



5 Ways Technology Is Radically Transforming Manufacturing

cora

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Introduction

The events of the last few years have forced the manufacturing sector to stop and take a careful look at how they get the parts and products that they make to the businesses and customers who've ordered them.

Between the pandemic and the supply chain chaos that that brought about, and the international trade war, and the actual wars that have broken out across the globe, getting things from A to B is, it turns out, much more complex than we'd all come to assume.

The good news is, all this has come about at precisely the time when technology is beginning to deliver on many of its lofty promises.

There had been a feeling that, after the burst of activity in the aughts, with the invention of the iPhone and everything that that ushered in, many of the breakthroughs that were supposed to have followed in the next decade had failed to deliver. But what we're now discovering is that it just took us a little bit more time to find out exactly what you can do with the Internet of Things, and what 5G is for.

As ever, it's in industry that the IoT are first being tried and tested, which is why you're as likely to hear about the IIoT as you are the IoT (see sidebar on page 10). Specifically, it's in the world of manufacturing. There are in fact five core areas where technology is radically transforming the way manufacturers get their parts and products from the warehouse and the factory floor to your front door.

What can you do with the Internet of Things, and what is 5G for?



“Collaborative, intelligent robots, or ‘cobots’, are specifically designed to work alongside humans”³

1. Smart Factories & Hyperautomation

According to Gartner®:

“Hyperautomation involves the orchestrated use of multiple technologies, tools or platforms.”¹

The key word here is orchestrated. Because every aspect of manufacturing, from production, supply and distribution, is being massively improved by the process of digitization, which is what makes all this automation possible.

On the one hand, more and more of the individual tasks that need doing are becoming automated. Which means that:

- Tedious, repetitive tasks are performed much more consistently and with far fewer errors
- Employees can become more productive, doing tasks that generate more value and are more fulfilling to perform

And on the other, manufacturers can use all the data that this automation generates to better coordinate what it is that they do. We can see how all this works in practice by looking at the three main areas that smart factories can be broken down into:

1. Analytics everywhere

According to Michael Strand, Senior Vice President at Hitachi Solutions, America:

“IoT and predictive analytics are having a major impact on manufacturing, offering exciting new opportunities for connecting operations and transforming business processes.” ²

That’s because IoT-enabled devices make it possible for manufacturers to precisely monitor how every piece of equipment is performing. Because what AI (artificial intelligence) does is to gather huge quantities of data, and to then analyze them all looking for patterns. Which means they can identify where a problem is likely to occur before it even happens. And, when there is a problem, they can get a much better idea of what fixing it entails beforehand. So that when the technicians arrive, they can get in and out significantly quicker.

“IoT and predictive analytics are having a major impact on manufacturing”



As technology improves, everything becomes smaller and cheaper

You can then use what you've learnt from those patterns to massively improve your ability to forecast, so you can plan for what you're going to need, and where it's going to be needed. What parts and materials, how much to unload and store, and with what machinery, when, and where it's then got to go to. Which hugely improves warehousing, transportation, distribution and every link across your supply chain. Reducing costs and waste, minimizing risks and increasing margins.

And as technology marches ever onwards, everything it produces becomes ever more efficient – i.e. smaller and cheaper. So you can expect to find sensors being attached to absolutely everything, from the transmission in a forklift truck, to the fittings connecting steel beams to girders, and across every square inch of packaging.

From here on in, it really is all about your data and what you do with it.

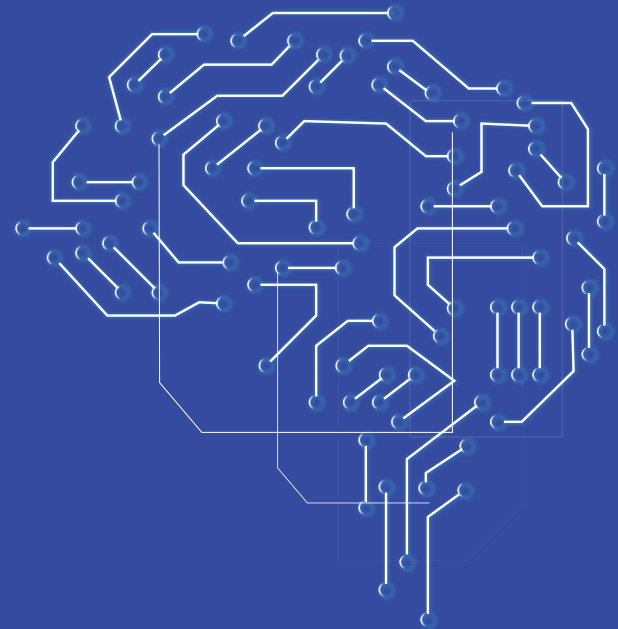
2. Autonomous things

Comprising of any self-driving vehicles, drones, robots or any other equipment that can operate by itself, without direct human supervision. These machines can perform everyday physical tasks, like sorting, packing and delivering, or the more mundane ones of counting, cataloguing and monitoring. As well as doing the sorts of tasks or tests that would be dangerous for humans to do, such as moving chemical waste, or working in difficult (and even impossible) to navigate terrains, like the ocean floor and in outer space.

And their ability to perform these tasks is advancing all the time, thanks to improved sensors, better tracking and diagnostics, and the ability to incorporate data capture technologies using video and smart cameras. All of which can be operated and supervised remotely, from further and further afield, thanks to the increased bandwidth that 5G gives you.

All of which creates its own positive feedback loop, thanks to the perpetually improving nature of AI.

**Perpetually
improving AI
creates its own
positive feedback
loop**



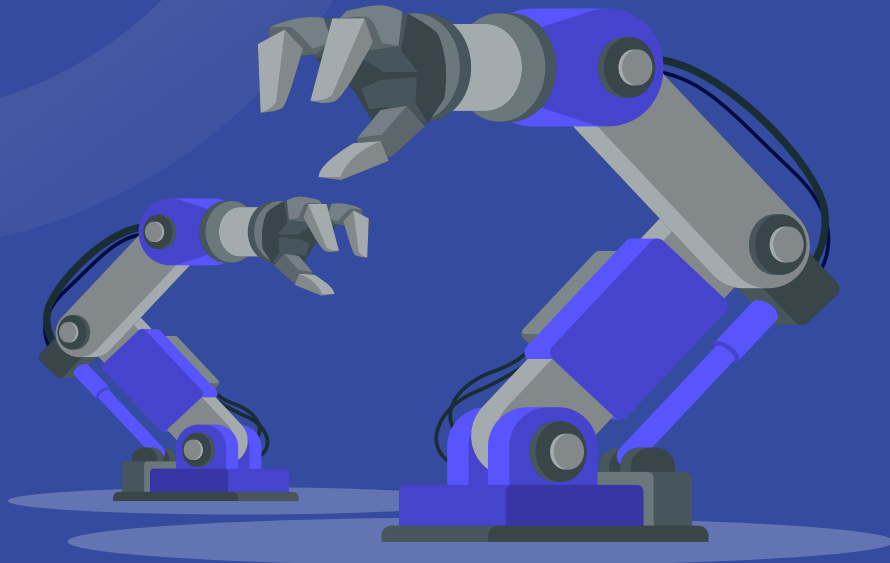
3. Next generation robots

In the past, the things that robots could do was limited to a very basic and rudimentary set of tasks, which each required complex programming and expensive processing. AI has completely transformed that whole landscape. So that what they do, and how they go about doing it, has significantly broadened in scope.

Initially, the sole purpose of a robot deployed in manufacturing was to replace a human, so that the employee could use their time more productively. But today, as Bernard Marr writes in Forbes Magazine:

“We have collaborative, intelligent robots – or “cobots” – that are specifically designed to work alongside humans... to enhance the work of humans”³

Cobots usually have humans standing over them or wearing them, so that what is done can be done much more precisely, more consistently and more easily. And they help with any number of tasks, from assembling parts, welding and finishing products, to dispensing with materials and waste, quality inspections and handling dangerous or heavy materials.



**Collaborative,
intelligent
robots, or
‘cobots’**

And as these robots and cobots get to make use of all the data from the increasing number of sensors that they all have on them, what they do, and who and what they do it with, will become ever more complex.

Going forward, we'll see manufacturing plants with a fleet of robots interacting and communicating with one another, and with other equipment, like doors and elevators. All of which will be supervised and coordinated by humans, remotely, at other parts of the plant, and in other parts of the country.

All this hyperautomation is transforming the manufacturing landscape, and it's happening right now. As Gartner found:

“By 2026, the use of autonomous things will displace 25% of warehouse logistics operators such as forklift drivers.” and “By 2025, manufacturers will lower operational costs by 10% by combining hyperautomation technologies with redesigned operational processes.”⁴

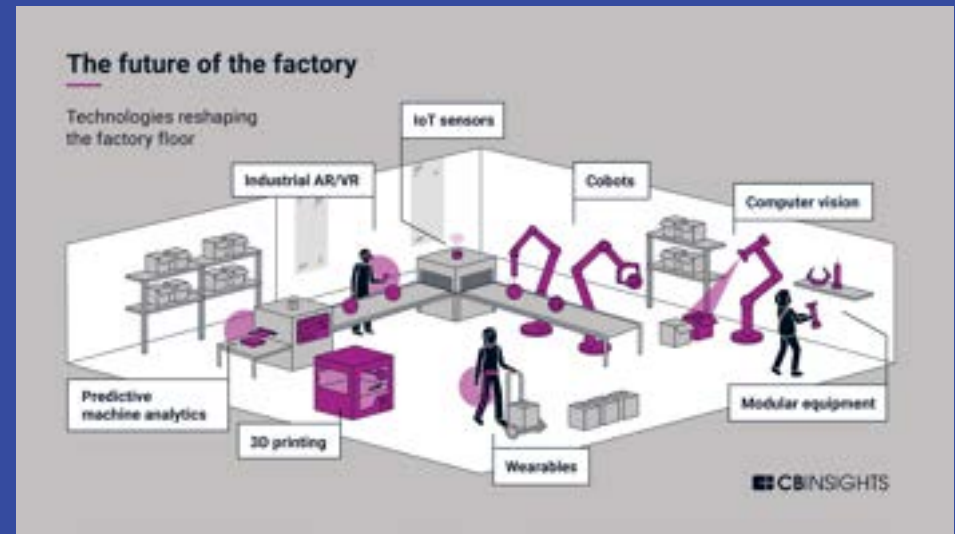


Image courtesy of: <https://www.cbinsights.com/research/future-factory-manufacturing-tech-trends/>

Cora sidebar:

The analytics that the Cora dashboard gives you access to means you can keep track of where all your materials and physical assets are, and how they're progressing. So your supply chain will be significantly better synced, reducing waste and costs, and minimizing risks. While our Integrated Workflow's automated processes then trigger steps in other systems feeding into any automation cycles.

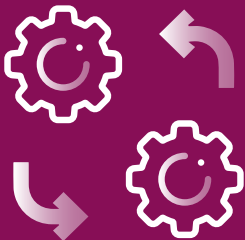
Sidebar - Jargon Buster



IoT and **IIoT**, or the **Internet of Things**, and **the Industrial IoT** - all the bits and pieces that will have sensors collecting data to monitor how they perform, whether in the real world or throughout the world of industry.



5G – the network that will send that data back and forth from the things of the IoT to a data center, that then analyzes and redistributes all that data. So the IoT is to 5G what web pages are to the Internet.



4IR, or the fourth industrial revolution – after the first three, which came about with the advent of steam in the 18th Century, electricity in the 19th, computers in the 20th and, now, the Internet in the 21st.

Web 3.0 –Web 1.0 began with static pages connected through the Internet that you accessed via a browser. But after the explosion of mobile connectivity and social networks in the 2000s, Web 2.0, which is where we are now, came to be dominated by UGC, or User Generated Content. With the result that a handful of companies have rapidly transformed themselves into 5 or 6 of the most powerful entities in the world.

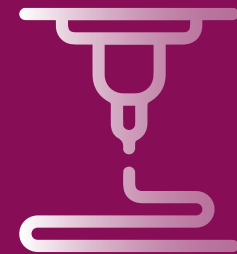
Web 3.0 is the hope that this monetization of the net can be neutered and perhaps even reversed, so that the Web becomes the decentralized, open, bottom-up and genuinely democratic tool it was supposed to have been first time around.

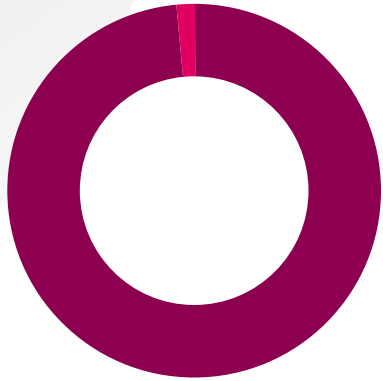
The technology that is going to make this happen is AI, artificial intelligence, thanks to machine learning and, above all else, blockchains, where information – data – is shared through peer-to-peer networks, bypassing the need for a centralizing controller.



3D printing - or additive manufacturing, is a way of creating parts or entire products from scratch. The machine gets a set of instructions from a digital design, and then puts down incredibly thin layers of material, using powders, liquids, plastics and metals. Which are then fused together to create the desired object.

Too slow at the moment to be used for mass production, but that's changing, rapidly. And it's already being used extensively in aerospace and by car manufacturers for prototypes. Unquestionably, 3D printing will come to massively disrupt the whole manufacturing ecosystem.





**“98%
of organizations
report that a
single hour of
downtime costs
them over
\$100,000”²**

2. Anywhere operations

The biggest change to the world of business that the pandemic brought about was the challenge it posed to the conventional wisdom that all activity, whether B2B or B2C, needed to be location specific. Everyone has always assumed that all business is done far more successfully when conducted face to face.

But the last couple of years has completely upended that. And pretty much every organization across the globe has moved to a hybrid model, with people working both from home and at the office.

Superficially, you might think that manufacturing was the one area where this might not be possible, because of the physical nature of what it entails. But there is far more to manufacturing than the physical assembling of parts into products. And, as we have seen from Hyperautomation above, even here, what workers do and where they do it is being radically transformed.

The increasing use of the IIoT, autonomous things and the general deployment of AI means that workers are moving from the factory floor to supervisory and management roles. Because the more menial and repetitive tasks that were once done by humans are increasingly being done by machines. And that technology and those processes now need to be managed and supervised. Which means that more and more of what people do in manufacturing can be done remotely rather than on site.

Both workers and machines, therefore, will need to be constantly upskilled, with new, differently skilled workers being brought in to help existing workers perform all the new and changing activities, whether as trainers or as co-workers. All of which will be done regardless of where they're working from.

So in order to survive and prosper, manufacturing companies are going to have to focus on, and invest in, their digital capacities. Because there are going to be huge changes to the way departments are managed internally, and to the way the organization functions as a whole. As more and more of their employees work in different physical locations within the organization's buildings, and from home, wherever that might be.

Autonomous things need to be managed and supervised





Your ability to manage data is what gives you location independence

All of which is going to have huge knock-on effects on governance policies, and of course on security – which we look at below.

So a company's ability to embrace the future and succeed in this changing landscape depends on how well it can navigate and implement the digital transformation needed within. Because your ability to effortlessly manage your data internally is what gives your organization its location independence.

3. Cybersecurity

An unfortunate by-product of the digital transformation that the world is undergoing is the growing risk from cyberattacks. Technology makes everything easier, and you're far less likely to get caught online than you are in the real world. And manufacturers are particularly at risk because of the sheer number of parts, materials and machinery they need. Each one of which can be targeted with the likes of:

- Ransomware, malware, trojan horses et al
- Corrupt or malicious code
- Firewall and landing page breaches
- Legacy software vulnerabilities
- Hardware attacks from spyware etc.
- Identity theft and digital impersonation
- Security and data breaches, both internal and external



**“34%
of manufacturers
have plans to
incorporate IoT
technology into
their processes”²**



**“32%
of manufacturers
plan to embed IoT
technology into
their products”²**

The only way to guard against all of this is by using a sophisticated and reputable software package to organize and take charge of your internal processes. Because all your data need to be centralized, easy to access and permanently visible, so that each and every one of those moving parts can be carefully tracked and followed, as they make their way from factory to warehouse to office and customer.

As any number of recent news stories can attest, criminal gangs are becoming incredibly sophisticated (and brazen) when it comes to theft, blackmail, counterfeits and fakes. But with every success they have, technology responds with innovations and improvements. And software packages are getting more and more adept at factoring in the many security issues that all manufacturers have to guard against.

So getting the right software package, and making sure that all your employees are kept up to speed about how to get the most out of it, is absolutely fundamental.

4. Digital twins

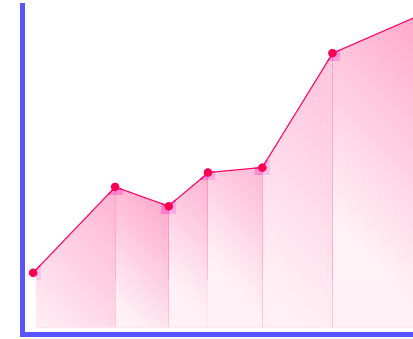
According to Deloitte:

“By 2022, 70% of manufacturers will be using digital twins to conduct process simulations and scenario evaluations.” ⁵

A digital twin allows you to replicate an object, or the process through which it's brought into being. You take all the data around design and construction plans and use them to explore a limitless array of What-if scenarios. Which hugely improves your forecasting abilities, and of course can be done from anywhere in the world.

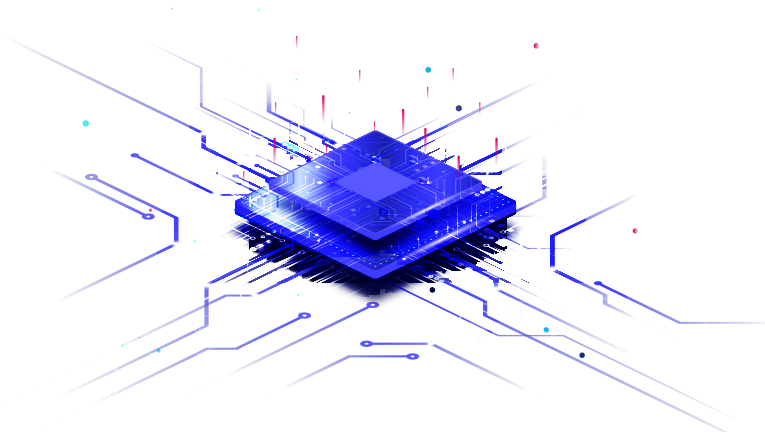
They've been around for a couple of decades now, but advances in technology mean that they are now becoming cheaper and cheaper to make and use. And they're already being used extensively in an expanding number of manufacturing areas, such as:

- for prototypes in the car and aerospace industries
- throughout healthcare, particularly around cardiovascular research
- for urban planning and city management, in places like Singapore



“The digital twins market is projected to reach \$35.8 billion by 2025.” ⁵

Advances in technology mean they are becoming cheaper to make and use



Cora sidebar:

Cora's Strategic Portfolio Management (SPM) solution means you can experiment with extensive what if scenarios to explore future trends and fine-tune your ability to plan and forecast. Effectively, it means you can create your own, mini digital twins within the system.

Digital twins can be used for individual parts and components, for whole products, or for the equipment needed to meld them all together. But possibly most usefully of all, they can be used for the entire supply chain, as a Digital Supply Chain Twin (DSCT). All that data that the supply chain now generates can be used to create a dynamic, real time simulation of the actual supply chain. So that any number of potential situations and problems can be tried out, explored and prepared for.

There's a bit to go before Digital Supply Chain Twins become the norm. But it will happen. And it's already happening for all the parts and materials that move through it. As Deloitte notes:

“The digital twins market—worth \$3.8 billion in 2019—is projected to reach \$35.8 billion by 2025.”⁵

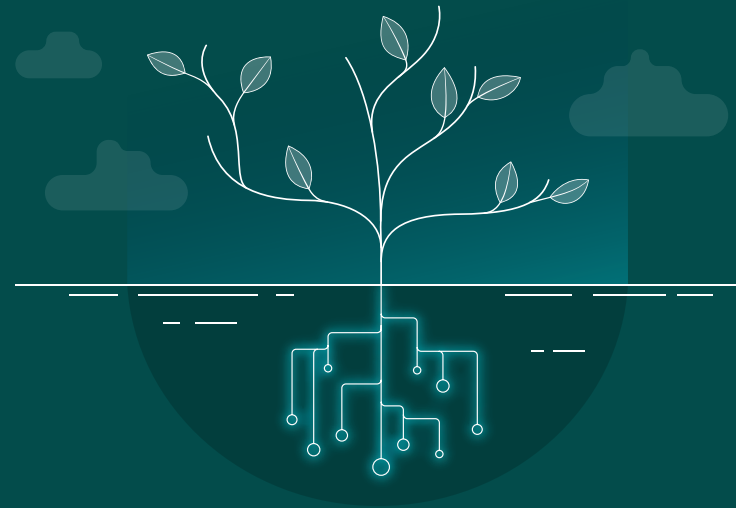
5. Sustainability

ESG, or environmental, social and governance, is becoming increasingly important, both to organizations and to the people who work in them. And it's particularly relevant for manufacturing, which a lot of people blame for many of the planet's problems. Both because of the endless stream of products it produces, and the need to move them all around the globe.

As far as transportation goes, there's a huge amount of time and effort being invested into weaning the world off of carbon fuels and on to renewables. This is going well (ish) and is gathering pace but will take time. So in the meantime, alternatives are being looked for to bridge the gap. And as many people are, rightly or wrongly, afraid of nuclear, many countries and organizations are turning to hydrogen. As the World Economic Forum notes:

“Hydrogen offers the potential to end our dependence on fossil fuels (and) can reduce CO2 emissions in industry and transport.”⁶

And over the next decade and a half we can expect to see more and more goods and products being transported via hydrogen cell trucks and cars, and on ships and planes propelled by hydrogen-based fuels.



“Customers will increasingly gravitate towards products that are sustainable, reusable, and recyclable.”³

Forbes Magazine

ESG is fundamental for a brand and its global image



Cora sidebar:

Cora's Strategic Capacity Management (SCM) functionality will mean you make far better use of the resources you have at your disposal within your organization. So materials, physical assets and labor won't end up being deployed to the wrong place and on the wrong day. Which will reduce waste and unnecessary travel, and improve your ESG metrics.

At a more granular level, more and more products are being transported and preserved in reusable and sustainable packaging, and in smart packaging (sometimes called connected or intelligent packaging). So everything can be tracked as it moves through the supply chain. Because people need to be confident that what they're consuming is not part of a process that's environmentally or ethically suspect. As Forbes notes:

“Customers will increasingly gravitate towards products that are sustainable, reusable, and recyclable. The throwaway culture of the past is coming to an end and manufacturers will have to take (this) into account.”³

And that's as true for employees as it is for consumers. Which means that organizations are becoming ever more reliant on their software to provide them with easily accessible data, so that they can demonstrate that they are meeting, and are serious about meeting, their sustainability goals and metrics.

All of which has become absolutely fundamental for a brand and its global image, and for holding on to customer and employee loyalty.

Conclusion: Joining all the data dots

Technology is transforming manufacturing in all sorts of ways. The autonomous things that the IIoT is making possible, and all the data that that generates, is completely transforming the factory floor. Changing what gets done, how it's done and who or what does it. Making what you do at every stage of the supply chain both more efficient and more environmentally sustainable.

It's also having a similarly profound effect on how organizations are structured, both internally, and in how they relate to the world around them. What all this transformation revolves around, and is made possible by, is data. And how you organize and give shape to all that is through your software.

“By 2025, manufacturers will lower operational costs by 10% by combining hyperautomation technologies with redesigned operational processes.”⁴

It's your software that provides you with Gantt charts and all those other graphs that give you a constant stream of status updates, keeping you up to speed about absolutely everything that's going on, and in real time. Which hugely improves planning and forecasting and, therefore, your capacity for Risk Management. Which in turn will help and significantly improve your Strategic Capacity Management.

Once all that data is centralized, consolidated and made visible, you'll be able to precisely track where absolutely everything is as it moves through the various stages of the supply chain. Which will massively improve your ability to reduce waste and minimize delays. And all of which will lead to significantly better margins and increased profitability.

1. The 2022 Strategic Supply Chain Technology Themes

Published 25 March 2022 - ID G00759007 -

By Analyst(s): Christian Titze, Dwight Klappich, © 2022 Gartner.

2. <https://global.hitachi-solutions.com/blog/top-manufacturing-trends/>

3. <https://www.forbes.com/sites/bernardmarr/2022/01/25/the-10-biggest-future-trends-in-manufacturing/?sh=254e372b4d56>

4. Industry Insights - 2021 Manufacturing Top Strategic Technology Trends

Published 26 July 2021 - ID G00753917

By Analyst(s): Corporate Strategy Research Team, © 2022 Gartner.

5. <https://www2.deloitte.com/us/en/insights/focus/tech-trends/2020/digital-twin-applications-bridging-the-physical-and-digital.html>

6. <https://www.weforum.org/agenda/2022/03/hydrogen-decarbonization-climate-change-energy/>

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Cora: giving you the power of predictability



Radically reduce costs

Significantly increase revenue

Cora empowers enterprise organizations to plan and manage their long-term projects.

What we do

We make sure that everything you do and make is delivered on time and on budget, thanks to our seamless integration of your forecasting, schedules, resourcing and financial controls.

How we do it

By streamlining and centralizing all your data, and integrating all your processes and software into the one, single system, giving you effortless visibility into every project and across your portfolio.

What that means

Those gaps between planned and actual costs and delivery are significantly reduced, so your costs and waste go down and your margins and revenue soar.

We make you the 'control tower'

Where all your data and documents are collected and organized. Everything is constantly updated and immediately accessible.

So you get to effortlessly orchestrate each and every one of your projects.





Prioritize the right projects

Consistently recognized by Gartner™ in its Magic Quadrant for Strategic Portfolio Management, Cora gives you that bird's-eye into your portfolio. So you can visualize and evaluate how they each fit in with your strategic objectives.



Integrate processes

Bring any existing processes into the one, central system, so everyone is working in the same, standardized way, and off the same facts and figures.



Sync your supply chain

Track and monitor all the data that your parts, materials and assets generate as they move through your supply chain.



Centralize your project data

Get immediate and granular visibility into everything, wherever you are. It's all there on your dashboard.



Reduce deviation

Minimize those gaps between planned and actual costs and delivery, so you can be confident of continually maximizing your margins.



No/low code configurability

We've designed all our products so that they can be easily configured to meet your precise needs, both for you and by you. And because Cora is so famously easy to use, you get immediate buy-in across your whole organization.





The Power of Predictability

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