

SIEMENS CANADA: DIGITAL TRANSFORMATION

R. Chandrasekar wrote this case under the supervision of Professor Ning Su solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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In late July 2018, Faisal Kazi, president and chief executive officer (CEO) of Siemens Canada, was chairing a meeting with his direct reports at the company's headquarters in Oakville, Ontario. Siemens Canada was a fully owned subsidiary of the multinational Siemens AG. The parent company was to unveil, in a few days, a new growth plan entitled Vision 2020+. It was meant to be a mid-course adjustment of the five-year growth plan Vision 2020, which the company had launched in October 2014. The adjustment was necessary because, in a display of employee commitment to the growth plan, the goals of Vision 2020 had been realized two years ahead of schedule (see Exhibit 1). Kazi explained,

As a core team, we now need to address two issues. First, how can we, at Siemens Canada, get ready to execute Vision 2020+? What are the additional skills and competencies needed locally to do so? Second, how can we, at Siemens Canada, add value to the new growth plan? What local initiatives on our part could enhance the global objectives of Siemens AG?

SIEMENS AG

Siemens AG was founded by Ernst Werner Siemens in October 1847 in the city of Berlin in northeastern Germany. Ernst Siemens had recently invented a telegraph that replaced the Morse code with a needle that pointed to the right letter. Known as the "electric pointer telegraph," the invention led him to set up a workshop producing pointer telegraphs. He was soon joined by Johann Georg Halske, a precision mechanic, and together they hired 10 artisans and set up a firm called Telegraphen-Bauanstalt von Siemens & Halske.¹ It was a predecessor to Siemens AG, and soon the three brothers of Ernst Siemens came on board. Siemens AG went on to become a family enterprise "born in Germany, raised in Europe, and at home in the world."²

The company had seen—and prospered through—the advent of locomotives, electricity, the internal combustion engine, steam turbines, jet engines, personal computers, and clean energy. Siemens had not

¹ Insa Wrede, "No Time to Rest as Siemens Prepares for the Future," DW, November 15, 2017, accessed March 2, 2019, www.dw.com/en/no-time-to-rest-as-siemens-prepares-for-the-future/a-41394998.

² Joe Kaeser, "Ownership Culture—The Code for Sustainable Success," *St. Gallen Business Review*, May 13, 2015, accessed February 17, 2019, www.stgallenbusinessreview.com/ownership-culture-the-code-for-sustainable-success.

only survived technological revolutions but had also led some of these revolutions. Siemens had also missed opportunities, such as in telecommunications. The company had underestimated the Internet.³

Siemens AG had consolidated revenues of €83,049 million⁴ for the fiscal year ending September 2017 (see Exhibits 2 and 3). It had 363,000 employees worldwide, of whom 223,000 were directly involved in manufacturing. Siemens AG had 32 joint ventures and associate companies worldwide in addition to many subsidiaries: 129 in Germany; 519 in Europe, the Commonwealth of Independent States,⁵ Africa, and the Middle East; 165 in the Americas; and 218 in Asia and Australia. The company had six business divisions: Power and Gas, Energy Management, Building Technologies, Mobility, Digital Factory, and Process Industries and Drives. Siemens AG also had two autonomous divisions: Healthineers and Renewables (see Exhibit 4).

Siemens AG had been operating in Canada since 1912. The Canadian subsidiary was involved in several lines of business, including communications systems, power generation, industrial and building automation, medical technology, railway vehicles, and water treatment systems. It employed 4,500 people in 39 offices and 14 production facilities across the country. It had revenues of CA\$2.2 billion⁶ in 2018.

Vision 2020

In October 2014, under CEO Joe Kaeser, who had taken over a year earlier, Siemens AG had announced a five-year growth plan. Vision 2020 was the company's biggest reorganization in the past 25 years. It repositioned the company along three businesses that had a common value chain: electrification, automation, and digitalization. Each business was a mega market with high growth rates, but digitalization was the fastest growing of the three. Electrification was the company's traditional competence, and Siemens was a world leader in automation. The company was now building on that platform to move into the age of digitalization in order to lead from the front.

Vision 2020 had been triggered by two developments. First, the company's major competitors were growing faster and achieving higher profit margins faster than Siemens AG, leading to a realization that Siemens was not living up to its full potential. Second, its long-standing business domains were under attack by software companies, such as SAP Software Company, Microsoft Corporation, IBM Corporation, Google LLC, and Apple Inc., which were venturing into manufacturing technologies.

The growth plan was designed to strengthen Siemens AG so that it could "consistently occupy attractive growth fields, reinforce its core business, and outpace competitors in efficiency and performance" and become entrepreneurial by "applying the virtues of a family enterprise to a multinational."

Vision 2020 had seven overarching goals that were to be monitored regularly: (1) cut costs by €1 billion; (2) tap growth fields and get underperforming businesses back on track; (3) secure a return of 15 to 20 per cent on capital employed; (4) position 30 per cent of Division and Business Unit managers outside of Germany; (5) ensure 20 per cent improvement in the Net Promoter Score; (6) achieve a 75 per cent approval

³ "We Need to See Calm Restored," *Der Spiegel*, August 7, 2013, accessed February 16, 2019, www.spiegel.de/international/business/spiegel-interview-with-siemens-ceo-joe-kaeser-a-915314.html.

⁴ € = euro; €1 = US\$1.20 on September 8, 2017, accessed March 10, 2020, www.poundsterlinglive.com/best-exchange-rates/euro-to-us-dollar-exchange-rate-on-2017-09-08.

⁵ The Commonwealth of Independent States was a regional intergovernmental organization formed after the dissolution of the Soviet Union in 1991. Its nine-member states comprised Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, and Uzbekistan.

⁶ All dollar-denominated currency amounts are in CA\$ unless specified otherwise.

rating in the categories of Leadership and Diversity globally; and (7) increase the number of employee shareholders by 50 per cent.

Vision 2020 had three milestones: drive performance (2015), strengthen the core (2017), and scale up (2020) (see Exhibit 4).

Vision 2020+

Vision 2020+ was designed to realign the global-local balance at Siemens AG by providing greater autonomy to the subsidiaries. Its overarching purpose was to make Siemens nimbler and more profitable in the digital industrial age and to sharpen customer focus.

Vision 2020+ was founded on two pillars. First, the company would consolidate its product portfolio into three operating companies—gas and power, smart infrastructure, and digital industries—and into three strategic companies—Siemens Alstom, Siemens Gamesa, and Siemens Healthineers. Second, the Munich headquarters (HQ) would devolve decision-making to the operating companies, which would henceforth be reporting to regional HQs at Houston, Texas, in the United States (for gas and power), at Zug, Switzerland (for smart infrastructure), and at Nuremberg, Germany (for digital factories). The role of the Munich office would be limited to finance, governance and markets, legal and compliance, human resources, and communications. The new structure was to become effective October 2018.

Digitalization: Internal

Siemens formally began its digital journey in 2007 when, instead of outsourcing software skills as in the past, it started building a pool of in-house talent through acquisitions. By 2018, the company had spent more than US\$10 billion in acquiring small and medium software companies possessing niche capabilities.⁷ By 2017, it employed 17,500 qualified software engineers who were involved in various streams of activity in the company's sprawling operating divisions worldwide.

One of the major activities involved developing software to be embedded into the company's products. Each Siemens product had inbuilt sensors, and each sensor had a story to tell. Every moment, the sensors delivered data to the embedded software both for real-time analytics and for storage in the cloud for later retrieval.

Historically, Siemens was focused on tracking markets because the markets for many of its products were cyclical, ranging from two to seven years. Since 2007, Siemens was also focused on supporting customer requirements by means of data because data helped in recognizing changes in the markets early on and responding better to them. The data helped foresee, for example, how the customers' customers were changing; it was a new competitive advantage.

The launch of the Digital Factory division, effective October 2014 as part of Vision 2020, denoted a high-tech resurgence at Siemens. For many years, the company had been involved in enabling its industrial customers to go to market faster with their products; however, doing so without incurring huge costs was a perennial challenge, both for its customers and for Siemens as a facilitator. Siemens engineers started looking at a seemingly fictional scenario: enabling an industrial customer to deep dive into manufacturing

⁷ Sarmad Khan, "Siemens Scouts Market for More Software Business Acquisitions," *The National*, September 14, 2018, accessed February 25, 2019, www.thenational.ae/business/technology/exclusive-siemens-scouts-market-for-more-software-business-acquisitions-1.770108.

not only without setting up physical infrastructure (e.g., a production line) but also without even having a finished product on the table. They found the answer in digital twins. According to Shalabh Bakshi, Siemens chief digital officer,

Digital twins, involves creating an integrated virtual environment of a product or a manufacturing process into the virtual world, making as many changes or versions to optimize and validate the best solutions before applying them back into the real world of manufacturing. It involves creating a simulated model, based on Siemens software(s), and tweaking it in terms of optimizing engineering, identifying bottlenecks, and monitoring performance metrics like quality, uptime and load time. The model replaces the conventional destructive testing with non-destructive testing, as everything can now be perfected virtually prior to real world implementation.

A major prerequisite for full digitization was complete integration. The product needed to be available fully digitally; the production line needed to be available fully digitally; and the performance metrics from the real world had to be monitored fully digitally. It was only in a digital ambience that the product-production-performance process could be fully integrated to deliver an end to end digital transformation for a customer.

Digital Enterprise was thus a market-led innovation practice that provided a powerful incentive for Siemens to embark on a journey of digitization both internally in its own operations and externally to help customers. By 2017, every division of Siemens had a digital enterprise strategy with clearly defined mandates often implemented by cross-divisional teams. The company was practising what it was preaching to customers.

Siemens had several digital tools in place: It had implemented customer relationship management systems. It was deploying cloud computing. It was utilizing artificial intelligence tools in recruitment. It had digitized sales quotations and employee travel/expense statements.

The company had several training tools to ensure that employees stayed tuned to the current trends in digitalization. It offered regular inhouse webinars on becoming digital. The company had an internal Facebook page called Siemens Social Network, which served as an information exchange point on topical issues, including digitalization. Siemens Canada offered an ongoing two-day course in digitalization for its divisional managers, business unit heads, and all employees. According to Jeff Phillips, a manufacturing engineering manager at Siemens Canada,

Siemens has several ongoing digital projects. Engineers at the company's plant at Peterborough, for example, have been working on two applications for MindSphere. They are known as overall equipment efficiency (OEE) and cause and effect manager (CEM). OEE is a performance metric indicating how well the Peterborough plant is using its capital assets. The metric is a multiple of three coefficients—availability of equipment, performance of equipment, and quality of output. A drop in OEE means a problem with the production line requiring resolution. CEM is a supplementary metric flowing from OEE. Another project, for example, that has been in play at Peterborough is the digitization of the manual components of a typical sales order flow.

Digitalization: External

The stimulus for digitalization at Siemens came from its industrial customers who were keen on reducing their costs of going to market. Siemens had provided the solution with its digital twin. The customers had other needs that digitalization could address. Mass production was being gradually replaced by customization. In mass production, scale meant that, for example, if a factory produced 5,000 high-

temperature blades, the unit costs would be lower, but if it produced only 50 blades, the unit costs would be higher. With digitalization, the blade would have a digital twin that could be produced in small-volume prototypes using 3-D printing. Digitalization not only took scalability out of the equation but, by bridging the gap between scale and scope, enabled the manufacture of different *types* of blades. An industrial customer could thus produce a lot size of one and still be viable. This ability represented a leap forward in manufacturing technology facilitated by digitalization.

The company's customers had other questions: How could sensors be deployed better? How could data points be reconfigured to facilitate remote decisions? How could augmented reality be used to run remote diagnostics? Siemens was experimenting with different digital technologies in a bid to provide the answers. According to Vishal Gandhi, a digital enterprise coordinator for process industries in Canada,

Industrial manufacturers are under pressure. They are looking for ways of increasing productivity. They are under compulsion to move from mass production to customized production. Given that the innovation cycles are very short nowadays for the manufacturers, they're looking at how quickly they can come up with new products. The onus on seeking differentiation in the marketplace is heavy.

A major limitation for a facilitator such as Siemens AG was that manufacturing environments were not homogenous. Key performance indicators (KPIs) varied from one customer to another. The stage of life cycle at which a customer would commence the digital journey also differed. An understanding on the part of the customer of where they wanted to be in five or 10 years was crucial because digitalization was more like a marathon than a sprint. Siemens was keen on an approach it called product life-cycle management (PLM), whereby customers treated digitalization as a journey and not an end. However, this approach did not always coincide with customer expectations.

Digitalization also meant organizational transformation. Not all people in a client company shared a common understanding of what was going on. Not all were motivated or incentivized to change the way they worked. These were the barriers in working with customers on their digitalization.

To overcome these barriers, Siemens had developed an integrated suite it called Teamcenter. It was a PLM system that connected people and processes across functional silos with a digital thread for innovation. Combined with the use of a digital twin, Teamcenter generated flexibility in new product development. Several companies were involved in multi-year implementations of digital solutions provided by Siemens, including aerospace companies such as Bombardier, automotive companies such as Maserati, and several companies in the injection moulding business.

A highlight of digitalization at Siemens was an internally developed software product called MindSphere, a cloud-based operating system that was offered as a platform-as-a-service. It connected Siemens products, plants, systems, and machines through what was known as the Internet of Things (IoT) and used advanced analytics to harness the data generated by the IoT. MindSphere had an open architecture, enabling engineers, both at Siemens and at its customers, to collect data, store it, and then write mobile applications (apps) of their own to process that data.

Digitalization products were also becoming an independent source of revenue for Siemens. MindSphere was being marketed as a stand-alone product at a one-time registration fee of €2,000 and an annual subscription fee of €640. There was also the possibility of a secondary source of revenue by providing MindSphere as an add-on to a company's process instrumentation products. MindSphere core value proposition was that it could monitor processes, track key metrics, and help schedule predictive maintenance.

Ownership Culture

A message that was regularly reiterated at various levels of leadership at Siemens was that the employees owned the company. It was borne out of a conviction that employees were more loyal to culture than to strategy and that the best way to secure buy-in for strategy was to ensure that culture and strategy were mutually reinforcing. It was part of the mandate of the global CEO that Siemens should incorporate “the virtues of a family enterprise.”⁸ There was also recognition on the part of leadership that “culture change is a marathon, not a sprint.”⁹

The message played out at the ground level in three ways. First, 144,000 employees of the company worldwide were shareholders of Siemens. The stated target, as part of Vision 2020, was to increase employee shareholding by at least 50 per cent, to more than 200,000. Equity stakes ensured that employees shared the company’s progress year to year through both stock appreciation and dividends. Second, ownership encouraged employees to act entrepreneurially, not necessarily in making an investment decision but in their day-to-day interactions, however small. It showed up in employees asking routine questions such as the following: Is the customer happy? How can I improve my performance? How can I make this process more efficient? Third, Siemens was giving priority, as in a family enterprise, to financial solidity over short-term profit, which was evident both in the company’s financial targets and its compensation systems, which were oriented toward the creation of sustainable value.

The message had gained credibility because it was being reinforced by the company’s legacy of having “close and trusted partnerships with vendors and customers, often over generations.”¹⁰

Innovation

Siemens had begun as a start-up in a backyard in Berlin. Successive leadership teams believed that a piece of that spark of entrepreneurship resided inside each employee. But it was buried deeply for two reasons.

First, sectors such as utilities and oil and gas were regulated by governments, and the companies operating in these sectors, such as Siemens, were prone to being conservative. In fact, it was only when Siemens entered the healthcare business that it could begin to break out of its conventional template and replicate some of its innovations in health care and other verticals. Second, as it had grown over the decades into a multinational conglomerate, the company needed to comply with statutory requirements around fiduciary duties, financial controls, provisions of the *Sarbanes–Oxley Act*, and corporate governance norms. Conformity was a test of corporate citizenship.

The leadership team, led by company veteran Joseph Kaeser as CEO, made innovation the nucleus of its growth agenda. For reasons of size and others, Siemens could not pretend to be a start-up, but it could become a sought-after partner for start-ups. It could help them become what they aspired to be: a company as successful as Siemens. That was the core positioning Siemens was seeking through innovation.

A major part of Siemens internal messaging, of late, was tolerance for mistakes. In reiterating that employees should act as if Siemens was their own company, Kaeser made a distinction between acceptable and unacceptable mistakes. An acceptable mistake occurred when one could not predict the outcome, which, after due consideration, could go either way. An unacceptable mistake occurred when one knew for

⁸ Kaeser, op. cit.

⁹ Ibid.

¹⁰ Ibid.

certain the outcome but did not want to go ahead because the route was untested. Kaeser had also made it clear that people who made a mistake by trying to do their best would never be in trouble; but if people did not ask for help, they would be in trouble because someone somewhere in the Siemens universe had likely not only dealt with the same issue but also would have been eager to help.¹¹

Two models of innovation ran parallel at Siemens, which, as a global company, was oriented along products manufactured by individual business units. The traditional research and development (R&D) model of innovation was decentralized to the business units. Several units comprised a business division, each of which had a global headquarters. The second model of innovation, the open model, was largely conducted in conjunction with customers by business units. According to Ann Adair, vice-president of strategy at Siemens Canada,

The bridge that links the R&D model and open innovation model is an entity known as portfolio owner, which I think is unique to Siemens. Portfolio owners have global span of control and could be stationed anywhere in the world, depending upon the products in which they would be specialized. They would be anchoring business decisions around which product in the pipeline should be commercially scaled and in which part of the world the product under review should be manufactured.

The beginnings of customer-led innovation could be traced to the company's energy division, which dealt directly with utility companies as an equipment vendor. Traditionally, a utility company would put together a capital investment plan, usually on an annual basis, to announce major investments for the period. It would then appoint general contractors (GCs) to execute projects. Vendors such as Siemens were required to work with each GC to provide the hardware and software needed for each project. They would be enlisted only when the utility company had already decided on the crucial factors, such as project financing and the performance metrics. Siemens was often successful in becoming involved in a project during its early stages of strategy development.

Customer-led innovation became known internally as Customer Value Co-creation (CVCC). At its core was the blend of Siemens's domain knowledge at Siemens and the client's expertise at creating a product that would benefit both parties. CVCC had a well-defined process around how Siemens would work with a customer, understand their business drivers, empathize with their pain points, and get a sense of their KPIs before arriving, together, at a minimum viable product for scaling up. An issue that often required deliberation was the ownership of the intellectual property that would be jointly developed.

An example of a successful CVCC was the collaboration between Siemens Canada and NB Power, the electrical utility in the province of New Brunswick. Siemens Canada provided its expertise in the smart grid compass to help its long-standing customer develop an energy road map for the future. A result of the successful initiative was that Siemens Canada also received funding from the federally regulated Strategic Innovation Fund to conduct a pilot project of smart grid solutions in Atlantic Canada.

Siemens had several innovation tools in place. For example, every year its Energy division held a Dragons' Den¹²-style program for three months, where employees could present their new portfolio ideas. The winners received investment funding to develop their products. The company had a Corporate Technology group, whose primary role was to scan the industrial environment to recommend focus areas for R&D, but also funded innovative ideas from within. The group had built up enough credibility to bypass the company's signatory decision-making processes to quickly approve new product development projects that

¹¹ "Viewpoints: Joe Kaeser of Siemens," WSJ video, 32:13, January 12, 2016, accessed February 18, 2019, www.wsj.com/video/viewpoints-joe-kaeser-of-siemens/856BABEE-6065-43B7-9325-51DEB8DA022B.html.

¹² Dragons' Den, CBC, accessed February 18, 2019, www.cbc.ca/dragonsden/m_episodes.

it identified as being worthwhile. Siemens also had a division called Innovation AG, wherein anyone, both inside and outside the company, could file a business case. The division was insulated from the rest of Siemens and acted as a typical venture capitalist or a business angel to help potential entrepreneurs start and grow a business. It had extensive networks outside Siemens and access to resources within Siemens.

In addition, Siemens had the 3I Initiative, which invited, once or twice a year, proposals from around the globe for scaling up new ideas, new technologies, and new solutions on which the applicants had already started working. Another program, the Next47, looked for promising start-ups, both internally and externally.

Siemens was also involved in creating an ecosystem of collaboration. For example, if a manufacturing firm in Ontario wanted to implement automation but was unsure how to get started, Siemens Canada would help find industry funding, connect the firm with a vocational training college in which Siemens would have installed its equipment, and help the company manage the transition to automation.

Realigning the Global-Local Balance

With operations spanning more than 200 countries and regions, Siemens was a global enterprise. In 2017, it generated 87 per cent of its revenue outside Germany. With a range of disparate businesses in its portfolio, it was also a conglomerate.

CEO Kaeser made it clear, however, that the days of conglomerates were over. Businesses that were not core to electrification, automation, and digitalization were being spun off. Health care and wind energy were among the businesses that were being cut loose. It was a sharp contrast to the company's history, whereby getting bigger used to be the answer to most of its strategic challenges. As part of Vision 2020, the "lumbering aircraft carrier," as the CEO called it, was yielding place to a "fleet of ships," each thriving by its own means and moving speedily and purposefully in its focus area.¹³

The company was also striking a balance between pursuing its global aspirations and meeting local needs. Country subsidiaries were gaining more leeway in fulfilling the growth priorities set by HQ and identifying their own growth opportunities. Local growth opportunities were given shape and substance in a document known internally as the Country Opportunity Plan and reviewed monthly by senior managers at the country level. When a formal proposal was ready, it was presented by the country's CEO to senior management at HQ for approval. A key factor in getting approval was preparing the ground through informal discussions and information sharing with HQ staff.¹⁴

Siemens had two channels for escalating a local solution globally: Corporate Technology located at HQ, which looked at innovations in different spaces and in different areas of Siemens, and portfolio owners located in different parts of the globe. The latter reported to product managers who were also located in different parts of the globe. For example, the Peterborough plant in Canada housed portfolio owners specializing in level-sensing products. They reported to the product management group based in Karlsruhe, Germany. Similarly, the product management group for pressure transducers was based in the United States, and the product management group for flow products was based in Germany.

¹³ Chris Bryant, "Siemens Launches a Thousand Ships," *Bloomberg Businessweek*, August 3, 2017, accessed March 2, 2019, www.bloomberg.com/news/articles/2017-08-03/siemens-launches-a-thousand-ships.

¹⁴ Paul Boothe and Jean-Louis Schaan, *Core Manufacturing: Lessons from Four Global Giants in Canada*, (London, ON: Lawrence National Centre for Policy and Management, 2016), accessed March 2, 2019, www.ivey.uwo.ca/cmsmedia/2677918/core-manufacturing-lessons-from-four-global-giants-in-canada.pdf.

An example of a local initiative triggering a global mandate was the Smart Grid Centre of Competence, opened in January 2013 in Fredericton, in the Canadian province of New Brunswick. It was borne out of a successful collaboration between Siemens Canada and NB Power. The team that worked on the NB Power project also worked on other global projects involving collaboration with utility companies.

Part of the Siemens strategy for digitalization was based on Digital Lighthouse Factories, the global repositories of flagship projects that provided expertise to country subsidiaries that were executing similar projects. These repositories were the first to be called on within Siemens for help. An example was the process analytics factory at Karlsruhe, Germany, which was the lead for MindSphere. The Karlsruhe unit coordinated the MindSphere Application Centers (MACs), which were based in 36 locations worldwide, ranging from Austin, Texas, in the United States, to Shanghai, China. Each location focused on a market vertical.¹⁵ All MACs were doing virtual sprints in developing apps such as the OEE.

FUTURE PLANS OF SIEMENS CANADA

Vision 2020+ led to a devolution of decision-making powers from the corporate office in Munich to the three regional headquarters: at Houston, Texas, in the United States (for gas and power); at Zug, Switzerland (for smart infrastructure); and at Nuremberg, Germany (for digital factories). The subsidiaries would report to one of the three regional HQs rather than to Munich, whose role would be limited to finance, governance and markets, legal and compliance, human resources, and communications. Kazi clarified,








Our global CEO has outlined the broad direction in which the company will move forward. We will be looking for growth options within that mandate. We will be watching megatrends. Urbanization, for example, is one of them. By 2050, 70 per cent of the world's population is forecast to live in cities. Suburban transportation is a window of business opportunity for us in Canada. On the technology front, I am excited by machine learning and artificial intelligence. Data analytics is another area where we will be looking for new business opportunities. Meanwhile, we need to answer several key questions. How do we incorporate best practices from the Siemens universe? How do we generate best practices locally for absorption by subsidiaries worldwide? How do we innovate faster locally? How do we measure up at Siemens Canada to the entrepreneurial freedom being given to subsidiaries as part of Vision 2020+?

¹⁵ Siemens, "MindSphere Application Centers," accessed October 17, 2019, <https://new.siemens.com/global/en/products/software/mindsphere/application-centers.html>.

EXHIBIT 1: VISION 2020+ AT SIEMENS AG—BUILDING ON VISION 2020

Siemens Vision 2020 - Execution well underway, most targets already achieved by FY 2017

SIEMENS
Ingenuity for life

GOAL	INTENT	KPI	
1 Implement stringent company governance with effective support functions	Live lean governance and drive continuous optimization	 €1bn cost savings by FY 2016 achieved	✓
2 Strengthen portfolio	Sharpen our business focus in electrification, automation, and digitalization	 Tap growth fields > 8% margin in underperforming businesses	✓
3 Execute financial target system	Grow our company value	 15-20% ROCE Growth > most relevant competitors	✓
4 Expand global management	Get closer to our customers and markets	 > 30% of Division and Business Unit management outside Germany	✓
5 Be a partner of choice for our customers	Foster an intimate and trusting partnership with our customers	 ≥ 20% improvement in Net Promoter Score	✓
6 Be an employer of choice	Unleash the full potential of our people	 > 75% approval rating in leadership and diversity in global employee survey	✓
7 Foster Ownership Culture	Ignite pride and passion for Siemens, through a new mindset and equity ownership	 ≥ 50% increase in number of employee shareholders	✓

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Commerzbank German Investment Seminar

Note: FY = fiscal year; € = euro; €1 = US\$1.20 on September 8, 2017; bn = billion; ROCE = return on capital employed.
Source: Company files.

EXHIBIT 2: SIEMENS AG—CONSOLIDATED INCOME STATEMENT, 2013–2017

Year ending in September (in € millions)	2017	2016	2015	2014	2013
Revenue	83,049	79,644	75,636	71,227	73,445
Cost of goods sold	(58,021)	(55,826)	(53,789)	(50,869)	(53,309)
Gross profit	25,029	23,819	21,847	20,357	20,135
Research and development	(5,164)	(4,732)	(4,483)	(4,020)	(4,048)
Selling and general administration	(12,225)	(11,669)	(11,409)	(10,190)	(10,869)
Other operating income	647	328	476	654	500
Other operating expenses	(595)	(427)	(389)	(194)	(424)
Income from investments	43	134	1,235	582	510
Interest income	1,487	1,314	1,260	1,058	947
Interest expenses	(1,051)	(989)	(818)	(754)	(784)
Other financial income	135	(373)	(500)	(177)	(154)
Income tax	(2,180)	(2,008)	(1,869)	(2,014)	(1,634)
Income from continuing operations	6,126	5,396	5,349	5,302	4,179
Income from discontinued operations	53	188	2,031	215	231
Net income	6,179	5,584	7,380	5,507	4,409

Note: € = euro; €1 = US\$1.20 on September 8, 2017.

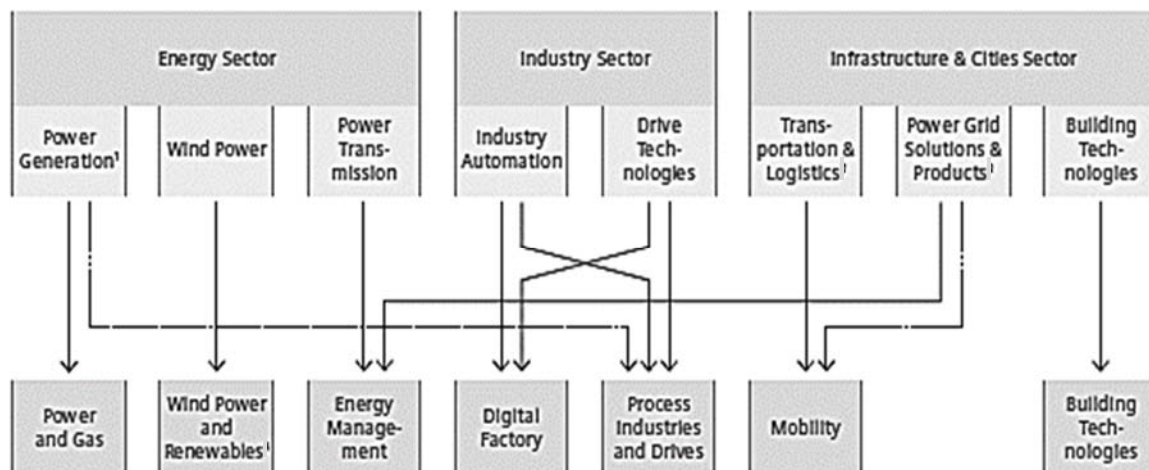
Source: Company files.

EXHIBIT 3: SIEMENS AG—REVENUE BREAKDOWN, 2013–2017

Year ending in September (in € millions)	2017	2016	2015	2014	2013
By business division					
Power and Gas	15,467	16,471	13,193	12,720	—
Wind Power and Renewables	—	—	5,660	5,567	—
Energy Management	12,277	11,940	11,922	10,708	—
Building Technologies	6,523	6,156	5,999	5,569	—
Mobility	8,099	7,825	7,508	7,249	—
Digital Factory	11,378	10,172	9,956	9,201	—
Process Industries and Drives	8,876	9,038	9,894	9,645	—
Healthineers	13,789	13,535	—	—	—
Healthcare	—	—	12,930	11,736	12,819
Siemens Gamesa Renewable Energy	7,922	5,976	—	—	—
Energy					28,797
Industry					16,688
Infrastructure and Cities					21,894
Sub-total: industrial business	84,331	81,112	77,062	72,396	80,198
Sub-total: financial services	921	979	1,048	937	1,072
Reconciliation with consolidation	(2,202)	(2,447)	(2,475)	(2,106)	(1,699)
Total revenue	83,049	79,644	75,636	71,227	73,445
By location					
Germany	11,142	10,739	11,244	11,244	
Rest of Europe, CIS, Africa and Middle East	32,225	31,080	27,555	23,156	
Americas	23,516	22,707	21,702	21,702	
Asia, Australia	16,166	15,118	15,135	15,125	
Total revenue	83,049	79,644	75,636	71,227	73,445

Note: €1 = US\$1.20 on September 08, 2017; CIS = Commonwealth of Independent States.

Source: Company files.

EXHIBIT 4: SIEMENS AG AS OF OCTOBER 1, 2014

Source: Company files.