project Sponsor and stakeholders responsible for reviewing each iteration of BI-Bot tool.

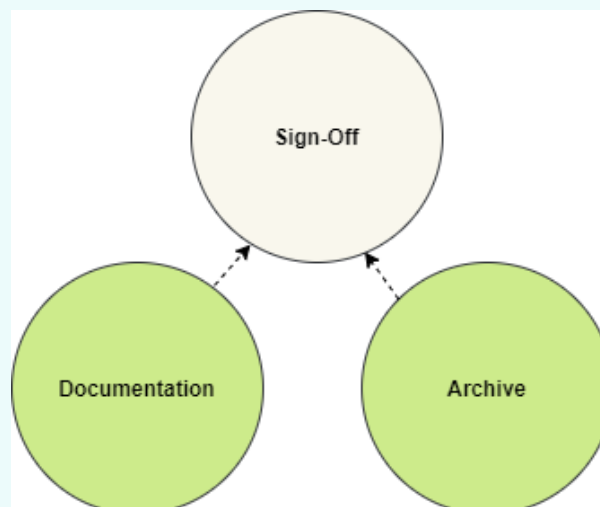


Figure 6: Sign-off

## Business Management Process Notation Diagram

*'Business Process Management is one of the most recommended investments for process improvement. It adds value to the business, enables the reuse of IT investments and addresses the aforementioned integration issues' (Pourshahid, et al., (2009))*

The following Business Management Process Notation Diagram is intended to illustrate the interaction process between employee, BI-Bot, and the editor user (back-end) in a situation where the employee will use the chat as the main point of access to HR.

Depending on who is accessing the bot, the language it provides may differ. For example, a BICC employee based in England who accesses the chatbot while in France will get English results back. This is down to the fact the Bot will recognize their employee ID and align its responses with the employee's primary language.

The system will work with a login process on the company's website with password authentication to protect the information of all employees. The bot will have access to a vast number of articles, where it will search for answers by keywords and indicate the article that best fits the question. It will also have access to general user data, such as vacations and bank holidays.

For compliance with international and local laws, the Bot will be tailored to only provide information to an employee which complies with the respective international and/or local laws. This will be automatically picked up on by the Bot depending on the country in which it is being accessed.

All information input into the chat is recorded, with an advisory notice to this being highlighted when the tool is opened.

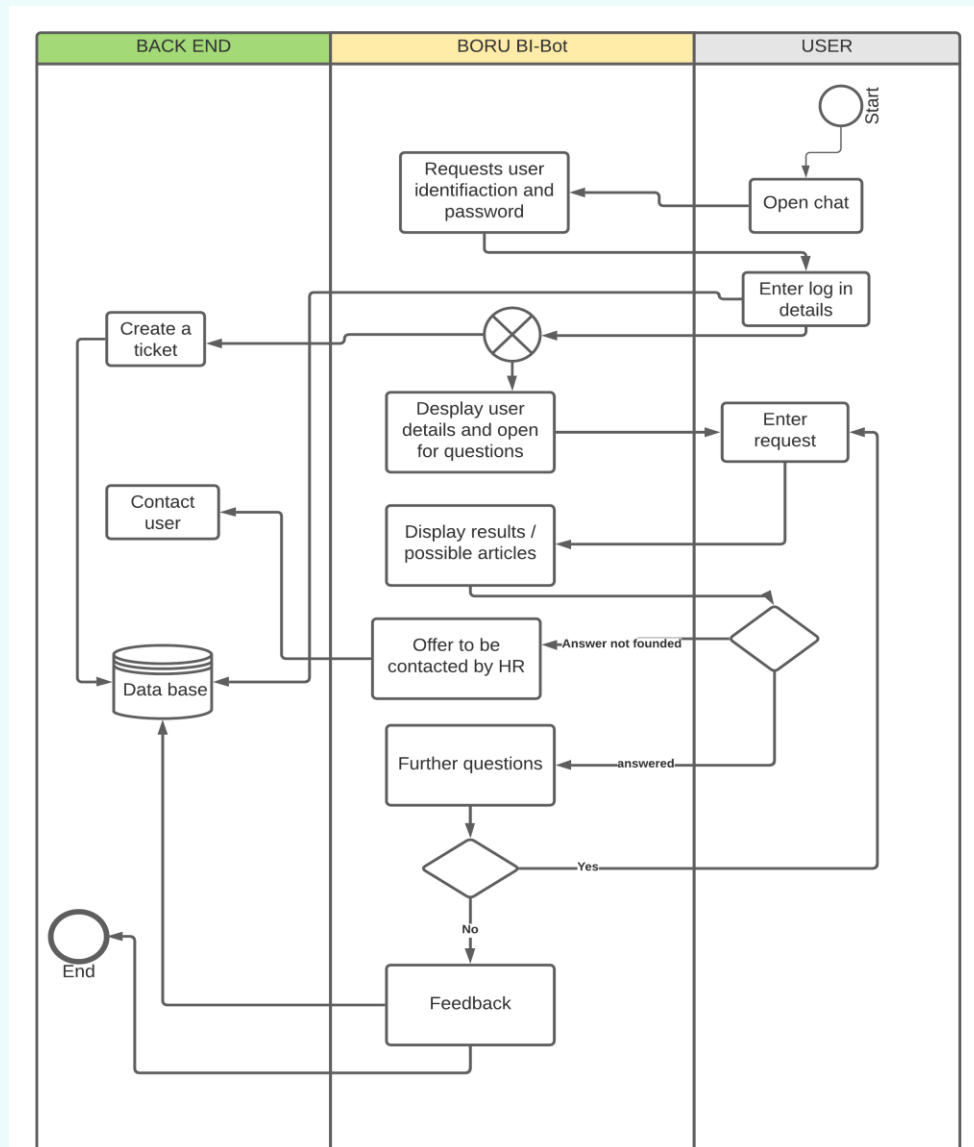


Figure 7: Business Management Process Notation Diagram

## Business Analysis Approach

*'Agility is the counterpart of discipline. Where discipline ingrains and strengthens, agility releases and invents. It allows the athlete to make the unexpected play, musicians to improvise and ornament, craftsmen to evolve their style, and engineers to adjust to changing technology and needs' (Boehm, B., & Turner, R. (2004). Balancing agility and discipline: A guide for the perplexed)*

We feel an adaptive, 'agile' approach as referenced above is necessary given the current financial, and social climate BICC face, including but not limited to; reduced social and geographical mobility of labour and resources, increased operation costs, and a marked decrease in the effectiveness of communication due to Covid-19.

As part of our strategy, we have outlined an iterative approach to the implementation of our solution based on the Oracle Unified Method, hereby noted as OUM (Oracle Unified Method, (2016)) – the BI-Bot, as illustrated below:

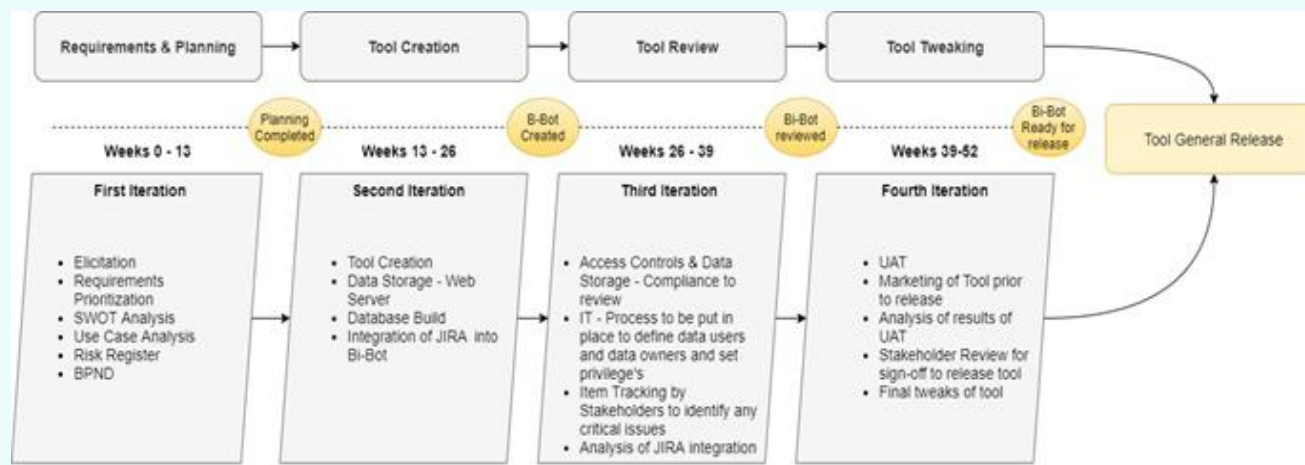


Figure 8: Project Iterations

*'The product that results from an iterative process will be of better overall quality than products that result from a conventional sequential process. The system will have been tested several times, improving the quality of testing. The requirements will have been refined and will therefore be more closely related to the users' real needs.' (Kruchten, Philippe & Fellow, Rational. (2001)).*

The above diagram contains two plans, an implementation plan, and an iteration plan with the former above the dotted line and latter below it. While the Oracle Unified Method suggests timeframes per iteration of 2-6 weeks, we feel it necessary to extend this to 13-week intervals given the nature of the change proposed and its impact on various actors within BICC.

Our first iteration will have a limited scope which will expand in subsequent iterations. We anticipate there being four iterations, after which Bi-Bot will be generally released to our employees. At this point, subsequent improvements to the product can be implemented by our IT department or if we elect to outsource this, Softtext.

Our reasoning behind this approach is three-fold; namely

- The complex nature of the change
- The anticipated level of usage by different actors within the organization
- The number of stakeholders involved in the implementation of 'BI-Bot'

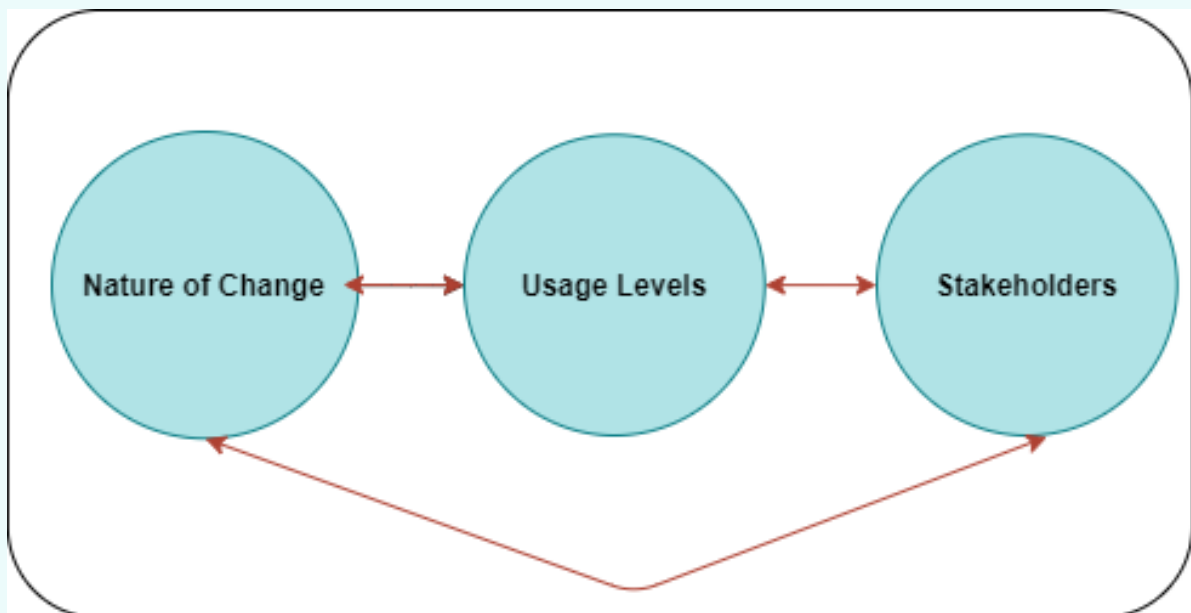


Figure 9: Reasoning for Approach

We anticipate it could take up for a year for the BI-Bot to come to fruition in its desired form, with each iteration subsequently being assigned a 3-month interval. At the end of each time period, we should be able to produce and work on the following iteration. To ensure this occurs with minimal overlap, we feel it is imperative BICC has bi-monthly meetings between Softtext and representatives of the following stakeholders in months one and two, with weekly meetings in month three for each respective iteration:



Figure 10: Stakeholders



Below is an OUM Implement Core Workflow (The OUM Implement Core Workflow – The Key to Understanding and Applying OUM, An Oracle White Paper (2012)) outlining the iterative process being followed from a high-level perspective:

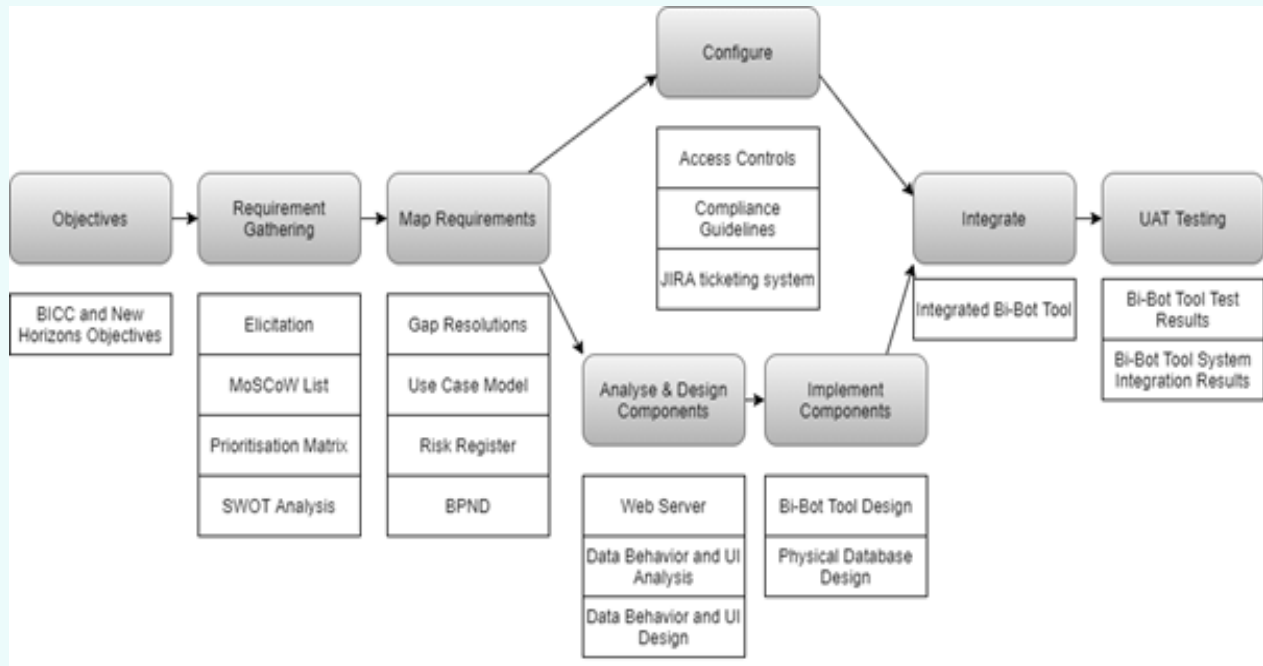


Figure 11: OUM Implement Core Workflow

## Iterations

### 1<sup>st</sup> Iteration

Regarding the first iteration, the primary goal is to have completed requirements mapping and investigation, as well as concluding elicitation. To this end, we have specified that within this iteration elicitation techniques such as Questionnaires/Surveys will be undertaken so as to gain an insight into how end users (employees) feel regarding the HR function as is. Further to this, we have outlined that a Risk Register is to be developed with SWOT Analysis and Use Case Analysis to concurrently be generated to illustrate how we can best position ourselves to design and account for Bi-Bot in later iterations as well as ensure all stakeholders are on the same page regarding the vision for Bi-Bot.

## **2<sup>nd</sup> Iteration**

This will be the most practical iteration and will see the creation of Bi-Bot for review and tweaking in later iterations. At this point, we should be reaching out to AWS to arrange to use an online server of theirs to host information relating to Bi-Bot with back-end and front-end engineers to be responsible for oversight of this process and integration with Bi-Bot itself, in line with work done by Softtext. The Bi-Bot database will also need to be built, and integration of JIRA as an existing system of BICC to Bi-Bot to occur.

## **3<sup>rd</sup> Iteration**

The third iteration will call on our compliance function to review how and where the inputted queries and captured information is held (see 'Data Storage'). We will also be calling on our IT department to ensure BI-Bot is compatible with our internal Jira ticketing system where tool and database errors are flagged for investigation. Our IT department will also be tasked with identifying Data Owners, and Data Users and defining how access can be gained to the tool (authorization must be given by IT department).

## **4<sup>th</sup> Iteration**

The fourth iteration will involve multiple actors working with the tool to ensure all deliverables are addressed, and that the tool possesses the functionality to be used by a small sample of employees as part of a more comprehensive UAT. At this point all relevant stakeholders will also need to conduct a thorough analysis vis-à-vis item tracking to determine if there are any critical issues with this iteration that need to be addressed, and if so, communicate these to Softtext for review.

Due to geographical and cultural considerations, we suggest for the third iteration to be released to a sample size of 100 employees as illustrated overleaf.

## User Access Testing - Samples

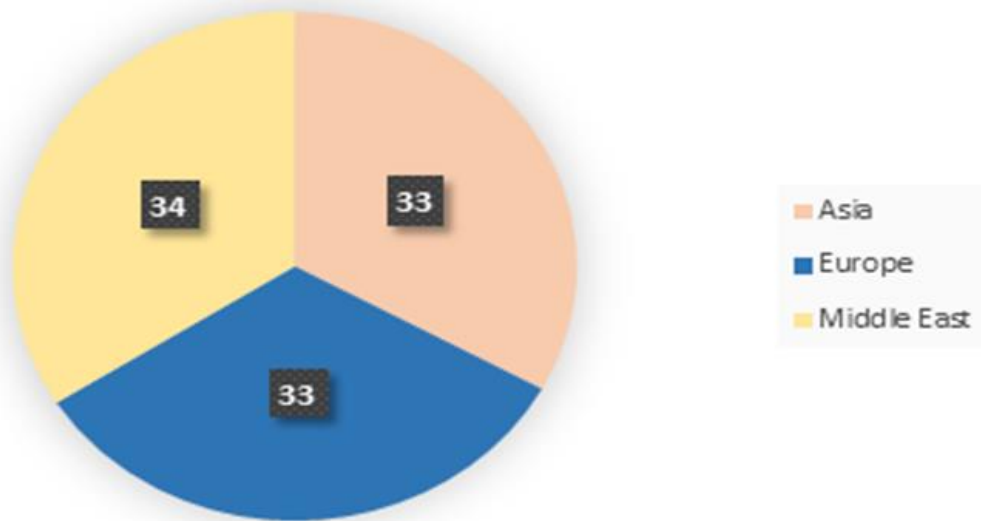


Figure 12: UAT samples

To ensure compliance with company values and governance practice ('One Boru'), we have taken a small sample size from three regions as above to ensure the tool works in each region. The goal in this regard is to ensure we are compliant with governance processes, and relevant local and regional legislation.

For the tool to be successful, it is imperative our employees use it – to this end, our marketing department will be tasked with pre-emptively highlighting the usefulness of the tool via internal marketing campaigns as a solution to our employees concerns and discontentment with existing HR processes.

### General Release

At this point, we will have reached the end-goal of our design; the completed BI-Bot tool and its general release. At this point, it is expected pending the iterative process as outlined above being followed, the tool will have

- Secure Tool Control
- Secure Database Access
- A wide range of manually inputted answers to queries gained from our sample of 100 people, and review of existing employee concerns and existing HR email archives.
- A complete engagement loop (see Use-Case Diagram)

- Complete compatibility with JIRA ticketing system
- Automated flagging of database gaps to HR
- Automated notification to HR of an employee query that the tool cannot, or was not able to address

## Data Storage

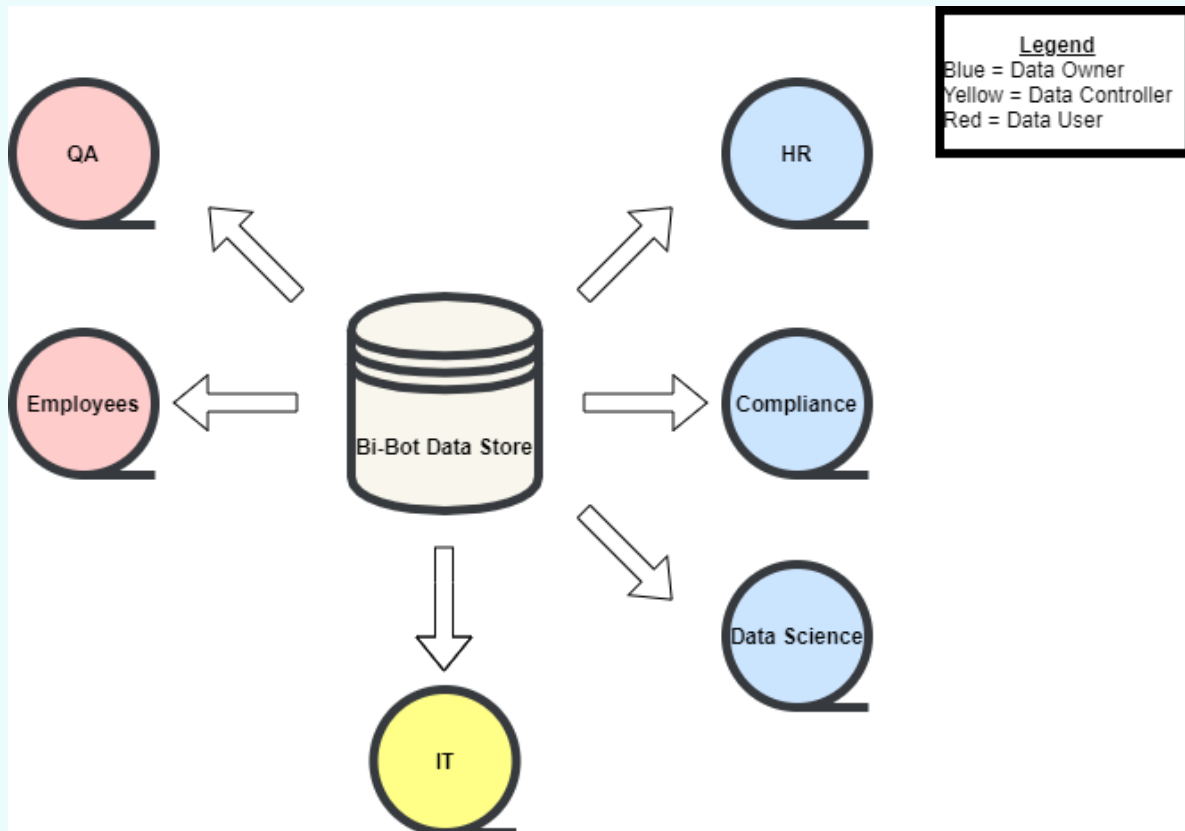


Figure 13: Data Store and Actors

*'Access control is considered the most important aspect of information security and is an important pillar of information security' (Rao U.H., Nayak U. (2014))*

The storage of data inputted into the tool and subsequently collected, is to be managed by our IT department to whom we have assigned responsibility for controls on access to, and use of, information gained from the tool. Further to this, we suggest the use of Amazon Web Services to host a server to contain this information, to enable access by the relevant IT and HR departments of our operating markets.

To ensure only authorized employees can access the database, only company owned, and issued devices will be able to use the tool, with logins to the tool data to be approved by the relevant persons within each geographical region. To this end, we would suggest a member of the IT team within each region be responsible for authorizing, and subsequently arranging for access to the database.

### **Change Controls**

At each meeting between relevant stakeholders and Softtext; minutes should be kept and documented. This is to ensure we can monitor if the BI-Bot tool is being developed in line with recommended changes for which sign-off has been given.

The project sponsor will be responsible for signing off on the recommended changes after each meeting, and this should be communicated no later than three working days to the relevant stakeholders. This is to allow time for the recommendation to be followed by Softtext and for respective stakeholders to understand the direction in which the solution is going and thereafter align it with their function's responsibilities within the scope of the project.

## Elicitation

*'Requirement elicitation is a process of determining the problems and needs of the customer, so that software developers can construct a system that actually resolve customer problems and address their needs'* (Tiwari, S., & Singh, S. R. (2017) p.2)

We believe the use of collaborative elicitation techniques to be most relevant to the design and implementation of BI-Bot.

In this regard, each stakeholder will be collaborating with other stakeholders to gain an understanding of what is expected of them, whom they will be interacting with, when these interactions will occur and on what basis they will occur.

Communication between stakeholders, as touched upon previously, is assumed to be primarily digital given the current climate and obstacles to travel created by Coronavirus. As English is the language used at a high level within BICC for the purpose of communication, this is to be the language used throughout the elicitation stage.

## Compliance

It is acknowledged BICC's compliance function will want to ensure BI-Bot compliant with internal business processes, external controls (local and regional legislation) and that it is in line with relevant data protection legislation per country/region. As such, we have suggested they are consulted prior to commencement of the first BI-Bot iteration, with heavy involvement in its second iteration as it is forecast this is where the tool will be of most importance to this function.

## IT

Our IT department will be responsible for Assisting in the design and implementation of BI-Bot, and secondary to this, could be responsible for control and improvement of the tool once released to our employees after the iterative process is complete, should we elect to not outsource this task to Softext. If kept inhouse, they will be called upon to identify errors, and an appropriate means of resolving them easily and quickly. In this regard, we have forecast that the JIRA ticketing system can be used for assigning tickets to IT from the HR function or from the tool itself. To enable our IT department to successfully do this, we have specified this as an overall goal of the project, and that this is considered by Softext when they are designing BI-Bot.

## Finance

Bi-weekly reporting to Finance has been accounted for, to ensure BI-Bot is within budget guidelines. It is an accepted risk, as seen within our Risk Register, that there may be a budget overspend on this project, due to its scope and complexity. We have looked to account for this in our choice to use a Rough Order of Magnitude estimation technique.

## HR

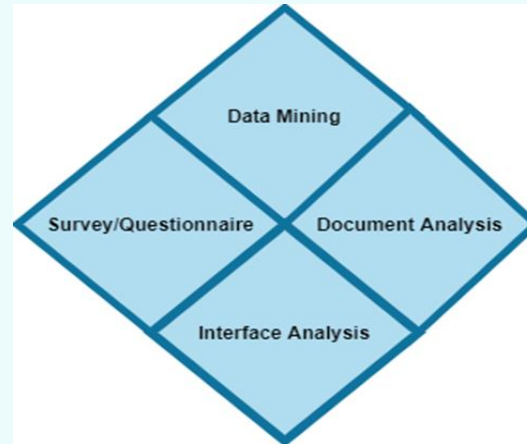
We have aligned HR's objectives with our overall project objectives, as they are directly related to one another. As touched upon on page X, we are hopeful BI-Bot will reduce the volume of employee queries thereby enabling HR to spend more time at improving their graduate program and enhancing employee's perception of the HR function. A caveat to this, in the scope of this project, is that HR will liaise with IT if any issues with BI-Bot identified. As BI-Bot will be designed with a view to enabling reporting, HR will be able to review where employees are most concerned/most interested in terms of HR/administration queries. We have specified that they will be responsible for updating the BI-Bot database of auto-generated responses to queries, pending review of said response by the compliance function.

## Softtext

As Softtext Ltd will be in control of designing BI-Bot in conjunction with IT, as opposed to an in-house team, it is imperative clear and regular communication occurs between BICC and Softtext Ltd. As such, they will need to understand time constraints as well as appreciate the importance of forecasting on the project pipeline and reporting on BI-Bot costs to Finance. It is for this reason we have outlined a project timeline and suggested the use of an iterative process regarding the design and implementation of BI-Bot.

*'For communication to occur reliably in the realm of requirements, there needs to be a shared understanding, which can only occur through co-operation and negotiation' (Coughlan, J., and Macredie, R. D. (2002), p.11.)*

We have identified four means of eliciting information to guide and shape stakeholder co-operation and negotiation as outlined below:



*Figure 14: Elicitation Techniques*

Zakari, Lawan and Bekaroo (2017) propose a hybridized Approach regarding Requirement Elicitation in their paper ‘A hybrid three-phased approach in requirement elicitation’. We have incorporated the model they have outlined into our analysis. It is important to consider the elicitation process in stages, as one should naturally occur after the other so as to ensure effective elicitation occurs, with appropriate communication.

### **Stage 1**

In the first phase, the aim will be to get information from large groups of employees so as to get different views from the users/stakeholders using questionnaires and surveys. Information collected is then analyzed to get insightful information on the key questions that need to be asked to the main stakeholders of the system.

### **Stage 2**

In this stage, data mining alongside document analysis is conducted to further refine the requirements driven from the questionnaire in stage 1, which will help guide interface analysis in stage 3.

### **Stage 3**

The information acquired from users/stakeholders using the aforementioned elicitation methods will help guide interface analysis to identify areas of prioritization and help align the project with its objectives.



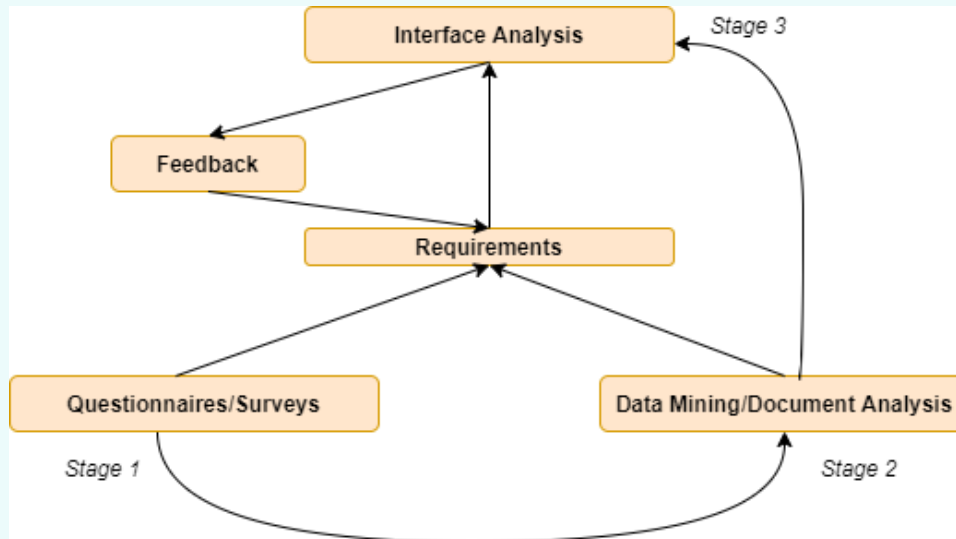


Figure 15: Elicitation Techniques

### Data Mining

To help our stakeholders understand what needs to occur, and when, we suggest the use of data mining by our HR department to highlight the key areas of importance for our employees. This will result in a volume of data, accessible to our stakeholders, which can then be broken down into indexed areas of importance for resolution via the BI-Bot tool.

### Document Analysis

Further to this, analysis of existing governance processes, and internal business documents should be conducted to enable our stakeholders to understand how BI-Bot will affect their respective business functions, and what complications or inferences can occur or be made.

### Interface Analysis

A review of existing documentation available to employees, and of the routes advertised by BICC for resolution of employee queries is to be undertaken. We feel if a (non-end-user) stakeholder puts themselves in the shoes of an employee and compares what is on offer to them versus their areas of concern, significant inferences can be made that can be aligned with the iterative BI-Bot approach and prioritization of resolution via BI-Bot when it goes live.

### Survey/Questionnaire

We feel a survey should be carried out amongst our employees to understand their self-ascribed areas of frustration, and what they most want out of our proposed solution (BI-Bot).

## Prioritization

*'Prioritization is the act of ranking requirements to determine their relative importance to stakeholders; Prioritization is a critical exercise that seeks to ensure the maximum value is achieved' (Babok Guide (2015), p. 87)*

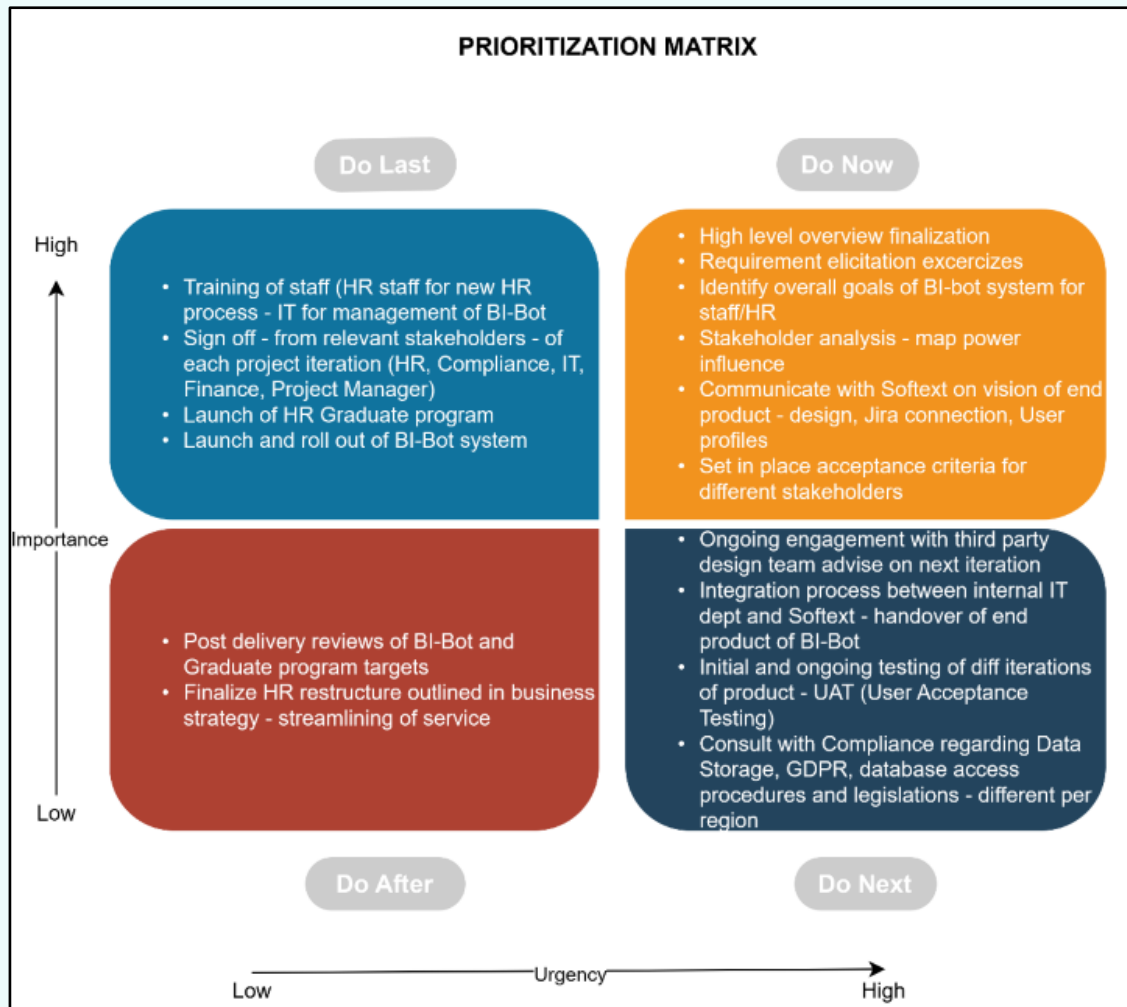


Figure 16: Prioritization Matrix

We see the best assignment of priorities, in accordance with the agile and adaptive business analysis approach to the project, is as in the above Prioritization Matrix. The need to reassess and possibly regroup after different milestones, such as design, implementation etc., during certain points of the project (iterations) is very important. The priorities will be defined through several techniques undertaken during the project such as interviews, workshops, and surveys of various stakeholders. This will help ensure there is an efficient assignment of resources to relevant tasks.

Risks and outcomes may vary, change, or appear during the life cycle of the project and so prioritizations will change with each iteration. The above model gives a good starting point and general roadmap of priorities for the BI-Bot from the outset. Interactions and interdependencies between stakeholders will also help to determine certain priorities.

Costs as always can be unpredictable and new costs can occur during a project. However, based on the 'People Management Review', the initiative to retain and attract the best technical staff is seen as essential and will be resourced and financed accordingly. Taking these factors into consideration, we feel the above division of prioritization matches the scope of the project.

Departments and stakeholders tasked with high priority tasks throughout the life cycle of the project as touched upon previously on the BI-Bot timeline have been identified as HR, IT, Softtext, Finance, QA and Compliance. Their tasks and decisions will have a medium to high impact on the project and will affect cost, time, use of resources and their review will be required for each iteration.

### **Do Now High Urgency/High Importance**

These are tasks that the project team have identified as the most crucial to implement to ensure future success and to make the rest of the project flow smoothly. Once the high-level overview is established, identification and interaction with relevant stakeholders and end users would need to occur. Communicating the vision to Softtext – along with requirements and recommendations is very important at this stage. Setting acceptance criteria for the BI-Bot will help ensure its successful adoption by end users.

### **Do Next High Urgency/Low Importance**

Continuous engagement with Softtext on monitoring their progress while setting out clear and defined deadlines for different stages of delivery is crucial as outlined in the timelines the business project case and concept. Having chosen Softtext from a large list of potential third-party partners we would hope this process would not become urgent and one that will flow naturally providing there is a clear line of communication set out early as referenced in the project execution. Testing and finding the right balance of user acceptance is a task that can be done within each iteration of the project. Its urgency will become greater as the project moves nearer completion. The Compliance department will need to be engaged with early and often as their knowledge on different local and regional regulations will need to be referred to throughout the design in the business analysis approach.

### Do Last High Importance/Low Urgency

These items and tasks will become very important but not until the latter stages in project life cycle. Training of staff who will engage directly with the BI-Bot such as HR and IT staff 'on the ground' will need to be subject matter experts – primarily by trainers within the HR/Operations function. The launch and roll out of the product and the subsequent Graduate program are the long-term goals – and if project plan is followed and relevant adaptations made during its iterations these should be delivered on time (1 Year) and in budget (€221,500 or €189,000 depending on the route chosen by the stakeholders).

### Do Later (post project) Low Importance/Low Urgency

These items may be outside the scope of the project plan, however as they are linked to the successful delivery of the BI-Bot system/Graduate program, it is important to reference these as long-term goals to work towards.

The MoSCoW prioritization model is one that can be applied also, outlining could have, should have, and must have scenarios along each iteration. Each iteration will have high priority items, such as planning and mapping of requirements in phase 1, tool creation in phase 2, compliance review in phase 3 and user testing in phase 4. These items will each move into the must have and should have sections when our prioritization plan is revisited at the end of each phase or iteration.



Figure 17: MoSCoW Prioritisation

## BI-Bot SWOT Analysis

*'SWOT analysis is a simple, yet effective tool used to evaluate an organization's strengths, weaknesses, opportunities, and threats to both internal and external conditions.'* (Babok Guide (2015), p. 353)

Our SWOT analysis identifies the primary strengths, weaknesses, opportunities, and threats that may rise throughout the design and implementation of BI-Bot. The ideal outcome as touched upon previously is to increase employee satisfaction with the HR function, and reduce the workload of the HR function, thereby enabling them to set up a graduate hiring program. These outcomes will together lead to a more holistic HR approach which will ideally lead to the company retaining and recruiting the best technical talent available.

After assessing the SWOT linked to the overall BI-Bot project, we have outlined some strategies which will highlight some strengths and take advantage of opportunities and mitigate risks associated with possible weakness and threats.

The SWOT matrix feeds into our high-level vision which has set out a clear and concise framework to add context to any strategy taken or suggested. The SWOT will also act as a support for the agile approach we are undertaking with the project and will be revisited and referenced along the process to ensure alignment of efforts with existing strengths and weaknesses, and potential opportunities and threats.

Measuring results of SWOT analysis can be done by using quantitative metrics. Applying a point scale of each SWOT category from 1-5 or 1-10. Perfect execution of strategy involving SWOT category, full avoidance of threat and mitigating weakness or making full use of strengths would achieve a 10 for example. This can give you us an overall SWOT score we can refer to when the Bi-Bot is delivered. Please see pages 29-30 for illustration of this, where we have included this into our Risk Register Model. (Maculley, J. R. (2003))

	Opportunities	Threats
	<p>College Graduate Program</p> <p>Freeing up of HR personnel</p> <p>External Recruitment Agency</p>	<p>Scarcity of technical talent in market</p> <p>Cost/Budgeting issues</p> <p>Coronavirus Pandemic</p>
Strengths	SO Strategies	ST Strategies
<p>HR Chatbot would reply quickly to all staff in regards to general HR queries</p> <p>Accessible from anywhere in the world, at any time</p> <p>BI-Bot fits in with BICC values</p>	<p>The Graduate program will allow the company to procure the best talent straight from degree courses and allow for the management of the careers of the graduates from the moment they join the workforce</p> <p>The accessibility and international nature of the Bi-Bot will lead to greater homogenisation of the company. As with all large level multinational companies, an advantage is that the work environment is much the same across different regions allowing for easier cross training, communicating of values, and creating of a culture. For example if a person moves from one region to another within the company it not only allows us to retain talent but also leads to the employee feeling familiar in their surrounding of a new job in a new country.</p> <p>A fully functional and effective Bi-Bot feeds in with the BICC core values of continuous improvement and delivery. The Bi-Bot will be continuously updated as an ongoing process. The end users will see the Bi-Bot 'delivering' answers on queries in a timely nature, which was a big issue for employees outlined in management review</p>	<p>The lack of technical talent is a threat that has been identified at an early stage of the New Horizons review. Proper and quick implementation of Bi-Bot will reduce complaints of existing staff and allow HR to focus on recruiting new talent and keeping existing talent happy also</p> <p>The freeing up of HR personnel would allow them to focus on the hiring of graduates, and to focus more on their technical training. This will be an aim to execute once Bi-Bot is established. This will become measurable over time through manpower hours and budgetary savings along with the companies rising reputation</p> <p>Rolling out of the Bi-Bot during the pandemic would represent challenges, but could lend itself to the remote nature of people new WFH reality. Employees now more conditioned to not having face to face interactions will be more willing to accept and engage virtually with Bi-Bot system</p>
Weaknesses	WO Strategies	WT Strategies
<p>Unable to answer more complex personal queries</p> <p>Possibility of not linking in with recruitment and onboarding which is a big part of the New Horizons vision</p> <p>Outsourced design - possibility of clear oversight</p>	<p>Outlining a very thorough set of terms and conditions - that employees could opt in/out of. If they opt in it opens the possibility of Bi-Bot answering more complex queries. Also adding in additional layers of security to access could ensure only the employee who makes the query receives response.</p> <p>To mitigate this possibility that the Bi-Bot may not link in with the existing recruitment and onboarding process ensuring through the infrastructure of Bi-Bot is linked inextricably from the design phase will take extra precedence</p> <p>The external recruitment agency &amp; HR department can work more closely together to combat the obvious deficiency of the HR chatbot on the recruitment side</p>	<p>With the scarcity of technical talent in the Irish market, perhaps the company can take advantage of the current remote working by looking outside of the Irish market for hiring. Bi-Bot would then be even more of a requirement, as more will be working abroad.</p> <p>A lot of trust is being placed in Softtext, the company tasked with designing, building and implementing the Bi-Bot system. Thorough previous investigation of their previous work and portfolio would have been undertaken and a clear vision would be communicated with many ongoing meetings and reviews so they can update the company on the progress of Bi-Bot</p>

Figure 18: SWOT Matrix and Strategies

## Estimation Techniques

Coinciding with our adaptive method, we will treat estimation as an iterative process that we will update through the life cycle of the project. As the project becomes nears completion, and our elicitation process completed, we will have a better-defined view of the actual cost of the project. In the beginning, our estimation technique will be based on a Rough Order of Magnitude, or ROM, to give a high-level estimate to stakeholders based on the limited information that we have available to us in the beginning. As the project continues through its various iterations and the full scope of the project becomes more defined, we will be able to provide better estimates. This latter technique is known as a rolling wave estimation.

Estimation is used to support the decision-making process by predicting attributes such as: cost and effort to pursue a course of action, expected solution benefits, potential value anticipated from the solution and project cost. The cost of the course of action and the project cost are both considered in the budget outlined on page 8. While the result of the estimation will be expressed as a single number, we would like to note that this is only a high-level estimate with a confidence interval of around 50%. This is a standard confidence interval in ROM estimation, which will later be refined in the various iterations. Our initial cost-benefit analysis will be based on research completed by the project team before we receive feedback from internal and external stakeholders on their costs. We believe that we can draw on the experience of our finance and IT departments in the elicitation phase for an estimate of cost, though this will only be analogous. We can also use external stakeholders such as our external recruitment partner and the bot designer, Softtext, in order to give us an estimate of cost for recruitment, consultancy and the HR-bot itself.

There are several considerations regarding the current estimates provided in the budget. The estimates are only as useful as the level of knowledge of the team. Prior to the completion of our elicitation, this will be quite a broad estimate. We do not wish to assign too high a confidence interval until we have more information. Further to this, we do not wish to provide unrealistic expectations regarding the cost of the project, and so we would again reiterate the confidence interval of 50%. While considering the importance of this project in the wider context of the future of BICC, we realize that the cost of the project is not an issue. Due to this, we feel that the Rough Order of Magnitude estimate is justified.

There are multiple options that the BICC can take, and we have come up with two options which we feel represent the most value, which we are referring to as outsourcing and internal resources, respectively. For the outsourcing of resources, the company would both allow Softtext to host and act as the main administrator to the HR-Bot and would have Jira themselves host the Jira cloud-based server. While cheaper in the beginning, this would mean paying annual fees to Jira and Softtext, which would be more expensive in the long-term.

The internal resources option would mean that the IT Department would handle the hosting and administration of both the BI-Bot and Jira. This would entail paying more up front to purchase the bot and the Jira source, which would be hosted on internal servers by the IT Department. This could mean that more physical servers are required, and could put strain on IT Department resources, meaning that an additional IT hire may be required as a server administrator. In the long-term however, the company would see the monetary benefit, as well as being able to set their own standards in terms of privacy and data-handling. A rough order of magnitude estimate for each of these is €189,000.00 & €221,500.00, respectively, however, we see that the latter is more cost effective in the long-term (at five years) per the budget.



## Use Case

*'Use cases and scenarios describe how a person or system interacts with the solution being modelled to achieve a goal'. (Babok Guide (2015), p. 356)*

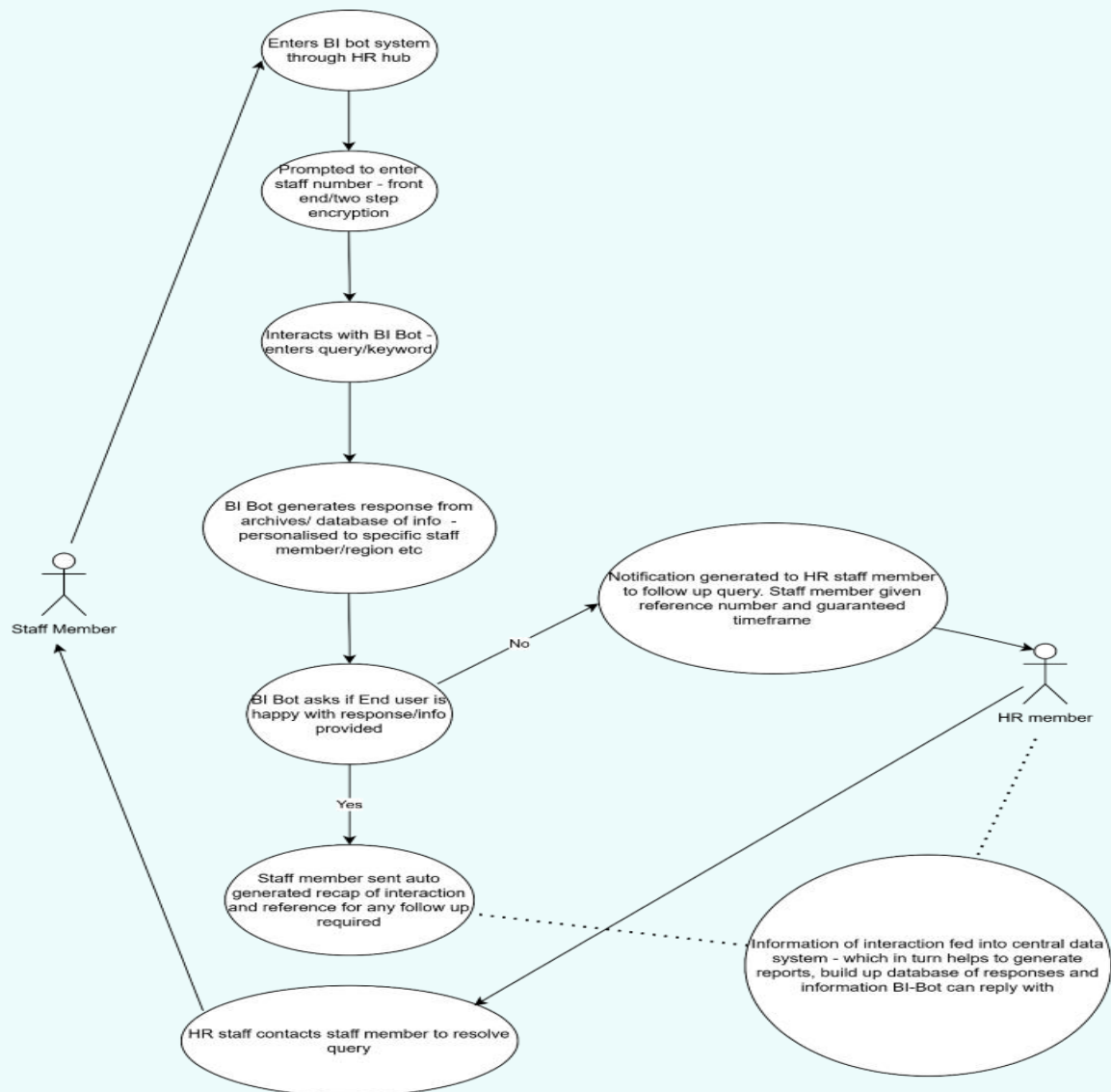


Figure 19: BI-Bot Use Case Diagram

The Use Case Diagram as above illustrates how, when and where the end user (staff member) and other actors (HR, Compliance, IT) interact with BI-Bot. The primary actor in the diagram is an end user who has logged into the tool and entered a query.

Early in the design and testing processes we will gauge different stakeholders and users' feedback in the form of user stories. These will help us identify needs and allow us to prioritize resources accordingly. The use case itself can be communicated to different stakeholders and encourage a universal understanding of the system.

After a staff member enters a query, BI-Bot will respond with an answer that the staff member will hopefully find useful. If BI-Bot does not find the answer or does not understand the query, the user will have the possibility to contact HR with the bot logging a ticket if the employee requests assistance.

The staff member will be asked to indicate if they are satisfied with the response given by BI-Bot if one is available. If not, a notification will be sent directly to a HR staff member to deal with the unresolved query.

If they are happy this information will be fed into a database of 'resolved' queries which can help to generate reports for HR management and in turn can help to upscale the BI Bot's growth and capacity to answer more and more queries first time as touched upon on pages 7 & 8. The reports generated can also lead to easier communication and greater understanding of staff issue by HR. A secondary goal of the BI-Bot system is the streamlining of the HR system overall, so the use case must flow smoothly to take pressures off current HR format

Very sensitive information such as payroll related questions will not be answered by chat but sent by a ticket to HR, where an employee will address the question directly with the employee and subsequently determine if their answer is suited to be entered into the tool database, after review by compliance.

As a final process of the interaction between the end-user and the BI-Bot, employee feedback will also be requested. The feedback will not be mandatory but will be short, merely an evaluation of "1 to 5 stars" and an option for further feedback. As one of the main objectives of the project is to increase employee satisfaction, feedback will be an important metric for us to measure the impact of BI-Bot on employee satisfaction.

The success of the BI Bot is dependent on End user (staff member) buy in and interaction. Nonresponse or abandoning mid query will lead to stagnation so interaction interface of the BI Bot needs to draw in and keep staff members interest throughout process. A quick response from HR staff to unresolved queries from BI Bot is also crucial as it will lead to greater trust in the BI Bot system.

*'Simply put, a use case is a description of all the ways an end-user wants to "use" a system. These "uses" are like requests of the system, and use cases describe what that system does in response to such requests.'* (Larson, E. & Larson, R. (2004))

## Risk Register

*'Risk Analysis and Management is a key project management practice to ensure that the least number of surprises occur while your project is underway. While we can never predict the future with certainty, we can apply a simple and streamlined risk management process to predict the uncertainties in the projects and minimize the occurrence or impact of these uncertainties.'* (Lavanya, N. & Malarvizhi, T. (2008))

Risk analysis involves identifying, analyzing, and evaluating uncertainties involved in a project, and coming up with plans in order to reduce or remove these uncertainties and to potentially implement these plans. A risk is a situation that could potentially expose the project to danger or reduce the value of the project.

*'A risk event could be one occurrence, several occurrences, or even a non-occurrence. A risk condition could be one condition or a combination of conditions.'* (Babok Guide (2015), p. 330)

The identification of these risks can be performed through elicitation and by using the analogous experience of the stakeholders involved in our project that they have gained from past projects. The risks identified relating to the design and implementation of our BI-Bot solution are represented Risk Register on the next page.

	Risk Event	Consequence	Probability	Impact	Risk Level	Risk action	Owner	Probability	Impact	Risk Level
<b>Objective Risks</b>										
1	Project runs over timeframe set out	Stakeholders will need to invest more of their time into the project, which could cause conflict with other projects or cause issues with budgets.	7	8	56	Regular and consistent High Level update meetings and collaboration across all stakeholders. Constant engagement with Third Party on design, implementation. Setting clear targets to them and internally. Rewards for timely execution of deliverables	All Stakeholders	3	6	18
2	Covid-19	Covid-19 may cause difficulties during the project with communication, as many stakeholders and users are abroad, or cannot attend meetings in the office.	10	5	50	The use of MS Teams/ Skype, along with frequent meetings with Stakeholders to ensure that things are moving smoothly, but some risk may have to be accepted, as disruption / delay during covid-19 cannot be avoided.	All Stakeholders	10	2	20
3	Lack of oversight on Bi-Bot design	If left completely up to Softtext, perhaps the result of the HR Bot design will not completely fulfill the specifications needed for the desired outcome of the project	5	9	45	Without micro-managing Softtext, clearly defined specifications must be outlined to the designer for what will be required. Regularly meetings for updates with Softtext must be held to make sure that any changes that need to be made can be made early in the development.	Softtext, IT Department	2	9	27
<b>Operational Risks</b>										
4	Poor advice offered by Chatbot	Could potentially open the company up to legal issues should the chatbot offer incorrect advice which is detrimental to staff members	6	10	60	Ensure that the chatbot cannot offer solutions to problems via advice, but instead offer information to users to allow them to find their own answers. E.g. "What pension plan should I go with?", Chatbot wouldn't provide a plan but instead say "Here are available plans with the pension"	IT, Softtext	2	10	20
5	Service Interruption	HR-Bot could go offline, causing interruption to HR services and overloading HR staff	5	8	40	BICC should look into potential cloud hosting services such as AWS to host the server for the Bi-Bot. This will ensure that if local servers are disrupted, the Bi-Bot can quickly be back online to minimise impact.	IT, Softtext	2	8	16
6	Information becoming old or stale, as the HRBot can only provide information that has been provided to it	Potential that staff could be given incorrect information should local regulations or HR rules change	5	8	40	IT should have an administrator regularly update the information available to the chatbot to ensure that all information is up to date	Susan Garcia, IT department	2	8	16
7	HR becoming too impersonal/ employees dissatisfied with outcome	If employees are not satisfied with the Bi-Bot answers, or with the impersonal nature of dealing with a bot, their may be low interaction levels with the bot, meaning that HR do not benefit.	5	6	30	Bi-Bot should have personalised greetings, be conversational and try to have information on all eventualities. It should feel like speaking to a person who can provide information.	Jori Daly, Softtext	3	6	18
8	Focus on graduate programme diluting experience	Too much focus on the graduate programme for new hires may lead to too many inexperienced staff members should there be a period of high turnover	3	5	15	A focus on staff retention should be made in order to hold on to the highly valued experience staff, and technical staff. This is highlighted as a top priority in the prioritisation model.	HR, Line managers, Fergus Murray	2	5	10
<b>Reputational Risks</b>										
9	GDPR/ Data Breach	Could result in fines or reputational damage to the company, and future distrust in the HR bot	7	10	70	Setting up of HR profiles with personal logins should mitigate much of this risk. This would mean that any data a user enters will only be viewed by the user. Correct data storage measures should be used also.	IT, Softtext, HR, Compliance, Rachel Kumar	2	10	20
10	Phishing Event	Phishing could cause employees to become sceptical of future communications with Bi-Bot and with information security, potentially becoming reputation-damaging if high profile	7	8	56	Increase employee awareness of phishing through security training, phishing training and random phishing scenarios/ drills	Susan Garcia, IT, HR	4	8	32

Figure 20: Risk Register

The Risk Register describes the event that may cause a risk and the consequence of this risk. We have assigned a number value between one and ten to each event to describe both the probability of the risk and the potential impact of the risk on cost, time, or reputation. The rationale for this is outlined below. We have then multiplied these numbers to give us a risk value. The risk register is broken down into three sections: objective risks, operational risks, and reputational risks. Objective risks are risks

associated with meeting the objectives of the project. Operational risks are risks associated with the operations of the company post-completion. Reputational risks are risks that could potentially cause damage to BICC's reputation. These are simply a "best fit" heading, as many of the consequences of the risk events outlined can have multiple impacts. The risks have then been ordered by highest to lowest risk. There are any number of possible risks involved with any project, which could quickly become unmanageable, so we are only assessing what we feel are the top 10 risks to New Horizons.

	Number Value	Quality	Cost	Duration	Reputation	Social Responsibility
Low Impact	1-3	Minor quality problems	Adding an additional cost of >1% to the project outside of the budget	Delay in the duration of the project of up to 5%	Minor impact to the reputation of the business	Minorsly detrimental
Medium Impact	4-6	Outcome of the project is fit for use, but would not be as hoped	Between 1-5% additional cost	Delay in the duration of the project between 5% and 10%	Moderate impact to the reputation	Moderately detrimental
High Impact	7-10	The product of the project is not fit for purpose	Greater than 5% additional cost	Delay in the duration of the project greater than 10%	Large impact to the business's reputation	Highly detrimental

Figure 21: Risk Measurements

On the right-hand side of the table, we see potential actions that can be taken in order to mitigate either the impact or probability of the risk, which then lowers the overall risk percentage. We also propose a risk owner, which is the department or person who we feel should be responsible for trying to implement the risk action outlined. There are various ways of ways to approach risks, including mitigation, avoidance or even acceptance of the risk. Some risks, such as covid19, are simply unavoidable and must be met head on. Once a decision is made, the risk is re-analyzed, which is what we are seeing on the right-hand side of the table. There will almost always be some residual risk, but as we can see, the assessed risk is decreased in all cases by the suggested risk actions.

## Conclusion

To reiterate, the aim of the project is to ensure that all employees can have their queries answered in a timely manner and to free up HR personnel in order to allow them to get more involved in recruitment and higher-level duties. This will help us to reach the “New Horizons” vision, by allowing HR to focus on the hiring of talented graduates, be more involved in their training and to retain BICC’s current technical talent.

We feel that the best way to accomplish these goals is to focus on the creation and adoption of a HR-bot, in conjunction with a HR ticketing system such as JIRA. Our recommendation, based on budget and the conclusions of our risk analysis, is to host these on a secure cloud server such as AWS but to have both administered by BICC’s own IT department.

This would allow for the greatest amount of customization and security, while also being cost effective. Our aim is to have the project completed within a year, and although we are expecting some difficulties to arise due to the coronavirus pandemic, we hope that by adopting an adaptive approach and regular communication, we can reach our goals on time via the four iterations outlined previously. If our recommendation is accepted, we are expecting a budget of between €148,000 and €295,000, which will be revised in rolling waves after each iteration as the timeline becomes clearer and the various elicitations are completed.

We believe that the BI-Bot will not only allow BICC’s HR department to save time on repeated queries but will allow for multiple other efficiencies and cut down on BICC’s reliance on outsourcing. We see this as integral to integrating BICC’s “Higher Vision” initiative.

## Appendices

Expected reaction on tickets creation and tickets solved in a year

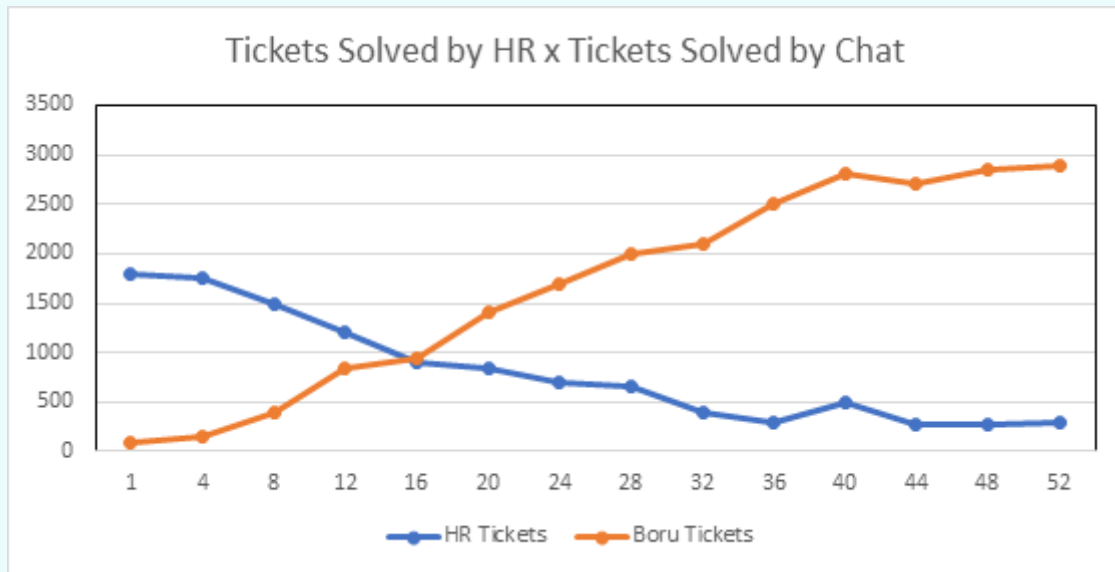


Figure 22: Total tickets solved by bot and HR

Mobile interaction with BI-BOT chat

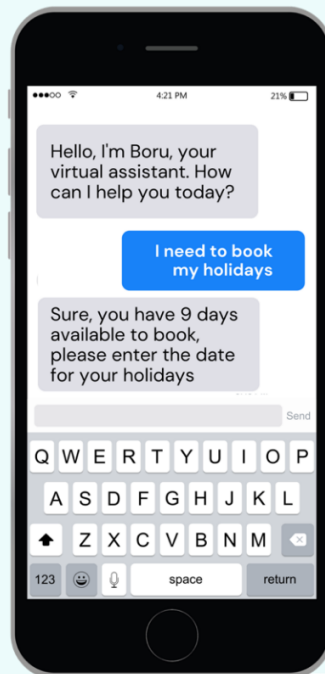


Figure 23: BI-Bot mobile

	Opportunities	Threats
	College Graduates	Scarcity of technical talent in market
	Improving economics outlook	Coronavirus Pandemic
	External Recruitment Agency	
Strengths	SO	ST
HR Chatbot would reply quickly to all staff in regards to general HR queries	The freeing up of HR personnel would allow them to focus on the hiring of graduates, and to focus more on their technical training	Since many are working abroad/ from home during the pandemic, the BI-bot would allow for faster replies and global accessibility, mitigating some problems caused by coronavirus
Accessible from anywhere in the world, at any time, so you don't need to wait for head office to come online if working abroad/ remote		
Freeing up of HR personnel		
Weaknesses	WO	WT
Unable to answer more personal queries	The external recruitment agency & HR department can work more closely together to combat the obvious deficiency of the HR chatbot on the recruitment side	With the scarcity of technical talent in the Irish market, perhaps the company can take advantage of the current remote working by looking outside of the Irish market for hiring. HRBot would then be even more of a requirement, as more will be working abroad.
Unable to help with recruitment and onboarding which is a big part of the New Horizons vision		

Figure 24: First version of the SWOT analyses

## Meeting Minutes

### 10/11/2020

- Overview of project
- Group discussion regarding deliverables
- Agreement to review project in advance of next meeting
- Next meeting scheduled 13/11/2020

### 13/11/2020

- Discussion regarding review of project since last meeting
- Agreement for each member to undertake some analysis of all deliverables and present findings/notes on each
- Next meeting scheduled for 16/11/2020



### **16/11/2020**

- Review of notes, files, and diagrams uploaded by members of the team
- First Working Project Notes file agreed as being the basis for conducting individual work on assigned deliverables to improve group cohesion in approach to answering each deliverable
- Assignment of deliverables to group members
- Agreement to work on assigned deliverables and upload work in advance of next meeting
- Next meeting scheduled for 25/11/2020

### **25/11/2020**

- First project draft was created based on work done by each member of the team
- With us being one member down, we agreed on the allocation of their workload to members of the group
- Reviewed what is outstanding – remainder of work to be done allocated to each member of the group.
- Group happy with the allocation of the remaining workload
- Next meeting scheduled for 09/12/2020

### **09/12/2020**

- Review of project deliverables completed to date
- Agreement to get all outstanding parts done within 2 days.
- Next meeting scheduled for 14/12/2020

### **14/12/2020**

- All parts minus referencing completed
- All members advised to get references completed prior to next meeting
- Next meeting scheduled for 16/12/2020

### **16/12/2020**

- Some referencing still left to be completed – strict importance placed on these
- Assignment of last remaining actions to be completed – Formatting, and overall reference review for cohesion
- Agreement to meet for final time on the 18/12/2020 prior to project submission

**18/12/2020**

- Project reviewed
- Project Signed off on by all members of team – Project submitted for grading.

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