3E-MOTION Ventures GmbH
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PROFILE

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Ausbildung

1975	Abitur am Mannheim-Feudenheim Gymnasium
1976-1980	Dipl. Ing. Nachrichtentechnik; Spezialisierung: Automatisierungstechnik FHT Mannheim
	Diplomarbeit: Batteriegepufferter externer RAM-Speicher für Steuer- und Regelgeräte mit mikroprozessorgesteuertem Programmiergerät zur Simulation von Prozessdaten

Technische Fähigkeiten

- Systemarchitektur-Design (Embedded control networks)
- Entwicklung von Steuergeräten (HW & SW)
- Bussysteme CAN, LIN, Flexray TT-Ethernet(Lektor an der TU Graz für Echtzeitbussysteme
- Entwicklungswerkzeuge Automobilelektronik, SPICE, SAE1939, AUTOSAR
- Microcontroller-Programmierung 8051, AVR, (Assembler, C)
- Modellbasierte Entwicklung MATLAB-Simulink, ASCET, IEC61131
- Model-to-model Transformation
- Funktionale Entwicklungsmethodik, Virtual Solution Design
- PCB-Layout (CADstar)
- E3.series, ePLM (DS2)
- Microsoft-Tools MS Office, MS Project, Corel X5, QuarkXpress, NetObjects Fusion,

Werdegang

1/2011-heute Geschäftsführer 3E-motion Ventures GmbH

Beratung Engineering-Prozesse Automobilelektronik & Automation

Verantwortung:

- Geschäftsleitung
- Investitionsstrategie Automobilelektronik & Automation
- Top-Management-Beratung Engineering-Prozesse, Methoden & Tools

7/2008-12/2010 Mitglied der Geschäftsleitung Gigatronik Stuttgart

Engineering-Dienstleistungen für die Automobilindustrie

Verantwortung:

- Standortleiter Graz/Österreich
- Aufbau und Management des Entwicklungsteams
- Leitung des Geschäftsbereichs ESCAPE – Engineering Tool Suite (Embedded Systems Computer Aided Project Engineering)
- Key account BMW, Leitung des AIDA-Angebotsprojekts, Spezifikation des zukünftigen E/E-Entwicklungsprozesses bei BMW

10/2005 -6/2008 Leiter Area 6 Elektrik/Elektronik (Kompetenzzentrum "das virtuelle Fahrzeug", Graz)

Forschung & Entwicklung von Methoden und Tools zur virtuellen Entwicklung von Fahrzeugelektronik/Elektrik

Verantwortung:

- Aufbau und Management des Forschungs- und Entwicklungsteams (10 Mitarbeiter)
- Leitung CAPEmaster Engineering-Tool-Entwicklung
- Leitung des Kooperationsprojekts mit Delphi zur automatischen Optimierung der Systemarchitektur der Innenraumelektronik einer PSA-Fahrzeugplattform

4/2004-9/2005 VP Business Development (CapeWare Technologies, München)

Engineering-Systeme für die Entwicklung von Automobilelektronik

Verantwortung:

- Forschungs- und Entwicklungsmanagement (12 Mitarbeiter)
- Akquise und Leitung von Kooperations- und Förderprojekten

4/1999 – 3/2004 Geschäftsführer (CapeWare Software GmbH, Mannheim)

Engineering-Systeme für die Entwicklung von Automobilelektronik

Verantwortung:

- Geschäftsleitung
- Aufbau und Leitung des Software-Entwicklungsteams (20 Mitarbeiter)
- Produktmanagement Engineering-Tools
- Kundenakquise, Key accounts BMW, VW, OPEL

4/1991 – 3/1999 Leiter Entwicklung Fahrzeugleittechnik Engineering-Systeme (ABB DaimlerBenz Transportation)

Schienenfahrzeuge (Lokomotiven, Metro, Trams, People mover)

Verantwortung:

- Weltweite Verantwortung für die Entwicklung der Engineering- Systeme für die Fahrzeugleittechnik
- Weltweite Verantwortung für die Entwicklung wissensbasierter Werkstattdiagnosesysteme für alle Schienenfahrzeuge
- Leitung der Entwicklung von intelligenten Führerstanddisplays (z.B. ICE)
- Leitung der PCB-Layout-Gruppe für alle Steuergeräte
- Projektleiter CAPE/C Engineering-Tools, 30 Mitarbeiter
- Leiter Time Based Management-Projekt, Standort Mannheim
- ADtranz-Vertreter im ABB ESI (Engineering Systems Integration) steering committee
- Gutachter im Verbesserungsvorschlagswesen

4/1988-4/1991 Leiter Entwicklung Fernwirkunterstationen (ABB Netzleittechnik)

Netzleitanlagen

Verantwortung:

- Leitung der Entwicklung von Fernwirkunterstationen (HW und SW, Microcontroller 8051)
- Projektleitung cross-border-Entwicklung RTU210 Fernwirkunterstation
- Leitung des deutsch-norwegischen Entwicklungsteams
- Einführung und Leitung des PC-basierten PCB-layouts (CADStar) der Fernwirkgeräte
- Prototypenfertigung und Serieneinführung

1986-1988 Entwicklungsingenieur HW/SW (ABB Netzleitechnik)

- Entwicklung von Steuergeräten für die Netzleittechnik

1983-1986 Entwicklungsingenieur HW/SW (BBC Kraftwerksleittechnik)

- Entwicklung von Steuergeräten für die Kraftwerksleittechnik

Patente

Sichere Überwachung der Ausgabe von Schaltbefehlen für Hochspannungsschaltanlagen

Lehrbefugnis

Lektor für Echtzeitbussysteme in Fahrzeugen, TU-Graz seit 2007 Vorlesungen und Laborübungen (Motorsteuergeräte mit CAN-Bus-Konfiguration)

Veröffentlichungen/ Konferenzbeiträge

BICC-Net Innovation Forum , München, 8.4.2011

Konferenzbeitrag "Integration of model based design with PDM - nightmare or piece of cake?"

Product Day Fellbach , 2010, Fellbach/Stuttgart

Konferenzbeitrag "Integrated product & process design"

Euroforum Konferenz Automobilelektronik, München , 10.2.2010

Konferenzbeitrag „Modellbasierte Kooperation zwischen OEM und Supplier"

BMW IT-Messe, München, 15.10.2009

Konferenzbeitrag "Die Komplexitätsfalle- wie man hineingerät und wie man sich daraus befreit"

„Die letzten 5 Jahre waren geprägt von der Einführung domainspezifischer Modellierungswerkzeuge und -methoden. Die Nutzung solcher Tools nicht nur zur virtuellen Entwicklung, sondern auch zum Zwecke des Variantenmanagements und der Code-Generierung hat viele Anwender in eine Komplexitätsfalle geführt. Der Weg aus dieser Falle zu höchst effizienten Engineering-Prozessen führt über ein domainunabhängiges Referenzmodell, das in allen Phasen eines Projekts vom Requirement bis zum Seriencode durchgängig verwendet werden kann. Die Einfachheit der Abstraktion ist dabei der Schlüssel zu Handhabbarkeit und Akzeptanz. Der Beitrag zeigt auf, wie dieses Referenzmodell die domainspezifischen Werkzeuge von Software bis zum Schaltplan integriert, Datenkonsistenz herstellt und zeitraubende Engineering-Aufgaben automatisiert. Anhand der Engineering-Plattform ESCAPE wird gezeigt, dass die benötigten Werkzeuge bereits heute verfügbar sind, um Einsparpotentiale von 15-30 Prozent im E/E-Prozess zu realisieren."

ZUKEN engineering days 2009, Dallas/Texas

Konferenzbeitrag "A model based environment from requirements to production code"

HANSER automotive, 2009

Veröffentlichung "Vom Funktionsnetz zum Seriencode"

HANSER automotive, 5/6 2009, Carl Hanser Verlag

4.Euroforum Jahrestagung München, Februar 2009

Konferenzbeitrag Dr.Reichart, Co-Autor

4.CTI-Forum "Automotive EESystems", Nürtingen, 15./16.4.2008

Konferenzbeitrag "Integrierter E/E-Architekturentwurf und -optimierung"

- Optimierung des HW-Deployments über genetischen Algorithmus
- Optimierung des SW-Deployment über Netzwerk von Steuergeräten
- Automatische Konfiguration von CAN, LIN, Gateways
- Optimierung des Kabelbaums und Harnessdesign

SAE 2008 conference, Detroit, 14.4.2008

"Holistic Change Management in Automotive Electrical/Electronic Development using an Integrated Engineering Product and Process Model" , Co-Autor

"The automotive domain has encountered significant changes within its competitive environment over the last decade. Automotive OEMs are forced to constantly introduce innovative features and additional functions within their engineering products in order to satisfy customers needs. As a consequence, Electrical/electronic (E/E) development has become a key process enabling OEMs to address the required needs. To face this new challenge, the automotive industry has started to gradually introduce development processes for E/E systems. However, current approaches are component-oriented rather than system-oriented meaning that the engineering product is considered completely decoupled from the underlying engineering process.
In this work a model-based approach to integrate product and process of E/E system development is proposed. The entire E/E system, which is referred to as the engineering product, is modeled on its functional level. This model can be simulated using standard simulation environments such as MATLAB/Simulink."

Embedded realtime world, Paris, März 2008

Konferenzbeitrag „Integrated engineering of embedded systems“

Elektronik im Kraftfahrzeug, Baden-Baden, 11.10.2007

Konferenzbeitrag: "Code vs. Cable – modellbasierter Entwurf und Optimierung von E/E-Systemen"

www.vdi.de/autoelectronics2007

"Integration von Elektrik und Elektronik auf Basis eines gemeinsamen Referenzmodells
Architekturbewertung mit Echtzeitanalysen,konsistente Datenhaltung in E/E-PDM-System
Automatische Generierung von Lastenheften und Schaltplänen,
Darstellung eines aktuellen realen Beispiels mit E.3cable, ESCAPE, ChronSIM und DS2“

Konferenz "Elektronik im Automobil", Baden-Baden, 11.10.2007

Konferenzbeitrag: "Code vs. Cable – model based design and optimisation of E/E-systems"

SAE Commercial Vehicle Engineering Congress 2007, Detroit

Paper presentation "Fault Tracking and Failure Effect Analysis in Complex Automotive Control Systems based on a Generic Modeling Approach", co-author

SAE Commercial Vehicle Engineering Congress 2007 (n/a, n/a, 2007-10-31). n/a, 2007, p. n/a. - 07CV-107

Product Life Live, Mainz, 2006

Leitung eines Workshops: „PDM als Engineering Data Backbone für die Entwicklung mechatronischer Systeme“

VDE ivz2983, November 8, 2006

Mechatronik, Paderborn, 2006

Konferenzbeitrag: „Optimierung von E/E-Architekturen in Fahrzeugen mittels modellbasierter Entwicklung von Mechatronik“

„Der Beitrag beschreibt den Ansatz der modellbasierten Entwicklung von E/E-Systemen vom funktionalen Modell über die technische und topologische Architektur bis hin zum Kabelbaum-design. Die Erfahrungen aus einem mehrjährigen Integrations-PDM Forschungsprojekt unter Berücksichtigung von Simulationsdatenmanagement sowie die Implementierung eines funktionalen Ansatzes zur Beschreibung von E/E-Systemen werden zusammengefasst, um einen leistungsfähigen Ansatz zum Systemdesign mit Einsatz von mechatronischen Komponenten sowie der Abbildung in einem Engineering Data Backbone zu präsentieren.“

Heinz Nixdorf Institut (Hrsg.), 2006 , March 30, 2006

Elektronik im Automobil, Ludwigsburg, 2005

Konferenzbeitrag: "Functional modelling and design of automotive control systems"

World Congress for Railway Research Florenz, 1997

Konferenzbeitrag "Integrated computer aided product engineering"

"All rail system suppliers face the challenge of decreasing market prices and increasing customer requirements on LCC and RAMS. Mergers and cooperations lead to global distributed development and manufacturing with increasing demands on international project and workflow management. Companies are restructured to focus on customer projects. Today's support of information technology can not keep pace with this dramatic change. A new approach is needed to solve the arising problems: Integrated Computer Aided Project Engineering
CAPE is an integrated engineering environment that introduces a new engineering process. Main features are:

- *integration of the three engineering disciplines: Control and Communication, Electrical and Mechanical Engineering*
- *world-wide distributed engineering based on the global share of data*
- *data based engineering instead of document based workflow*
- *support of the complete process chain from tendering to maintenance*
- *design-to-LCC, design-to-RAMS functionality*
- *modelling of rail systems and subsystems on an abstract as well as a generic level*
- *calculation and simulation of system models regarding important aspects like LCC, RAMS, ESC etc.*
- *verification of design by model analysis*
- *reuse of engineering solutions instead of implementations*
- *consistency of the complete system design (control, electrical and mechanical parts)*
- *control system engineering according to IEC1131*
- *generation of information for knowledge based diagnosis and fleet management systems*
- *consistent object oriented approach including OODB and CORBA*
- *integration with Product Data Management (Metaphase)*

World Congress for railway research Paris, 1994

Konferenzbeitrag "Maintelligence - wissensbasierte Werkstattdiagnose"

GMA-Congress '93 Automation technologies, 21./22.9.1993 Dresden

Konferenzbeitrag "CAPE/C: Computer aided project engineering of vehicle control systems"

Experience/Projects

Project SL2FUN (2006-today)

Goal Spezifikation und Entwicklung eines model-to-model transformation Tools

Problem Die Anwender von MATLAB-Simulink stehen immer häufiger vor großen Problemen bei der Entwicklung von Automobilelektronik. Die größten Herausforderungen entstehen wegen der Komplexität der Systeme, Inkonsistenzen der Daten und Modelle sowie des Versions- und Variantenmanagements.

Lösung Entwicklung eines Tools zur automatischen Transformation umfangreicher Simulink-Modelle und –Bibliotheken in ein XML-basierendes Referenzmodell

Import in PDM/PLM-Systeme, Autorenwerkzeuge und automatische Rückwandlung in Simulink

Resultate: Automatische Wandlung der Fahrwerks- und Motormodelle bei BMW

Project: **AIDA (2008-2009)**

Goal AIDA-project at BMW: Tender for an integrated engineering platform / E/E-PDM for functional design of complex embedded automotive electronics

Problem: The effort of an OEM like BMW for the engineering of automotive electronics is increasing. There are between 200-400 internal tools in use. The AIDA-project shall integrate all activities and all engineers involved in the engineering of the electronics in a car (5000 users)

Activities:

- Concept development, specification for integration of ESCAPE with DS2 (ZUKENs ePLM) , E3.cable and CHRONSIM (INCHRON)
- Cooperation management (ZUKEN, CIM-Team, INCHRON)
- Project management
- Assessments
- Marketing (e.g. BMW IT-fair)

Results: ZUKEN-offer for BMW AIDA, member of the BMW AIDA-short list

Project: **ESCAPE (2008-2010)**

Goal Development of an integrated engineering plattform for functional design of complex embedded systems

Problem: The electronics of mobile and stationary plants is getting more and more complex. Actual tools for the model based design are not suitable for the engineering of complete plants. The design of a system architecture cannot be verified before it is implemented.

Activities:

- Team selection and management
- Concept development, requirement specification
- Management of implementation
- Sales & marketing
- Cooperation management (ZUKEN, INCHRON, Technical Universities Munich, Düsseldorf, Graz, …)
- Key account BMW

Results: ESCAPEpro, ESCAPElight

Leading platform for functional design of huge, complex embedded systems

Project: **Automotive electronics architecture optimization (2006-2007)**

Goal Development of an architecture design & evaluation tool for automotive electronics & communication systems

Problem: The electronics of modern automobiles is getting more and more complex. Suppliers have to offer subsystem networks for e.g. the body electronics. They have to offer the lowest possible price for the whole system in a very early phase of a project. It must be proven that the chosen architecture fulfills the requirements in all situations. Furthermore it must be proven that the subsystem can be implemented and delivered at the offered price.

Activities:

- Concept development for an automatic bus configuration of CAN and LIN bus communication systems, specification
- Project management
- Cooperation management (Delphi)

Results: Integrated engineering solution (CAPEmaster / eSCOUT)

Project: **BMW compatibility management (2003-2004)**

Goal Specification of the data required and proposal how to proceed with the verification of compatibility of electronic control units

Problem: The data required for a precise statement on the compatibility of ECUs are not known.

Activities:

- Evaluation of the required data
- Preparation of a specification for compatibility management
- Proposal for implementation

Results: Specification compatibility management

Project: **BMW E60/PL2 (2002-2004)**

Goal: Fault analysis E60 (BMW 5 series) and PL2 (product line 2)

Problem: Available diagnosis information is insufficient; information about faults is inadequate. Diagnosis of failures and malfunctions in vehicles is difficult; causes of system failures are often not identifiable; up to 80% of the electronic components are exchanged needlessly.

Activities:

- Project management
  - Development of an interface to the BMW BNDB (onboard network database)
  - Bidirectional data transfer via RPC
  - Transformation of the BNDB data into functional model
  - Identification of the information for the analysis of failures via interviews with the developers of the ECUs in cooperation with EDAG, MAGNA
  - Input of the dependencies in CAPE/C
  - Storage of the data in the BNDB

Results: Functional network of the E60 including dependency matrices

Project: **CAPE/C Rel.4.1 (2002-2003)**

Goal: Further development of CAPE/C; multiuser environment; access rights; failure analysis; integration of MATLAB Simulink; enhancements of user interface

Problem: Conversion from single user to multiuser environment; interaction of all objects and functions; support of Windows NT, Windows 2000 and Windows XP

Activities:

- Management and controlling of product development
- Information about processes and organization at BMW
- Coordination of requirements with OEMs (BMW, VW, Daimler, MAN and John Deere) and suppliers (Siemens VDO and Knorr Bremse)

Results: Delivery of CAPE/C 4.1; first deployment at BMW at the E60 (new 5 series) for failure analysis

Project: **John Deere re-engineering tractor electronics (2002)**

Goal: Re-engineering of the C codes of 3 ECUs of a new tractor series: user interface controller, park lock controller and transmission controller

Problem: Documentation on the software and the dependencies of the control units involved are insufficient; UIC developed by John Deere themselves; PLC order development by Siemens VDO (rights belong to JD); transmission controller from ZF (rights belong to ZF)

Activities:

- Project management:
  - Transformation of the C code of 3 ECUs in functional models
  - Visualization of all C functions as functional components
  - Presentation of the data types
  - Presentation of the dataflow between functions (instances)

Results: Functional network of the ECUs; software type library

Project: **CAPE/C Rel.4.0 (1999-2002)**

Goal: Further development of CAPE/C to manage the increasing complexity of electronic control systems in automobiles, land machinery, aerospace & defense

Problem: Network of control devices developed using different technologies and ECU networks consisting of many individual elements; no standards, no reuse, no overview of total system level and no consistency between inhouse data and product on the road; lots of expensive iterations at the end of a vehicle project (30 planned and 100 unplanned iterations)

Solution: Data-based, functionally oriented development process; support through appropriate engineering systems with focus on the functional design of the complete system; reduction of complexity for the user by introducing a hierarchical model of functions and standardization of functional components; consistency via constant development process and control of all data required; separation of solution and implementation

Activities:

- Specification of product
- Requirement management in cooperation with customer (BMW-EE1)
- Information about the development processes and tools in the automobile industry, especially at BMW
- Execution of a pilot project with BMW EE11 (Professor Heinecke); modeling of the light functions of the E65 (7 series BMW) in CAPE/CI; visualization of the complete process chain from sensor to actuator

Results: Supply and market introduction of CAPE/C 4.0

Pilot use at BMW and John Deere

Project: **CAPE/S (1997-1998)**

Goal: Model-based specification of rail cars and traffic systems; integration of the three engineering disciplines electrics, electronics and mechanics; consolidation of the R&D activities of ABB Transportation and DaimlerBenz Transportation

Problem: Many isolated solutions; tools developed inhouse; no data exchange between different tools

Solution: Integration of the engineering systems and tasks via engineering objects approach; generic model of a rail car; functional models independent of technology; integration of all relevant data (electric, electronic and mechanical) and relations between the objects concerned

Activities:

- Project management
- Coordination of the departments in charge (Daimler research Berlin)
- Exploration of a method to integrate the three engineering disciplines and data communication between the IT systems concerned (blackboard concept)
- Development of a prototype for model based specification of vehicles and calculation of the dependencies between the model elements in terms of electric, electronic and mechanical properties

Results: Prototype CAPE/S in "smalltalk"

Project: **CAPE/C (1991-1998)**

Goal: Creation of a standardized engineering system for all countries and organizational units of ABB Transportation developing embedded systems; application in all vehicle projects (tram, underground, metro, locomotives, high speed trains and People Mover)

Problem: Technically: existing solutions of the three countries Switzerland, Sweden and Germany incompatible; different hardware developed inhouse (control devices), operating systems and programming tools

Politically: three competing ABB solutions, one from each country; years of fighting among the development teams involved; no cooperativeness

Solution: Technically: development of a new control systems engineering platform (CAPE/C) for all future ABB Transportation control systems; separation of solution and implementation via abstraction layers; introduction of the industry standard IEC 61131 for the programming of the control devices

Politically: Cross-border team with 30 members from Switzerland, Sweden and Germany

Activities:

- Project organization and management
- Supervision of cross-border development tasks
- Coordination of all participating development departments and research centers (ABB Mannheim/Heidelberg, ABB Baden/Turgi/Zürich, ABB Västeras, DaimlerBenz Frankfurt and FZI Karlsruhe)
- Organization and coaching of the cross-border development team
- Termination of internal fights among the development teams
- Restoring confidence via onsite cooperation, face-to-face commitment, and allocation and administration of worldwide responsibilities in the team
- Communication of joint goals and feelings of success
- Creation of a joint vision for the future engineering of management systems of ABB Verkehrstechnik (traffic technology)
- Research and development of the functional approach in the development of ECU networks in rail vehicles
- Research and development of a novel abstraction model for the generally applicable presentation of electronic systems (virtual solution design)
- Research and development of the separation of solution and implementation; mapping of solutions to technical architectures
- Evaluation of data bank systems in cooperation with ABB research centers as a basis for the engineering system; compilation of a catalogue of criteria and different weighting factors of the three countries; reaching an agreement on the selection of a data bank system
- Implementation of the Windows-based development of engineering tools
- Introduction of the IEC 61131 for the standardized development of software in rail vehicles (IEC 61131 = industrial standard; 5 defined languages; target: use of software developed once on different systems/ECUs by different producers)

- Development of an automatic bus configuration for the MVB (multi-purpose vehicle bus; bus in rail vehicles standardized throughout Europe)
- Introduction of the new engineering in 4 different fields and in 4 development projects at the same time (tram in Nantes/France, underground HK Berlin, locomotive EL2000 Rheinbraun and ORION power converter generation)

Results: Reduction of development costs and times through standardization, function block libraries and engineering automation:

Bus configuration:

Before: one person year/vehicle project

Afterward: operating one bottom

Control engineering projecting:

First vehicle: 6 months

Second vehicle: 6 weeks

Development of power converter control engineering:

Before: 5 developers

Afterward: 1 developer

Project: **Change management (1995/1996)**

Goal: Changing the company organization of ABB Henschel Germany with the goal of shorter decision-making processes and a reduction of times and costs by flatter hierarchies

Problem: Deadlocked organizational structures and blocking of changes by status quo defenders in the middle management

Solution: Change Agent Organization

Activities:

- Participation in building a network of Change Agents
- Identifying and addressing potential disseminators for the definition and realization of proposals for changing the form of organization
- Working out proposals for changing the organizational structure as a draft for decisions of the Board
- Cooperation with the management and discussion of necessary measures
- Realization of measures for empowerment of staff members; goal: entrepreneurial thinking, responsibility being accepted by staff members and reduction of unnecessary bureaucracy and hierarchy

Results: Project was discontinued prematurely because of the merger with DaimlerBenz Transportation

Project: **TBM Time Based Management (1995/1996)**

Goal: Reduction of the costs in the development and production of rail vehicles of ABB Henschel Germany

Problem: Development and production of electrics, mechanics and electronics distributed over several independent sites (Kassel, Berlin, Mannheim and Nuremberg); control and combination of electrical, electronic and mechanical developments and components in the assembly

Solution: Determination of the processes and interfaces and their optimization

Activities:

- Survey of the actual state of development and production processes
- 16 teams with about 10 experts from the different departments in each case
- Preparation of a process description for the whole company
- Working out concepts for the future process

Results: Process description of the actual state; proposals for the target process

Realization became obsolete because of the merger with DaimlerBenz Transportation; project discontinued

Project: **KEVIN- Knowledgebased Evaluation of Vehicle INformation (1991-1996)**

Goal: Development of a system for the diagnosis of breakdowns in the I&C systems in rail vehicles based on knowledge; use in workshops of the operators (transportation providers)

Problem: System has to be easy to operate by normal workshop staff

Solution: Graphical user interface on the basis of Apple McIntosh; inference machine for the evaluation of the knowledge base; user guidance via interactive graphics and videos

Activities:

- Management and control of development
- Preparation of the license and maintenance agreements with customers
- Introduction of software as a product of ABB Verkehrstechnik for the first time
- Introduction at SBB and Hamburger Hochbahn

Results: Reduction of residence times of vehicles in the workshop by up to 30%

Project: RTU210 (1989-1991)

Goal: Development of a new generation of remote terminal units; full functional compatibility with RTU200; intended price: DM1.500 production costs incl. protective housing and modem for remote data transmission (price reduction compared with RTU200: about 50%); outdoor operation, e.g. in the footing of an oil rig or in the forests of North Norway

Problem: Technically: rack-based construction too expensive

Politically: two competing ABB solutions, one from Germany and one from Norway

Solution: Technically: novel design of the control units; no rack; simple plug system for the bonding of the control units with each other; automatic addressing system

Politically: organization of a cross-border team with 8 staff members from Germany and Norway; establishing confidence via onsite cooperation and personal commitment; communication of joint goals and feelings of success

Activities:

- Project management; supervision of the development of all components of the system
- Organization and coaching of the cross-border development team consisting of 8 staff members from Germany and Norway
- Allocation of tasks and responsibilities
- Establishing confidence via onsite cooperation and personal commitment
- Communication of joint goals and feelings of success
- Development of an automatic addressing method for the control units of the RTU210
- Development of a PC interface card for the RTU200/210 family -> PC replaces RTU CPU
- Development of a PC-based test tool for the automated test of equipment of the RTU200/RTU210 family (WINDOWS 2.2; programming language C)

Results: Goals achieved; full compatibility with the RTU200; intended price met

Cooperation in partnership between Germany and Norway; friendly relationship; same technical basis

Project: RTU200 (1986-1988)

Goal: Development of a new generation of remote terminal units; recording and preparation of the data for the control center computer; process data resolution 1ms, recorded consistently in terms of sequence of time and transmitted reliably via all terminal units in the network control center

Problem: All data have to be recorded, processed and transmitted within one ms

Solution: Decentralized system with up to 32 control units in one terminal unit; event buffer for 50 events on each control unit; consistent sorting and transmission to the control center computer via CPU

Activities:

- Development of a redundant bus system for the remote terminal unit RTU200; parallel bus with event buffering on each control unit; realization of the redundancy via a second serial bus; automatic switching if one bus fails
- Development of the communications report of the RTU200; reliable data report for the safe switching of high voltage switches; special handshake report to rule out single and multiple errors
- Development of the operating system for all decentralized data preprocessing equipment of the RTU200, INTEL 8031; scheduler; remote system diagnostics; software-controlled correction of the different clock times of the control units (compensation of frequency fluctuations of the quartzes)
- Development of a software-controlled bus module for all peripheral units of the RTU200; microcontroller INTEL 8031; development of the hardware; PCB layout; reusable standard layout; communication software to control the bus communication
- Development of a digital input unit (16 channels), HW and SW, INTEL 8031; free parameter assignment of the inputs (1-channel, 2-chanel, 8/16-channels, counted measures, debouncing and event filtering)
- Development of a command output device for the switching of high voltage switches, HW and SW, INTEL 8031
- Development of a command control to test and secure the triggering of high voltage switches (switching patented), HW and SW, INTEL 8031
- Introduction of the SMD production technology in development and in the ABB electronics production site in Eberbach

Results: Launching of an unrivaled new generation of remote terminal units

Project: Introduction of a computer-aided PCB layout

Goal: Reduction of development time up to finished prototype by 25%

Solution: Introduction of a PC-based PCB layout system (Racal-Redac CADstar),

Activities:

- Selection and provision of a suitable PCB layout program
- Training of the staff members
- Use in developing the control units

Results: Reduction of the processing time in development by 25% for the prototype and by up to 75% for changes

1975-1976 Construction of printed circuit boards at BBC Mannheim (manual PCB layout)

1980-1985 Development of electronic equipment of automation technology:

- Programming unit:input unit for programming parameters in automation control units; INTEL 8085
- RAM pack: clip-on battery-buffered storage device for the simulation of parameters of control units
- Development of a PC on INTEL 8085 basis incl. operating system
- Queue unit: PROCONTROL P214 control unit for the input/output of information in power plant control rooms; HW and SW development; INTEL 8085
- Temperature measuring equipment: PROCONTROL P213 control unit for measuring temperatures of the boiler wall in power plants; data preprocessing; INTEL 8085
- Control unit: PROCONTROL P214 control unit for controlling processes in power plants and industrial plants; INTEL 8085/80186
- Emulator for bus processor (LSI) of the MVB (multi-purpose vehicle bus); emulates all functions of the LSI chip that operates the bus (PROCONTROL P215); the MVB became the standard for the data communication in all rail vehicles of the German National Railways; standardized throughout Europe; is also used in short-distance traffic (tram, underground and People Mover)
- Development of a synthesizer card with 9 tone generators for Apple 2; development of a graphical user interface for adjusting the synthesizer parameters via slide controls
- Development of a drum computer with 6 trigger inputs on the basis of Intel 8085
- Development of an intelligent display unit for RVs on the basis of 8085
- Development of an emulator for ATARI VCS 2600 programs