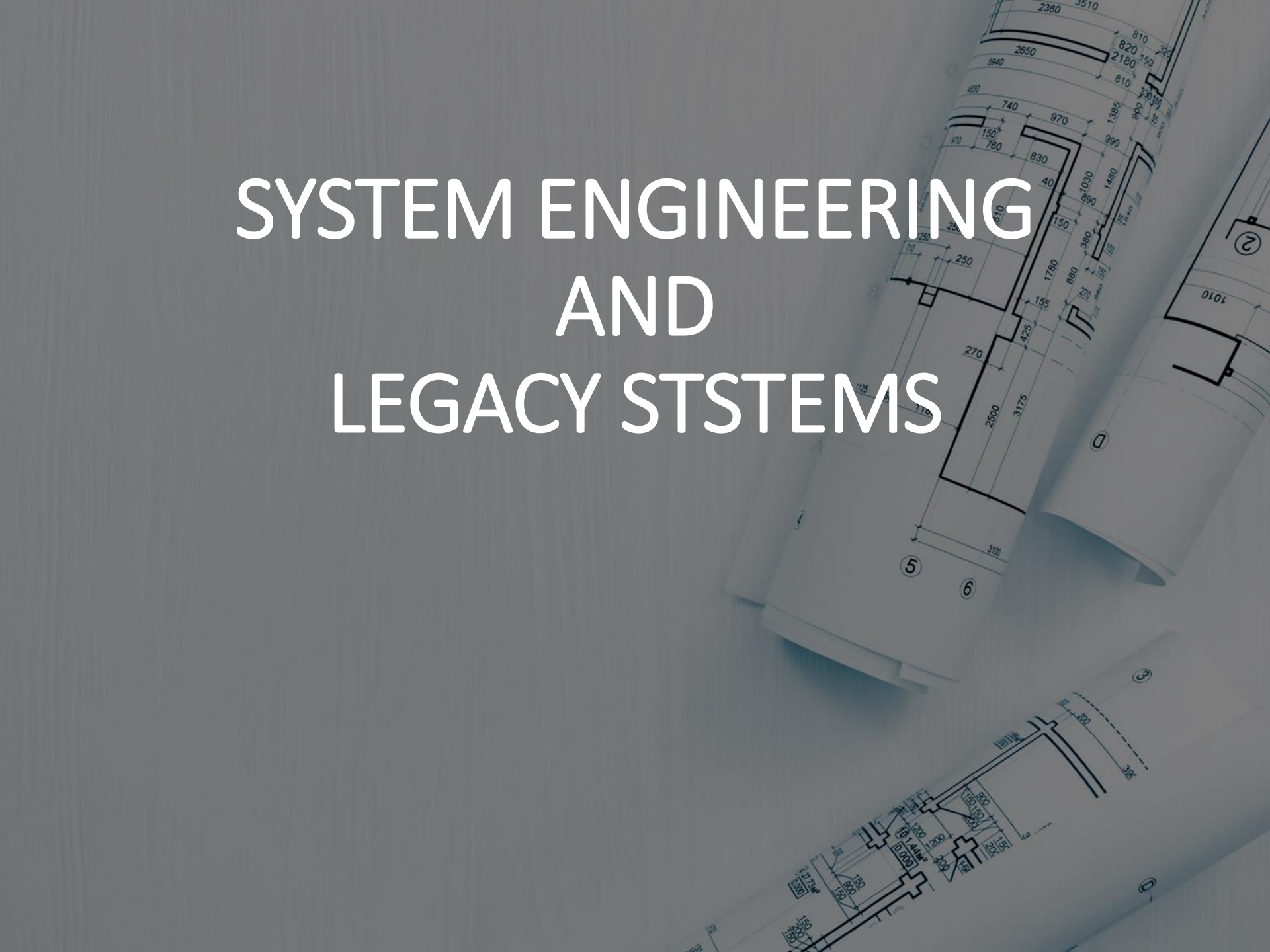


SYSTEM ENGINEERING AND LEGACY SYSTEMS

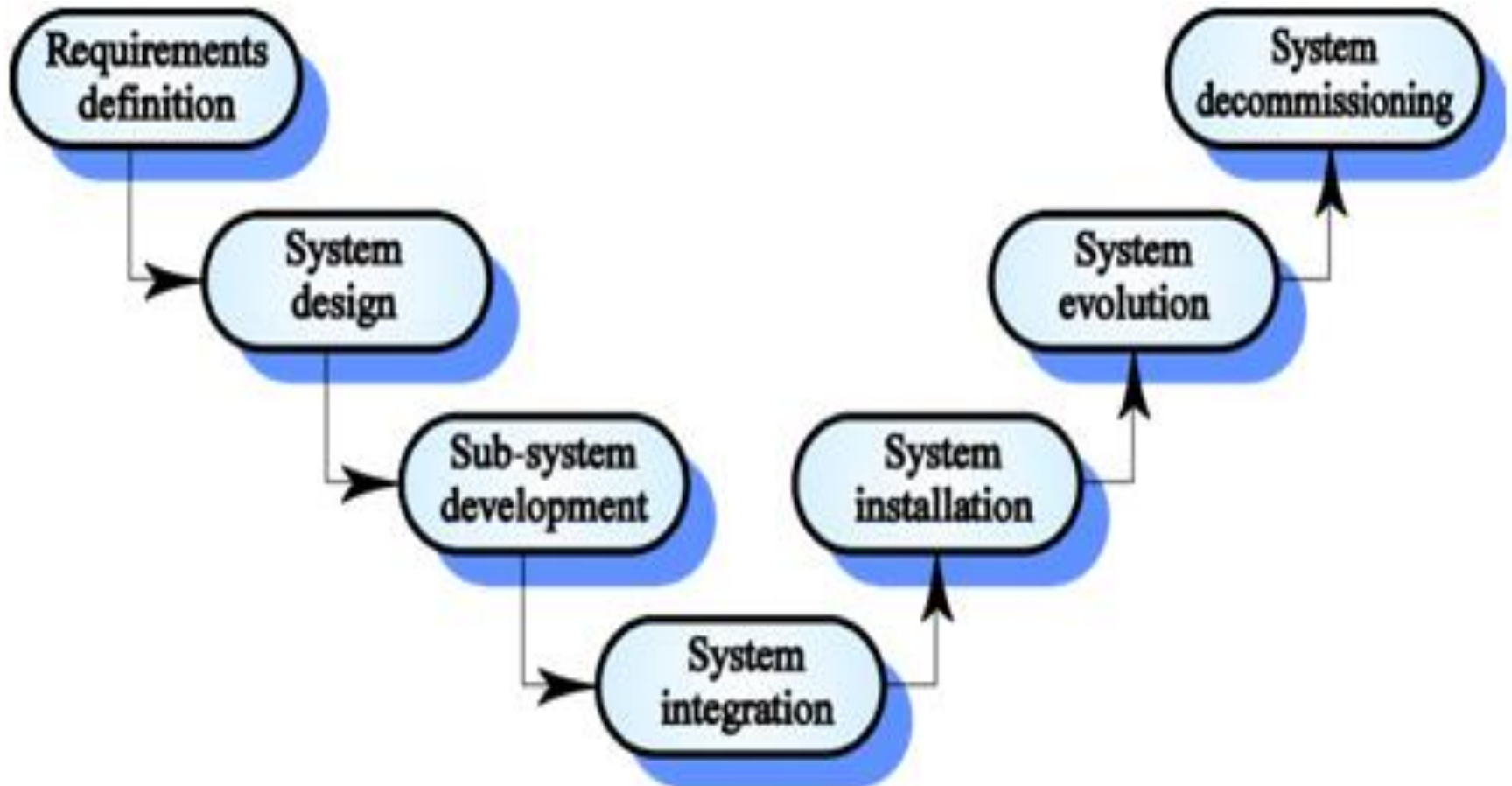
The background of the slide features several rolled-up architectural blueprints. The blueprints are white with black lines and text, showing various technical drawings, dimensions, and annotations. The rolls are arranged diagonally across the frame, with some unrolled sections visible at the bottom right. The overall image has a semi-transparent, muted blue overlay, which makes the white text of the title stand out prominently.

Systems Engineering

- Activity of speaking, designing, implementing, validating, deploying and maintaining socio-technical systems.
- Systems engineers are not just concerned with software but also with hardware and the systems interactions with users and its environment.
- They think about services that the system provides, the constraints under which the system must be built and operated and the ways in which the system is used to fulfil its purpose

System Engineering Process

System Engineering is a discipline which ensures that the customer needs are satisfied throughout the system's life cycle.



There are important distinctions between the system engineering process and the software development processes

1. Limited scope for rework during system development: It states that once the system engineering i.e. gathering of ideas and designing has been done in content with the objective and starts with the development, it is difficult to change any requirements.
2. Interdisciplinary involvement: Many different disciplinary approaches has been introduced and integrated as each has different approach and terminology.

System Engineering Process

System Requirement

System Requirement Definition :

- It describes the functions that the system as a whole should fulfil to satisfy the needs and requirements of the stakeholders.
- The main focus of requirement phase is to set an overall objective that the system must meet as a functional and organizational needs .
- Functional needs specifies the interaction between the system and its environment
- whereas organizational needs focuses on the functioning of the system according to the policies and procedures of the organization.

System Requirement

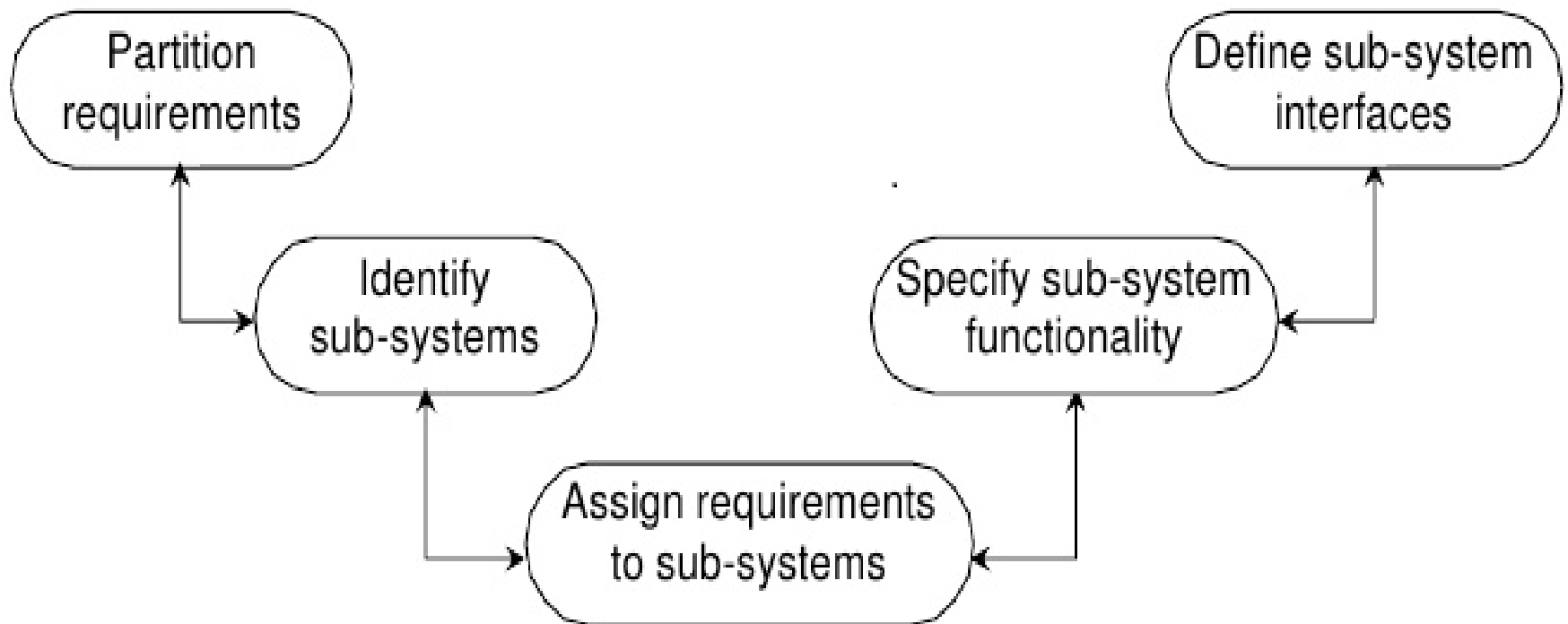


This phase of system requirement definition focuses on the following three types of requirements:

- a) Abstract functional requirements
- b) System properties
- c) Characteristics that the system must not exhibit

SYSTEM DESIGN

- System Design is the process of defining the elements of the system such as architecture, components and modules their interaction of how data goes through the system.



Organizations, People and Computer Systems

- Socio Technical system are organizational systems intended to help deliver some organizational or business goal.
- If it is difficult to understand the organizational environment where a system is used , the system is less likely to meet the real need of the business and its users.
- Human and organizational factors from the system's environment that affect the system design include:

Organizations, People and Computer Systems

1. Process Changes

- Does the system require changes to work processes in the environment ?
- If changes happen in the process than training is mandatory.

2. Job Changes

- Does the system de-skill the users in an environment or cause them to change the way they work?
- If job changes are resented in the organization ,than the employee has to be well trained to be accepted by the introduction of the system in the organization.

3. Organizational changes

- Does the system change the political power structure in an organization ?
- Depending upon the complexity of the organization ,the changes has to be accepted in the organization.



Legacy Systems

- Socio-technical computer-based systems that have been developed in the past using an obsolete technology.
- Include not only software and hardware but also legacy processes and procedures-old ways of doing things that are difficult to change because they rely on legacy software.
- Often business critical systems and are maintained because too risky to replace them

Legacy Systems

-
- Legacy systems constrain new business processes and consume a high proportion of company budgets.

Various Issues are:

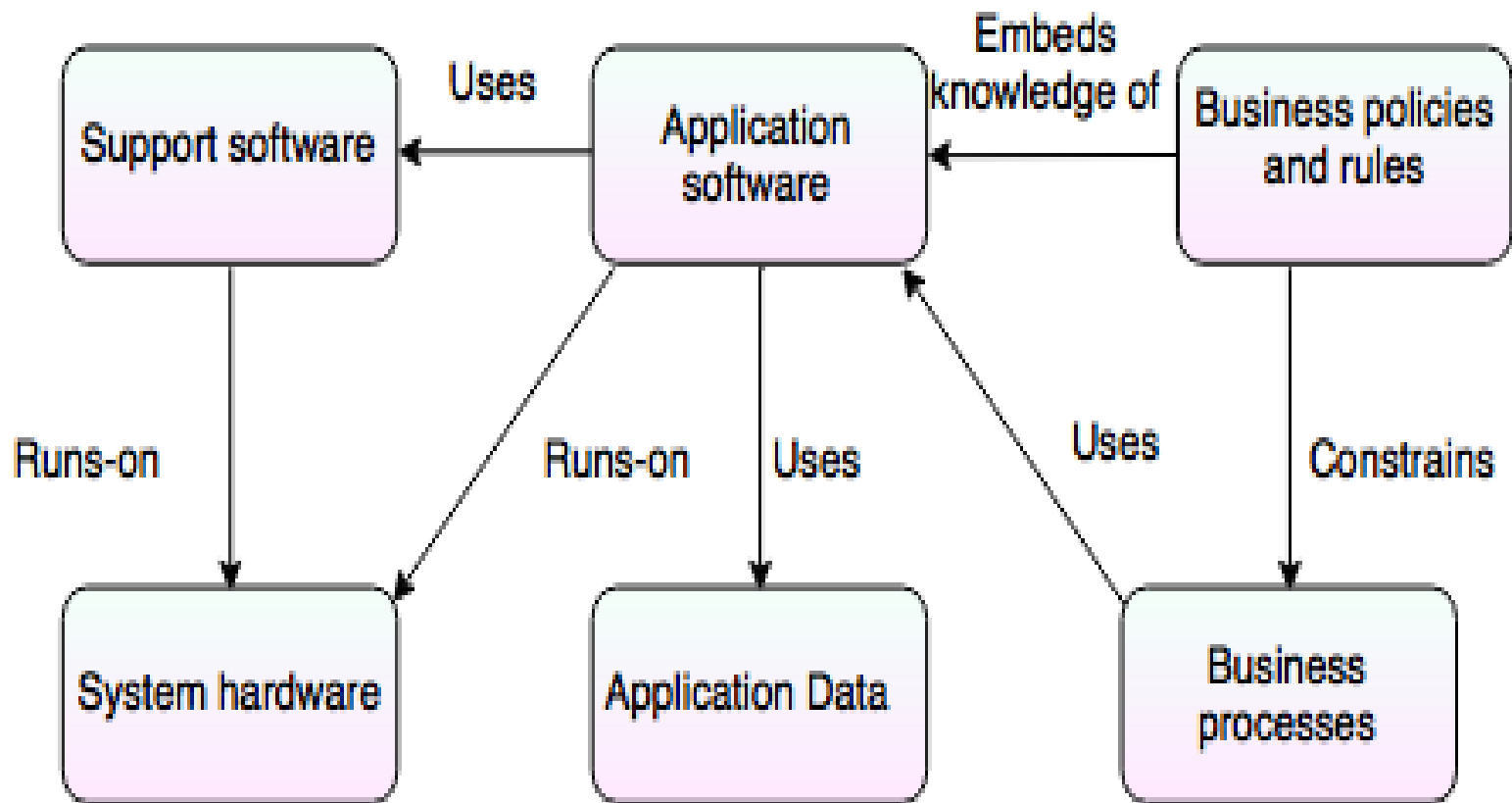
- Do we throw away and restart or continue to maintain?
- What are the economics (costs and risk) of each approach
- If system depends on other COTS, will upgrades to those be available?

Legacy Systems Components

Legacy System Components

- **Hardware** - may be obsolete mainframe hardware.
- **Support software** - may rely on support software from suppliers who are no longer in business.
- **Application software** - may be written in obsolete programming languages.
- **Application data** - often incomplete and inconsistent
- **Business processes** - may be constrained by software structure and functionality.
- **Business policies and rules** - may be implicit and embedded in the system software.

Legacy System Components



Critical Systems

- Systems failure that can result insignificant economic losses, physical damage or threats to human life.
- They are technical or socio technical systems that people depend on

Types Of Critical Systems

- **Safety-critical system** – System whose failure may result in injury, loss of life or serious environmental damage. Example Control system for a chemical manufacturing plant
- **Mission-critical system** – System whose failure may result in the failure of some goal directed activity. Example Navigational system for a spacecraft
- **Business-critical system** – System whose failure may result in very high costs for the business using that system. Example Customer accounting system in a bank

Simple Safety-critical system

