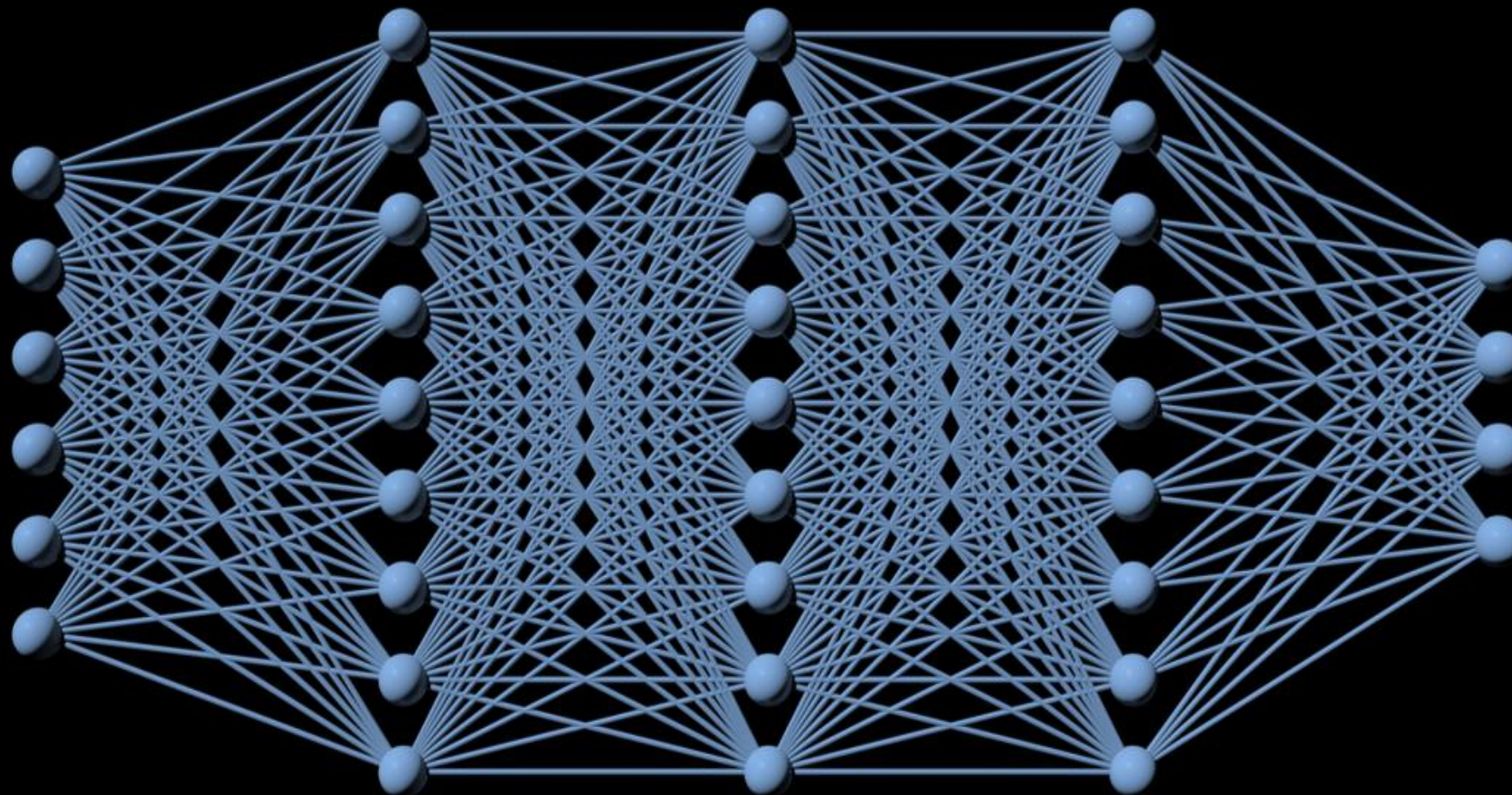


# Tupl

## Learn to automate, or automate to learn?

Monica Paolini, Senza Fili



A conversation  
with Petri  
Hautakangas, CEO,  
and Pablo Tapia,  
CTO, Tupl

**SENZA  
FILI**

In collaboration with

**FierceWireless**

## Tupl: Profile

Tupl was founded in 2014 to unlock the potential that artificial intelligence and automation in wireless have for increasing efficiency and creating new business opportunities. Tupl sees this as a revolutionary transformation in telecoms which could have an impact comparable to that of the industrial revolution.

Today, operators do not effectively use most of the performance and operations data from their wireless networks. Tupl wants to change this and to do this it has created a platform that transfers performance and operations data into a digital format that enables automation and optimization in wireless networks.

Tupl created TupLOS, an AI engine, as a tool for developing automation utilities and creating a digital knowledge database to harness complex processes.

TupLOS system includes utilities to collect data from multiple sources, to create models and to simplify training processes, with a goal to make it easier to automate complex processes.

Automation of manual and repetitive tasks can reduce costs and help operators use existing network resources more efficiently.

In addition to digitizing performance data and automating processes, Tupl's solution continuously learns from the data it captures, to further refine the automation and adapt the processes to changing requirements of increasingly dynamic and complex wireless networks.

Tupl claims that its solution can deliver a 90% reduction in manual labor, a 100-fold increase in

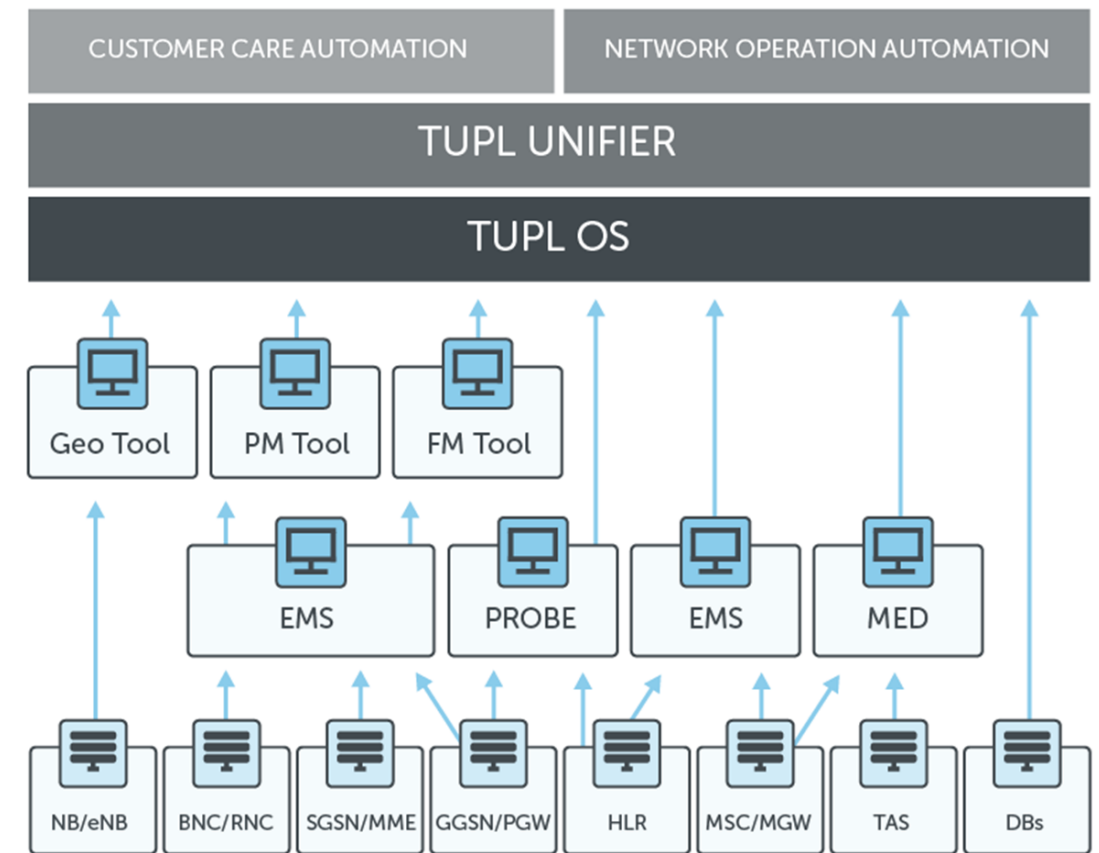
speed, and a fourfold increase in accuracy compared to existing, manual engineering processes.

Tupl applications within TupLOS include automated technical customer care (Automated Customer Complaint Resolution [ACCR]), Proactive Care, automatic network troubleshooting (Network Advisor), network construction prediction, and operations workflow management (UNIFIER).

Tupl ACCR brings together network and customer data from multiple sources to find the root cause of customer problems, then provides recommendations to customer service personnel and network engineers. Heuristics and machine learning work jointly to identify the cause of a subscriber complaint.

According to the company, 80% of complaints can be resolved in a closed loop, without human intervention. For the 20% that require human supervision, the time it takes to resolve the issue is cut in half, because engineers can drill down into the data or escalate the resolution process more effectively.

Tupl Network Advisor uses AI and ML to do root cause analysis and troubleshooting. It automates the data analysis and helps engineers refine their tools for



**Tupl solution**

*Source: Tupl*

tuning network performance.

Tupl UNIFIER is a platform that gives the operator a high-level and detailed view of its network's health and performance. UNIFIER brings together data from multiple sources at multiple granularity levels, including:

- Network status data: network performance KPIs, alerts and anomalies; configuration parameter values, changes and discrepancies; faults, trouble-ticket and work-order events
- Customer data: geo-location records, call performance, service performance.

## Tupl: Interview

### Learn to automate, or automate to learn?

A conversation with Petri Hautakangas, CEO, Tupl and Pablo Tapia, CTO, Tupl

What happens when an operator starts to automate its processes? How does the internal culture change, what are the financial benefits, and how does it affect the services the operator offers? I posed these questions to Petri Hautakangas, the CEO of Tupl, and Pablo Tapia, the CTO of Tupl.

**Monica Paolini:** Tupl is a new company. Could you tell us what you do?

**Petri Hautakangas:** We are a relatively young company. We were founded in 2014, with a good group of industry experts. We saw a real need for automation coming up, especially in the most aggressive tier 1 operators.

There weren't any really good solutions out there. That was the premise for founding the company: to start developing a solution that can face the automation tasks when it comes to complex but repetitive manual work that happens day in, day out in network operations.

**Monica:** How does automation relate to other sister efforts, such as AI, machine learning, or deep learning?

**Pablo Tapia:** Automation has been going on in the networks for a while. Operators have been trying to deploy solutions to be more efficient – for example,

in frequency planning, or cell planning. Some tools are automated in the networks using artificial intelligence, which is a way to put people's thoughts into code.

The real breakthroughs are techniques in machine learning that enable this automation to go one step beyond what was possible before. There are algorithms that don't necessarily require coding. These automation solutions can be created faster, and they can go deeper than real-life coding. They can capture things that are in gray areas.

Machine learning and deep learning are taking over in many industries, not only telecoms – for instance, in automotive or agriculture. It's only natural that it would come to telecom, and it's starting to produce notable results.

**Monica:** Is there anything special in the wireless industry that's motivating the adoption of these technologies?

**Pablo:** In the wireless industry, the complexities of the networks are increasing dramatically, not only because of the technologies that are deployed, but also because of the size of the networks, and the number of components deployed, the small cells, and more devices with IoT.

At the same time, customers are becoming increasingly demanding on quality. Mobile network operators need to become much more efficient at operating these systems. The only possible way to do it is through automation.

**Monica:** Automation is not simple. How can mobile operators get the benefits without too much disruption?

**Pablo:** This is a long-term journey. It's not a big solution that you buy, deploy, and then you transform your operations from one day to the other. It's a gradual path where, with very little investment, operators can start to get into this transformation, and they can start to see benefits already from day one.

There are a lot of things that can be automated. There are customers that have big targets for automation in over 80% of their processes. This is a journey of automating, little by little, all these processes that are manual today.

In order to do that, you have to have a vision of how you're going to orchestrate all these automation solutions, so that you do not end up creating a new problem that replaces the one you're trying to solve.



**Monica:** Before we talk about the technology, can you tell us about the cultural changes that go with it? Technology is one part of it, but automating a network means you're going to lose some control. It means that people will be doing different tasks than they do now.

**Petri:** First off, we don't believe in losing control. It has to be a transparent system. It has to be run by engineers. We try to take very repetitive tasks that are not what the engineers should be doing anyway. They should rise above those tasks. That's one part of the system that one deploys for any use case.

It should start from looking at the existing way of doing things, but doing them automatically, and then adapting them to the operator's existing environment. Then you don't have that kind of cultural problem, at least in terms of changing the way things are done right now. It's just that tasks are done automatically, but the engineers continue to be in control.

The next step could be that you start looking into adding new value, new functionality, that's not possible with just manual processes.

There are, of course, some obstacles also, technical ones and departmental ones, because to create value, you may need to break down some silos that exist in pretty much any operator at the moment.

**Pablo:** There is an exciting perspective of how this can change the way people are operating the networks today. As Petri mentioned, there is a lot of manual work that goes on day to day.

Control needs to rise to a higher-level role, where

engineers, instead of doing the actual job, are more like designers, and they move from being a telecom engineer to a sort of software engineer who handles all these models, the decisions, and the knowledge base that is being created.

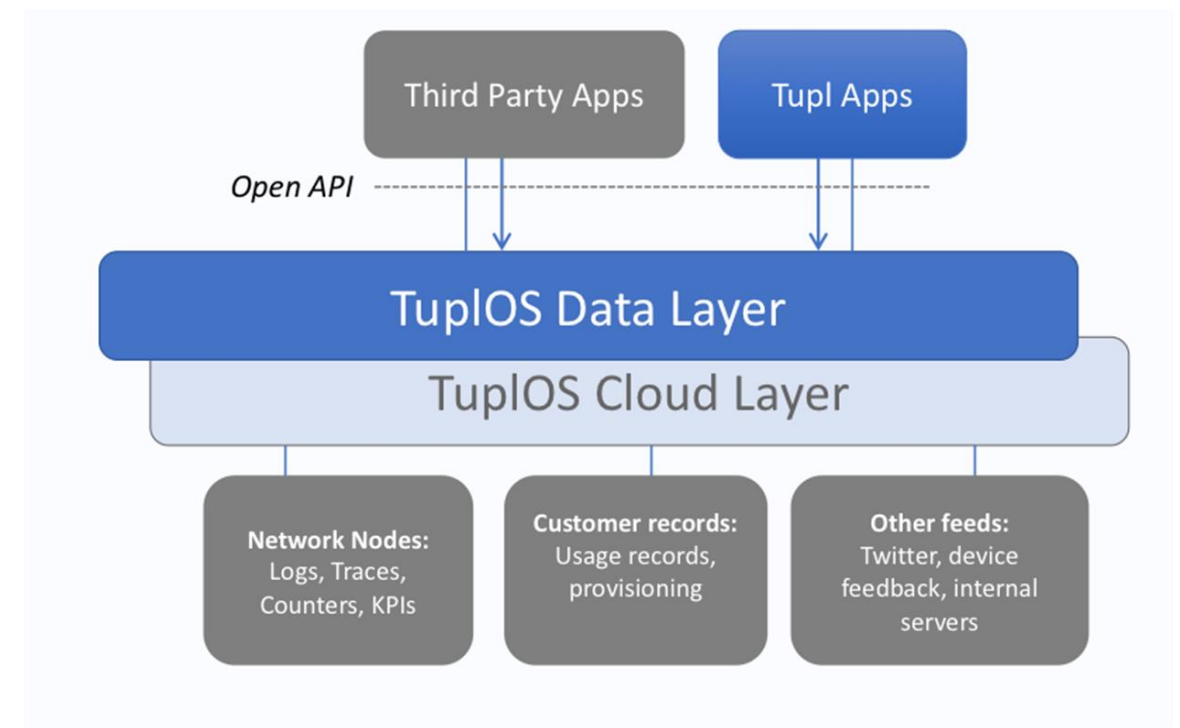
It's an interesting change of paradigm. It doesn't have to happen overnight, but it will be interesting to see how it develops.

**Monica:** How do you envision the adoption path unfolding? Are the operators going to start automating end to end, or will they start with specific functions?

**Petri:** We are engaging with extremely aggressive operators in Europe, here in North America and in Japan.

Every operator is slightly different, but the most aggressive operators have decided that they will need to reach a high level of automation, otherwise they will not be able to cope when the complexity increases in the network.

Automation tasks start from individual functions. That's what we see. You have small tasks to be automated, and then you have also rather big ones – for example, optimization, or solving technical customer care issues in an automatic way.



**TuplOS AI Engine for automating network operations**

*Source: Tupl*

**Monica:** What are the functions that operators want to automate first?

**Pablo:** It depends on the operator; every operator has its own pain point. It depends also on the phase the operator is in. Some operators are growing, so they need an augmentation of their workforce. Things like designing the network faster or troubleshooting problems quicker are relevant to them.

Other operators are focused on customer experience, and they want to see their customer care processes improve. Right now, if you look at typical ratings, operators don't get very good reviews from a customer care perspective. There is a lot of room for improvement.

Depending on the operator, depending also on the geography, there is a focus on one point or the other. What is important to understand is that there are many, many things to do. Ultimately, all these things fall into buckets that all operators will end up having to use.

**Monica:** Petri, you've worked in Europe, Japan, and the US. Have you seen any differences?

**Petri:** Yes. A surprise, in a way, is that Japan has created an almost countrywide mentality in support of automation. It's a very strong, holistic requirement that makes Japan one of the most aggressive countries in automation. And that flows into the operators, definitely.

The US is very business oriented and customer oriented. Operators want to be efficient and serve their customers the best possible way. If you have too many manual tasks, for example, it takes too much time to respond to customer issues.

If you are able to automate that, just think about how quickly an operator can help the subscriber. There're always some issues, but if you are able to respond quickly to the customers' problems, you are in a different league than other operators.

**Monica:** Pablo, you mentioned that this is not an expensive addition to the network. Can you expand on that?

**Pablo:** Because of the technologies that can be leveraged for these solutions, you do not need to develop massive systems. What is important is to focus on the value provided to the customer.

In many instances, it's a very clear-cut business

case for the customer, because it provides a significant amount of savings, and you are able to quantify it. You can demonstrate the ROI in a few months. It's quite an easy investment, from the operators' point of view.

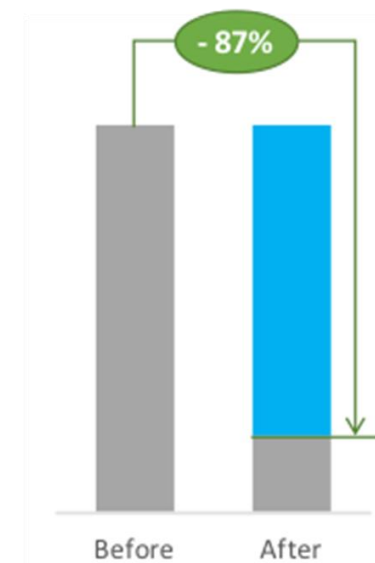
**Monica:** At the same time, you need to go through the learning process at the beginning, that results in a long-term change. Is there a long-term component in the ROI?

**Pablo:** It depends on the solution you're using. We've put a lot of purpose into making those aspects very simple in our solutions – into how to create and train those models, and into how to make sure maintaining the automation solutions does not impact the bottom line.

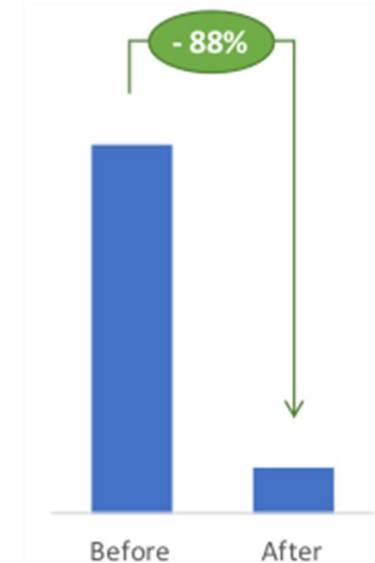
**Petri:** If anything, the ROI can be extremely fast. These automation applications are rather complex, but if there is a good underlying system to quickly create the automation model by using the engineers' workflows in a particular customer, you see the benefits really, really fast. We can make a very interesting case on the ROI.

**Pablo:** One interesting aspect is that these are cumulative savings. It's a change of mentality. When one looks at this problem, you're not trying to solve everything, or to get a big chunk of your

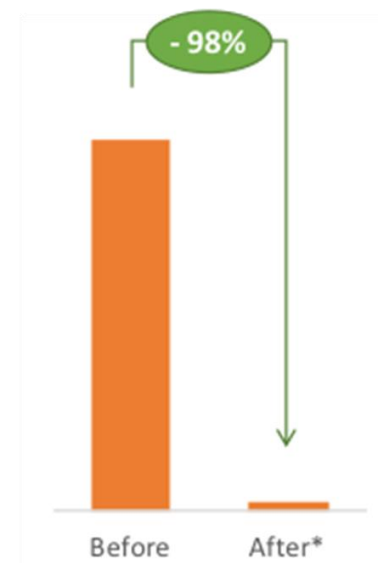
Ticket handled manually



Headcount



Response time



Increased efficiency with the Tupl AI Engine

Source: Tupl

opex with the first step.

When you look at the final goal, you see cumulative cost savings that, many times, come from hidden costs and, at the same time, empowerment for doing new things.

**Monica:** What is Tupl's focus in network automation?

**Petri:** Our slogan is "operations made simple." At the moment, we deal in automating the technical customer care, even looking into doing that in a proactive manner, and we are automating network engineering and optimization tasks.

We have a second product called Network Advisor, which just recently won a Fierce Innovation Award in the network optimization category.

In the network operations center, we do task

automation, alarm handling, and so forth. There's lots to be done in a more intelligent way in that area, also.

Those are the three buckets we do.

I can mention briefly what is technical customer care automation. About 20% to 30% of the overall customer care issues are related to something technical.

The technical issues end up landing with the engineering and operations people. They spend a huge amount of time going issue by issue, looking at six different tools, and trying to, in their head, correlate what's the root cause, and how to fix it and how to communicate back to the customers. It takes a long time. It also consumes a lot of the engineers' time. It's not necessarily consistent, because you have a group of 100 or 200 engineers doing it.

We set out to automate this. This is a good example, because in a particular customer case, we started correlating a certain amount of feeds, a task that the engineers typically did. The results were immediately valuable, using the engineers' expertise to figure out the right route, and what to communicate. We've trained that model with the engineers.

Then you start to add more information into the system, so you get more granularity and more accuracy to really pinpoint the issue. That's how you add new value to an existing process for which it was impossible, in a way, for the engineers to have all the data in hand. The savings are significant, and the customers are really happy. Our clients are able to resolve customer issues 100

times faster by automating up to 90% of the engineering tasks that had been done manually in the past. Plus, they are getting results that are four times more accurate, and 100% consistent.

**Monica:** The system keeps learning. As you say, at the beginning you have the initial learning phase, but then as you go on, it perfects itself, so you should be seeing better results, right?

**Petri:** Yes, but perfecting is maybe not the right word, because the situation also changes. Let's say you build a perfect system. It will be a static environment. We all know there's nothing static about mobile networks.

New technologies and changes in the network are introduced. The network has to adapt in a scalable manner, in a maintainable manner, and the only way to have this is by AI learning.

**Pablo:** It's not like it's going to be always getting better, though. There's a point at which it's good enough, because even engineers don't agree on the results. What is important is to have the ability to provide this feedback mechanism to continue adapting and re-teaching the system.

There is also an interesting question of how you go beyond the first use case. There are two ways to go.

One is to continue going deeper into that use case. For example, in the case that Petri mentioned, the customer care resolution, now we are going into the second phase. Instead of reacting to a customer complaint, we are going to proactively identify and resolve the issues customers complained about.

**Petri:** I call it the holy grail of customer care.

**Pablo:** At the same time, once you have incorporated all these different data feeds and data correlations, you can build other use cases on top of what we call our TuplOS platform. That's an AI correlation engine that allows you to build more value, and then realize this dream of creating multiple automation solutions that solve the operator's challenges.

**Petri:** It's a journey.

**Monica:** Once you understand what's going on, and what the causes are, you might be able to preempt them. You might see the problem coming, and also, you might generate new services that address the concerns users have.

**Petri:** Exactly. That's reactive customer care moving towards proactive customer care. You validate your model and the underlying algorithm in the reactive mode. And then you start to have the pro-activeness, so even before there is a physical call, you are able to use the same process to take action proactively.

**Pablo:** Not everybody calls to complain.

**Monica:** Subscribers may churn without calling. You want to catch them before that. There is a huge amount of value if you can do that. Operators do not know today why subscribers churn. This is a way to address that, because the operator can go back and see what happened before a subscriber churned.

Once an operator adopts your solution for customer care, it has a platform that can work in

other domains as well. The operator is learning a lot about its network, which goes beyond customer care, because, as you said, it's a technical problem. How easy is it for them to then move to new areas of automation with your solution?

**Petri:** We have always had a vision of a multitude of use cases developed on our AI engine. From the beginning, we've designed our use cases with consideration for this expansion.

Once you have integrated the first use case, which depends on the first pain point that the operator has, then adding the next one is a simple effort from an integration point of view. You just focus on the value creation through models, training, and so on.

To give you an example, with customers, I always start with the customer care solution. Now we are going to a second use case, which is the network optimization and troubleshooting, which we call

Network Advisor. It uses many of the same feeds, but it solves a different problem, which is the problem of the RF engineers in the field.

**Monica:** What's next at Tupl?

**Petri:** We've set good foundations, especially with the most aggressive operators. We now see the next wave of operators requesting the same solutions. It's continuing with the journey.

We already have requests for IoT, but we see it almost as a service that has to be managed separately, although it is in the same network.

These things take additional paths. Those need to be properly managed and automated as much as possible, because again, networks are not getting any simpler anytime soon. We plan to support all these future paths going forward.

What we have designed is completely applicable to any network operation. We already see the

complexities increasing in verticals such as utilities. It's pretty easy for them, to be honest, for applications such as electricity metering. It's a point-to-point connection, and every now and then, a couple of bits come.

Now, with smart meters and so forth, you have many other networks where the same process applies. To be honest, you can't find a more complex place to be than in mobile networks. We've proven ourselves by solving even the most complex tasks in wireless networks by automation.

Glossary

AI	Artificial intelligence
IoT	Internet of Things
RF	Radio frequency
ROI	Return on investment



## About Tupl



Founded in 2014 by telecom, big data and AI veterans, Tupl is transforming customer access and experience in the telecom industry through improving operations with leading wireless operators across the US, Canada, Japan, Mexico, and Europe. Its AI Engine, TuplOS, utilizes machine learning and several other utilities to enable faster innovation cycles for network and customer care operations. Tupl is headquartered in the US in Bellevue, Washington with presence in Spain, Mexico and Japan, and is continuing its rapid global expansion in 2018. To learn more about Tupl and request a demo, visit [www.tupl.com](http://www.tupl.com).

## About Petri Hautakangas



Petri Hautakangas is the CEO at Tupl. Petri is well known in the telecom industry, having worked in senior positions in Japan, USA, China, Mexico, Brazil and Finland. In Japan, his most recent position was Nokia CTO for Japan & APAC markets. During an earlier stint in Japan, Petri was instrumental in growing Nokia's network business six-fold, reaching well over 1BUSD in sales. Petri also worked in the Seattle area as CTO from Nokia to T-Mobile, orchestrating new mobile network solutions that millions of T-Mobile users are now enjoying. Prior to Japan and USA, Petri worked in Brazil to help build business from near zero to the biggest Nokia operation in Latin America.

## About Pablo Tapia



Pablo Tapia is the CTO and Founder at Tupl. Pablo founded Tupl after a 15 year career in wireless, with multiple roles across various areas and disciplines. Prior to Tupl, Pablo was a Member of the Engineering Staff at T-Mobile USA, where he led major technology projects, including Self-Organizing Networks (SON), Quality of Service (QoS) techniques, as well as spearheading the evolution to HSPA+ and LTE. Before T-Mobile, Pablo led a development team at Optimi, a software startup developing optimization solutions, and held various positions at Nokia Networks R&D. He is an author and contributor to several books on Wireless technologies. Pablo holds an MSc EE from the University of Malaga, Spain.



## About Senza Fili



Senza Fili provides advisory support on wireless technologies and services. At Senza Fili we have in-depth expertise in financial modeling, market forecasts and research, strategy, business plan support, and due diligence. Our client base is international and spans the entire value chain: clients include wireline, fixed wireless, and mobile operators, enterprises and other vertical players, vendors, system integrators, investors, regulators, and industry associations. We provide a bridge between technologies and services, helping our clients assess established and emerging technologies, use these technologies to support new or existing services, and build solid, profitable business models. Independent advice, a strong quantitative orientation, and an international perspective are the hallmarks of our work. For additional information, visit [www.senzafiliconsulting.com](http://www.senzafiliconsulting.com), or contact us at [info@senzafiliconsulting.com](mailto:info@senzafiliconsulting.com).

## About Monica Paolini



Monica Paolini, PhD, founded Senza Fili in 2003. She is an expert in wireless technologies and has helped clients worldwide to understand technology and customer requirements, evaluate business plan opportunities, market their services and products, and estimate the market size and revenue opportunity of new and established wireless technologies. She frequently gives presentations at conferences, and she has written many reports and articles on wireless technologies and services. She has a PhD in cognitive science from the University of California, San Diego (US), an MBA from the University of Oxford (UK), and a BA/MA in philosophy from the University of Bologna (Italy). You can contact Monica at [monica.paolini@senzafiliconsulting.com](mailto:monica.paolini@senzafiliconsulting.com).