# Modeling Hierarchy, Coping with the Dynamic Range of Design Details

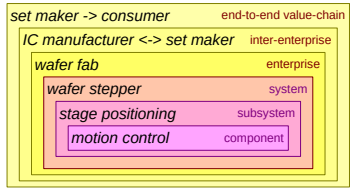
by *Gerrit Muller* Buskerud University College
e-mail: gaudisite@gmail.com
www.gaudisite.nl

## Abstract

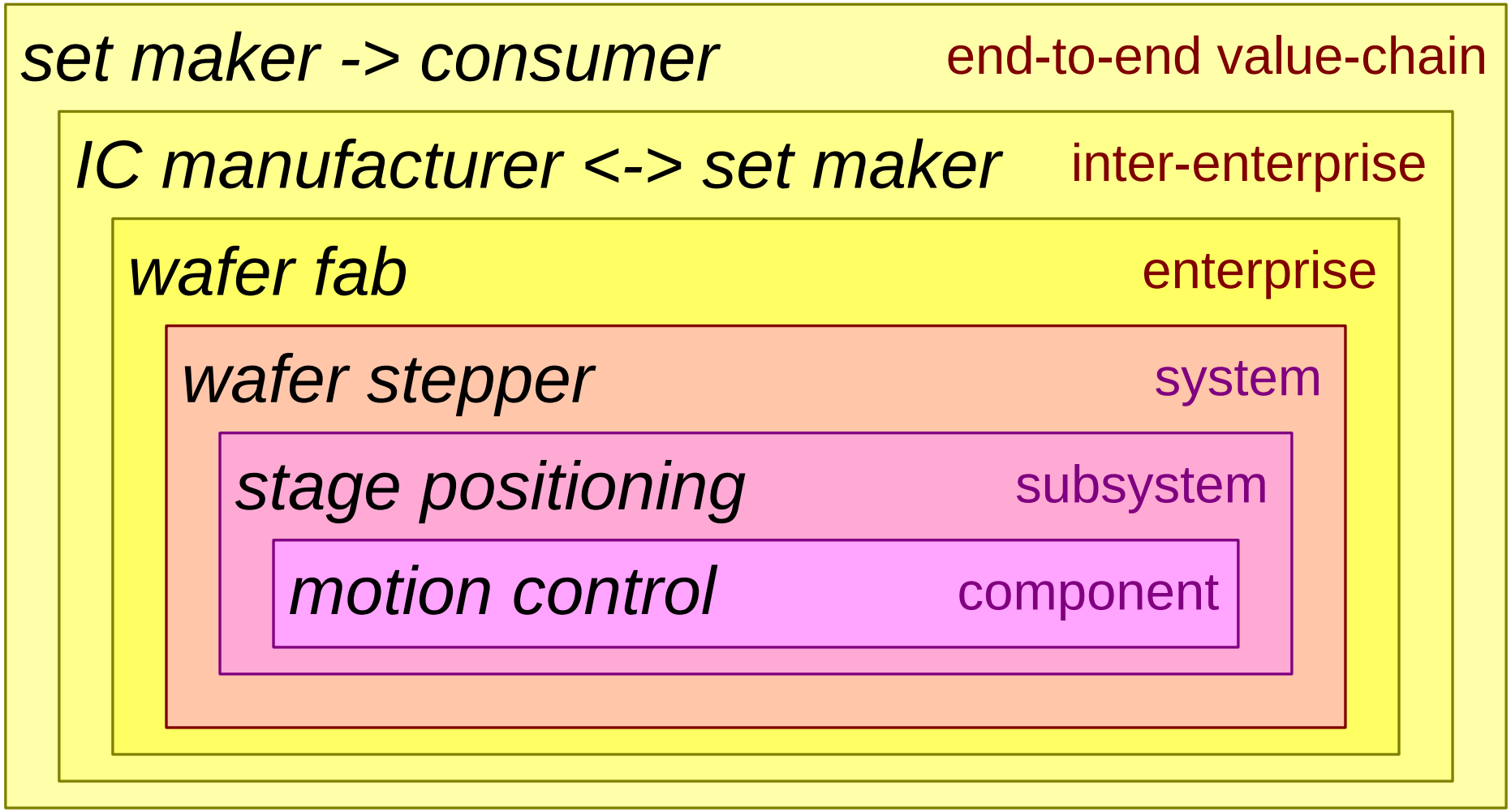
A system functions as part of a broader enterprise. For the design of a system understanding is required of it's purpose within the enterprise, as well as of it's internal functioning. Models are a means to create and capture understanding. Many different models are needed during the design of a system, from broad enterprise models down to detailed implementation models of components or functions. In this article we show the hierarchy of models, their relations and the level of detail in these models.



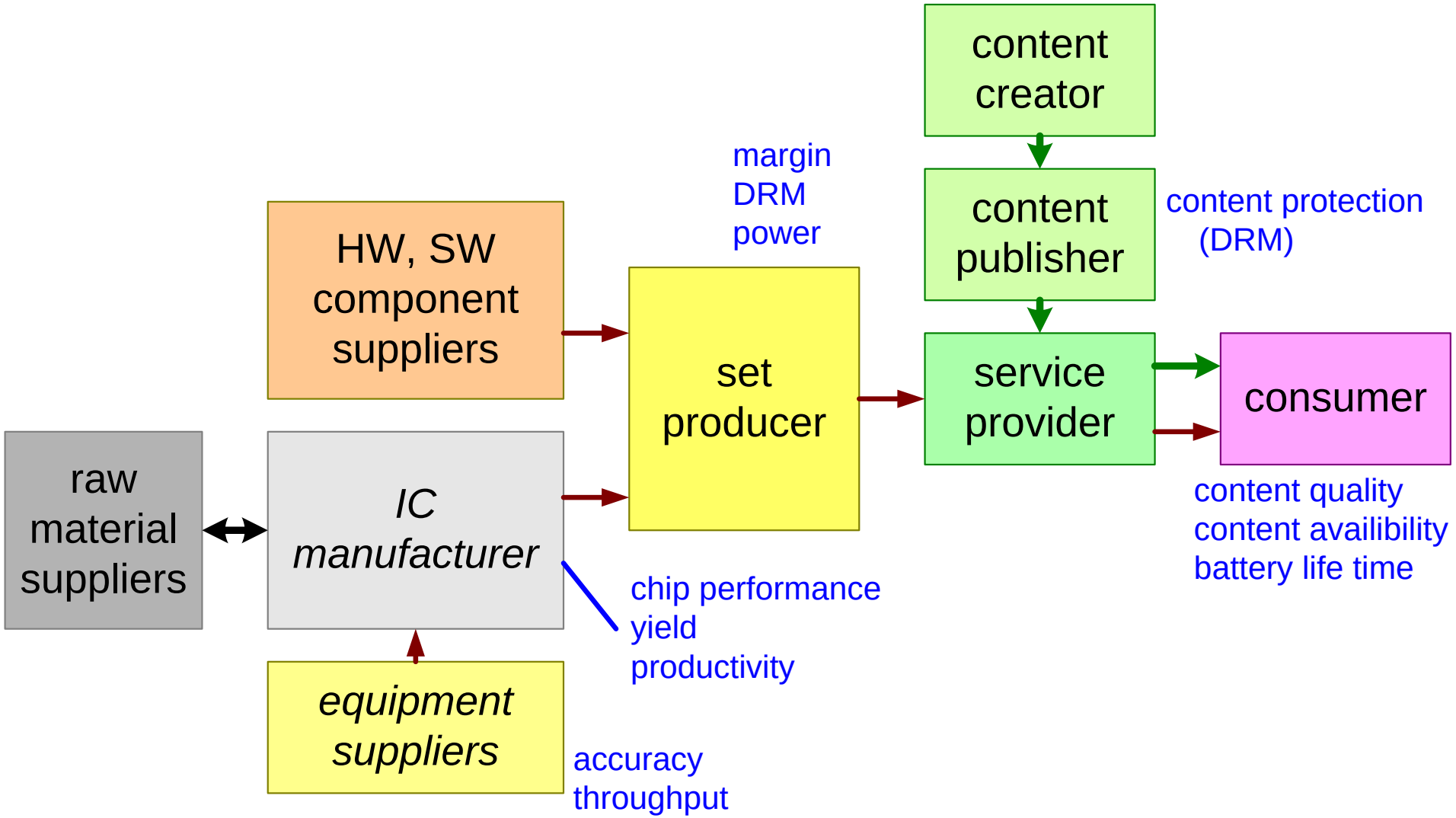
July 4, 2016
status: preliminary draft
version: 0.1



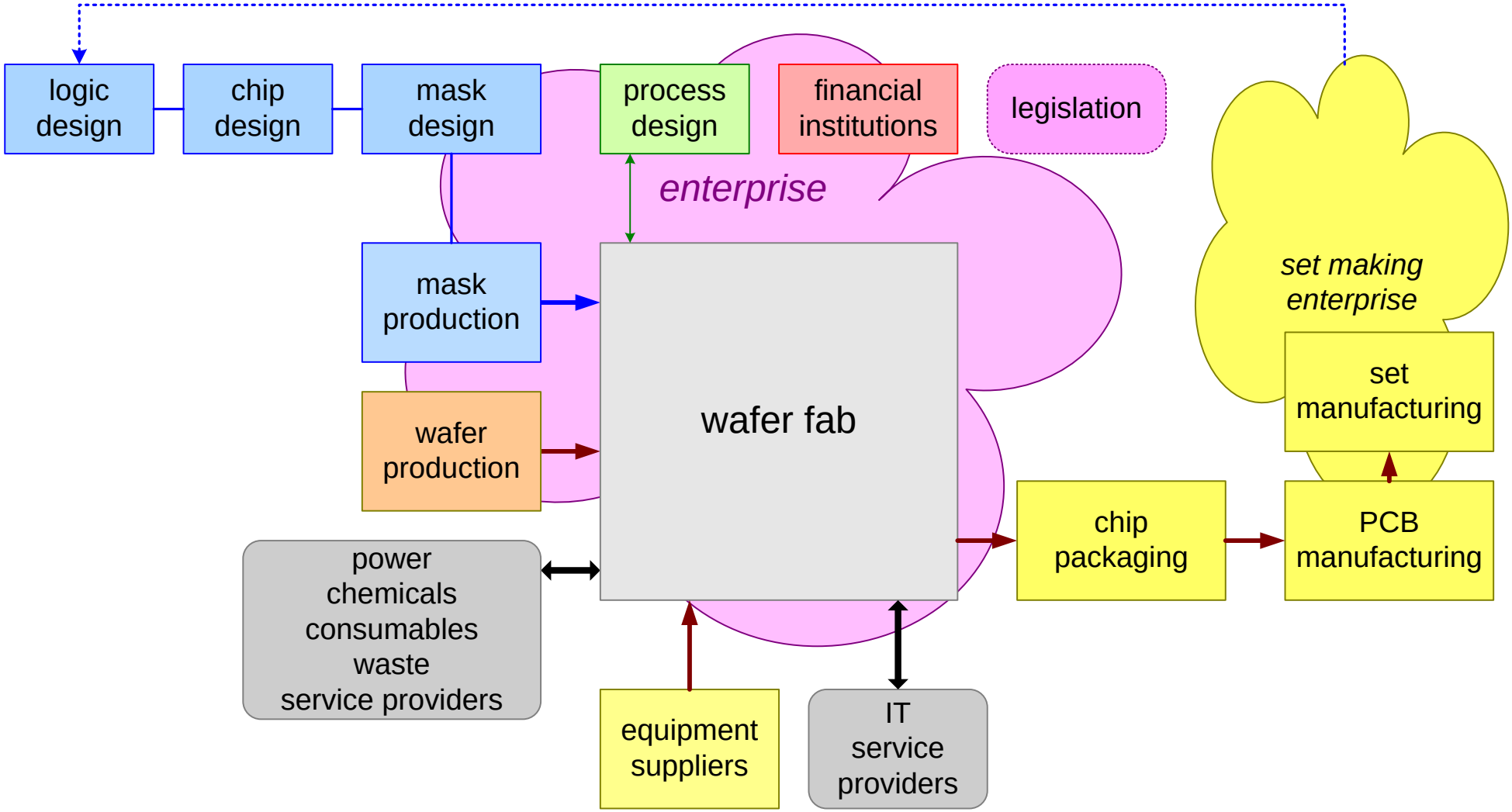
# Hierarchical Levels in Semiconductor Industry



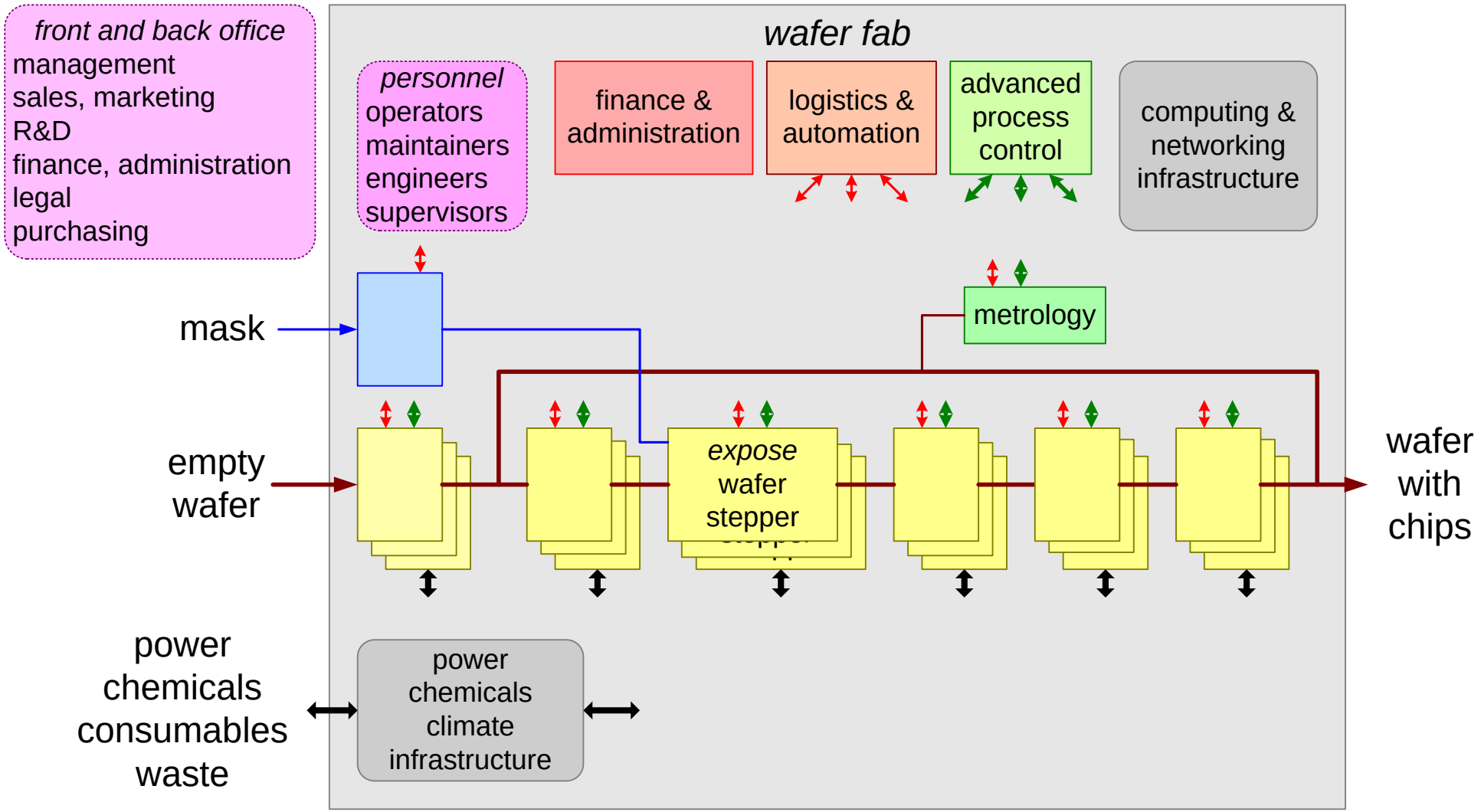
# End-to-End Value-Chain



# Inter-Enterprise

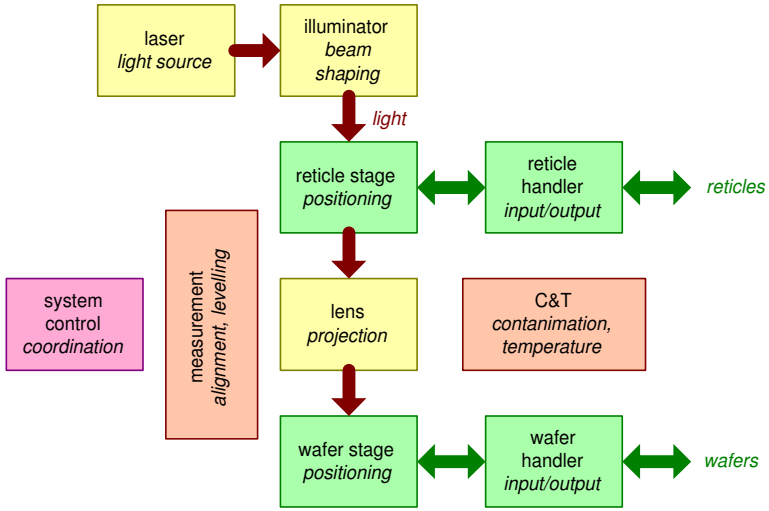


# Enterprise

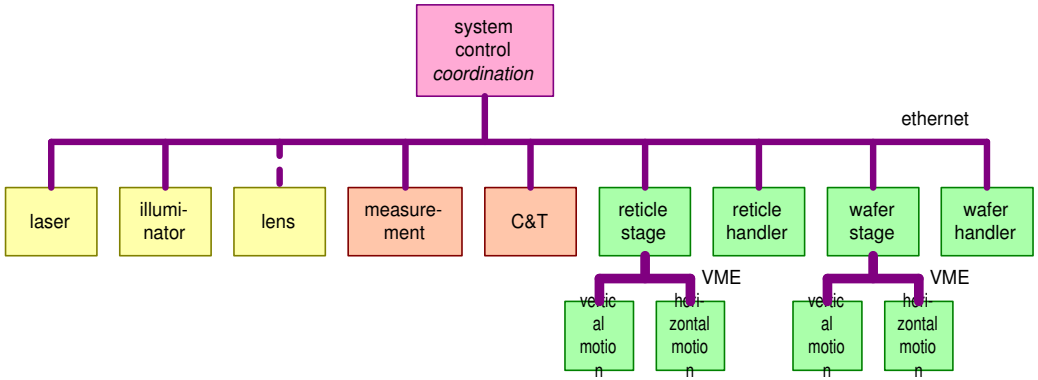


# Wafer Stepper System Views

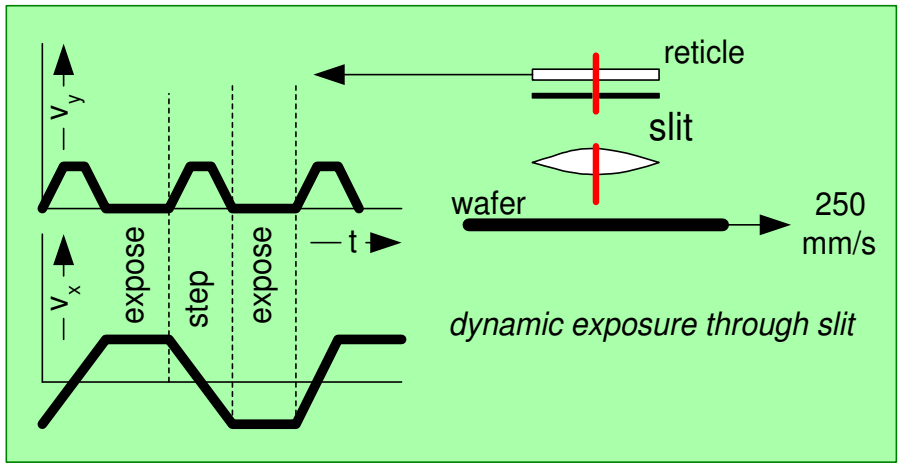
## subsystems



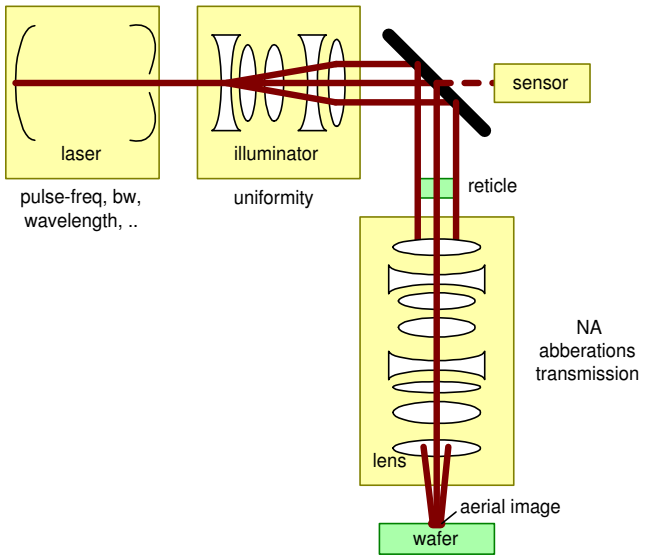

## control hierarchy



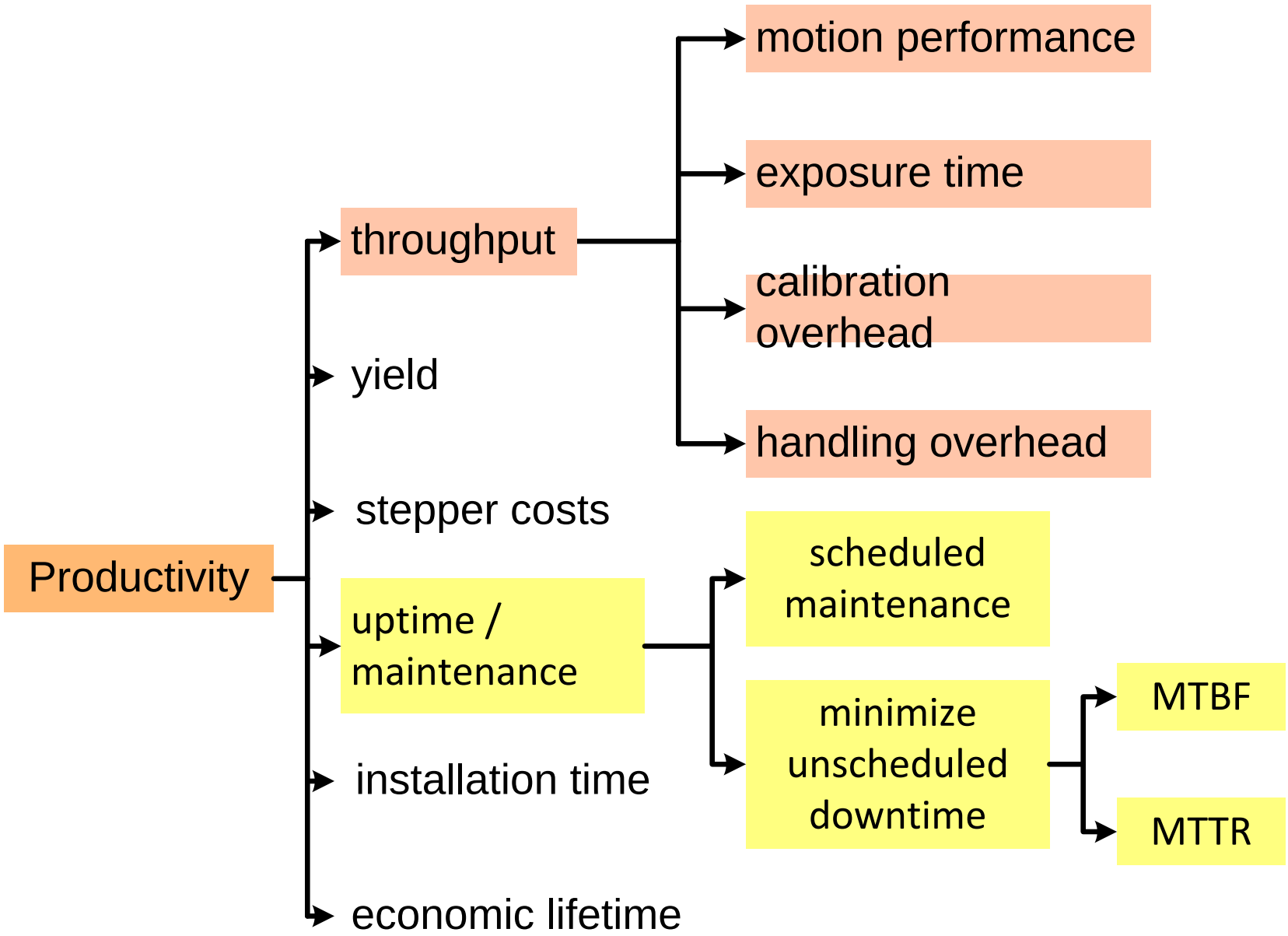

## kinematic



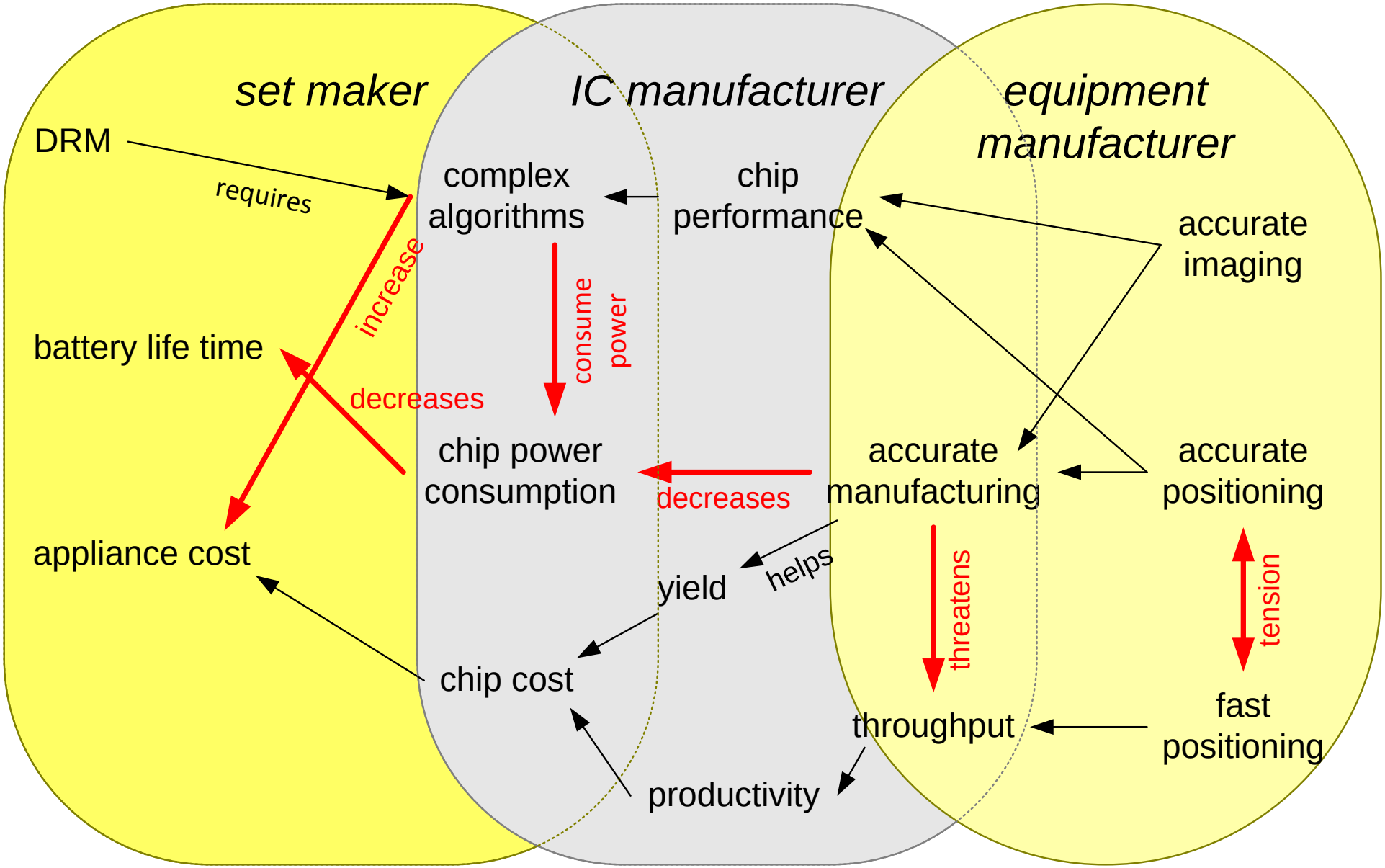

## physics/optics



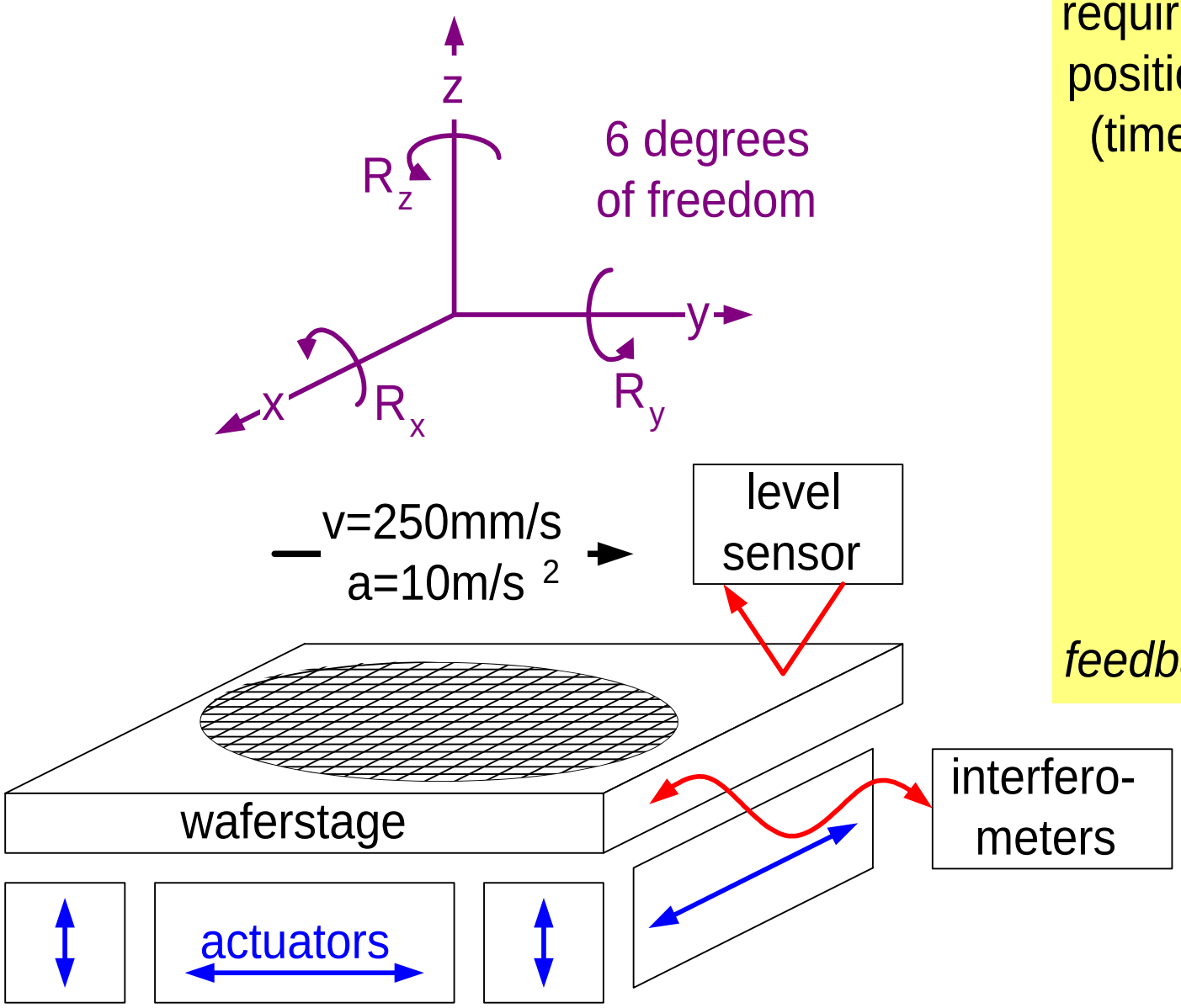
# Productivity Key Driver Decomposition

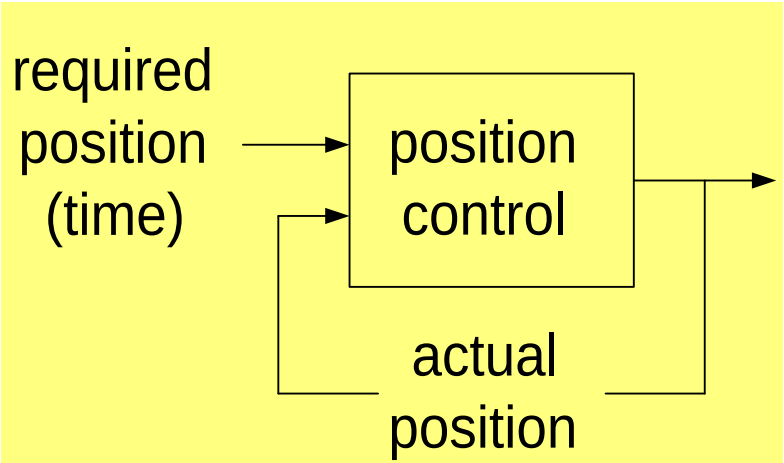


# Relating Key-Drivers



# Stage Positioning

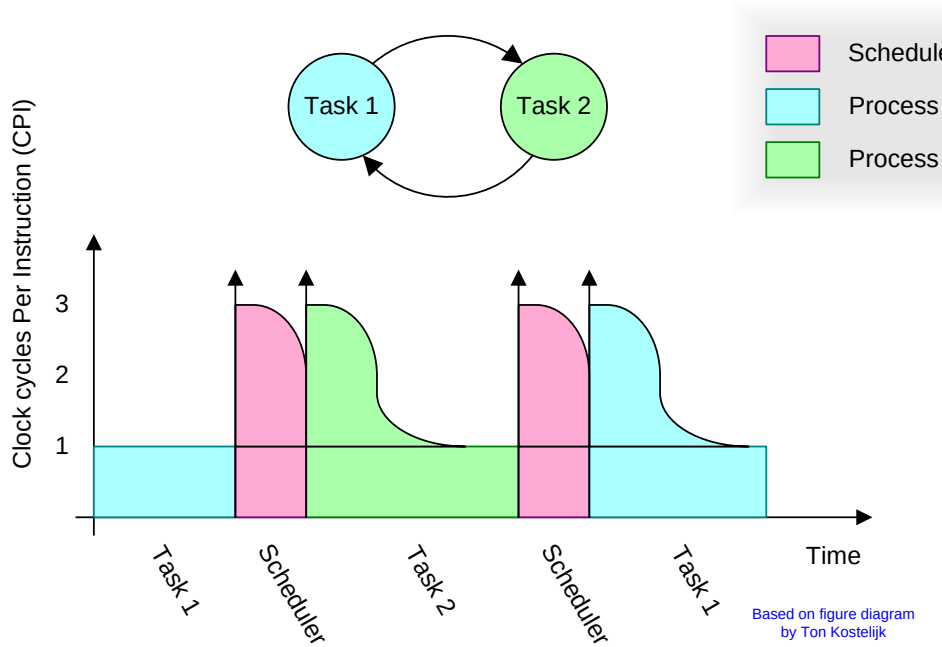


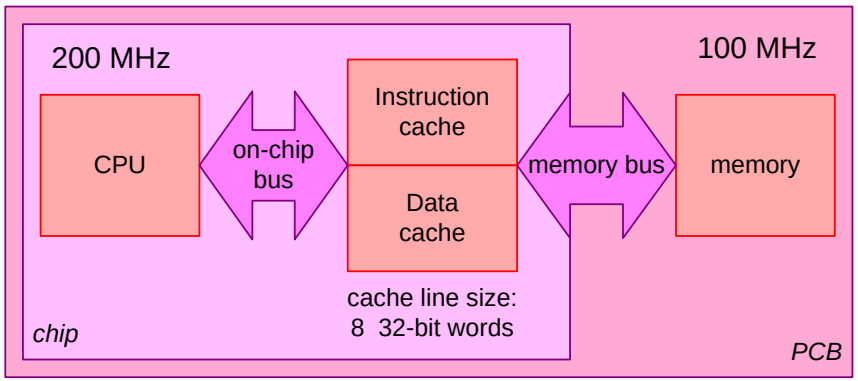




feedback frequency:
4 kHz (250 usec)

*feedback: fast and accurate*

# Characterization of Motion Control Platform




SW
model

+

HW
model

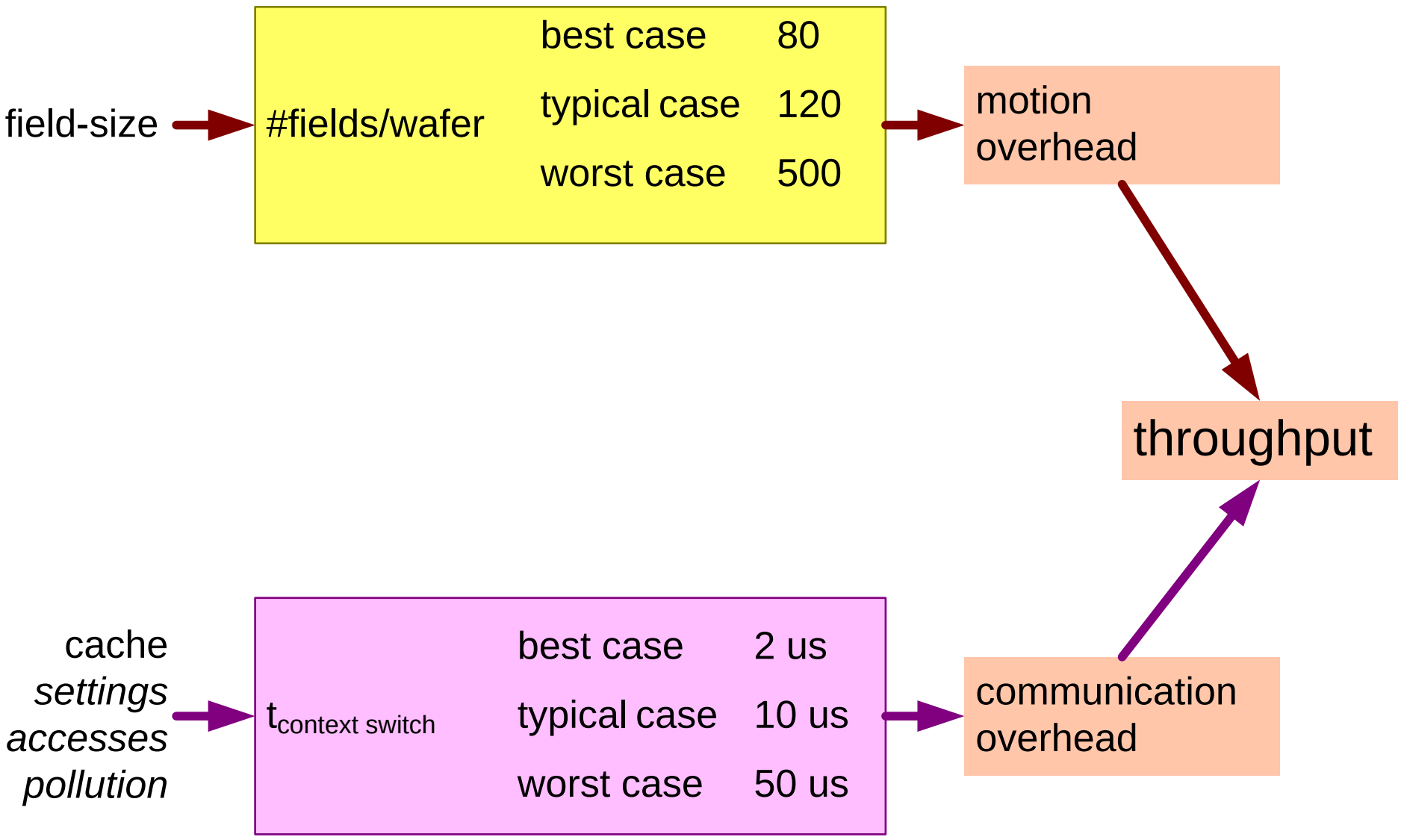
↓

control performance

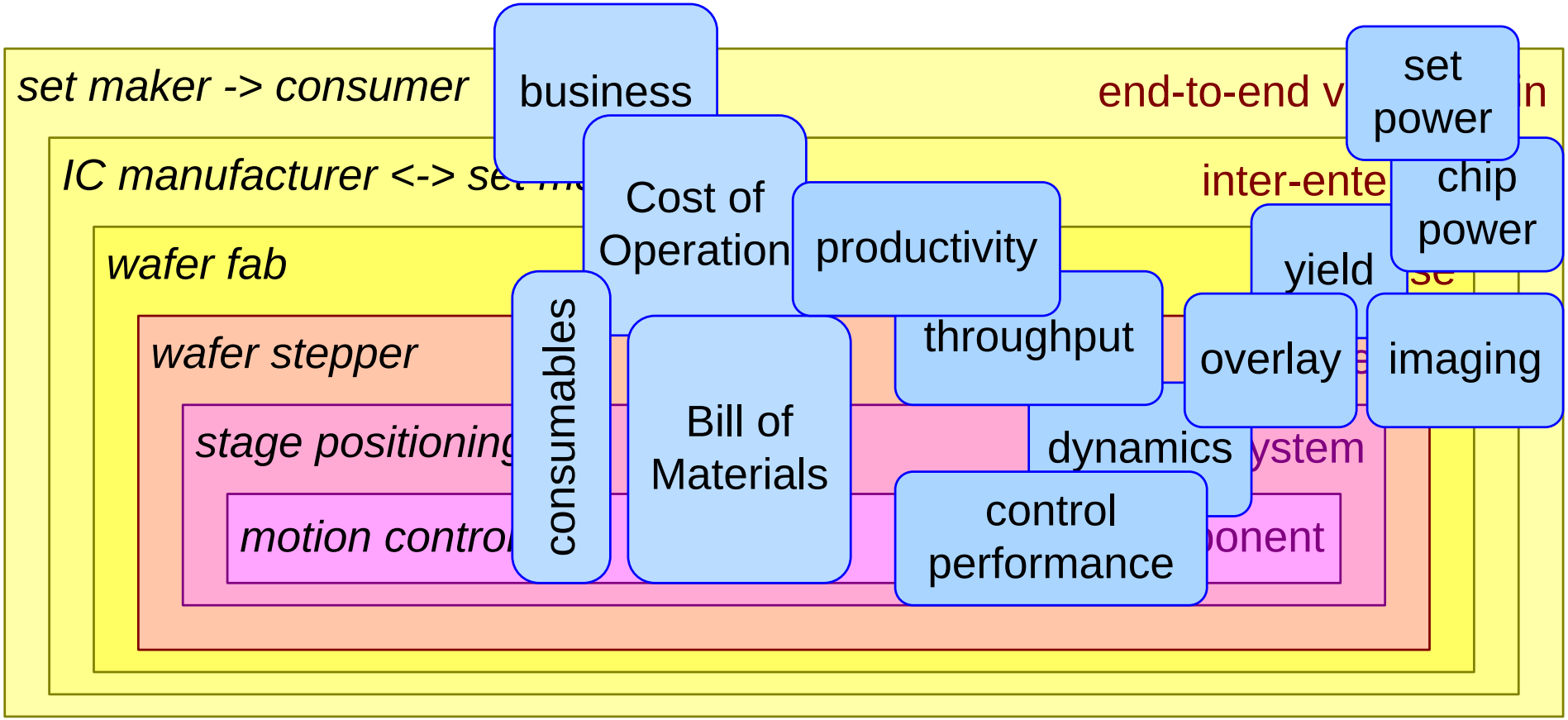
# Quantification Issues

| | |
|---|---|
| requirements analysis | paradigm boundaries<br>application relevance<br>design sensitivity |
| ranges and relations | typical, best, worst case<br>dependencies |
| variation analysis | random vs systematic<br>types of systematic variation<br>time-base, rate of change |
| propagation analysis | amplification or dimming |
| evolution | application, business evolution<br>technology evolution<br>scaling, scaling boundaries |

# Typical, Best and Worst Case Example



# Related crosscutting models at different levels



# Models to be made help to analyse and understand