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Echoes of the Industrial Revolution
How the AI Revolution Mirrors It

As I see the internet simultaneously rejoicing and worrying about the AI wave, I look back at my time at *Ford Motor Company* as an industrial engineer and before that in my graduate studies as a student in the same discipline at *Virginia Tech* (go Hokies!) and realize, a technological change of this magnitude, perhaps bigger, *has happened quite recently* and we've forgotten it.

When the earliest inventions of the Industrial Revolution began to appear, the world looked very different. There were no factories, there was no mass manufacturing, and there was no concept of *going* to a large building for eight hours and then returning home at the end of the day.

Many people worked as independent craftsmen—blacksmiths, cobblers, carpenters, and tailors. Goods were usually made to order. You would go to the town market, visit a cobbler there (who was likely your friend Jack), and say something like, "Hello there, Jack, I saved up some money. This is my foot size. Can you make a shoe around it?" And Jack the cobbler would work on it for a couple of weeks. Eventually you would

pass by again and he would tell you the shoes were ready. You would pay him—or sometimes barter something.

Some people today might think that was a good thing. But most modern conveniences, including the computer you are reading this on or the shoes you wear to work, would not have happened without the industrial systems that eventually emerged. Let's take a dive into the relatively recent past to see how this relates to the AI revolution we are facing today.

The Steam Engine and the Explosion of Supporting Industries

One of the pivotal inventions of the Industrial Revolution was the *steam engine*. Early versions were developed by Thomas Newcomen in 1712 to pump water from mines. Later, James Watt's improvements in the 1760s and 1770s made the steam engine far more efficient and commercially useful.[1]

Once steam power became viable, a whole ecosystem of supporting industries had to emerge. If you had steam locomotion, you suddenly needed:

- rails made from iron and later steel
- train cars to carry goods and passengers
- braking systems and mechanical controls
- lighting systems
- signaling systems

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[1] Kanefsky, Robey & Felton — The Steam Engine and the Industrial Revolution

- large coal mining operations

In other words, one major invention created an entire network of related industries.

The Blacksmith

If we look at blacksmiths who were creating regular metal parts—things made of iron and steel—they would have been extremely proficient in metallurgy and in the manual skill of shaping metal with heat and hammer.

It is very likely that many of the earliest engines were produced by craftsmen with exactly these skills. Every part would have been custom. In modern manufacturing terms, this would be called made-to-order (MTO) production. Made-to-order production is expensive, because every item is customized. That was how most goods were produced at the time.

Demand Changes Everything

The growth of railways in the early 19th century dramatically increased demand for machinery.

One of the earliest successful locomotives was George Stephenson's locomotive built in 1814, followed by the famous Rocket locomotive in 1829, which demonstrated the commercial viability of rail transport.[2]

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[2] Rolt — George and Robert Stephenson: The Railway

As railways spread across Europe and North America, demand for rails, engines, and metal parts increased dramatically. Later, railways were built across colonial territories as well—including India, Africa, and Australia.

The demand for train components skyrocketed. At that point, the blacksmith who had been making swords, axes, horseshoes, and carriage parts might suddenly be asked:

"Can you make five engines like this?"

Over time, the blacksmith would have become highly proficient at producing engines. Eventually he might have stopped making other products entirely. Other blacksmiths would continue producing traditional items (you might always need axes). But those who specialized in machinery gradually became something new. They became *engineers*.

The Emergence of the Factory

As workshops expanded to meet rising demand, they began to resemble early factories. Initially, production was still organized around a single machine. Workers would come to the product being built, perform their task, and leave. Later developments changed this.

The introduction of interchangeable parts, particularly in American firearms manufacturing in the late 18th and early 19th centuries, allowed machines to be

assembled from standardized components.[3] Standardization enabled faster and more predictable manufacturing. By the late 19th century, factories were producing complex machinery at scale. The next major leap came in 1913, when Henry Ford introduced the moving assembly line for automobile production.[4] Instead of workers moving to the product, the product moved past workers in sequence. Each worker specialized in a narrow task. This dramatically increased productivity.

The Birth of Engineering Disciplines

As manufacturing systems became more complex, new professional roles emerged. People began specializing in different parts of the industrial system:

- Mechanical engineers, focused on machine design
- Manufacturing engineers, focused on how machines are built
- Industrial engineers, focused on optimizing efficiency, workflow, and production systems

Disciplines like Packaging, Metallurgy, Chemical, Petroleum and many more emerged as engineering principles of designing a product, then designing a machine for the product and then designing a system for the machines expanded to other industries.

Blacksmiths, though, did not disappear. Their knowledge of materials and metalworking evolved into modern engineering disciplines.

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[3] Hounshell — From the American System to Mass Production

[4] Ford Motor Company Archives — Assembly Line Introduction (1913)

Drawing the Parallel with AI

We may be witnessing a similar transition today with artificial intelligence. Right now there appears to be a separation between two emerging groups:

1. People who design and train AI models

2. People who use AI models to build products and systems

The first group resembles the engineers designing machines. The second group resembles those designing production systems and applications around those machines.

The core technology—the model—may eventually become only one component of a much larger system. What matters increasingly is how that technology is applied.

Future Specializations

If the historical analogy holds, we will likely see entirely new roles emerge. Some engineers may design systems of interacting AI agents capable of performing complex coordinated tasks. These systems might control robots, manage fleets of drones, run logistics networks, or execute large chains of automated operations.

Just as the Industrial Revolution created mechanical engineers, manufacturing engineers, and industrial engineers, the AI revolution may create new specializations that we have not fully defined yet.

The Craftsman Does Not Disappear

During the Industrial Revolution, craftsmen were not eliminated. Some adapted and became engineers. Others continued producing handcrafted goods for specialized markets.

Blacksmiths still exist today. There are enough enthusiasts of horse-riding for stirrups, horse-shoes to be handcrafted by your local blacksmith. Enough custom leather jackets made by a tanner whose family understands hide better than any machine and a large percentage of farming is still done manually. Either there is still demand or the knowledge to automate it has not been created it yet.

Something similar may happen with software. Some engineers will specialize in AI systems, while others will specialize in applying AI tools, yet others might control vast swarms of robots or agents where their job doesn't even involve checking on an individual unit but on the behavior of the whole swarm — what will they be called? AI Beekeepers? Who knows? Lastly, some may continue practicing highly specialized forms of handcrafted programming.

Better Problems to Solve

History is made of events that are unprecedented so we won't say that the AI Revolution will be similar. It could be something we can't expect. However, it's a reasonable explanation to expect that technological revolutions don't eliminate work entirely. Instead, they change the type of work that people do because problems will always need to be solved and we're just coming up with nicer problems.[5]

Seen through that lens, the AI revolution may be less about job loss and more about the early stages of another transformation we have seen before.

So, an open question:

If the Industrial Revolution offers any guide, the most interesting jobs of the AI era may not exist yet. So the question becomes:

What roles do you think will emerge as AI becomes a foundational technology across the economy?

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[5] From the principles in the book, "The Beginning of Infinity" by David Deutsche