

Final Report

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System Request

Project Sponsor: Mid and Higher management

Business Need:

- Support business and organizations decision-making activities
 - Make an informed decision based on analyzed data of a less well-structured, under-specified problems.
 - Analysis of data to assist in decision-making
 - Evaluate specific operation
 - Provide guidance on establishing supply chain movement, and sales
-

Business requirement:

- Data Management
 - Organization's Information
 - External information
 - Provide reports that project revenues, sales, market share, ...etc
 - Interactive software-based system to help decision maker use the information
 - Present the data in a useful manner
 - Model management
 - Knowledge management
-

Business Value:

- By making good decisions it might increase profits and market share of the company
 - makes workflow more efficient
 - Rescuing time needed
 - Avoiding errors
 - Planning and management
 - Ensures management success
 - Determines potential outcomes
 - Evaluating past data
 - Examining current trends of information
-

Feasibility Study

Technical

- Experience engineers (in real estate)
- Hardware
 - When it comes to hardware and computing power there are two options
 - Internal: Where internal servers and data centers are used. This adds overhead costs
 - External: where cloud computing is used which can offer flexibility, and the ability to scale the system.
 - But in case of sensitive data an internal data center is preferred

Knowing that our system's data are not sensitive then the chosen hardware for our system is going to be a cloud server.

Economic

- Since we have chosen a cloud server this reduces our overhead costs
- A conservative budget for the system is around a 50,000 threshold
 - Where the 50,000 threshold is the minimum and 240,000 is the maximum
- Reduction of the time needed to make decisions by at least 25%
- Reduction of errors by at least 50%
- Increase management success
- Improve planning of department
- A projected increase in market share by 1%
- Improve the workflow
- Improve the operation processes
- Production of reports that contain a summary of our data than can be used to make informed decisions
- Produce projection of the current state of the organization

Operation

- Since our users are going to be the managers, the interface for the interactive software is going to be kept simple and clean
- Fast reports that can reach the management and improve the management process
- Can reduce the time the managers needed to make decisions as well as visualize the data

Schedule

Time Estimation

- Minimum time needed for the process is about 6.5 months
- Such a schedule might be extremely strict and result in rescheduling so, another estimation is given where the project is going to be done in about 1.3 years
- Planning: 30 Days
- Analysis: 48 Days
- Design: 58 Days
- Implementation: 58 Days

Project Methodology

The chosen methodology for our system is the *Waterfall Method*

Since our project is extremely similar to the ordinary Data Analytics life Cycle, and there is not an extreme variation. The *Waterfall Method* fits perfectly our needs.

Moreover, its simplicity is another advantage that can further make the project successful

Task Identification.

Project Manager

Ahmed Ashraf

Tasks

Start date: Mon 10/24/22, End Date: Wed 8/30/23

1. Planning Phase of Project *Start: Mon 10/24/22, End: Fri 11/11/22*
 - 1.1. System Request *Start Mon 10/24/22, End: Thu 10/27/22*
 - 1.2. Feasibility Study *Start Fri 10/28/22, End: Mon 11/7/22*
 - 1.3. Project Plan *Start Tue 11/8/22, End: Fri 11/11/22*
 - 1.3.1. Methodology
 - 1.3.2. Time Estimation
 - 1.3.3. Charting: Gant & PERT diagrams
2. Analysis Phase
 - 2.1. Requirement determination
 - 2.2. Joint application Development (JAD)
 - 2.3. Entity Relationship Diagrams
 - 2.4. Document Analysis
3. Data Discovery and Formation of problem
 - 3.1. Define the data's purpose

- 3.2. Scheduling the analysis Lifecycle
- 3.3. Managers meeting to determine the requirements of the analysis
- 3.4. Forming the hypothesis and assessment based on the managers meeting
- 3.5. Determination of the sources of the data
- 3.6. Identifying the technological requirements of the analysis
- 3.7. Identifying the business requirements based on the managers meeting
4. Data Collection, preparation, and warehousing
 - 4.1. Data acquisition through in-house resources
 - 4.2. Entry of additional data based on internal management
 - 4.3. Choosing the database architecture
 - 4.4. Building the databases
5. Design the model
 - 5.1. Choosing the techniques
 - 5.2. Designing the model
6. Model building
 - 6.1. Building the model based on the design phase
 - 6.2. Sandboxing
7. Interactive software design and building phase
 - 7.1. Identifying the needed elements in UI
 - 7.2. Choosing the language, and the framework
 - 7.3. Building the GUI
8. Connecting the backend
 - 8.1. Implementing the ability to produce reports
 - 8.2. Implementing the ability to produce projections
 - 8.3. Implementing the ability to plot the data
9. The measure of performance
 - 9.1. Using the sandboxed models asses the correctness of model
 - 9.2. Measure the accuracy based on the validation data

Tasks Relations

Since our chosen methodology is the *Waterfall method*, the relation between our tasks is purely sequential and linear.

Priority

Since our tasks are extremely linear, sequential, and depend on each other. The priorities are mostly the same since If one task was not done we enter a block that might cause issues.

Working Time

Working Times are from Monday to Friday:
08:00 AM to 12:00 PM
01:00 PM to 5:00 PM

Resources

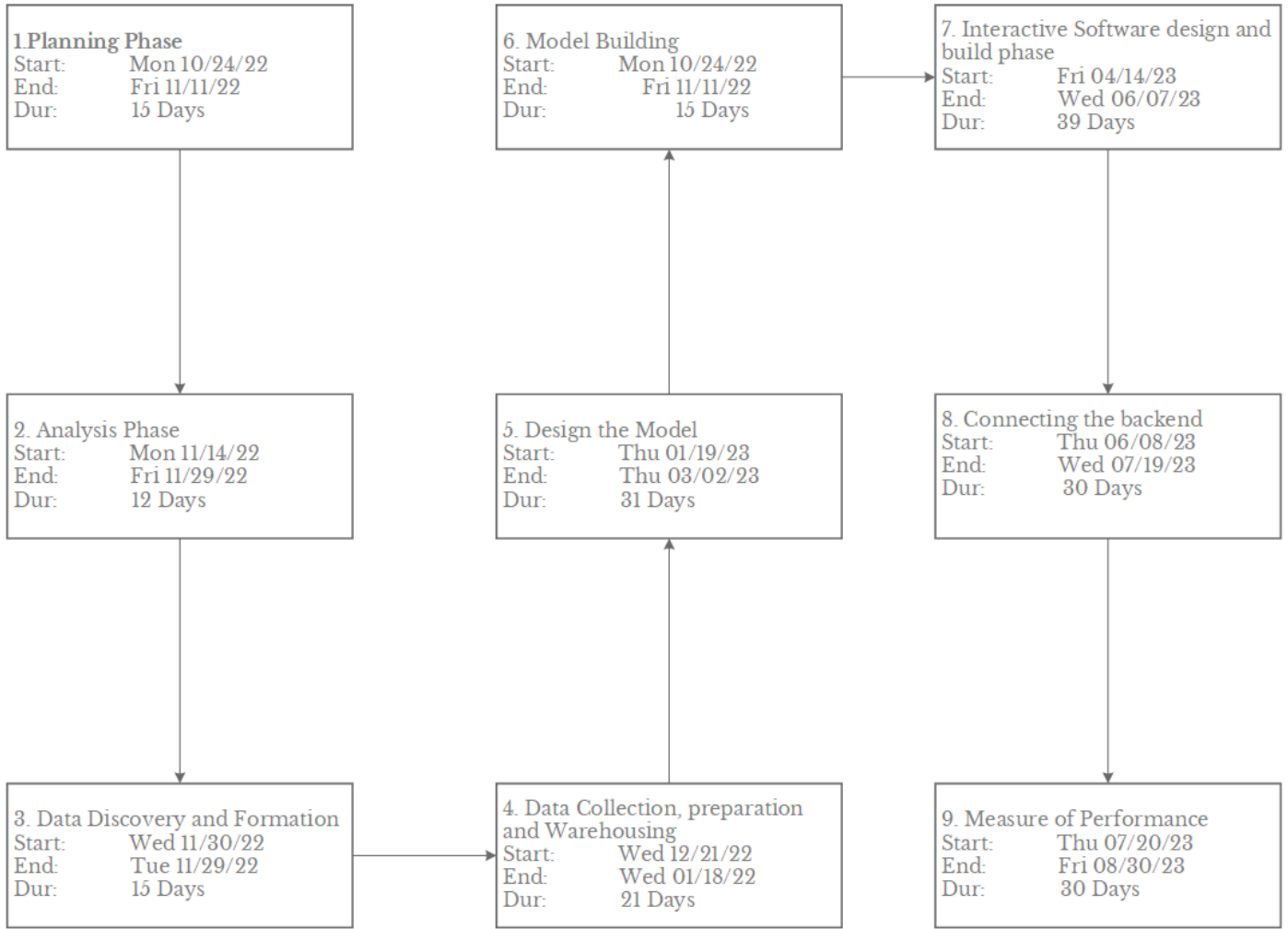
Work-based

- Cloud Server
 - Std. Rate: \$0.84/hr.
 - 24 hours
- Senior Developer
 - Std. Rate: \$25.00/hr.
- Junior Data Engineer
 - Std. Rate: \$25.00/hr.
- Junior Data Analyst
 - Std. Rate: \$20.00/hr.
- Senior Data Scientist
 - Std. Rate: \$25.00/hr.
- Project Manager
 - Std. Rate: \$30.00/hr.
- Junior Developer
 - Std. Rate: \$20.00/hr.
- System Analyst
 - Std. Rate: \$20.00/hr.

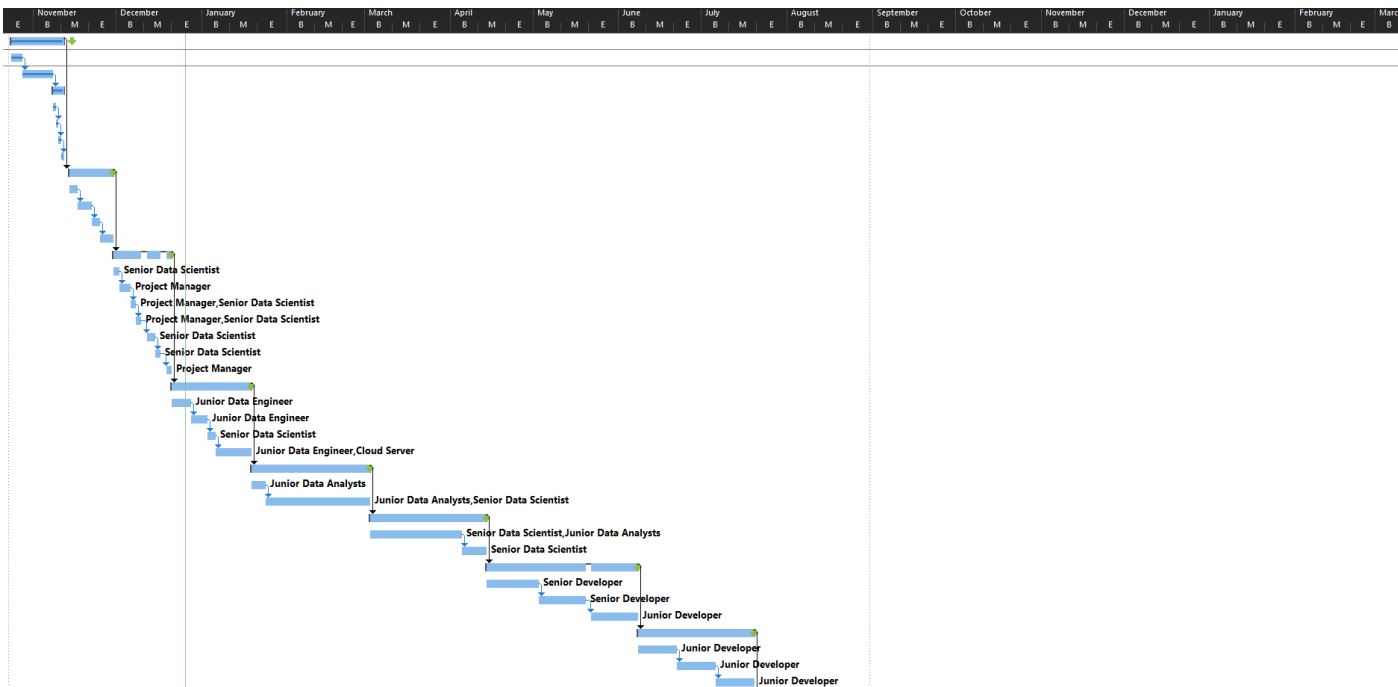
Deadlines

1. Planning Phase **Deadline: Mon 11/14/22**
2. Analysis Phase **Deadline: Tue 11/29/22**
3. Data Discovery and Formation **Deadline: Tue 12/20/22**
4. Data Collection, Preparation, and Warehousing **Deadline: Wed 1/18/23**
5. Design The Model **Deadline: Thu 3/2/23**
6. Model Building **Deadline: Thu 4/13/23**
7. Interactive Software Design and Build phase **Deadline: Wed 6/7/23**
8. Connecting The Backend **Deadline: Wed 7/19/23**
9. The measure of Performance **Deadline: Wed 8/30/23**

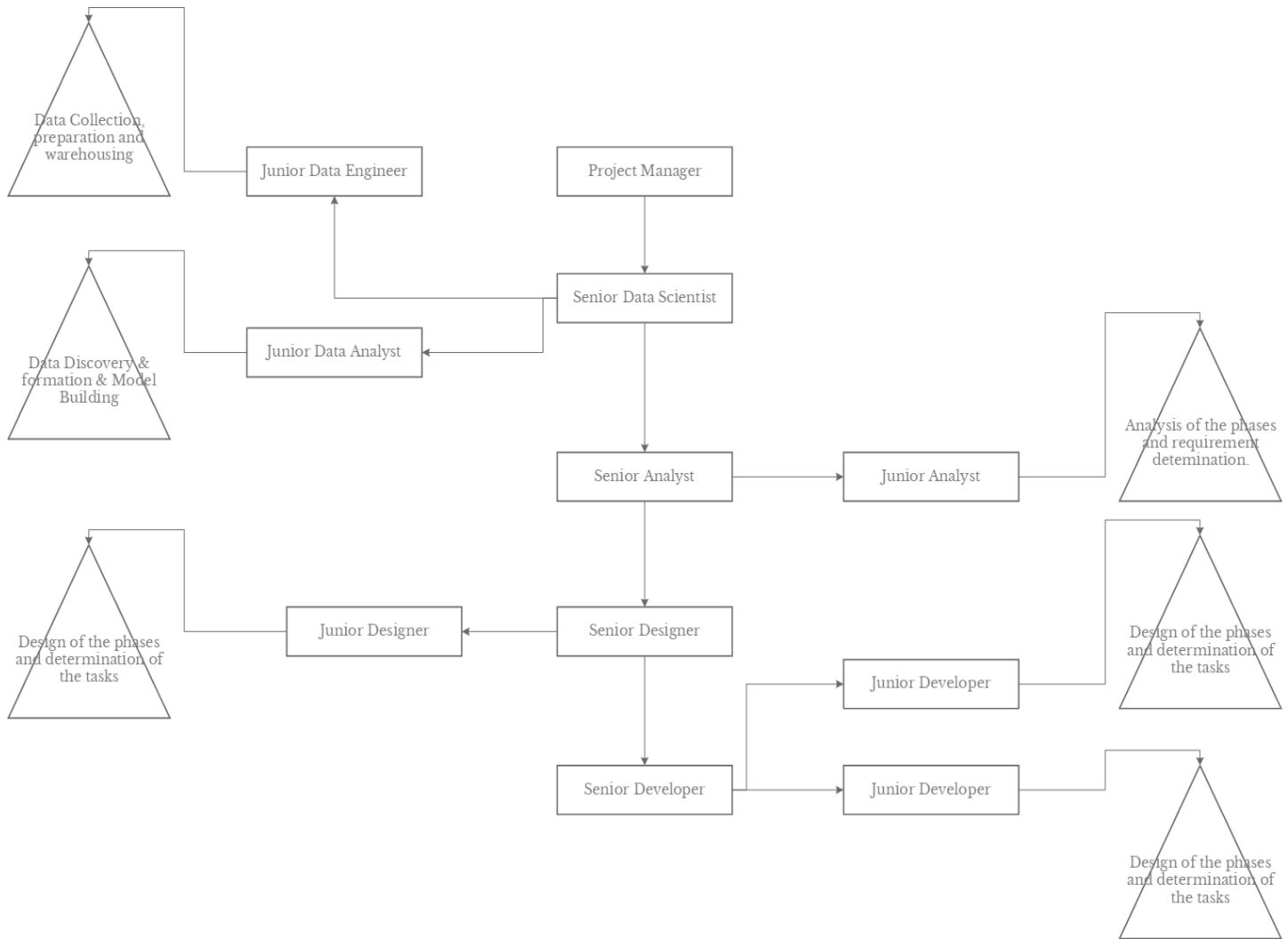
PERT Diagram



GANT diagram



Scope Management Diagram



Interview report

Interview Questions

Types of Questions

We are going to use all types of interview Questions

1. Funnel Type
2. Pyramid Type
3. Diamond Type

Funnel type questions

The funnel-type questions are going to be used for the first interview with the users as it gives the user the freedom to express their opinions about the proposed system and then expand by close-ended questions which shall give more information about our requirements.

Users:

1. What do you expect the system to output in the generated reports?
2. How do you think the system will help you to solve current managerial problems?
3. To what degree would you assess the sensitivity of the data used?
4. What additional features would you like to see in the system?
5. Should the interface contain a dashboard of the most important data?

Pyramid-type questions

The Pyramid-type questions are going to be suitable for an admin interview as we need to identify the intended usage of the systems by the admin, and the interview expands by asking questions about the expected usage of the system.

Admin:

1. Should the system include a data management subsystem?
2. Should the system include a review capability of the reports produced before being finalized?
3. What is your main concern about the analysis of data in the system?
4. What are the possible issues that you might face during the administration of the system?
5. What are your thoughts about the interface that is going to be used in the data management subsystem?

Diamond-type questions

The diamond-type questions are going to use for the third and last interview with the head of the Finance department. This type shall give more information about the head of the Finance department's expectations of the contents of the system as well as any performance metrics not thought about beforehand.

Head of Finance department

1. Should the reports produced by the system include projections of revenue gain and possible losses?
2. What financial performance metrics do you expect to be included in produced reports?
3. Do you think the systems might help with identifying financial trends?
4. How often should the financial reports be produced or updated in the system?
5. Should the ability to display different currencies and conversion capability?

Structure of the interview

is going to be semi-Structured to allow follow-up questions that elaborate more on the answers.

Report of The Simulated Interviews

The first interview (users)

Interviewee

Users: Mid to higher management

Interviewer

Shahd Ahmed Taher

Purpose of the interview

The purpose of it is the collection more information about the requirements of the interface subsystem as well as the reporting subsystem in the aspects of clarity and simplicity.

Interview

Question: What do you expect the system to output in the generated reports?

Answer: I expect the reports to contain a breakdown of data, giving useful information that I can use to make a different decision, as well as a visual breakdown as that is going to be more beneficial. Moreover, A more detailed external report document.

Question: How do you think the system will help you to solve current managerial problems?

Answer: As discussed before a visual breakdown of the data will be useful for making informed decisions.

Follow-up Question: Might there be other ways that can help you make such informed decisions?

Answer: Maybe I can choose different visualizations of the data that can give a better idea of what's happening.

Question: To what degree would you assess the sensitivity of the data used?

Answer: The data we are dealing with is not extremely sensitive.

Follow-up Question: Since the data is not sensitive, does storing the data externally or using a cloud computing solution seems like an issue to you?

Answer: No, It's not going to be an issue.

Question: What additional features would you like to see in the system?

Answer: I would like to be able to filter the data myself and produce different visuals from the filtered data.

Question: Should the interface contain a dashboard of the most important data?

Answer: Yes, it should.

Summary

After asking the main five questions, we found that since the sensitivity of data is not extremely high a cloud computing solution is going to be used, as well as

the inclusion filtering capability of the data to be able to exploratory analysis on the filtered knowledge-base. The dashboard shall include the ability to produce different visualizations of the data based on the filtering and the needed visual outlook. The report documents shall include a detailed outlook on the company's financial state as well as projected revenue gains and losses compared to the competitors.

Action Items

- The development of a dashboard that highlights important information and that it differs from the dashboard used for Finance
- Determination of the best cloud solution for the company
- development of the filtering capability
- development of the different visualizations for the filtered according to the exploratory analysis

The second interview (admin)

Interviewee

Admin

Interviewer

Shad Ahmed Taher

Purpose of the interview

The purpose of it is to identify the possible management issues that the admin might face during the supervision of the system, express his opinions about the inclusion of the data management subsystem, and his concerns about analysis done.

Interview

Question: Should the system include a data management subsystem?

Answer: Yes, It should.

Question: Should the system include a review capability of the reports produced before being finalized?

Answer: Yes, It should

Question: What is your main concern about the analysis of data in the system?

Answer: My concern is the speed of compiling the data and the time needed for the analysis process the if it's not fast enough it going to cause some issues.

Question: What are the possible issues that you might face during the administration of the system?

Answer: The breadth of data might cause some issues when it's handled.

Question: What are your thoughts about the interface that is going to be used in the data management subsystem?

Answer: The interface of the data management section should be more like a spreadsheet to facilitate the editing of the data.

Summary

The main concerns of the admin are the performance of the exploratory analysis that is going to be done by the system, as well as the management of the data and the ease of modification. The data shall go through a preprocessing stage (i.e. turned in information). There should be a review capability of the reports to make them more comprehensible.

Action Items

- Assessment of the exploratory analysis performance and possible improvements
- Being provided the data that is going to be used in the system.
- Preprocessing of data subsystem that is supervised by the admin.
- Modifications of data management subsystem to enable easier editing of the data

The third Interview

Interviewee

Head of the financial department

Interviewer

Shahd Ahmed Taher

Purpose of The Interview

The purpose is to clarify the information that is going to be included in the financial report of the system as well as identify the rate at which the report is going to be produced.

Interview

Question: Should the reports produced by the system include projections of revenue gain and possible losses?

Answer: Yes, It should be beneficial for more informed decisions

Question: What financial performance metrics do you expect to be included in produced reports?

Answer: It should contain more in-detail metrics like Gross profit Margin, Net Profit Margin, Quick Ratio, Current Ratio, Working capital, and Debt-to-equity ratio.

Question: Do the systems help with identifying financial trends?

Answer: With a visual presentation of the financial data we have, It might be useful for identifying trends inside the company, but It should contain market data so that I can identify market trends.

Question: How often should the financial reports be produced or updated in the system?

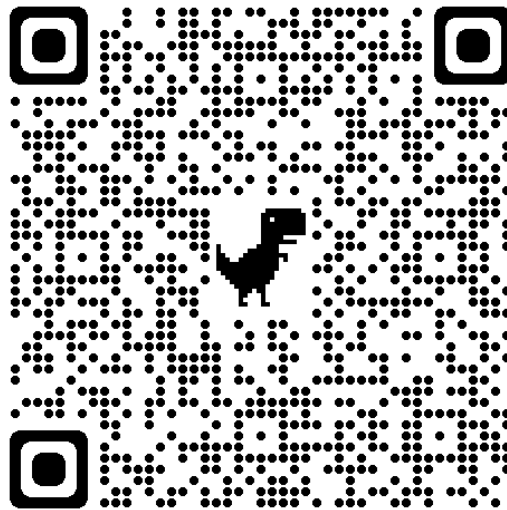
Answer: Detailed report documents should be produced monthly.

Question: Should the ability to display different currencies and conversion capability?

Answer: Yes, It should.

Action Items

- Inclusion of prediction of net profit and debt asset ratio
- Inclusion of more detailed performance metrics in the report
- Making the interface easier to use to be able to sift through the data
- Adding capability to display different currencies, as well as automatic conversions
- The system, shall produce the reports monthly



Play Script

Actors

Department of Engineering

Department of Laws

Department of Engineering

Department of Finance

Script

The engineer will see the land and assess its value and price

Will look up the needed licenses

After getting need licenses will determine the number of buildings and the number of levels and will assess the value of the unit meter

Will calculate the value of the

	facilities and the costs of construction and the possible profits
Department of Marketing	Will calculate the marketing value
Department of Engineering Manager	Will decide whether or not to build or invest in the project

Requirements

Functional

The activity that the system must perform.

- The System shall use a database
- The system shall be model-driven
- The user interface shall display a visual representation of data
- The report shall contain a Summary of the data
- The report shall contain a projection of the marketing value
- The report shall contain a projection of the expected gains
- The user interface shall provide multiple languages to display
- The report shall be produced in the chosen language
- The system shall contain a bug-reporting sub-system

Non-Functional Requirements

how the system should behave and that it is a constraint upon the system's behavior.

- The system shall use a data management subsystem
- The user interface shall contain
 - a Graph tab
 - Where the visuals of the data are presented
 - A data tab
 - Where the user can sift through the data
 - Report tab
 - Produces a report that contains the most important details of the Exploratory analysis
 - Predictions tab
- The system shall build a prediction model
- The visual representation shall provide a variety of graphs
- The system Shall do an exploratory analysis

Data Dictionaries

Data flow specification form

Data Flow Specification Form	
ID: L1 Name: Licenses Description: it tells us Whether we can build or not and how many levels we could have	
Source Engineer	Destination Check the licenses Department of Legal Affairs
Type of Data flow <input checked="" type="checkbox"/> File <input type="checkbox"/> Screen <input type="checkbox"/> Report <input type="checkbox"/> Form <input type="checkbox"/> Internal	
Data Structure Traveling with flow License	Volume/Time 261/day
Comments:	

Data Flow specification form	
ID: PP1 Name: Predicted Profits Description: By determining the cost of the supplies and the price of the meter The system can predict the profit of the project	
Source: Determination of costs and predicted profits	Destination: Exploratory Analysis
Type of Data flow <input type="checkbox"/> File <input type="checkbox"/> Screen <input checked="" type="checkbox"/> Report <input type="checkbox"/> Form <input type="checkbox"/> Internal	
Data Structure Traveling with the flow: Profits	Volume/Time: 130/day
Comments:	

Data flow specification form	
ID: R1 Name: Report Description: contain details of all processes in the system	
Source: Generate Report	Destination: Manager
Type of Data flow <input type="checkbox"/> File <input type="checkbox"/> Screen <input checked="" type="checkbox"/> Report <input type="checkbox"/> Form <input type="checkbox"/> Internal	

Data Structure Traveling with flow: Report	Volume/Time: 3/day
Comments:	

Data Structures

Data Structures

Licenses = Type of Land +
Contain contingent Properties +
Ownership

Profits = Gross Profit Margin +
Net Profit Margin +
Working Capital +
Return on Sales (ROS)

Report = Accepts Licenses +
Costs of Lands +
Models of Buildings +
Financial Metrics

Buildings Records = Date of initiation +
Land Dimensions +
No of Levels +
No of Apartments +
{3D Model}

Data Elements

Name	Type of land
Alias	Land Type
Description	Unique type of land
Length	20
Input format	X(20)
Output format	X(20)
Default Value	
Continuous/Discrete	Discrete
Type	Alphabetic
Base/ Derived	Base
Upper Limit	
Lower Limit	

Discrete	
----------	--

Name	Contain contingent Properties
Alias	Contingent Properties
Description	Whether or not a land contains any contingent properties
Length	4
Input format	X(4)
Output format	X(4)
Default Value	FLASE
Continuous/Discrete	Discrete
Type	Logic
Base/ Derived	Base
Upper Limit	
Lower Limit	
Discrete	"True", "False"

Name	Ownership
Alias	
Description	Describes the type of ownership of the land
Length	20
Input format	X(20)
Output format	X(20)
Default Value	
Continuous/Discrete	Discrete
Type	Alphabetic
Base/ Derived	Base
Upper Limit	
Lower Limit	
Discrete	

Name	Gross profit Margin
Alias	COGS

Description	The difference between revenue and cost of goods sold, divided by revenue.
Length	10
Input format	9(10)
Output format	9(10)
Default Value	
Continuous/Discrete	Continuous
Type	Number
Base/ Derived	derived
Upper Limit	9999999999
Lower Limit	0000000000
Discrete	

Name	Net profit margin
Alias	
Description	Measure of profitability. It is calculated by finding the profit as a percentage of the revenue.
Length	10
Input format	9(10)
Output format	9(10)
Default Value	
Continuous/Discrete	Continuous
Type	Number
Base/ Derived	Derived
Upper Limit	9999999999
Lower Limit	0000000000
Discrete	

Name	Working Capital
Alias	
Description	operating liquidity available to a business
Length	10
Input format	9(10)

Output format	9(10)
Default Value	
Continuous/Discrete	Continuous
Type	Number
Base/ Derived	Derived
Upper Limit	9999999999
Lower Limit	0000000000
Discrete	

Name	Return on Sales
Alias	ROS
Description	ratio used to evaluate a company's operational efficiency
Length	10
Input format	9(10)
Output format	9(10)
Default Value	
Continuous/Discrete	Continuous
Type	Number
Base/ Derived	Derived
Upper Limit	9999999999
Lower Limit	0000000000
Discrete	

Data Store specification form

Data Store specification form	
ID: D1 Name: Licenses Records Alias: Licenses Description: It stores all the permits for the build and lands	
File format: <input checked="" type="checkbox"/> Computer <input type="checkbox"/> Manual	
The file type:	

<input checked="" type="checkbox"/> Database <input type="checkbox"/> Indexed <input type="checkbox"/> sequential <input type="checkbox"/> Direct
Record Size (Characters): 93,960 Number of records (Maximum): 261/day Number of records (Average): 130/day Growth per year (percent): 6%
Dataset name: Licenses Data structure: Licenses data Primary key: Licenses id Secondary key: Licenses name
Comments:

Data Store Specification Form	
ID: D2 Name: Building Records Alias: Building Description: it contains all the building data	
File format: <input checked="" type="checkbox"/> Computer <input type="checkbox"/> Manual	
The file type: <input checked="" type="checkbox"/> Database <input type="checkbox"/> Indexed <input type="checkbox"/> sequential <input type="checkbox"/> Direct	
Record Size (Characters): 1500 Number of records (Maximum): 3/day Number of records (Average): 1/day Growth per year (percent): 6%	
Dataset name: Buildings Data structure: Buildings data Primary key: Buildings id Secondary key: Buildings name	
Comments:	

Process Specification and logic

1.0

Process Specification form

Process Specification form
Number: 1.0 Name: check licenses Description: check licenses to see whether we could build or not

Input Data Flow: Licenses of land Previous licenses
output Data Flow: Refused licenses Accept licenses
Type of Process: <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <input checked="" type="checkbox"/> Online <input type="checkbox"/> Batch <input type="checkbox"/> Manual </div>
Process Logic: DO WHILE there are licenses report to process Begin IF LICENSES ARE ACCEPTED THEN STORE THEM and go to next process Else Go to the engineer End IF End While
Refer to name: determine item quantity logic: <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <input checked="" type="checkbox"/> Structured English <input checked="" type="checkbox"/> Decision Table <input type="checkbox"/> Decision Tree </div>
Unresolved Issues: no

Process logic in Structured English and Decision table

```

DO WHILE there are licenses report to process
  Begin IF LICENSES ARE ACCEPTED
    THEN
      STORE THEM and go to next process
    Else
      Go to the engineer
  End IF
End While
  
```

	Rules	
Conditions	1	2
Lincenses are accepted	Y	N
Actions		
Store and go next process	✓	
Go to the engineer		✓

2.0

Process specification form

Process Specification form

Number: 2.0 Name: Determine the number of building Description: determine the number of buildings and levels
Input Data Flow: Accept licenses Spaces of the land
output Data Flow: No of apartments and Buildings
Type of Process: <div style="display: flex; justify-content: space-around;"> <input checked="" type="checkbox"/> Online <input type="checkbox"/> Batch <input type="checkbox"/> Manual </div>
Process Logic: DO WHILE there are Accepted licenses and land space to process Begin If Land type is Urban Begin If Land space > 500 squared meters Then Calculate Land-Building Ratio Else Number of buildings is 1 End IF Else IF land type is Wetland Begin IF land space > 500 squared meters Then Calculate land-building ratio divided by 2 Else Number of buildings is 1 End IF End IF Send the number of buildings to the determination of cost and profit End While
Refer to name: determine item quantity logic: <div style="display: flex; justify-content: space-around;"> <input checked="" type="checkbox"/> Structured English <input checked="" type="checkbox"/> Decision Table <input type="checkbox"/> Decision Tree </div>
Unresolved Issues: no

Structured English

```

DO WHILE there are Accepted licenses and land space to process
    Begin If Land type is Urban
        Begin If Land space > 500 squared meters
            Then Calculate Land-Building Ratio
            Else Number of buildings is 1
        End IF
    Else IF land type is Wetland
        Begin IF land space > 500 squared meters
            Then Calculate land-building ratio divided by 2
            Else Number of buildings is 1
        End IF
    End IF
    Send the number of buildings to the determination of cost and profit
End While

```

Decision Table

	Rules			
Conditions	1	2	3	4
Land type is Urban	Y	Y	N	N
land type is Wetland	N	N	Y	Y
Land space > 500 squared meters	Y	N	Y	N
Actions				
Calculate Land-Building Ratio	✓			
Calculate lang-building ratio divided by 2			✓	
Number of buildings is 1		✓		✓
Send the No. of Buildings	✓			

6.0

Process specification form

Process Specification form		
Number: 6.0 Name: Measure Model against Previous buildings records Description:		
Input Data Flow: Analyzed Parameters		
output Data Flow: Blueprints of Buildings		
Type of Process: <input checked="" type="checkbox"/> Online <input type="checkbox"/> Batch <input type="checkbox"/> Manual		
Process Logic:		
Refer to name: determine item quantity logic: <input checked="" type="checkbox"/> Structured English <input checked="" type="checkbox"/> Decision Table <input type="checkbox"/> Decision Tree		
Unresolved Issues: no		

Structured English


```

Do While there are parameters to process
    Begin If Generated Model using parameter exceeds or equals previous records
        Then Store the generated model.
    End IF
End While
Chooses the Model that Generates best Performance metrics

```

Decision Table

	Rules	
Conditions	1	2
Generated Model using parameter exceeds or equals previous records	Y	N
Actions	✓	
Store the generated model	✓	
Chooses the Model that Generates best Performance metrics	✓	