New Title:  
**SUSTAINABLE APPROACHES TO SYSTEM IMPROVEMENT**

Course #62360  
Lecture: Tu & Thurs, 9:30 – 10:45  
4349 Grainger Hall

**SYLLABUS**

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College of Engineering  
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Course Purpose and Content
Organizations employ a variety of improvement approaches to develop sustainable practices. This course examines innovative system improvement concepts and methodology that sustainably seek combinations of benefits from mission-central concerns such as quality, cost, response time, sourcing, quality of work life, brand, profit, market share, base of the pyramid, emission buildup and natural capital.

Course participants will learn sustainable value creation approaches to develop and simultaneously improve combinations of strategic performance objectives that satisfy multiple stakeholder and customer groups including targeted and indirect customers such as those at the base of the pyramid. System-wide improvement involves long-term and system thinking, leadership methods for both breakthrough and incremental improvement, analytical techniques for analyzing and changing systems, supply and customer chains, flow and cycle management, data-based participatory decision making, creativity techniques for innovative design of processes and systems, and methodology for employee involvement and empowerment. Pedagogy also addresses supportive organizational structures and policy issues.

Why sustainability? Due to population and consumption growth, and deterioration of natural capital and biodiversity, organizations face increasing demand and dwindling supplies of both non renewable (fossil fuels, metals and minerals) and renewable resources. Natural capital deterioration involves a complex web of factors including water, energy, climate, forests, oceans/fish, biodiversity, air, soils, the ozone layer, waste management, chemical build-up and desertification, all of which precipitate changes in organizational behavior. Furthermore, one billion people face hungry daily while 4.5 billion make less than 10 dollars per day and are mostly ignored by modern economic systems. New thinking and practices are necessary to integrate sustainable behavior into mission central activity. Sustainable practices include value creation opportunities in at least three critical areas: (1) sourcing resources renewably and through reuse to maintain natural capital and biodiversity, while dramatically reducing material, energy and water flows from natural sources throughout the value stream; (2) Managing all outputs to maintain their value throughout and beyond their lifecycle, ensuring that all outputs are entirely consumed safely, without increasing concentrations in the natural world, and (3) extending value creation principles to all stakeholders through approaches such as building capacity at the base through inverse innovation. Sustainability benefits include innovative services and products, access to new markets, increased market share, more resilient supply chains, dramatic cost reduction, improved employee satisfaction and retention, reduced risk, and enhanced creativity through innovative conceptualization, partnerships and collaboration.

The course discusses sustainable approaches to improvement in a wide variety of contexts, industries and ownership structures. Application includes

- integration, development and improvement of multiple performance objectives related to sustainability, quality, profitability, market growth, agility and response
time, community building, cost reduction, brand image, safety, quality of work life, customer satisfaction and value creation.

• multiple approaches that find leverage and develop improvement focus, including sociological methods such as social network analysis and communication theory, economic methods such as lean and cost-value analysis, scientific and system stratification approaches, theory of constraints and bottleneck analysis, flow and organizational structure analysis, innovative sustainability methods and their integration into mission-central activities, statistical analysis and systems thinking.

• different organizational and job functions including leaders, healthcare professionals, human resource managers, engineers, supply-chain managers, market researchers and product managers, sales, accounting, finance, production, and customer service

• varied industries such as service, manufacturing, health care, education, government, retail, banking, real estate, insurance, and publishing

• a variety of ownership structures, both public and private, profit and not-for-profit

Course Leaders
Professor Mark Finster and TA Ozgur Isil teach this course.

Contacting the course leaders
You may reach Professor Mark Finster at:
Office: 4250D Grainger Hall Office hours: T, Th: 12:30 – 1:30
Email: mfinster@wisc.edu and by appointment

Ozgur Isil may be contacted at:
Office: 4284a Grainger Hall Office hours: TBA
Email: isil@wisc.edu Phone: TBA

Biographical sketches
Mark P. Finster is a faculty member in the Graduate School of Business and the College of Engineering at the University of Wisconsin-Madison, and a contributing member in the Gaylord Nelson Institute for Environmental Studies, the Center for Quality and Productivity Improvement, the Energy Institute, the Consortium for Global Electronic Commerce, and the Center for Quick-Response Manufacturing. He also serves on the executive boards of the Center for Operations and Technology Management, the Global Studies program, and Manufacturing Systems Engineering.
Professor Finster has received the Gaumnitz Distinguished Faculty Award and the Mabel W. Chipman Excellence in Teaching Award and has helped improve the management systems of more than 150 businesses, government agencies, and nonprofit organizations from four continents.

Professor Finster received his Ph.D. from the University of Michigan and has served as a professor at Cornell and Johns Hopkins Universities. He is a five-time National Science Foundation (NSF) Scholar and chaired the NSF session that established a national research program in organizational excellence. He also serves on the Board of Directors at Home Savings Bank.

Teaching and research interests include sustainable strategy, design and improvement of complex systems in a wide variety of organizational frameworks, including health care, government, NGOs and for-profit missions.

Ozgur Isil is a Ph.D. student in the School of Business. He supports projects as the teaching assistant. Ozgur’s research involves development of profitable strategy and methodology for improving organizational sustainability. Ozgur has received a School of Business award for exemplary teaching.

Projects
During the semester, students will apply course material to projects involving sustainable improvement of a complex system that involves multiple organizational levels, multiple organizations and organizational functions, and multiple stakeholders, typically with conflicting demands. Projects may involve either a self-selected research topic that investigates an organization’s approach to sustainable improvement or may involve consultation with an organization. Consulting projects tend to require more time, greater commitment and more team meetings, but also provide more hands-on experience and a richer learning experience. We strongly recommend that students participate in teams to enhance their capability.

The course involves two seven-week projects. After seven weeks the project topic and project participants may or may not change. A project may begin anew during the second seven-week period, with some team members joining or leaving a project. Each seven week project will be graded as a separate project. Typically, a consulting project requires that team members commit to a 15 week project.

Research projects
In a research project, students select an topic of interest to them and research organizational best practices to sustainably improve a complex system related to that topic. We recommend that students select a topic that is central to their interests and degree. Typically projects take the perspective of a single organization although some choose to compare and contrast a group of organizations. Topics may couple a variety of organizational challenges around sustainability and improvement such as supply chain management, cost reduction, quality and productivity improvement, increased response time, sales/market growth, brand enhancement, profit
improvement, customer satisfaction and retention, employee satisfaction, community development, inverse innovation, or may involve student theses, dissertations or startups.

Examples of past study areas:
• Assessment of an organization’s efforts in an area of interest to the student, such as embedding sustainability into their core systems, quality, energy, water, operations, supply-chain management, customer management or health care
• Individual company or comparison of industry leaders, such as IBM, Johnson & Johnson, Google, Proctor and Gamble, GE, Unilever, Dell, HP, Intel, LG, Interfaces, Herman Miller, Patagonia, Electrolux, or Bolder Community Hospital in a topic of interest, such as sustainability, quality, operations, energy, reuse or reverse supply chains.
• Sustainable health care practices, sustainable buildings, green IT, green operations, industrial symbiosis, sustainable cities
• Development at the base of the pyramid, such as aids mitigation in the Democratic Republic of the Congo, or improvement of subsistence farmers in Peru through crop diversity, certified crop development and canopy restoration
• Innovation, such as development of a new business involving distributed solar for Florida Power and Light, or reuse systems for Vestas Turbines.
• Urban agriculture linked to community and economic development in a food desert, such as Growing Power in Milwaukee and The Plant in Chicago.
• Process design (reengineering) for processes that cut across several functions
• Adoption of new technology (such as information or communication technology) to customer-focused improvement (e.g., IBM’s Smarter Planet)
• Application of the management principles of sustainability and/or quality to a functional area, such as sales, marketing, accounting, finance, engineering, production, distribution, etc.
• System thinking and analysis in a system improvement process
• Culture/climate assessment and intervention during improvement
• Organizational learning and knowledge management
• Cutting edge practices in an organization, industry, country or system
• Employee involvement and empowerment in system improvement.
• Development of a new sustainable business.

Consulting projects
In a consultant project, students partner with leaders in a local organization and support their efforts to identify and solve strategic problems and improve complex systems. Typical consulting projects require greater commitment of time and resources and commitment to the whole semester. During the project, the student team of consultants supports organizational members in making key decisions by providing useful findings and insights. As consultants, team members typically spend several hours per week in the organization, often in small subgroups working concurrently with various stakeholders of the system. The following describes typical
activities for consultant projects. Actual activities are project dependent. Teams are not likely to engage all the activities described below.

Often the organization proposes a project or topic that serves as the focus. In some cases, the consulting team assists in identifying and selecting strategic improvement projects with promising benefits and strong chances for success.

After selecting a problem, issue or system to improve, the team may work with the organization to conduct contextual analysis and target important benefits that help the organization succeed in its strategic environment. Analysis also clarifies how the strategic environment shapes and constrains the design of potential system changes.

As consultants, the team may also assist the organization in targeting stakeholders and markets, and the benefits the project should deliver to those groups. Team members may help analyze market structures, determine key customer and stakeholder needs, and establish communication channels for learning about customers and stakeholders, and for managing that information.

After targeting strategic, environmental and stakeholder benefits, the team helps formulate measurable project goals. This usually entails development of a set of performance metrics that clarify and indicate how system outputs must be improved to deliver targeted benefits. Formulation also involves estimates of the amount of each benefit, estimates that are updated after further system analysis.

Student consultants may also work with the organization to identify both motivators and sales points for promoting the project, as well as potential project barriers. This entails stakeholder analysis to understand stakeholder perspectives and to clarify and quantify the amount of benefits that the organization intends to deliver to each stakeholder group. Throughout the project students typically help develop and manage a social network within the organization that will design and carry out the necessary changes.

The team then works with organizational leaders to identify and analyze key organizational systems, seeking to uncover the leverage and consensus areas within these systems that have the greatest impact on project objectives. This typically involves a variety of different analyses, such as an examination of sustainability impacts, stratification, value stream assessment, investigation of social networks, structure and flow analysis, application of systems and constraint theory and methodology, study of communication and information flow, reengineering, industrial ecology, life-cycle assessment, biomimicry, and so forth.

The team may also help the organization conduct causal relationship analysis, redesign key system components, develop a change plan, conduct pilot studies, implement and verify gains. They may work on making changes routine, on organizational learning and on future planning. In conclusion, the team provides a written report and PowerPoint presentation to the organization, typically to its senior management.
Project Reports
During a seven-week project, each team will submit and present two written reports. The first report, the project prospectus, describes the project, preliminary findings, team plans and, most importantly, verifies adequate sources of information. The second and final report presents the analysis, findings, system improvements and best practices. Each report should engage course concepts and methods, and should critique organizational efforts and suggest improvements.

Report 1: Project Prospectus
In the prospectus, describe project goals and plans, a contextual analysis, targeted benefits and beneficiaries, performance foci, and preliminary findings. Most importantly discuss key sources of information and verify that you have adequate resources to complete the project. In other words, investigate sources to ensure that you have adequate access to the information required to complete the project and present preliminary findings that confirm the significance of results possible. The prospectus should be no longer than 2.5 pages of text per team member. So a team of four members would submit a report with no more than 10 pages of text. Charts, graphs, tables and images DO NOT count as text. So we recommend that these images be used liberally to illustrate the importance of your topic and the significance of proposed findings.

The format above recommends content for the project prospectus. Introduce the team and describe its capabilities. Describe the project topic and associated complex system (organizational functions and levels of management involved). A flow and organizational map may be useful. Provide a few research questions or project goals that focus the team’s efforts and indicate your desired learning. Research questions typically investigate methods and best practices for sustainable improvement of a complex system. Research questions should not be answered with a simple ‘yes’ or ‘no’.

Explain why the project is important by summarizing relevant strategic and contextual issues that the project addresses, and by elucidating beneficiaries and the benefits expected. Describe the targeted system’s performance dimensions that deliver desired benefits. Identify potential sources of knowledge (books, research journal articles, web sources, sustainability reports, individuals, organizations) that the team will employ to answer the research questions and attain project goals. Reference sources with title, author, date, publisher and web addresses. Briefly describe the information that appears useful in each source. When available, attach electronic copies of sources such as sustainability reports and journal articles to your report.
Email the project prospectus to the professor and TA at least three days prior to your discussion meeting.

Report 2: Final report
The final report presents your findings and best practices through the lens of the course material. See the recommended content to the right.

Submit a written report and present to the class. The final report should be no longer than five pages of text per team member, well integrated into a single report. Graphs, tables, images and charts do not count as text.

The length of the class presentation will depend on the team size. The oral reports are due weeks seven and 15, the written reports weeks eight and 15. See the discussion timetable below.

Discussion
During discussion the TA will support the projects, review submitted project reports and brainstorming options.

<table>
<thead>
<tr>
<th>Week</th>
<th>Discussion Agenda</th>
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<tbody>
<tr>
<td>1 &amp; 2</td>
<td>Project formation</td>
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<tr>
<td>3 - 4</td>
<td>Project prospectus</td>
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<tr>
<td>5 - 6</td>
<td>Open discussion with teams</td>
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<tr>
<td>7</td>
<td>Final project presentations</td>
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<tr>
<td>8</td>
<td>Written reports due, open discussion regarding project options</td>
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<tr>
<td>9</td>
<td>Project formation, second project.</td>
</tr>
<tr>
<td>10 – 12</td>
<td>Project prospectus</td>
</tr>
<tr>
<td>13 - 14</td>
<td>Open discussion with project teams</td>
</tr>
<tr>
<td>15</td>
<td>Final project presentation.  Written reports due.</td>
</tr>
</tbody>
</table>

Weekly homework
Each Thursday, download homework from the course web space at Learn@UW. The homework requires application of course concepts & techniques to your project. Return completed homework Sunday via email to the TA, who will grade it.
 Grades
The criteria below determine grades. We assess both individual and team efforts.
- Attendance and participation: 100 points (10%)
- Homework: 300 points (30%)
- Project 1: 300 points (30%)
  (Prospectus: 100 points, final report: 200 points)
- Project 2: 300 points (30%)
  (Prospectus: 100 points, final report: 200 points)

Attendance policy: After two absences from lecture or after one absence from discussion, we deduct one percent (10 points) per absence from the final grade.

 Linking to course material
You may link to course material in many ways. In reports and presentations, we evaluate both the findings presented and the methodology/analysis used to generate those findings. The discussion below summarizes ways you can connect to the course material.

1) Demonstrate the value of findings and decisions to various stakeholders of the complex system (in a research project), or of the participating organization (in an organizational project). Quantify benefits.
2) Provide quality supporting evidence (either performance or perception data) that support the findings and decisions made.
3) Employ and describe course methodology to generate the findings.
4) Provide consistency in the logic that connects the findings (system’s thinking).

 Examples of ways to link to course material
We evaluate each area below for improving a system. These also provide a framework for presenting project findings. Since no team can or should conduct all these activities, the assessment description extends beyond any single project’s findings. The broad focus ensures every team receives credit for its project activities.

 Issue selection
- Collection of opportunities, inclusiveness of four managed directions, stakeholder voices represented during issue selection
- Criteria developed, appropriateness and thoroughness
- Analysis, logic and data to support issue selection

 Organization
- Teamwork, especially across diverse team members, relationships built, trust
- Involvement, the degree to which each team member is involved
- Team structure & process, appropriateness, efficiency & effectiveness
- Development of the needed resources and support network
- Effectiveness of communication within the team and with the organization when appropriate, communication of the team’s approach to improvement.
Formulation and measurement
- Strategic analysis of the benefits and linkage/relationships between benefits
  - Description of how project benefits support larger contextual (strategic) issues (three levels of systems)
  - Environmental and contextual impacts on solution development
- Market/stakeholder selection, needs and benefits and focus for project
- Purpose/theme statement, clarity of results needed to deliver benefits
- Measures and data that demonstrate progress toward the project purpose, development of the method for obtaining data, presentation of data
- Description and quantification of the amount of benefits delivered to each stakeholder group, inclusion of key stakeholder groups
- The promotional plan to communicate benefits to key stakeholder groups

Understanding the system to develop strategies
- Appropriateness, application and breath of approaches used to explore for system leverage
  - Communication, aggregation, structuring, sharing and synthesis of perspectives from key stakeholders; social relationship analysis, consensus building
  - System stratification
  - Flow and structure analysis
  - Bottleneck and constraint analysis
  - Cost-value impact analysis
  - Statistical analysis and evidence
  - Sustainability analysis
- Description and communication of possibilities considered for leverage
- Precision of key focus areas, explanation of reasons for the focus and determination of the amount of leverage
- Formulation of strategies that will accomplish the project theme/goals; measures and data that indicate how well each strategy works

Analysis and verification of causal relationships
- Identification of potential causal relationships
  - Involvement of key stakeholders and grass-roots employees
  - Aggregation, structuring, sharing and synthesis of findings
- Focus & verification
  - Evidence to verify critical relationships & impacts
  - Formulation, communication, buy-in and measurement of key relationships

Improvement Plans
- Design
  - Creation of design alternatives to address key relationships
  - Design development, development of criteria used for design evaluation
  - Design selection and testing
Pilot implementation and lessons learned

- Implementation/change plan development
  - Identification of barriers (resistance) and enablers (assistance)
  - Development of critical support processes
  - Action plan development with budget schedule and ownership
  - Development of system for monitoring implementation
  - Identification and addressing of stakeholder needs

Implementation

- Experimentation and pilot studies
- Full-scale ramp-up
- Analysis and verification of results, data that describes:
  - Effectiveness of implementation
  - Effectiveness of design
  - Unintended consequences
  - Key causal relationships that have been changed
  - Effectiveness of strategies
- Impact on problem objectives
  - Amount of benefits delivered
  - Customer and market impact
  - Larger contextual (strategic) impact
- Responses to the issues discovered above

Building routine after the implementation

- Making improvements routine
  - Establishing the new focus
  - Developing ownership of key focus points
  - Aligning focus
  - Developing linkage relationships
- Establishing creative and evolutionary mechanisms, controls & standards

Closing the project

- Future plans – connecting the current project to the future
- Learning analysis
  - Learning to share with the organization
    - Project-related learning
    - Other organizational opportunities
  - Learning to share with team members
    - Learning about improvement
    - Other learning opportunities
- Celebration of the project, closing ritual, party!
### Schedule
The schedule describes planned weekly topics. Course topics and the schedule remain flexible and change with student interests.

<table>
<thead>
<tr>
<th>Week</th>
<th>Detailed Topics</th>
<th>Text Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Syllabus overview, introductions; projects; approaches to improvement: defect reduction &amp; six/lean/green sigma, quality improvement approaches, resource-based improvement, environmental &amp; ecological economics, sustainability; evolution of traditional improvement approaches, benefits &amp; limitations, improvement approaches in small organizations, classic mass-production approaches to improvement, functional approaches to improvement</td>
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<tr>
<td>2</td>
<td>Cross-functional improvement approaches, forces driving sustainability, natural capital and biodiversity as drivers to organizational risk and opportunity, forests and fish, sourcing &amp; life-cycle management, traceability, visibility &amp; transparency, technology innovation, leveraging sustainability for competitive advantage, regulations, market changes, eco system service deterioration, water risk &amp; opportunity</td>
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<tr>
<td>3</td>
<td>Virtual water, population growth &amp; resource consumption, the seminal equation of industrial ecology, metrics, technology development, metals, minerals &amp; biomass, cycle management, material, water &amp; energy intensity of value creation, footprints &amp; rucksacks that guide improvement, organizational responses and metrics, buildup of concentrations, toxins &amp; health care issues, factory farms, EU directives, Dodd-Frank</td>
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<tr>
<td>4</td>
<td>Economic, political and scientific pressures for sustainability, garbage buildup, PVC &amp; plastics, automotive &amp; electronic waste, landfills, incineration &amp; composting, organizational responses to gain competitive advantage, carbon reduction &amp; financial considerations, related organizational responses to risk &amp; opportunities, base of the pyramid, inverse innovation, microfinance, sustainability approaches, definitions &amp; metrics</td>
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<tr>
<td>5</td>
<td>Key concepts: Approaches to long term thinking; flow, process &amp; cycle analysis &amp; management, key decision points &amp; functional interfaces, deployment charts, life-cycle analysis, product design, supporting infrastructure</td>
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<td></td>
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<td>1, 2, 3, 4, 5</td>
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<tr>
<td>Week</td>
<td>Detailed Topics</td>
<td>Text Chapter</td>
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<tr>
<td>6</td>
<td>Customer &amp; stakeholder value creation, critical quality &amp; environmental characteristics, continual improvement, natural pathways to improvement, infrastructure for improvement; importance of focus; Toyota’s Eco-Vas, fear of change, pathways to inclusion, involvement and empowerment, crowdsourcing, Google’s 20% program, IBM’s crowdsourcing of Smarter Planet, crowdsourcing apps; crowd sourced business planning; Walmart’s sustainability 360, organization approaches to system thinking and sustainability, drivers of social capital &amp; relationship management, nested systems model, diversity &amp; innovation capability, I-pencil, building infrastructure for collaboration, rewards &amp; compensation; organizing for change; knowledge management; learning systems and the scientific method, experimentation, Budweiser’s learning system; study of variation; data-based decision making, IBM’s Smarter Planet’s instrumentation, interconnection &amp; intelligence systems; building management; interconnected harbor, restaurant, aquaculture, energy, tourism, &amp; commercial fishing management; variation, data use during improvement, leverage – energy efficiency cost abatement curve, intro to special/common causes</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Project presentations</td>
<td></td>
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<tr>
<td>7 - 8</td>
<td>Special &amp; common causes, decision making &amp; consequences, inventory management, budgeting; improvement projects, approaches &amp; processes, accelerated improvement, Ford’s Rapid system, GE treasure hunts, six sigma, reengineering, green sigma, lean sigma, VW’s sustainability strategy; phased improvement, improvement of complex systems, overview of improvement activities, selection &amp; organization, formulation, A-3 thinking, strategy development, cause analysis, system design &amp; improvement, assessment of system progress; selecting issues for improvement, designing change networks, processes &amp; stakeholder involvement groups, managing issue collection, criteria for benefits &amp; changes for success, evaluation tools, case – SNV &amp; biogas services in Africa – market selection &amp; infrastructure development</td>
<td>6, 7, 8</td>
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<tr>
<td>9</td>
<td>Objectives formulation, identifying mission-central benefits, P&amp;G example, UW Hospital Ultrasound A3 example, formulation for sustainability, sustainability diamond of benefits, P&amp;G assessment, Growing Power example, architecture and building examples, contextual analysis &amp; identification of strategic drivers, strategic inferences &amp; benefit analysis, system analysis tool – Ackoff’s nested system analysis &amp; example – HIV mitigation in the DRC; system thinking tool – goal hierarchy analysis &amp; example – Sustain Dane, system thinking tool – value stream &amp; core competency analysis and example – Tandem Press</td>
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<tr>
<td>10</td>
<td>Formulate the theme and measures of progress, example - carbon formulation and measurement, Climate Registry &amp; Carbon Disclosure Project metrics, reasons for carbon disclosure, scopes, carbon chasm, example – Baxter Health Care climate formulation and strategy, methods for evaluating themes: affinity method, spreadsheet analysis, sequencing, radar charts, Green Supplier Network metrics, measurement over time, Navitus, Wisconsin State Lab of Hygiene, clinic example, six sigma metrics, qualitative goals, Sustain Dane example, Walmart sustainability example, supply chain sustainability assessment index &amp; questions, scoring, impact on suppliers, Walmart assessment, Ernst &amp; Young’s Integrated Reporting, describe benefits to key stakeholders, examples – fundraising, corporation examples of amount of benefits from carbon reduction, Walmart &amp; RFID benefits, Navitus, Tandem Press, forcefield analysis.</td>
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<td>11</td>
<td>Stakeholder benefit analysis &amp; flows, stakeholder identification &amp; prioritization, approaches to understanding stakeholders – demographics, purpose &amp; use analysis, primary &amp; secondary benefits, channel analysis, psychographic &amp; lifestyle analysis; loyal, high-volume, lead &amp; strategic customers, benefit analysis, converting products to services, customer profiles, approaches to gather customer information, customer contact analysis, interviews, surveys, focus groups, observation, appreciative inquiry, dialogue, processing customer information, prioritizing stakeholder benefits</td>
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<tr>
<td>12</td>
<td>Finding high-impact focus - system leverage and analysis; determining the amount of leverage; leverage analysis for greenhouse gas &amp; water reduction at Unilever &amp; Apple, leverage for healthcare at GE’s Healthymagination, leverage for water reduction at Miller-Coors, formulating &amp; measuring strategies; classical approaches to leverage, communication, sociological, political, human resource and involvement approaches to leverage, social networks, 4W technique; scientific, expert and system stratification approaches to leverage, double stratification, Unilever’s product approach to leverage for waste, water &amp; GHG reduction, U.S. Water Policy leverage analysis; Office Depot leverage analysis for sustainability; flow and structural approaches to leverage, health care leverage with hospitalists, leverage at Lexus, IBM Credit, Walmart’s generative organizational structure for sustainability; constraint and bottleneck approaches to leverage, leverage at Chicago’s Com Edison energy reduction program, removing, widening &amp; circumventing bottlenecks; simplicity &amp; complexity, cost-value analysis &amp; approaches to leverage such as activity based accounting, lean analysis &amp; value engineering that quantify cost benefits, example: food life cycles</td>
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<tr>
<td>14, 15</td>
<td>Sustainable approaches to leverage, backcasting from a sustainable vision, solution multipliers, assessing an organization’s sustainability approach, improving wind power, sourcing, leverage for closing water gaps, hydrological cycles, leverage for IBM’s Smarter Water, water &amp; supply chains, Unilever’s supply chain water focus, water assessment tools, Kellogg’s water leverage, Adidas’s water leverage, water quality leverage, Grohe’s water strategy, water for competitive advantage, water innovations, water branding &amp; marketing strategies, use of water sustainability to enter difficult markets, water education as a competitive strategy, development of new marketing channels through water reduction activities, demand- &amp; supply-side mechanisms &amp; costs, regional differences in water leverage: India’s water cost abatement curve, drip irrigation at the base, Nestlé’s water strategies, community partnerships &amp; learning systems, Coca Cola’s water strategy in India: successes &amp; failures, Coca Cola’s Australia strategy – contrasting contextual drivers, Miller-Coors water strategies, Brazil, South Africa water scenarios, water payback curve, other key leverage factors: scalability, local supply chain capability, management complexity, up-front transaction costs, China; consumability of outputs; sourcing strategies: supplier involvement, fuel efficiencies, logistics efficiencies, sea transportation challenges, packaging, Coca Cola Packaging strategies, certification, traceability, transparency; sustainable design, dematerialization strategies, transmaterialization strategies, Ehrenfeld’s dematerialization strategies: system redesign, simplicity, turning products to services, BMW &amp; car sharing, urban traffic reduction, Daimler’s &amp; Zipcar’s car sharing strategies, remanufacturing, turning products to services, focus on customer &amp; supply chains, Walmart’s sustainability objectives &amp; strategies: products, jewelry &amp; textiles, Patagonia; biological business models, cycle management, technological &amp; biological cycles, Nintendo’s strategies, Coca Cola’s plant based packaging; Sony, Nokia &amp; Sprint reuse strategies; Teijin, Sears, Patagonia, Bagir &amp; Design Tex approaches to reuse, H&amp;M clothing reuse, automotive reuse, Munich Zoo, urban agriculture in Chicago, industrial ecology, Kalundborg’s industrial symbiosis; biomimicry: form, function &amp; system biomimic design; supply &amp; customer management, distributed &amp; centralized concentrated &amp; cellular solar power, locality, Desertec, Heliotrope, Freiburg, technology &amp; innovation, wind technologies, German &amp; Chinese strategies, electric cars, life-cycle design, base of the pyramid</td>
<td></td>
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<tr>
<td>15</td>
<td>Presentations</td>
<td>12</td>
</tr>
</tbody>
</table>
Textbook and Background Readings

Required
Electronic versions of the textbook chapters may be downloaded from the course web site at Learn@UW. They provide the primary course readings.

Finster, Mark P. 2013. Sustainable Approaches to System Improvement: Value Creation Perspectives.

Background readings
Background readings are references that support course material. Additional references will be posted on the course website according to student interests.


Diamond, Jared, 2009. What’s your consumption factor?


ISO 14001 Environmental Management System Self Assessment Checklist


McKinsey 2009. Charting our water future


Salazar, Dennis, 2008. Sustainable Packaging, the Housewares Show, the 5 Stages of Grief.


Additional references:


