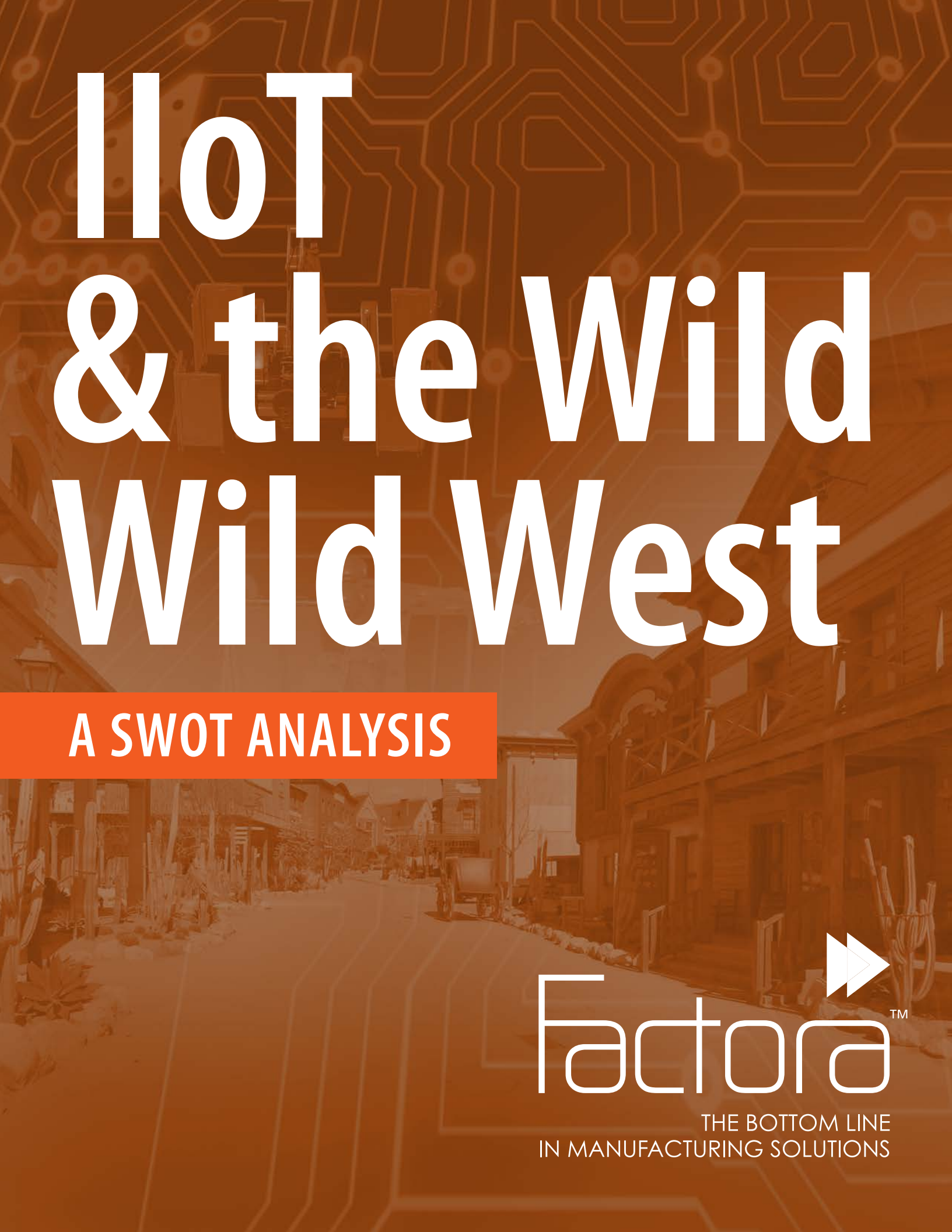
IIoT & the Wild Wild West

A SWOT ANALYSIS



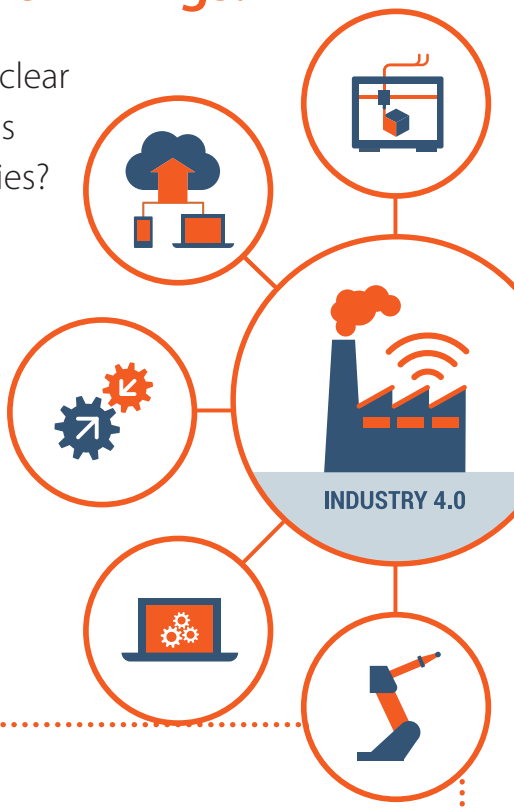
Factora™

THE BOTTOM LINE
IN MANUFACTURING SOLUTIONS

The much-discussed Industrial Internet of Things!

Some of us are already in the thick of it, some not; some have a clear understanding of concept, some don't. What will IIoT capabilities mean to us? And how can we best harness the new opportunities?

To help navigate this new world, this paper has been designed as a SWOT analysis of IIoT. True, SWOT analysis is more typically used to analyze the potential of a business, or a new product. But bear with us, we think you'll enjoy this high-level overview of IIoT ups and downs.



Strength

IIoT drives the dream

C-Suite executives are now seeing possibilities that weren't even dreamed of just a few years ago. This is particularly true in industries that traditionally did not move easily into new product offerings – utilities and manufacturing come to mind.

Today's new platforms can surround and extend existing investments in equipment and smart manufacturing, delivering new actionable insights. Much of this data has existed for years or decades, but it's typically been siloed in incompatible systems. IIoT provides a more accessible path to the insights that this data gives.

To name but a few dreams, all on the macro level, IIoT could help to enable smart power grids and smart healthcare, or to develop new manufacturing systems driven by collaborative equipment. We'll give examples of new products/services later in this paper.

This type of Big Dream strategy must live at the C-Suite level, away from day-to-day operations. It marks a fundamental change, a whole different journey to follow. Leadership teams with vision and passion can now identity and deliver brand-new ways of delivering value to shareholders.

Smart Manufacturing vs IIoT

Both can improve performance & profitability; both represent a fundamental change in operations. But! Here are three major differences:

1. Smart Manufacturing is all about cutting costs. Decreasing something to improve the bottom line.
2. IIoT builds on this to provide a new, barely explored avenue to the top line.
3. Smart Manufacturing tends to live and flourish within a factory's four walls. IIoT, by definition, takes you to pastures new.

Weakness

Listing IIoT weaknesses is enough to put one off one's breakfast, not to mention the entire day's meals. Still, it's worthwhile to have full knowledge of the risks. Following, a high-level overview of what we see:

Security

The most frequently mentioned challenge. Industrial enterprises will need to integrate advanced cyber threat protection.

Standardization

In critical infrastructure such as utilities, supply chain and standardization can become issues. We'll need devices built to an agreed standard, with, ideally, a transparent supply chain. Strong governance of these standards and processes is key.

Device appropriateness

IoT technology, originally, was often developed for a consumer or office environment. Under industry use, other factors come into play (environmental, safety, hazardous conditions, reliability) that can change the requirements of the devices used.

Silos

Particularly in manufacturing, IT and OT have had silo issues for decades. With IIoT, control engineers must up their knowledge and skills in networking and security. Correspondingly, IT professionals must gain a better handle on the difference between business and manufacturing processes.

Safety

The integration of connected devices and physical controls opens new safety issues.

Opportunity

The best way to show the new opportunity is through examples. The following run all the way from specific applications to brand-new approaches to traditional challenges.

Connected field devices

A global utility company, headquartered in NYC, uses many devices in the field. Now they're exploring how they can generate new revenue if they connect these devices.

With connected field devices, what data could they offer? To whom? What could they charge? And could they offer data back to their own customers, as a service benefit?

Say this same utility connects with the equipment of one of their clients, a Midwestern city. Through analytics, the utility might be better able to predict when a motor might fail. This would reduce outages, which would cut fines.

Real-time, in-situ data on the shop floor

With the latest in AR headsets or eyewear, an operator on a manufacturing floor can see the temperature, vibration data, or efficiency data of a piece of equipment – simply by looking at it.

Predicting aviation delays through machine learning

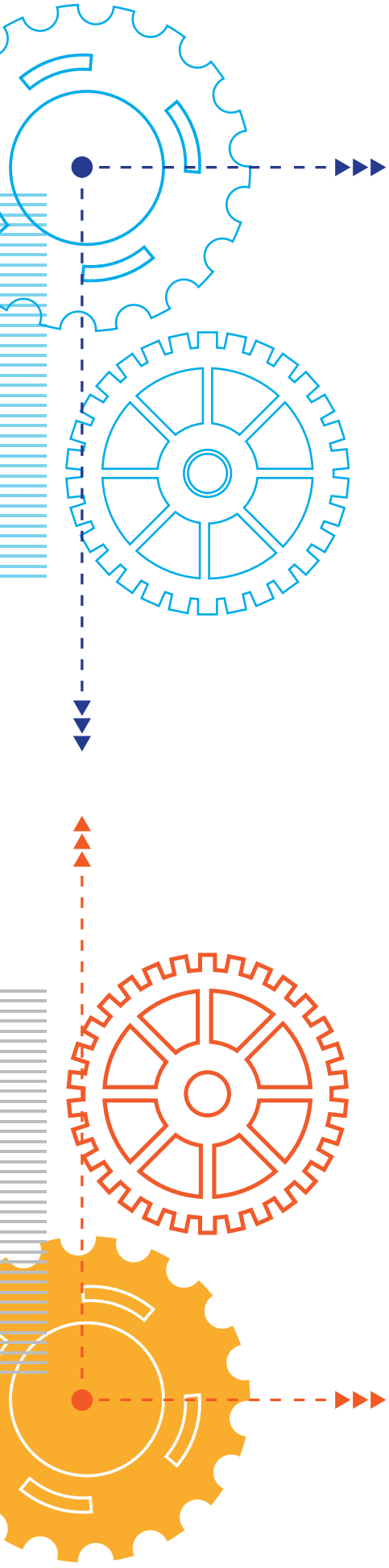
In the aviation industry, IIoT-driven predictive maintenance can deliver the probability of an aircraft being delayed or cancelled, using machine learning and data sources such as maintenance history and flight routes.

Detecting hazards and equipment issues

Thermal vision can be used to spot overheating components. The latest in wearable devices are also capable of doing diagnostics and detecting hazards.

Real-time maintenance training on the shop floor

Smart helmets can provide employees with guided work instruction. In cases of repair work, this can speed up repair time by eliminating the need to consult printed instructions, plus decrease errors.



Opportunity continued ...

Digital twins & preventive maintenance

Digital twin! You know the term. How comfortable are you with the concept?

- Colin Parris, GE's VP of software research, described a digital twin as "a living model of anything that delivers a business outcome." Note the *living!* Old-style static models were doomed to begin going out of date the moment they were put into use.
- A digital twin shows you **what *good* looks like.** And by comparison, what good *doesn't* look like. It's a model built on real data, over time, that *continues to evolve.*

Serving as virtual versions of physical assets, digital twins can track and manage parts wear and breakdown far more efficiently than ever before. In the past, maintenance was always too early or too late, wasting resources either way. With digital twins, we can come much closer to providing maintenance as and when needed, a savings opportunity of tremendous potential.

- **Jet engines** are a particularly good example of this breadth of this possibility. With remote telemetry, the capability of keeping planes in the air skyrockets. IIoT-enabled aircraft can send data in mid-air and deliver data bursts/algorithms as they hit the runway. If minor repairs are needed, the appropriate technician can be at the job before the wheels have barely come to a stop.
- Caterpillar, a global leader in **heavy machinery**, is using augmented reality in predictive maintenance, enabling operators to 'see' a visual overlay of a machine, showing when components need to be replaced, how much fuel has been used, and how much weight the equipment is carrying.
- Flowserve, a specialist in **flow control products and services**, is working to improve maintenance of its centrifugal pumps through mixed reality. Real-time sensors will monitor machine conditions for anomalies; a real-time CFD analysis will be triggered to pinpoint the cause. A virtual image – essentially, a CAD model – is projected onto the machine and then combined with animation to show the steps for making the repair. This company is also working with an AI firm to predict pump failures 5 days in advance.

Opportunity continued ...

Digital twins & rapid prototyping

Virtual prototyping has tremendous potential. Creating a new product or service digitally, simulating its operation and surroundings even before it exists, not only saves costs, but removes a massive barrier to innovation. As well, virtual prototyping can be highly precise.

One more advantage of inexpensive prototyping is the learning. Even when a prototype proves to be a bad idea, the learning gained can lead to a better solution, plus one that is more quickly reached. Again, this removes a considerable barrier to innovation.

Opportunities in patterns and anomalies

By establishing a protocol to identify patterns and anomalies in your IIoT data, it's possible to prevent mishap (e.g. for a city, evidence of a hacking might be that a pump was repeatedly stopped and started) or discover opportunity (sky's the limit here).

Threat

The bottomless pit

The biggest trap the IIoT offers – particularly now, in the early stages – is the bottomless pit, the mindset of "anything is possible." Many new adopters have tumbled down that pit, convinced by internal champions or slick salespeople to connect for the sake of connecting. It may do no harm, but it often does no good. Worst yet, it wastes scarce resources.

"It's really easy to capture data, but to then make that data actionable is where companies are really struggling," notes Ryan Lester, director of IoT strategy for Xively, an IoT platform provider. "Companies don't have the right analytics tools to parse through the data and they don't have access to good algorithms to get insights."

Many industrial companies dwell halfway down this pit, regularly collecting data that they don't know how to action. As time goes by, the problem escalates. Sometimes the company will configure an analysis model to make sense of the data, and then have to change it again when more problems creep up. But this is an old-school way of operating.

Lack of a business case, necessity for governance

With IIoT, it's necessary to be exceptionally clear on the business case for a given project. What will we gain? When? Using how much time and money?

And how will we measure this gain, to see how it stacks up against other available initiatives?

IIoT initiatives are in particular need of a good governance model. Otherwise, drowning in that bottomless data pit is far too likely.

Poorly designed user experience

Increasingly, in all areas of industry, UX is being recognized for what it offers – the opportunity to get better buy-in and operator take-up of any new system. Because it is at the leading edge, IIoT initiatives can sometimes be led by those who are more driven by the excitement and complexity than the necessity of an excellent UX that makes a new system accessible and useable.

It's the wild wild west

And there you have it: the strengths, weaknesses, opportunities and threats of the Industrial Internet of Things. Today, IIoT is akin to the wild wild west. Full of opportunity and possibility, but fraught with financial and operational danger for those who cross its frontiers without appropriate preparation.

Factora four-step approach to IIoT

1. **Discovery session** Time to dream! Working with your C-Suite, we'll identify the best business opportunity
2. **On-site workshop** Determine area with highest probability of success for chosen opportunity, based on Factora assessment of current state
3. **Short pilot** Proof of value
4. **Implement** Develop and execute plan to implement IIoT across business, based on findings of proof of value.

For more information, please contact us

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