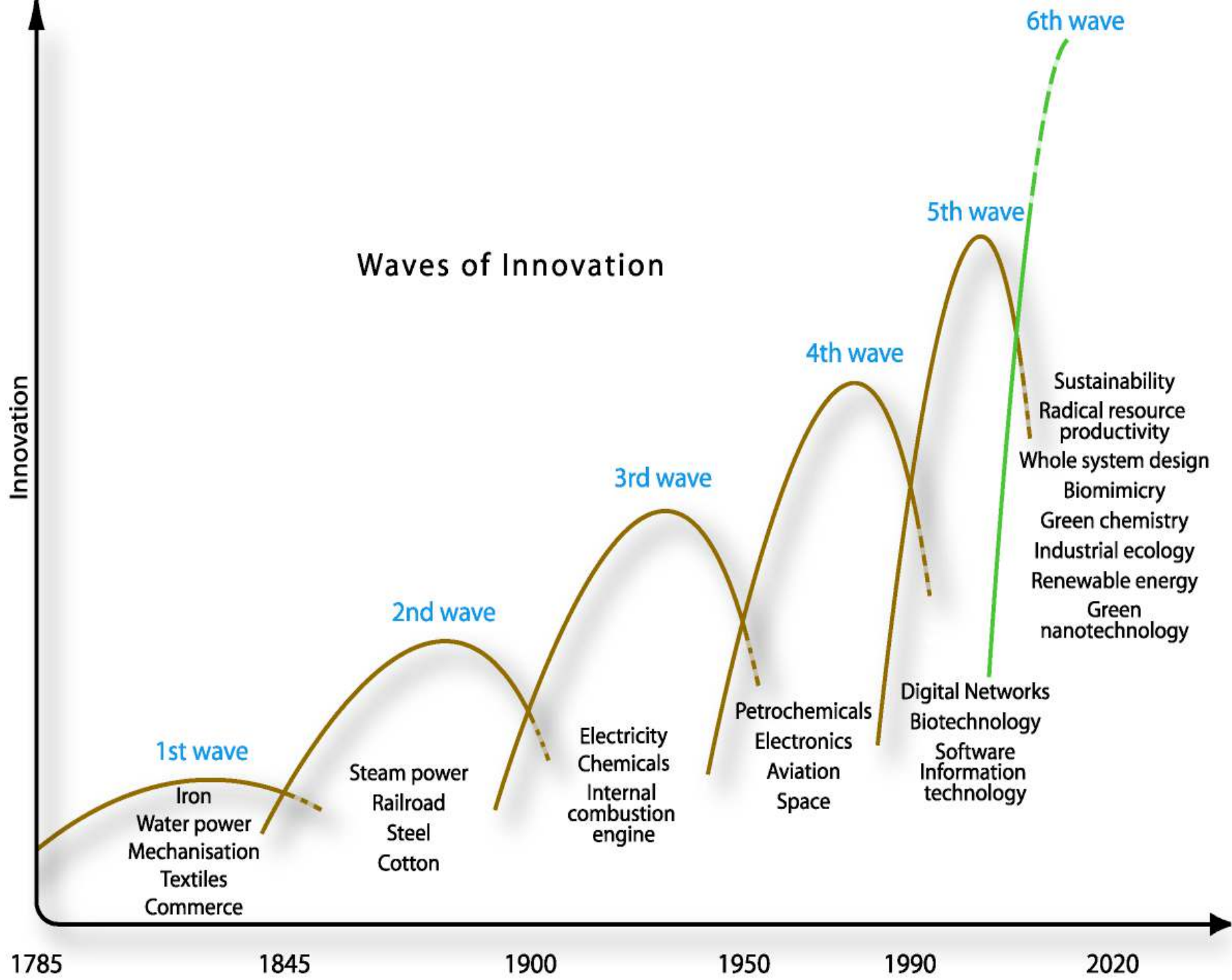


Natural Capitalism Solutions

ELDORADO SPRINGS, COLORADO



ENTREPRENEURING THE SOLUTIONS
KEY TO COMPETITIVENESS AND PROSPERITY



“The Integrated Bottom Line”

The

Business Case for Sustainability Enhancing Shareholder Value:

- Financial performance
 - Reduced cost, enhanced profitability
- Reduction of risk
 - Franchise to operate, legal liabilities
- Attraction and retention of best talent
- Ability to drive innovation
- Labor productivity - increased worker health
- Market share - enhanced brand equity
 - Product differentiation
- Supply chain and stakeholder management
- “First to the future” = the billionaires of the future

Sustainability pays

- It is no accident that the companies in the Dow Jones sustainability Index outperform the general market
- Or that the Domini Index outperforms the Standards and Poors Index
- Or that regions that protect their environment outperform those that do not

PWC 2002 Report: 75% of Fortune 1000 are “advancing sustainable practices in the workplace”

150 largest companies in the world have “sustainability officer” at VP level or higher

89% of Fortune 1000 think sustainability will be a more significant issue in 5 years

CEO Survey : going beyond compliance gives companies:

- Enhanced reputation: 90%
- Competitive advantages: 75%
- Cost savings: 73%

“Our central message is that... managers must start to recognise environmental improvement as an **economic and competitive opportunity**.. it is time to build on the underlying economic logic that links the environment, resource productivity, innovation, and competitiveness”.

Professor Michael Porter
Harvard Business School
Author of Competitive Advantage of Nations

Natural Capitalism: A competitive advantage:

1. Buy time by radically increasing resource productivity
2. Design for sustainability: Biomimicry: closed loops, no waste, no toxicity
3. Manage for restoration of human and natural capital

Ensure no net loss of human or natural capital

Whole systems thinking

Successful businesses in the new era of natural capitalism will realize that solutions lie in understanding the interconnectedness of problems, not in confronting them in isolation

A sustainable company:

Is restorative of all forms of capital: human and natural as well as financial and manufactured

Enhances shareholder value by using resources efficiently, striving for zero waste

Conducts business in accord with natural principles - biomimicry

Operates in partnership with the stakeholders impacted by its activities

The services of whole systems:

Facilitate company-wide communications

Discover/exploit synergies

Avoid missing piece dysfunction

Reduce unintended consequences

Avoid split incentives

Avoid cream-skimming



Path to Sustainability

How do you actually
bring sustainability
to a company?

Epiphany? Ray Anderson

Crisis? Shell, Citi

How about we lay out a
strategy? A roadmap?

Frameworks vs. tools

Frameworks:

Natural Capitalism

Natural Step

Ecological Economics

Cradle to Cradle

Holistic

Management

Tools:

Dream team

EMS/ ISO/ clean production

DFE/ green design

Life cycle accounting

Lean manufacturing

Ecological Footprinting

Factor 4, Factor 10

Incentives/ regulations

Industrial ecology

Climate neutral - CCX

The Sustainability Helix

A double helix is made of two strands.



In the Sustainability Helix, the first rail ensures that an organization's

- Mission
- Vision
- Values
- Products
- Services

lead towards sustainability

The second strand contains an organization's measurements

- Accounting
- Finance
- The Integrated Bottom Line

The second strand is how an organization measures the success of its Integrated Bottom Line

Sustainable Business
Achievement Rating system
enables a company to rank its
performance

Sustainable Business Achievement Rating System

Governance and management

Workplace

Community

Marketplace

Environment

In any organization

- The two strands are linked together strong fibers:
 - Governance and Management
 - Operations and Facilities
 - Design & Process Innovation
 - Human Resources & Corporate Culture
 - Marketing & Communication
 - Partnerships & Stakeholder Engagement

Like this:

Mission, Vision, Values, Products, Services

Measurement, Finance, Accounting

- Governance and Management
- Operations and Facilities
- Design and Process Innovation
- Human Resources and Corporate Culture
- Marketing and Communications
- Partnerships and Stakeholder Engagement

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Each turn offers a different perspective,
a point at which to develop a new
understanding of what sustainability
can offer to your organization:



Each turn of the spiral offers a point at which an organization can choose to become more sustainable:

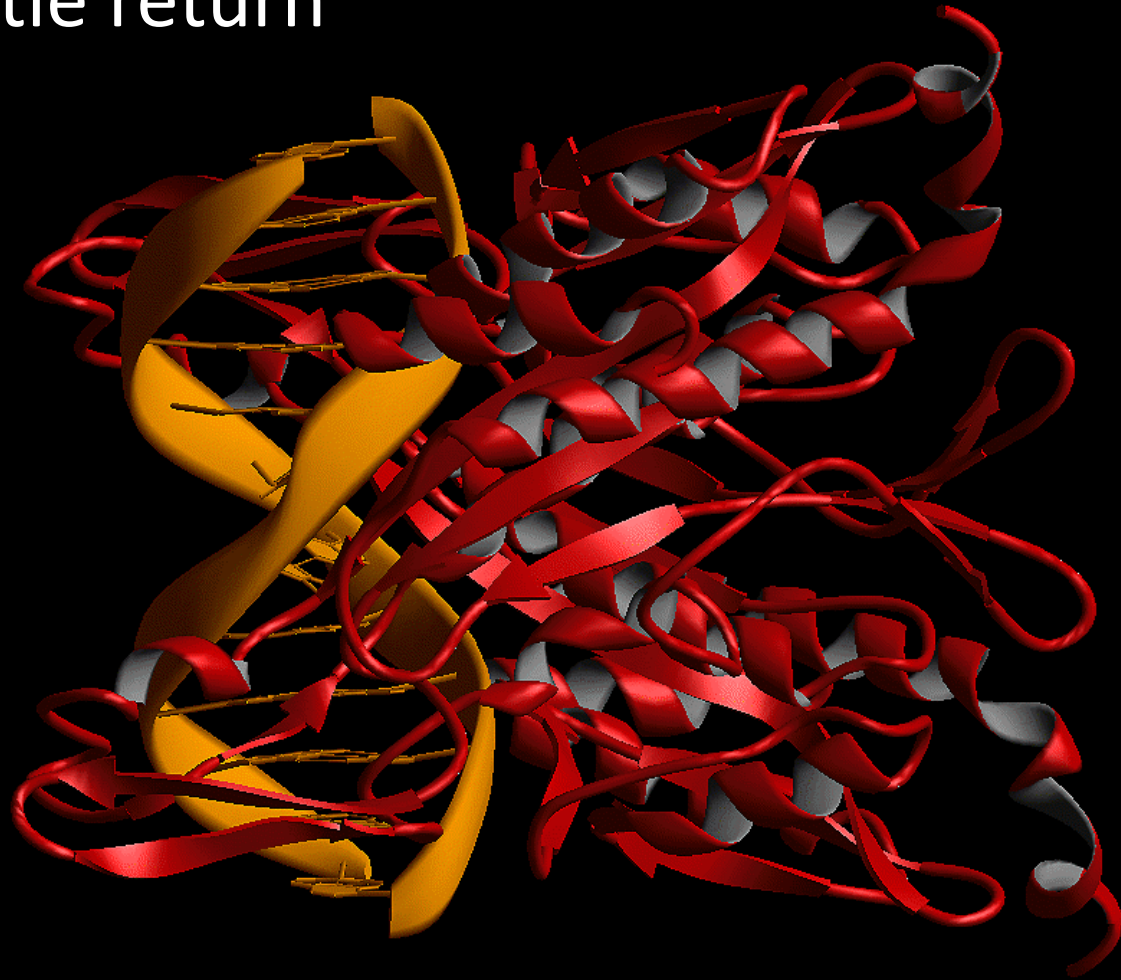
1. Exploration, interest; information gathering
2. Testing, demonstration, and experimentation
3. Sustainability leadership
4. Restorative organizations ongoingly restore, enhance and sustain human and natural capital.

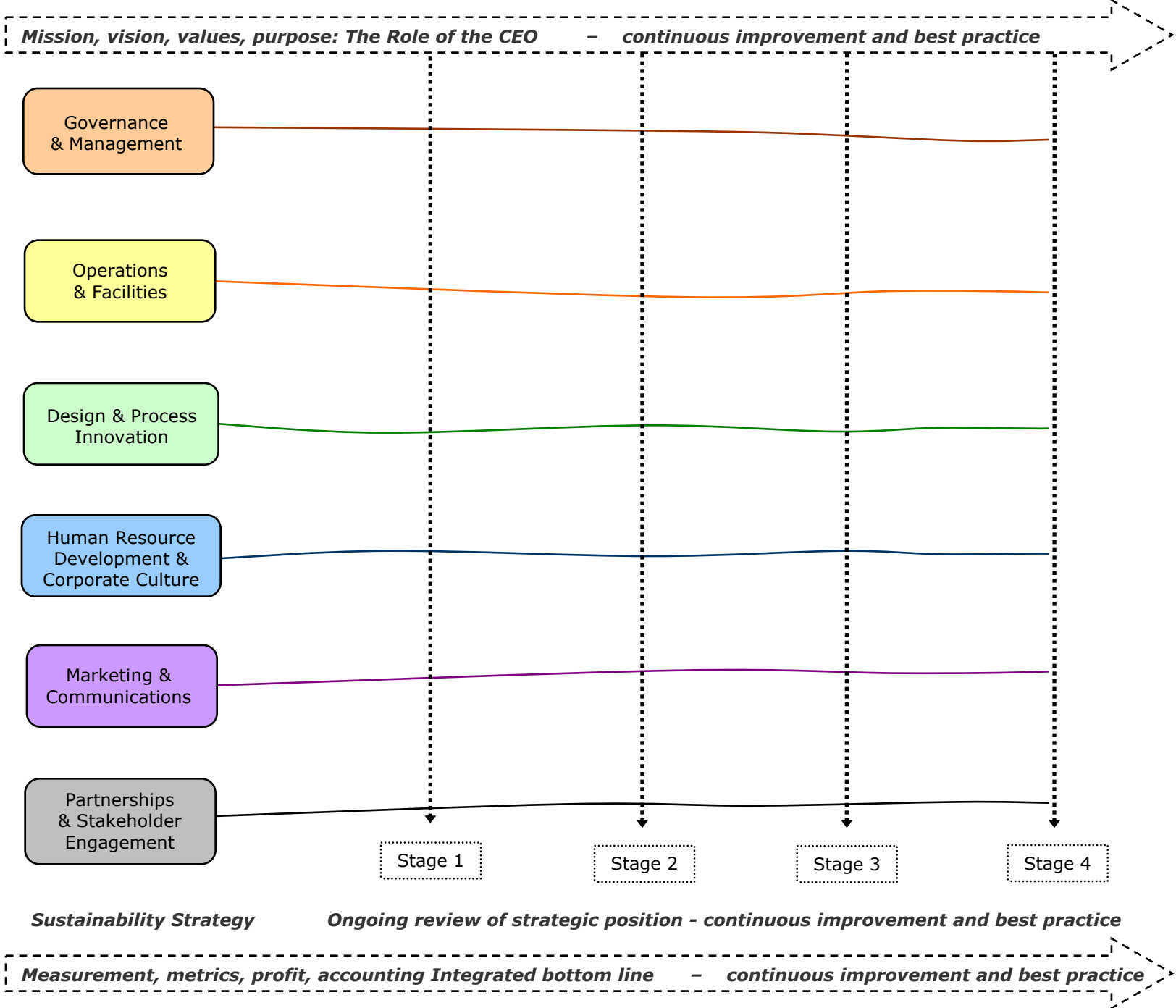
In some organizations

- If there is pollution, toxicity, or dishonesty,
- The two strands are uncoordinated, so the organization cannot grow, the helix, decays and crumbles, and the enterprise ends in disaster or dissolution.



Without a process to organize your thinking the search for sustainability can leave a company in a muddle, spending a lot of time and money but getting little return





SUSTAINABILITY CHOICE POINTS

- 1.) Exploration
- 2.) Experimentation
- 3.) Leadership
- 4.) Restoration

Integrated
Bottom Line

- Governance and Management
- Operations and Facilities
- Design and Process Innovation
- Human Resources and Corporate Culture
- Marketing and Communications
- Partnerships and Stakeholder Engagement

GREENPLANTS

Introduction to the Sustainability Helix



Generously funded by the
Economic Development
Administration

System requirements:

PC only (not Mac compatible)
Windows 98 or later version
Internet Explorer 5.5 or above
Windows Media Player 6.4
Deactivate popup blocker
Optimized for 1024x768 display

Check your computer now

INTRODUCTION TO THE SUSTAINABILITY HELIX

The Chicago Manufacturing Center (CMC) is pleased to offer the GreenPlants course, *Introduction to the Sustainability Helix*, with support from a grant from the Economic Development Administration and the City of Chicago. This is the first of many web courses CMC is developing to help Chicago's small and midsize manufacturers gain access to world-class sustainability ideas and practices that are driving innovation and profitability.

In this introductory course, Hunter Lovins, the President of Natural Capitalism, Inc. and co-author of *Natural Capitalism*, defines the steps and phases that successful companies are taking to become sustainable enterprises. Hunter and her team have been working with major corporations and organizations internationally to assist with the implementation of the ideas of Natural Capitalism for over 20 years. You will hear case studies on how companies and communities around the world are using sustainable practices to become more innovative and profitable. You will also hear stories from two Chicago manufacturers who are creating sustainable products and developing economic success as well.

We hope that you find this course informative and will want to become part of the GreenPlants network of companies that can work together to transform the Chicago area into the greenest urban industrial region in the country.

The Management Helix for the Sustainable Organization has been co-developed by **Natural Capitalism Inc.**, **The Natural Edge Project**, and **The Global Academy** and is summarized in Chapter 10 of ***The Natural Advantage of Nations***, (Earthscan 2005).

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For more information about
GreenPlants or the
Sustainability Helix,
please contact:

kwon@cmcusa.org

Stage 1: Explore the Sustainability Opportunity

- The **willingness to embark on the sustainability journey** typically arises when a change agent within the company has determined that this is a process worth exploring.
- The work of this stage is to develop an understanding of what sustainability is (to the company), and to then explore the value of sustainability to the mission and business model of the company.
- This includes an exploration of what other companies are doing and how a commitment to sustainability can add core business value to the operation.

Stage 2. Testing the Business Case: key initiatives and pilot projects

- At this stage the company becomes willing to make a commitment to operating in more sustainable ways.
- The company undertakes to commit resources to set clear indicators of success, assess its social and environmental impacts, and prove through the pilot projects the validity of the business case for sustainability.
- The stage is characterized by a quiet learning mode of implementation through experimentation, capacity building and development and testing of internal tools and procedures.
- **The goal is to use these pioneering efforts to make the case for committing to a whole systems approach.**

Stage 3. Sustainability Leadership

- At this stage the company has assured itself that there is a strong business case for sustainability and is **ready to make a systemic commitment** to behave responsibly towards the planet and society through its operations and influence.
- In this stage a company implements its sustainability strategy throughout its operations, activities and its value chain. It builds upon its responsibility to enhance shareholder value by taking a public leadership role within its industry and the world at large.
- Public commitments perpetuate momentum towards minimizing its impacts on natural and human capital, and beginning to behave in ways that reinvest in all forms of capital.

Stage 4. A Restorative Company

- At this stage a company is in a position to ensure that a **high level of competitive advantage has been realized through integration of sustainability concepts,** methodologies and processes into business practice.
- By the end of this level the goal is for the company to be become a truly sustainable corporation.
- Through its activities the company restores human and natural capital, maximizes shareholder value and finds its rightful place in the whole of society in which business, civil society, government and all other stakeholders contribute to achieving genuine progress.

Governance and Management

Corporate governance in the 21st century requires a broad set of management tools and processes to ensure that companies not only prosper economically, but are also socially and environmentally responsible. This stream will guide management in framing and implementing best practice in management systems to achieve the goals of a sustainability strategy.

Operations and Facilities

There is an enormous scope for improving the efficiency and effectiveness of most business practices and operations and in doing so to reduce costs and external impacts. A well recognized suite of tools now exist to offer greater profitability for business through reducing material and energy inputs, waste and pollution, and minimizing health risks to employees and customers.

Design and Process Innovation

The capacity of an organization to innovate has always been a strong source of competitive advantage, and is becoming increasingly important for survival in a information-based global world. Businesses that can rapidly translate customer needs into new or improved products and services, in light of constraints (present or anticipated), reap the benefits of first mover advantage.

Human Resource Development and Corporate Culture

Sustainability strategies often dramatically improve productivity by creating healthier and more inspiring workplaces; fostering feedback and employee contributions to continuous improvement' encouraging strategic risk-taking cultures' improving knowledge of global developments and technological advances' and aligning corporate goals with long-term societal and personal values.

Marketing and Communications

Competitive advantage arises out of the value that a firm continues to provide to its customers. Trust is now an underpinning value between an organization and its consumers, and sustainability offers opportunities for businesses to strengthen their competitive advantage by meeting customer needs to feel good about their consumption choices.

Partnerships and Stakeholder Engagement

In order to remain competitive in a market growing in complexity an organization must take advantage of developing relationships, partnerships and alliances with a range of other organization, institutions and groups within society.

Sustainability Management Stages

S1: Exploration of sustainability ops and business cases, development of internal tools procedures and capabilities, commitment to sustainability journey. Alignment of the business model with sustainability principles.

S2: Quiet learning-mode implementation through experimentation, capability development and assembling whole-systems starting with pilot projects; solidifying commitments and momentum.

S3: Public commitments anchor momentum for use of sustainability throughout operations and value chain; natural and human capital impacts understood and being neutralized.

S4: Full competitive advantage realized through integration such that “sustainability management” no longer necessary; improving natural and human capital through operations.

Sustainability Management

Strategies

- Vision Strategy
- Helix Strategy Development
- Helix Strategy Implementation

Financial Management

Strategies

- Accounting
- Finance - Capital Access and Internal Allocation
- Finance - Implications and Valuation

Sustainability Management

Desired Outcome

- Sustainability Management no longer necessary

•Key Practices

- Whole-systems approaches such as backcasting from a vision of a sustainable enterprise that respect the need for incremental progress
- Assignment of sustainability to top “mover/shaker” such as future leaders - get out of pigeon-holing as environmental compliance
- Integrate with recognized ENTERPRISE management systems as well as ISO or Six Sigma, etc.
- Tightly correlate sustainability solutions with existing strategic goals - help top executives use sustainability to find best solutions for existing problems

•Key Inter-relationships

- Finance
- Governance

Governance Overview

Strategies

- Ethics Strategy
- Project Development Systems
- Risk and Shareholder Value: Insurance Strategy
- Unsustainable Lifecycle Risks Strategy
- Shareholder Value Strategy
- Legal: Regulatory Strategy
- Legal: Intellectual Property Strategy

Governance: Stage Progressions

S1: Explore governance opportunities and risks of being unsustainable, including insurance coverage, life-cycle product risks, existing project development systems, legal strategies and emerging global ethics requirements. Recommend appropriate changes to maximize and protect shareholders and sustainability-influenced expanded view of total stakeholders.

S2: Achieve fundamental compliance with global sustainability norms for governance and sustainability integration with project development systems; refine legal strategies to emphasize competitive advantage through sustainability performance. Ensure corporate strategies align with emerging insurance norms.

Governance: Stage Progressions

S3: Achieve industry leadership position in risk assessment and management, sustainability-integrated ethics systems, transparency. Align public policies with natural capitalism systems for making markets work.

S4: Full sustainability implementation means multiple-values driven governance based on transparency, whole-systems approaches, and inclusion of global human and natural capital in performance objectives.



Human Resources

Strategies

- Optimal Utilization Strategy
- Internal Training Strategy
- Incentive Systems
- Sustainability / Risk-taking Culture Strategy
- Cultural Alignment Strategy
- Healthy Workforce Strategy
- Diversity Strategy

Human Resources: Stage Progressions

S1: Sustainability exploration is supported by broad management training in concepts, principles, techniques and the adopted sustainability definition. HR training, incentive, health and recruitment systems are explored for potential sustainability-based productivity advantages and human capital loss reduction.

S2: Sustainability training extended to workers and company's leadership training; mentoring developed where appropriate. Cross-functionality strategies to enhance whole-system approaches explored and piloted. Incentive system adjustments for sustainability performance piloted. Healthy workforce strategy piloted or fully implemented.

Human Resources: Optimal Utilization

Sustainability leadership

- Level Five Leadership's humility + excellence

(Collins - Good to Great)

- "The new model is someone with the highest ethical standards, who can lead by example and build a strong team" (Finkelstein).

- "Farsighted, tolerant, humane and practical CEOs returned 758% over 10 yrs vs. 128% S&P 500 avg" - Fast Company 9/05

- Self-organizing Leadership = Toyota Production System (Management by Means)

Operations Overview

Strategies

- Climate: Greenhouse gases / Ozone Strategy
- Climate: Water Strategy
- Manufacturing/Production Procurement Strategy
- Sustainable Manufacturing Strategy
- Zero Waste Strategy
- Product Stewardship Strategy
- Transport: Personal Transport Strategy
- Transport: Materials Transport Strategy
- Transport: Logistics Procurement Strategy
- Facilities: Facility Resource Procurement Strategy
- Facilities: Facility Location Strategy
- Facilities: Facility Land Use and Buildings Strategy

Operations: Stage Progressions

S1: Operations receive natural capitalism audit, including development of company-appropriate methodology for "footprints", including carbon and water awareness developed and used as strategic data; sustainable energy and eco-efficiency opportunities identified.

S2: Carbon neutral scenarios developed supporting commitment to climate neutrality; pilot eco-efficiency projects launched and capital sources secured for further investments; sustainable purchasing procedures implemented.

S3: Eco-efficiency opportunities fully explored and implemented; sustainable energy is substantial source for operations. Climate neutrality and maximum water efficiency is understood and on the horizon.

S4: Operations are restorative of human and natural capital through full integration of sustainability practices into facilities, manufacturing and product logistics systems.

Climate Impact: Climate/Ozone Strategy

- **Desired Outcome**

- Climate and ozone “neutral”

- **Key Practices**

- Footprinting/inventory in accordance with legal requirements of exchanges, such as Chicago Climate Exchange

- Join exchanges to enhance ROI of investments (\$\$ from selling credits earned); integrate carbon into risk management

- Carbon neutral certification (product or organization) evaluation

- Use industry and/or NGO partnerships for solutions, marketing value

- Carefully watch global politics/perceptions for regulatory surprises, customer awareness

- Align with credible carbon sequestration organizations that plant trees etc.

- **Key Inter-relationships**

- Product/service design determines most of lifecycle climate impacts

- Insurance and access to capital

- Local energy sources

Climate: Water Strategy

- Desired Outcome

- Sustainable water impacts minimized (no loss of natural capital) through minimizing consumptive use and minimizing off-site wastewater flows while restoring natural ecological systems

- Key Practices

- On-site wastewater treatment through minimizing impermeable surfaces (unless needed as part of local water system) and using Eco-machines or similar technologies to naturally clean wastewater
- Xeriscaping (natural landscaping)
- Maximize efficiency of cleaning systems, minimizing water consumption and wastewater
- Account for “natural capitalism” (full social/environmental costs included) price of water in facility designs
- Whole-system lifecycle approach to water use

- Key Inter-relationships

- Facility Procurement Strategy
- Manufacturing and Testing Processes

Manuf/Prod Procurement Strategy

- Desired Outcome

- Help lead shift to sustainable energy and materials through 100% sustainable procurement goal and implementation

- Key Practices

- Sustainable materials pooled research
 - Sustainable energy pooled purchasing power
 - Maximize on-site efficiencies and multiple benefits (e.g. co-generation)
 - Set long-term goals to give signals to supplier utilities; reduce peaks in short-term
 - Zero Waste to the biosphere; invest in closed loops not cul-de-sacs

- Key Inter-relationships

- Value Chain Supplier Strategy
 - Climate/Ozone Strategy
 - Whole-system Design Strategy and Process Design Strategy

Sustainable Manufacturing Strategy

- Desired Outcome

- Maximize resource productivity, minimize life-cycle carbon/ozone/water footprints and detoxify manufacturing processes

- Key Practices

- Whole-system engineering of facilities and support systems
- Lean manufacturing value-chain strategies
- Life-cycle approach to materials flow that minimizes transport to end user and end of life
- Management by Means financial and managerial accountability (TPS)

- Key Inter-relationships

- Process Design Strategy
- Zero Waste Strategy
- Manufacturing Procurement Strategy
- HR Optimal Utilization Strategy

Zero Waste Strategy

- Desired Outcome

- Zero Waste to the Biosphere

- Key Practices

- Minimize raw materials (shaping) necessary through procurement practices and maximizing resource productivity
- Define “waste” as use of fossil fuels and similar natural capital-depleting activities (Interface strategy)
- Use “waste = food” strategies - possibly emphasizing waste-matching rather than waste minimizing per se
- Explore/use five natural kingdoms and abundance approach of ZERI
- Take lifecycle approach to products using “solutions” leasing

- Key Inter-relationships

- Sustainable Manufacturing and Manufacturing Procurement
- Internal Training Strategy
- Value Chain Strategies

Product Stewardship Strategy

- **Desired Outcome**

- Ingrained sustainability-based life-cycle approach to products/services sold in synch with adopted sustainability definition (e.g. no net loss NC or HC)

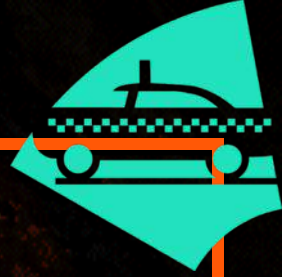
- **Key Practices**

- Solutions economy assumptions in design (assume product will always be owned by producer)
- Design for disassembly and reuse (Xerox)
- Product stewards internally assigned, properly incentivized according to impacts

- **Key Inter-relationships**

- Legal: Regulatory Strategy and Partnerships Regulatory Strategy
- Product/Service Design
- Research/Innovation/Risk Partnerships and Financial Risk Strategy (risks of unsustainable products)

Personal Transport Strategy



- **Desired Outcome**

- No net loss of natural or human capital from organization or employee/customer transport activities

- **Key Practices**

- End the free parking era (a relic of pre-peak oil?; Nike example)
- HR-popular solutions such as less workdays/week and telecommuting and virtual meeting systems
- Support for lower-income workers obtaining best technologies
- Centralized facility locations or otherwise transit friendly sites
- Explore opportunities for on-site housing and affordable housing
- Explore multiple benefits (e.g. hydrogen production systems for facilities that can fuel employee vehicles and use them for green power generators)
- Maximize cost-effectiveness of corporate fleets

- **Key Inter-relationships**

- Facilities Location Strategy
- HR Optimal Utilization Strategy



Materials Trans Strategy

- **Desired Outcome**

- Minimized materials transportation and resulting carbon footprint over life-cycle of product/service

- **Key Practices**

- Prohibit truck idling at sites (Ricoh)
- Source local wastematched or organic materials
- Resource productivity minimizing materials needs
- Solutions economy services approach (illumination, not light bulbs)
- Design for disassembly
- Integration of carbon considerations with solid waste strategies

- **Key Inter-relationships**

- Usual suspects regarding mfg processes: Design, Zero Waste, etc.
- Value chain supplier and customer strategies
- Facilities location strategy



Logistics Procurement Strategy

- **Desired Outcome**

- No net loss of natural or human capital through minimized logistics operations.

- **Key Practices**

- Hire logistics services with sustainable-incentive contract to minimize use and energy usage
- Outsource repairs (UPS model)
- Zero Waste strategies

- **Key Inter-relationships**

- Zero Waste Strategy
- Materials Transport Strategy
- Value Chain Supplier Strategy



Facility Resource Procurement Strategy

- **Desired Outcome** Help lead shift to sustainable energy and materials through 100% sustainable procurement goal and implementation
- **Key Practices**
 - Sustainable energy pooled purchasing power
 - Maximize on-site efficiencies and multiple benefits (e.g. co-generation)
 - Set long-term goals to give signals to supplier utilities; reduce peaks in short-term
- **Key Inter-relationships**
 - Value Chain Supplier Strategy
 - Climate/Ozone Strategy
 - Whole-system Design Strategy and Process Design Strategy

Facility Location Strategy



- **Desired Outcome**

- Positive natural and human capital impacts of facility locations

- **Key Practices**

- Centralized locations, infill or land reuse
- Clean up and utilize former “brownfields”
- Include carbon analysis in location decisions
- Include facility needs such as food for human occupants, which can be largest sustainability impact of location decisions
- Minimize use of quality arable land by facilities
- Offset land used by facilities with land preserved (BMSquibb)

- **Key Inter-relationships**

- Climate Strategies
- HR Optimal Use Strategy
- Value Chain Strategies

Facility Buildings / Land use Strategy

- Desired Outcome

- Buildings and sites are restorative to natural and human capital

- Key Practices

- Use whole-system building and site development stds (e.g. LEED) enhanced as necessary for carbon/sustainability strategies (e.g. NREL 30% better than code for energy PLUS Silver LEED)
- Human capital impacts calculated and inserted into life-cycle cost-effectiveness calculations, particularly productivity factors
- Full valuation of human/natural capital impacts beyond market prices

- Key Inter-relationships

- Climate Strategies
- HR Optimal Utilization Strategy
- Mfg and Building Procurement Strategies
- Process Design

Operations Primary Challenges

- Accounting for sustainability intangibles in cost structures
- What to do with existing inefficient equipment?
- Does lean or sustainable manufacturing require the entire value chain to switch?
- Building a sustainability culture contrary to US culture
- Talking about productivity investments in years payback instead of ROI
- High ROI investments evaluated against unknown PIRR perceptions by management of using capital for other business needs

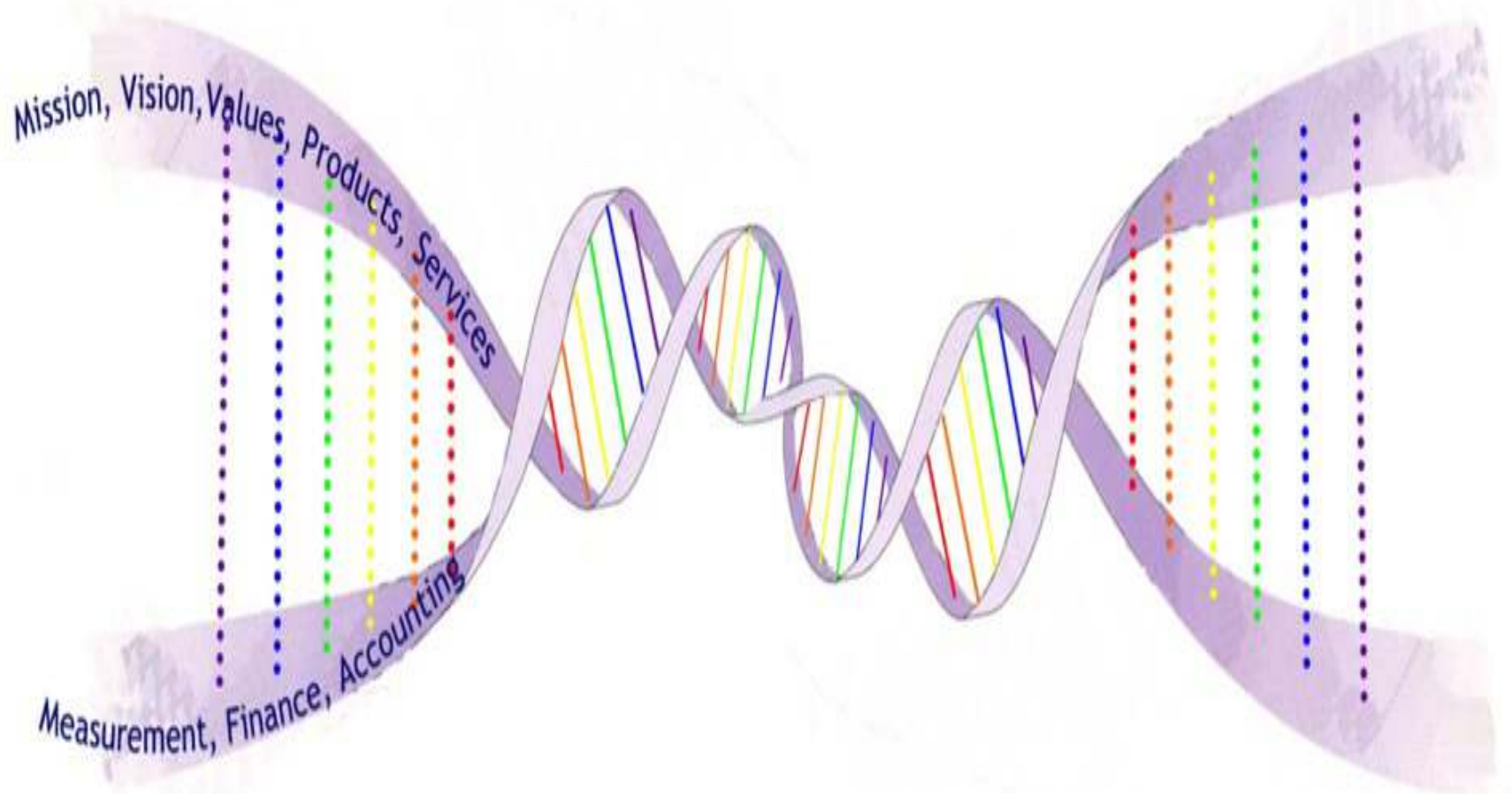
Operations - Case Stories

• Harbec Plastics

- Installed 55 skylights
- Own wind turbine provides 20% electricity; combined with own micro-turbines fueled by natural gas, generates 95% of energy on site
- Plant uses electric and biodiesel vehicles
- Recycles scrap plastics into industrial products

Operations: Tools

- Value Engineering....Is Not
- Lean Manufacturing Systems with Sustainability Indicators integrated??
- Natural Capitalism Walk-through (audit) tool
- Should companies get into the energy price prediction business - NCS tool under development but tricky; very localized electricity-wise
- “Connecting the Drops Towards Creative Water Strategies” - GEMI
- Green Building guides and analyses: 15% cheaper to build/operate over life cycle (CA study)



Design Overview

Strategies

- Whole-systems Design Strategy
- Product/Service Design Strategy
- Process Design Strategy
- Testing Strategy

Design Stage Progressions

S1: Opportunity and systems for integrating sustainability into design explored and piloted, including "Biomimicry," life-cycle analysis and product takeback, solutions economy approaches. Merits of various design tools and/or sustainability partners assessed.

S2: Sustainable design tools finalized and applied to new products/services. Testing systems analyzed for sustainability impacts and recommendations made to executives. Initial solutions economy products piloted. Sustainable design partnerships explored.

S3: Cost-effective life-cycle analysis and biomimicry techniques/science fully integrated into design; solutions economy approach broadened to most appropriate products/services. Sustainable design partnerships launched.

S4: Company advances to development of industry-leading R&D institute; sustainable design and solutions economy integrated to all products/services.

Design - Whole-system Strategy

- Desired Outcome

- Full integration of natural capitalism / sustainability concepts and techniques into all design functions (internal and outsourced) - avoiding the problem that all big mistakes are made on the “first day”

- Key Practices

- Explore and adopt into organizations culture, as appropriate: biomimicry, cradle to cradle, The Natural Step conditions,
- Integrate sustainability into project development systems (e.g. EWEB in Oregon infusing Natural Step questions)
- Develop or install whole-system tools that are easy to use like Metabolics, etc.
- Use Sustainability Advisory Board and transparent partnerships to ensure whole-system perspectives

- Key Inter-relationships

- HR Internal Training
- Partnerships: Research/Innovation/Risk and Regulatory

Product/Service Design Strategy

- Desired Outcome

- Design as though organization owns all life-cycle impacts is mainstream to the organization
- Getting the incentives to promote sustainability throughout the value chain is fully integrated into design strategies as part of whole system

- Key Practices

- Solutions economy (value-chain incentives and exploration of services desired rather than products)
- Natural Capitalism/ sustainability practices life-cycle assessment tool regarding materials and supplier choices
- Reframing markets when possible (“winning the format wars”)

- Key Inter-relationships

- Research/Innovation/Risk Partnerships
- Value Chain Customer and Supplier Partnerships
- Marketing / Communications Strategies
- Operations especially Sustainable Manufacturing and Climate

Process Design Strategy

- Desired Outcome

- Biomimicing production systems maximizing resource productivity and minimizing toxicity

- Key Practices

- Biomimicry research and exploration (new databases available)
- Lean manufacturing systems
- Culture of innovation
- Zero Waste

- Key Inter-relationships

- Sustainable Manufacturing Strategy
- Regulatory Partnerships and Legal Strategy
- Intellectual Property Strategy
- HR: Healthy Workforce Strategy

Testing Strategy

- Desired Outcome

- Testing processes causing no loss of natural or human capital

- Key Practices

- Use biomimicry to eliminate toxicity
- Ethics systems regarding testing on animals
- Whole-system approach to testing looking at ecological unintended consequences (precautionary principle)

- Key Inter-relationships

- Whole-system design
- Regulatory partnerships
- Healthy Workforce strategy

Design Primary Challenges

- How sustainable are customers getting, how fast?
- Will most advanced regulations, generally EU, spread quickly to US?
- Price of energy and materials in future?
- Traditional molecular-based LCA too expensive, inconclusive, static
- Connections with biomimicry science in early stages
- Poor engineering education habits

Design: Case Stories



KTM Industries, Inc.
Biodegradable Engineered Foam



- KTM Industries, Michigan (25 emp; 1997)
 - Green Cell biodegradable foam packaging, insulation & die cuts that exceed performance of metal or petroleum based foams from “premium grade proprietary starch” from domestic agricultural products (corn, rice, soy and potato starch).
 - Also developed Magic Nuudles building block toys that stick together with water.



Design: Case Stories

IdleAire Technologies - eliminate the need for diesels to idle while drivers resting through a highly efficient external HVAC and 110-volt electrical system. (Truckers have 10 hours rest required after 11 on road).

- Can demo air emission reductions for communities in non-attainment areas; overall 98% reduction Clean Air Act “criteria” pollutants and 83% overall emissions
- US potential: eliminate 36 million tons/yr air emissions from unnecessary idling (~98% CO₂) or 1.7 billion gallons fuel.



Design: Tools

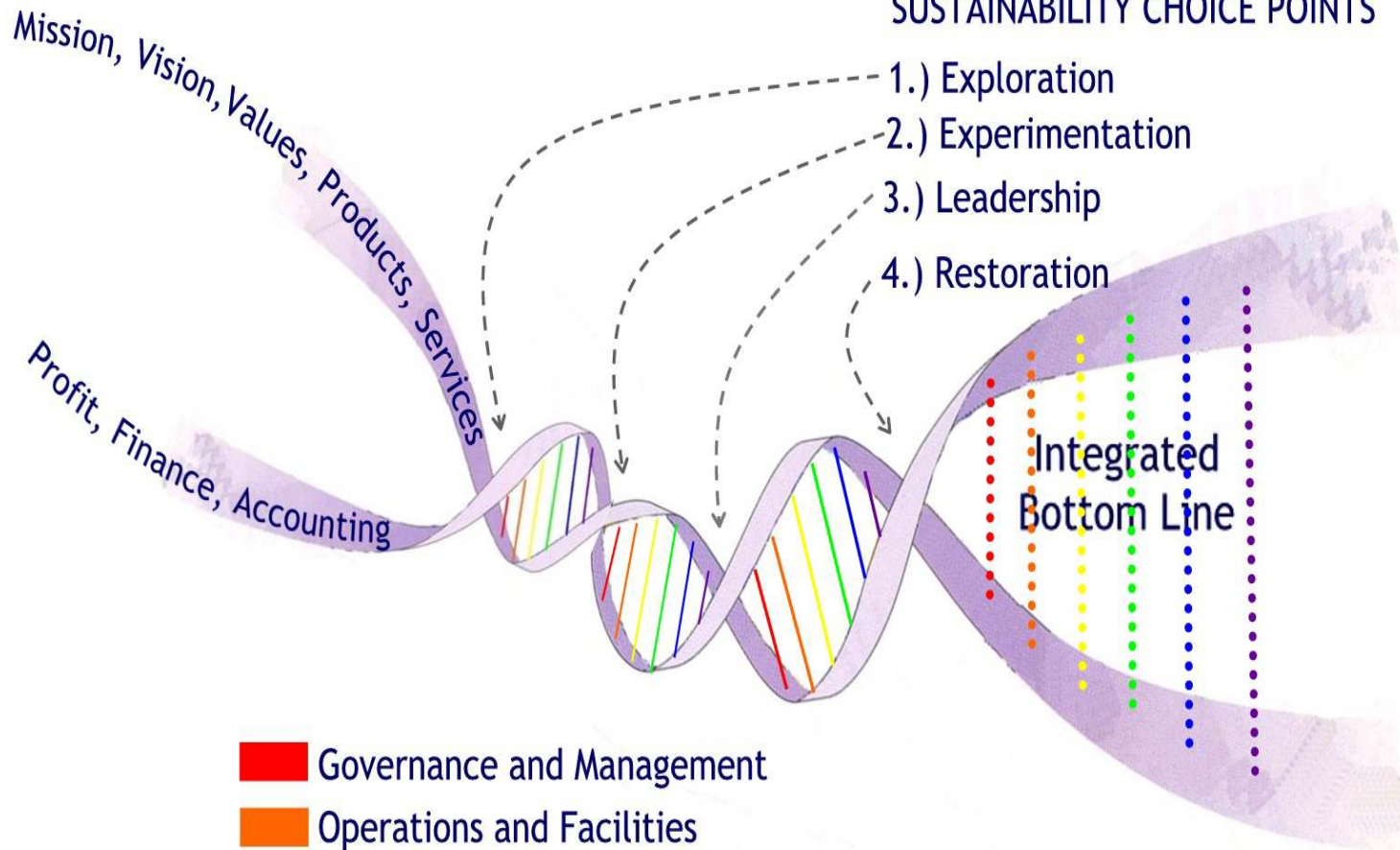
Natural Capitalism Design Accounting: impute into design assumptions natural capital fully valued (properly valued) but keep this as a design tool, not mixed with organization's accounting. Result: less "consumption" of natural capital by the product.

- Estimates are that coal-fired electricity's externalities are \$.16/kwhr or about 4-8X market price; nuclear estimated at \$.09, or 3x market price.
- Estimated that the price of gas in the US is subsidized by \$3.46/gallon defense expenditures not otherwise necessary.

Natural Capitalism Lifecycle Analysis

–Cost-effective examination of value chain (full lifecycle) sustainability practices, weighted by weight of materials in final product, and tempered by carbon footprint - all added together to determine "hot spots" for sustainability management attention or relative sustainability orientation of product design choices. Better shows trends rather than point-in-time analysis of molecules.

SUSTAINABILITY CHOICE POINTS



- Governance and Management
- Operations and Facilities
- Design and Process Innovation
- Human Resources and Corporate Culture
- Marketing and Communications
- Partnerships and Stakeholder Engagement

Marketing and Communications

Strategies

- Sustainable Marketing Strategy
- Sustainability Education Strategy
- Internal Communications Strategy
- Public Relations Strategy
- Branding Strategy

MktComm: Stage Progressions

S1: Internal development of sustainability language and announcement of sustainability strategy; establish tracking system for accomplishments; consideration of sustainability impacts on market positioning.

S2: Initial successes are published internally and friendly external venues including partnerships. Marketing of sustainability strategy developed for external and internal audiences, and business case for external endorsements developed. Goal is for everyone in company to be engaged in sustainability efforts.

S3: Strategies/accomplishments are externally and internally communicated; active engagement in external endorsements/awards. Branding includes sustainability leadership. All relevant sustainability reporting requirements or “desire-ments” are met.

S4: The company has become a household word for sustainability, which is integrated into all marketing and communications strategies and activities.

MktComm: Sus Mkt Strategy

- Desired Outcome

- All organization marketing is integrated with adopted sustainability definition, goals and strategies and marketing activities are physically sustainable

- Key Practices

- GRI or other globally-standardized reporting systems
- Customer education where needed, especially third-party
- Industry collaboration for customer education
- Integration with sustainability “communities” locally/internationally
- Reputation risk tools and ongoing assessment

- Key Inter-relationships

- Design strategies
- Partnership strategies especially NGOs
- Regulatory strategies

MktComm: Sus Education Strategy

- Desired Outcome

- Sustainability-informed customers / regulators that are able to distinguish sustainability intangibles and feel sustainability imperative
- Sustainability mainstreamed in suppliers, industry and regulators

- Key Practices

- Industry, government or third-party partnerships
- K-12 education and higher education strategies
- Transparency e.g. TRI systems applied internally

- Key Inter-relationships

- Design Strategies
- Research/Innovation/Risk Partnerships
- Human Capital Development Strategy

MktComm: Internal Comm Strategy

- Desired Outcome

- Sustainability becomes mainstream culture of organization

- Key Practices

- Solicit suggestions from all after training
- Sensitivity about alignment with personal values
- Reward early successes and seek third-party endorsements
- Build upon Pride / History factor
- Reinforce integration of sustainability rather than “one-offness”

- Key Inter-relationships

- HR Optimal Utilization Strategy and Incentive Strategies
- Value Chain Customer and Supplier Strategies
- Manufacturing and Facility Procurement

MktComm: PR Strategy

- Desired Outcome

- Public relations, through transparency, is “truth in advertising”

- Key Practices

- Integration of sustainability management with marketing functions (DuPont)

- Sustainability reporting minimizing materials usage

- Integration of ethics reporting with sustainability

- Key Inter-relationships

- Sustainability Education

- Internal Marketing

- Governance particularly Risk Management

MktComm: Branding Strategy

- Desired Outcome

- Brand secured from unsustainability risks and organization is “household” word for responsible / sustainable behavior/operations.

- Key Practices

- Sustainability reporting, preferably with third party audits
 - Internal training that fully infuses sustainability into corporate culture
 - Sustainable supply chain management
 - Market-leading / generating products

- Key Inter-relationships

- Product Design Strategy
 - Risk and Legal management



Partnerships Overview

Strategies

- Research/Innovation/Risk Partnerships
- Regulatory Partnerships
- Human Capital Strategy (external)
- Value Chain - Customer Strategy
- Value Chain - Supplier Strategy

Partnerships Stage Progressions

S1: Potentially helpful stakeholders identified and contacted; sustainable value chain management tools and opportunities explored and activities planned.

S2: Stakeholder partnerships engaged with processes and missions developed; Value chains educated about the sustainability business case and exploring new products and delivery systems.

S3: Sustainability-based partnerships delivering new products, management tools, and substantially affecting consumer preferences through customer education partnerships.

S4: Sustainability-integrated stakeholder and value chain systems are fully sustainability-integrated (evaluation, education, LCA analysis and metrics) and are spreading sustainability techniques to other industries or community/national efforts.

Partnerships: Value Chain Customer Strategy

- Desired Outcome

- Customers are “demand pulling” sustainable products from company’s value chain in quantifiable, market-driving manner

- Key Practices

- See MktComm Education strategy
- Development of local delivery partners for solutions economy (Interface)
- Transparency - building customer trust at every turn
- Key market local economic development and business community presence especially sustainable business community
- Partnering with global marketers to define / set the bar for foreign markets

- Key Inter-relationships

- Marketing strategies
- HR - Internal Training
- Finance

Partnerships: Value Chain Supplier Strategy

- Desired Outcome

- Entire value chain has education and incentives to drive sustainability performance such that cost-intensive management is minimized

- Key Practices

- Industry collaboration for education and standards (e.g. CARE of chemical industry)
- Flexible networks or other means of ownership partnering to leverage performance and transparency
- Demonstrable customer desire, or regulatory threats
- Ability to try pilot projects

- Key Inter-relationships

- Product/Service and Process Design
- Finance - Internal Capital Allocation Strategy
- Stakeholder Partnerships - especially NGOs that can assist with research/innovation/risk

Partnerships: Primary Challenges

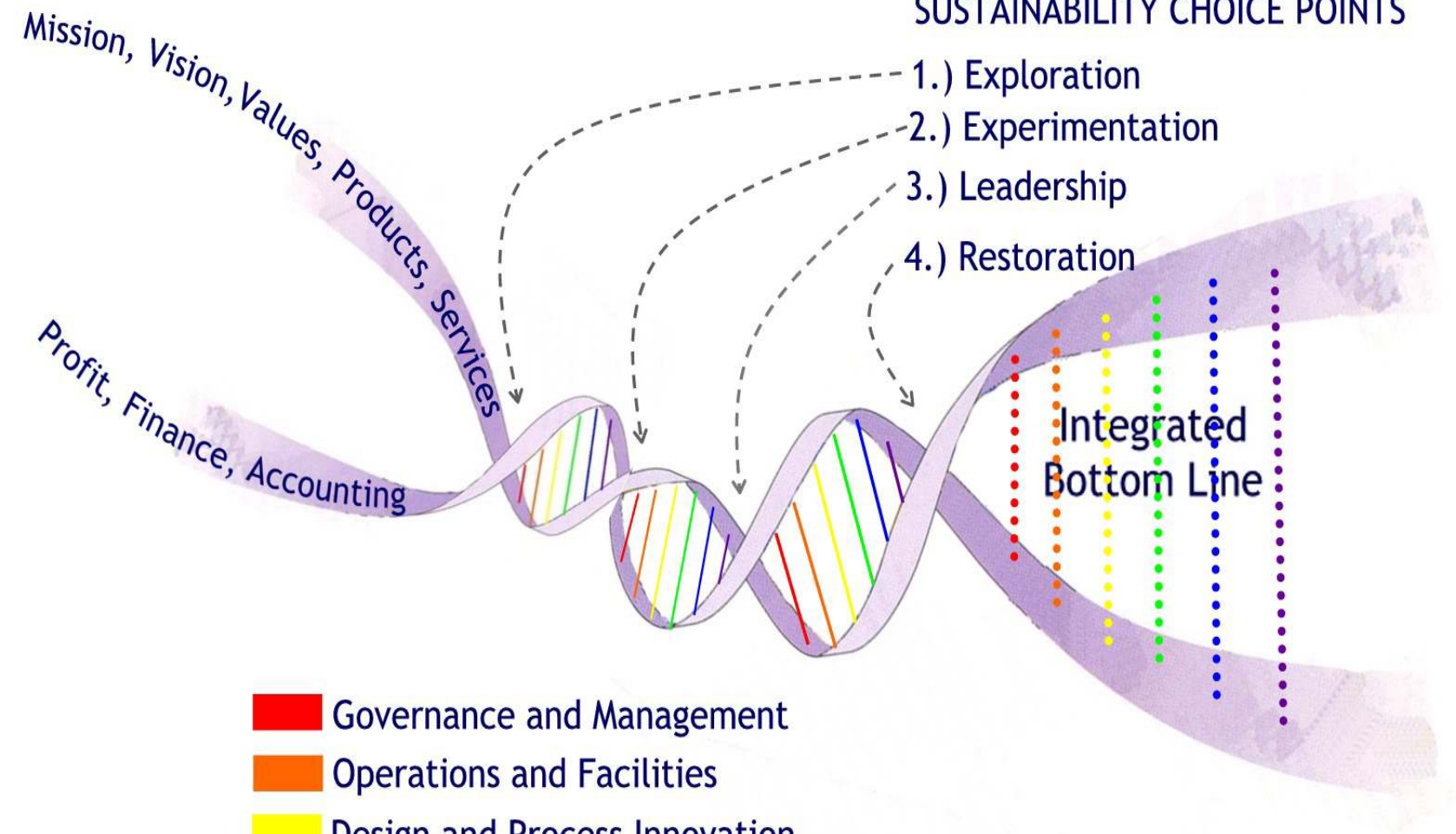
- Supply Chain Management

- Market leader lack of leverage without full industry movement or credible regulatory threat, especially if small business
- Lack of existing supply chain standards
- Companies already feel harassed answering inquiries from SRI funds....
- Summary from Nordic Partnership:
 - Blurring boundaries between suppliers and customers
 - NGOs and society hold end-marketer responsible
 - Sustainability issues that can seriously affect brand value often arise in supply chain
 - Customers perceive many things as outside their control (that aren't!)
 - Supplier bases often seem overwhelmingly large
 - Many management approaches imply big investments (financial and human capital)
 - Management adds costs and benefits are hard to quantify

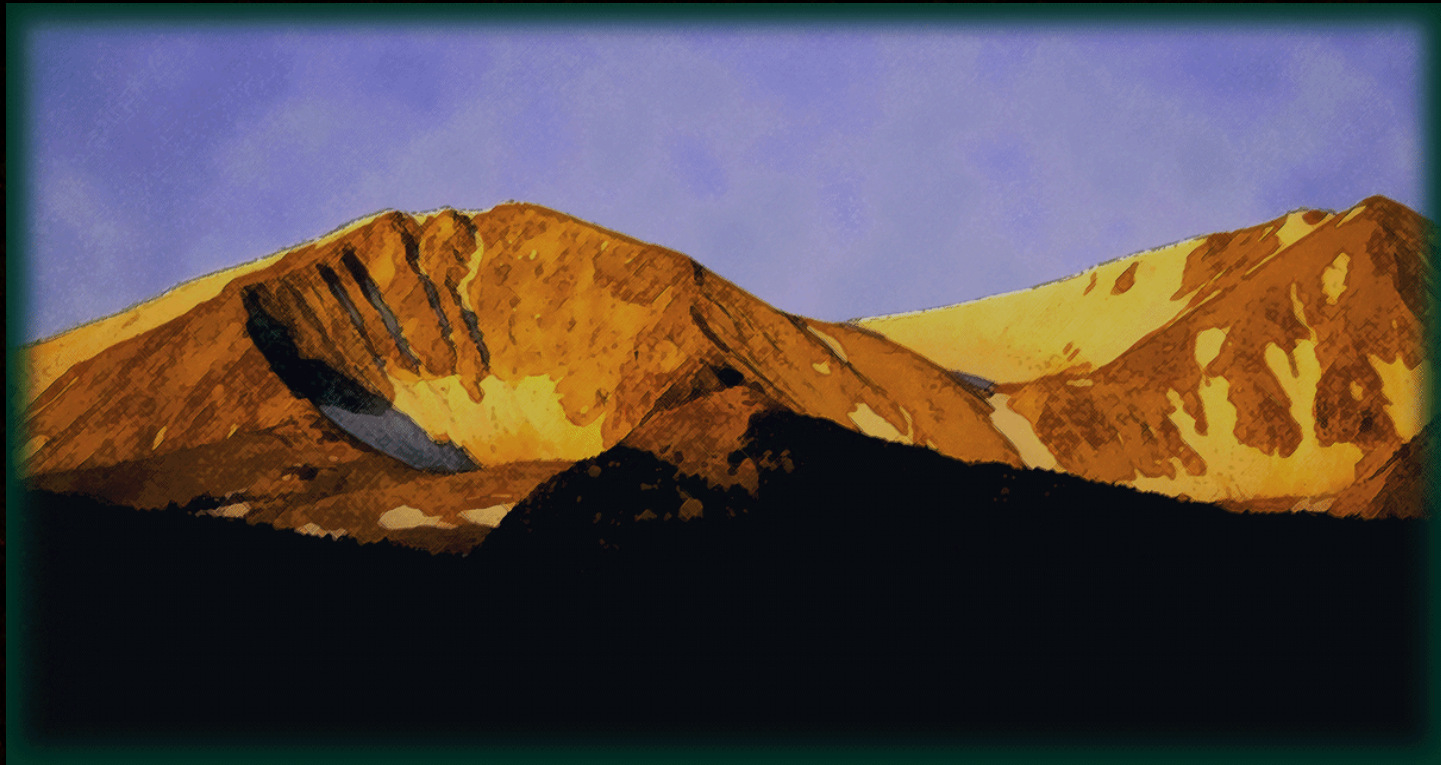
Supply Chain Tools

- **Nordic Partnership Sustainable Supply Chain Management (SSCM)**
 - Diagnostic for assessing needs, potential approaches, cost-effectiveness
- **GEMI “Forging New Links” Supply Chain Value Mgmt tool**
 - Recognizing, prioritizing and pursuing opportunities...integrating EHS into value creation rather than just logistics
- **Natural Capitalism Supply Chain Management System - The Helix**
 - Use NC Principles to assess companies and products, integrated into other supplier evaluations
 - HP’s TQRDC-E evaluations where the the “E” is for environment or “S” for sustainability into the evaluations of Technology, Quality, Responsiveness, Delivery, Cost, and Environment.

SUSTAINABILITY CHOICE POINTS



- Governance and Management
- Operations and Facilities
- Design and Process Innovation
- Human Resources and Corporate Culture
- Marketing and Communications
- Partnerships and Stakeholder Engagement



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