Architecting System Performance; Defining Performance

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Abstract

Performance is a broad term. Each domain has its own key performance parameters. Performance can be used to indicate time-oriented performance, such as response time, throughput, or productivity. However, more broadly, it may be used for aspects like image quality, spatial performance (f.i. positioning accuracy), energy or power properties, sensitivity and specificity of algorithms, or reliability and availability.

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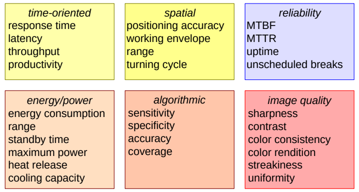

time-oriented
response time
latency
throughput
productivity

spatial
positioning accuracy
working envelope
range
turning cycle

reliability
MTBF
MTTR
uptime
unscheduled breaks

energy/power
energy consumption
range
standby time
maximum power
heat release
cooling capacity

algorithmic
sensitivity
specificity
accuracy
coverage

image quality
sharpness
contrast
color consistency
color rendition
streakiness
uniformity

Performance Attributes

time-oriented

response time
latency
throughput
productivity

spatial

positioning accuracy
working envelope
range
turning cycle

reliability

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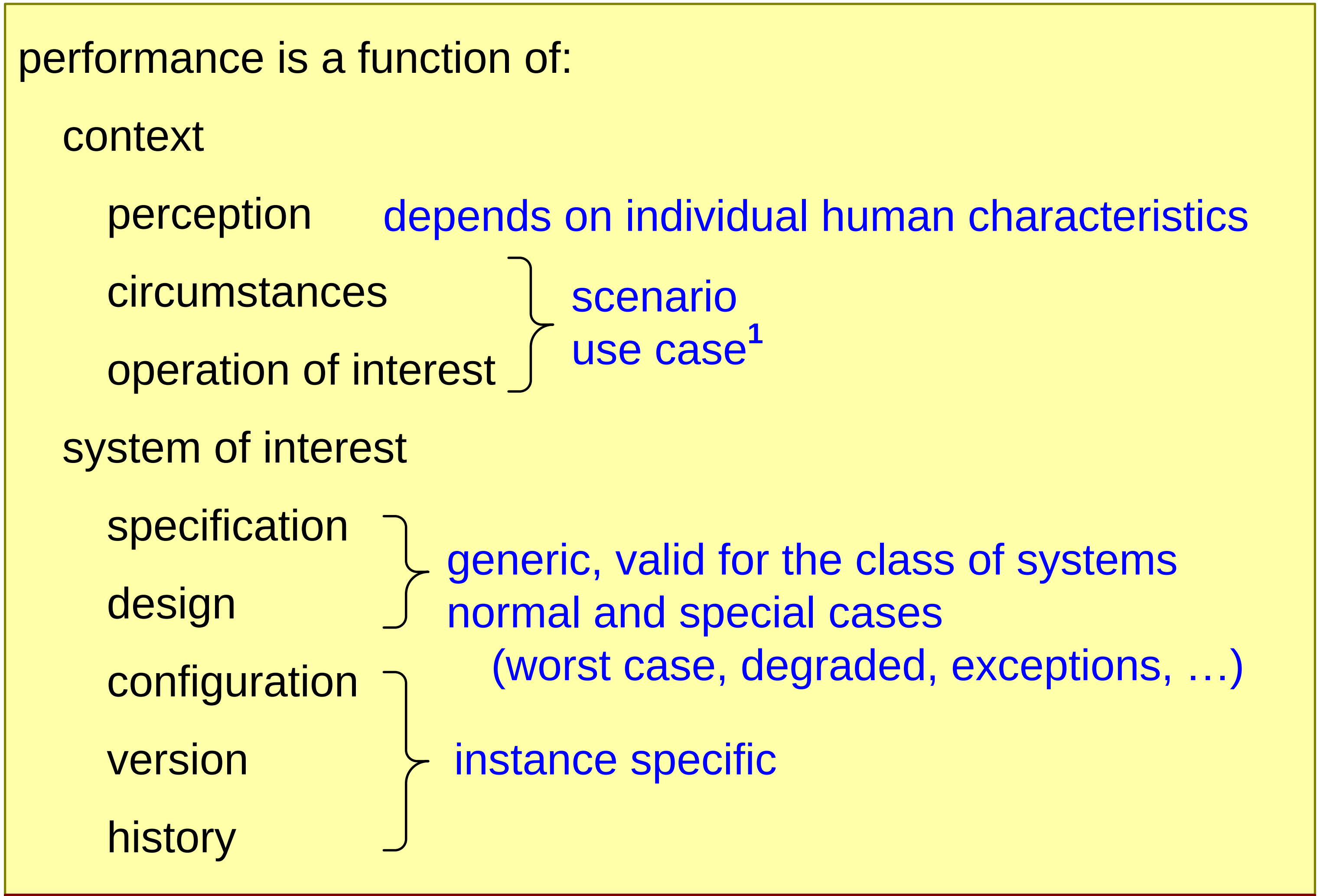
Defining Performance



performance is a function of:

- context
  - perception
  - circumstances
  - operation of interest
- system of interest
  - specification
  - design
  - configuration
  - version
  - history

depends on individual human characteristics
scenario
use case[1]
generic, valid for the class of systems
normal and special cases
(worst case, degraded, exceptions, …)
instance specific

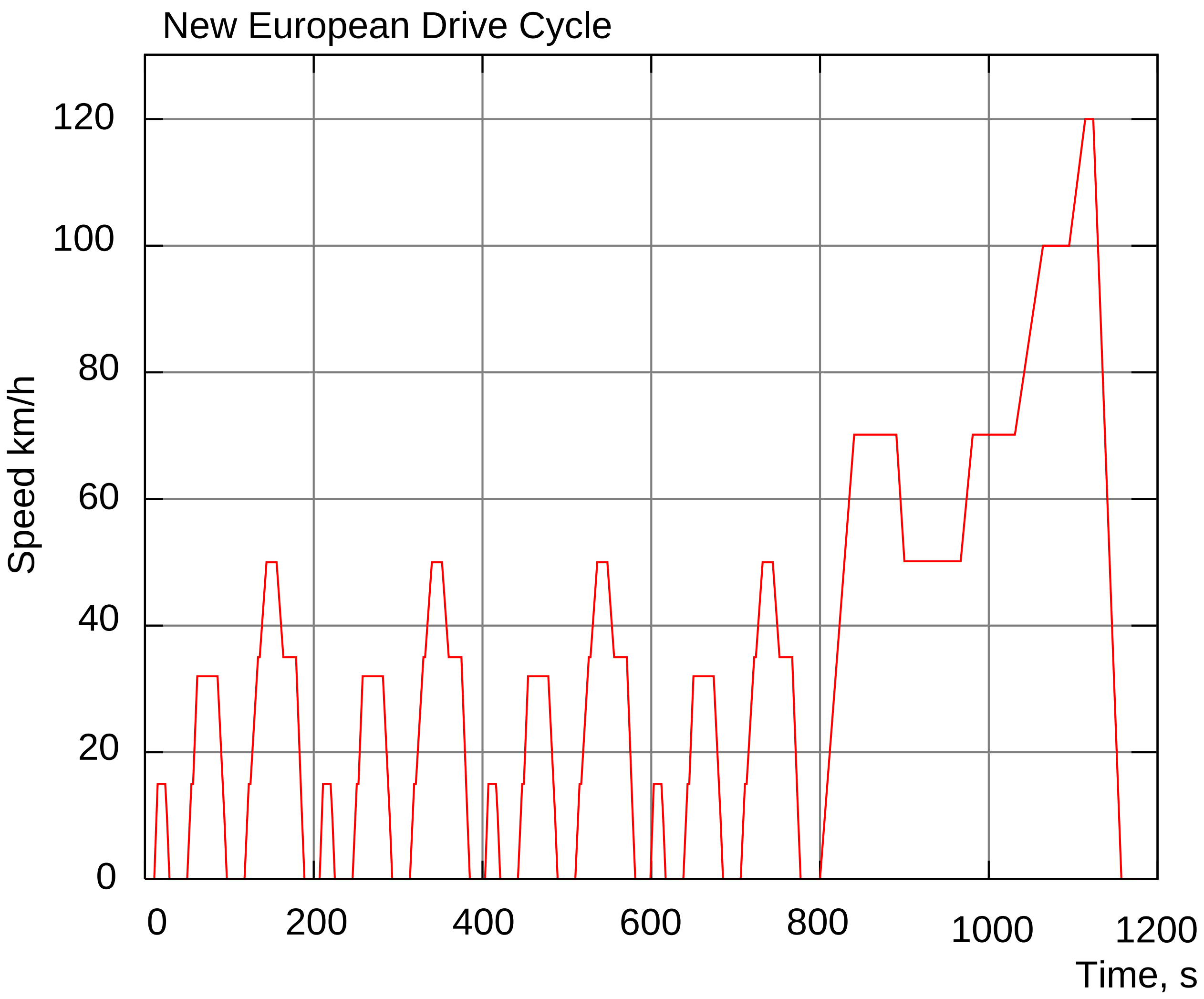
[1] a use case in this context is rich (includes quantifications) and broad (covers the operation of interest, not a single function)

Example EV Range Definition

Electric Vehicle
Driving Range

Range = f(
v(t),
Circumstances,
Driving style,
Car load,
Charging state,
Battery age)

A quantified Use Case defines under what circumstances the EV will achieve the specified range.



http://en.wikipedia.org/wiki/New_European_Driving_Cycle#/media/File:New_European_Driving_Cycle.svg
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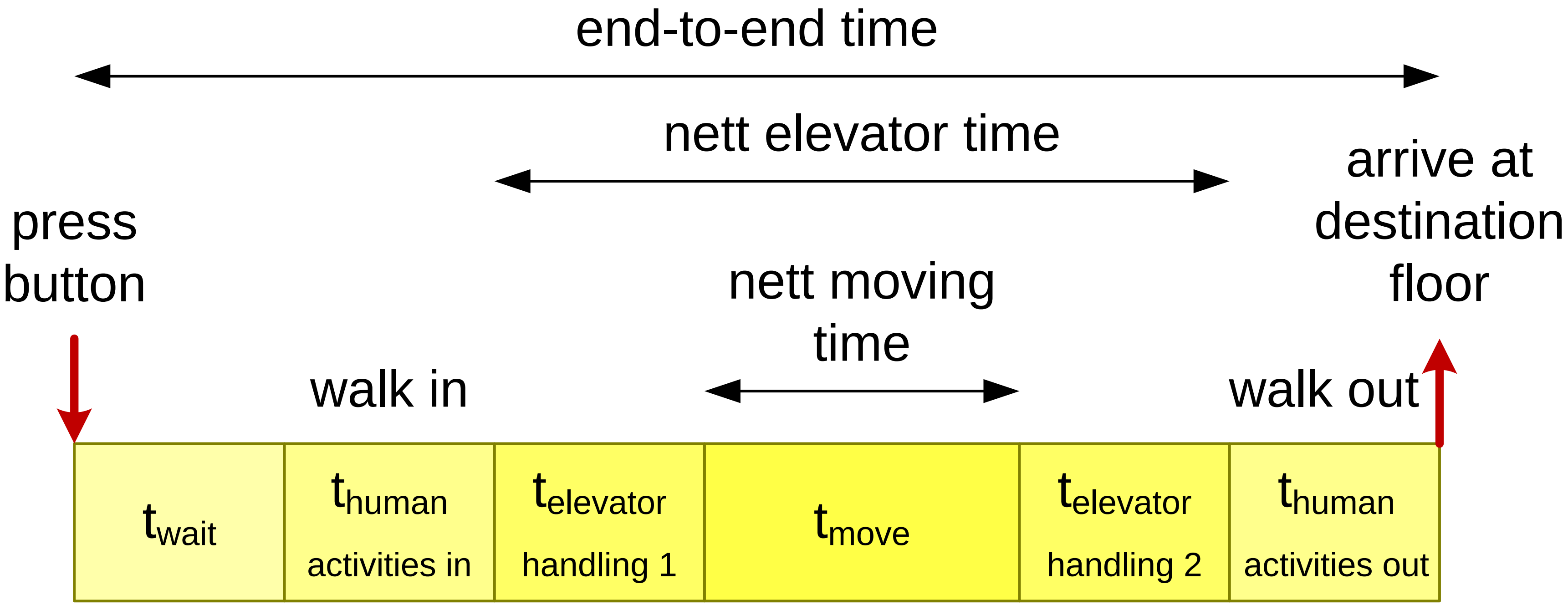
End-to-End Performance

The **end-to-end** performance is the relevant performance as the **stakeholder** experiences it: from **initial trigger** to **final result**.


end-to-end time
nett elevator time
press button
arrive at destination floor
nett moving time
walk in
walk out
t_{wait}
t_{human} activities in
$t_{elevator}$ handling 1
t_{move}
$t_{elevator}$ handling 2
t_{human} activities out

$$t_{\text{end-to-end}} = t_{\text{human activities}} + t_{\text{wait}} + t_{\text{elevator handling}} + t_{\text{move}}$$