



# *Causes of Software Errors*

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# Classification of the causes of software errors

As software errors causes poor software quality, it is necessary to identify the causes of these errors in order to prevent them.

A software error can be “code error”, a “procedure error”, a “documentation error”, or a “software data error”.

Causes of all these errors are human, made by systems analysts, programmers, software testers, documentation experts, managers and sometimes clients and their representatives

Even in rare cases where software errors may be caused by the development environment (interpreters, wizards, automatic software generators, etc.), it is reasonable to claim that it is human error that caused the failure of the development environment tool.

# Classification of the causes of software errors

**1. Faulty requirements definition**

**2. Client–developer communication failures**

**3. Deliberate deviations from software requirements**

**4. Logical design errors**

**5. Coding errors**

**6. Non-compliance with documentation and coding instructions**

**7. Shortcomings of the testing process**

**8. Procedure errors**

**9. Documentation errors**

# Classification of the causes of software errors

## 1. Faulty definition of requirements

- Erroneous definition of requirements.
- Absence of vital requirements.
- Incomplete definition of requirements

Case Study : Municipality's Local Tax Software System



Inclusion of unnecessary requirements, functions that are not expected to be needed in the near future.

# Classification of the causes of software errors

## 2. Client - Developer Communication Failures



Misunderstandings happened due to defective client– developer communication causes errors that can be overcome in the early stages of the development process

# Classification of the causes of software errors

## 2. Client - Developer Communication Failures

- Misunderstanding of the **client's instructions** as stated in the requirement document.
- Misunderstanding of the **client's requirements changes** presented to the developer in written form during the development period.
- Misunderstanding of the **client's requirements changes presented orally** to the developer during the development period.
- Misunderstanding of the **client's responses to the design problems** presented by the developer.
- **Lack of attention to client messages** referring to requirements changes and to client responses to questions raised by the developer on the part of the developer.

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## 3. Deliberate deviations from Software Requirements



The developer **reuses software modules** taken from an earlier project without sufficient analysis of the changes and adaptations needed to correctly fulfil all the new requirements.

Due to time or budget pressures, the developer decides to **omit part of the required functions** in an attempt to cope with these pressures.

Developer-initiated, **unapproved improvements** to the software, introduced without the client's approval, frequently disregard requirements that seem minor to the developer. Such "minor" changes may, eventually, cause software errors.

# Classification of the causes of software errors

## 4. Logical design errors

Software errors can enter the system when the professionals who design the system, systems architects, software engineers, analysts, etc., formulate the software requirements wrongly



# Classification of the causes of software errors

## 4. Logical design errors

- a. Erroneous definitions that represent software requirements may cause erroneous algorithms.
- b. Process definitions that contain sequencing errors
- c. Erroneous definition of boundary conditions
- d. Omission of required software system states
- e. Omission of definitions concerning reactions to illegal operation of the software system

# Classification of the causes of software errors

## 5. Coding errors

A broad range of reasons cause programmers to make coding errors.

- Misunderstanding the design documentation,
- Linguistic errors in the programming languages,
- Errors in the application of CASE and other development tools,
- Errors in data selection.

# Classification of the causes of software errors

## 6. Non-compliance with documentation and coding instructions

Every development unit has its own documentation and coding standards that define the content, order and format of the documents, and the code created by team members.

To support this requirement, the unit develops and publicizes its templates and coding instructions.

Members of the development team or unit are required to comply with these requirements.

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## 7. Shortcomings of the testing process

Shortcomings of the testing process causes a greater number of errors undetected or uncorrected. These shortcomings result from the following causes:

- **Incomplete test plans** leave untreated portions of the software or the application functions and states of the system.
- **Failures to document and report** detected errors and faults.
- **Failure to promptly correct detected software faults** as a result of inappropriate indications of the reasons for the fault.
- **Incomplete correction of detected errors** due to negligence or time pressures.

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## 9. Documentation errors

The documentation errors that trouble the development and maintenance teams are errors in the design document. These errors can cause additional errors in further stages of development and during maintenance.

Another type of documentation error, one that affects mainly the users, is an error in the user manuals.

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## 9. Documentation errors

Typical errors of this type are:

Omission of software functions.

Errors in the explanations and instructions given to users, resulting in “dead ends” or incorrect applications.

Listing of non-existing software functions, that is, functions planned in the early stages of development but later dropped, and functions that were active in previous versions of the software but cancelled in the current version.

# Summary



**Software Errors?**



**Main reason for software errors?**



**Causes of software errors?**