Sustainability Assessment methodology for highly automated industrial manufacturing systems

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Introduction:
- Trends in Manufacturing:
  - 30 million people are employed in the manufacturing sector in the EU
  - Automation & Sustainability are key\(^{(a)}\) to maintain competitive
  - Burden shifting from use stage (e.g. e-Mobility)
  - New ISO 14001/2015: Life cycle perspective in production
- Automotive Manufacturing:
  - Car Body production is highly automated (up to 1,200 robots ≈ 95%)

\(^{(a)}\) Roadmap for Factories of the Future in 2030 developed by European Commission & European Factories of the Future Research Association (EFFRA)

Challenge:
\[ I = P \times A \times T \] \(^{(b)}\)
- Environmental Impact (I) of car sector rises due to population (P) and affluence (A= \( \uparrow \) prosperity \( \uparrow \) mobility) increase \( \rightarrow \) Technology (T) the only lever to decrease impacts
- Increase in car variants, production life-time, infrastructure costs and complexity
- Decrease of time for planning & ramp-up
- Economic data main industry interest
- Life cycle thinking hardly exists in production


Objectives:
Sustainable Manufacturing:
- Assess Sustainability in relation to the final product incl. rebound effects & planetary boundaries
Sustainability in Highly Automated Manufacturing:
- Sustainability Assessment Algorithm for production planning targets to be applied in an economically feasible way
- Identification of when, how and where to implement

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