

Unit 1-3: Collaborative Discussion 1: The 4th Industrial Revolution

Instructions:

- Identify a specific incident (not covered in your reading list) where the failure of an information system has had a significant impact.
- Your post could consider a range of impacts of the failure, including: the implications to customers, the economic cost, the reputational cost, or any other relevant impacts.
- Review lecturecast 1 and read papers provided in the references list.
- Go to the discussion forum and create an initial post of your contribution to the discussion.
- You should demonstrate that you understand the topic covered and ensure you use references to academic literature (journals, books, reports, etc.).

Learning Outcomes:

- Understand the applicability and challenges associated with different datasets for the use of machine learning algorithms.
- Systematically develop and implement the skills required to be an effective member of a development team in a virtual professional environment, adopting real-life perspectives on team roles and organisation.

Initial Post:

Lecturecast 1 made it clear, Industry 4.0 gave us real-time big data, machine learning, and smart systems. Where statistical models describe patterns without needing training, machine learning models predict and learn from real time data. That's what powers today's connected vehicles, including F1 and fleet telematics systems like Cartrack. We've moved from monitoring and being reactive to reacting in real time and being proactive.

Industry 5.0, as explained by Metcalf (2024), goes a step further, bringing humans back into focus. The tech isn't just about efficiency anymore, it's about resilience, ethics, and working alongside people. In my field, Data Science in vehicle tracking, this means smarter dashboards that support, not override, human decision-making. In F1, it's about tech enhancing the pit wall without removing driver instinct.

Case Example: F1 IT Outage at the 2024 Hungarian Grand Prix

At the Hungarian GP in 2024, Mercedes experienced a full-scale IT failure that shut down access to live data. Engineers had no real-time telemetry, no tire models, and no strategy simulations (Smith 2024). They had to operate purely on instinct and past experience, completely opposite to what Industry 4.0 promises. This caused major disruption:

- Strategic breakdown: No access to predictive analytics for race planning.
- Customer impact: Viewers missed out on telemetry overlays and insights.
- Economic loss: Potential points lost, along with sponsor and performance bonuses.
- Reputational hit: Questions were raised about system reliability at the highest level.

This highlights what Metcalf (2024) warns about, without built-in resilience, even the most advanced systems can collapse under stress.

What We're Learning

From a data science point of view, systems need failovers. The more we integrate AI, the more important it becomes to understand what happens when it doesn't work. Recent work by Siam et al. (2023) shows how machine learning can track driver stress through biosignals like ECG and GSR. Yass and Faris (2023) shows how YOLO (You Only Look Once) and tracking algorithms help detect wrong-way vehicles. These advances are powerful—but as F1 showed us, they're not invincible.

References:

- Nousala, S., Metcalf, G., Ing, D. (2025) Industry 4.0 to Industry 5.0: explorations in the transition from a techno-economic to a socio-technical future. Available at: <https://www.tandfonline.com/doi/full/10.1080/09537287.2025.2484571>. [Accessed 9 May 2025]
- Smith, H. (2024) IT outage causes F1 chaos as Sky Sports issue apology and Mercedes made to suffer. Available at: <https://www.express.co.uk/sport/f1-autosport/1925428/IT-outage-Hungarian-Grand-Prix-Mercedes>. [Accessed 9 May 2025]

Siam, AL., Gamel, SA., Talaat, FM. (2023) Automatic stress detection in car drivers based on non-invasive physiological signals using machine learning techniques. Available at: <https://link.springer.com/article/10.1007/s00521-023-08428-w>. [Accessed 9 May 2025]

Yass, WG., Faris, M. (2023) A Comprehensive Review of Deep Learning and Machine Learning Techniques for Real-Time Car Detection and Wrong-Way Vehicle Tracking. Available at: <https://mesopotamian.press/journals/index.php/BJML/article/view/594>. [Accessed 9 May 2025]

Peer Reviews:

Opeyemi Adeniran:

You've shown the fragility of real-time systems in high-stakes environments like Formula One remarkably well. The Hungarian GP shortage is a textbook example of why resilience planning needs to match technological ambition. A basic redundant telemetry system, either cloud-based or locally remote, could be a backup to ensure strategic continuity. As Metcalf (2024) and Industry 5.0 thinking emphasise, human insight must be supported but not stranded by tech. The more we rely on machine learning, the more important it becomes to simulate failure modes, not just maximise outcomes. Given this, do you think high-tech industries like motorsports should adopt mandatory resilience training, similar to the cybersecurity red team?

Summary Post:

My initial post explored how the evolution from Industry 4.0 to Industry 5.0 impacts real-time systems in connected vehicles, focusing particularly on the F1 IT outage during the 2024 Hungarian Grand Prix. This incident revealed how even the most advanced systems can fail catastrophically without built-in resilience. I then connected this to my work in vehicle telematics, where smart dashboards now empower rather than replace human decision-making.

A key point raised by Opeyemi's thoughtful feedback was the need for redundancy in real-time systems—such as fallback telemetry or local cloud-based backups—to mitigate the risks of complete data loss. This reinforces Metcalf's (2024) view that Industry 5.0 is not just a technological evolution, but a socio-technical shift that places human resilience and adaptability at the forefront.

Opeyemi's suggestion about mandatory resilience training in high-tech industries is especially relevant. Just as red team exercises stress-test cybersecurity, failure simulations in machine learning applications could prepare teams for real-world breakdowns. This could be invaluable in motorsports and fleet management, where real-time decision-making is business-critical.

In conclusion, the transition from Industry 4.0 to 5.0 demands not just smarter systems, but more human-centric, fail-safe designs. As data scientists, we must plan not only for optimal outcomes but also for inevitable system disruptions—supporting human judgment, not replacing it.

References:

Nousala, S., Metcalf, G., Ing, D. (2025) Industry 4.0 to Industry 5.0: explorations in the transition from a techno-economic to a socio-technical future. Available at:
<https://www.tandfonline.com/doi/full/10.1080/09537287.2025.2484571>. [Accessed 25 May 2025]