



# The Knowledge Required for IoT

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In a blog a couple months ago, I said I would not write about the Internet of Things (IoT) again until I had something real to talk about. The continuous buzz around the topic can make it confusing and risks it becoming nothing more than marketing rather than a real opportunity to transform industry and the world in general.

I really believe IoT will be a key enabler of smart manufacturing and Industry 4.0 initiatives, but we need to learn from experience and not only from intriguing futuristic visions. Having said that, I'm writing again about it because we've had our first experience and there are some lessons learned that make sense to share.

Just for clarity, we didn't develop a huge global project with thousands of things communicating with each other and with a central entity. We developed a pilot project—probably better called a proof of concept—on just a few machines. In any case, it was enough to learn that there are many aspects that need to be considered carefully.

As system integrators, we have worked for 20 years on software solutions for manufacturing. We have a good

knowledge of communication protocols, fieldbuses, integration of different systems, IT, software development, database management and web development. Maybe we're not the smartest people in the world, but we're certainly not the least experienced either.

And yet we discovered that we were a little naive in some areas that need to be managed correctly in order to provide a reliable IoT solution. Detailed below are some of those areas.

**Hosting:** We read and talk a lot of hosting. We have some of our internal services hosted in the cloud. We host some services for our clients. We thought we knew enough about hosting. But suddenly we discovered it was not enough. All it took was landing on the websites for Microsoft Azure or Amazon Web Services to understand immediately that they are not one-click configuration services. To choose the right server to install the application, you first need to find your way through a lot of terms, options and possibilities that you would never normally consider. Some of them are pretty easy to understand, while other seems to be pretty geek-oriented. And some cause you to ask yourself such philosophical questions as "Who am I?" and "What will I do in my future?" It took some time to find the right way through and discover that hosting might be cheap, but not as cheap as expected.

The Internet is not just a big Ethernet network. It has its peculiarities that you need to be familiar with if you want to implement a reliable application.

**Connectivity:** The Internet is a commodity. We are so used to it that we don't even realize that we use it almost continuously. We communicate on the Internet, we exchange files, we access data spread out all around the world. We do many complex things without being aware of what happens when we hit the enter key. The Internet is easy and straightforward to use; a little less so when you need to develop an application for it. But communicating via the Internet is not like communicating through Ethernet.

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Protocols are easy and effective, but different from the ones we use in our daily projects. All the knowledge and experience we had was not completely sufficient to avoid all issues.

**Unstructured data:** It's been almost 30 years that I've been working with databases. I started with DB3 and Clipper (the compiled version), and have had several advanced training sessions on the Microsoft SQL server. But my 30 years of experience has been with structured databases. Do you have any idea of the mental effort needed to move from the idea of a structured database to the idea of an unstructured one? It's probably comparable to moving from object-oriented programming to plain C. It's not less powerful, efficient or effective. It just requires a different mindset and converting is not easy. Fortunately, we had one of our fresh engineers working on it, and young minds are much more flexible than the old ones. But I saw signs of panic in the eyes of some of our best old engineers.

These three simple points are just the most evident things we encountered. I didn't want to dive too deeply with technical advice on how to approach an IoT opportunity. I just wanted to share, especially with system integrators like us, that IoT is powerful, fascinating and easy...in its own way. But do not underestimate the knowledge it requires. It's fairly different from the knowledge we typically have in our companies, and we need to be very conscious of that.