Step-by-Step

Understand systems viz. Engineering Design, Manufacturing, smart utilities, production lines, Automotive industries, Tech system

Engineering Design:

The **engineering design** process is a methodical series of steps that engineers use in creating functional products and processes. The process is highly iterative - parts of the process often need to be repeated many times before production phase can be entered - though the part(s) that get iterated and the number of such cycles in any given project can be highly variable.

One framing of the engineering design process delineates the following stages: research, conceptualization, feasibility assessment, establishing design requirements, preliminary design, detailed design, production planning and tool design, and production.

Manufacturing:

Manufacturing is the production of merchandise for use or sale using labour and machines, tools, chemical and biological processing, or formulation. The term may refer to a range of human activity, from handicraft to high tech, but is most commonly applied to industrial production, in which raw materials are transformed into finished goods on a large scale. Such finished goods may be used for manufacturing other, more complex products, such as aircraft, household appliances or automobiles, or sold to wholesalers, who in turn sell them to retailers, who then sell them to end users – the "consumers".

Manufacturing takes turns under all types of economic systems. In a free market economy, manufacturing is usually directed toward the mass production of products for sale to consumers at a profit. In a collectivist economy, manufacturing is more frequently directed by the state to supply a centrally planned economy. In mixed market economies, manufacturing occurs under some degree of government regulation.

Modern manufacturing includes all intermediate processes required for the production and integration of a product's components. Some industries, such as semiconductor and steel manufacturers use the term fabrication instead.

The manufacturing sector is closely connected with engineering and industrial design. Examples of major manufacturers in North America include General Motors Corporation, General Electric, Procter & Gamble, General Dynamics, Boeing, Pfizer, and Precision Cast parts. Examples in Europe include Volkswagen Group, Siemens, and Michelin. Examples in Asia include Sony, Huawei, Lenovo, Toyota, Samsung, and Bridgestone.

SMART Utilities:

S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology; often written as SMART) is a monitoring system included in computer hard disk drives (HDDs) and solid-state drives (SSDs) that detects and reports on various indicators of drive reliability, with the intent of enabling the anticipation of hardware failures.

When S.M.A.R.T. data indicates a possible imminent drive failure, software running on the host system may notify the user so stored data can be copied to another storage device, preventing data loss, and the failing drive can be replaced.

Understand the business problem related to engineering, Identify the critical issues. Set business objectives.

The BA process can solve problems and identify opportunities to improve business performance. In the process, organizations may also determine strategies to guide operations and help achieve competitive advantages. Typically, solving problems and identifying strategic opportunities to follow are organization decision-making tasks. The latter, identifying opportunities can be viewed as a problem of strategy choice requiring a solution.

Comparison of business analytics and organization decision-making processes
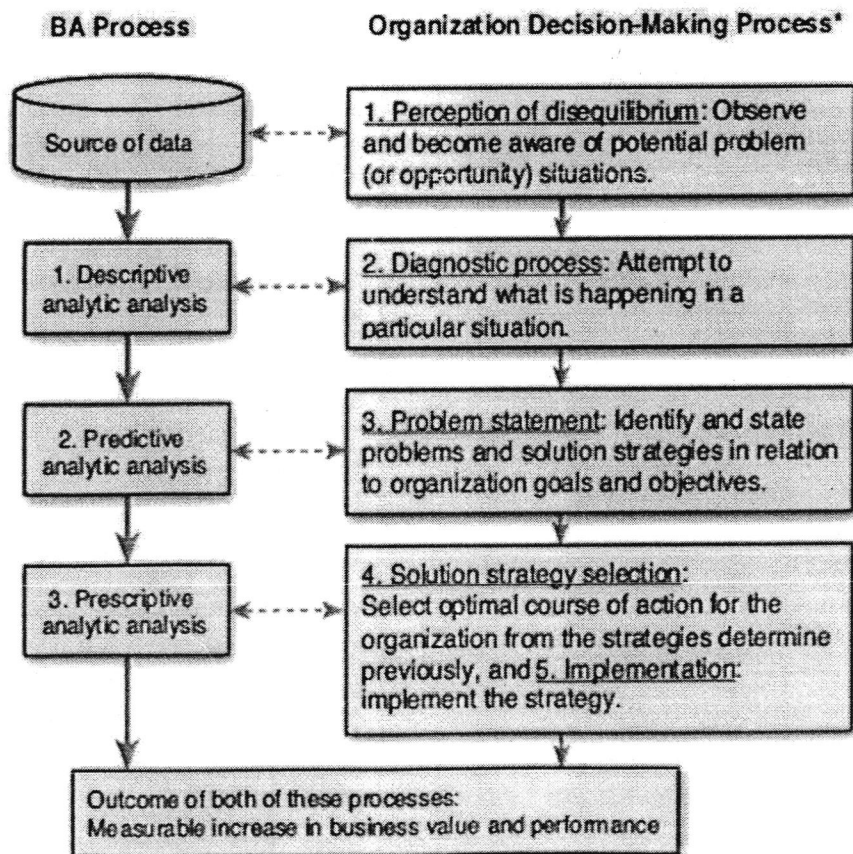
Requirements gathering : Gather all the Data related to Business objective

There are many different approaches that can be used to gather information about a business. They include the following:

- ❖ Review business plans, existing models and other documentation
- ❖ Interview subject area experts
- ❖ Conduct fact-finding meetings
- ❖ Analyze application systems, forms, artifacts, reports, etc.

The business analyst should use one-on-one interviews early in the business analysis project to gage the strengths and weaknesses of potential project participants and to obtain basic information about the business. Large meetings are not a good use of time for data gathering.

Facilitated work sessions are a good mechanism for validating and refining "draft" requirements. They are also useful to prioritize final business requirements. Group dynamics can often generate even better ideas.

Primary or local data is collected by the business owner and can be collected by survey, focus group or observation. Third party static data is purchased in bulk without a specific intent in mind. While easy to get (if you have the cash) this data is not specific to your business and can be tough to sort through as you often get quite a bit more data than you need to meet your objective. Dynamic data is collected through a third party process in near real-time from an event for a specific purpose (read into that VERY expensive).

Three key questions you need to ask before making a decision about the best method for your firm.

➢ What is the timeline required to accomplish your business objective?

➢ What is your required return on investment?

➢ Is the data collection for a stand-alone event or for part of a broader data collection effort?

How to interpret Data to make it useful for Business:-

Business intelligence (BI) is the set of techniques and tools for the transformation of raw data into meaningful and useful information for business analysis purposes. BI technologies are capable of handling large amounts of unstructured data to help identify, develop and otherwise create new strategic business opportunities. The goal of BI is to allow for the easy interpretation of these large volumes of data. Identifying new opportunities and implementing an effective strategy based on insights can provide businesses with a competitive market advantage and long-term stability.

BI technologies provide historical, current and predictive views of business operations. Common functions of business intelligence technologies are reporting, online analytical processing, analytics, data mining, process mining, complex event processing, business performance management, benchmarking, text mining, predictive analytics and prescriptive analytics.

BI can be used to support a wide range of business decisions ranging from operational to strategic. Basic operating decisions include product positioning or pricing. Strategic business decisions include priorities, goals and directions at the broadest level. In all cases, BI is most effective when it combines data derived from the market in which a company operates (external data) with data from company sources internal to the business such as financial and operations data (internal data). When combined, external and internal data can provide a more complete picture which, in effect, creates an "intelligence" that cannot be derived by any singular set of data.
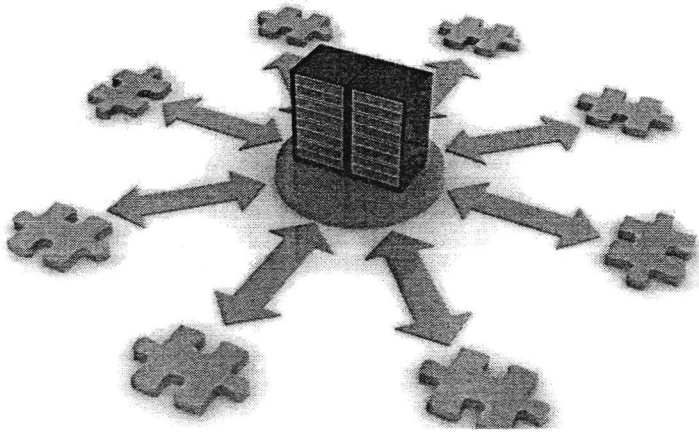
Business intelligence is made up of an increasing number of components including:

- Multidimensional aggregation and allocation
- Denormalization, tagging and standardization
- Realtime reporting with analytical alert
- A method of interfacing with unstructured data sources
- Group consolidation, budgeting and rolling forecasts
- Statistical inference and probabilistic simulation
- Key performance indicators optimization
- Version control and process management
- Open item management

Business intelligence can be applied to the following business purposes, in order to drive business value.

- Measurement – program that creates a hierarchy of performance metrics (see also Metrics Reference Model) and benchmarking that informs business leaders about progress towards business goals (business process management).
- Analytics – program that builds quantitative processes for a business to arrive at optimal decisions and to perform business knowledge discovery. Frequently involves: data mining, process mining, statistical analysis, predictive analytics, predictive modeling, business process modeling, data lineage, complex event processing and prescriptive analytics.
- Reporting/enterprise reporting – program that builds infrastructure for strategic reporting to serve the strategic management of a business, not operational reporting. Frequently involves data visualization, executive information system and OLAP.
- Collaboration/collaboration platform – program that gets different areas (both inside and outside the business) to work together through data sharing and electronic data interchange.
- Knowledge management – program to make the company data-driven through strategies and practices to identify, create, represent, distribute, and enable adoption of insights and experiences that are true business knowledge. Knowledge management leads to learning management and regulatory compliance.

In addition to the above, business intelligence can provide a pro-active approach, such as alert functionality that immediately notifies the end-user if certain conditions are met. For example, if some business metric exceeds a pre-defined threshold, the metric will be highlighted in standard reports, and the business analyst may be alerted via e-mail or another monitoring service. This end-to-end process requires data governance, which should be handled by the expert.

Data can be always gathered using surveys.

Your surveys should follow a few basic but important rules:

1. **Keep it VERY simple.** I recommend one page with 3-4 questions maximum. Customers are

visiting to purchase or to have an experience, not to fill out surveys.

2. **Choose only one objective for the survey.** Don't try to answer too many questions, ultimately you won't get much useful data that way because your customer will get confused and frustrated.

3. **Don't give the respondent any wiggle room.** Open ended questions are tough to manage. Specific choices that are broad enough to capture real responses gives you data that is much easier to use.

4. **Always gather demographics.** Why not? But rather than name and e-mail (leading to concerns with confidentiality and often less than truthful answers) gather gender, age and income; you might be surprised at who is actually buying what.

Check your understanding
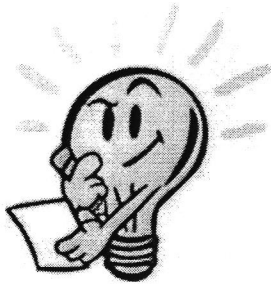
1. What are various steps involved Organization Decision making?
2. What are examples of SMART utilities?
3. What do you understand by Production Lines?
4. What are various components of Descriptive Statistics?

Summary

> Engineering design process is a methodical series of steps that engineers use in creating functional products and processes.

> Manufacturing is the production of merchandise for use or sale using labor and machines, tools, chemical and biological processing, or formulation.

> Assembly line or Production line concept was first used by Henry Ford in automobile industry. It reduces production time drastically.

> Most of the critical Business problems are solved with help of Data Analytics.