SIEMENS

Ingenuity for life

1847 – 2017

Shaping the future

Qualities that set Siemens apart – after 170 years

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Contents

The profile of a successful company

What do we stand for? What makes us special? How do we plan to achieve long-range success? Whoever understands their heritage and history are the only ones that can achieve success today and shape their own destinies tomorrow.

The same goes for the history of great companies. When you delve into their pasts, you witness exciting events as well as experiencing the highs and lows, the successes and failures and the economic upswings and the social changes. Siemens is one such company. This global pioneer in electrical engineering began as a simple startup. Today, 170 years later, the 10-man business that once operated at Schöneberger Strasse 19 in Berlin is a global giant that has served as a major innovation and technology force over the years. It is an unbelievable achievement that was accomplished amid an unending sequence of political, social and economic challenges in the world.

Throughout each chapter of Siemens' complex history, certain qualities and abilities have always assumed a place at the forefront. The characteristics whose interaction has made Siemens the company that it is today are: innovativeness, internationality, a commitment to quality and customers, crisis-tested strength, adaptability and a powerful sense of responsibility. If you examine these characteristics separately and successively, you quickly realize that it is not the individual qualities on their own that define the essence of Siemens. Rather, it is their interplay. The individual features coalesce to create a sharper, more precise picture of the qualities that have defined Siemens in the past and that illustrate what it represents today – a profile that also points toward a promising future.

Which characteristics make the ultimate difference? What has enabled Siemens – unlike so many other companies – to overcome the challenges and produce 170 years history of business success?

From the very beginning, Siemens was defined by its innovativeness. This is the feature that actually gave birth to the company. Its **innovativeness** first went on display when the company refined and commercialized the pointer telegraph, work that was done amid the revolutionary acceleration of communications technology. The invention of the dynamo machine followed shortly thereafter and laid the cornerstone for electrical engineering. It continues to be seen today in innovations like MindSphere, an operating system for the Internet of Things. From the very start, the company has focused its attention on key technologies and – in a crucial step – turned them into market-ready products. Over the years, the key players in this story combined scientific curiosity with entrepreneurial action to turn Siemens into a major corporation that sets standards in many fields and masters the entire value chain of electrification in a way that few others can. During this time, one special aspect of Siemens has been the company's ability not only to change itself, but also to shape the world around it.

Siemens has been so successful only because, from the very beginning, it has linked innovation to another special quality: **internationality**. It was forced to take this step when the first sales crisis hit the Prussian telegraph market. In the wake of this crisis, the Siemens brothers began to seek new markets that their fledgling company could serve. It was these two brothers, Carl and Wilhelm, who created the foundation for Siemens' global role. Carl constructed more than 9,000 kilometers of telegraph lines in Russia, and Wilhelm (later William) made and laid submarine telegraph cables from his base in London. These bases enabled the company to become a global player that – more than a century and a half later – can claim to be at home in some 200 countries around the world. This international presence reflects another special trait of Siemens as well. It is viewed not as a German company, but as a domestic company in each country. One look at the anniversaries of the international companies shows how deep Siemens' roots reach around the world today – or, expressed differently, just how large the company's "local footprint" on the international scale is. Generations of Siemens executives have worked to establish the company as a local partner and a member of local society. This work has involved much more than simply speaking the local language. It also means understanding attitudes and local customs, acknowledging them, and adopting them wherever they are consistent with the values of the company as a whole. This is what makes Siemens truly international.

How has the company been able to get this far? This is where attributes come into play that mark Siemens above and beyond the ones already named – like its strict **focus on quality and customers**. This quality also emerged early in the company's history. The young company took over the job of maintaining the Russian state telegraph network, where it went on to generate its first significant profits from service. This quality and customer focus is visible even today, for example in Siemens' founding of a digital hub in Singapore and its collaboration with customers, partners and representatives of civil society there to address the major questions of the future facing the city-state.

These are just a few of the company's defining qualities. Ever since its founding, Siemens has **proven itself in crises** and shown its **ability to change**. This skill is seen throughout the company's history: the way it over-came the early sales difficulties in the telegraph market, the way it recovered from the impact of two world wars and the way it overcame the compliance crisis – undoubtedly the most perilous period of the company's recent past.

It is obvious that Siemens has not taken a straight path to success. Instead, the company has experienced frequent ups and downs, numerous setbacks and even bad mistakes. The company has known continuity as well as strong reverses. Crises are part of its 170 years of history as well, and may even have helped make the company stronger – after all, it has repeatedly had to refocus on its core sense of itself.

What holds the company together today in its innermost elements? Werner von Siemens answered this question about the company's purpose early on, saying that he wanted to build a company that combined **responsible action** with sustainable benefits to the company and society – beneficial, because they would last.

In keeping with this tradition, Siemens' current CEO also sees responsibility to its stakeholders as the company's highest objective and purpose: "What-ever we do," Joe Kaeser says, "it must add lasting value and deliver benefits – for shareholders, for employees, for customers, and for our partners in business and society." That responsibility requires all employees to act as though the company were their own – in other words, it creates an "ownership culture" that is brought to life every day.

Werner von Siemens provided important new impetus for the young field of electrical engineering and permanently shaped the evolution of the electrical industry.

Siemens' past and present are closely tied to these characteristics and features. If Siemens can remain innovative, maintain its focus on customers and quality, operate internationally and responsibly and maintain its ability to weather crises and transform, the company will be in an excellent position to achieve a successful future and "make real what matters," as our mission statement says. As we now look at these various qualities and features individually in greater depth, we mustn't lose sight of what they have in common, what joints them together, and therefore what makes them specific to Siemens. It's only the interplay of these characteristics, combined with the fundamental attitudes that have served as our guiding principles, that shapes the profile of Siemens as a global corporation. And it's also only logical that some aspects will be found multiple times in many different contexts. Because it's only by viewing the company from different angles that we can best see – and understand – the whole.

Siemens is innovative – from the dynamo machine to MindSphere

"Ideas alone have little value. An innovation's importance lies in its practical implementation."

Werner von Siemens, company founder, 1851

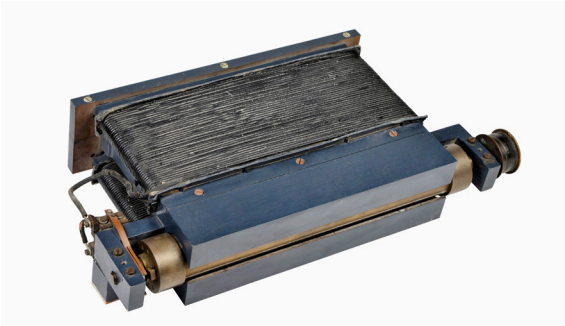
Pioneering technologies and the business models that were built on them have been the foundation of Siemens for 170 years. The company's innovations have stood out because they didn't stop with a mere invention; rather, they established a place for themselves in the market as new products, solutions, and services. These are innovations that have helped shape the world because they've concentrated on key technologies that contribute significantly to economic and social progress.

It all started with the pointer telegraph

That was already a feature of Werner von Siemens' very first innovation, the basis on which he founded the "Telegraphen-Bauanstalt von Siemens & Halske" in 1847. He developed the pointer telegraph, and just two years later he built Europe's first long-distance telegraph line. This was a technological revolution that carried significance at the highest political levels, because now for the first time important information could be transmitted across a long distance from A to B in a matter of minutes. No longer did a message take hours, days, or even weeks to reach its recipient; all it took was a few moments. The world was growing smaller – with a large impact, as the very first use of the telegraph line from Frankfurt am Main to Berlin demonstrated. The news that Prussian King Friedrich Wilhelm IV had been elected German Emperor reached the capital in minutes, and at a single stroke made Siemens into a name known far beyond Berlin's city limits. Siemens' successful commercialization of electrical telegraphy laid the cornerstone for a new era in communication – equivalent in effect to the introduction and significance of the Internet in the twenty-first century.

Werner von Siemens laid the cornerstone of the "Telegraphen-Bauanstalt von Siemens & Halske" with the invention of the pointer telegraph.

Yet by itself, an innovation is no guarantee of lasting success – as Werner von Siemens himself soon learned. Challenges quickly arose that had to be resolved, and that presented the company with its first crisis. The sheathing on the telegraph cable was inadequate and led to transmission problems. Werner, his brother William, and Johann Georg Halske went to work to develop a new design for the cable sheathing, and they made it technically feasible using what was known as the "gutta-percha press." The new technique enclosed the wires in a seamless, water-tight jacket. This was both a differentiating feature and a major success, because the telegraphs that Siemens built would serve from now on as a benchmark for the ability to get pioneering ideas onto the market – an ability that was as typical of innovative entrepreneurs back then as it is today.



Werner von Siemens laid the foundation for the application of power engineering with revolutionary consequences, because electrifying businesses, public infrastructure, and private life made fundamental changes to the world.

An innovation's value lies in its practical implementation

And there was another aspect. Werner von Siemens' pursuit of scientific progress and practical benefit led in 1866 to his most significant innovation – the dynamo machine. As with his development of the pointer telegraph before, he was thoroughly familiar with the status of research in his time, and he built on that foundation. But unlike many others, he put his theoretical insights to practical use. He was responding to his era's questions and needs, an approach that would remain both a guiding star and a challenge for Siemens throughout its history. Werner was quicker than others to recognize the specific benefits of the dynamo-electric principle, and so he made a byword of the maxim that an innovation's value lies in its practical implementation. The dynamo machine that the company brought to maturity for the market permitted the first practical applications of electricity by cost-effectively converting mechanical energy to electrical power. And this is how Werner von Siemens laid the foundation for the application of power engineering – with revolutionary consequences, because electrifying businesses, public infrastructure, and private life made fundamental changes to the world. And the same was true of the other innovations that lined up during the company's first decades like pearls in a necklace:

- 1879: the first electric railway
- 1880: the world's first electric elevator
- 1881: the world's first electric tram
- 1882: the first permanent electric street lighting in Berlin and the world's first electric trolley bus (the Elektromote)
- 1896: the first subway in continental Europe

Siemens & Halske presented the world's first electric locomotive at the Berlin Commercial Exposition.

These were all innovations that helped bring city-dwellers together and that still shape the landscape of today's major metropolises. Along with other examples too numerous to mention, these developments demonstrate the company's immense creative power and determination as well as its innovations' high level of social relevance. Siemens has always made the most of the opportunities and potential that its long lifespan has afforded. It provided stimuli and opened up prospects that extended far beyond the current day and short-term success and shaped technological progress – in some cases, for many years and even decades. The real depth of this influence is evident in an outstanding example from one generation later: the electrification of the Irish Free State. Siemens was commissioned in 1925 to build a hydroelectric plant on the River Shannon that would supply a large part of the country – its people and their homes – with electricity for the first time. That plant is still in operation, and is still closely associated with the Siemens name in popular memory even today. At the same time, the project demonstrated Siemens' return to international competitiveness after World War I.

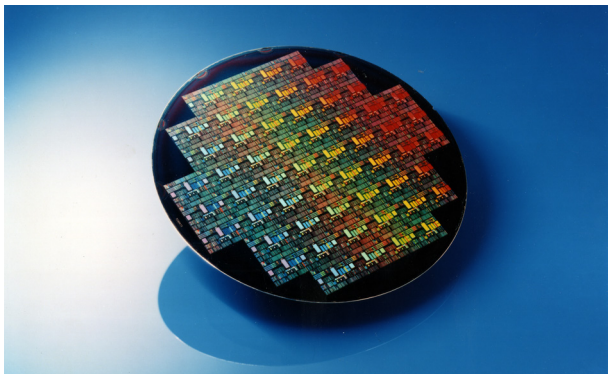
A look at medical technology shows how broadly the company's innovative strength has expanded over the years. The foundations of modern x-ray technology were laid in the 1930s. Early in the 1950s, ultrasound waves made it possible for the first time to conduct heart examinations more precisely – a capability without which cardiac diagnoses would be inconceivable even today. And again, early in the 1980s, it was Siemens whose first magnetic resonance tomography unit significantly improved diagnostics without exposing patients to x-rays. In 1983, the MAGNETOM was the company's first magnetic resonance tomography unit to go into operation. In 2010 the company's Biograph mMR added another previously unheard-of dimension to medical imaging. All of these innovations have one thing in common: They serve human health and well-being.

Semiconductor and computer technology – A missed opportunity

But it's also an historical truth that, in spite of Siemens' innovative strength, the company hasn't always held the technological forefront. In 1953 Siemens was the first company that was able – almost simultaneous with and independent of researchers in the U.S. – to obtain ultrapure silicon, an essential material for semiconductor components. Four decades later, in the 1990s, Siemens delivered the first customer samples of a 256-megabit memory chip, the smallest, fastest semiconductor memory of its kind, with enough capacity to store all the works of Shakespeare and Goethe. Nothing special today, but a sensation at the time.

But semiconductor and data technology is also an example of how inventions and excellent ideas are not enough by themselves – as the company discovered to its distress. Its engineers and managers had the ambitious vision of taking the technological lead or even dominating the market for semiconductor and computer production in the twenty-first century, but it proved unviable. Extremely volatile business developments, short product cycles, and dramatic drops in pricing made the business less and less predictable

for Siemens, and ultimately led the company to spin these activities off.



The 256-megabit chip had enough capacity to store all the works of Shakespeare and Goethe.

A pioneer in automation and digitalization

But there was also a breakthrough that laid the groundwork for the company's market-leading position in automation technology right down to today: the 1959 introduction of the Simatic control solution. With SIMATIC, Siemens marketed the first control and instrumentation components made up of transistorized circuits. These replaced relays, contactors, and electron tubes, making it possible to build circuits for logical connections, storage, counting, and computing. Simatic control systems are still delivering smooth operations at most of the world's industrial installations today. Every one of the 30 largest automotive manufacturers uses Siemens control technology: That's an innovation with a lasting effect. Industrial automation, which is now associated with the concept of the "digital factory," became one of the company's most successful businesses, and led Siemens at an early date to become involved with digitalization – and in later this years would make it one of the global leaders in the field.

It was Siemens that brought Industrie 4.0 to life and played an active role in its development, long before the concept acquired the familiarity it has today. Siemens was faster than others to realize that manufacturers had to drastically cut their throughput time and substantially increase their flexibility. The reason: the intensifying trend toward individualized mass production, even as the consumption of raw materials and energy had to be reduced, also for competitive reasons. Siemens set the course for the digital automation of entire production facilities as far back as 1996, when the launch of its Totally Integrated Automation (TIA) Portal enabled companies to coordinate elements of their production operations and to closely intermesh hardware with software. And the introduction of MindSphere in 2016, Siemens finally offered the first cloud-based, open Internet of Things (IoT) operating system that is able to fully connect machines and physical infrastructure to the digital world.

As these selected examples of innovation from Siemens history show, what has kept the company ahead is the combination of decades of technological expertise, an inventive spirit, and a sense of the needs of the current times. Speaking at an anniversary celebration, Gerd Tacke, who headed Siemens AG as CEO from 1968 to 1971, summarized the basic position that would characterize all the company's innovative efforts, both before and after his time: "To us, technology is not an end unto itself. We measure our technical performance against the progress that it offers our customers and, beyond that, people in many countries of the world."

The introduction of MindSphere in 2016, Siemens offered the first Internet of Things (IoT) operating system.

Innovations that shape the future

In the company's 170 years of history, Siemens has been distinguished less by its unique technological breakthroughs than by the steady stream of inventions and gradual improvements that have earned it the leading market positions in many fields. But as the company made clear in 2016 – especially in an era that is again characterized by disruptive technological developments – new paths and the courage to recognize and pursue them early are needed. With the new startup unit next47, whose name alludes quite deliberately to the year when Siemens was founded (1847), the company has opened the door for fast, agile, young companies that can help move it ahead in the most important fields of innovation.

next47's name joins past and present together: Siemens, a startup itself back in 1847, is now open to the ideas of other speedy, agile young companies.

Which brings us to our last and most important point, the feature that makes Siemens' innovative strength possible in the first place: its employees. It's their ideas, inventions, and personal dedication that have enabled and will

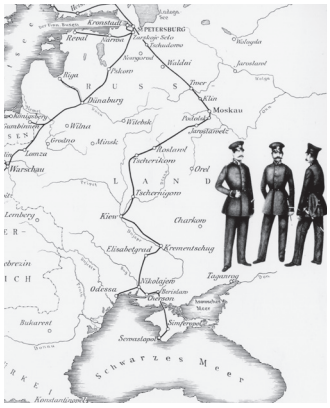
continue enabling the company to develop. Today Siemens has more than 32,000 researchers and developers, about 8,000 of them at Corporate Technology, the company's central research and development department. They and their colleagues ensure that Siemens can make the most of the skills it has amassed, develop them even more, and continue to stay right in line with the times.

Siemens focuses on quality and customers – from maintaining the Russian state telegraph network to the Digital Hub in Singapore

"If you deliver the best, you'll remain at the top, and I always prefer publicity through performance to an image based on words."

Werner von Siemens, company founder, 1876

The customer is the focus of all of Siemens' business activity – and has been for 170 years. But a customer orientation needs to be learned, put into action, and constantly reconfirmed. That was already evident in the pointer telegraph system, which included not just the apparatus itself but also its gutta-percha insulated cables. That business experienced an early crisis in 1856 that called for a fast response. Siemens changed its business model and shifted its focus mainly to servicing its telegraph lines, and a customer orientation became a survival strategy. Between 1853 and 1855, the company laid more than 9,000



Siemens started offering added value in service early: A sophisticated monitoring system protected the 9,000-km telegraph network in Russia against downtime.

kilometers of cable in the Russian Empire. Its "remonte" contracts ensured the young company's survival: It owed its success in Russia less to producing its telegraph systems than to maintaining the lines, and therefore – speaking from today's customer perspective – to its ability to deliver as a systems provider. In producing the pointer telegraph, Werner von Siemens relied entirely on the knowledge and skill of his partner, precision mechanic Johann Georg Halske. This partnership enabled him to make product quality one of the company's banner features and to build customer relations on that reputation. "My telegraph," he wrote to his brother William, "uses only one wire, can be played with keys like a piano, and combines the greatest reliability and such speed that one can telegraph nearly as fast as the keys can be pressed. Yet it is ridiculously simple and quite independent from the strength of the current." Here the emphasis is not on technology for technology's sake; instead, customer benefit is the whole point. It was always the company founder's aim to make focusing on the customer and on quality a kind of guiding principle for his young enterprise. For example, in a letter from 1872 he wrote: "Personal accomplishments of any kind should only be judged according to the benefit which they create for others. Such deeds deserve to be honored only when they have made a contribution to the public good." So Werner von Siemens quite consciously adopted as his own the customer's perspective and the perspective of general public benefit. In other words, he "thought" from the viewpoint of the customer or society, and – as cited above – primarily emphasized the quality of what the company offered. The pointer telegraph system was equally oriented to both quality and the customer. It was fast, because it saved an immense amount of time in transmitting information. It was precise, because it transmitted texts with no errors. It was durable, because the gutta-percha insulation made the cables more resistant to weathering effects. And it was innovative, because the company was able for the first time to set up a service network that guaranteed customers a maximum level of protection from expensive downtime in the event of a malfunction.

Digital service – cRSP makes 250,000 systems smart

Here we can see strong parallels with today's common Remote Service Platform (cRSP) from Siemens, to which far more than 250,000 Siemens systems around the world are already connected: from high-rises and gas turbines to central traffic monitoring stations in 255 cities and some 120,000 high-end medical devices. The platform provides an early warning of potential malfunctions, and it makes sure they can be remedied quickly online – around the clock, worldwide, 365 days a year. Operators of large plants and entire cities in particular are using this service to protect them from equipment failures. For example, when customers buy a gas turbine, they usually also sign a customized maintenance agreement. Siemens takes care of any inspections due, maintenance work or technical emergency services, and is using an increasing range of intelligent applications for this kind of service. Remote monitoring and maintenance is made possible by the data collected from a large number of sensors within the systems that make those systems intelligent. Remote maintenance has helped many cities get a better grip on their serious traffic problems. For example, Siemens employees at a digital monitoring center in Munich monitor traffic computers in more than 250 cities all over the world, ensuring that malfunctions in traffic signals or traffic computers are detected immediately and remedied as quickly as possible.

Open Innovation advances a digitalization hub: Siemens is working with customers, partners and universities to develop new digital applications for the "Smart Nation" of Singapore.

From the "remonte" service contract to today's common Remote Service Platform, the focus has always been on the individual needs of the customer – from individual customers in transactions with end users to medium-sized companies optimizing their operations with Siemens technology, or large customers for whom Siemens acts as a systems supplier. Meeting their needs and satisfying their preferences is what has always motivated and advanced this company, with its focus on the art of engineering. Nevertheless, the result has not always been consistent success.

A misjudgment with consequences

At times systemic constraints, mistaken decisions, technological dead-ends, or misjudgments of customer needs have caused Siemens to fall behind in technological development, or to overlook or miss out on trends. And the consequences could be severe. Telecommunications is one such example. It's the story of a mistake, as Joe Kaeser frankly admitted in a 2014 interview: "In the late eighties, three young men from California came to Siemens in Munich. They had a really cool business idea and wanted to meet with us. They said, 'We're developing a technology that will let people make phone calls over the Internet. Would you be interested?'" He continues to explain that Siemens didn't believe it and told the young founders and the venture capitalist, "How is that supposed to work? And if it did work, we would have invented it." The two founders' startup became the world's biggest network equipment supplier, with annual revenues on the order of $50 billion. Siemens couldn't keep up in that business, and ultimately had to give it up in 2013. That's a mistake that the company learned from – as is shown more than clearly by its startup activities, its active portfolio policy over the past few years, and its uncompromising focus on digitalization. That focus is guided by the conviction that "It won't be the biggest companies that survive – nor the fastest," as Joe Kaeser never tires of pointing out. "The successful companies will be those that can best adapt to changes in the world."

Focusing on quality and the customer in the 21st century

A very current example from a large number of projects for key customers demonstrates how the company understands this focus on the customer and quality. Singapore wants to draw on Siemens' assistance to become an intelligent region, a true "smart nation." The South Asian city-state will rely entirely on MindSphere, the open, cloud-based operating system for the Internet of Things, to largely digitalize its infrastructure. Siemens is supporting this master plan by setting up a digitalization hub, working alongside customers, partners, and universities to develop new digital applications. The partnership was signed and sealed in July 2017 and is the logical next step in the development of the City Account initiative, in which Siemens has delegated its own experts – City Account Managers – to advise urban decision-makers in more than 60 cities around the world during the crucial planning phase of infrastructure projects. In daily, high-intensity communication, they help Siemens acquire the best possible understanding of its infrastructure customers' needs so it can offer them precisely tailored solutions that will make their cities more environmentally friendly, improve the residents' quality of life, and at the same time save money.

Siemens is international – from Berlin and London to St. Petersburg and onward to the world.

"The era of national isolation is over. We have to recognize that in today's world we have become mutually dependent."

Carl Friedrich von Siemens,
company founder's youngest son, 1931

Siemens moved out into the larger world at an early stage. The company assisted with the economic and sociopolitical development of numerous countries, provided aid in reconstruction with work like restoring infrastructure destroyed by war – and it also didn't head for the hills when things got difficult, either politically or economically. Of course, profitability plays a key role in any involvement – how could any business think otherwise? But all the same, there's always been the higher vision that was impressively summarized by Carl Friedrich von Siemens, the company founder's youngest son: "Electricity has contributed to the development of transportation and understanding among nations, and it will also

be important for promoting understanding among nations in the future." As far as today goes, international companies are key actors in globalization, and they quickly draw criticism for causing global problems – and yet they are unjustifiably given far less credit as partners as they work to find solutions out in the field.

Carl Friedrich von Siemens, as "head of the house" from 1919 to 1941, shaped the company's development in politically and economically difficult times.

But let's go back to the beginning. Only a few years after the company was founded in 1847, Siemens had crossed national borders and begun pursuing a transnational policy. In 1853 the Russian government commissioned Siemens to build a telegraph line from Warsaw to the Prussian-Russian border. The construction of that line was just the beginning of a number of telegraph projects that threw all previous Siemens & Halske orders into the shade. In the Tsar's empire, the company laid more than 9,000 kilometers of telegraph cable in just two years. The small Berlin workshop quickly burgeoned into a medium-sized firm. Before the major Russian orders, it had barely 50 employees; by 1856 the workforce was more than 330, two-thirds of them working in Russia. Revenues quadrupled and came primarily from Russia: The export ratio reached 80 percent at times.

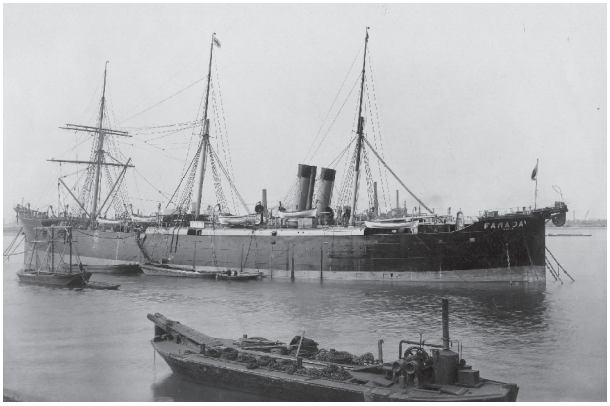
The vision: A global enterprise like the Rothschilds'

But Russia was just the start. By the fall of 1858, an English subsidiary was being founded in London: Siemens, Halske & Co. headed by William Siemens. It would play an important role in the submarine cable business – a business encumbered with serious risks, because the technology was still immature and required a large capital investment. Nevertheless, Werner and William quickly decided to get involved in this field. In 1863 they built the first Siemens cable factory in Woolwich, on the Thames. The brothers planned to use cables from that factory in January 1864 to lay a telegraph line across the Mediterranean, from Cartagena in Spain to Oran in Algeria. The client was the French government, yet another of the company's international customers. As we will see, the Siemens brothers incurred a great risk, and initially suffered an equally great loss. But Werner was profoundly convinced that his company's future lay in global networking, and he wanted to play an active role in that development. He wrote to his brother in 1863: "My guiding idea [...] was to found a permanent company which might later, under our boys' management, become an enterprise of world standing comparable to the Rothschilds' [...] and earn our name respect in the world."

Siemens' cable plant in Woolwich outside London made the company's English branch independent from suppliers and strengthened its position in the highly competitive submarine cable market.

Global networking through major international projects

Two other major international projects from the first two decades of the company's history show how committed he was to this idea: the Indo-European telegraph line of 1865 to 1870 and the transatlantic cable in 1874 to 1875. The Indo-European telegraph line was planned to run from London across the North Sea to Emden in Germany, then through Prussia, Poland, South Russia, and the Caucasus to Teheran, where it would connect with an existing line of the British India Telegraph Department leading to Karachi and onward to Calcutta. Construction work began in the spring of 1868 and was officially completed just two years later, in April 1870. Messages could now be transmitted from London to Calcutta, some 11,000 kilometers away, in less than half an hour. Countries had been brought closer together. The world had gotten smaller.



The 3,000-km transatlantic cable joined the Old and New Worlds – a feat that would pay off.

The Siemens brothers understood that the Indo-European telegraph line was an important testimonial. But they couldn't catch up with the leading companies in the industry until they achieved a major submarine cable project – yet another risk. The brothers discovered that in this project they would be contending not just with the Atlantic Ocean,

but also with powerful and sometimes unscrupulous competitors who would not shy away even from sabotage. The project faced a constant stream of new challenges. The telegraph line finally went into operation in September of 1875. Even though the company's main competitor eventually won out on this project and made a successful takeover offer, Siemens was still in the game. The company got more orders for transatlantic cables from France and the U.S. By now Siemens was a truly international firm.

The locations of Siemens' international offices and agencies founded over the years, as well as its independent representatives, read like a Who's Who of world metropolises:

- 1850: London
- 1855: St. Petersburg
- 1871: Brussels
- 1878: Paris and The Hague
- 1879: Vienna and Warsaw
- 1880: Stockholm and Turin
- 1886: New York
- 1887: Tokyo
- 1888: Rio de Janeiro
- 1890: Budapest
- 1892: Chicago

Siemens electrified Moscow's tram system in 1899.

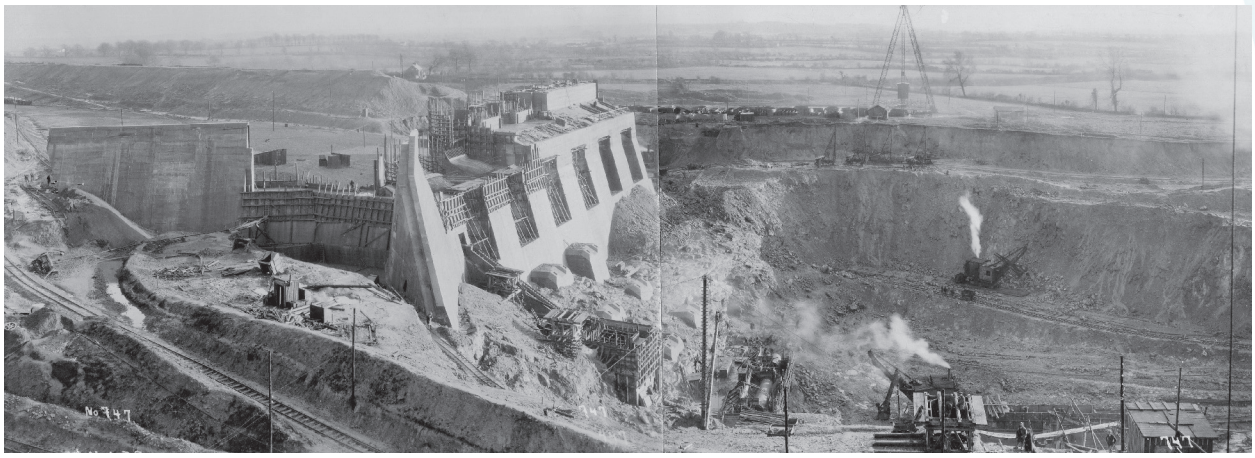
At work in Japan, too: Siemens' Fusi Denki Seizo joint venture began making electrical equipment products in Japan in 1923.

Like the German electrical equipment industry in general, Siemens' international business expanded steadily until World War I. By 1913, Germany accounted for nearly half the world's trade in electrical products. But the World War caused a profound disruption, especially in international business, and it was some time before Siemens regained a foothold in the international market. In 1923 it joined Japan's Furukawa group to found Fusi Denki Seizo KK, a company that would produce electrical goods in Japan. Just two years later, Siemens equipped a coal mine in China with the era's latest ultramodern mining technology. In the mid-1920s, as has already been discussed, it installed electricity in Ireland – the largest foreign contract to be landed by any German company since the turn of the century. Siemens had proven its ability to compete internationally, very much as intended by the company's chief executive at the time, Carl Friedrich von Siemens. In 1931, bucking the contemporary trend for countries to isolate themselves economically, he emphasized the need for Siemens to take up an international orientation: "The era of national isolation is over. We have to recognize that in today's world we have become mutually dependent."

World War II put an end to these developments. Once again, Siemens lost a large share of its foreign markets, patents, and trademarks. Once again, recovery was difficult. But the company management was unanimous in believing that the necessary growth couldn't be achieved by concentrating on Germany alone. All the same, it took time. While domestic business slowly picked up again, international sales remained negligible for a time. It wasn't until the mid-1950s that the picture changed, when Siemens management was able to buy back not just the confiscated international companies but also ownership of the company's patents and trademarks. Examples of the rising share of exports included the 300-megawatt (MW) San Nicolás power plant in Argentina, completed in 1956, and the national telecommunications network for Saudi Arabia. The company also revived its former business connections with Fusi Denki Seizo KK in Japan and Westinghouse in the U.S. By the mid-1960s, it had regained its foothold in the world market.

Yet the focus still remained primarily on the worldwide sale of products made in Germany, or at least in Europe. Investments in other countries were mostly made in order to seize new export opportunities or preserve existing ones. The experience of the two World Wars, with the loss of almost all the company's foreign property, led the management in Munich to shy away from more extensive export risks. Even into the 1970s, for example, the U.S. – undoubtedly the world's largest market for electrical products – remained largely a blank page for Siemens. That situation would only begin to change slowly, in 1973, when the crisis in oil prices and the associated foreign-currency turbulence caused a shift in basic attitudes. Finally, in an increasingly globalized world, worldwide production locations became an important criterion for success – whether in the U.S., Eastern Europe, or Asia. The company now also began attending to what were known as emerging economies:

Siemens in India: Siemens has been making motors in Kalwa since 1966.



Siemens electrifies Ireland: The company started work in 1925 on a hydroelectric plant on the River Shannon that still supplies the country with electricity today.

Unlike Western markets, they had an urgent need to catch up, and so they offered an immense market for sales. Globalization was first seen as an opportunity and ultimately as an absolute necessity – without ever losing sight of the risks involved.

Globalization also changed the company's organization. In contrast to the 1980s and early 1990s, by 1998 for the first time the company had more employees outside Germany than in it. Investment practices also changed significantly. Where more than 50 percent of revenues were generated internationally in the 1980s, by fiscal 2016 the figure was nearly 80 percent. Today Siemens is at home in some 200 countries around the world – a global player through and through.

Siemens has proven itself in crises and shown its ability to change – from early sales difficulties to the compliance crisis

"Acting decisively and vigorously is almost always the best thing in a critical situation."

Werner von Siemens, company founder, 1857

Companies that have enjoyed a long history have had to prove themselves in crises and must be able to change. Over time, every large company has gone through periods of declining margins, stagnating growth, falling stock prices, sales slumps, and financing problems. Corporate crises are often home-made, and so as a rule they are easier to influence than those caused by developments in politics or the economy. The culprits may include complex bureaucratic structures, too many levels of management, poor customer service, an underdeveloped sense of personal responsibility among management and staff, a lack of guidance for the business orientation, and unclear objectives, among many others.

Crisis as opportunity – The compliance affair compels a reassessment

Peter Löscher, the President and CEO who had the task of guiding Siemens out of one of its greatest crises, the compliance affair, addressed the crises frankly in 2009: "Siemens is no more able to escape the crisis than any other company. We too will feel the impact. But we are well prepared. We are convinced that this crisis also opens opportunities for us – and we intend to take advantage of them." And this is precisely the crucial difference that distinguishes successful companies from less successful ones: The future belongs to those who view crises as opportunities, learn lessons from them, and are able to change. But exactly what needs to be done in order to get back on track for success after a crisis? One important insight suggests taking a look back through history. Companies that counteract crises or use them as opportunities should also make the most of the mental and practical attitudes of those who've overcome potentially fatal phases before. After all, it's their abilities, qualities, and arrangements that enable companies to survive and return to success today.

That includes a strong willingness to take responsibility and act, a consistent customer orientation, and a firmly established ownership culture that provides guidance for employees within the company. It's important to adapt these characteristics in the best possible way to what the times require, and to maintain the ability to change in these ways.

In a letter to his wife Mathilde, Werner von Siemens gave some advice that might seem a little outdated from today's perspective, but it contains a kernel of truth. He wrote in 1854: "With careful contemplation and active engagement with the dreaded wheels of fate, one can achieve quite a lot, avert some disasters, and turn certain enemies into friends." Those words reveal his willingness to take responsibility and act, as well as his accurate sense of proportion. And indeed, even in the company's early years, these characteristics were needed, in conjunction with a strong willingness to change and adjust. As already mentioned, in the early 1850s the Prussian state canceled its telegraph contract, with drastic consequences for a company that was still in its startup phase. A sales crisis in the home market loomed. But Werner von Siemens and his brothers stood their ground. They took advantage of the crisis as an

opportunity to systematically internationalize their company. They tapped new markets in Russia and England and soon elsewhere as well. The first crisis was averted, and the company proved it was able to transform itself and survive. Barely 20 years later – as has already been described – it once again demonstrated that it still had these factors for success, and thus the ability to withstand crises. Laying the transatlantic cable started out with a whole series of setbacks and failures. But Siemens didn't give up, recalled its core competences, showed again that it could change and adapt – and in the end, succeeded.

However, the truly great crises still lay ahead. The two World Wars presented the company with unimaginable challenges in 1918 and 1945. Twice within a single lifetime, Siemens lost most of its international markets, patents, and trademarks. The bald facts and figures scarcely give a sense of what that actually meant. World War I was bad enough, as it cost the company 40 percent of its assets, primarily through the loss of foreign plants and activities. But in 1945, the damage after World War II was twice as bad: about 80 percent was irretrievably lost. Not to mention the irreplaceable intangible damage from the loss of intellectual capital, faithful employees, and business customers and partners.

Siemensstadt in World War II: In 1945, for the second time since 1918, Siemens lost a large portion of its assets and had to start again – successfully, as the record shows.

A new beginning in the West

After 1945, Siemens achieved something that seemed impossible: It rebuilt both in Germany and internationally. It took the dedication of many and a firm belief in success – and sometimes even the "courage of despair" – to raise Siemens out of the literal ruins of World War II. Once more, it was the company's ability to change that ensured its survival. As it became evident that the divided city of Berlin could no longer function as the company's headquarters, management quickly decided to relocate the most important production facilities, and most significantly the corporate headquarters, to southern Germany. The company's power engineering unit, Siemens-Schuckertwerke, found a new home in Erlangen. The headquarters of Siemens & Halske were relocated to the mansion built by former court architect Leo von Klenze in the heart of Munich. From now on the company's fate would be controlled from Munich and Erlangen. Siemensstadt still survived, and Berlin and Munich are still Siemens' primary locations today.

A new beginning after 1945: Siemens & Halske relocates corporate headquarters.

The foreign business picked up momentum as well, although it took hard work to recover confiscated international companies, the ownership of patents, the Siemens brand, and the former subsidiaries. Here again, a consistent reliance on core technological skills was a help, as were the persistence and endurance that had already been a characteristic of the company's founding generation. The results proved that the decision-makers had been right. Following World War II, the company experienced a slow but steady upswing that returned it to the world markets. The crisis that at first seemed to mean the company's annihilation had been overcome. Adaptability and confidence in its own strength – the features that made Siemens successful in the first decades of its existence – helped again.

Siemens, a global player: Siemens employees deliver service in Bangkok.

Now let's take a leap through time to the new millennium. In 2006 Siemens found itself in a situation that truly threatened its survival: the Compliance Crisis, one of the darkest chapters in the company's history. The development of the debacle in the 1990s included a massive earnings crisis and a substantial compliance problem – especially involving an active attempt to influence customers' executives and employees. This unsavory mixture remained concealed for a considerable time. But during the 1990s and early 2000s, the signs of trouble began to accumulate. While it's true that not all parts of the company were in economic difficulties, and compliance violations never involved the company as a whole at any time, the crucial fact is that these factors combined to threaten the entire company. When investigations by the Munich public prosecutor made the crisis public knowledge in 2007, Siemens fell overnight into a profound crisis of trust and survival. A lack of transparency, unclear lines of responsibility, the absence of a corporate culture that

could manage these issues, and also – it can't be denied – the criminal activities of some individuals placed the company in a situation that was worse than merely difficult.

Yet here too, Siemens demonstrated its strength. Albeit late and not entirely on its own initiative, the company now systematically implemented the necessary consequences. The threat to the company's survival put compliance work in the center of attention. A large portion of top management was replaced. With Peter Löscher as CEO and Gerhard Cromme as the Chairman of the Supervisory Board, two men were appointed to head the company who now initiated a rigorous investigation. Along with Josef Ackermann and Berthold Huber, they set a new course. Another new appointment was former General Electric manager Peter Y. Solmssen, the Managing Board member heading the new department for legal affairs and compliance. He would make a significant contribution to clearing up the matter. In a record two years, the deeply troubled company had again become a reliable partner. Full cooperation with the American and German authorities resulted in a relatively mild penalty, though it was still a record figure. And a compliance system was set up that would henceforth stand as a benchmark in the German business world.

Looking back, it becomes clear that this crisis caused an especially tough change in the company. Peter Löscher led the company out of the crisis; Joe Kaeser then placed it on a new track for success. With his Vision 2020 strategic program and his mission of "making real what matters," he set, as he said in 2014, "A clear direction and pointed out to people in the company what really counts." Both CEOs followed Werner von Siemens' original maxim that "Acting decisively and vigorously is almost always the best thing in a critical situation." Withstanding crises and the ability to change are therefore among the important characteristics that have repeatedly strengthened Siemens over the past 170 years and made it the company it is today.

Siemens is responsible – from employees' first sharing in company results to the Business to Society concept

"Business is based on trust."

Carl Friedrich von Siemens,
company founder's youngest son, 1925

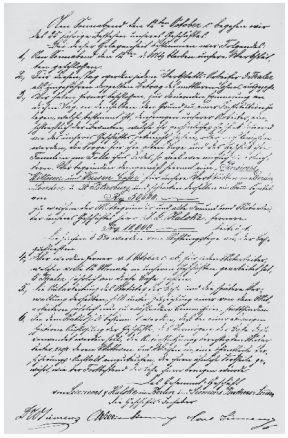
Trust and the acceptance of responsibility have always been the glue that binds people together worldwide – in politics and society, but also and especially in economic contexts. After all, "Business is based on trust," as Carl Friedrich von Siemens put it in a speech from the 1920s. This insight by the company founder's youngest son is still valid today – indeed, it may well be more valid than ever. Customers rely on companies that can be trusted and that take responsibility, from the big things to the smallest. Just one example: More and more people are basing their buying decisions on whether they can trust the companies involved. If a company has a reputation for being responsible and trustworthy, then as a rule it's also viewed as reliable, secure, stable, and viable for the future.

But trust doesn't just come out of nowhere, and certainly not overnight. Trust takes time and persistence: It needs to be earned. And trust always has a history. During its 170-year history, Siemens has always insisted on being a responsible partner for both its customers and its employees and therefore earning their trust. That's because – to cite Carl Friedrich von Siemens once again – "Siemens' reputation as a company around the world [is founded] not just on its technical achievements [...], but at least to an equal degree on the trust that its business friends have in it [...]. Without presumptuousness, I believe I can say that there is no company on earth that stands ahead of us in this regard." That was undoubtedly quite a claim for Carl Friedrich to make in 1925 – because he already knew that trust can be forfeited much faster than it can be gained. All the same, during the first 70 years of its existence, Siemens built up a great fund of trust, including among its employees. Of necessity, Werner von Siemens had to trust his partner Johann Georg Halske, his brothers, and of course his employees. He wrote to his brother Carl in 1868: "I consider it mistaken to interfere in the work of those to whom the matter must be entrusted."

The company still relies today on that observation when it reflects on its ownership culture. That's because ultimately, the same thing is involved: responsible management that gives creative leeway based on its trust in the employees' ability to do their job and their sense of personal responsibility. After all, it's the employees whose work and products continue to earn the customers' and society's trust in the company. That was already important to company founder Werner von Siemens. As early as 1858, he provided employees with a share in the company's success. It was a step that from a businessperson's perspective is merely responsible, and that from the employees' viewpoint builds trust, establishes a sense of identity, and generates motivation for the long term – as is shown by more than the company's history alone. This is where all three factors implicit in the concept of "trust" come together: attitude, the associated actions, and not least of all, intention. These are the three factors that are associated with or that result from a measure intended to build trust. By giving his employees a stake in the company's profits, Werner von Siemens aimed to strengthen their loyalty to the firm, enhance their motivation, and ultimately increase the success of the business. There's no question that his decision was guided by strong business interests. But at the same time, it manifests and underscores his intent as a company founder and patriarch to increase the prosperity of his company and its employees. And it had the intended effect: staff identification with the company grew.

Responsibility a corporate principle

Accordingly, Werner von Siemens continued along the same path. In 1853 he insured the employees under a specially established fund for illness, death, and disability benefits. In the late 1860s, he set up the company's own pension plan for the workforce, which by now had reached almost 1,000 employees. In 1872, on the occasion of the company's twenty-fifth anniversary, the firm founded a "workers' and officials' pension, widows' and orphans' fund" that offered the prospect of a retirement pension for employees in Berlin, London, and St. Petersburg – and this was more than a decade before the German Reichstag legislated a state disability and retirement insurance system.



Responsible corporate management: Werner von Siemens set up a company pension fund in 1872.

It's a matter of corporate responsibility to treat people with trust, whether they're employees or customers. This is an essential prerequisite for being treated with trust oneself. That fundamental concept from the company's earliest origins continues in the Siemens Defined Contribution Benefit Plan (BSAV) that is offered to employees today. It's a voluntary social benefit from the company, financed entirely from corporate capital. But responsible action is also evident in the company's close partnership with employee representatives, and not just in Germany. In 2012, Siemens, the company's Central Works Council, the IG Metall Union, and the IndustriAll Global Union signed an International Framework Agreement on principles of social responsibility under which the company again declared its commitment to fundamental workers' rights. These rights include equal opportunity and freedom of collective bargaining and association – all over the world. The company has therefore externalized in a binding form a commitment that it had already made in its worldwide Business Conduct Guidelines and enshrined for its business partners in the Code of Conduct for Siemens suppliers: a responsible business policy.

Enhancing trust and identification

Back to the beginnings again. The social policy measures undertaken by the still-young Siemens company were closely tied to the sense of responsibility and obligation of its founder, Werner von Siemens. He wrote in his recollections: "It had become clear to me very early that a satisfactory development of the continually growing firm must depend on securing the hearty, spontaneous cooperation of all the workers for the furtherance of its interests." And he acted accordingly. In 1858 he paid the Inventurprämie profit-sharing bonus to employees, as already mentioned; a fixed amount of the profits was set aside for this purpose from 1866 onward. In 1872, because of an extra workload resulting from piecework, he reduced the work day to nine hours; in 1891 he reduced it again to eight and a half hours. Werner also acted responsibly on his employees' behalf when – as orders collapsed drastically after the end of the Franco-Prussian war of 1870-71 – he continued to stockpile product at the plant rather than lay off employees. His responsible attitude was also attuned to a clear sense of realism. All of his trust-generating, identity-building measures had to be consistent with the company's prosperity and long-term prospects. As the founder of a family firm, he needed to aim for an organization that would be able to survive him.

Fair work hours: Siemens reduced the work day to nine hours in 1872 and to eight hours and a half in 1891.

For a responsible entrepreneur like Werner, protection and concern for the workforce were a necessity in his own interest. In 1888 the company's first independent examining doctor was appointed, the Siemens family physician Dr. Friedrich Körte. In 1906, a plant medical service was established, initially with physicians in independent practice. The first permanent plant doctor's office was then established at Siemensstadt in 1935. The realization that only healthy, well-rested employees can perform at their best led in the second and third decades of the twentieth century to the establishment of a number of employee facilities. Between 1907 and 1915, 973 apartments were built for employees at various company levels in Siemensstadt. The Ettershaus, a rest home for employees, opened in 1909; Ahlbeck, another rest home for women workers, opened in 1914; and in 1922 came the first convalescent home for employees' children. In 1919 the establishment of a corporate social policy department created an office to coordinate benefits within the company. Separate foundations like the Hertha-von-Siemens-Stiftung and the Antonie-von-Siemens-Stiftung likewise undertook to provide responsible care for company employees.

The 1940s represent a dark chapter in the company's history. Siemens fell short of its own standards as a values-based, responsible company during World War II. It used at least 80,000 forced laborers between 1940 and 1945, with all the associated wrongs; this was a violation of the principles adopted by Werner von Siemens and that still

represent the Siemens code of values today: namely, working "to the highest professional and ethical standards" and being a "good corporate citizen in the societies" where Siemens operates around the world. With that awareness, in recent years Siemens has been dealing explicitly with the topic of forced labor used by the company. In 1998 Siemens founded its own humanitarian aid fund for former forced laborers, and some 4,300 applications from those laborers were processed and payments of about €11.3 million were disbursed. Siemens is also involved in German business's "Remembrance, Responsibility, and the Future" charitable foundation initiative dating from 2000, through which it has furnished some €138 million for the foundation's work. Between June 2001 and June 2007, the foundation paid out €4.337 billion to some 1.6 million beneficiaries in almost 100 countries, and this included funding for programs to support the culture of remembrance as well as for fellowships, school projects, and youth support projects. None of this can make up for the wrongs that were committed, but it's being done in the awareness that the company incurred guilt during World War II. In the knowledge of this historical responsibility, scholarly work on the period is being planned.

Medical care: A company medical service assisted employees in Berlin from 1906 onwards.

Homes for employees: Siemens began building apartments for the Berlin staff in 1907.

Focus on employee health: The company began building its own rest homes for employees in 1909.

Sustainability – a guiding principle

Acting responsibly means dealing properly not just with employees but also with the social environment and natural resources. Werner von Siemens defined this mission as part of the company's essence when he wrote about 125 years ago: "I won't sell the future for short-term profit." That's one definition of what today are being discussed all over the world as the principles of sustainability. Being guided in all activities and decisions by the principle of sustainability, and acting responsibly in ecological, economic, and social terms for the benefit of future generations are some of Siemens' principal aspirations today.

Striking a balance between these three core realms is one guideline in Siemens' sustainability strategy. In ecological terms, the goal is to use innovative products and solutions to improve the company's own environmental balance and that of its customers; in economic terms, it's to build on long-term value-added with innovative products and solutions; and in social terms, it's to commit to the well-being of the company's employees and environs. These goals are also rooted in the company's history. Even before the now-famous Club of Rome study on the "Limits to Growth" appeared at St. Gallen in 1972, in 1970 Siemens took significant steps by establishing the first company-wide central department for environmental protection. Twenty years later, in 1990, environmental protection found a new anchor in the company when environmental protection officers were appointed for individual company units and – even more importantly – binding guidelines for environmental protection were adopted. Just one year later, Siemens established an office for product-related environmental protection, and in 1992 it signed the 16 Principles for Environmental Management of the International Chamber of Commerce (ICC), committing to implement those principles. In 1993, the company adopted its first standard for environmentally friendly product design, and in 1995 it issued the first Siemens Sustainability Report. Ever since then, all the units of Siemens AG have been audited regularly according to environmental criteria. Finally, in 2001, the Managing Board adopted the Business Conduct Guidelines mentioned above, which are mandatory for all employees and suppliers, and which firmly establish environmental protection as a corporate objective.

Another way that Siemens shows how seriously it takes its sense of responsibility is that in 2001 it joined the United Nations Global Compact, the world's largest and most important initiative for responsible corporate management. On the basis of its 10 universal principles on human rights, labor standards, environmental protection, and corruption prevention, the Global Compact pursues the vision of an inclusive, sustainable global economy for the benefit of all people, societies, and markets. Today more than 13,000 companies and organizations in civil society, government, and research in 170 countries have adopted these goals. But here again, declaring adherence to an obligation is one thing; implementing it and actually living it is something else. Only the latter will establish trust for the long term. The Compliance Crisis described earlier also showed Siemens that acting on its own values and principles means hard, uncompromising work every day. Company management since 2007 has made this abundantly clear. The "Business to Society" reports issued since 2016 show that Siemens is on the right track. The reports evaluate the impact of specific projects, locations, transactions, and other corporate activities throughout an entire countries. This is an important basis not just for laying claim to responsible corporate management but for laying that claim open to scrutiny. When Carl Friedrich von Siemens noted nearly a century ago that business activities can only

be truly successful if they are founded on justified trust, he stated something that has remained an important guideline for Siemens corporate management.

Sustainability in practice at Siemens: By 2030 the company will complete a modern campus in Erlangen that will be the first CO_2-neutral Siemens site in the world.

The foreground needs a background – a look ahead

Innovativeness, a commitment to quality and customers, internationality, crisis-tested strength, adaptability, and a powerful sense of responsibility: These characteristics have guided Siemens throughout its history. Over the course of 170 years, they've made it the company it is today. By keeping its background constantly in mind and acting on that awareness, Siemens makes an important contribution to shaping the future for the long term. "Whatever we do, it must add lasting value and deliver benefits – for shareholders, for employees, for customers, and for our partners in business and in society." That appeal by President and CEO Joe Kaeser is closely allied with the conceptual world of company founder Werner von Siemens, who impressively established the prime imperative of his still-young company when he said, "I won't sell the future for short-term profit."

Coming equally from the two poles of Siemens history, in this way the past and the present inscribe a forward-looking principle in the company's DNA: Shape the future for the benefit of those you work for and who are relying on you. Or, as Werner von Siemens wrote to his wife Mathilde in 1854: "There is powerful magic in the words 'I want,' if it is meant in earnest and if there's conviction behind it!"

Questions? Comments?
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