April, 2020
Ekkono Solutions AB

Capitalize on Customer Data – Forget About It!

In IoT you put sensors on things and connecting them to the cloud. Then product vendors will collect data and capitalize on it, just like Google and Facebook have done so successfully. I am sorry to break it to you, but I think *you can forget about it*.

Why? Because,
1. *Customers are reluctant to share data due to security and data leakage risks,*
2. *They realize that data is a currency,*
3. *It is a huge responsibility to handle someone else's data, which makes it expensive,*
4. *It is way harder than it looks; And*
5. *You need a commercial relationship with the end-customer (you cannot be the guy behind the guy) to do so.*

However, you still want to offer smart features. These are best done on the device, at the edge, with no human intervention or risk of data-theft in transfer. The insights are instead fed to the next level up in the solution, like the ball bearing telling the electrical motor about its status, and the motor telling the machine about its insights, which makes the machine and the entire production process truly smart. Now is the time to consider what role your company will take in Industry 4.0, autonomous vehicles, or another smart eco-system.

1.   Background

We are at a stage where each individual component in a machine or a production line must become a *little* smarter, in order for the entire process to become *a lot* smarter. By smart I mean that it can self-learn the normal condition, understand the surrounding environment it operates in, and detect or even predict when the conditions change.

And there is a technology that is perfectly suited for this – Machine Learning. It is all about learning from data instead of programming each and every possible scenario. The core of the machine learning mathematics is to make predictions, which tells you what will happen, or at least what is suppose to happen, or when something deviates from it. This will not only tell when a pump is failing, but also when something is blocking the pipe upstream.

Components can be as small as a screw, or as large as a conveyor band. Today there are screws that measure strain and vibrations. But imagine if every screw communicates directly to the Internet. It would instantly generate a data lake the size of the Black Sea. And in parallel there would be other ocean-sized lakes with data from ball bearings, motors, electrical drives, pumps and conveyor

bands. The question is what we would find in these lakes? We saw this in the telecom industry in the beginning of the previous decade when storage got so cheap that they stored everything about what people were doing online. While cheap to store, it turned out to be very hard to mine all this data. You also need to know what you are looking for. Reality is that most operators found almost nothing. Mining, correlating and understanding all this data is way harder than Google makes it look; And hard equals expensive. On top of this, the regulatory requirements and the online threats are constantly increasing, which makes it even more expensive.

2.   IoT and Connectivity

But let us not get ahead of ourselves. To fill the data lake we have to get the things connected. For 15+ years we have learnt the concept of cloud. Unfortunately, it is not reasonable, possible or wanted for all these components to send all their sensor data to the cloud. Sometimes they cannot even connect to the cloud. At least not *your* cloud. Customers will not allow it. For a lot of reasons. It is actually a practical issue to have thousands of individual components with wireless connections in one and the same facility. But the most obvious reason is security and data leakage. Connectivity always creates a door, which poses a security threat. Another threat is what can be read from the collected data, like production rates etcetera that might be sensitive information for a public company. A pump vendor with a big marketshare might even be able to predict the oil production by correlating production data from drilling rigs all over the world.

Another reason is also that customers are not stupid. If a vendor claims that they will capitalize on data, then the customer realizes that they are sitting on the raw material for that goldmine. So, why would they give it away for free? Which means that data collection requires an agreement, which is executed between the seller and the buyer. Who is your customer? If you are the guy behind the guy, i.e. provide the component that goes into a machine that is sold to the end-customer, then you do not have an agreement with the end-customer. But you still have a customer – the screw and the ball bearing are sold to the motor manufacturer, the motor is sold to the machine manufacturer, who sells the machine to the end-customer. We call them "your neighbor", i.e. the next level up in the eco-system.

3.   Know Your Customer

As said above, there is a good chance that you for different reasons cannot connect to your cloud. But usually there is some kind of interface to *your neighbor*. Eventually this channels up to the primary connection point, like the telematics gateway of a car, the HMI (human-machine interface) or the PLC of the machine. And they will send the data to *their* cloud. Now you have a few things to consider, like do you really need to collect the data, is it still possible to develop smart features, and do you provide value to your customers?

First, we have already concluded that few can really capitalize on the user and customer data by mining a big data lake. Maybe you just need a small subset of relevant data, e.g. to help you in making product development decisions. Access to this, in an anonymized format, is rarely denied by the other players in the value chain. And maybe, this can even be a currency that you can use to bargain with.

Because yes, you still want to build smart data-driven automation features even without direct access to your component; Like smart battery management for individual remaining range and smart charging to extend RUL (remaining useful life), predictive maintenance on wear parts, virtual pressure sensors, and health indicators for optimal operations settings. This can be done using *Edge Machine Learning*[*]. Applying intelligence on the device/component, on small local data, can generate some really interesting insights about the individual state and the surrounding. Insights that can also be valuable when aggregated one level up to your neighbor where they are correlated with other learnings, sensors and ambient parameters to get a more comprehensive picture. Adding to this value-chain will make you the preferred choice over competitors, and you might even be able to charge a premium price to improve your margins. But the insights might also be the currency you need to negotiate – "you, dear mr customer, get these insights for free, in exchange for you forwarding a copy of the value to me". A trade. A trade where an automotive suppliers can convince an OEM to share the insights from many units that can benefit the future design and development of your next gen product. Data is the only asset that can be copied several time without decreasing in quality or value.

4.   Conclusions

All of this leads to the conclusion that insights and smart features are preferably built on the device. Or the *edge* as it is known. This enables the screw and the ball bearing to feed insights about deviations to the motor, and the motor to combine this with an insight of unusual resistance, which enables the machine to proactively detect emerging issues, and guide maintenance or the operator to the root cause of the issue.

The raw material, the sensor data, is not the real value here. The insights are. Do not try and chew off more than you can swallow, because as attractive as capitalization of data might sound on paper, it is harder and more expensive than it seems. Rather consider who is your customer, usually the next level up in the value-chain (your neighbor) rather than the end-user, and how you can increase the value you offer her. By each level of component feeding the next level up with contextual and predictive insights, we are crowdsourcing smarts up to where the car can be autonomous, and where the entire production process can be truly smart.

The technology, like Ekkono's Edge Machine Learning, is available. These are just tools. The real value is in your domain expertise on what typically fails, how to measure the state of a machine, and how everything connects. Tools are there to help, but this is the time for your domain expertise to shine!

- The raw data is not the value — insights are
- Do not chew off more than you can swallow
    - It is harder and costlier than it seems
- Consider who is your customer — provide value to *your neighbor*
- Autonomous is the sum of smart insights
- Domain knowledge is king!

[*] Edge Machine Learning means running machine learning (ML) at the edge of the network – onboard the connected device. Ekkono develops an Edge Machine Learning software. In Ekkono's case, it is possible to do incremental learning at the edge, which means that the ML model continuously gets better but also that it gets personalized as it is fed with sensor data while in production.

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Ekkono #openfika is a short open, online fika† session, hosted by Ekkono, on hot, contemporary and relevant topics, where a 15 minutes presentation is followed by discussion and Q&A. Keep an eye on www.ekkono.ai and LinkedIn for the next #openfika session.

Ekkono Solutions AB is a software company that develops Edge Machine Learning. Our product is the result of seven years of research at the University of Borås, Sweden, and assists product OEMs in different industries to rapidly develop smart features onboard their products, using machine learning to make them self-learning and predictive. For more information, visit www.ekkono.ai.

† fika (wikipedia.org); Swedes have fika (pronounced [ˈfiːka]), meaning "coffee break". The tradition has spread throughout Swedish businesses around the world. Fika is a social institution in Sweden and a common practice at workplaces in Sweden. Fika may also function partially as an informal meeting between co-workers and management people, and it may even be considered impolite not to join in.