

Mastering Systems Integration; Testing

by *Gerrit Muller* TNO-ESI, University of South-Eastern Norway]

e-mail: `gaudisite@gmail.com`

`www.gaudisite.nl`

Abstract

During integration, the integrators continuously test parts, functions, and systems. Testing requires the creation of an experimental set-up, where the test environment offers stimuli and measures responses. This lesson discusses some of the testing methods and considerations.

Distribution

This article or presentation is written as part of the Gaudí project. The Gaudí project philosophy is to improve by obtaining frequent feedback. Frequent feedback is pursued by an open creation process. This document is published as intermediate or nearly mature version to get feedback. Further distribution is allowed as long as the document remains complete and unchanged.

August 16, 2025
status: planned
version: 0.1

logo
TBD

Why Testing?

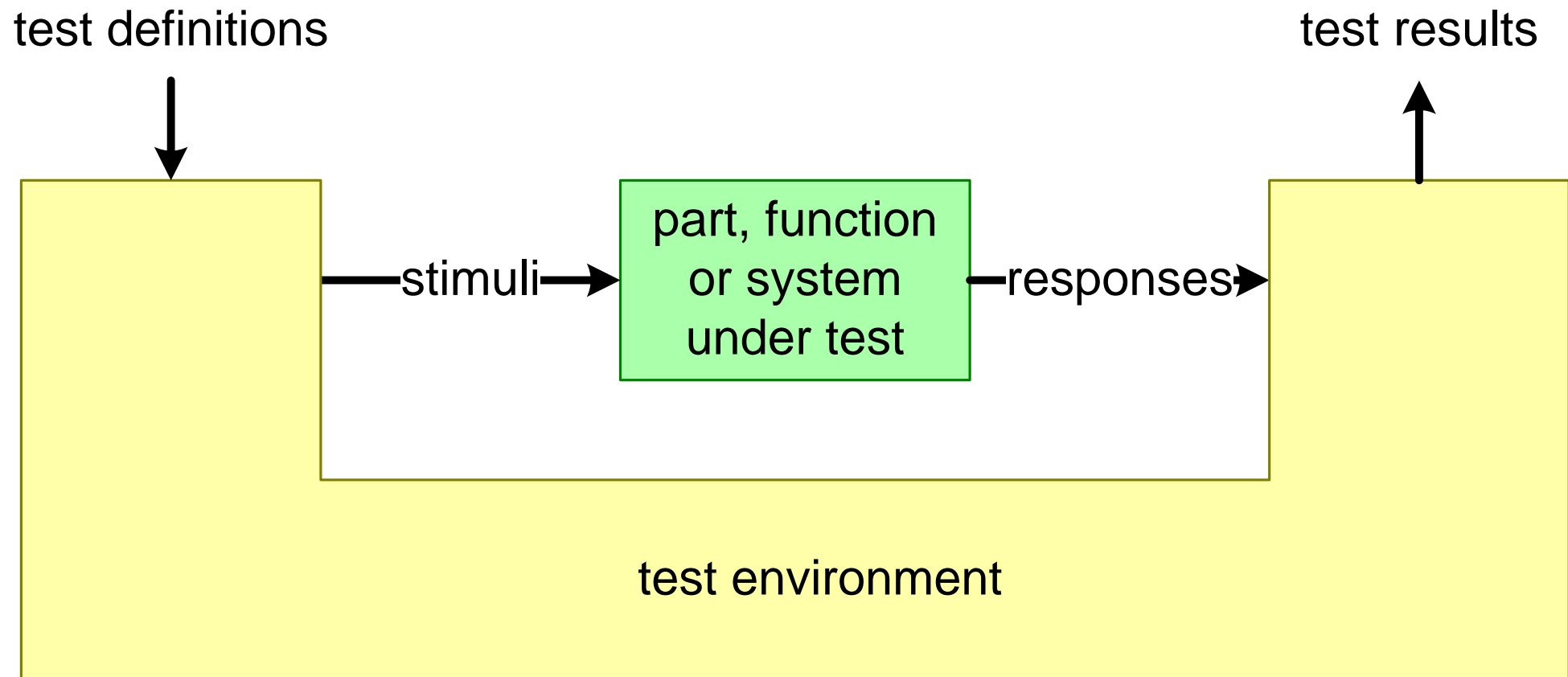
Objectives of testing during integration:

- to find potential quality attribute and behavior problems at specification and design level as early as possible.
- to learn as much as possible about the emerging quality attributes and behaviors.

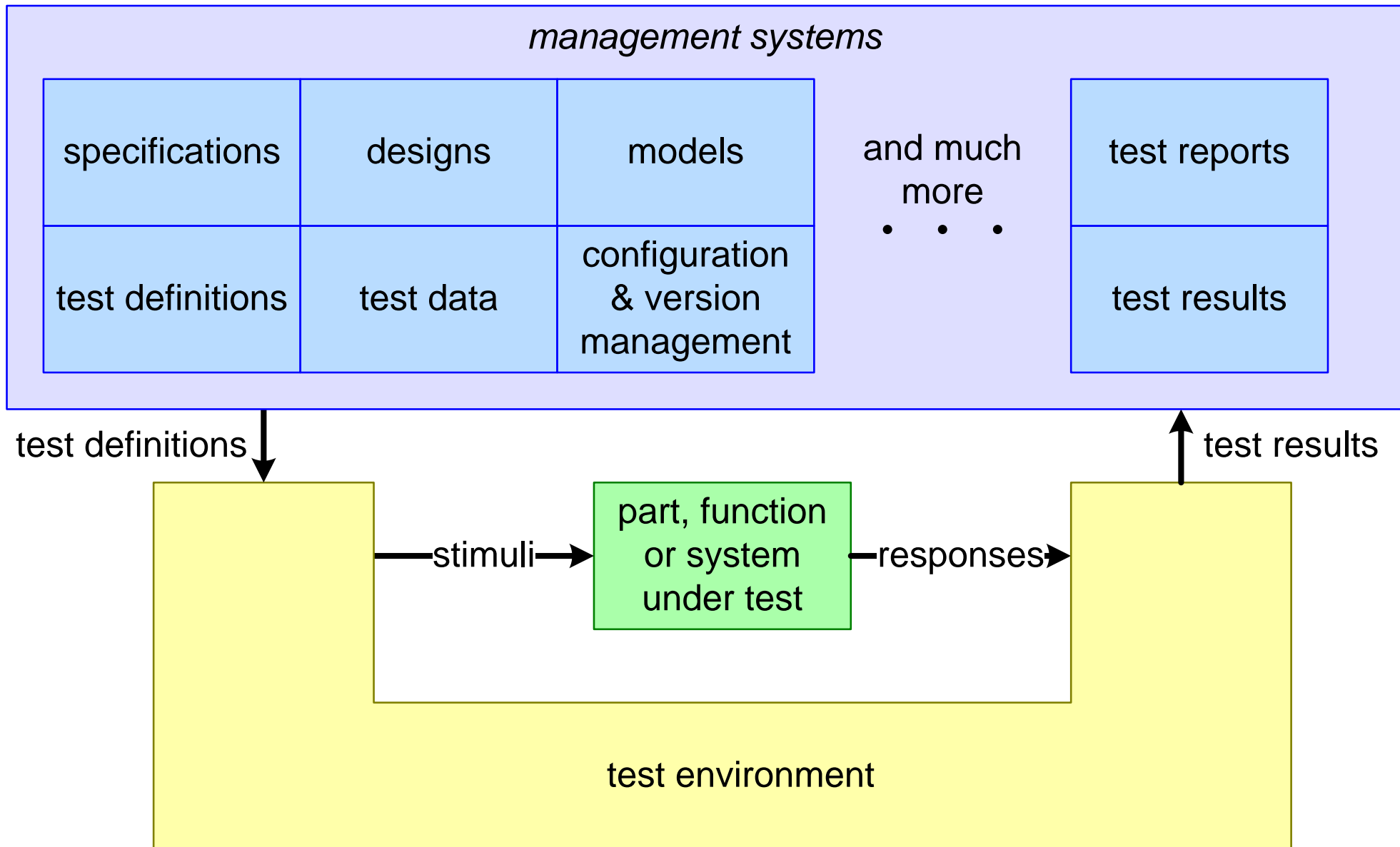
Consequences for testing:

- stimulate the object under test externally and internally (insertion)
- observe the system externally (specification) and internally (design)

Testing Environment



Testing Environment Management Systems Context



During normal use, stimuli are periodic, with frequencies f_0 , f_1 , f_2 , etc.

During accelerated testing these frequencies are increased.

- **ALT** (Accelerated Life Testing) is **Test-to-Pass** (showing how long the system can operate)
- **HALT** (Highly Accelerated Life Testing) is **Test-to-Fail** (learning weaknesses and margins)

The concepts are applicable in hardware, software, and systems. However, engineers know the stimuli for hardware better (temperature, humidity, vibrations, etc.).