

# Supplier Systems Engineering Course; Assignments

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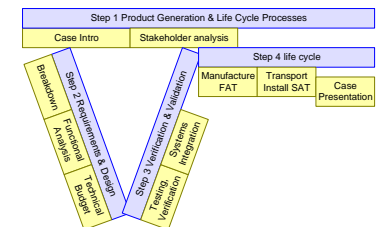
## Abstract

This course focuses on systems engineering in companies that are supplying to an OEM company. The assignments use a case and guide the participants through the V-Model for that case.

### Distribution

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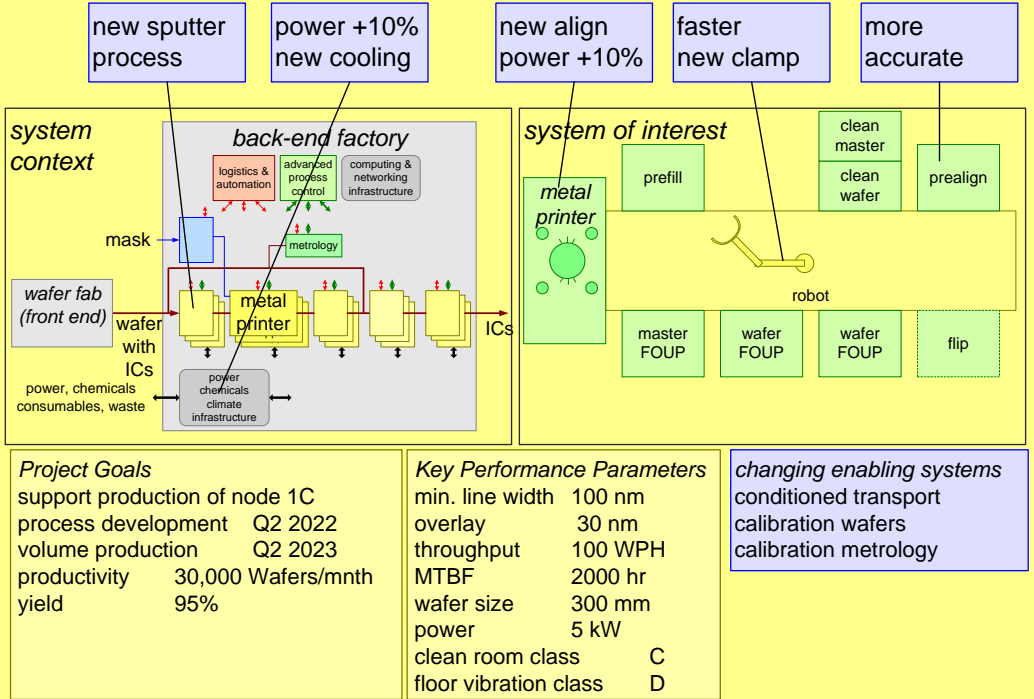


# Case Introduction

Discuss the Project Overview

What are the most relevant project goals?

Sketch the project master plan (the main milestones and their timing)



# Stakeholder Analysis

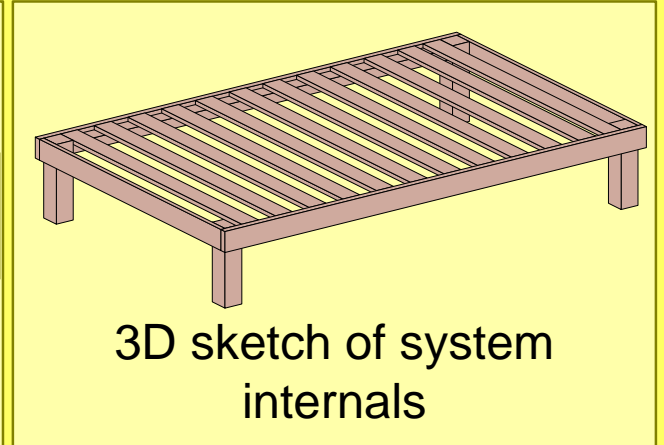
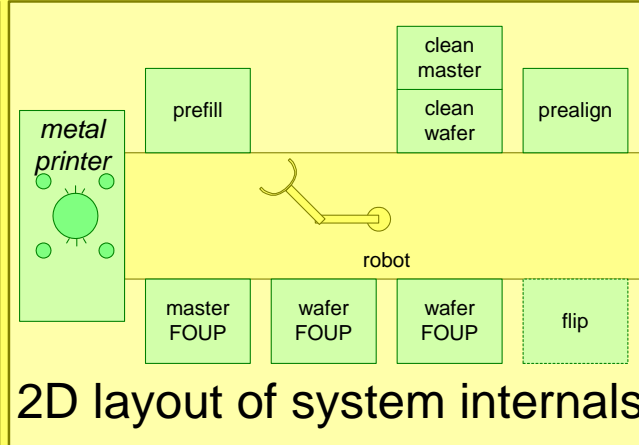
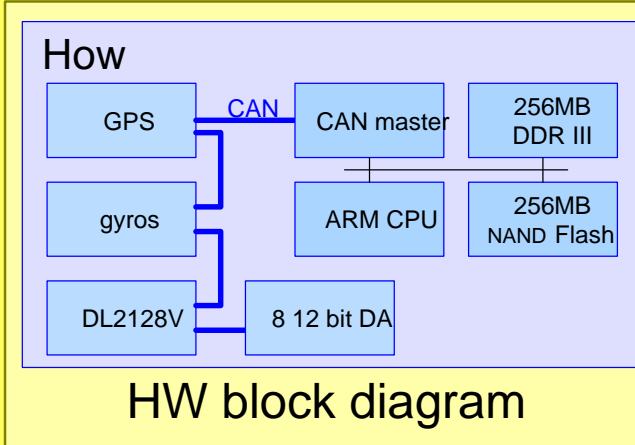
Identify ~10 stakeholders of the project

Determine per stakeholder their ~3 main concerns

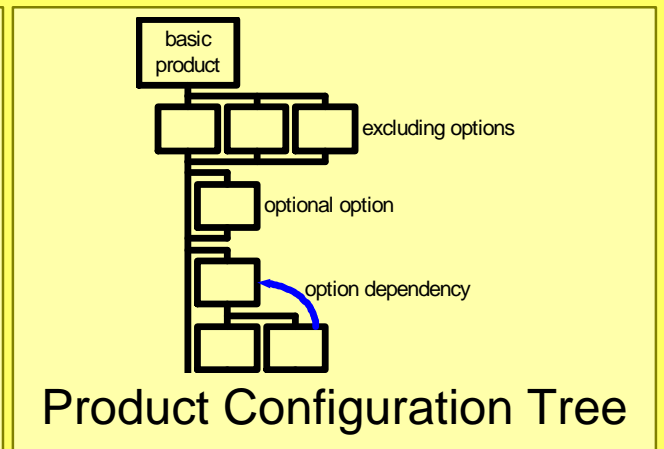
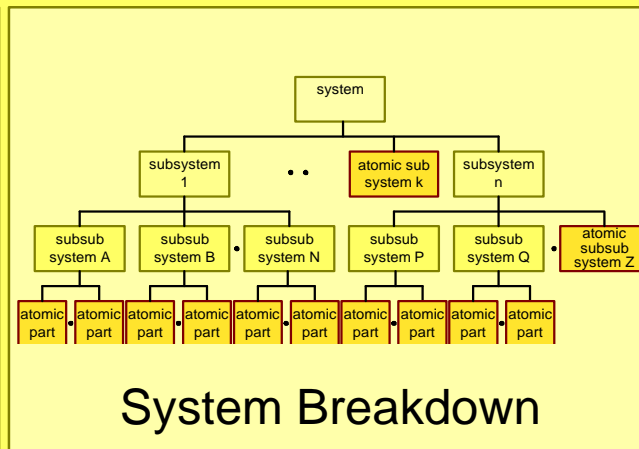
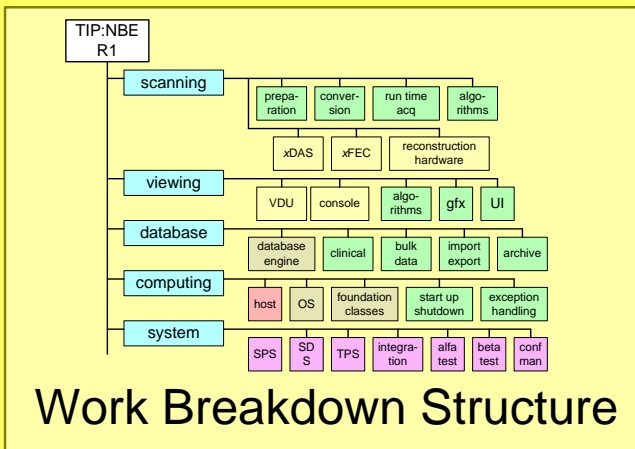
sales manager	price, margin, value proposition
purchaser	purchasing price, delivery date
project leader	delivery date, resources, budget
developer	
integrator	
operator	
maintainer	
...	

# Breakdown

Make a breakdown of your system. Choose 1 representation from below



and select 1 representation from below



# Functional Analysis

Make ~3 functional diagrams showing the behavior of part of the system

### sequence diagram

```

sequenceDiagram
    participant WI as wafer in
    participant WO as wafer out
    WI -->> L1[load]
    L1 -->> M1[move]
    M1 -->> C1[condition]
    C1 -->> M2[move]
    M2 -->> PA[pre-align]
    PA -->> T1[transfer]
    T1 -->> WS[wafer stage]
    WS -->> T2[transfer]
    T2 -->> M3[move]
    M3 -->> U1[unload]
    U1 -->> WO
    
```

### feedback control

required position (time) → position control → actual position

feedback frequency: 4 kHz (0.25 msec)

### light path

laser (pulse-freq, bw, wavelength, ...)

illuminator (uniformity)

sensor

reticle

lens

NA aberrations transmission

aerial image

wafer

### frequency response

$\frac{A_{out}}{A_{in}}$

controller + motor

$A_{in}$  →  $A_{out}$

$f_{set-point}$

### parameter as function of time

load

condition

move

move

t

### swimming lanes

clean wafer

robot

prealign

clean master

prefill

print

0 100b 200b

### state diagram

```

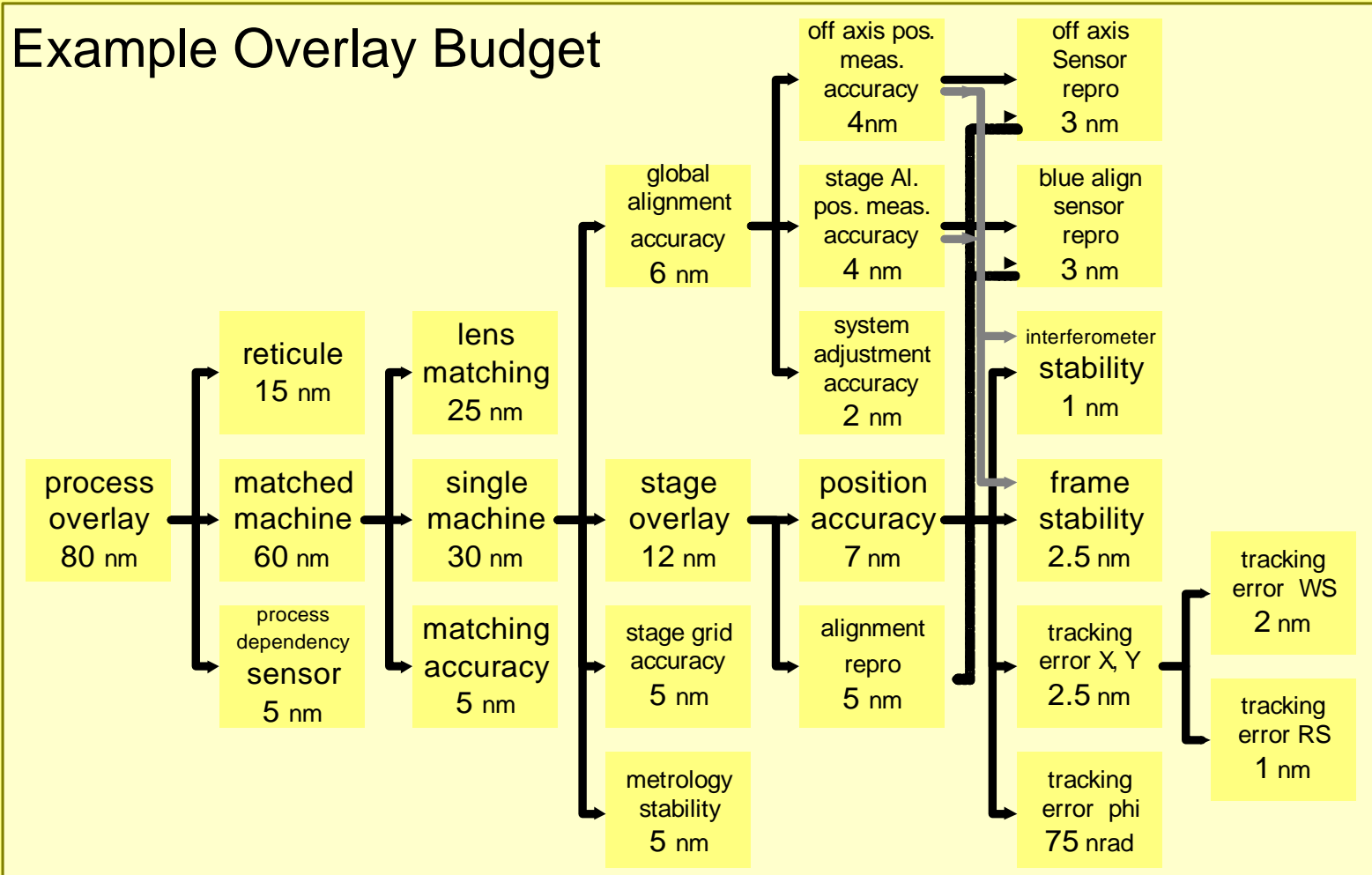
stateDiagram-v2
    state idle
    state operating
    state pre_alarm_mode as pre-alarm mode
    state alarm_mode

    idle --> operating : start
    operating --> pre_alarm_mode : event
    pre_alarm_mode --> operating : reset
    pre_alarm_mode --> alarm_mode : acknowledge
    alarm_mode --> pre_alarm_mode : alarm handle
    
```

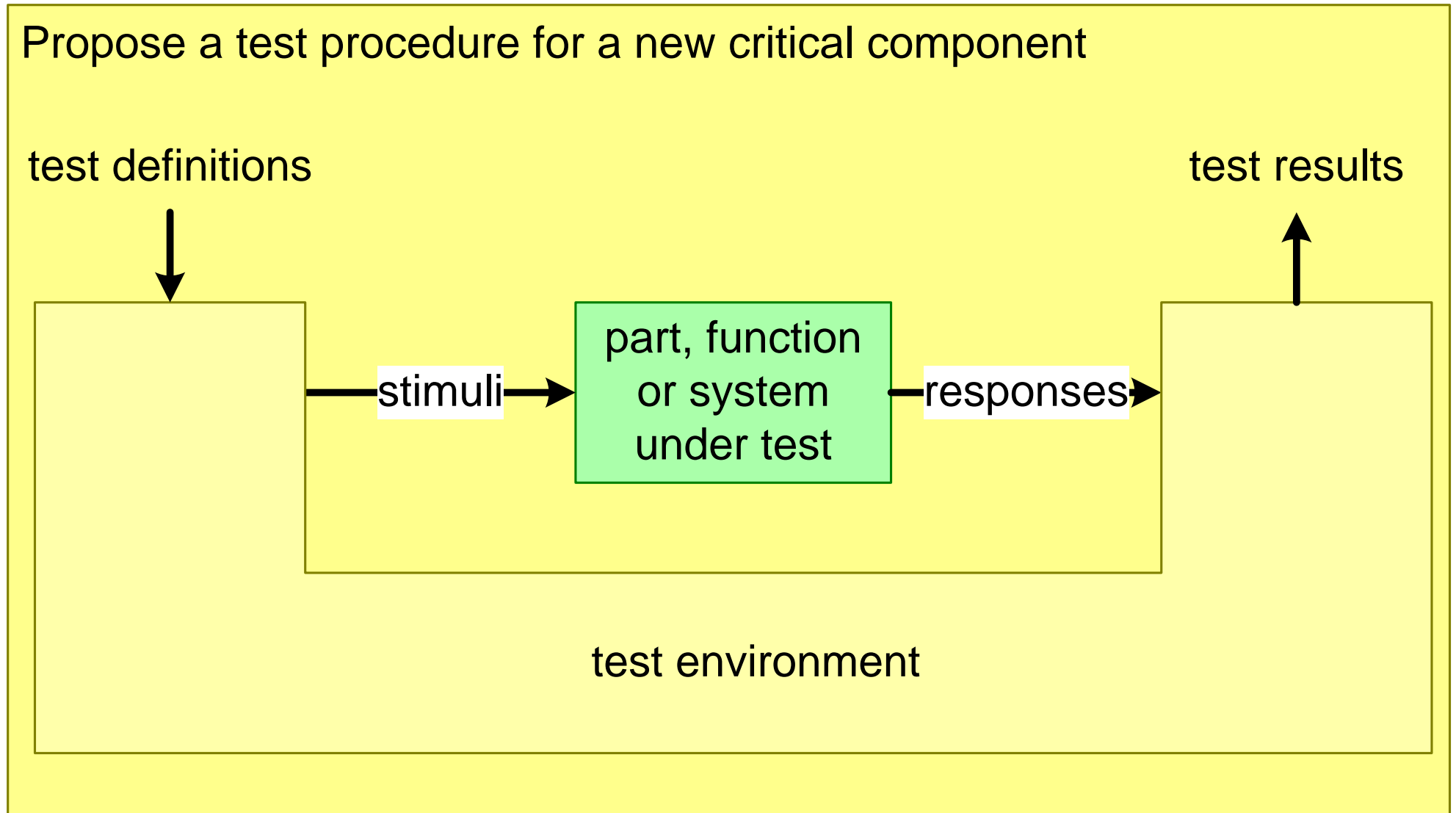
# Technical Budget

Make a technical budget, a breakdown of contributions, for one KPP

## Example Overlay Budget

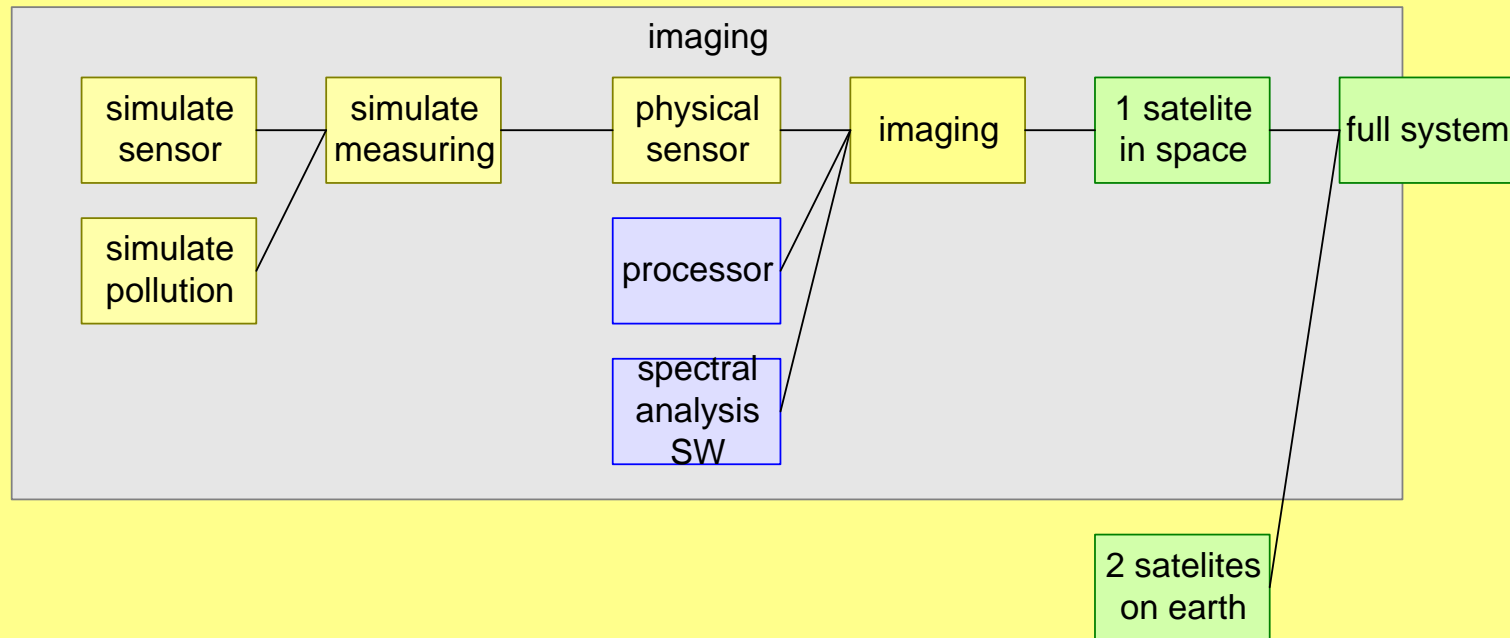


# Testing and Verification



# Systems Integration

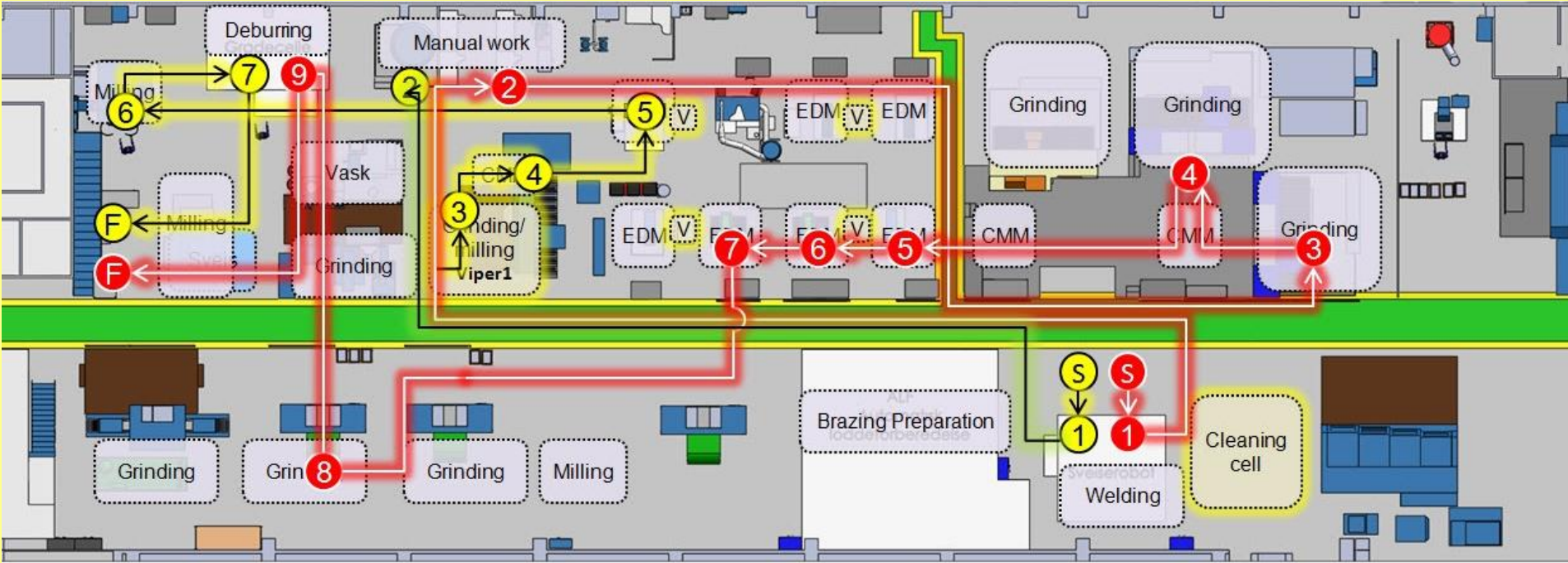
Propose an integration sequence that shows the KPP early





# Manufacturing and FAT

Propose a manufacturing workflow and layout

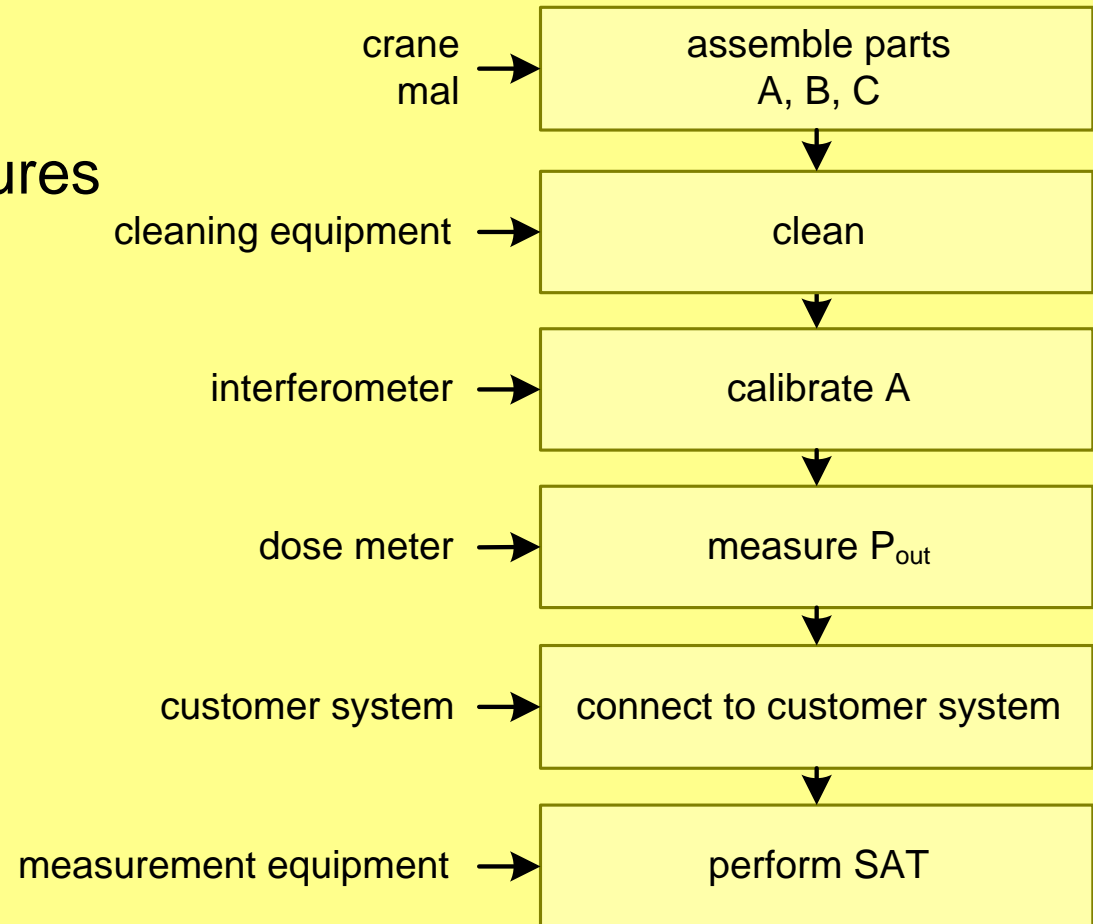


source: [https://gaudisite.nl/INCOSE2014\\_Stalsberg\\_Muller\\_ModelingProductionLine.pdf](https://gaudisite.nl/INCOSE2014_Stalsberg_Muller_ModelingProductionLine.pdf)

# Transportation, Installation, and SAT

Propose an installation workflow at the customer

Identify critical operations and prerequisites like tools and fixtures



# Case Presentation

Make a presentation for the Project Team to explain

- project overview
- master plan
- design
- verification & integration
- life cycle

