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WOOD FOR THE FUTURE:
INTEGRATING SUSTAINABILITY ACROSS INDUSTRIES

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Title of the paper: *Opportunities for Digitalization and the Circular Economy in the Wood Technology Sector*

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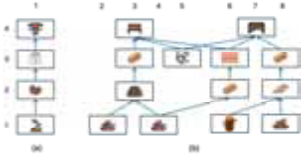
Introduction

- Increasing environmental and regulatory pressure on the wood sector
- Industry 4.0 opens new possibilities for circularity
- Goal: Analyze how digital tools support sustainable transformation

Technologies Transforming the Sector

- **IoT:** Real-time monitoring of drying, cutting, and batch tracking
- **AI:** Predictive maintenance, optimization, quality control
- **Blockchain:** Traceability, smart contracts, fraud prevention
- **Big Data:** Decision-making, simulation (digital twins), planning
- **ERP Systems & Digital Twins:** Integrated operations management, real-time planning, improved responsiveness





Not just concept…

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Circular Economy Strategies

Reuse & Recycling

- AI-powered sorting of wood waste
- IoT tracking for material origin and condition

Product Lifecycle Extension

- Modular design for easy repair and reuse
- Digital platforms for resale and refurbishment
- BIM (*Building Information Modeling*) tools for material tracking and reuse in construction

Sustainable Forestry

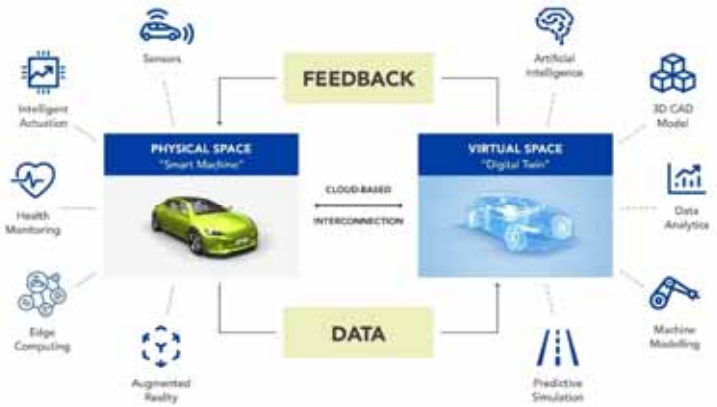
- IoT-based forest monitoring (LiDAR, drones, carbon tracking)
- AI for predicting deforestation and improving biodiversity management

Lessons from Other Sectors

Automotive

- Digital twins → simulate lifecycle, reduce waste & improve recycling
- Blockchain → supply chain transparency (Renault, Volvo)

Inspiration: trace certified wood & optimize processing



Lessons from Other Sectors

Manufacturing

- IoT sensors → 30% less downtime (Siemens)
- Cloud analytics → optimize energy & equipment use (GE)
  - *Inspiration: smart sawmills & drying processes*

Lessons from Other Sectors

Textiles

- AI → sorts fibers for recycling (Refiberd)
- Resale platforms → extend product life (ThredUp, Vinted, Patagonia)
- Circular design tools → suggest recyclable materials

Inspiration: AI for wood residues & reuse platforms

Lessons from Other Sectors

- **Construction**
- BIM → tracks materials across lifecycle
- IoT & modular design → enable reuse of elements
- Material passports → record origin & composition

  Inspiration: wood product passports for reuse & recycling

Challenges & Future Steps

- High costs & lack of digital skills
- Data security and lack of standardization
- Need for policy support and cross-sector collaboration

Recommendations

- Public funding & incentives
- Training and upskilling programs
- Research & collaboration platformss

Conclusion

- Digitalization and circular economy are mutually reinforcing
- Wood sector can benefit greatly from tailored applications
- A coordinated, multi-stakeholder approach is needed

Thank you for your attention!