

**The Global Engineer  
An Industry Point of View  
3<sup>rd</sup> Colloquium on International Engineering Education  
University of Rhode Island, October 13th, 2000  
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**Page 1:**

Video

**Page 2:**

Good afternoon Ladies and Gentlemen, we can do that is the motto of a Siemens image campaign in the Americas. Maybe a commercial is an unusual start, but it fits quite well, especially in the US. We – Academia and the Industry – can do that could also have been the theme of my keynote address:

What can we do together for the education and development of highly motivated and international oriented current engineering students?

It is a great pleasure for me to speak at the 3<sup>rd</sup> Colloquium on International Engineering Education. I would like to thank very much the Organization Committee for giving Siemens the opportunity to share the view with you on the topic of „The Global Engineer“ from an industry point of view. The video gave you an idea, on the global engineering powerhouse Siemens displaying its far-reaching business segments. They offer a wide scope of changes for engineers and therefore has implications on their qualifications, which is the topic of my speech.

**Page 3:**

But please let me first introduce myself briefly. My name is Hans Höller, I am working at the Siemens Corporate Headquarters HR in Munich, Germany. My function is Head of the, as we call it, Corporate Area Recruiting and Sourcing. We work on Policies and Corporate Programs for worldwide Recruiting. Part of my responsibilities are University Relations. I took over this new job as of January this year. Before that I worked on industrial relations and conditions of employment at Siemens in Germany. This included, for example, collective bargaining agreements with German trade unions.

Before joining corporate HR, I was the commercial head of a telecommunications plant of Siemens, with approximately 3000

employees. Through this I experienced both sides of the HR work. At this point I can not concede any longer that I am not an engineer but I do have a commercial background.

#### **Page 4:**

Let me now return to the topic of my speech, the qualifications of the Global Engineer, as expected by industry today.

For that, I am going through the following items:

- Firstly I would like to give you a short introduction to Siemens as a workplace for engineers
- Secondly I will identify four trends in business which shape our world today and – more important – I will show how these trends impact certain personal capabilities we expect from engineers today.
- Thirdly I will come to how Siemens works hand in hand with Academia and other institutions, to help promote and develop these personal capabilities.
- As we also train these capabilities inside Siemens. I will fourthly give a rough overview of our development and learning program.

#### **Page 5:**

Most of you know who Siemens is, but maybe not the full scope of the company I represent and therefore I would like to spend a little bit of time to introduce Siemens to you!

#### **Page 6:**

In 1999, in terms of total sales, Siemens continued to rank third worldwide behind GE and IBM in the electrical industry and electronics, ahead of Hitachi and Matsushita. Ranked on sales of electrical capital goods only, Siemens was in second place among the world's top ten companies.

#### **Page 7:**

Siemens is more than 150 years old, founded in 1847 by Werner von Siemens in Berlin. Today we would describe Werner von Siemens, a brilliant engineer, as an entrepreneur, who founded a startup to realize

his ideas. He used seed money from his relatives and expanded his company very fast internationally with a focus on UK and Russia first. The company and their employees derive quite a portion of pride from this fact. A symbol for this combination of tradition and future orientation is our headquarter in Munich, you can see on the picture. Its front stands for Siemens, a 150 year long success story. The new part of our headquarter, stands for a highly competitive, future-oriented company.

### **Page 8:**

With a network of regional companies and representative offices in roughly 190 countries, Siemens is one of the world's leading companies in electrical engineering and electronics.

Traditionally Europe dominated the turnover, but the recent developments show an enormous growth in the United States, not at least through acquisitions like Westinghouse, Entex IT and Shared Medical Systems as well as in China. In the fiscal year 1999, international business accounted for 73 % of sales.

### **Page 5:**

In 1999 440.000 employees have been working for Siemens in 190 countries, with only 43 % of the workforce located in Germany. Just to compare, in 1970 this figure was 77 %. Siemens has really changed a lot, because these numbers meant a big change in culture as well!

### **Page 9:**

Over the last two decades, as I already mentioned, new markets, acquisitions and joint ventures have led to an increase in the size of our workforce, especially in such growth regions as the Americas and Asia-Pacific. In the fiscal year 1999, the number of employees in Germany dropped marginally, while the size of the workforce outside Germany grew by more than 10%.

Almost 75,000 of these employees are in the US alone, within a total of 525 locations.

### **Page 5:**

At the same time, another significant change is occurring in our employee structure. In 1970, engineers and scientists made up some 10% of our German workforce, the percentage being even smaller

around the globe. This number has now risen to 30 %. Worldwide, Siemens has around 120,000 engineers and scientists. Worldwide we hire approximately 9200 University Graduates per year, 80 % of them are engineers and scientists.

Within the next few years, we expect they will comprise about one third of our total workforce. In simple terms: Every third Siemens employee will be an engineer or scientist with a university degree at Bachelor's, Master's or Ph.D. level.

### **Page 10:**

When students in engineering are asked, in what function they will be working after graduating from university, most of them answer production or R&D.

The reality in my company is quite a bit different: R&D is indeed a very important area but equally important is Sales and Marketing. Production is a distant third at around 10% and the percentage is dropping. Some 10 % work in other functions, by the way HR is one of them.

To give you an example: At Corporate HR two of my five colleagues as Corporate Area Heads have an engineering or a natural science background.

Ricardo Cardenas, from Siemens Energy and Automation, and Christian Callegari, who are with me – are also engineers. At Siemens we believe in this kind of functional change not at least, because we think it prepares engineers of all levels to develop the capabilities of successfully facing the changing business world.

This leads me to the four trends, which are the reason, why being an engineer today needs different competencies, compared to the past.

In my company we define competencies as the summation of knowledge, experience and personal capabilities. The changing business trends affect especially these capabilities. We think they have to play a stronger role in the education of engineers!

To develop these capabilities is the joint responsibility of Academia and Industry, therefore I will put this at the center of this address.

All the business trends are not new today, they shape the world for quite some time now and consequently the education of engineers, too!

**Page 11:**

First trend: small and profitable is beautiful!

It is obvious that our business is going faster and faster. To play a role in this business, a company has to be among the first, to be the leader, especially when everything else (products, services) becomes more and more comparable.

Additionally, in the US already for a long time, shareholders worldwide demand a higher yield for their investment. This trend has by now almost reached every country in the world and asks for an increased need of profitability.

The quest for speed and profitability fosters the creation of small and flexible organizational units. They are operating with great autonomy worldwide together and they can reconfigure themselves constantly because of their inherent flexibility. These leads to a change in the role of the engineer, who has to keep in mind more and more, the economic dimension of her/his way of doing the job.

She/he has to understand that not the finance department is in charge of profit and loss, but the engineer, who gets entrepreneurial responsibility.

The benefit from that: The outstanding engineer much earlier than before gets the chance to take over a management or an entrepreneurial function!

It is obvious that in order to reach this high profitability, every individual has to contribute at the highest level! Therefore the entrepreneurial orientated engineer is more and more a team player and most of all leader.

Acting as an leader and entrepreneur requires

- to be motivated and inspired, by enthusing and encouraging others as well as to operate with integrity and dynamism, that means setting clear and demanding goals for her/himself and others, being a team player
- It also means to act result oriented, by being focused and ambitious.
- The engineer is strategic oriented, by having strong business insights and seeing the big picture. She/he is aware of trends and able to

create a vision and is not willing to give up a long-term vision under day-to-day pressure.

## **Page 12:**

### **Second trend: less products, more solutions!**

The second trend I would like to emphasize was also initiated some years ago and will continue in the future! In general: customers do not want products anymore, they want solutions. Products and services are part of solutions.

## **Page 13:**

I am talking about industrial services/solutions, because this is the area where Siemens is working in.

Industrial services that means product related services for Siemens or third party products as well as value added services.

- Engineering (Hardware)
- Installation and Commissioning
- Spare part service
- Maintenance
- Training

are examples for more conventional product related industrial services. Whereas professional or Value Added Services are for example Consultancy, System Integration, E\*Commerce Solutions and so on

As the chart shows, Siemens will increase its Service Business by an average of 25% with the Value Added Services, growing much faster than product related services.

In the fiscal year 03/04 service will roughly triple and comprise approximately 50 % of Siemens' turnover, up from 26% in the fiscal year 96/97. This is a dramatic change, which can not be without consequence for engineers.

I should say, that this shift from hardware and production to services does not mean the demand in engineers goes down. Quite to the contrary: Growth of industrial services as described will increase the need of engineers worldwide.

**Page 12:**

Both solutions and service business have significant impact on the skills required in our company and the industry as a whole:

Firstly there is a strong need for customer orientation at every level, more than ever before. Customer orientation has become a must. That means engineers do have to understand the customer's problem and must not focus on technical issues, regardless how fascinating or mind tickling they might be!

Secondly in my company solution-business to a large extent is project business. Competencies and resources from inside and outside the company have to interact worldwide. Very often our engineers develop solutions making use of Siemens knowledge spread all over the world and hand in hand with our customers. Excellent project management therefore is a prerequisite for being successful.

The solution oriented business world means for an engineer

- To be focused on the customer by understanding the customer's needs. She/he is even more responsive to customer needs and above all keeps commitments and develops a strategy together with the customer for further cooperation and understands and adapts to the customer's language
- She/he has to understand complex projects fully and identify her/his position inside the project as well as outside to the customer

**Page 14:****Third trend: from local to global!**

This third trend is the most prominent reason why I am today standing in front of you. Even if it is overused, we are now all living in the global village. Our business becomes more and more a global business!

Therefore, working at Siemens means being exposed daily to cultures and languages different from our own heritage. As Siemens is present in almost every country around this globe, it does not matter if the engineer is in Research and Development, Product Management, Production, she/he will work in world-wide teams, being confronted with other ways of speaking, other ways of thinking, other ways of working every day. Cross-border interactions and co-operation is more and more a daily way of working.

Therefore we at Siemens believe that the students, who are putting themselves through the arduous curriculum of an International Engineering Program like here at the University of Rhode Island, are the employees companies like ours needs to be successful today and in the future.

As a consequence, engineers' are becoming more and more mobile around the globe and working for several years abroad is not an exception anymore. Foreign language skills become more important for engineers (although English language is dominant particularly in technical subjects).

As exposure to other cultures should happen, preferably during her/his studies, the IEP is so valuable, because it prepares the student early in her/his educational process for that step, by learning another language and actually studying and working abroad. It helps to acquire the capability to adapt and to improve relationship skills in networking and communication.

## **Page 15:**

Fourth trend: change is the only constant!

Change is nothing new, it is even an inherent part of industry, since the first industrial revolution! New is the ever-accelerating pace, which was driven to new record highs by Microelectronics and most of all, the Internet.

The demand for lifelong learning is more important than ever. To learn and to adapt to new situation is the key to long-term employability. This is universally true for every career and especially, because of the rapid change in technology, for engineers.

So increasing the speed of change requires continuous improvement by being open and flexible. It also requires making decisions without all information being available or the information being uncertain and even of contradicting nature.

Therefore it is of utmost importance, that individuals learn to live with ambiguity and resistance to change. In our experience especially engineers often do not feel comfortable with ambiguity. They are accustomed to precision.

To cope with change engineers should be

- Able to understand complexities and uncertainties and make a sound problem assessment.
- Capable of making decisions by being risk aware, evaluate options and solutions. They exercise judgement in making sound decisions and do not wait for more information when enough is already available

### Page 16:

Ladies and Gentlemen, the business trends I pointed out shape the environment engineers work in and they have major impact particularly on the personal capabilities required by the global engineer. These capabilities can be summarized as

- Entrepreneurial capabilities
- Relationship capabilities and
- Change capabilities.

### Page 17:

These three capabilities are part of what we call the Siemens Competency Model and which is basis for personnel/management development and recruiting.

You can now see the three components of the Siemens competency model. I already mentioned them in the beginning:

- Knowledge
- Experience, and
- Capabilities; we talked about

Let me describe these competencies and give some examples.

Professional **Knowledge** in techniques like mathematics, physics or the respective engineering subjects is the content of university education. Regardless of all business trends, it is still of utmost importance to master these techniques.

Basic knowledge regarding business processes can be acquired in the course of a study too.

To some extent, **Experience** can be obtained while being a student, but mostly this competency is part of the development process while being an engineer inside Siemens.

This applies for

- professional as well as
- Project experience.

This leads me to the personal **Capabilities**; Entrepreneurial, Relationship and Change capability.

As mentioned, knowledge will be obtained mainly at the university, and experience is a natural part of the professional live.

The biggest overlap between Academia and the Corporate World exists with the personal capabilities! These capabilities can be trained jointly between you, that means universities, and business that means the companies.

Most effective ways of training are e.g.

- national and international internships and co-ops
- senior projects and
- MS and Ph.D. thesis projects

Siemens is willing to work jointly with the students to the benefit of the IEP, to develop the capabilities very early in their studies. We feel that this is the biggest part where we can make an impact on the lives of these young individuals.

## **Page 18: SSP**

How we are going to do this in practice? Although programs like internships, co-ops and so on as a rule are run on a national basis we have a tool called the Siemens Student Program (SSP) which is internationally oriented. How the program is structured and operated, was part of the presentation given by Ricardo Cardenas and Christian Callegari in the previous session!

The SSP is designed to attract and train top international talent, almost every country where Siemens is present participates in this program. It basically facilitates the exchange of students for international internships and co-ops.

It is globally coordinated by corporate Recruiting and Sourcing and organized and managed by the participating Regional or Operating Companies.

I think it offers great opportunities to students like seminars, meetings, information, job counseling, and mediation of international internships and co-ops.

### **Page 19:**

After graduation from University, in general there are two ways of entering Siemens as an engineer: one is the traditional way of a direct entry, 99.9% of all employees enter through this way, and then there is a premier way, that is the Siemens Graduate Program (SGP).

### **Page 20: SGP**

The SGP can be regarded as a logical extension of an IEP, because IEP students should have the capabilities we look for in the members of this program. When I describe this program to you, you will see what we expect and that all three, before mentioned capabilities are harnessed in this

The SGP is a

- two year working programs split into three eight month assignments
- with two cross-functional assignments of eight months each in the home country
- and one assignment of eight months in an unfamiliar culture
- with language and intercultural training to prepare for this assignment
- two annual Networking Meetings, where all the members, roughly 140 come together.
- And special training of management skills.

We are sure that this program is preparing our future managers and we think that the IEP could be a perfect feeder for this program.

### **Page 21: Internal Development**

Siemens puts a lot of emphasis on personal development, in order that our engineers stay at the top, as far as their technical skills are concerned. Life long learning is a reality at Siemens. But we also consider the development of capabilities I mentioned before as extremely important, especially the ones that shall enable the engineers to acquire the skills of a management position. Siemens spends roughly more than 800-million deutsche mark a year on Career Development and Learning measures.

## **Page 22: Siemens Management Learning**

Management learning plays a major role, because the capabilities to succeed in a business environment change each time a new position is assumed. Siemens understood this need and therefore has developed an internal way of training these capabilities over time, the Siemens Management learning. It more or less covers the complete professional live from shortly after entering Siemens until a top executive position.

- First step is the management Introduction Program, which is still mostly focused on the individual. The chart shows some of the topics the program, deals with.
- The next step is the Basic Management Program for individuals holding a management position. Again please find the main topics on the chart.
- The third step is called the Advanced Management Program for Senior Managers. It has a focus on leadership issues.
- At the General Management level the topics are mostly covering strategic issues.
- And at the top, the Siemens Executive Program marks the peak of this scheme.

I wanted to demonstrate that Siemens is very much committed to the personal capabilities. From the start in our Siemens Student Program (SSP), through the Siemens Graduate Program (SGP) and the Siemens Management Learning (SML) we have a consistent avenue. And with this, I am almost at the end.

Let me summarize shortly.

## **Page 23: Resume**

Ladies and Gentlemen, I identified four major trends, being

- **Small and profitable is beautiful!**
- **Less products, more solutions!**
- **From local to global!**
- **Change is the only constant!**

The trends are not new, they more and more shape our business world. I also mentioned the impact of these trends on the capabilities required by engineers.

These are

- Entrepreneurial capabilities
- Relationship capabilities and
- Change capabilities

Besides knowledge and experience these capabilities are part of the whole set of competencies an engineer needs in order to be successful.

Providing students with technical and engineering knowledge clearly was and will be the responsibility of Academia.

Experience in engineering can be acquired on the job only, this lies in the responsibility of the companies.

Developing the personal capabilities needs both, Academia and companies, we see it as a common area of responsibility.

I would like to offer to you a cooperation between Academia and Siemens to develop and harness the capabilities already at the student level.

Siemens believes that the IEP can contribute a lot and we would like to offer our help and cooperation.

I thank you for your attention and as I mentioned in the beginning, I think we can do that together!

**Page 24:**

We can do that