Contents

1) Information needed for business decisions:

The following 11 points states the information that we as a company will need to make certain business decisions. The business decision or business rule is then shortly described at each point for more clarity as to why we will need the certain information.

Number	Business decision/-rule	Business information needed
1	Which drug(s) would we advise to be discontinued (i.e. which drug(s) were not effective). To give report back to the FDA.	The amount of drugs where the test results were "not effective".
2	For reporting purposes of the frequency of treatments. To easily see if more or less treatments should be performed.	Total amount of treatments per year/quarterly/month per location.
3	It is important information to know which province/branch's workers is under-/overpaid.	Total amount of salary expenses per year/quarterly/month per location.
4	To report to all important members on the average time spent on a trial and the financial implication of the timespan.	The average time a patient participates in the trial.
5	To answer the question if bonuses expenses are too much.	Average bonuses paid for the year per worker according to overtime.
6	It is important for the company to tests if there is an influence on the treatment if a patient is taking test medication for the condition before the treatment.	The total amount of patients that are currently taking medication for their condition.
7	The company wants to know which patients are not eligible to participate further in this specific trial, or for the same test but in another trial.	The total amount of patients that has an allergy for the drug they are receiving.
8	In order to ensure a greater chance of success and minimize unnecessary expenses in a trial, the company only wants to test on drugs with a FDA rating of 70 or higher.	The total amount of drugs that has a FDA approval rating of 70 or higher.
9	The company wants to know which provinces are underpaid or paid enough in terms of governing allowance for expanding purposes.	Total amount of governing allowance per location.
10	A question that needs to be investigated: If there is a higher demand than the patient limit, should there be more than one test at a location?	The total demand for a specific drug per region.
11	It is important to know if the supplier delivers enough drugs and if the supplier is trustworthy in order to know if the company should change suppliers.	Total amount of drugs received on a monthly basis.

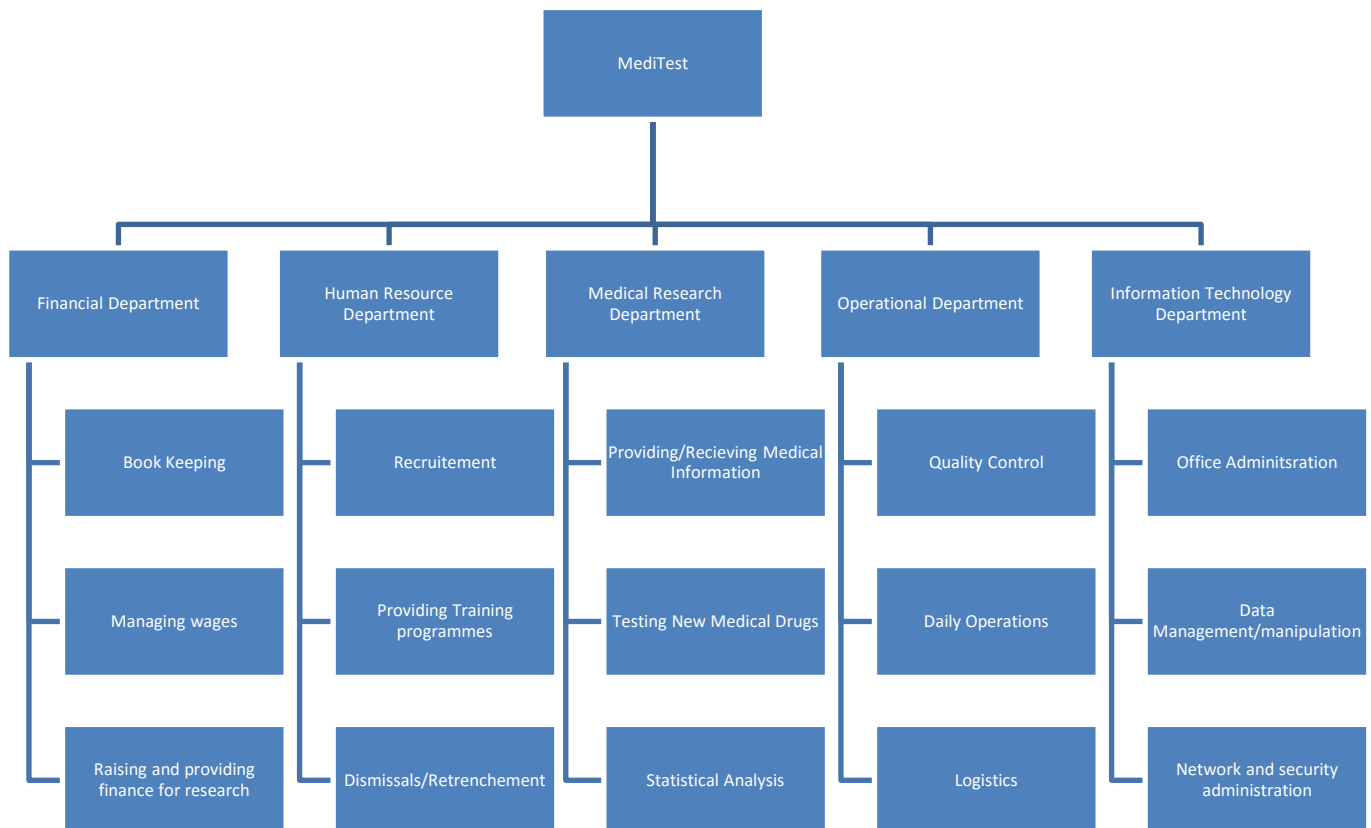## 2) Different levels of the organization for which information is needed:
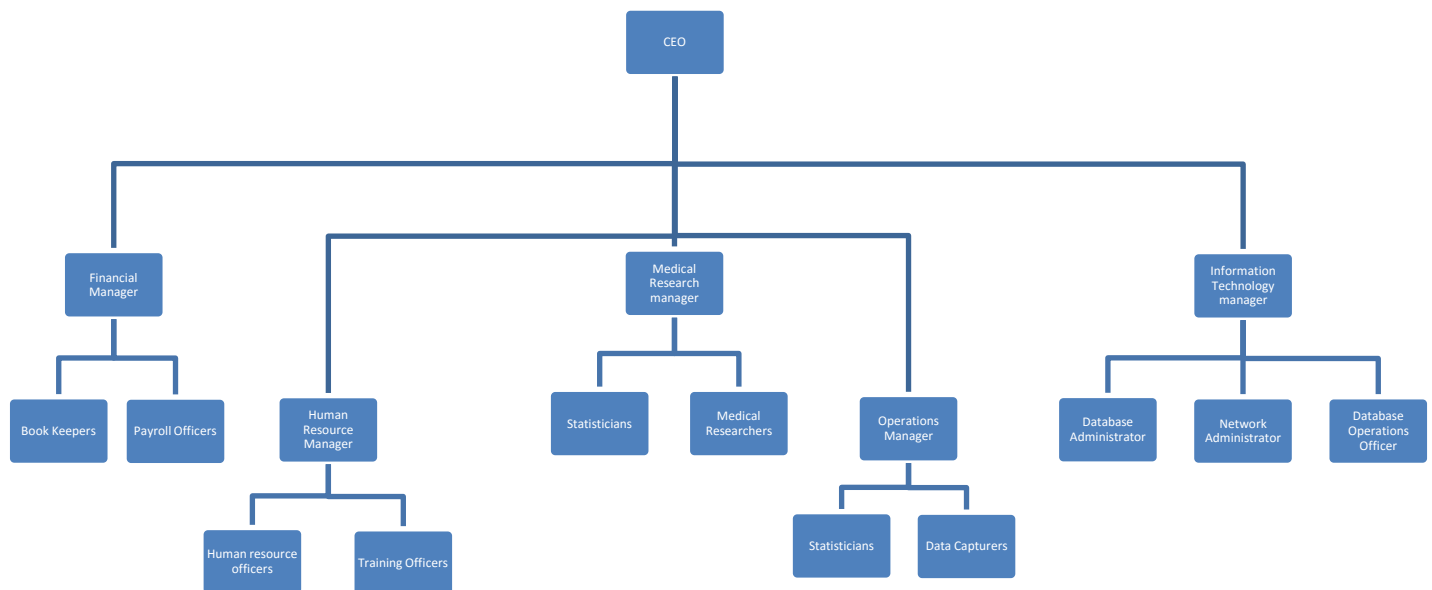
The company is divided into **two main levels**- managerial and worker level. In the following table we have divided the two main levels into four levels for clarity. Level 1 and level 2 personal is the managerial level and level 3 and 4 is the workers level.

Levels	Participants	Information needed
Level 1 (managerial level)	CEO	• Amount of drugs where the test results were not effective. • The total amount of drugs that has a FDA approval rating of 70 or higher. The CEO needs to know all the important decisions that are being made that have an influence on the company. Important information includes the effectiveness of drugs and which drugs will be admitted into the trials. Other important decisions can stem from information of moving business and expanding trials, but he only needs to know the final decision.
Level 2 (managerial level)	Financial manager, Medical research manager, Information technology manager	• Amount of drugs where the test results were not effective. • Total amount of salary expenses per year/quarterly/month per location. • Average bonuses paid for the year per workers overtime. • The total amount of drugs that has a FDA approval rating of 70 or higher.

		• Total amount of governing allowance per the location. Managers oversee the level 3 workers and make final and crucial decisions while reporting important information back to the CEO.
Level 3 (worker level)	Book keepers, payroll officers, HR manager, statisticians, medical researchers, operations manager, databases administrator, network administrator, databases operations officer	• Amount of drugs where the test results were not effective. • Total amount of treatments per year/quarterly/month per location. • Total amount of salary expenses per year/quarterly/month per location. • The average time a patient participates in the trial. • Average bonuses paid for the year per workers overtime. • The total amount of patients that are currently taking medication for their condition. • The total amount of patients that has an allergy for the drug they are receiving. • The total amount of drugs that has a FDA approval rating of 70 or higher. • Total amount of governing allowance per the location. • The total demand for a specific drug per region. Level 3 workers do most of the processing work. They report to Level 4 managers. Most of the data analysis and reporting take place at this level.
Level 4 (worker level)	HR officers, training officers, data capturers	• Total amount of salary expenses per year/quarterly/month per location. • The average time a patient participates in the trial. • The total amount of patients that has an allergy for the drug they are receiving. • Total amount of drugs received. Level 4 workers are mostly responsible for data manipulation, capturing and reporting to level 3 workers. The HR department makes up most of level 4.

3) Different business areas of the organization for which information is needed:

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                                    MediTest
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      ┌──────────────┬──────────────┬──────────────┬──────────────┐
Financial        Human Resource   Medical Research  Operational   Information Technology
Department       Department       Department        Department    Department
      │              │                │                │              │
  Book Keeping   Recruitement   Providing/Recieving  Quality        Office Adminitsration
                                Medical Information  Control
      │              │                │                │              │
  Managing wages Providing       Testing New         Daily          Data
                 Training        Medical Drugs       Operations     Management/manipulation
                 programmes
      │              │                │                │              │
  Raising and    Dismissals/     Statistical         Logistics      Network and security
  providing      Retrenchement   Analysis                           administration
  finance for
  research
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Department	Information needed
Financial department	- Total amount of salary expenses per year/quarterly/month per location. - Total amount of treatments per year/quarterly/month per location. - Average bonuses paid for the year per workers overtime. - The total amount of drugs that has a FDA approval rating of 70 or higher. - Total amount of governing allowance per the location. - Total amount of drugs received. The financial area covers most of the other departments including all of the areas where income and expenses are of the matter.
Human Resource department	- Total amount of salary expenses per year/quarterly/month per location. - Total amount of treatments per year/quarterly/month per location. - Average bonuses paid for the year per workers overtime.

	• The total demand for a specific drug per region.
	The HR department is responsible for the staff within the company including their working hours, salaries, bonuses and rights. This department deals with hiring, administration and training of staff.
Medical Research department	• Amount of drugs where the test results were not effective. • The average time a patient participates in the trial. • The total amount of patients that are currently taking medication for their condition. • The total amount of patients that has an allergy for the drug they are receiving. • The total amount of drugs that has a FDA approval rating of 70 or higher. • The total demand for a specific drug per region. The medical research department is the heart of the company. The department is responsible for the statistical analysis and hypothesis testing with conclusions. Research plays an important role in the practice's success. Successful research will help future treatments and techniques to work more efficient and quicker.
Operational department	• Amount of drugs where the test results were not effective. • The average time a patient participates in the trial. • Total amount of treatments per year/quarterly/month per location. • The total amount of drugs that has a FDA approval rating of 70 or higher. • The total demand for a specific drug per region. The operational department is in charge of day to day business operations and activities such as the treatments and communication with different parties of the company. Operations management refers to the administration of business practices to create the highest level of efficiency possible within an organization.
Information Technology department	All information that needs to be extracted for business decisions can be extracted from the databases, which is part of the Information Technology department. The Information

	Technology department also maintains the database and updates it regularly.

4) Format of information needed (e.g. end user presentation tools, graphical presentation, web based, drill-down levels):

All the information needed for business decisions will require different graphical representations.

Information sentence 1: The amount of drugs where the test results are effective or not and why they are effective and not effective.

User	Display format	Knowledge extracted
Managerial level	Display graphically using bar chart. And a drill down on treatments data to look at the differences.	Receives meaningful information in a specific format and makes decisions based on that information. The CEO/managers can easily make a conclusion about the amount of drugs that were effective or not.
Worker level		They receive the data and process it. The statisticians do statistical analysis on the data and gives feedback to the managerial level. The medical research manager only needs the final result to make important business decisions such as whether to continue testing a 'not effective' drug or to report back to the FDA on what drugs were effective and what drugs were not effective. Any decision maker can use the drill down to see whether something has gone wrong and also where and when.

Information sentence 2: Total amount of treatments per year/quarterly/month per location.

User	Display format	Knowledge extracted
Managerial level	Construct a line graph and bar chart .Do a drill down per location.	Managerial decision makers can make final conclusions on whether the amount of treatments is acceptable or not.

		Important decisions can then be made such as, "is there too much treatments and why?"
Worker level		Workers can conclude whether there are too many or too few treatments. They can also do a drill down to see what location has the most and fewest amount of treatments specified per month/quarterly/year.

Information sentence 3: Total amount of salary expenses per year/quarterly/month per location.

User	Display format	Knowledge extracted
Managerial level	Construct a bar graph and do a drill down per location.	Managerial decision makers can see what location's workers are underpaid or overpaid. They can make final decisions such as paying less or more to certain locations.
Worker level		Worker level (especially HR department) gathers the information and reports it to the managerial level for decision making and interpretation.

Information sentence 4: The average time a patient participates in the trial.

User	Display format	Knowledge extracted
Managerial level	Display amount of average. Box-Plot graph. (To see the maximum, minimum, average, outliers, 1st and 3rd quantiles)	Managerial decision makers can conclude whether the duration of a treatment is too long or to short.
Worker level		The worker level acts as communication between the patient and organization; the patient can query how long the average treatment lasts and then make a decision on whether to participate in a trial or not.

Information sentence 5: Average bonuses paid for the year per worker according to overtime.

User	Display format	Knowledge extracted
Managerial level	Display value. Do drill down per worker level.	Managerial decision makers can use this information and the drill down option to regulate

		the total amount of overtime worked. E.g. 0 – 50 hours = R0-R30000 pa. 51-100 hours= R31000-R50000 pa. 100+ hours= R51000-R70000 pa.
Worker level		Worker level (especially HR department) gathers the information and reports it to the managerial level for decision making and interpretation.

Information sentence 6: The total amount of patients that are currently taking medication for their condition.

User	Display format	Knowledge extracted
Managerial level	Display value. Do drill down per worker level.	Managerial level interprets the information provided by workers and make business decisions based on that information.
Worker level		Workers ensure that information provided by the patient is accurate and true. The workers also then tests if there is an influence of taking test medication before the treatment.

Information sentence 7: The total amount of patients that has an allergy for the drug they are receiving.

User	Display format	Knowledge extracted
Managerial level	Display value. Do drill down per worker level.	The managerial decision makers are responsible to interpret each case individually. If a patient is highly allergic to a component of the drug they are receiving, the use would be discontinued, but it is up to the discretion of the patient and managerial decision makers.
Worker level		The worker ensures that the information provided by the patient is accurate and correct.

Information sentence 8: **The total amount of drugs that has a FDA approval rating of 70 or higher.**

User	Display format	Knowledge extracted
Managerial level	Display value. Do drill down per worker level. Bar graph	The managerial decision makers then concludes on whether a drug is going to be worthwhile testing or not (FDA approval rating >70). It is beneficial to the organization on a financial perspective because a drug that has an approval of 70 or higher will most likely be more effective and will minimize the amount of resources used.
Worker level		The worker level are in charge of constructing a useful report on what drugs has a FDA approval of 70 or higher and which not.

Information sentence 9: **Total amount of governing allowance per the location.**

User	Display format	Knowledge extracted
Managerial level	Bar chart.	Managerial decision makers can use this information to conclude on whether receives enough governing allowance and also concludes what locations can be expanded. This information can also be used to see the state of liquidity of all the branches.
Worker level		Worker level (especially HR department) gathers the information and report it to the managerial level for decision making and interpretation.

Information sentence 10: **The total demand for a specific drug per region.**

User	Display format	Knowledge extracted
Managerial level	Construct a line graph	The managerial decision makers can conclude whether there is enough supply of a specific drug at a specific location. They can make a decision such as whether to decrease or increase their supply or expanding the

		locations of drug treatments.
Worker level		The workers extract the data and report in a manner that decisions can be made. A drill down can be used to see exactly at what location the demand or supply is high or low.

Information sentence 11: Total amount of drugs received.

User	Display format	Knowledge extracted
Managerial level	Construct a line graph	The managerial decision makers can conclude whether the organization received enough drugs and to decide if the supplier is trustworthy.
Worker level		As long as they have drugs, they are happy ☺

5) Timespan required for information:

The main information that MediTest uses for development and strategic changes has to be collected over a timespan of one year, but the smaller changes and short term planning are required by the monthly and quarterly extraction of the data from the system.

In the following table the information needed for business decisions are divided into 3 main time dimensions: Yearly, Quarterly and Monthly.

Time dimension	Information in time dimension
Yearly	The expenses from salary and overtime bonuses are important to extract from the database on a yearly basis to use for yearends. The total amount of treatments is also important to the organization as a whole and will also be extracted on a yearly basis.
Quarterly	The expenses and government allowance can be summarized in a financial report which is extracted on a quarterly basis. These expenses mainly consist of salaries paid and drug related expenses.
Monthly	Total amount of drugs received on a monthly basis is important for the organization to indicate whether a location can commence a treatment or not. The expenses from salary and overtime bonuses are important to extract from the database on a monthly basis.

If an error occurs then workers can perform a drilldown first yearly then quarterly, monthly and even daily.

6) Aggregation needed. Granularity, i.e. different levels of aggregation needed:

Aggregation functions include:

- COUNTIF function to calculate the amount of drugs where the test results were "not effective".
- SUM function to calculate the total amount of treatments yearly per location.
- SUM function to calculate the total amount of treatments quarterly per location.
- SUM function to calculate the total amount of treatments monthly per location.
- SUM function to calculate the total amount of salary expenses yearly per location.
- SUM function to calculate the total amount of salary expenses quarterly per location.
- SUM function to calculate the total amount of salary expenses monthly per location.
- AVERAGE function to calculate the average time a patient participates in the trial.
- AVERAGE function to calculate the average bonuses paid for the year per worker according to their overtime.
- COUNTIF function calculates the total amount of patients that are currently taking medication for their condition.
- COUNTIF function that calculates the total amount of patients that has an allergy for the drug they are receiving.
- COUNTIF function that calculates the total amount of drugs that has a FDA approval rating of 70 or higher.
- SUM function to calculate the total amount of governing allowance per location.
- SUM function to calculate the total amount of drugs received on a monthly basis.

Granularity:

The managerial decision makers will look at the yearly expenses split up by salaries, bonuses according to overtime and other drug related expenses. If he notices at any errors by looking at the above specified information, the managers can make use of the drill down function to look at the monthly or quarterly information. Statisticians are mainly interested in concluding whether a drug is effective or not and a drill down can be performed to see individual effectiveness of each drug. A drill down can be performed on the yearly amount of treatments according to location if there arises any errors or any decision maker wants to see a more detailed answer. In order to see the different levels of FDA approval ratings per drug a drill down must be used, to help decision makers decide which drugs should be accepted or rejected.

7) Dimensionality of the information needed:

Qualifying characteristics that provide additional perspectives to a given fact.

Dimension	Description	Possible attributes
Time	Monthly, quarterly, yearly. Since 1960-present.	- Total amount of treatments. - Total amount of salary expenses. - The average time a patient participates in the trial. - Average bonuses paid for the year per worker according to overtime. - Total amount of drugs received on a monthly basis
Location	The nine provinces of South Africa as well as Namibia.	- Total amount of treatments per location. - Total amount of salary expenses per location. - Total amount of governing allowance. - The total demand for a specific drug.
Activity	Includes the different treatments and associated drugs.	- Amount of drugs where the test results were not effective. - The total amount of drugs that has a FDA approval rating of 70 or higher. - Total amount of treatments. - The average time a patient participates in the trial. - Total amount of drugs received.

Star schema for expenses: