The Birth of MicroSCADA

"The best way to predict the future is to invent it" (Alan Kay)

Where?

- *Made in the Finnish electrotechnical company Strömberg Oy, Vaasa, Finland*

It is not trivial to answer the question why something or somebody was born. This is true for MicroSCADA too, because it all happened 20 years ago and human memories are fading away. But fortunately, I have saved quite a lot of documents.

The MicroSCADA birth process started in 1981 in the Finnish electrotechnical company Strömberg Oy, which was founded by Gottfrid Strömberg in 1889. In the 80s, before the ABB merger, Strömberg was active mainly in Finland and in the Nordic countries but to some degree also in other countries. Generally Strömberg focused on medium voltage products for electrical utilities and industry.

Strömberg made automation products for electricity distribution and industry already in the 60s. Strömberg started, for example, the development of static protection relays for medium voltage applications in the early 60s. In the 70s, Strömberg made a variety of automation products and systems such as alarm systems, paper quality analysis systems, process control systems, power control systems for motors, remote network control systems, and even a process computer including software for industrial applications (Strömberg 1000).

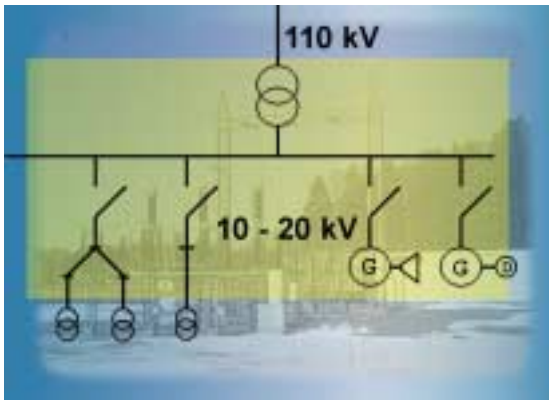
Why?

- *Lack of an appropriate control system for power distribution and generation*
- *Automation a "door opener" for primary product business*

In the early 80s, I was working in the project organisation that offered total electrification projects for Utilities and Industry. The projects included primary electrical equipment and automation products. In the automation business, we represented Allen-Bradley at that time and we were using their PLC products plus our own protection relays and alarm systems in the projects. However, we were not able to make total automation systems by ourselves, because we did not have an appropriate control and reporting system. This fact that we were missing one part in the automation concept was one of the factors that initiated the birth of MicroSCADA.

Another factor was that automation was considered to be an important "door opener" for the primary product business and therefore Strömberg tried to improve its own knowledge base and product scope.

Strömberg had gained quite a lot of experience of control systems earlier, both from its own development projects and its external representations. In the 70s we represented Landis & Gyr and were selling their remote control system to utilities, and in the late 70s we had a short time of co-operation with Nokia, selling their remote control system (in a joint company named Nokia Strömberg Control). In the 70s, we also made our own remote control system STCS for building automation and water treatment. However, in 1980 this co-operation and development work were history (for many reasons, not described here) and we were lacking an appropriate control system for electricity distribution and generation.



Accordingly, we started to study the possibility of making our own control system for our project business in 1981. The goal was to develop an automation system for

- **remote and local control of substations and disconnector stations**
- **remote control of power distribution networks**
- **remote and local control of diesel and hydro-electric power plants**
- **remote control of district heating**

In addition, we included industrial process applications and water treatment in our scope of activities, but in the late 80s, we focused on our core operations: electricity distribution and generation.

The basic idea and requirement was to integrate all the functions necessary for power management, i.e. monitoring, control, reporting, protection, optimisation, etc. into the substations and control centres, that is, to integrate the control system, our SPACOM protection relays and Allen-Bradley's PLC products to a unified automation system for local and remote applications. We called the total integrated concept **Distribution Automation,** abbreviation DA. In other words, the basic idea was to provide our customers with an integrated and total automation solution.

We gave the new control system the name **Strömberg Control System, SCS,** later renamed **MicroSCADA** and included in the S.P.I.D.E.R. concept when we joined ASEA and BBC and became ABB.

When?

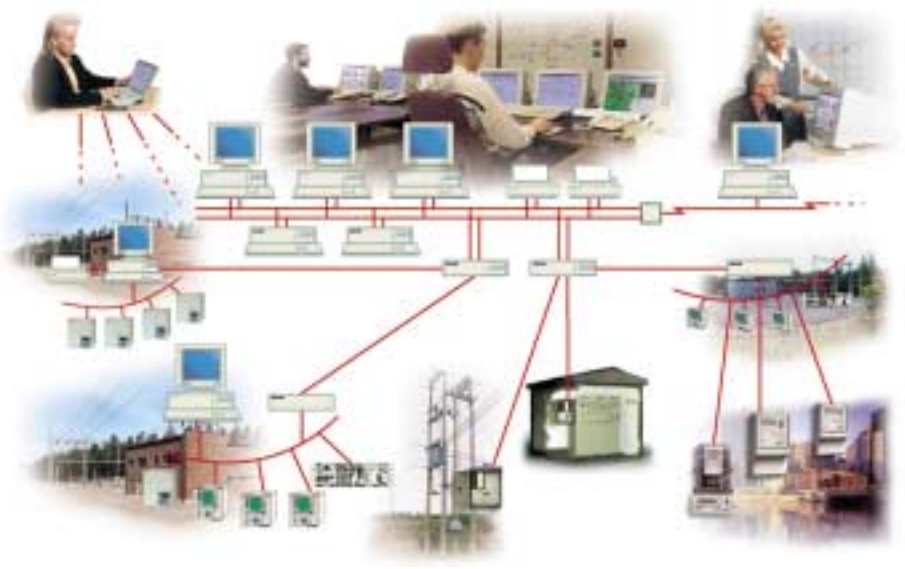
- *Market study, requirements and concept development in 1981*
- *Development start in February 1982*
- *The system up and running in 1983*
- *First deliveries in 1984*
- *First DA system delivery in 1987*
- *Worldwide era started in 1989, S.P.I.D.E.R. Product Launch, Frankfurt*
- *Award from the "The Finnish Federation of Technicians in Special Branches" in 1990*
- *Integration of Network Management System from Tekla Oy in 1993*
- *DA Product Launch for ABB local centres in 1993, Helsinki*
- *Panorama concept, Product Launch in 1995, worldwide*
- *Acquisition of Versoft Oy in 1997, integration of Distribution Management System and Graphical Information System with MicroSCADA*
- *Year 2000 without problems*
- *MicroSCADA, Industrial IT certified in 2002*
- *Now 20 years in 2003 and 3000 customer installations*

As a result of the needs and ideas, we made a market requirement study and concept description in 1981. This work took most of the year and in the late 1981 we decided to start developing the software of SCS.

At that time we had very short and efficient decision paths and early in February -82 (project start dated 1982-01-27) the work started with a small group of seven people. In 1983 the software group included twelve people. We had awfully hard work for two years (but interesting, indeed!), because there were many brand new ideas we had jumped on (see "What") and with our experience of the control system development in the 70s, we wanted to do the job a lot better this time.

In 1983, we had the system up and running, so **this year, MicroSCADA will be 20 years.** In **1984 we made the first customer deliveries** in hydro-electric power and network control (the first one to **Enso Gutzeit Hydro Power**).

In 1987, we delivered the first complete **Distribution Automation** system to **Övik Energi Nät AB** in Sweden. This was a significant step in the MicroSCADA birth process, because here we integrated substation automation and network control for the first time to form a unified system solution. On the substation level MicroSCADA was integrated with SPACOM relays and connected to MicroSCADA in the control centre (still running, but with updated computer technology). The concept advantages are obvious, because the MicroSCADA nodes on different levels are automatically compatible with identical software and application objects, which dramatically reduces integration and engineering work. In Övik we could also, unlike any other competitor, for the first time demonstrate protection parameter setting/monitoring of the substation relays, executed remotely from the control room. We had the complete concept, exactly what the power utilities wanted and which today is a requirement from our customers.



So, the development of the basic concept and the first version took about three years (1981-83), but this was, however, only the beginning of the big "birth" process to come when we joined ASEA (1986) and then BBC (1987), and became ABB (1988). Thanks to this big company merger, we got the chance to grow worldwide and to realise our underlying long-term strategy and business idea "***GLOBALLY LOCAL"***. Our thinking was that we needed locally based marketing, sales, engineering and support in order to be successful in power distribution business. This principle also proved to be right, according to our customer satisfaction figures and business progress.

The worldwide era started in 1988-89. In 1988, ABB Relays in Sweden started to market SCS for substation control worldwide with **Mats Kristensson** as the driving force, and in 1989 SCS became part of the **S.P.I.D.E.R.** family and renamed **MicroSCADA** (and also renamed Substation Control System, i.e. SCS 100, for Substations). Considering this worldwide start, **Erik Ödmansson**, as being the head of Network Control, is worthy a great praise for his progressive and crucial MicroSCADA decisions and support. From that moment, we started with his help to negotiate licence agreements with local sales and engineering centres within ABB, in order to sell MicroSCADA for integrated substation automation and network control, globally. The official marketing and sales start took place in Frankfurt in 1989 (the S.P.I.D.E.R. Product Launch).

In 1990, we got the SETELI award in Finland. The "Finnish Federation of Technicians in Special Branches" rewards creditable technology and business achievements every year.

In 1992, we already had negotiated quite many MicroSCADA licence agreements with local ABB centres and consequently we arranged a big product launch in 1993 in Helsinki, where we introduced the full DA concept including the whole range of DA products from Vaasa.

In 1993, we integrated the Network Management System MicroXpower of the Finnish company Tekla Oy with MicroSCADA.

In 1994, the power management business concept Panorama was created jointly by all ABB centres included in the TNP Business Area. The DA concept was one important part of the concept. Panorama was launched in 1995 to local ABB centres and customers around the world.

In 1997, we acquired the small, but successful Finnish software company Versoft Oy and included and integrated their advanced products, i.e. their Distribution Management System and Geographical Information System, with MicroSCADA. By this acquisition we got the pieces missing in the Distribution Automation concept.

Thanks to a good software base and the preparations made in 1999 together with our local centres and customers around the world, we had no problems bringing MicroSCADA into the new Millennium.

In recent years, ABB has introduced the Industrial IT concept and last year MicroSCADA was certified as being part of the Industrial IT.

Today, after 22 years of hard work, we have 54 licence agreements with local sales and engineering centres around the world and now we dare say that we have **globally local presence and successful growing business.** Last year, our local ABB centres sold almost 400 systems, which is the best sales figure so far (except for the sales related to the year 2000 preparations).

However, it has not always been that easy, rosy and straightforward as it may seem here in this birth process review. We have encountered many problems and tricky things, but on the other hand, there has also been a lot of encouraging and positive customer feedback and events, which have stimulated to continued hard work.

What?

- *Base software independent of target platform*
- *Distributed software*
- *Safeguard investments in application work*
- *Smalltalk influence, future-proof software concept*
- *SCIL, an advanced application language for control applications*
- *Graphical windows and mouse, the first in the world for control*
- *Advanced Library engineering method for the control application engineer*
- *Platforms, SBC/RMX, PC/RMX, VAX/VMS, PC/UNIX, Alpha/OpenVMS, PC/Windows NT, PC/Windows 2000, PC/Windows XP*
- *Modern and comprehensive product, thanks to continuous implementation of customer and system requirements over 22 years!*
- *High quality, tested in thousands of customer installations*
- *Evolutionary software*

As the software was to be our big and important investment, we made quite an effort in the beginning to investigate how to structure the software. The goal was to find an advanced and future-proof concept and logical structure. We saw, for instance, that the basic control software should be independent of the target technology, i.e. hardware, computer languages, operating systems and communication systems, in order to maximise the software life-cycle. The result was that we isolated the base software from these changing technologies. In practice, this proved to be a very successful strategy for the long-term business.

From the market we clearly saw the need for a distributed software concept. Our control applications

were distributed to different types of substations, power plants, local control centres, main control centres, secondary control centres, etc. It was a must to structure the software in such a way that we could flexibly, depending on the application, set up different configurations of distributed MicroSCADA nodes, with both local and wide area communication.

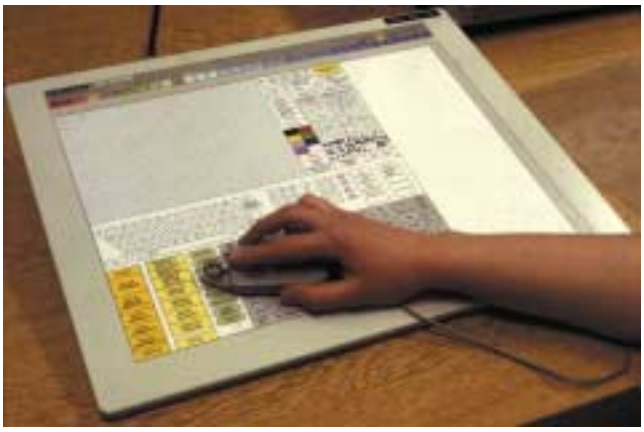
Another important initial decision we made, was to keep new developments fully compatible with previous ones, in order to safeguard investments in the application work. This has also proved to be very valuable for the customers and has enabled them to upgrade hardware and software without re-doing any applications. In this way, we have succeeded to get very loyal customers who have come back to us in business many times. We have a lot of examples of customers, who have regularly changed to newer and faster technology, without any need for changing their applications.

From our long experience of substation automation and network control, we knew that customers need a broad spectrum of functionality with continuous upgrading and changes. We had also learned from history that when customer needs and wishes are translated into FORTRAN and similar codes, there is a tricky and expensive work to be done in every project (specify, plan, program, compile/link, test, verify, document, release,.. errors,.. delays,.. complaints,..costs,.. bad reputation,..). Now we wanted a much smoother and easier method, so we decided to **isolate the application world from the basic software world.**

Thanks to ideas from **Smalltalk** in the early 80s (Alan Kay, Xerox Research, see further http://www.smalltalk.org/#ABriefIntroduction), etc., we designed our own **application-oriented language specifically adapted for control, named SCIL** (Strömberg Control Implementation Language and later renamed it Supervisory and Control...) and **a totally new graphical user interface with multiple windows, cursor/mouse control and graphical dynamic push-buttons.**

Thanks to these "inventions", we could move the **application work to people with process and application knowledge,** but who did not have to be experienced in software programming (Pascal, C, Basic,..).

Thanks to the new and advanced graphical user interface with multiple windows and mouse control, we could simplify both engineering work and process operations. MicroSCADA (SCS) **was the first control system in the world to use windows and mouse technique** (we developed our new user interface in parallel with Apple's Lisa & Mac and used the same source of ideas, Smalltalk).



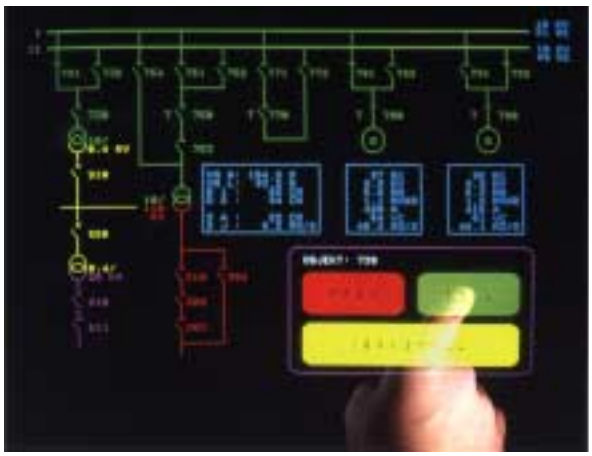
I remember some utility customer reactions when we first demonstrated our new window/mouse graphics and software push-buttons in 1983: "We cannot use such toys for controlling our switchgear!" Today this technique is of course state-of-the-art technique and fully accepted, but in the MicroSCADA "childhood" we had some customer acceptance problems.

Considering the MicroSCADA software, the basic principle is quite simple (like in Smalltalk). It can shortly be described in terms of the **SCIL engine** and the **application objects** (several types, i.e. "datalog objects", system nodes, system equipment, communication channels, process objects,..). The SCIL engine executes the application programs, which operate and handle the objects and commu-

nicate data between them. The objects are intelligent, i.e. they can send messages to each other, process data, create other objects, etc., because an object can include an application program. Thanks to this object-oriented principle, all application programming and database creation and testing are very fast and flexible and can be made online under normal process operation. Another advantage, thanks to the isolation of SCIL and objects from the Pascal world, is that **application programming errors cannot crash the system.** This is very important, when application engineers with process knowledge, but without programming knowledge, are to do the engineering job.

In addition to the MicroSCADA node software, we also needed a **flexible and redundant communication system** for the communication between the distributed nodes, protection relays, PLCs, RTU terminals, etc. First we designed this communication subsystem on separate microprocessor hardware and later we integrated it into the node hardware. The communication is based on the **SDL principle** (Specification and Description Language), a technique we borrowed from the telecommunication industry (Bell, LM Ericsson at that time). See further e.g. http://www.sdl-forum.org/

Thanks to the "SCIL & window & object" principle, we could very easily build **all application engineering tools into the system itself** and accordingly we created a unique and fast method, the MicroLIBRARY, to create customer-based applications and objects from customer input data. This method automatically creates customer substation and network graphics, reports, etc. plus all the required databases and application programs using standardised substation and feeder objects. Here we realised the Smalltalk idea in creating tools (the SCIL language/objects) by which we can more easily create higher-level tools (application engineering tools), by which we can more easily create still higher level tools (the MicroLIBRARY), allowing us to create customer applications much more easily. The MicroLIBRARY has saved a lot of costs in customer application engineering around the world.



Together with ABB in Sweden, Switzerland and Germany, we made a comprehensive engineering library (FI/Lib510, SE/Lib520, CH/Lib530, DE/Lib542) for most of ABB's protection and control products in the 90s. This means that today most of ABB's substation products are easily configured together with MicroSCADA, for both local and remote substation automation and network control. **This enables the local centres to sell standardised functionality, save engineering costs and improve business.**

Regarding base technology, we made only minor investigations before starting the SCS project, because as mentioned, our thinking was that the software should be as independent as possible of the hardware technology, etc. Microprocessor technology had come to stay and this was our primary target platform due to the expected good price/performance ratio in the future (the PC was emerging). However, this was not yet the case at that time! The cost of the first microprocessor-based target system was about 20 kUSD, which in today's money would be close to 80 kUSD. Today the corresponding PC target with much more capacity is below 4 kUSD, i.e. 20 times cheaper.

In the 70s we had based our control system on mini-computer technology, but although this technology was mature and had a well running development environment, unlike the micro-technology,

we saw much more future potential in the microprocessor technology.

Regarding software languages, the choice was quite easy at that time. Our previous control system software was made in FORTRAN and we thought this was not right for the micros. The most tempting alternative was **Pascal** (Ada not available), although this was not yet very well supported in microprocessors.

After a short study of available micro-platforms we started with Intel's single-board microcomputer family **Multibus**, SBC 86 plus their real-time operating system RMX 86 and their Pascal 86 toolkit. The development environment was based on Intel MDS and ECLIPSE from Data General Corporation. Later, in the middle of the 80s, we changed from Intel MDS to Digital Equipment VAX/VMS, including cross-compiling/linking facilities for different automation target platforms. The reason for this was to get a mature development environment with long-term stability.

Our expectation regarding **changing technologies** was right. It was not long until the **DOS-PC** was booming (about 1984) and we **made SCS available under PC/RMX,** in order to cut costs. However, the PC was not yet that popular for industrial applications and utility customers **wanted SCS in VAX/VMS**, which we released in1986. After that, the international market wanted **MicroSCADA in PC/UNIX** (a real-time Unix, System V from UMC), which we introduced in 1991.

When Digital Corp. introduced the Alpha platform, we made **MicroSCADA available in Alpha/OpenVMS**. Soon, however, we saw the importance of Windows NT on the market and we ported the software to **PC/Windows NT** with a first release in 1995. Here we also had to make a cross compiler from Pascal to C. Now, since 2002, MicroSCADA is also running **under Windows 2000** and this year, it will be available under **Windows XP** as well.

We have many times heard nonsense like, the "old" MicroSCADA is "dead", etc. The fact is, however, that the MicroSCADA sales volume has continued to increase, as has the popularity with the customers and users. This is clearly seen in the business figures and in personal customer responses and customer satisfaction studies and figures. The concept is popular at the local ABB centres, thanks to the **"globally local"** principle, which enables them to **add their own value,** not only sell our products as such. This principle is also very important in selling small projects, worldwide.

The "globally local" business principle means that we provide the base MicroSCADA software product for the centres, which then implement the total customer projects, adding computer and communication equipment, protection relays, RTUs, etc. and their own application knowledge in form of engineering work. Thanks to SCIL and the graphical tools, many centres have made their own standardised application tools and application libraries. ABB in Germany, Switzer-

land, Austria, Sweden, Spain, the Czech Republic, Finland, etc., have made a lot of advanced application tools and objects plus lots of advanced and comprehensive customer solutions.

I remember, for instance, that the Swiss ABB people in Baden (**Volker Lohmann & Co**) made an advanced redundant system solution for substation control using SCIL, even before we had the hot stand-by redundancy implemented in the standard software product. They (**Wolfgang Wimmer**) also made and included an advanced and comprehensive busbar colouring system for station diagrams. The German ABB in Ladenburg applied MicroSCADA for Load Management (**Bertold Bunten and his crew**) including an advanced customer-oriented engineering system, and the Network group (**Michael Herack, Volker Darmochwal**, **etc.**) made an Energy Management System with advanced engineering tools saving a lot of manual work. In Austria, **Hans Szeremeta** demonstrated his skills and experience in making a very comprehensive and advanced network control system using SCIL/Motif, which provided excellent graphics and functionality (regarding Motif, see further, http://www.opengroup.org/openmotif/). There are lots of similar examples from different application areas around the world. Thanks to the flexibility and adaptability, MicroSCADA **can be used in most application areas**.

Although the development work started in the early 80s, it does not mean that the epithet "old" is negative! On the contrary, this means that MicroSCADA is **one of the most comprehensive and high-quality products for integrated substation automation and network control on the market today!**

The main reasons are:

- ***The comprehensive DA concept for integrated substation and network control***
- ***An advanced and evolutionary software concept and structure***
- ***A continuous implementation of customer requirements and system features for more than 20 years offering the customer what he wants, with maximum quality and at moderate prices***

Actually, the customer can be very happy to get the "old" but at the same time **modern MicroSCADA** software, because it has been **tested in thousands of customer installations**. Mostly, the quality and functionality of brand new software is a nightmare both for customers and vendors and according to my experience, it is very time-consuming to create high quality software (we also had problems). The reason is that it takes awfully much time to collect all thousands of customer, system and (changing!) technology requirements and to plan, implement, test, verify, document and release them. And to correct the errors! And to train all the people, worldwide! And, to install the products/systems into the business process! Etc.

We have many other examples in the world of "old", but advanced software like MicroSCADA, e.g. Oracle, SAP, Mac, UNIX, MS Windows, MS Office, etc.

The software imperative is evolution, not revolution!

Who?

- *Ari in the place of honour*
- *Our strength: the wide knowledge base in ABB, several hundred people*
- *We have trained thousands of people around the world*
- *It's all about human competence*

When talking about the birth and development of MicroSCADA it would almost be a crime not to mention **Ari Örn** in the place of honour. He has been (and still is) as important for this system, as air is to the human being. Ari has his own consulting company, Rekursio Oy, in Helsinki and he has been working for us since 1975(!) when I first met him at EKONO and engaged him for the development of our first control system (a few years he worked partly for Nokia too). Ari is a true virtuoso in software engineering and mathematics and he "talks" Pascal, Ada, FORTRAN, C, etc. languages, better than the Finnish language (smile!). Together with him, we set up the software concept and structure, defined the SCIL engine, objects, databases, communication, window/mouse graphics system, library engineering, hot-stand-by, Visual SCIL, etc. He was the main software implementation architect and the guy who has managed and coded most of the kernel modules for 22 years, together with his skilled partner **Tarmo Laaksonen**. Ari is also the architect of the development system and software logistics and the strict implementation rules we have followed. What would MicroSCADA have been without him? Nothing! **Our best thanks to both of you!**

I remember Tarmo once stated in a restaurant, one night after a hard day's planning, "You see, Ari is a really "bad" guy, because you are not allowed to make the smallest mistake and you are really out in the cold, if you don't follow every small detail of the programming rules". But thanks to this, we have succeeded to keep the large software system under control and make a releasable standardised product out of it. And more, thanks to this and the resulting high quality, it was possible to licence and distribute the software product to the local ABB centres for **value-added local sales, engineering and support.**

Of course we have made errors and had problems too. Especially with the UNIX version. In 1994, the situation was so bad that we stopped everything in spring and started a "softwar". We even postponed summer holidays! The "war" took six weeks and we found more than 200 bad errors!

But, back to the Very Important Persons in the MicroSCADA history. **Raimo Pikkala** was from the start our hardware and microcomputer expert and he also handled the software packaging. **Erik Englund** first participated in the software group and later he was involved in customer training and handled our worldwide software licensing. **Rune Björkstrand,** who joined our group in late 84, was the absolute master of the MicroSCADA communication system MicroNET and **Allan Örn,** who joined us in the early 90s, was also the very specialist in NET communication. In late 87 **Dick Kronman** joined us and he played a great role in LAN communication design, system software and tricky software trouble-shooting.

Mikael Molander, Mats von Essen (starting in

the late 80s) and **Leif Williamsson** (in the early 90s) were the prominent figures for the MicroSCADA graphical tools, MicroLIBRARY and engineering principles.

I also want to mention two external, very skilled software experts from the early days, 1982 and –83, i.e. **Kaija-Riitta Liimatainen** working with the SCIL engine and **Jukka-Pekka Numminen** working with the process object database.

In marketing, sales, customer engineering and support, the prominent figures were/are **Johannes Björkgren** (from the start), **Pentti Mäenpää** (from the start), **Erkki Antila** (from the start), **Jouko Kytömäki** (from the start), **Christer Bertell** (from the start)**, Juha Salmu** (almost from the start), **Sven-Erik Nygren** (almost from the start), **Tapio Vainio** (almost from the start), **Sixten Holm** (in the 90s), **Juha Muhonen** (in the 90s), **Jarmo Järlström** (in the 90s), **Kimmo Lindholm** (in the 90s) and **Sauli Toivonen** (in the 90s).

I would also like to mention a few general managers, who worked hard to make MicroSCADA a success. **Harri Niemelä** played a very important role in the start-up phase and in the 80s as the head of the automation business, and after him **Kalle Mattila** and **Mikko Helinko** made a great job. Considering the Distribution Automation concept and business, **Göran Wiklund** was (and still is) the ultimate driving force and co-ordinator with very deep knowledge and experience of substation automation.

Regarding other ABB managers, who have made a strong effort for the MicroSCADA business, etc. in other countries, I wish to mention **Erik Ödmansson, Mats Kristensson, Arne Johansson, Ulf Hermansson, Hubertus Zinke, Michael Herack, Volker Darmochwal, Bertold Bunten, Heinz Giller, Volker Lohmann, Wolfgang Wimmer, Klaus-Peter Brand, Hans Szeremeta** and **Harvinder Singh.**

I could, of course, also mention a lot of other skilled people, who have contributed with ideas and hard work, but within the first 10 years of MicroSCADA, about 40 persons were more or less engaged in the development work and in the 90s, there were many more people, so from this point of view, I just take the opportunity to **Thank You Everybody,** mentioned and unmentioned, for the valuable work you have made to concretise our vision.

If we count all the people involved in sales, engineering and support worldwide, we have trained hundreds of people. This means **there are several hundreds of MicroSCADA people in ABB.** We started the MicroSCADA training in 1986 in Vaasa with **Britt-Louise Sievers-Storholm** and later **Sakari Kyttä** as trainers for both ABB people and end-customers. Including end-customers, we have trained **several thousand people** altogether (about

6600 participants in our training courses). **The MicroSCADA knowledge base of people is one of the most valuable properties we have.**

The leading principle when we started the development of MicroSCADA was to use **few but skilled** people. In a work like this with many new progressive ideas on-board, it's important in the start to keep the group relatively small to be efficient and keep all people aware of everything. All people in the SCS group were 100% or "more" engaged and very enthusiastic about the ideas, progress, business, etc. In the early days, many of us also took part in meetings with customers and consultants, in order to get the touch and feel of the reality in the field. My experience is that you can do whatever you want, if the people "see the great idea" and the needs behind, are truly motivated and have a childish enthusiasm. If you cannot create this atmosphere, then skip the big thinking.

Whereto?

- *Market changes, deregulation, regulation*
- *Technology changes, web, wireless, satellite*
- *Power Management according to new principles: Online Services*
- *Industrial IT enabled MicroSCADA advantages for the future, big installed base, large knowledge base, high quality, high functionality, advanced system concept, DA for integrated substation and network control, high adaptability, long life-cycle*
- *Utilise MicroSCADA properties for business and safeguard customer investments*
- *Migrate to new models, which are imperative for our customers*

As a consequence of changes in the power utility markets, we have lately been looking into new business principles for selling Power Management to our customers. The deregulation of the electricity market and the resulting competition has forced the utilities to review their own processes in order to cut costs. This has caused them to focus on core activities and to outsource other activities and buy external services.

As IT and automation are considered to be non-core operations for the utilities, they are expected to buy Power Management as services in the future. Consequently, we have recently executed a large business research project allowing us to provide MicroSCADA functionality as online services on the Intranet or web for the customer. The project was executed together

with utility customers and the operator partner TeliaSonera in Finland.

In short, the principle is that MicroSCADA software is running in a server "hotel", to which the substations and users are connected through appropriate standard communication infrastructures like Intranet and various wireless channels (GPRS, WLAN, .. Satellite). The customers can rent functionality as online services according to their needs, independently of their geographical location. One advantage is that the customer doesn't need to invest in software, computers and communication networks. Another advantage is, that ABB will take full responsibility for the IT operation, new revisions, maintenance and support. Thanks to the use of new communication infrastructures (Intranet, Internet, wireless,..), flexibility will grow significantly and the companies and users may be located anywhere in the world.

This new principle will have a great impact especially on Power Distribution, where the substations, power stations, disconnector stations and transformer stations are distributed over large areas in the countryside. I predict that the utilities will see the online services as quite a tempting alternative in the future.

So, the direction, "whereto", for the customers in the future is, as I see it, towards renting power management services on-line on Intranet (and the Internet), according to their own needs, instead of buying big complex control systems and having their own IT staff for operation, integration, maintenance and support. These online services are substation services, operation services, training services, expert services, network services, asset management services, business services, planning services, etc.

Considering the future direction, MicroSCADA is well suited for facing new challenges, thanks to its high degree of adaptability, for example, in providing online services according to the new business concept.

Considering the huge effort we have made in the past 22 years in many countries worldwide regarding development, globally local presence, sales channels, licence agreements, customer projects and installations, knowledge base, people motivation and engagement, training, system concept, functionality, quality, etc., it is very important to continue to utilise all this property in our ABB business and to provide continuation for our customers, safeguarding their investments.

We should continue in the same way with the Industrial IT enabled MicroSCADA as we have done in the past; to migrate to new customer needs, to new technologies, to new ways of operating within ABB, to new society rules and to new business models we find imperative for our customers.

Thank you for your attention!

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