15. Transformation in the automotive sector: the management challenges of AI and the digital revolution

Karin A. King and Aurelie Cnop

This case summarises the key drivers of change in work and job design caused by Industry 4.0, digitisation and the use of AI. It examines the complexities of designing jobs that motivate the workforce from both managerial and employee perspectives within the rapidly evolving digital landscape.

Describing a fictional organisation – a British luxury automobile manufacturer named Insignia – and its employees, this case provides a rich source of material for exploring a wide range of HR management, digital transformation, change management and job design questions. The issues explored in this case include:

- **Digital transformation, Industry 4.0 and the rise of AI**. The implementation of these technologies has led to significant improvements in productivity, agility and customisation. However, these advancements also present challenges, including the need for substantial investment, cybersecurity concerns and the necessity for workforce re-skilling to operate and collaborate with these advanced systems.
- **Impact on work and human-AI collaboration.** Integrating AI and automation tools into the workplace impacts workforce morale significantly.
- **Job design, talent management and retention.** As Insignia transitions into Industry 4.0, job roles need to be redefined to include digital competencies and the use of AI-based tools. The effective management of talent is a priority to ensure a workforce with the required mix of skills, experience, potential for development and advancement, and engagement.

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- **Change management.** Managing resistance to change is a significant challenge during digital transformation.

Guidance on how to write a case analysis can be found in Chapter 1, 'Business cases: what are they, why do we use them and how should you go about doing a case analysis?'.

A teaching note for this case is available to bona fide educators. To request a copy please email a.cnop@lse.ac.uk or k.a.king@lse.ac.uk.

Introduction

> Disruptive innovation generates growth. Sustaining innovation makes good products better – but then you don't buy the old product. They're replacements. They do not create growth. (Clayton Christensen 1997)[1]

Digital transformation in the automotive industry is driving significant change in business models, in customer expectations and in organisations and their workforces. As technology is rapidly progressing, present-day organisations are confronted with massive changes. These technological changes are particularly affecting the design of work in the way in which employees work in organisations as well as the conditions under which they do so.

This case considers the rapid digitisation of industry and its consequences for human resource management, specifically the design of work and jobs in light of the use of AI. As a management sciences topic, to consider the topic as it occurs in context, this case study directs the learner to the automotive sector specifically and the use of AI in the sector. Given the significant demands on industry to adopt emerging technologies to remain competitive in today's global economy, how should workplace and job design evolve in keeping with the new landscape in which digitisation and the use of AI are becoming ever more prominent?

The company: Insignia

In the sprawling industrial complex of Insignia, nestled in the heart of the UK's manufacturing belt, the hum of machinery harmonises with the digital symphony of advanced robotics and AI systems. Insignia, a leader in the luxury automobile manufacturing sector in the United Kingdom and Europe (conceived of for the purpose of this case study), stands at the forefront of the Industry 4.0 revolution, that is, the fourth industrial revolution, which is now well underway. The original industrial revolution was brought about by the invention of the steam engine. This was followed by the second

industrial revolution, powered by the onset of electricity and subsequently by the development of automation and machines, which drove the momentum of the third industrial revolution. Now, in the fourth industrial revolution, intelligent computers are demonstrating unprecedented pace and disruption in their influence on the future of work.[2]

Competing with prestigious brands like Rolls-Royce, Bentley, and the multinational Bayerische Motoren Werke AG (BMW), Insignia epitomises the challenges and opportunities facing contemporary automotive manufacturers. Founded by Sir Edward Thornhill in 1955, Insignia began with a mission to blend traditional craftsmanship with modern technology to create luxury vehicles that epitomise elegance and performance. Thornhill, a passionate engineer and designer, was inspired by the idea of creating cars that were not only functional but also works of art. His vision was to develop vehicles that offered unparalleled driving experiences while exuding sophistication and style.

In its early years, Insignia gained a reputation for producing handcrafted vehicles that featured intricate detailing and superior materials. Each car was meticulously assembled by skilled artisans who took pride in their work, ensuring that every Insignia vehicle was unique. This commitment to quality and exclusivity quickly set Insignia apart from other manufacturers and established it as a symbol of luxury and prestige.

Insignia's competitor landscape

The luxury automobile sector in the UK is highly competitive, with formidable players such as Rolls-Royce and Bentley, both of which have a storied history and a reputation for excellence. Over the past 20 years, the UK luxury car market has experienced significant growth, driven by advancements in technology, the rise of EVs, and changing consumer preferences.[3] Retail sales in the UK luxury car market are projected to grow at a compound annual growth rate (CAGR) of 6 per cent from 2023 to 2028, reaching £33.9 billion. This growth is underpinned by several factors, including the continuous introduction of new models, the expansion of luxury brands into electric and hybrid vehicles, and the increasing purchasing power of consumers. Overall, the global luxury car market is expected to grow from US$410 billion in 2022 to US$566 billion by 2028, reflecting a CAGR of 5.5 per cent.[4] Additionally, consumer preferences have also evolved significantly, with a growing emphasis on sustainability, personalisation and connectivity. Younger, affluent buyers are increasingly looking for vehicles that reflect their values and lifestyle choices. This demographic is more likely to prioritise eco-friendly options and cutting-edge technology over traditional markers of luxury. A study by Deloitte indicates that 48 per cent of consumers in the luxury car market are willing to pay a premium for sustainable vehicles, underscoring the shift towards greener options.[5] Moreover, according to a survey by J.D. Power, 55 per cent of luxury car buyers are looking for enhanced connectivity features in their vehicles.[6]

The main UK luxury automobile companies are:

- **Rolls-Royce**: Founded in 1906, Rolls-Royce is synonymous with ultimate luxury and precision engineering. Known for their meticulous attention to detail and bespoke craftsmanship, Rolls-Royce vehicles are often considered the pinnacle of luxury cars. Their model lineup includes iconic names like the Phantom, Ghost and Cullinan. Each car is custom-built to the buyer's specifications, with options for unique materials, intricate designs and state-of-the-art technology. Rolls-Royce's commitment to innovation can be seen in their adoption of advanced materials and cutting-edge technologies, such as the use of carbon fibre and lightweight aluminium in their chassis designs. Furthermore, their focus on sustainability is evident through their research into electric drivetrains and other eco-friendly technologies, positioning them as a forward-thinking leader in the luxury automotive market.
- **Bentley**: Established in 1919, Bentley offers a unique blend of performance and luxury. Their vehicles, such as the Continental GT and Bentayga, are renowned for their powerful engines and opulent interiors. Bentley's emphasis on combining speed with comfort sets them apart from other luxury car manufacturers. Bentley has also been at the forefront of technological innovation, incorporating features such as advanced driver assistance systems, hybrid powertrains and sophisticated infotainment systems into their vehicles. Their investment in hybrid and electric technologies aligns with global trends towards more sustainable automotive solutions, ensuring they remain competitive in an evolving market.
- **Aston Martin**: Another key competitor in the UK luxury car market is Aston Martin. Known for its association with James Bond, Aston Martin epitomises British luxury and performance. Models like the DB11 and Vantage offer sleek designs coupled with powerful engines. Aston Martin has also ventured into the realm of EVs with the introduction of the Rapide E, showcasing their commitment to innovation and sustainability. Aston Martin's focus on exclusive, high-performance sports cars appeals to a niche market of enthusiasts who value both style and substance. Their continued investment in new technologies and partnerships, such as their collaboration with Mercedes-Benz for electric vehicle technology, ensures they remain a significant player in the luxury automotive sector.

Embracing innovation

Over the decades, Insignia has continuously embraced innovation, adapting to market demands while maintaining its core values. The 1970s and 1980s saw Insignia integrating advanced engineering techniques and materials into their

designs, such as the introduction of lightweight aluminium frames and high-performance engines. This period also marked the beginning of Insignia's foray into the world of motorsport, where it showcased its engineering prowess and gained further acclaim.

Meanwhile, Insignia's UK rivals, such as Rolls-Royce and Bentley, were also advancing greatly. Rolls-Royce continued to set benchmarks for luxury and precision, becoming synonymous with high-end, bespoke automobiles. Bentley, on the other hand, was making a name for itself with its powerful and luxurious cars that blended performance with comfort. Both brands, like Insignia, focused on innovation and quality, but each had its unique approach and market segment.

Rolls-Royce, known for its meticulous attention to detail and handcrafted elements, maintained its reputation through continuous improvement and the introduction of advanced technologies in their production processes. Bentley's emphasis on performance and luxury appealed to a different customer base, those seeking both speed and sophistication in their driving experience. These brands, along with Insignia, represented the pinnacle of automotive excellence in the UK, pushing each other to innovate and excel in an increasingly competitive market.

The Industry 4.0 revolution and the automotive sector

The adoption of Industry 4.0 technologies in the automotive sector is driving substantial growth and innovation. The global market for Industry 4.0 technologies is projected to grow from US$94.42 billion in 2023 to US$241.58 billion by 2028, at a CAGR of 20.67 per cent.[7] The implementation of digital technologies like AI, internet of things (IoT), and robotics in automotive manufacturing has led to significant improvements in key performance indicators (KPIs) such as productivity, agility and customisation.

For example, smart factories utilising AI and IoT can predict maintenance needs, reducing unplanned downtime by up to 25 per cent and enhancing overall efficiency.[8] This includes advanced digital capabilities that are known as 'digital twins' and 'digital threads', which make use of virtual representations of the physical assets and processes that companies can use to run simulations of how the asset and process will function in the real world.[9] In addition to predicting maintenance requirements, the integration of digital twins and digital threads allows companies to create real-time digital duplicates of physical objects, optimising business performance and accelerating the innovation curve.[10] Overall, the digital transformation enabled by Industry 4.0 is revolutionising the automotive industry, positioning it for increased competitiveness and responsiveness to market demands. Companies that successfully leverage these technologies can achieve significant operational efficiencies, enhanced product quality and a stronger market position.[11]

As the world entered the era of Industry 4.0, Insignia found itself at a crossroads. The rise of AI, machine learning and advanced robotics prom-

ised unprecedented efficiency and customisation but also posed significant challenges. Insignia recognised the imperative to integrate these technologies into its operations to stay competitive and subsequently invested heavily in research and development. This investment led to the incorporation of cutting-edge digital tools in both design and manufacturing processes. Computer-aided design (CAD) software, 3D printing, and robotics became integral to Insignia's operations, enhancing precision and efficiency while preserving the brand's hallmark craftsmanship.

In recent years, Insignia has fully embraced the principles of Industry 4.0, which emphasises the use of digital technologies to create smart factories.[12] These factories feature interconnected systems that communicate in real time, optimising production processes and ensuring the highest levels of quality control. The adoption of AI and machine learning has enabled Insignia to predict maintenance needs, reduce downtime and tailor products to individual customer preferences with unprecedented accuracy. Insignia's smart factories are a testament to this integration.

These facilities leverage AI-driven systems for predictive maintenance, ensuring that machinery operates with minimal downtime. Advanced robotics handle complex assembly tasks with precision, while data analytics optimise supply chain management. The result is a seamless blend of automation and human oversight, allowing Insignia to produce bespoke vehicles tailored to individual customer preferences. However, this rapid transformation has created challenges at different levels, both for the employees and the organisation.

Management dilemmas and executive perspectives

This case study presents the perspectives of two managers at Insignia who are navigating the challenges of this rapid digital transformation: Sarah Thompson, the marketing and sales manager, and John Carter, the manufacturing manager on the factory floor.

Sarah Thompson, marketing and sales manager

Sarah Thompson has been with Insignia for over a decade, overseeing marketing strategies and sales operations. Sarah grew up in Chicago in a family of entrepreneurs, which ignited her passion for marketing from an early age. She earned her bachelor's degree in marketing and communications from Northwestern University, where she excelled academically and gained practical experience through internships. Her early career at a tech startup showcased her ability to develop successful marketing strategies, leading to a swift promotion. At Insignia, Sarah leads a dynamic marketing team, driving growth and enhancing the brand's reputation with her innovative approaches to digital marketing, brand management and customer engagement.

Outside of her professional achievements, Sarah is deeply committed to community service, volunteering with local non-profit organisations focused on education and entrepreneurship. She is also an avid traveller and fitness enthusiast, participating in marathons. Looking ahead, Sarah aims to further her education with an MBA and aspires to take on more significant leadership roles within Insignia, ultimately becoming a global marketing director. Her blend of creativity, strategic thinking, and dedication makes her a key player in Insignia's marketing success and a mentor for aspiring marketing managers.

With the introduction of AI-based software for digital marketing and managerial decision-making, Sarah is tasked with integrating these technologies into her department. Her primary challenges include motivating her team, who are apprehensive about the new tools, and ensuring that they have the necessary skills to leverage AI for better marketing insights and customer engagement. She says:

> Integrating AI into our marketing strategy is not just about adopting new tools; it's about transforming our entire approach to how we engage with customers. The real challenge lies in motivating my team to embrace these changes, learn new skills and see the potential of AI to enhance their creativity and efficiency. It's a delicate balance of maintaining morale while pushing the boundaries of what we can achieve together.

John Carter, manufacturing manager

John Carter, the manufacturing manager at Insignia, grew up in Detroit with a deep-rooted passion for manufacturing, inspired by his father's engineering career in the automotive industry. He pursued a bachelor's degree in mechanical engineering from the University of Michigan, where he gained practical experience through internships in various manufacturing firms. Starting his career as a production supervisor, John's exceptional leadership and problem-solving skills quickly propelled him to the role of manufacturing manager.

At Insignia, John oversees the optimisation of production processes, ensuring efficiency and high-quality standards. His innovative approach to process improvement and quality control has significantly enhanced Insignia's manufacturing operations. Outside of work, John remains committed to his community, often volunteering for local engineering and manufacturing education programmes.

John has spent 15 years managing Insignia's factory floor, where precision and craftsmanship are paramount. The factory is now implementing automation technologies to streamline production and enhance quality control. John's challenges lie in motivating his staff, who fear job displacement, and re-skilling workers to operate and collaborate with advanced machinery.

Additionally, he faces the constraints of maintaining high-quality standards while adapting to the new automated processes. He says:

> Implementing automation on the factory floor isn't just about efficiency; it's about preserving the craftsmanship that defines Insignia while embracing the future of manufacturing. The biggest hurdle is reassuring my team that their skills are more valuable than ever and providing them with the training they need to thrive alongside these advanced technologies. It's a challenging transition, but it's essential for our evolution.

Change management and motivating staff during digital transformation

Both Sarah and John face the significant challenge of motivating their teams amidst the uncertainties brought about by digital transformation. The integration of AI and automation requires a shift in the workforce's mindset and skillset, which can be met with resistance.

Sarah is facing resistance from her team, who may be apprehensive about the new technologies. Overcoming this involves fostering a culture of continuous learning. Last month, she organised a workshop and training sessions to build confidence in using AI tools. Clear communication about the benefits, and reassurances that AI is meant to enhance, not replace, their roles are essential. She knows that engaging in transparent communication and involving employees in the change process is vital. She has therefore held regular meetings to explain the purpose and benefits of the AI integration and shared success stories from other companies or departments that have successfully adopted similar technologies. In doing so, she has created a cross-functional team that includes representatives from different levels of the department to provide input and feedback on the AI implementation process.

However, during a recent meeting where Sarah introduced a new AI-driven marketing tool designed to optimise customer segmentation, she noticed a palpable tension in the room. Many team members expressed concerns about the complexity of the tool and its potential to replace their roles. One employee, Jane, voiced her frustration openly, stating, 'I feel like this new technology is undermining my skills and years of experience. I'm not convinced it will add any real value to our work.'

John faces similar problems to Sarah. He brought in a robot to work with human workers, to highlight improved efficiency and show that automation helps, not hurts, their jobs. But when he showed a new automation tool to make the assembly line better, he felt a lot of stress in the room. Many workers worried about the tool being too complicated and that it would take over their jobs. One worker, Mark, said angrily, 'This new technology makes my skills and experience useless. I don't think it will do anything good for our work.'

Evolving business needs and job designs

As Insignia transitions into Industry 4.0, both Sarah and John face the additional challenge of evolving job designs to meet new organisational requirements. This includes redefining roles and responsibilities to incorporate digital competencies and ensuring that job designs are motivating and fulfilling for employees.

John must redefine the roles within his team, including his own, to include new digital competencies required by AI-based tools. This involves shifting from traditional manufacturing roles to those that require a strong understanding of data analytics and digital manufacturing strategies. To address this, John introduces new roles such as 'digital manufacturing analyst' and 'AI production strategist.' These roles focus on leveraging AI tools to gain insights from production data and develop optimised manufacturing processes. John calls for a team meeting to announce the upcoming changes. He outlines his vision of integrating AI tools into the manufacturing process and introduces the new roles. However, the response is less than enthusiastic. Long-time employees express concerns about job security and their ability to adapt to new technologies.

'Why fix something that's not broken?', questions Dave, a veteran floor manager with over 20 years at the company. 'We've been doing fine without these fancy tools.'

However, John perseveres and, understanding the need for a skilled workforce, John collaborates with HR to develop a comprehensive training programme. The programme includes workshops, online courses and hands-on training sessions. However, he quickly realises that many team members lack basic digital literacy, making it challenging to even begin the training. John also decides to start with a foundational digital literacy course. Despite his efforts, attendance is low and some employees struggle with the material. He faces a tough decision: should he push forward with the existing team or consider hiring new talent with the required skills?

John is also facing an unexpected challenge in paving his way towards redesigning jobs: budget constraints. While his aim is to include collaboration with automation, ensuring that human skills complement machine efficiency, he is meeting financial barriers. John presents his budget proposal to the executive board, detailing the costs of AI tools and training programmes. The executives are hesitant, questioning the high costs and uncertain ROI. 'We need to see tangible benefits before committing to such an investment,' says Lisa, the CFO, 'How can we be sure this will pay off?' John realises he must find a way to demonstrate the potential benefits without the full initial investment. He proposes a pilot project to test the AI tools on a smaller scale, hoping to gather data to support his case.

Talent management, re-skilling and retention

The scarcity of global managerial talent exacerbates the difficulties faced by Sarah and John. They need to ensure that their teams are prepared for digitisation through comprehensive re-skilling programmes. This involves aligning current talent with the competence-based demands of extensive digitisation and AI.

Mary, John's line supervisor, adds, 'I'm not sure I'm ready to learn all this new technology. What happens if I can't keep up?'

John responds, 'I understand your concerns, and that's why we're offering comprehensive training programmes to help everyone transition. We want to ensure no one is left behind.' John subsequently schedules one-on-one meetings with his team members to understand their individual concerns and career aspirations. During these conversations, he emphasises the importance of the upcoming changes and the opportunities they present.

Cultural shift and cybersecurity concerns

John recognises that for the digital transformation to succeed, his team needs to embrace a data-driven approach. He begins by celebrating small victories, showcasing how AI-driven insights can enhance production efficiency. During one team meeting, he presents a compelling example.

'Look at these numbers,' John says, pointing to a chart projected on the screen. 'In the past month, we've managed to reduce downtime by 15 per cent thanks to the predictive maintenance alerts generated by our new AI tools. This is just a glimpse of what we can achieve if we fully integrate these technologies.'

The room is silent, but John can see the gears turning in his team's minds. He continues, 'Imagine if we could prevent every unplanned shutdown and optimise our production schedules based on real-time data. The potential here is enormous.'

As John pushes for this cultural shift, another issue emerges: cybersecurity. The increased use of digital tools and the integration of AI systems open new vulnerabilities. Rachel, the IT manager, raises the alarm during a strategy meeting.

'Are we sure our data is safe with all these new systems?' Rachel asks. 'We've seen a rise in cyberattacks across the industry, and integrating AI adds more entry points for potential breaches. We need to ramp up our security measures to protect against these threats.' John understands the gravity of Rachel's concern. The last thing they need is a data breach that could compromise their operations or customer trust. He decides to prioritise cybersecurity, even if it means reallocating resources from other areas.

'Rachel, you're right,' John says. 'We can't afford to overlook security. Let's work together to implement robust security measures. This will be a strain on

our resources, but it's necessary to protect our data and ensure the success of this transformation.'

Rachel and her team get to work, implementing advanced firewalls, encryption protocols and continuous monitoring systems. They also conduct training sessions to educate employees about cybersecurity best practices, ensuring everyone is aware of potential threats and how to mitigate them.

This additional focus on cybersecurity adds to the workload and strains the team's resources, but John knows it is a crucial investment. As the weeks go by, the tension starts to ease. The production team becomes more comfortable with the AI tools, and the IT department successfully fortifies the company's digital defences.

During a follow-up meeting, Rachel reports back with some good news. 'We've implemented the necessary security measures, and our systems are now much more secure. We've also set up real-time monitoring to detect and respond to any potential threats immediately.' John breathes a sigh of relief. 'Great work, Rachel. This gives us the confidence we need to move forward with the digital transformation.'

While the journey is far from over, John feels optimistic. The team is slowly but surely adapting to the new data-driven culture.

Conclusion

John's and Sarah's journeys to integrate AI tools and digitise Insignia operations and marketing functions underscore the complexities of modernising a traditional industry. By attempting to address resistance to change, providing comprehensive re-skilling programmes, prioritising talent development and retention, and implementing robust cybersecurity measures, John and Sarah aim to navigate the multifaceted challenges of digital transformation. Their strategic approach will be key not only to enhance production efficiency but also to foster a resilient, future-ready team. To do so they need to achieve critical balance between technological innovation, and human adaptation and performance.

Preparing the case

This case raises several key management challenges arising from digitisation and the use of AI at Insignia. In preparing the case analysis, you may find it valuable to focus on one or more of the following four challenges. For each challenge, a corresponding set of questions is provided for your consideration.

Challenge 1: digital transformation

1. What does 'Industry 4.0' represent? What is different about the automotive markets today versus five years ago?

2. If you were to summarise the flow of Insignia's fortunes, what would be the major wins and losses?
3. What type of innovation has Insignia recently achieved? How can you relate this to the concept of 'disruptive innovation'? Explain.
4. With the rapidly evolving digital transformation in the automotive industry, is Insignia's response adequate? What would you do in Insignia's CEO role?

Challenge 2: change management

1. How different will the automotive factory of the future be? What can you do now in Insignia factories that you could not do 10 years ago?
2. Is digitisation the only transformation Insignia needs as part of preparing for the future? How difficult is this transformation?
3. How do you evaluate the change initiative inside Insignia so far? 'Too little, too late?' or 'too soon, too fast'?

Challenge 3: job design and job crafting

1. Map out the job characteristics model with the existing job tasks assigned to the two managers (employees) in the case description. Does the employee-level job design currently align with individual strengths and motives?
2. What factors may be limiting the engagement of each of the two managers (employees) in their jobs?
3. What are the options available to each of the two managers in crafting their jobs at Insignia?
4. What factors or circumstances could potentially enable these two employees to craft their jobs to better align with their motives and strengths (for example: autonomy)? What factors or circumstances could potentially limit the opportunity these two employees have to craft their jobs (for example: micro-management by supervisor)?

Challenge 4: talent management

1. Describe and analyse the talent management strategy at Insignia. For example, analyse talent management practices and explain the recruitment process.
2. How are 'talent' employees trained at Insignia? What are the challenges associated with recruiting and training (retraining) of talent in the context of the current digital transformation?
3. Based on your analysis of the case and your knowledge of talent management theory, what are the main priorities you recommend for Insignia to help retain its talent and how might these be implemented?

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