

# ***Automation of processes in industrial laundries***

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# Outline

- Laundry technology and process automation
- The role of sensors, artificial intelligence, big data etc.
- Critical review on “complete automation” of laundries
- Standardization and regulation processes of laundry technology on the international scale
- How important is the view along the whole textile value chain for the development of novel laundry technology?
- Economic, ecological and socio-technological view on utilization of laundry technology



# ***Laundry technology and process automation – state-of-the-art and view in the future***

**What is the current status of laundry technology?**



# ***Laundry technology and process automation — state-of-the-art and view in the future***

## **Several steps can be automated in standard**

- Washing, extracting and drying
- Shuttles, bag rail systems and conveyors
- Ironing, folding and stacking
- Intralogistics

## **Not yet standard, but feasible**

- Sorting, separating and placing by camera systems and robots\*
- RFID technologies
- Connection of databases to ERP systems

\*Hudetzka, V. White Paper: Detection of foreign elements in laundry articles, <https://inwatec.dk/tag/white-paper/>, 2018.



# ***Comparison between different markets Europe and USA***

## **Cost structure**

- In average lower labor costs and thus a lower automation level

## **Process optimization**

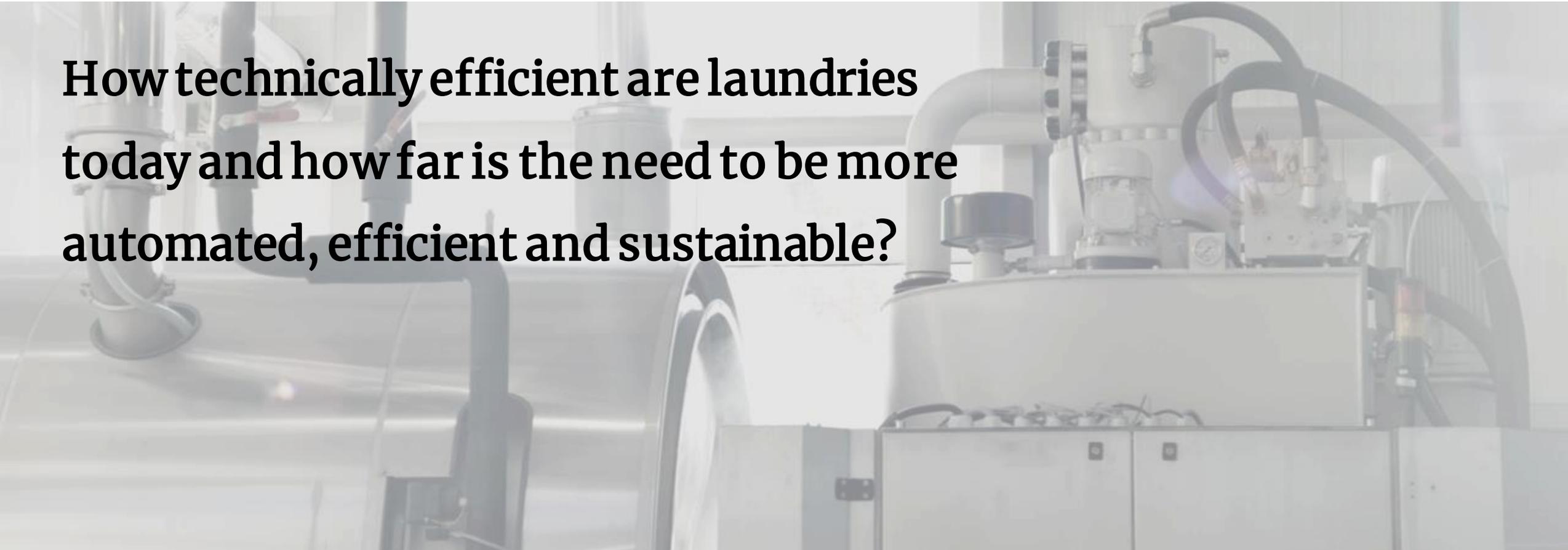
- Trend to increasingly higher hourly capacities and maximum output

## **Energy efficiency**

- Energy consumption is not in focus

# ***Laundry technology and process automation – state-of-the-art and view in the future***

How technically efficient are laundries today and how far is the need to be more automated, efficient and sustainable?



# ***The main factors influencing the automation process***

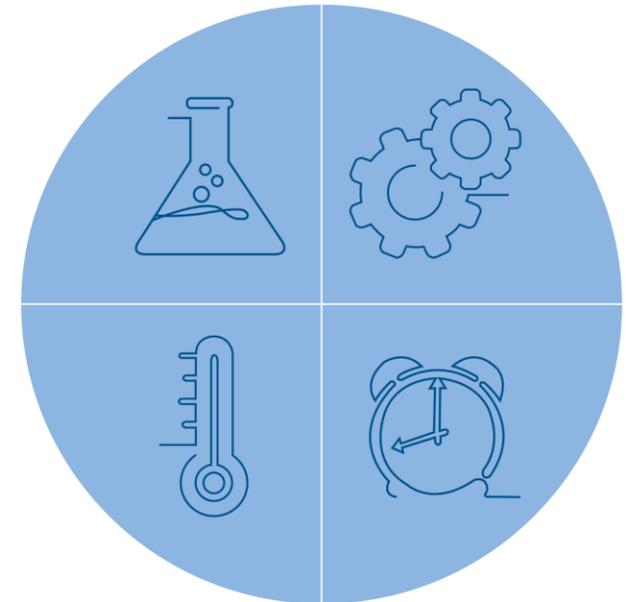
## **Cost pressure**

- Equipment and labor as well as water, chemistry and energy

## **Environmental regulations**

- Air and wastewater pollution, the resources used, such as the consumption of energy and water

## ***Sinner's circle***

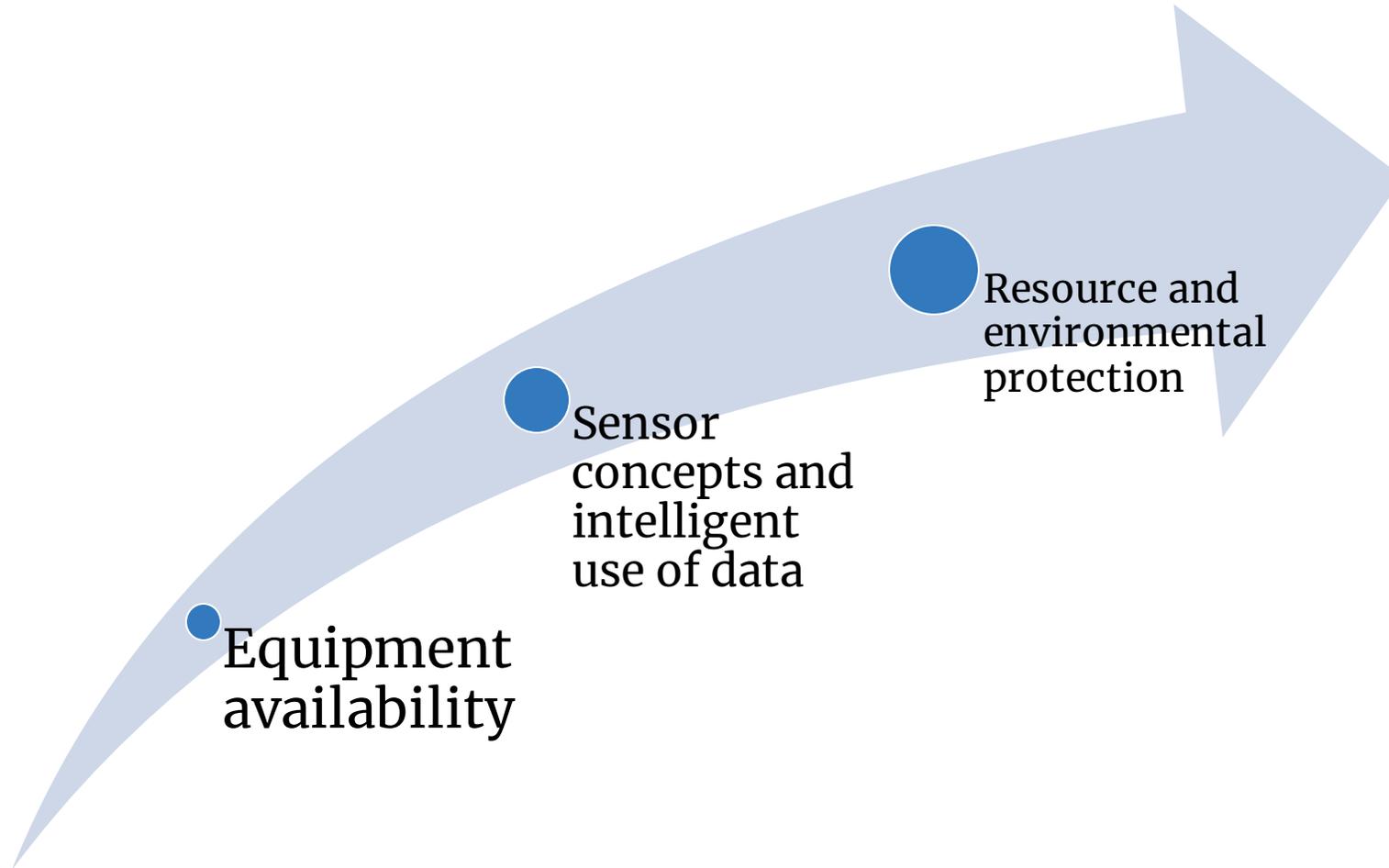


# ***Laundry technology and process automation – state-of-the-art and view in the future***

What are the future trends for  
laundry technology?



# ***Top 3 laundry technology and process automation trends***



# ***The role of sensors, artificial intelligence, big data analytics etc.***

- RFID
- Continuous measurements in the washing process
- Optimally controlled drying process
- Robust and redundant sensor technology
- Detection of wear
- Interaction of process data
- Artificial Intelligence



# ***Critical review on “complete automation” of industrial laundries → Opportunities and challenges***

- Not everything that is technologically possible today makes sense in practical use
- Complexity places higher demands on employees
- Digitalization and new technologies like AR/VR can provide detailed and subject-specific information
- Technology requires massive investment in master data and the interaction of various systems



# ***Critical review on “complete automation” of industrial laundries***

Legal issues remain to be clarified

Responsibility in case of damage or personnel injuries because of system malfunction\*

Data ownership and privacy is unresolved between laundries, equipment manufacturers and chemical suppliers

\*for further information on liability doctrine for autonomous systems see e.g. Marchant, G. E.; Lindor, R. A.

The Coming Collision Between Autonomous Vehicles and the Liability System *Santa Clara Law Review* 2012, 52, 1321-1340.

# ***Standardization and regulation processes in laundry business on the international scale***

- Different standards and guidelines increase efforts and costs
- Specialists must be involved
- Special solutions for different markets



# ***How important is the view along the whole textile value chain for development of novel laundry technology***

- Complexity requires a close cooperation between laboratories, institutes and manufacturers of sensors and machines
- Identifying critical resources and aligning the associated processes
- Standardized interfaces and data formats
- Development of novel fibers
- New business models



# ***Economic, ecological and socio-technological view on the utilization of laundry technology***

The question of the break-even point of economics of automation of laundry processes cannot be answered universally, it depends on:

- Local labor costs
- Local market and pricing
- Amount of investment
- Utilization of resources
- Demand of environmental protection



# ***Economic, ecological and socio-technological view on the utilization of laundry technology***

## **Regulations**

- Stricter requirements and environmental regulations

## **Laundry equipment**

- Environmental protection has a growing influence on the development of laundry technology

## **Customer satisfaction**

- Increasing focus of the end customers on the environmental issues

# ***Economic, ecological and socio-technological view on the utilization of laundry technology***

- The focus is on optimizing the interface between man and machine\*
- The goal is to display even complex information as easily and transparently as possible
- For example, Lavatec has developed novel control interfaces and the “osLaundry” concept

\*see also e.g. Dhiman, H.; Röcker. C Worker Assistance in Smart Production Environments using Pervasive Technologies *CoMoRea'19 - 15th Workshop on Context Modeling and Recognition 2019*, 95-100.



# ***Future of process automation in industrial laundries: Summary***

- Simple manual activities will gradually be eliminated
- Need for higher qualified employees
- The complexity for the employee remains manageable
- Diagnostic and remote maintenance functions
- Major challenges will be faced by manufacturers of machines and equipment
- Platforms and marketplaces may change the market



# ***Future of process automation in industrial laundries: Summary***

Therefore, the entire laundry industry needs to answer the urgent questions of the future:

- What expectations will the customers have in the future?
- How will customer relationship change in the future?
- Are there any requirements beyond the need for clean laundry?
- Which services lead to greater customer benefit?
- How can digitalization be used to increase transparency and efficiency in the overall process?



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