

## Certification

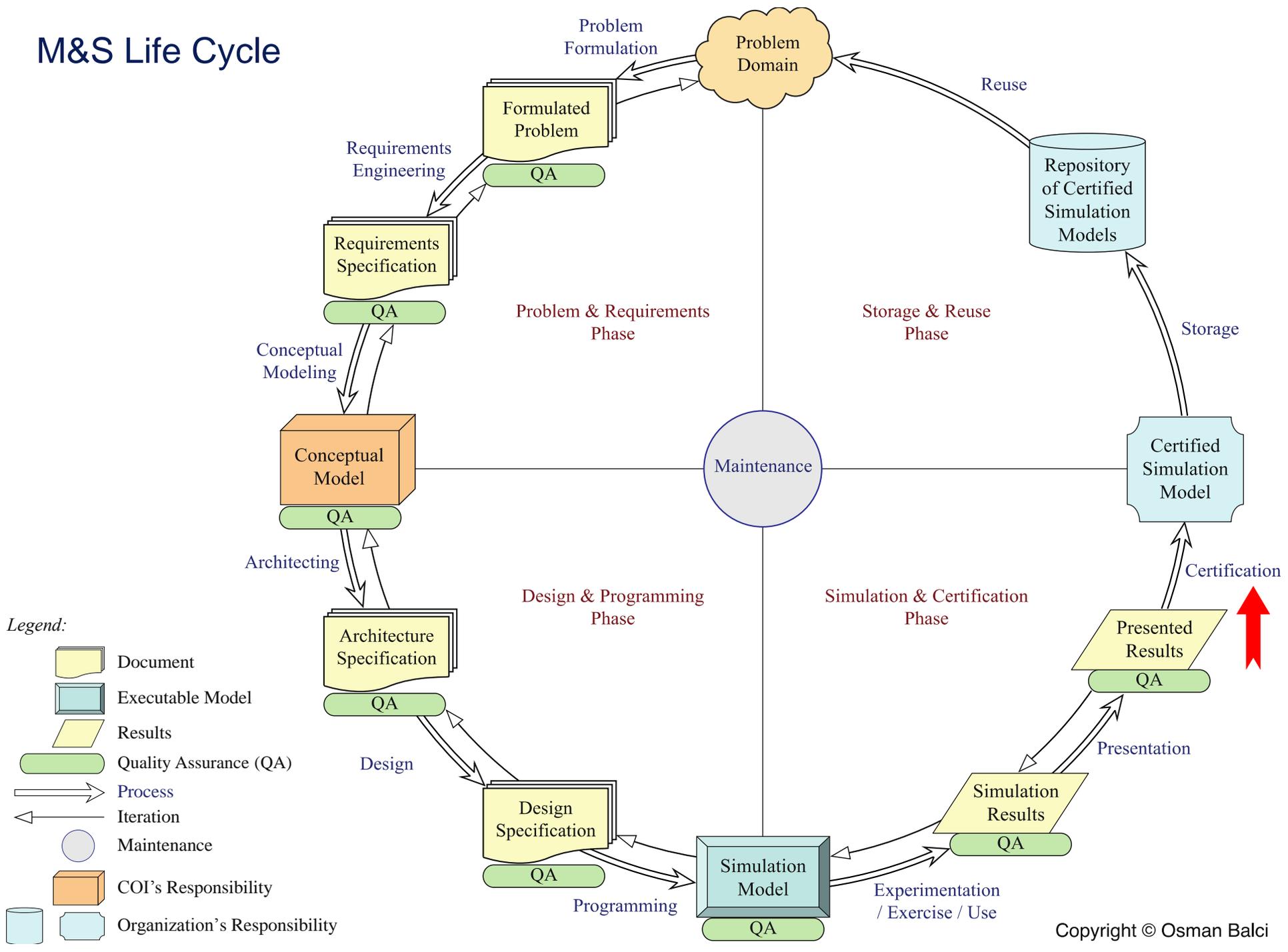
**OSMAN BALCI**

Professor

Department of Computer Science  
Virginia Polytechnic Institute and State University (Virginia Tech)  
Blacksburg, VA 24061, USA

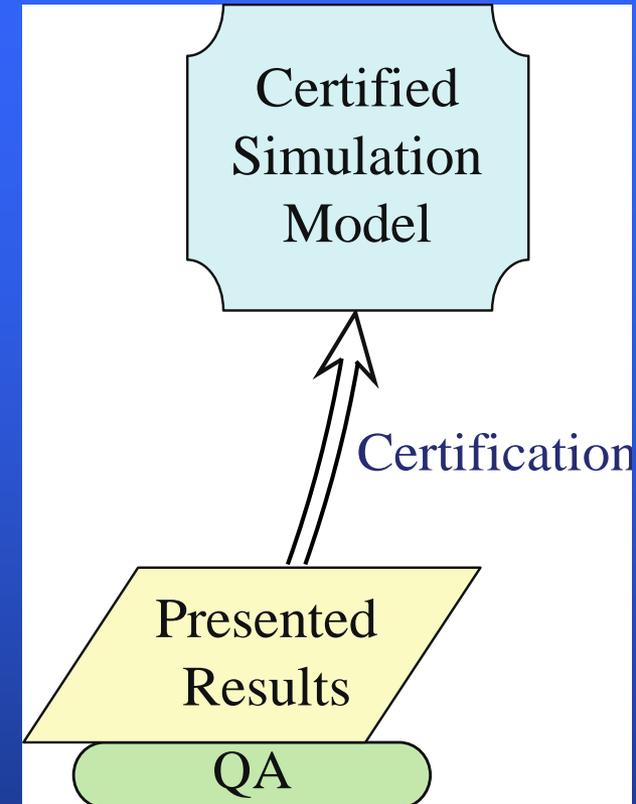
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# M&S Life Cycle

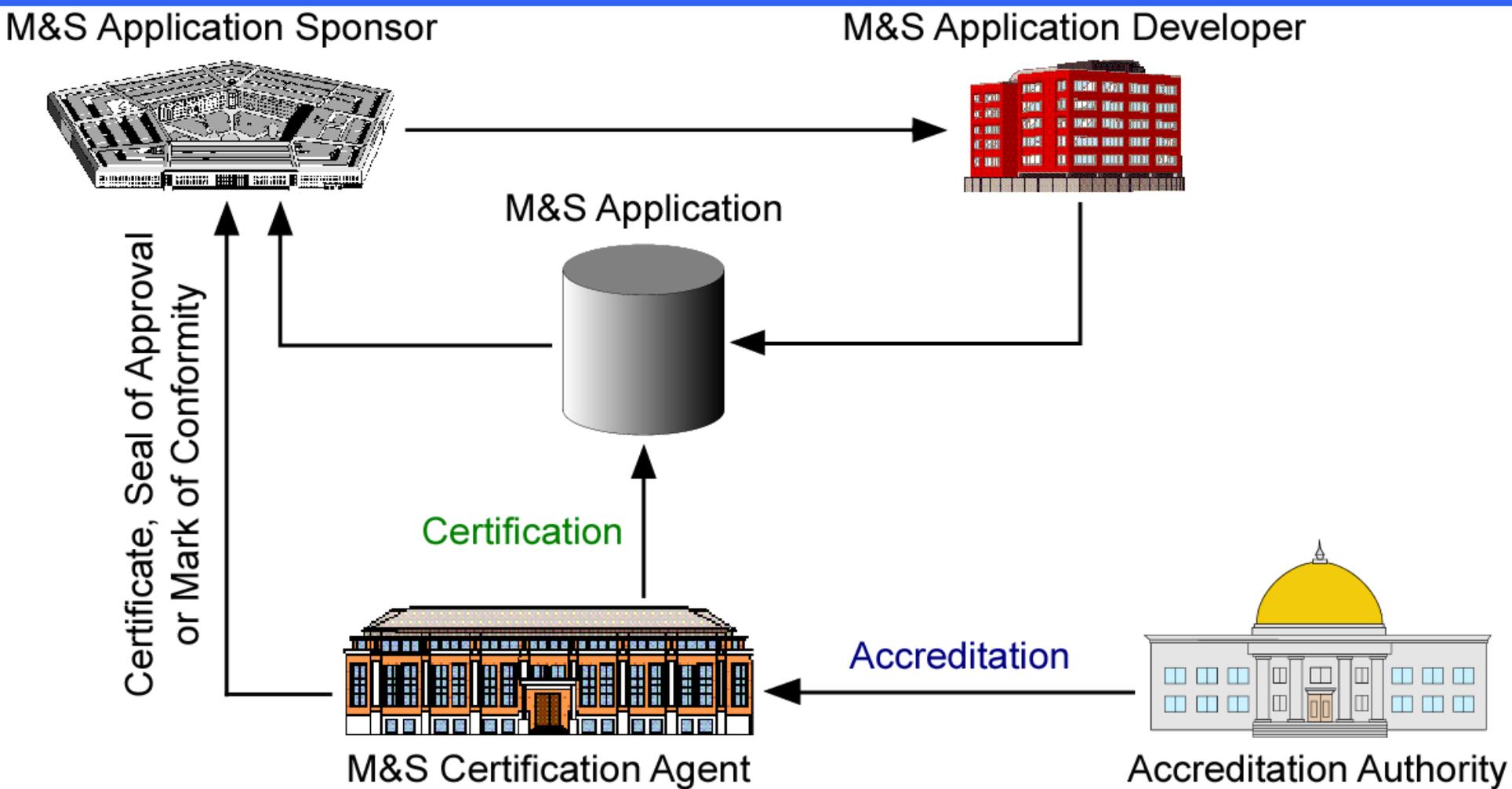


## Certification

- **Certification** is the responsibility of the organization that sponsored the M&S application development.
- **Certification** is a “procedure by which a third party gives written assurance that a product, process or service conforms to specified characteristics.” [ISO]
- **Accreditation** is a “procedure by which an authoritative body gives formal recognition that a body or person is competent to carry out specific tasks.” [ISO]
- Certification is the process of independently awarding a “**Certificate**”, a “**Seal of Approval**” or a “**Mark of Conformity**” formally attesting that a simulation model fulfills specific quality criteria under a set of prescribed intended uses.



# Desired M&S Certification and Accreditation Practice



## Certification

- The independent award is regarded by the M&S application sponsor as providing some form of guarantee of quality and credibility.
- Based on the guarantee, the sponsor decides to use the simulation results in making key decisions. The consequences of wrong certification may be catastrophic.

- **Terminology Problem:**

The DoD Instruction 5000.61 (DoD M&S Verification, Validation, and Accreditation) defines Accreditation as:

Accreditation is “the official certification that a model, simulation, or federation of models and simulations is acceptable for use for a specific purpose.”

**ISO's Certification**  $\equiv$  **DoD's Accreditation**

## Achieving Independence in Conducting VV&C

- **Independent Verification and Validation (IV&V)** is a technique of long-standing in the field of software engineering.
- The IEEE Standard for Software V&V states that [IEEE 1998, p. 58]
  - “the IV&V responsibility is vested in an organization that is separate from the development organization”
- Boehm [1984, p. 76], a well-known software engineering scientist, advocates that
  - “verification and validation activities produce their best results when performed by a V&V agent who operates independently of the developer or specification agent.”

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IEEE (1998), *IEEE Standards for Software Verification and Validation*, IEEE Standard 1012, IEEE Computer Society, Washington, DC.

Boehm, B.W. (1984), “Verifying and Validating Software Requirements and Design Specifications,” *IEEE Software*, pp. 75-88.

## Requirements for True Independence in V&V / Certification

The **IEEE Standard for Software V&V** dictates that the following three types of independence must all be satisfied to be able to claim true independence in V&V:

- **Technical Independence** implies that the IV&V / Certification Agent determines, prioritizes, and schedules its own tasks and efforts.
- **Managerial Independence** implies that the IV&V / Certification Agent reports to the M&S application sponsor independently of the M&S application developer organization.
- **Financial Independence** implies that the IV&V / Certification Agent is allocated its own budget for the M&S application V&V / Certification and does not rely on the M&S application development budget.