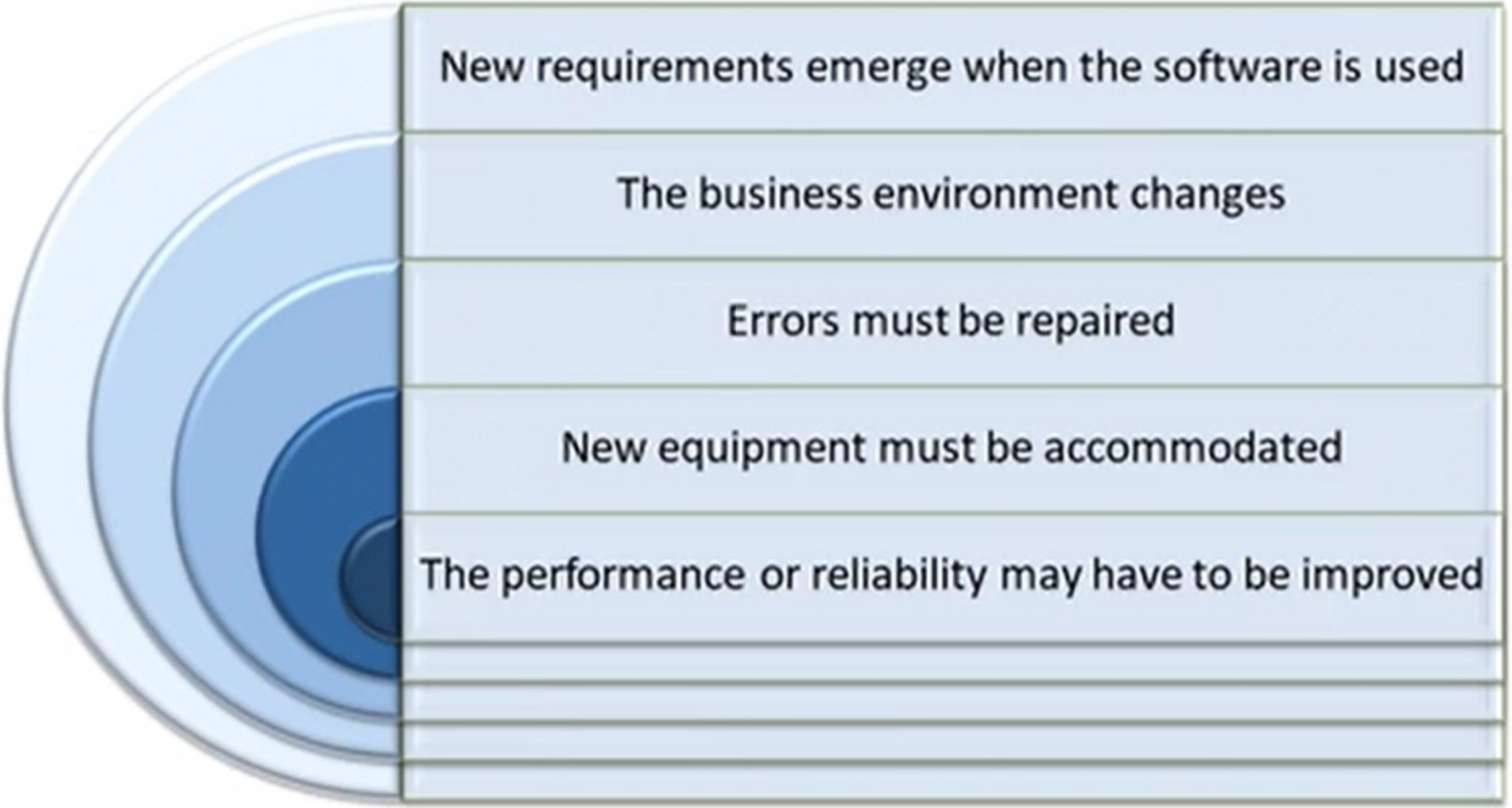
Software Evolution Approaches

Software maintenance

Architectural transformation

Software re-engineering.

Software Change



New requirements emerge when the software is used

The business environment changes

Errors must be repaired

New equipment must be accommodated

The performance or reliability may have to be improved

Software change strategies

Software Maintenance

- Changes are made in response to changed requirements but the fundamental software structure is stable

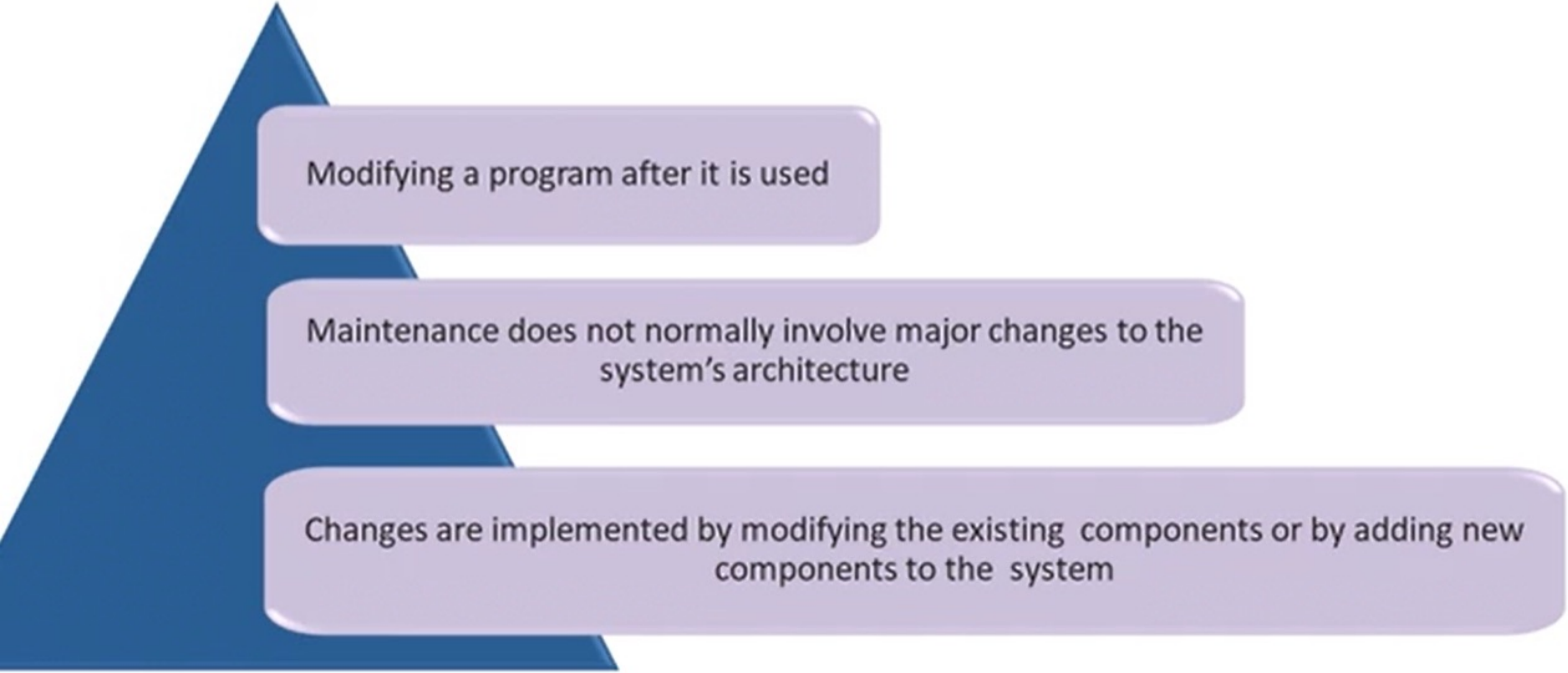
Architectural Transformation

- The architecture of the system is modified
- Generally from a centralized to a distributed architecture

Software Re-engineering

- New functionality is not added to the system but it is restructured and reorganized to facilitate future changes

Software Maintenance



Modifying a program after it is used

Maintenance does not normally involve major changes to the system’s architecture

Changes are implemented by modifying the existing components or by adding new components to the system

Types of maintenance

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Corrective maintenance

- Maintenance that includes the repair of defects in an existing system
  - Defects can stem from
    - Requirements specification errors
    - Design errors
    - About 80% of all problems stem from requirements and design
    - Coding errors

Adaptive maintenance

- Maintenance to adapt software to changes in the working environment
- Invoked by:
  - Internal needs
- External requirements e.g. changes in law

Types of maintenance

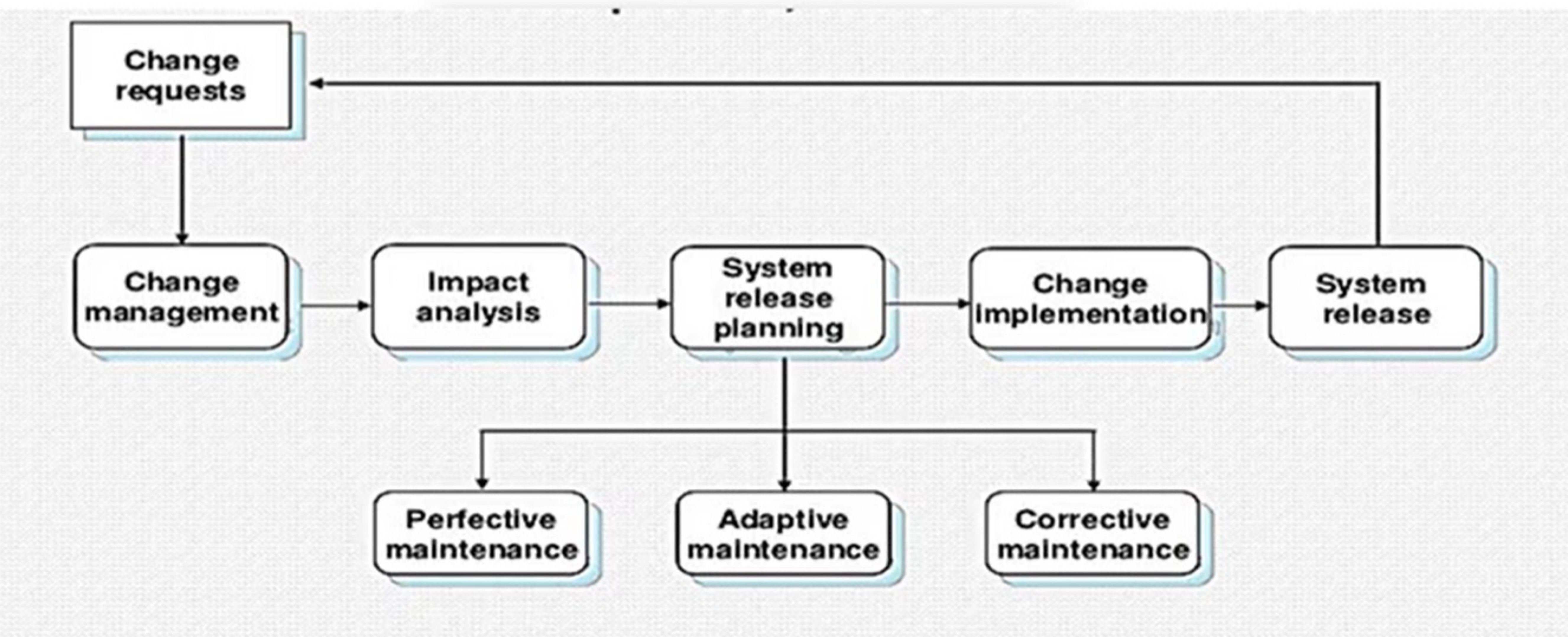
Perfective maintenance

- Includes all efforts to polish or refine the quality of the software or the documentation
- Important that the improvement reduces the system maintenance costs

Preventive maintenance

- Changes made to the system to avoid any software fault in the future

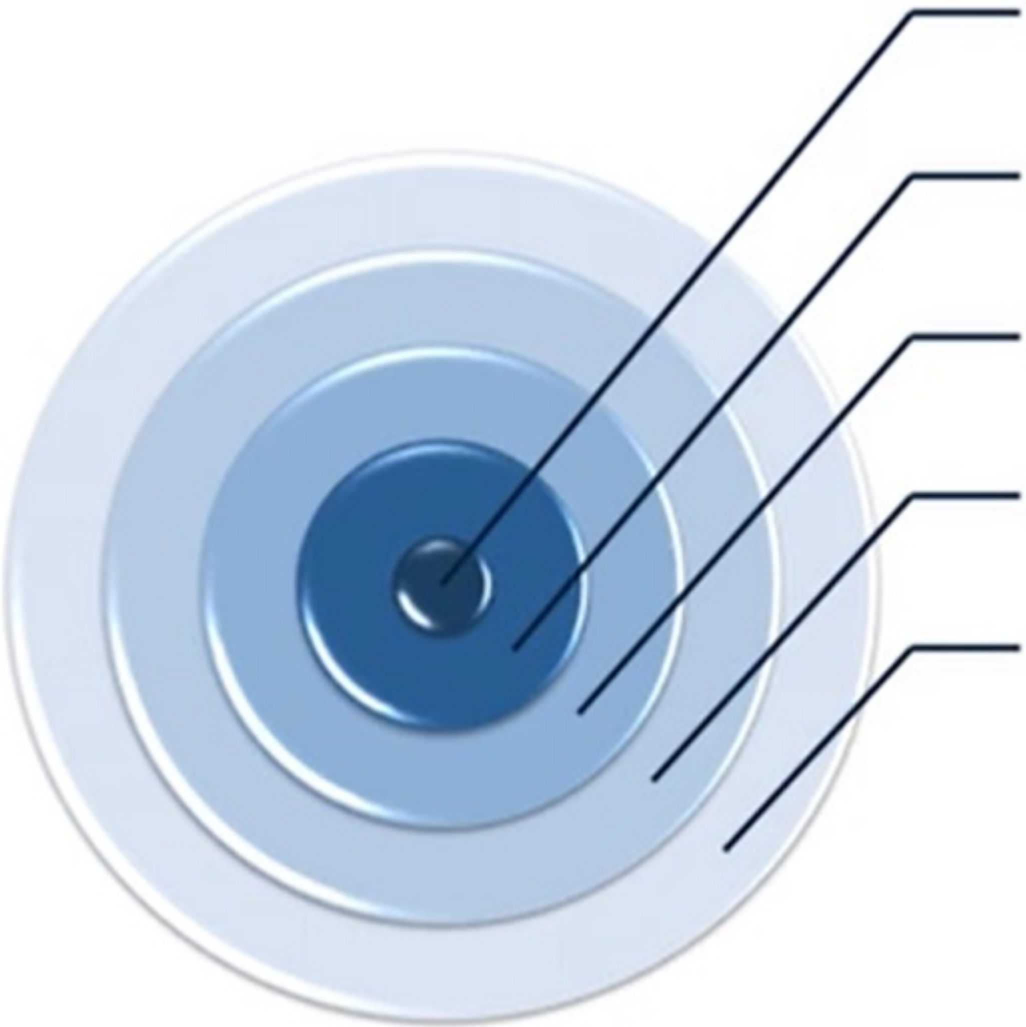
Software Maintenance



Maintenance costs

- Usually greater than the development costs
- Affected by both technical and non-technical factors
- Increases as software is maintained
- Ageing software can have high support costs

Relative Costs of Maintenance



3% Requirements definition

3% Preliminary design

5% Detailed design

7% Implementation

15% Testing

Maintenance Example

Anti-Virus Software

Operating System Patching

Y2K

Software Evolution

It is impossible to produce a system of any size which does not need to be changed.

Parts of the software may have to be modified to correct the errors that are found in operation, or to improve its performance or other non-functional characteristics.

After delivery, software systems always evolve in response to demand for change.