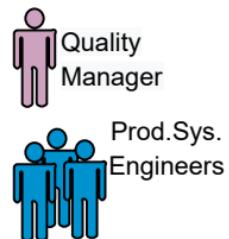


I4.0 Stakeholder questions/concepts



Production quality:
Why is Welding issue rate high?

Resource function:
When is Q. Control sys. error rate high?

What processes or resources influence Throughput?

Production condition > FMEA (DIN 60812) Cause+Effect Network (CEN)

CEN Module A: final production condition

Cause: Resource QC system error rate is high
C12

Cause: Process Positioning is inaccurate
C11

Production effect: Welding issue rate is high
E11



CEN Module B: pre-processing condition

Cause: Positioning parameters are wrong
C22

Cause: Positioning capabilities are insufficient
C21

Process condition: Positioning is inaccurate
c11

CEN Module C: resource condition

Cause: QC Camera capabilities are insufficient
C32

Cause: QC false positives rate is high
C31

Resource condition: QC system error rate is high
c12

Industry 4.0
Information System
Solution Architecture

Production Knowledge/Database

Product, Process, and Resource Asset Network (PAN) for a Cyber-Physical Production System (VDI 3682)

Product Car Body Parts

Process Cleaning

Cleaning System Accuracy

Process Positioning

Positioning System Accuracy

Process Welding

Welding System OK Quantity Cycle time

Product

Positioned Car Body Parts

Cleaned Car Body Parts

Welded Car Body Parts

Variability Model

Resource variants

Scenario diagram showing relationships between Cleaning System, Positioning System, Welding System, and QC Camera.

Production Data Space (PDS, VDI 2206)

Production target conditions

Production variability model

Product, Process, Resource Asset Admin Shells

Production Recipes, Working Range Data

Production Quality/KPI Data, KPI calculation

Answers to stakeholder questions

KPI	Condition	Eval!
QC err. Rate	OK	Green
Cycle time	OK	Green

IS User Interface

IS Business Logic/Queries

```

Scenario: OK -- Good
MATCH pts=(n)
WHERE (n:cause=true or n:effect=true)
AND NOT ((n)-[ppr_conn]-( ))
FOREACH t IN NODES(pts) |
SET t.marker="Diamond,Red"

MATCH pta=(a:ppr)-[]-(b)
WHERE (a)-[ppr_conn]-(b)
AND NOT ((a)-[pda_conn]-( ))
FOREACH t IN NODES(pta) |
SET t.marker="Diamond,Yellow"
  
```