HOW THE POWER OF IIOT WILL IMPACT GLOBAL TRENDS IN 2025

WHITEPAPER BY

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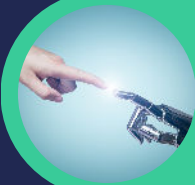
Asset Visibility. Made Simple.

You think 2024 was dynamic?

Think twice...

At Sensolus we believe 2025 will be even more dynamic.

In this whitepaper our CEO Kristoff Van Ratthinge shares his thoughts on how major global trends and Industrial Internet of Things (IIoT) will impact each other.

Learn how:

AI and IIoT can find their sweet spot

A beer card might be the answer to macro-economical challenges

IIoT will help you to stand the heat in times of global warming

The benefit of digitization has never been more clear, and certainly on those thousands of non-powered assets, from giant containers to small boxes.

Kristoff Van Rattinghe – CEO Sensolus

1. AI takes over

Unless you have been sleeping under a rock, 2024 was the year of AI.

Mainly the Large Language Models (LLMs); with ChatGPT the best known one; became a reality in most of our lives. **Everyone is playing with AI, from your grandparents to your children**. But the big tech players are still searching for the holy grail, i.e. super intelligence, where AI takes over general intelligence.

Their prediction is 2025 will be the year. **But this is not where IIoT plays a role**.

Today, we see AI being applied in IoT on 3 different levels.

1.1 AI as a bridge between LLM models and us

LLMs support all of us to query for insights. In essence, similar as we are used to ask ChatGPT for answers using tons of data on the internet, **LLM models are finding their way in the applications of IIoT**. Think about support agents (bots), improved training assistance, and even supporting developers to code.

Especially vertical AI agents are on the rise. Unlike general-purpose tools, **vertical AI agents are tailored to specific industries and able to handle specific tasks** like improving machine performance, predicting problems and automating repetitive work. They use data from connected devices to help businesses work more efficiently, save money, and respond faster to changes.

As in any sector, LLMs are supporting human interaction with all the systems related to IIoT. **Language is no longer a barrier.**

1.2 AI and machine learning add more intelligence on the edge and the cloud.

Simply stated: **AI processes the data** and starts looking for patterns, deviations, and even does predictions.

We need to split these two, starting with the **cloud**.

It is relatively easy to imagine how this works in the cloud, **think about a virtual assistant which will tell you where bottlenecks are** in your flows and where critical inventory gaps will pop-up. The more integrated operational data—the more valuable the assistant will support you.

> **We see that AI will take a "control tower" function; similar as a flight control center; able to automatically reconfigure devices in the field to make sure they are tuned to the requirements.**

Next to the massive amount of operational field data, Sensolus also **gathers a big amount of meta-data on the IIoT system** (even more than the actual data), such as device settings, network performance, radio signal strengths, battery levels, GPS performance and so much more.

We see that AI will take a "control tower" function; similar as a flight control center; able to **automatically reconfigure devices in the field** to make sure they are tuned to user requirements.

As such, some devices will sleep much more and only send logged data when really required. And some devices might start bursting more messages and more accurate locations as they are becoming more critical in the process.

AI will optimize the fleet, returning a much greater ROI of the IIoT system.

After the cloud, the second part is **edge-AI**, or about **intelligence in the device itself**.

For Sensolus, low-power operations are crucial, as tracker lifetime is an essential part of ROI: the longer your battery lives, the longer you can use a device. We all know the huge impact from NVIDIA, similar achievements are happening in low-power electronics and AI.

In essence, the micro-controllers and the sensors (such as the accelerometer) get more and more power-efficient, gaining an ability to run tiny AI optimizations without draining the battery.

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A simple example is motion analytics on the device.

Until now, if you want a device to detect...

- "in-flight" transit;
- "lifting by a forklift";
- "moving for more than 3 minutes above 30 km/h";
- Or any other motion;

...this required pre-programming motion paths of accelerations and many real life tests to get the parameters right.

Edge-AI turns this around.

A user can now define the parameters of the behavior (e.g. using a natural language query (LLM)), and the AI will train itself in the field till the right movement detection happens with mind-blowing accuracy.

In other words: any user will be able to define the real specific requirements for a use case, and the **device will train and improve itself to deliver accurate measurements over time**. Extensive and costly in-field validation will be reduced significantly.

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The next phase here is when the **different trackers start interacting between themselves** in the field, and where AI will locally decide which trackers can go into sleeping mode, as the "system" has sufficient local redundancy.

This all sounds fancy, but actually this is closer than we think and it is only accelerating.

1.3 IoT as a critical data source for AI systems

AI is asking IoT companies to provide valuable data from the actual physical world, so the accuracy of prediction and training can be enhanced.

Look around: AI is data hungry, the models need to train billions of parameters and iterations, so the **models need lots of data**, and unfortunately lots of energy (see trend 3 in this whitepaper). We noticed that even with the best model in the world, today, **there are still blank spots in logistics data**.

Imagine this: you bought a Christmas present for your mother-in-law because someone in the family thought it was a good idea to do a 'Secret Santa' this year. Your ordered your present online but it's two days before Christmas and on the delivery website you read 'in transit'. In other words: you have no idea where your gift is. The result? Christmas stress.

This happens with companies as well. At Sensolus, we sometimes joke that the location "in transit" of shipment companies must be a really big warehouse, as this is often the message you get. But nobody actually knows where "in transit" is.

> **IIoT feeds the AI with often the most critical and scarce data points of a physical process.**

It is clear AI will optimize many processes, but at the same time, it is also clear accurate and reliable field data in supply chain processes are critical. **IIoT for non-powered asset management (think about containers, boxes, pallets,…) is a crucial application to leverage the power of AI.**

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A fast reader can imagine that in combination with edge and cloud AI, the AI model itself will ask the edge-AI for additional data points, so the optimization can be improved and the end-user can be informed with adequate optimizations in his processes.

3 Things to remember

1. **Talk with your hardware device**

2. **Devices optimizes its settings for optimal usage... by itself**

3. **IIoT fills in the blank spots in field processes**

2. Macro-economical changes spur the need to digitize ALL your assets

2024 has been the prelude of the changes anticipated in 2025.

We see labor shortages, material scarcity, supply chain shocks (even accelerated with tariffs), resulting in inflation spikes, which inflate interest rates and so on. Efficiency is once more a competitive advantage.

Firms need more productivity out of their existing teams and assets (equipment) to neutralize the impact of inflation and labor/material shortages. The benefit of digitization has never been clearer, and certainly on those thousands of non-powered assets that many of customers have.

> **IoT allows our customers to do more with less. It allows them to ensure their teams work on efficiency, and much less on frustrating daily tasks such as retrieval and inventory counts.**

A digital asset is easy to count, easy to retrieve, easy to optimize in usage, easy to invoice, etc. In essence, macro-economic forces drive the digitization of non-powered assets. We call this the "beer card" case, the ROI of implementing IoT on non-powered assets is clearer than ever before, you can write the business case on a single beer card.

An IIoT investment allows our customers to postpone purchase decisions for new transport racks, or even decide to sell of part of their fleet. **It allows our customers to move towards pay-per-use models**, where all stakeholders benefit as only actual asset use is billed.

In the end, when your fleet of assets (trailers, reusable packaging, equipment, waste containers etc...) is not connected, the advantages to digitize them are rapidly growing in the current macro-economical climate.

Imagine your bank account were still managed on paper only – when it comes to non-powered assets, we think the same evolution will happen within 10 years.

2

Things to remember

1. Non-powered assets like containers and boxes are becoming digitized

2. 1,000 digital boxes are easier to count than 1,000 physical boxes

3. IIoT is cooling down the overheated globe

2024 is now the hottest year on record, and the first in which average global temperatures exceed 1.5 degrees Celsius (2.7 degrees Fahrenheit), even above the 1850-1900 pre-industrial period. (source: EU's Copernicus Climate Change Service).

And 2025 did not start much better, the recent fires in Los Angeles should be our warning call to make better New Year resolutions for 2025.

But will it? Let's be honest, if there is 1 global trend and concern, much more powerful than the previous 2, it is global warming.

AI might solve part of our global warming, in a constructive or very destructive way.

Today, I put my hopes on extreme optimization with quantum processing, leading to quasi eternal energy such as fusion. Or maybe, the superintelligence just finds a way to explain to every human being just to stop messing up the planet. This would be a great leap. But IIoT tackles the challenge with small steps.

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First of all, in the **IIoT hardware itself**, important steps are made to reduce the power consumption of the tracker. We see this on all levels of embedded electronics. This trend will continue, and **we are positive that the battery technology itself (in combination with energy harvesting) also will take important steps forward in the next years**, as this remains the biggest hurdle for IIoT.

The day IoT can be installed for a lifetime without charging, the real big ADOPTION will happen.

We also noticed more and more **IIoT is applied for efficiency**. This is easy to consider when thinking of a smart home, but we do see the same pattern in logistics and supply chain of our customers. IIoT data (example the location of empty pallets) is used to reduce transport cycles and to measure the carbon footprint.

> ❝ **The day IIoT can be installed for a lifetime without charging, the real big ADOPTION will happen.**

Our customers want to understand their environmental impact; often beyond their yard; so that they can set benchmarks and define steps of improvement, which can be measured accurately by IIoT. **IIoT is a key ingredient in greening the supply chain.**

In the same context, our **customers are shifting from one-way packaging towards returnable packaging** (often made from recycled materials). Within Europe, regular compliance is pushing this (deadline: 2030), but for most of our customer it remains a tricky step as they invest in more expensive returnable packaging, which gets out of the yard with minimal control on their investment.

Here IIoT kicks in again.
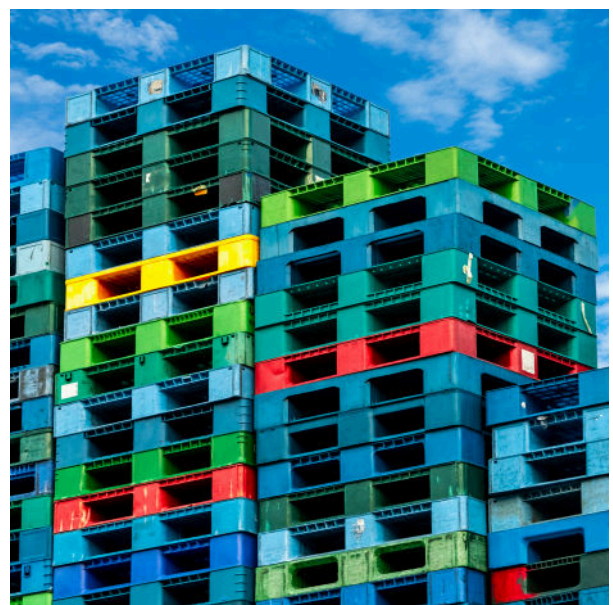
Digitization often a relatively small, additional investment in the switch to returnable packaging, but the recurring benefit of the digitization is massive, year after year. We refer to this as the "insurance" for ROI on returnable packaging. **IIoT ensures you have visibility and you are in control on your fleet.** It ensures you do more with less.

We are happy to see that more of our customers are requesting us to provide CO2 documentation on our products and services, and to have documented procedures in place for end-of-life (EOL) procedures , including battery replacements, with trackers running out of battery.

> ## The digitization is often a small additional investment in the switch to returnable packaging, but the recurring benefit of the digitization is massive, year after year.

In the same context, **we have customers investigating to put our trackers directly into the moulds of packaging** (and thus no longer retrofit them), as this is a huge saving on materials, time, and ultimately costs.

Those are all little steps towards a more sustainable supply chain, all with 1 common goal: **do more with less.**

2 Things to remember

1. We ~~dream~~ think about an IIoT device you never have to charge

2. More expensive returnable packaging = more control and sustainability

About Sensolus

Founded in 2013, Sensolus began with a simple yet ambitious goal: to **make IIoT technology easy and impactful** for businesses of all sizes. The founders combined their diverse expertise to create solutions that bridge the gap between complex technology and everyday business needs.

Today Sensolus is the European leader in asset visibility with **more than 1 million connected assets** in the world, **from giant containers to small boxes**. Together with a global certified partner network with 60+ partners Sensolus helps 500+ clients worldwide to make their assets visible.

About Kristoff

Kristoff Van Rattinghe is co-founder and CEO of Sensolus. He is a strategic leader in IoT & Smart Supply Chain with 20+ years in trendsetting innovation & entrepreneurship.

With Sensolus he is on a mission to connect all non-powered assets in different industries to optimize efficiency and productivity, which eventualy boils down in having a positive impact on sustainability in industry.

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