

How innovations establish themselves

# The Standards Puzzle

Establishing a standard in a market as a small company? That cannot work. In today's conditions even large companies find it hard to establish a standard. However, to trigger a process which then develops a life of its own – even small companies are indeed capable of this.

An example is Inova Semiconductors with APIX, a technology, which is currently establishing itself worldwide. If you look into this example more carefully, you can learn a lot about how innovations can be established in today's market, even if the initiative was triggered by a small company.

How are standards created? If you ask like this, you will most likely get two spontaneous answers: standards are discussed and decided in committees - or large companies establish their development as standard in the market, see, for instance, VHS.

However, almost nobody would believe a small company can establish its development as standard. Large companies dominate the committees in order to establish their interests, and small individual fighters usually lack the market strength or resources. Which large system manufacturer will rely on a technology, which may no longer exist in two years' time?

Large investments are necessary in order to implement a new technology - so even major manufacturers will avoid high risks. And small companies will be overwhelmed by the huge initial investments.

It sounds paradox, but considering all market participants, exactly these reasons speaking against a small company, can result in the technology of a small company establishing itself and even large automotive manufacturers contributing to the establishment of a new technology as the standard.

All pieces of puzzle must fit together to make this happen. However, the completed puzzle tells a lot about the rules on which the electronics industry is based and how these have changed over the past years.

## A real step forwards

There is hardly a problem for which there exists no solution. If you aim to enter the market with something new, you must firstly know the problem very well and second offer something which solves the problem better than established technologies - and not just a little bit better, but significantly better. This is the minimum requirement.

In addition, products based on the new technology must operate flawlessly, the quality must be right and supply must be

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ensured. The new technology should not only deliver better attributes - in this case higher transfer speeds, lower power consumption and better EMC stability. It should also offer users a higher degree of freedom and allow more flexible applications. Furthermore, it should be possible to simply and efficiently integrated the new technology as IP into highly integrated systems, such as microcontrollers, FPGAs or ASICs.

But it doesn't end there. Ultimately, one crucial criterion is profitability.



Robert Kraus, Inova

“ Suddenly we not only had to develop chips, but we also had to assume responsibility for software development, as only standard protocols will ensure interoperability in the future. ”

If you read this not even complete list of success criteria, you might jump to the conclusion that only large manufacturers are able to establish new technologies in the semiconductors market.

However, Inova demonstrated with APIX that the development can go the other way. The newest generation - APIX II - is just getting ready for its market introduction. The chip patterns are working, and some automotive manufacturers took already the decision to integrate these chips into their new models.

However, the investments are enormous - at least for a rather small company. "We invested approx. EUR 3 million in our APIX-II chip", says Robert Kraus, co-founder and CEO of Inova.

How is this possible? Let's look into the past.

## A seedling growing

The origin is a group of engineers of a then large electronics corporation with an integrated semiconductor department: Motorola. Based on bipolar technology, a considerable transfer rate of 700 Mbit/s could be achieved using the so-called "Highway"

ICs. However, Motorola did not continue the development and thus, Robert Kraus and his employees had the idea of looking for investors and founding in 1999 their own company, Inova Semiconductors. They believed in the technology and its extendibility requiring their full commitment and focus. The result was a transfer technology called GigaStAR. GigaStAR ICs, now on the market for ten years, still sell very well.

One of the reasons why the list of success criteria above for the introduction of a new technology is incomplete is the fact that the small word luck is missing. Looking back, Inova was lucky several times. And luck, as we all know, sticks with the brave. A first incidence happened approx. nine years ago when the right people met at the right time at an automotive electronics convention. Robert Isеле, today responsible for Driver Information Concepts & Software, Display technologies at BMW, heard about GigaStAR. Using this technology, it would be possible to generate point-to-point connections between the display and control unit in the vehicle. Isеле and Kraus started talking.

At that time, Isele recognized the advantages. Fully serial, digital video links did not exist, the automotive world was still mainly analog. "We wanted to connect the display via a real serial digital link in order to send data across larger distances as well," Isele remembers. Digital transfer technologies known at that time were originally designed for applications in consumer devices. Use in vehicles was rather problematic.

GigaSTAR, on the other hand, pointed in the right direction. However, he defined some fundamental requirements: for cost and power consumption reasons, the ICs must operate in pure a CMOS technology, the number of connecting lines must be as small as possible and they must be EMC-compatible. The result was APIX I.

In the meantime, the Bavarian Department of Commerce heard about the small proactive Munich-based semiconductor company and supported the development of APIX-I. So far, financial support in excess of EUR 1 million has been provided by Bavaria and the German Federal Department for Education and Research for the development of APIX-I and APIX-II. The main reasons for this investment were to keep precious technology know-how in the country and to create jobs. Kraus: "Not a small amount, and without this support we would not have made it."

APIX-I was Inova's journeyman's piece. According to Isele, alternative technologies were lacking a roadmap for the future. "But we had to think about future requirements and take into account expected higher data rates," explains Isele. "You must have vision and live for it." The result: The plan was to introduce APIX for the first time into the head-up display, a special equipment option in the BMW top model, the new 7-series.

The collaboration with BMW resulting from this lucky coincidence was a nice beginning, but nothing more. BMW was just carefully assessing the situation. Using such an innovative project the reliability of a small partner can easily be verified. Robert Kraus was fully aware of that: "The head-up display, the first APIX application, was a fragile seedling." BMW would have been able to implement

this equipment option using other technologies as well. For BMW this step barely represented a risk. But for Inova this was the first important practical test.

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### **What does this outsider want in our market?**

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Of course, in the meantime everybody had heard that for its heads-up display project,

BMW relied on the technology of a small company in Munich, which was known in the industry through GigaStaR, but was a nobody in the automotive sector. As usual, some old experts looked down on this project. Especially as both parties started the activities regarding the next generation. put mildly, the schedule was ambiguous.

With APIX-I, Inova demonstrated its capability to continu-

ously deliver quality. BMW was pushing to receive the second generation as soon as possible, which should be able to transfer no less than 3 Gbit/sec. "We were thinking to introduce an intermediate version with 1.5 Gbit/sec, but had to realize that our partner was not willing to grant us even the smallest break," explains Kraus.

No surprise that a few mockers predicted a crash. However,

# in the focus How is a standard established?

Inova managed to not only deliver a functional APIX-II prototype in the shortest period of time, but will also roll out a second APIX-II version with a special feature in July (see below for more). "Today even formerly critical observers positively evaluate APIX," states Kraus happily.

The success of this effort also has another reason. Since 2004 Inova has been closely collaborating with the ISS of the Fraunhofer Society (Fraunhofer Gesellschaft) in Erlangen. Kraus: "In particular, when we had to develop the second generation in a short period of time, the Fraunhofer Society provided us with extraordinary support. Occasionally more than 20 engineers worked on the project at the same time."

Here you might respond: A nice, perhaps even surprising success of two good partners. What does all this have to do with a standard?

In order to answer this question, it is the best not even to think about standards for a while. Above all, Robert Kraus thinks economically, a necessity for the Managing Director of a rather small company with approx. 20 employees. As a business-minded person and engineer, he knows how much an IC design costs and how difficult it is even for large companies to take the risk of a new design.

## A wave is developing

Even large manufacturers are afraid of this risk, if only one customer is behind the application, even if this customer is a large automotive manufacturer. However, if several manufacturers count on a new technology, an own dynamic may develop.

It paid off that at the beginning there was not only a vision, but also a strong commitment to develop the APIX concept over several years. And above all, to make it not only applicable to one market.

And again, a little bit of luck. Fujitsu, a major Japanese manufacturer, heard about APIX. Fujitsu has large development offices in Germany, among others in Munich, where engineers

work on graphics systems to be used in vehicles. They were quickly convinced by APIX's potential. "In a time, when design cycles are being reduced dramatically, I am a big fan of open innovation. In the future we will only be able to cope with the problem of shorter design cycles and increasing complexity at the same time in collaboration with partners," says Dirk Weinsziehr, Senior Marketing Director of Fujitsu.

As stated above, nobody starts at zero, most problems already have a solution. In the case of high-speed data transfer, a standard exists called FireWire, which was established many years ago. It originates in the computer industry and is applicable in vehicles. This standard is especially popular in Japan. Luckily for APIX, Fujitsu Germany managed to position their favorite candidate in several projects. APIX is to be introduced as the interface on Fujitsu graphic controllers.

This collaboration was the second large practical test for



Robert Isele, BMW

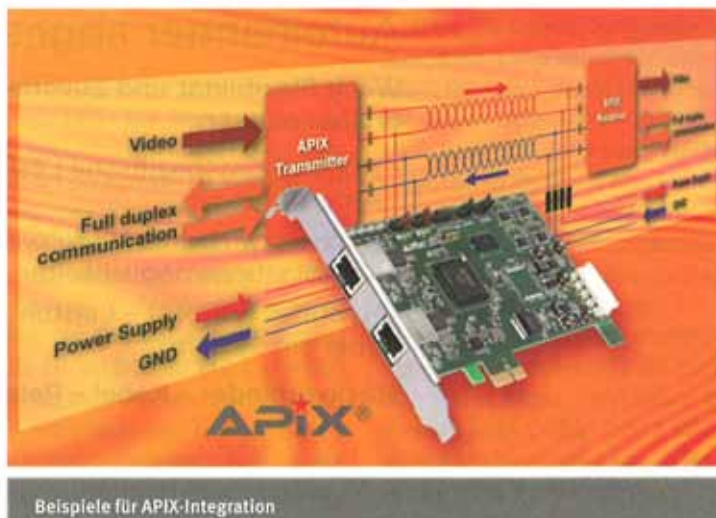
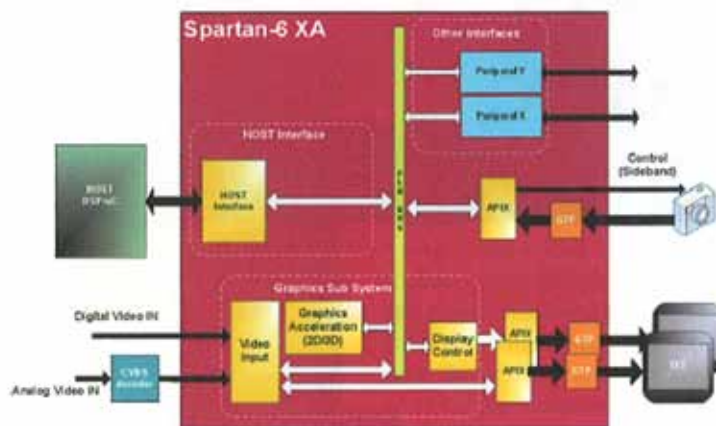
“ Know-how accessible via many companies is one of our most important assets. ”

Inova. "Here as well the schedule was rather aggressive", explains Kraus. But the challenge arrived from a different aspect. Until now, Inova understood itself as a hardware manufacturer. The company wanted to develop ICs enabling the transfer of high



Dirk Weinsziehr, Fujitsu

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data rates. In addition, Inova wanted to license the technology to enable other IC manufacturers to integrate the interfaces into their products. Now the engineers had to realize: In order to enable several manufacturers to use the APIX interface without any problems, which is a prerequisite for high quantities justifying high investments - it is not enough to only take care of the hardware. "Therefore, Inova also had to assume responsibility for software development, as only standard protocols will ensure interoperability in the future", explains Kraus.

This new task meant a not insignificant additional effort, not only with respect to the work itself. Additional development efforts translate into additional costs. Additional, unplanned costs. Now young, still small companies ask the concerned question: Will the investors agree? Here again, Inova was in a lucky position. The investors are closely connected with the company, they know the special nature of semiconductor business and gave the green light.

However, more substantial,

objective reasons may have convinced the investors to trust the management direction.

Not only Fujitsu suddenly spent money to integrate APIX, also companies in other electronics areas started to show interest into the fragile seedling from Munich. For example, in order to transfer high data rates in vehicles, respective cables and plug connectors are required. In the meantime, suppliers in these areas learned to trust the solution and released APIX-customized products onto the market. And not to forget, camera manufacturers themselves equip their products with APIX as well. Even measurement device manufacturers, such as Telemotive, offer first products fully customized for the APIX test.

At the same time, Inova puts efforts to develop new technology not only for the automotive market, but to also establish itself in other markets. In many industrial applications it is beneficial to transfer image data uncompressed with high quality over larger distances to the monitor of operating personnel. Companies in the Embedded environment investigated the new interface in more detail. In the meantime first boards with integrated APIX chip are available, e.g. by Congatec.

It cannot be missed: suddenly a network is created, a wave is building up, capturing more and more areas. "The wave is gaining momentum and we can ride on it," states Kraus happily. In the meantime, other large semiconductor manufacturers besides Fujitsu, such as Toshiba and Xilinx, became interested in APIX, now also offering products with integrated APIX interface. "Soon other IC companies will follow," says Kraus.

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### **The wave gains momentum**

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Now some of the larger automotive manufacturers are interested in the new interface as well. This helps the wave to gain momentum. As they can now reach more than one

customer, large TIER 1 suppliers for the automotive industry take care of APIX. This does by far not only cover intangible support. In order to integrate APIX in their platforms and to pass all qualification processes, they must invest large sums of money. Nobody would do that if he did not win trust and expects good business. This should result in feedback effects with other OEMs.

A problem for BMW? "Not at all, we were never interested in exclusivity," explains Isele. "BMW does not differentiate itself by the display link, but by the contents passing through it, and these are defined by us."

Each company joining strengthens the de facto standard. Know-how is now built up in many different companies. Kraus is under no illusions: "Nothing depends anymore on us at Inova alone." However, exactly this was the goal, as Isele confirms: "Know-how accessible via many companies is one of our most important assets." And with this both do not only think about a small company, which may go under. But also about very large manufacturers. The decision processes in large corporations are sometimes difficult to understand. "It may happen that a large corporation suddenly exits a promising technology," explains Kraus and cannot suppress a smile. Regarding combined APIX know-how this should be different: Everything is transparent, people assuming responsibility stand behind everything.

"And we are only getting started now," states Kraus excitedly. Fujitsu integrates the interface in a graphic processor, which is manufactured using a 65 nm process. This is very expensive. However, this is the only way to offer cost-effective ICs. "Being focused on their strengths, the employees of a small company above all offer us the benefits of efficient design implementation. Secondly, for the partner's openness we are able to integrate the ICs at a very high level, which is the fundamental requirement for cost efficiency," explains

Weinsziehr. The 65 nm graphic processors should be available starting December.

There will be several interesting announcements in short order. By companies counting on APIX and integrating the interface into their products as well as by Inova itself.

First Inova will release the second version of the APIX II generation to the market. The special feature: These ICs will not only contain other interfaces such as FC, but Ethernet as well. This was a huge effort as well. "In order to integrate the Ethernet interface, we had to rework the analog as well as the digital part of the chip. And that within a few month," says Kraus.

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### **Ethernet integrated**

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However, according to him this was beneficial: "Besides the high data transfer rate, the Ethernet interface is the crucial differentiator." And Isele adds: "Inova could secure this as well." Thus, the requirements were met, especially one central concern: 100% backward compatibility.

Apropos APIX I: As soon as the first version of APIX-II was available, the demand for APIX-I chips increased substantially. Now the suppliers can be sure of a transition possibility to the future generation, explains Kraus.

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### **Let's now discuss standards**

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And the standard? Here Kraus is quite free from emotions: "For us this was not crucial at all. However, it will be interesting to see, how the wave spreads."

He can imagine that something like a de facto standard will emerge. Why should a large manufacturer try to absolutely avoid a technology, which found broad support in a versatile network, which is available from many sources, works technically well and promises an economic system? The puzzle pieces fit together, starting from electro-mechanics, via measurement technology and Semiconductor manufacturers, to the

OEMS and their suppliers.

However, something attracts attention: If committees try to define in-depth standards at a round table away from market reality, then it is questionable, if due to a multitude of compromises applied to address manifold interests, the market players can actually afford the implementation - even if they would like to.

What remains is the large individual fighter. For him it should be difficult to fully enforce a standard. Development costs rather speak against it. Today, a new technology is created via a versatile dependency network. Thus, it may happen that at the end a de facto standard develops, that originated in a small company, which may be rather surprised about the fact: Was this really us? What is interesting to mention: Nobody was ever forced to do anything. However, suddenly many apply the new technology. A standard is not released or enforced, it consolidates via its own rules.

However, committees do have one benefit: "All parties involved must permanently think and discuss about the requirements of future systems. Everybody must work on the same feature group and formulate the requirements profile precisely", says Isele. To use committees to define something at bit and signal level, he simply regards as a waste of money, as it cannot be implemented, neither technically nor financially.

If now many companies enter the market with APIX chips, what under these circumstances is going to happen to Inova? Does Kraus think, it still makes sense to develop their own ICs, or would it be better to assume the role of the pure IP supplier? The answer is clear: "We will continue to develop and produce our own chips and sell them on the market. If we could not gain experience from our own chip development and manufacturing, we could not deliver high-quality IP." Kraus is convinced that Inova is going to ride the "Made in Bavaria" APIX wave using the strategy applied for a long time. (ha)

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*How do cloud-based applications affect usage quality and network security?*

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## **Test software provides security in the cloud network**

**Spirent Communications presented a software for testing the performance, availability and security of virtualized network appliances and cloud-based applications in public, private and hybrid cloud environments.**

While cloud computing and virtualization promise cost-efficient IT task processing, IT managers must address questions regarding the security of these environments and the usage quality for the user. This is addressed by the Avalanche Virtual software presented by Spirent. Companies and cloud service providers can determine whether the architecture applied delivers the promised security, functionality, performance and interoperability of virtualized appliances and used applications.

The Avalanche Virtual software is based on Spirent's Avalanche hardware and adds functions which user can apply to verify the stability of virtual IPsec, IDS, IPS and other security solutions. Furthermore, it is possible to identify error points

of software-based content delivery mechanisms. "Avalanche Virtual tests individual devices, application and services in the cloud," explains Jeff Schmitz, Vice President of Spirent. "So far, this approach was not possible using traditional test tools. Using our tool, the network manager can ensure that his cloud platform delivers the advantages of flexible computing without limiting the user experience." Unlike other solutions, Avalanche Virtual offers the same real world test functions in the cloud as in traditional networks and enables realistic performance and security loads in any cloud environment. Furthermore, the solution is independent of specific test hardware and can emulate millions of users. (nk)