OIDD-680

Operations Strategy Practicum

Spring 2018

(Revised January 28, 2018)

Locations: Scheduled sessions at Wharton will meet in **JMHH F36** at 4:30 pm – 6:00 pm, on scheduled dates. Spring Break in Germany and various company visits reachable from the Philadelphia Campus during the semester. On schedule Fridays.

Dates: Spring Semester 2018

- Lectures, Case Discussions
- Visits to German, Dutch and US manufacturing plants, logistics centers and service provider facilities
- Presentations by senior managers

Credit: 1.0 Credit Unit

Course Instructor

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Course Overview and Learning Goals

This course will focus on the management of operations at manufacturing and service facilities located within the US and Germany that are used either by domestic corporations or by foreign multinational companies. Our emphasis will be on the evolving patterns of operations strategies adopted by firms for producing products, sourcing manufacturing, distributing products, delivering services and managing product design as well as on programs for enhancing quality, productivity and flexibility and managing technology. We will focus on the formulation and execution of such strategies for a collection of firms in the context of the current dynamics of global competition. The course will consist of a set of site visits and in-class sessions which include lectures, case discussions and management speakers who will describe their company's current strategy.

Our course is motivated by the fact that many manufacturing and service producing firms are re-examining the structure of their global supply chains, internal processes and sourcing strategy in response to the uncertainties and risks they face in these turbulent times. These adjustments are occurring against a backdrop of fundamental change to the environment in which companies operate. For decades a dominant strategy in manufacturing has been to outsource to low cost global suppliers. This has led to the transfer of millions of manufacturing jobs and development activities out of the US, Japan and Europe and into low labor cost countries such as China, India and Vietnam. Today this trend is being challenged by a movement by some companies to "re-shore" their manufacturing by bringing it back or at least moving it closer to their developed country market, i.e. by "near-shoring" to locations such as Mexico or Eastern Europe. At the same time many firms continue to select offshore locations for outsourcing of material inputs and services. Similar arguments for global sourcing and re-shoring can also be made for firms that act as suppliers of services such as Business Process Outsourcing, Customer Service Support, Product Design and Software Development. Moreover there have been major technology developments affecting production automation, logistics and smart, connected product designs which are contributing to this re-structuring. Against this backdrop of change, we are currently in an era where government policies concerning globalization and its impact on domestic employment have been questioned and challenged.

This course will consider the current status of operations strategy and process management primarily from the perspective of major multi-national firms, although we will also interact with startup companies. The goal is to provide the class with the opportunity to interact with senior executives from these companies, which are headquartered and/or operating in the US and Germany, to explore current thinking and state-of-the-art practices concerning their global operations. Experiential learning will be facilitated by providing students with the opportunity to observe company operations in action under the guidance of company management. These interactions will facilitate an exchange of ideas that will identify managerial challenges and concerns. It will also highlight current practices and intentions of participating companies. Moreover, the course will consider various models and frameworks that have been developed in the economics, public policy, operations and management literatures for dealing with strategies for global supply chain sourcing, technology management and process improvement. We will also consider how technology developments are impacting current operations strategy (e.g. automation, E-commerce, Internet of Things). Our objective is to develop an understanding of the drivers of operations strategy decisions, at present and in the future, in order to identify opportunities for improvement and barriers to implementation.

We will explore these issues through the lens of visits to a specific group of multinational and emerging companies located in Germany and in the mid-Atlantic region of the US. The companies will be chosen to cover a range of manufacturing and service industries where global sourcing, productivity and coordination are key issues e.g. aerospace and defense, automotive, consumer electronics and computers, consumer products, entertainment, health care products, medical equipment, pharmaceuticals, logistics, and semiconductor. This course will build off of the learning based on a Global Modular Course on this topic that has been offered in Japan and from versions of the course that has been offered to students participating in the Wharton SiSF (Semester in San Francisco) program and to students in the regular full time program in Philadelphia.

Course Organization and Requirements

The course will include an intense week of company visits in Germany during the spring break (March 4 – March 10, 2018), several US company visits on Fridays, and several class

sessions at Wharton. The class sessions to be held at Wharton will include lectures, case discussions and guest speakers. Students will be responsible for travel expenses (flight to Germany and for the land arrangements in Germany and the US). We estimate that these expenses will be about $2,400 for the course (for the full semester, shared occupancy, excluding the cost of the flight to Germany). ***It will be necessary to register for the course (as a 1 CU course), and pay a deposit fee for the expenses in order to reserve your place in the course.*** Enrollment will be limited due to capacity restrictions imposed by the companies that we will be visiting.

Pre-requisites

Students taking this course should have completed at least one of the OIDD core courses, i.e. OIDD 611, "Managing the Productive Core of the Firm: Quality and Productivity" or OIDD 615, "Managing the Productive Core of the Firm: Operations Strategy", or an equivalent course, or have had work experience that focuses on operations and supply chain management.

Grading and assignments

Grades are based on (1) class participation which includes class discussions, contribution to the group reports and attendance to the company visits (25%); (2) analysis of 2 assigned cases, each requires an individual, written report (25%); (3) A background report concerning one of the companies and their industry, that we will visit, and an after-site visit report for that company based on observations from the visit. (25%); This will be a group report; and (4) a final, individual paper offering reflections on what you observed and learned during the site visits (25%). If you miss any of the company visits your participation grade will be reduced.

All of the Wharton class sessions will be recorded so if you miss a class you will be able to review the discussion. An adjustment to your participation grade can occur if you miss any of the Wharton sessions. Attendance at all of the company site visits is mandatory.

The schedule for the course includes a series of company visits in Germany during the week of Spring break (March 4 to March 10). The tour will begin the German segment in Frankfurt and we will visit ten companies as we work our way to Munich during the week of March 5. There will also be visits to Janssen Pharmaceuticals, Inc. of Johnson & Johnson and AmerisourceBergen, at sites that are accessible from the Philadelphia campus that have been scheduled in the Spring semester, (see below).

Canvas Site

https://canvas.upenn.edu/courses/1393534

Course Schedule

The schedule is subject to change.

The following is the full schedule for the course, including the domestic and European segments.

Session	Dates	Session	Location	
1	1/17/2018 – 4:30 pm - 6:00 pm	Opening class -Operations Strategy lecture - Plant Tours Analysis	Wharton	
2	1/31/2018 - 4:30 pm - 6:00 pm	Case Cisco SCRM Discussion	Wharton	
3	2/14/2018 -4:30 pm - 6:00 pm	Global Supply Chain Strategy – Sourcing and Location	Wharton	
4	2/21/2018 -4:30 pm - 6:00 pm	Industry Reports and Trip Preparation	Wharton	
E-0 – E-7	3/04 - 3/10, 2018	Trip to Germany	Germany	
5	3/21/2018 - 4:30 pm - 6:00 pm	Boeing Fasteners case Discussion	Wharton	
6	3/28/2018 -4:30 pm - 6:00 pm	Logistics and Distribution Strategy	Wharton	
7	4/4/2018—4:30 pm – 9:30 pm (evening)	Corporate Visit to AmerisourceBergen distribution center	Bethlehem PA	
8	4/20/2018 - 8:00 am to – 5:00 pm (Friday)	Corporate Visit to Janssen/Johnson & Johnson - large molecule facility	Malvern PA	
9	4/25/2018 - 4:30 pm - 6:00 pm	Post-Visit Group Presentations & Final Debrief	Wharton	

Schedule: Wharton study tour, Germany

The following schedule is subject to change.

Session	Date	Topic and Readings
1-A	**January 17** **4:30 pm -6:00 pm**	**Course Introduction – Operations Strategy** This session will present the goals and requirements for the course. We will then review the course schedule. Finally, we will introduce a framework for operations strategy that highlights the following concepts that will be covered in the course either in class sessions or through company visits: o Global Manufacturing Sourcing o Supplier Relationships and Coordination o Logistics and Distribution o Technology and Capacity Planning o Supply Chain Risk Management o Agility, Flexibility Strategies o Environment and Sustainability o Lean operations and continuous improvement • **Readings** o M. Fisher, "What is the Right Supply Chain for Your Products", Harvard Business Review, 1997. o H. Lee, "Triple A Supply Chain", Harvard Business Review, 2004.
1-B	**January 17** **4:30 pm -6:00 pm**	**Plant Tours and Industry Background** This session will introduce the Plant Tour Analysis tool that will be applied in our site visits by the student teams. We will also discuss the industry background reports that each team will prepare. Each team will be required to distribute their background report prior to the site visit and a summary of the site report after each visit. • **Reading** o R. E. Goodson, "Read a Plant – Fast", HBR, May 2002.
2	**January 31** **4:30 pm -6:00 pm**	**Supply Chain Risk Management – Cisco Case Discussion** This session will introduce the concept of supply chain risk management. We will do so by discussing the case which describes the Cisco process and how it reacted to the Tohoku earthquake in Japan. We will review the presentation of James Steele, who was director of Cisco's Supply Chain Risk Management program at the time of the quake, who has provided an update on Cisco's response. • **Readings** o R. Anupindi, "Cisco Supply Chain Risk Management (SCRM) in Action: 2011 Tohoku Earthquake", (U. Michigan Case 1-429-284, 2013)

		o R. Anupindi, "Supply Chain Risk Management at Cisco: Response to H1N1 (U. of Michigan case 1-428-881), – read pages 2 through top of page 9. o D. Simchi-Levi , W. Schmidt and Y. Wei, "From Super Storms to Factory Fires: Unpredictable Supply-Chain Disruptions", HBR Jan-Feb, 2014. o D. Reynolds, "Lessons From Tohoku", Wharton Magazine, Winter 2012. o A. Pollack and S. Lohr, "A Japanese Plant Struggles to Produce a Critical Auto Part", New York Times, April 278, 2011. o K@W-Wipro, "Process Resilience is Becoming a Business Imperative", K@W, April 2014.
3	**February 14** **4:30 pm -6:00 pm**	**Global Supply Chain Strategy – Sourcing and Location Decisions** We will review the current situation concerning global manufacturing sourcing, including the results of a recent Benchmark study. **Readings** o W. C. Shih "What It Takes to Re-Shore Manufacturing Successfully", , Sloan Management Review, Fall, 2014. o "Shifts in Cost Competitiveness Reshape Global Manufacturing", Sourcing Journal, September 05, 2014. o "Yen's Shifting Value Helps Japanese Carmakers Meet New Challenges", Knowledge@Wharton, April 01, 2014. o J. Endo, "Discussion paper of Nissan's Global Supply Chain Management Roles of Mother Plants and the Global Production Engineering Center in Japan, Revised February 16, 2015 (M. Cohen) o M. A. Cohen, S. Cui, R. Ernst, A. Huchzermeier, P. Kouvelis, H. L. Lee, H. Matsuo, Marc Steuber, A. Tsay "Benchmarking Global Production Sourcing Decisions: Where and Why Firms Offshore and Re-shore", , OID Working Paper, 2016.
4	**February 21** **4:30 pm -6:00 pm**	**Industry/Company Reports and Trip Preparation** Each group will present a brief report that provides background information concerning their assigned industry and company that we will be visiting. Topics that could be included in this report include: current competitive trends, technology

		developments affecting both the product and processes, the regulatory environment, etc.
E-0	**Sunday** **March 4**	Arrival in Germany 07.00 pm.: Opening Orientation Session
E-1	**Monday** **March 5**	09.00 a.m.: ABB - Heidelberg 2.00 p.m.: SEW Eurodrive – Graben-Neudorf
E-2	**Tuesday** **March 6**	09.00 a.m.: AUDI AG - Neckarsulm 2.00 p.m.: TRUMPF - Ditzingen
E-3	**Wednesday** **March 7**	09.00 a.m.: PORSCHE - Stuttgart 2.00 p.m.: BSH Hausgerate – Giengen an der Brenz
E-4	**Thursday** **March 8**	09.00 a.m.: KUKA Roboter - Augsburg 2.00 p.m.: RATIONAL – Landsberg am Lech
E-6	**Friday** **March 9**	09.00 a.m.: BMW - Munich 2.00 p.m.: RHODE & SCHWARZ - Munich 7.00 p.m. Farewell dinner - Munich
E-7	**Saturday** **March 10**	Depart

5	**March 21** **4:30 pm -6:00 pm**	**Case Discussion - Boeing: The Fight for Fasteners** We will discuss challenges associated with sourcing and supplier coordination encountered by Boeing in its 787 supply chain. Our focus will be on the procurment process and their interaction with suppliers of fasteners used in the assembly of the airplane. **Readings** o M. Lee and R. Anupindi, "Boeing: The Fight for Fasteners", by (U. of Michigan case 1-428-787, 2009) o C. S. Tang, and J. Zimmerman, "Mitigating New Product Development Risks – The Case of the Boeing 787 Dreamliner", Chapter 11 in M.S. Sodhi and C.S. Tang. *Managing Supply Chain Risk.* Springer. 2012
6	**March 28** **4:30 pm -6:00 pm**	**Logistics Systems and Distribution Strategy** This session will present insights derived from analytical models and current practices for materials management, cross-docking, and warehouse automation. We will focus on issues associated with risk pooling, coordination and technology **Readings** G. Cachon and C. Terwiesch, "Risk-Pooling Strategies to Reduce and Hedge Uncertainty", Chapter 15 "Matching Supply with Demand: An Introduction to Operations Management", 3rd edition, McGraw Hill
7	**April 4** **4:30 pm -9:00 pm** **Malvern PA**	**Corporate Visit to Amerisource Bergen distribution center in Bethlehem PA** Managers from the company will provide us with an overview of the distribution strategy at Ameriscource Bergen. We will then have a tour of their state-of-the-art distribution center. AmerisourceBergen
8	**April 20 09** **8:30 am – 4:00 pm**	**Corporate Visit to Janssen/Johnson & Johnson - large molecule facility** janssen PHARMACEUTICAL COMPANIES OF Johnson & Johnson

	(Friday) **Malvern PA**	
9	**April 25** **4:30 pm -6:00 pm**	**Post visit– Group Presentations & Debrief** Each group will have 10 minutes to present a report of our visit to their assigned company. The reports will be based on the group's observations and application of the plant tour assessment tool (i.e. "Read a Plant Fast" by Goodson). The reports will be shared with the full class. Your report should consist of a Power Point Deck and brief written report that summarizes your observations and insights. Length should be less than or equal to 500 words Each student will have the opportunity to comment on lessons learned from the course. We will review highlights of our company visits and discuss key lessons learned.

Case Assignments (Individual assignments - 25% of your overall grade)

First Case Assignment - Cisco

On March 11, 2011 a major earthquake struck Tohoku Japan. It had a devastating impact on global supply chains. Read the case, **Cisco SCRM in Action: 2011 Tohoku Earthquake,** by Ravi Anupindi (Tauber Institute, U. of Michigan case 1-429-284, 2013) and also read **Supply Chain Risk Management at Cisco: Response to H1N1** (U. of Michigan case 1-428-881), – read pages 2 through top of page 9 for a description of Cisco's approach to risk management. Prepare a 750 word paper *(plus or minus 5%; double-spaced; put word count and your name at the top)* that addresses the following questions:

1. *What are the major challenges facing Cisco as result of supply chain disruptions caused by the earthquake?*
2. *How should Cisco manage the crisis?*
3. *What metrics should be used by Cisco to support Supply Chain Risk Management? What data would you need to estimate these metrics? At what organizational level (plant, product, supply chain, business unit) would it be appropriate to apply these metrics? What may be typical uses of these metrics?*
4. *How should Cisco mitigate the impact of the disruption to their supply chain? What tradeoffs and risks should they consider and how are these related to the metrics? In particular, how can the TTR metric be used to develop a mitigation stratgy?*
5. *Comment on Cisco's SCRM process and how they dealt with the Tohoku crisis. What are its major strengths? Do you see any weaknesses?*

You should also read the following articles (posted on Canvas) as you prepare your answers to the case:

1. D. Reynolds, "Lessons From Tohoku", Wharton Magazine, January 26th, 2012,
2. D. Simchi Levi, "From Super Storms to Factory Fires: Managing Unpredictable Supply-Chain Disruptions", Harvard Business Review, Jan-Feb 2014.
3. A. Pollack and S. Lohr, "A Japanese Plant Struggles to Produce a Critical Auto Part", New York Times, April 2, 2011.
4. K@W-Wipro, "Process Resilience is Becoming a Business Imperative", K@W, April 2014.

Read the case and think about the assignment questions. We will discuss this case in class on **Jan. 31**. James Steele, who was director of Cisco's SCRM program at the time of the quake, has provided us with a report on how Cisco's SCRM system actually operated during the crisis. We will review his comments in our discussion of the case. Your paper is due on **Feb. 7**, posted on Canvas.

Second Case Assignment - Boeing

Boeing encountered an unusual supply chain problem during its 787 Dreamliner product development and manufacturing process, related to a small and unlikely source of difficulty, namely shortages and delays in the supply of fasteners needed to hold the airframe together. Read the case, **Boeing: The Fight for Fasteners,** by Moses Lee and Ravi Anupindi (Tauber Institute, U. of Michigan case 1-428-787, 2009) and prepare a 750 word paper *(plus or minus 5%; double-spaced; put word count and your name at the top)* that addresses the following questions:

1. *What were the causes of the fastener crisis at Boeing? How was the problem ignored for so long? What effect did the 787 Dreamliner project have on fastener supply?*

2. *What are the key elements of the Fastener Procurement Model (FPM)?*
3. *Describe the material, information, and financial flows between Boeing, fastener manufacturers (suppliers) and Tier-1 partners under FPM.*
4. *Evaluate FPM from the perspective of Boeing, fastener manufacturers, Tier-1 partners, and other stakeholders.*
5. *Critique the approach taken by Boeing in implementing FPM. What problems has Boeing encountered in rolling out the FPM?*
6. *What are some of the costs, benefits and risks associated with a "customer managed inventory" strategy such as FPM.*

You should also read the article by Chris Tang, and Josh Zimmerman, **Mitigating New Product Development Risks – The Case of the Boeing 787 Dreamliner**, Chapter 11 in M.S. Sodhi and C.S. Tang. *Managing Supply Chain Risk.* Springer. 2012, as you prepare your answers to the case.

Read the case and think about the assignment questions. We will discuss this case in class on **March 21**. Your paper, which includes answers to all 6 questions, is due on **March 28**, posted on Canvas.

Industry Background and Site Visit Report (Team assignment - 25% of your overall grade)

Each team will be assigned to a company that we will be visiting during the semester. Prior to the visit, the team will prepare and present or distribute a report that provides background information concerning their assigned industry and the company that we will be visiting. Topics that could be included in this report include: current competitive trends, technology developments affecting both the product and processes, the regulatory environment, etc. The team will then use the plant tour assessment tool (i.e. "Read a Plant Fast" by Goodson) to prepare a report based on the visit. The reports will be shared with the full class after the visits. Group formations and preferences are due on **January 31, 2017**. Please submit your group membership (3-4 members) and your first two choices for the background and post-visit reports. Each group will present their industry /company background report to the class in our pre-tour session on **Feb. 21**.

A session devoted to group reports based on observations from the the visits will be held on **April 20.** Each group will have 10 minutes to present a report of our visit to their assigned company. The reports will be based on the group's observations and application of the plant tour assessment tool (i.e. "Read a Plant Fast" by Goodson). The reports will be shared with the full class.

Your report should consist of a Power Point Deck and brief written report that summarizes your observations and insights. Length should be less than or equal to 500 words.

Groups will be assigned for the company visits from the following list:

- ABB
- AMERISOURCEBERGEN
- AUDI
- BMW
- BSH Hausgeräte
- JANSSEN/JOHNSON-JOHNSON
- KUKA
- PORSCHE
- RATIONAL

- RHODE & SCHWARZ
- SEW Eurodrive
- TRUMPF

Final reflection paper (Individual assignment - 25% of your overall grade)

This individual assignment is an opportunity to reflect on what you have learned in the course and through the site visits. It is worth 25% of your grade and is due on **May 9**, posted on Canvas. You should respond to the following questions.

1. *We have visited companies that are among the most successful in their industry. What are the most important factors, policies and/or decisions that have led to their success? Is there a common theme or strategy across these companies?*
2. *How have these companies succeeded, even though they are operating in an environment (Germany, the Netherlands) where wages and other costs are high?*
3. *What where the main causes for offshoring production in the US? How can US government policy i) strengthen the industrial sector and/or ii) encourage the re-shoring of manufacturing to the US? i.e. What advice would you give to President Trump?*

Our guideline for length is 750 words, roughly three pages, although this is a recommended, but not required, length; your paper can be either shorter or longer, as long as it captures your thoughtful reflections on your experience in the course.

Schedule: Wharton study tour, Germany
March 4 to 10, 2018

Date	Visit	Address	Transfer / distance	Hotel
Sunday March 4, 2018	**Arrival day**			Hilton Garden Inn The Squaire, Am Flughafe 60549 Frankfurt am Main
Monday March 5, 2018				Heidelberg:
07.30	Transfer to ABB	ABB Heidelberg Eppelheimer Str. 82	81 km 1,5 hour	
9.30-1.00	Visit of **ABB**	69123 Heidelberg		
1:00- 2.00	Transfer to SEW	SEW Eurodrive Ernst Blickle-Str. 1	40 km 60 min	
2.30-5.00	Visit of **SEW Eurodrive**	76676 Graben-Neudorf		
5.00	Transfer to hotel		44 km 60 min	Hotel Goldener Falke Hauptstraße 204 69117 Heidelberg Tel.: 06221 / 14330 www.goldener-falke-he

Date	Visit	Address	Transfer / distance	Hotel
Tuesday March 6, 2018				
7.30	Transfer to Neckarsulm	Audi AG NSU-Straße 1	66 km 1,5 hrs	
9.30 - 1.00	Visit of **Audi**	74172 Neckarsulm		
1.15 - 2.30	Transfer to Ditzingen	TRUMPF GmbH + Co. KG Johann-Maus-Str. 2	57 km 1 hour	
2.30 – 5.30	Visit of **TRUMPF**	71254 Ditzingen		Motel One Stuttgart Bad C
5.30	Transfer to Stuttgart		18 km 40 min.	Badstraße 20 70372 Stuttgart Tel: +49/711/218 402 00 stuttgart-badcannstatt@m one.com

Date	Visit	Address	Transfer / distance	Hotel
Wednesday March 7, 2018				
08.15	Transfer to Porsche		10 km 35 min	 City Hall of Augsburg
08:30 – 12.00	Visit of **Porsche**	Porsche AG Porscheplatz. 1 70435 Stuttgart		
12.00-3.00	Transfer to BSH Visit of **BSH Hausgeräte**	BSH Hausgeräte GmbH Robert-Bosch-Straße 100 89 an der Brenz	140 km 2 hrs	
3.00 – 6.00				Holiday Inn Express Aug Nagahama Allee 77 56153 Augsburg, Germa Office: +49 821 780 89 2
6.00-	Transfer to Augsburg		95 km 1,5 hrs.	http://www.holidayinne augsburg

Da	Visit	Address	Transfe	Hotel
Thursday March 8, 2018				
8.15	Transfer to KUKA	KUKA Roboter GmbH Zugspitzstraße 140	3 km 10 min	Sendlinger Tor, Munich
08.30-12.00	Visit of **KUKA**	86165 Augsburg		
12.00 – 1.00	Transfer to Landsberg	RATIONAL AG Iglinger Strasse 62 86899 Landsberg a.Lech	45 km 1 hrs.	
2.00-5.00	Visit of **Rational**			
5.00	Transfer to Munich		60 km 1,5 hrs	Holiday Inn Munich City C Hochstraße 3 81669 Munich Tel.: +49 89 4803-6006 www.hi-munich-city.de

Date	Visit	Address	Transfer / distance	Hotel
Friday March 9, 2018				
08:00	Transfer to BMW		9 km 30 min.	
09.00 – 1.00	Visit of **BMW**	BMW Am Olympiapark 80809 München		Munich City Hall
1.15	Transfer to			
2.00-5.00	Visit to **Rhode & Schwarz**	Rhode & Schwarz GmbH & Co. KG Mühldorfstraße 15 81671 München	11 km 30 min	
5.00 – 5.30	Transfer to hotel		2 km 10 min	
06.30	Departure to restaurant Franziskaner in der Au	Franziskaner in der Au Schornstraße 2 81669 München	850 m 15 min by foot	
7.00	Dinner			Holiday Inn Munich City Hochstraße 3 81669 Munich Tel.: +49 89 4803-6006 www.hi-munich-city.de
Saturday March 10, 2018 March 10-11 some rooms pre-booked		Individual Departure		Holiday Inn Munich City Hochstraße 3 81669 Munich Tel.: +49 89 4803-6006 www.hi-munich-city.de

Company Profiles
(Germany)

ABB

ABB is a pioneering technology leader in electrification products, robotics and motion, industrial automation and power grids serving customers in utilities, industry and transport & infrastructure globally. For more than four decades, ABB is writing the future of industrial digitalization. With more than 70 million devices connected through its installed base of more than 70,000 control systems across all customer segments, ABB is ideally positioned to benefit from the Energy and Fourth Industrial Revolution. With a heritage of more than 130 years, ABB operates in more than 100 countries with about 135,000 employees.

SEW-EURODRIVE

For more than 85 years, SEW-EURODRIVE has been setting the standard for drive technology in Germany and the world over. This is the beating heart of our globally successful family company. A great drive for innovation, huge production power and close proximity to our customers are what makes Germany such a strong location for us.

AUDI

With the Audi and Lamborghini brands, the Audi Group has long been one of the most successful car manufacturers in the premium and supercar segment. Since 2012, motorbikes from the traditional Italian brand Ducati have supplemented the range. Furthermore, the Audi Group also supplies other Volkswagen Group brands to customers via sales comp anies.

In Neckarsulm, Audi builds the Audi A4 Sedan, the A5 Cabriolet, the models in the A6 series including the RS 6 Avant, the A7 and RS 7 Sportback, as well as the A8 luxury Sedan. Neckarsulm is also home to Audi Sport GmbH – a fully owned subsidiary of AUDI AG. In addition to the high-performance models in the R8 series, which are exclusively built at the Neckarsulm plant, Audi Sport GmbH supplies customers with RS models, the sporty high-performance vehicles that represent the top models in the respective series. Furthermore, Audi Sport GmbH offers exclusive customisation options and high-quality lifestyle articles relating to the Audi brand. Audi Sport GmbH is also responsible for Audi Sport customer racing.

TRUMPF GmbH

TRUMPF is a high-tech company offering manufacturing solutions in the fields of machine tools, laser technology and electronics. We are driving the digital networking of the manufacturing industry through consultation, platform products and software products. As an independent family business, we think and act for the long term. Our creative drive guarantees that we are a continuous force in terms of innovation.

Porsche Zuffenhausen

In Zuffenhausen, the Porsche management is located and the first series production of the first series models were produced here. Today, the sports cars as well as all Porsche engines are built in Zuffenhausen. The series models are produced together with the racing versions on one assembly line, which is unique in the automotive industry.

BSH Hausgeräte GmbH

BSH Hausgeräte GmbH is one of the world's leading companies in the sector and the largest home appliance manufacturer in Europe. Driven by the individual customer needs of people all over the world, BSH aspires to continuously improve the quality of life for people with its outstanding brands, innovative products and top-class solutions.

Alongside the global brands Bosch and Siemens, as well as Gaggenau and Neff, the global brand portfolio includes the local brands Thermador, Balay, Profilo, Constructa, Pitsos, Coldex, Ufesa and Zelmer.

Founded in 1967 as a joint venture of Robert Bosch GmbH (Stuttgart) and Siemens AG (Munich), BSH has been 100 percent owned by Bosch Group since January 2015. Over its 50-year history, BSH has grown from a German exporter into the world's second-largest home appliance manufacturer. With more than 58,000 employees worldwide, BSH increased its revenue in 2016 to around 13.1 billion euros. BSH produces the entire range of modern home appliances at around 40 factories worldwide. The product portfolio ranges from cookers, ovens and extractor hoods, dishwashers, washers and dryers, fridges and freezers to small appliances such as vacuum cleaners, coffee machines or food processors. With Home Connect, BSH offers a cross-brand platform as the basis for a rapidly growing ecosystem of connected home appliances and customer-centric services for a special future experience in the kitchen.
41 production sites in Europe, the USA, Latin America and Asia, and a strong network of nearly 80 sales, production, and service companies in around 50 countries are a strong foundation for BSH’s customer-oriented business model.
The interplay of four Global Brands, eight Local Heroes, and two Label Brands guarantees a broad presence in a wide range of price segments and regions – making BSH the world’s number two in the appliance sector.

KUKA Roboter GmbH

As a pioneer in robotics and automation technology, KUKA Robotics is one of the leading manufacturers of robotic systems worldwide. KUKA offers a unique and wide range of industrial robots and robot systems, covering all common payload categories and robot types. The matching controllers and software for a variety of scenarios round out KUKA's product portfolio.

KUKA, together with its system partners, has automation solutions perfectly tailored to its customers' applications and industries – or can develop robotic systems for individual needs.

KUKA offers a comprehensive range of services, including collaborative planning, start-up and maintenance to help its customers realize the full potential of KUKA products. In case of urgency, KUKA's technical support is available 24 hours a day.

RATIONAL

Our primary objective has always been to offer the maximum possible benefit to our customers. Continued innovation has guaranteed our leading position by far in terms of technology and market share. Rapid growth has seen our worldwide market share increase to 54% and 70% in the UK. Our goal is to be the easiest catering equipment supplier to deal with.

Our dedicated development kitchen accommodates dealer, sales team training, RATIONAL CookingLive and Academy's. Investments include, a range of RATIONAL units of various specifications, allowing hands-on training and full presentation facilities with new media screens.

Chefs can test drive the combi oven at a RATIONAL CookingLive demonstration. Led by chefs who are experts in the latest combi oven technologies and techniques, participants can cook with the RATIONAL and sample the results.

BMW GROUP PLANT MUNICH

The BMW Group plant Munich is the parent BMW Group plant. It combines engineering excellence and innovative power with the passion of its approximately 7,800 employees from over 50 nations. The BMW Group Munich plant produces cars and engines since 1922.
BMW Plant Munich is the birthplace of what has since grown to become the BMW Group's global production network with 31 sites in 14 countries. For more than 90 years, the parent plant has combined supreme engineering and innovative strength with our people's passion for the BMW brand and the BMW Group. Given the complex plant structures and innovative production processes, the smooth cooperation of all production technologies in the most limited space is a major achievement in the global automotive industry. After all, the plant regards itself as an integral part of society, assumes social responsibility and acts as a reliable partner of the region. As the global leadplant for the BMW 3 Series, Plant Munich has a special responsibility. To ensure the plant's long-term competitiveness, the BMW Group is investing a total of over 700 million euros in the site's innovative and sustainable production structures by 2018. The expansion of the body shop and the assembly as well as the construction of a resource-friendly paint shop are the perfect means to prepare the plant for a successful future.

ROHDE & SCHWARZ

Founded more than 80 years ago, Rohde & Schwarz is one of the world's leading manufacturers of information and communications technology products for professional users. Initially focusing on Radio Frequency (RF engineering and RF applications in test and measurement, radiocommunications and broadcasting, the company has continually expanded its fields of activity over the past decades. The digital transformation of technology, business and society into a networked world means that IP-based communications technology must be integrated into virtually all future products. To succeed, this requires extremely reliable, high data security. Rohde & Schwarz has embraced this field of activity and become one of Germany's largest manufacturers of IT security products.
The company has grouped its activities into several business fields in order to address the different markets with dedicated products and solutions. Rohde & Schwarz is a market-leading supplier in the mobile and wireless communications sector, offering a complete portfolio of T&M instruments and systems for the development, production and type testing of components and consumer devices as well as for setting up and monitoring mobile networks. Other important T&M markets include the automotive industry, aerospace and defense, all industrial electronics sectors, research and education.

In broadcast and media, Rohde & Schwarz addresses network operators, consumer electronics manufacturers, content providers and post production studios. The portfolio includes solutions for the entire transmission chain for audiovisual content – from camera output and terrestrial broadcasting to transmission via satellites and IP networks.

Cybersecurity has become a critical factor in our data-driven world. With its cybersecurity solutions, Rohde & Schwarz protects industry and government authorities against sabotage attacks and espionage. Not only data requires protection but also communities, states and individuals.

Consequently, measures to ensure homeland and external security are indispensable. Technologically leading secure communications and intelligence products create information superiority for the army, navy and air force. Rohde & Schwarz also offers specialized products for public safety and security authorities and organizations as well as for operators of critical infrastructures.

The Executive Board is composed of two members: Christian Leicher (Chairman) and Peter Riedel. As an independent, privately owned company, Rohde & Schwarz generates its growth from its own resources. Since the company does not have to think in terms of quarterly results, it can plan for the long term. On June 30, 2017, Rohde & Schwarz had approximately 10,500 employees, about 6000 of whom work in Germany. The group achieved a net revenue of approximately EUR 1.9 billion in the 2016/2017 fiscal year (July to June).

Company Profiles
(USA)

AmerisourceBergen

AmerisourceBergen is driving innovative partnerships with global manufacturers, providers and pharmacies to improve product access and efficiency throughout the healthcare supply chain. As part of the largest global generics purchasing organization, the leading specialty pharmaceutical services provider and the partner with more community and health system pharmacy relationships than any other—we're well positioned to help you capitalize on the dynamic changes in healthcare. From product commercialization and distribution to pharmacy, provider and manufacturer solutions, we're working with you every day to enhance patient care.

Janssen Pharmaceuticals

Who is Janssen? We're more than 30,000 people working hard to prevent, treat, cure and stop some of the most devastating and complex diseases of our time. From heart disease to HIV, Alzheimer's disease to cancer, we are committed to issues that touch everyone's lives.

Our mission is to transform individual lives and fundamentally change the way diseases are managed, interpreted, and prevented. We believe that challenging something is the best way to change it. So every day, in more than 150 countries, we bring cutting-edge science and the most creative minds in the industry together to think differently about diseases. We aim not only to innovate but also to empower people with the tools they need to make informed decisions and achieve the best possible results for their health.

We are looking at a future where the world of healthcare will be challenged by informed and empowered patients. We work for change that will improve access to medicines: the best available treatment at an affordable price. That's why we at Janssen strive to provide access to effective and affordable medicines and related healthcare services to the people who need.

Our focus areas are: Cardiovascular & Metabolism, Immunology, Infectious Diseases & Vaccines, Neuroscience and Oncology.

Optional Reading List

Note: Required readings are assigned for the lecture classes and the written assignments. All required readings will be posted on the course Canvas site. The list below is provided for reference. Students are encouraged to suggest current readings to be shared with the class.

Optional readings provide: 1) recent examples of reshoring /nearshoring and insourcing, as counter-trends to offshoring and outsourcing, in a variety of firms, industries, and countries, from the business press; 2) comprehensive reports by think-tanks, consulting firms, and government agencies on the economic and policy issues surrounding manufacturing in advanced economy countries such as the U.S. and Japan; 3) examples of research articles by faculty that convey their interests and provide context for this course. Suggested books are listed as well.

1) Recent examples of reshoring/nearshoring and insourcing from the business press
    a) "San Diego", Destination San Diego June 21, 2016.
    b) "Mexico's maquiladoras: Big maq attack", The Economist, Oct 26th, 2013.
    c) "Yen's Shifting Value Helps Japanese Carmakers Meet New Challenges", Knowledge@Wharton, April 01, 2014.
    d) "Reshoring Could Create 200,000 jobs over next decade", Financial Times, March 11, 2014.
    e) "UK Reshoring Faces Battle Industrialists War", Financial Times, January 24, 2014.
    f) "Few US Reshorings Go Ahead, Study Finds", Financial Times, September 7, 2014.
    g) "Reshoring Driven by Quality, Not Costs, Say UK Manufacturers", Financial Times, March 3, 2014.
    h) "The Top Supply Chain Disasters of All Time", Supply Chain Digest, D. Gilmore, May 7, 2009
    i) "Rebalancing Your Sourcing Strategy", McKinsey & Co., July 2014.
    j) A. Pollack and S. Lohr, "A Japanese Plant Struggles to Produce a Critical Auto Part", New York Times, April 278, 2011.
    k) "Japan Re-Emerges in the Aerospace Arena With a New Jet", H. Tabuchi, New York Times, April 9, 2013.
    l) "Requiem for a Dreamliner," James Surowiecki, *The New Yorker,* Feb. 4, 2013.
    m) "New Problems with Boeing 787," C. Drew and J. Mouawad, *NY Times*, Dec. 10, 2012.
    n) "Does America Really Need Manufacturing?" Gary P. Pisano and Willy C. Shih. *Harvard Business Review*, March 2012.

o) "Making It in America." Adam Davidson. *The Atlantic*, Jan-Feb. 2012.
p) "Winning the Race with Ever-Smarter Machines." Eric Brynjolfsson and Andrew McAfee. *Sloan Management Review*, Winter 2012.
q) "Offshoring, Onshoring, and the Rebirth of American Manufacturing." Michael Dolega. TD Economics, October 2012.
r) "In Shift of Jobs, Apple Will Make Some Macs in U.S.," C. Rampall and N. Wingfield, *NY Times*, Dec. 6, 2012.
s) "Flextronics CEO Sees Hope for U.S. Tech Production," J. Hagerty, *Wall Street Journal*, January 4, 2013.
t) "Honda Bolsters Its Production in North America," M. Ramsey, *Wall Street Journal*, Aug. 12, 2012.
u) "Toyota Says No Full Production Until Year's End," H. Tabuchi, *NY Times*, April 22, 2011.
v) "Japanese Manufacturers Help Save Chip Maker Renesas," H. Tabuchi, *NY Times*, December 10, 2012.
w) "Nissan to Invest $358 million in Thai Plant," *Yahoo News*, Nov. 9, 2012.
x) "Toshiba Turns Overseas to Reduce Procurement Costs," J. Osawa, *Wall Street Journal*, Aug. 16, 2010.
y) "Hitachi's Revival Isn't So Good for the City of Hitachi," *NY Times*, Dec. 28, 2012.
z) "China Loses Edge As World's Factory Floor," *Wall Street Journal,* Jan. 17, 2013.
aa) "Hedging China Risks, Japan Firms Turn to Booming Southeast Asia," S. Grudgings, *Reuters*, Nov. 5, 2012.
bb) "The Insourcing Boom," Charles Fishman, *The Atlantic,* Dec. 2012.
cc) "Mr. China Comes to America," James Fallows, *The Atlantic,* Dec. 2012.
dd) "Should Manufacturing Jobs Be 'Reshored' to the U.S.?" *Knowledge@Wharton*, Sept. 26, 2012.
ee) "American Industry Is On the Move," S. Mallaby, *Financial Times,* Jan. 8, 2013.

2) In-depth reports from think-tanks, consulting firms, governments
   a) "Manufacturing Footprints: Getting to Plant X", K. O'Marah and H. Lee, SCM World, 2013.
   b) "U.S. Manufacturing in International Perspective." Marc Levinson. Congressional Research Service, Feb. 2013.
   c) "U.S. Manufacturing Nears a Tipping Point," Boston Consulting Group, 2012.
   d) "Locating American Manufacturing: Trends in the Geography of Production," Brookings Institute, April 2012.
   e) "Trading myths: Addressing Misconceptions about Trade, Jobs, and Competitiveness," McKinsey Global Institute, May 2012.
   f) "Manufacturing the Future: The Next Era of Global Growth and Innovation," McKinsey Global Institute, November 2012.

g) "Manufacturing's New Era: A Conversation with Timken CEO James Griffith," McKinsey and Company, December 2012.
h) "Offshoring (Offshore Outsourcing) and Job Loss among U.S. Workers," Congressional Research Service, December 2012.
i) "Rebalancing your sourcing strategy Offshoring is alive and well, but it's no longer the only answer," by Conradin Merk, Jonathan Silver, and Fabio D. Torrisi, McKinsey and Company, July 2014.

3) Faculty-authored articles
a) "Winning in the Aftermarket," Morris A. Cohen, Narendra Agrawal, and Vipul Agrawal, *Harvard Business Review*, May 2006.
b) "Valuing Operational Flexibility under Exchange Rate Risk," Arnd Huchzermeier and Morris A. Cohen, *Operations Research*, Vol. 44, No. 1, Jan.-Feb. 1996.
c) "Lessons from Product Architecture Initiatives in the Global Automotive Industry," John Paul MacDuffie, *Global Strategy Journal*, Vol. 3, No. 1, 2013.
d) "Get Ready for the Complexity Revolution," John Paul MacDuffie and Takahiro Fujimoto, *Harvard Business Review*, June 2010.
e) "Collaboration in Supply Chains: With and Without Trust," John Paul MacDuffie and Susan Helper, chapter 10 in *The Corporation as a Collaborative Community*, Paul Adler and Charles Heckscher (editors), Oxford University Press, 2007.
f) "Supply Chain Competitiveness and Robustness: A Lesson from the 2011 Tohoku Earthquake," Takahiro Fujimoto, Discussion Paper #362, Manufacturing Management Research Center, University of Tokyo, September 2011.
g) H. Matsuo, "Implications of the Tohoku Earthquake for Toyota's Coordination Mechanism: Supply Chain disruption of Automotive Semiconductors", 2014.
h) "Creating the New Global Enterprise: Transportation Panel", summary from Wharton conference on US-Japanese Manufacturing Alliances, April 7-8, 1993.

4) Suggested Books
a) *Producing Prosperity: Why America Needs a Manufacturing Renaissance*. Gary P. Pisano and Willy C. Shih. Boston, MA: Harvard Business School Press.
b) *Race Against the Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy.* Eric Brynjolfsson and Andrew McAfee. Lexington: Digital Frontier Press, 2011.
c) *The New Industrial Revolution: Consumers, Globalization and the End of Mass Production*. Peter March. New Haven: Yale University Press, 2012.
