



Teaching Sustainable Operations Management at BGI and PWC

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Teaching Environmental Sustainability Through a New MBA Education Paradigm

Bainbridge Island Graduate Institute

- “The first Graduate School of Sustainable Business” (<http://www.bgiedu.org>)
- There are many ways to change business, government regulation, consumer choice, socially responsible investment, etc. Most neglected of the ways is the choices people make at work to serve their values.
- Traditional business schools train students to focus on making money, not serving their other values. Graduates leave with a much narrower sense of responsibility than they came in with.
- ***The market for people who need a business education, but want their work to serve their values is large and underserved.***



The BGI mission

- Prepare leaders to achieve socially and environmentally responsible business success.
- Partner with other schools to help them incorporate environmental and social responsibility in their curriculum.



Presidio World College

MBA in Sustainable Management

Our Goal: Equip graduates with the **skills** and **knowledge** of a traditional program that will enable them to **understand** and **influence** business strategy and culture, as well as provide “new ways of thinking and acting” about how enterprises large and small can add economic, social and environmental value in a sustainable and profitable way.

Striking Features of the BGI and PWC MBA Programs

- The most common attribute among the Cohort 1 students is their values (triple bottom line perspective)
 - Variety of undergraduate and work backgrounds
 - Average age of PWC entering students – 30-35

What is Operations Management?

- Operations Management (OM) is defined as the design, operation, and improvement of the systems that create and deliver the firm's primary products and services.

Learning Objectives

1. Develop ways of thinking about how the organization gets its job done. Become familiar with the processes and tools involved. Core issues are quality, cost, throughput, flexibility, cycle time, reliability, resource efficiency, uncertainty, social contribution & environmental impact.
2. Develop a comfort level with the quantitative tools of operations management (OM).
3. Develop a familiarity with ways of thinking, vocabulary, principles, and paradigms taught in traditional OM curricula.
4. Understand the dynamics and tradeoffs involved in optimizing the firm's supply chain.
5. Become familiar with the basic principles and tools of industrial ecology.
6. Learn how to decipher and create processes, systems and flows that contribute to the larger industrial and biological ecology within which the organization operates.

A New Field: Industrial Ecology

- The means by which humanity can deliberately approach and maintain sustainability, given continued *economic, cultural, and technological evolution*.
- An industrial system needs to be viewed not in isolation from its surrounding systems, but in concert with them.
- This is a systems view. One seeks to optimize the total materials cycle from virgin material, to finished material, to component, to product, to obsolete product, and to ultimate disposal. Factors to be optimized include resources, energy, and capital.
- Principles: (1) Close material loops, (2) Don't discard waste that has energy content, (3) Eliminate materials (e.g., heavy metals) that upset system, and (4) Deliver function with fewer materials.*

*Graedel, Thomas, and Brad Allenby, *Industrial Ecology*, Second Edition, 2003.

New Performance Measurement Tools: The Life Cycle Assessment (LCA)

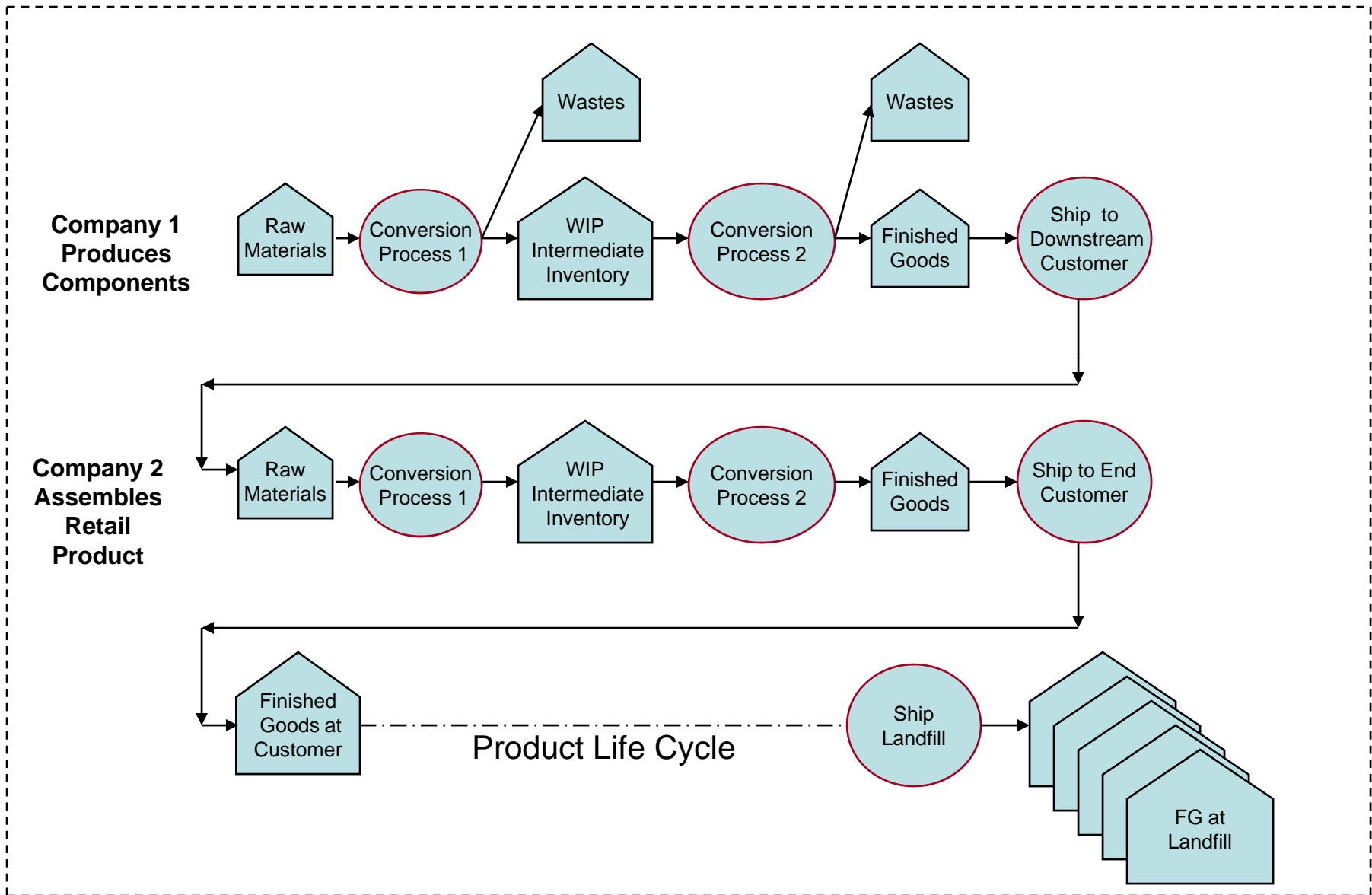
- An objective process to evaluate the environmental burdens associated with a product, process, or activity by identifying and quantifying energy, material usage, and environmental releases, to assess the impact of those uses and releases on the environment, and to evaluate and implement opportunities to effect environmental improvements.
- The assessment includes the entire life cycle of the product, process or activity, encompassing extracting and processing raw materials; manufacturing, transportation, and distribution; use/reuse/maintenance; recycling; and final disposal.

The Society of Environmental Toxicology and Chemistry

Teaching Approach

- Select good current textbook to introduce principles of traditional OM
- Add readings from new journals such as the Journal of Industrial Ecology

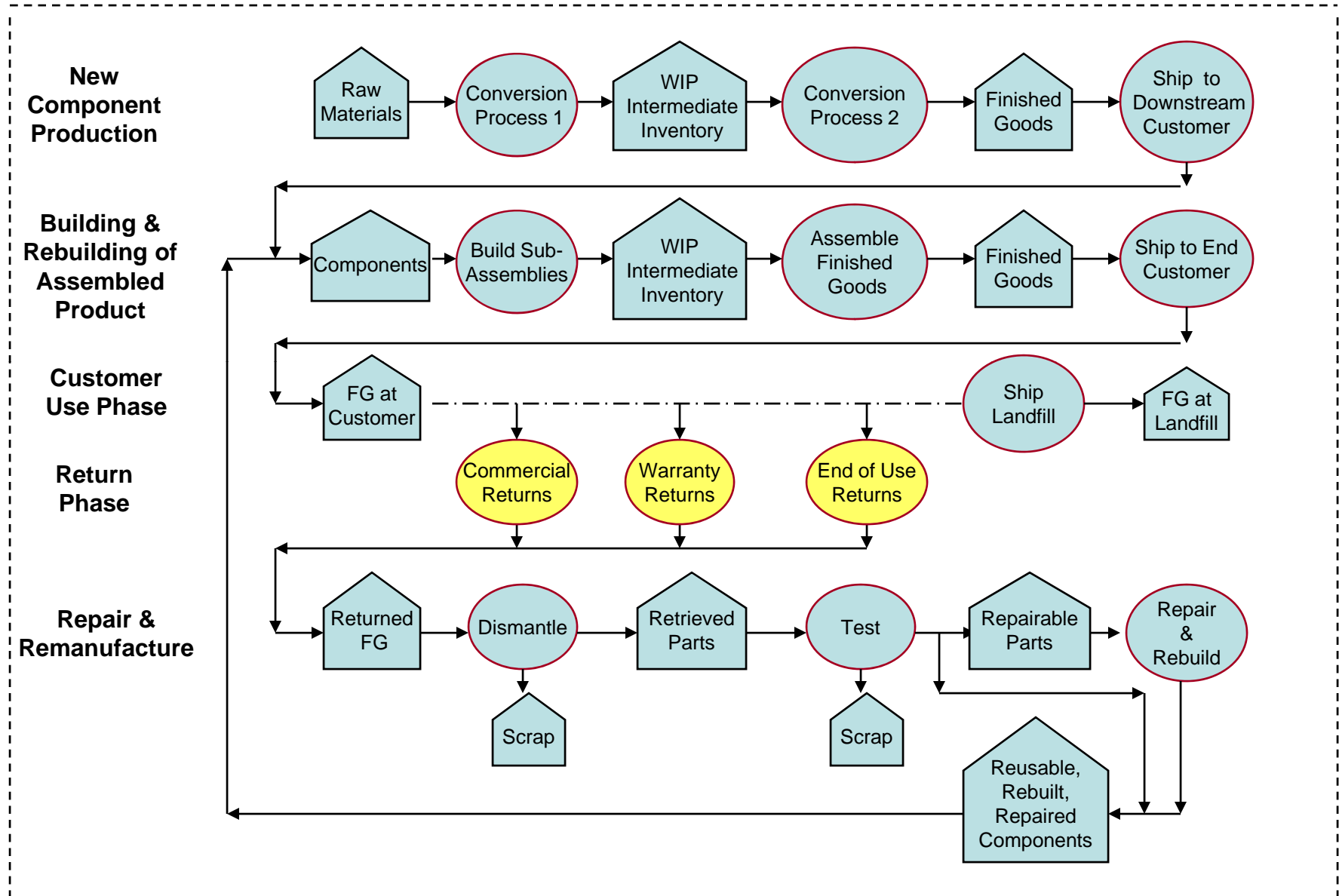
Traditional OM in the Extended Linear Supply Chain



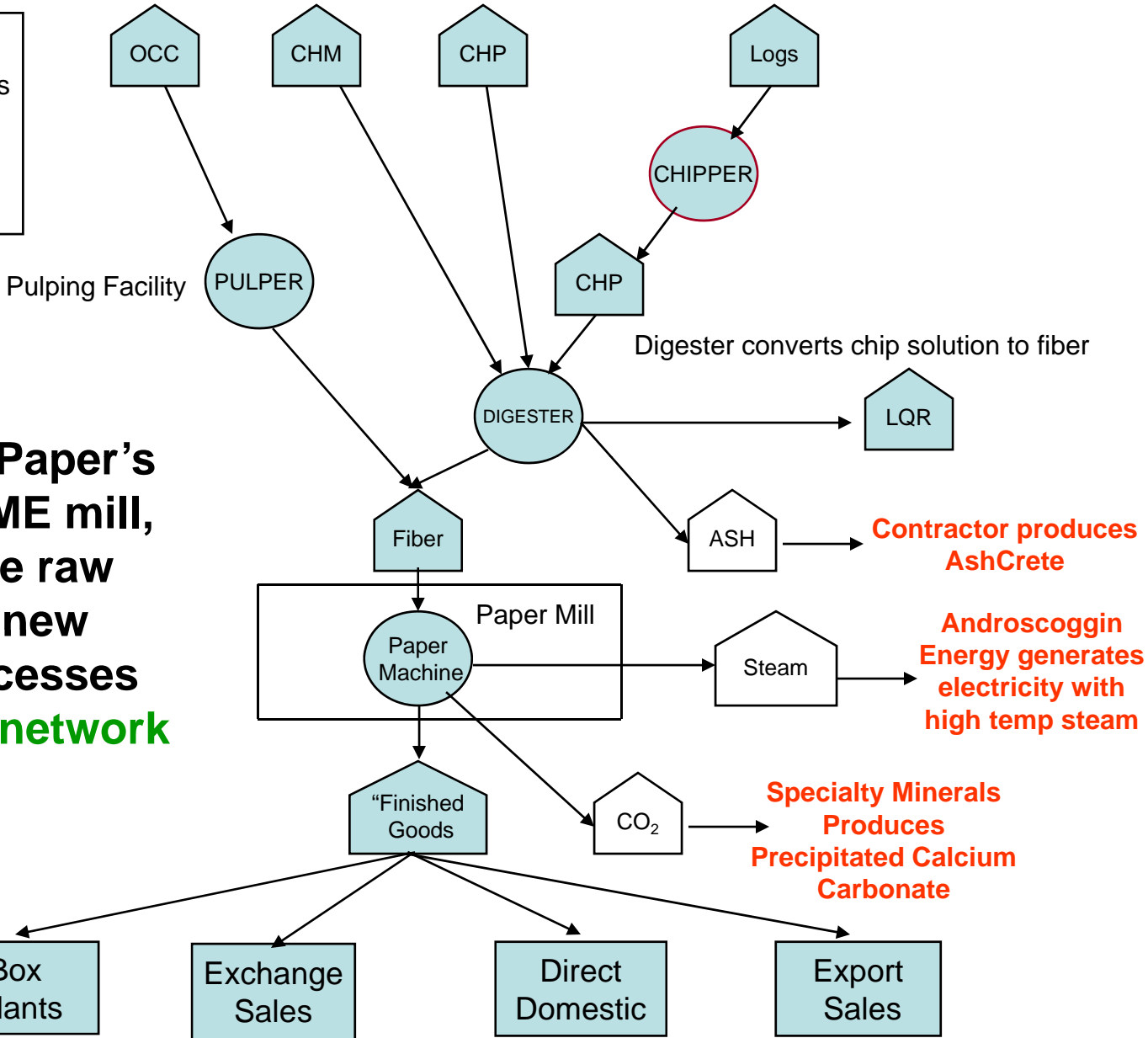
The challenge (1)

- Finding time to teach the discipline of the traditional + the new total systems level
- Finding tangible examples of how OM takes on new dimensions in a sustainable business, e.g.,
 - Extending OM into the repair and rebuild phase of a product life cycle
 - OM in an eco-industrial park (a network of supply chains where waste becomes a raw material)

Extended Supply Chain With Closed Loops



Legend
 OCC - Old Corrugated Cartons
 CHM - Chemicals
 LQR - Black liquor
 CHP - Wood chips
 FBR - Fiber



**At International Paper's
 Androscoggin, ME mill,
 wastes became raw
 materials for new
 production processes
 a production network**

Customers

Examples of OM in a Profitably Sustainable Business

- At Ricoh, OM now extends into facilities for repair and rebuilding of products at “end of life”
 - No part of a Ricoh ever ends up in a landfill
- Closed loop supply chains at HP and Bosch Tools

Implementing Industrial Ecology Principles A Case Study

- Xerox Europe
 - Waste-free products through product stewardship throughout whole life cycle
 - End-of-life equipment take-back
 - Quality manufacturing process
 - Design for Environment (DFE) supports product recovery
 - Reprocessed reusable components & reused as virgin parts
 - 2000 parts reduced to 250 to simplify disassembly/re-use
 - Bonus – hired and additional 400 people
 - 1997 Net Savings of over \$80M
 - Potential disposal cost converted to revenue stream
 - Improved environmental performance, customer satisfaction, and financial performance

Need Teaching Case Studies

- OM is especially challenging since there are not many they become dated quickly
- Companies who are leading the way in these areas can help by sponsoring the writing of teaching case studies around their decision making experience

What else can Profitably Sustainable Companies Do?

- Sponsor summer interns from BGI and PWC



Costa Rican Rainforest, March 2003