

Construction Project Safety and the Triple Bottom Line

Construction Institute
Construction Safety Workshop



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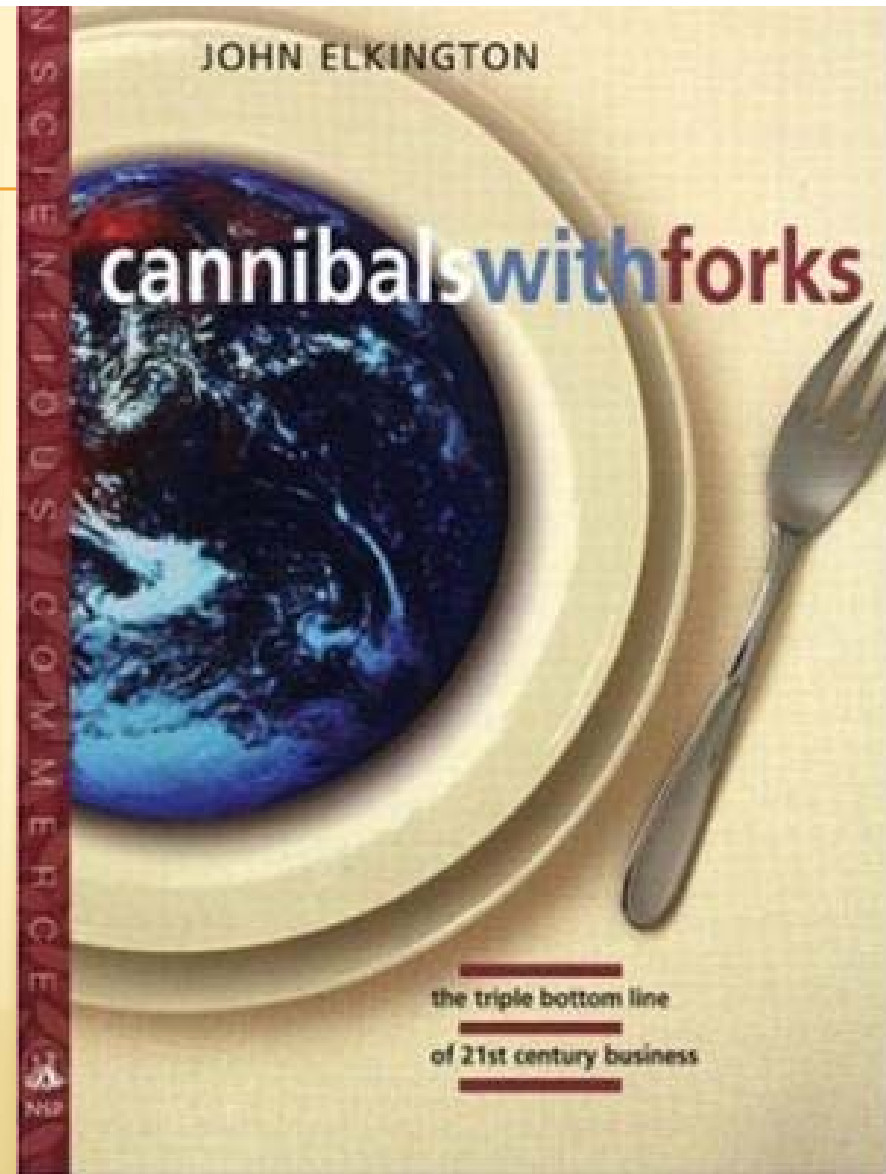
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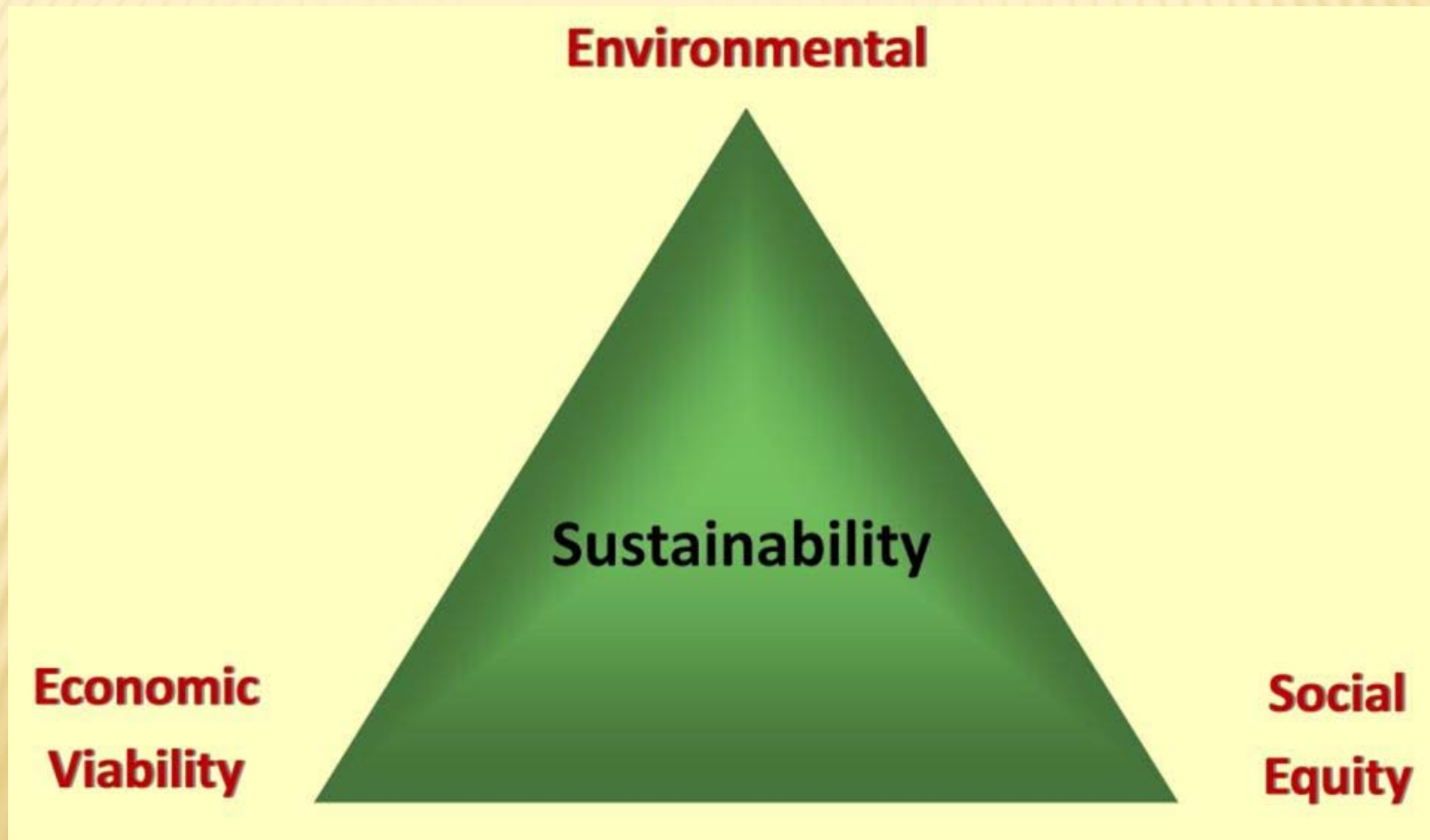
TRIPLE BOTTOM LINE

“All businesses can and must help society achieve three goals that are linked – economic prosperity, environmental protection and social equity.”

<http://blueandgreentomorrow.com/features/book-review-cannibals-with-forks-john-elkington-1999/>



SUSTAINABILITY AND THE TRIPLE BOTTOM LINE





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SOCIAL SUSTAINABILITY AND CONSTRUCTION SAFETY

- ❑ Definition of Sustainable Development in Brundtland Commission Report (1987)
- ❑ Focus on people as much as on the environment
 - Meet the needs of people who can't speak for themselves



CORPORATE SOCIAL RESPONSIBILITIES

- ❑ “Commitment by business to behave ethically and contribute to economic development;
- ❑ “Improve quality of life of the local community and society at large.”
- ❑ “Improve quality of life of the workforce and their families;

Source: World Business Council for Sustainable Development

Sustainable Development



Design and construction that doesn't unfairly affect people who are not at the table

Further reading:

Toole, T. M. and G. Carpenter (2013). "Prevention through Design as a Path Towards Social Sustainability." *ASCE Journal of Architectural Engineering* 19(3):169-173.

SOCIAL SUSTAINABILITY FUTURE ISSUES

- ❑ How will we convince all stakeholders that our project will not unfairly affect people who are not at the table during the concept development, design and construction planning?
 - Local politicians and regulators
 - Financiers
 - Nearby residents
 - Construction workers
 - Maintenance workers
 - Building occupants
 - Our employees

ECONOMIC SUSTAINABILITY AND CONSTRUCTION SAFETY

- ❑ Contractors' Experience Modification Rating directly affects project profits and ability to compete.
- ❑ Safety is good investment.
 - Preventing accidents is more cost effective than incurring the direct and indirect costs of accidents when they occur.
 - Average direct cost per injury is \$39,000 and \$1.42M for fatality.
 - Indirect costs of injury are 2-17 times direct costs.
 - \$1 in safety investment returns \$2-6 in benefits.
- ❑ Productivity and morale gains often more valued than injury cost savings.

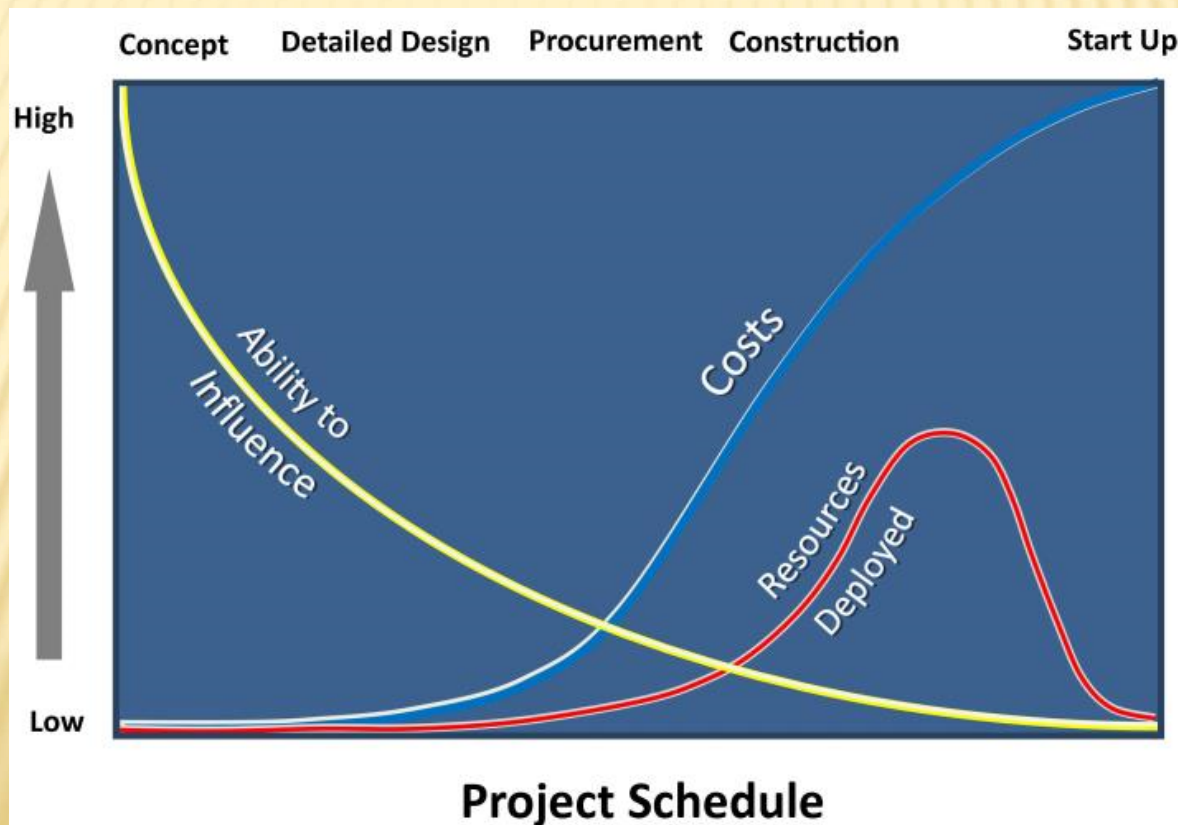
National Safety Council (2013). "Journey to Safety Excellence: The Business Case for Investment in Safety."

ECONOMIC SUSTAINABILITY FUTURE ISSUES

- ❑ Does making the business case for safety investment require quantitative data?
- ❑ If so, how and when should we do it?
- ❑ Will the current administration's pro-business initiatives affect our investment in safety?

DESIGN HAS MAJOR LEVERAGE

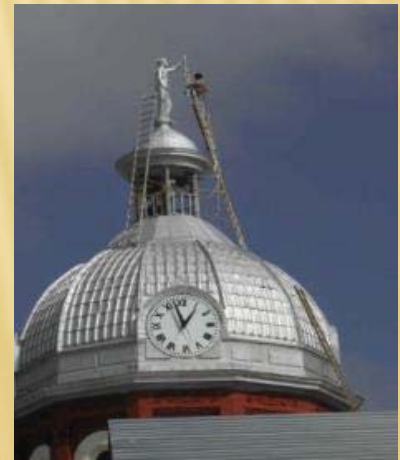
- Ability to influence key project goals is greatest early in the project schedule during planning and design (Szymberski, 1997)



PREVENTION THROUGH DESIGN (PTD)

“Addressing occupational safety and health needs in the design process to prevent or minimize the work-related hazards and risks associated with the construction, manufacture, use, maintenance, and disposal of facilities, materials, and equipment.”

(<http://www.cdc.gov/niosh/topics/ptd/>)



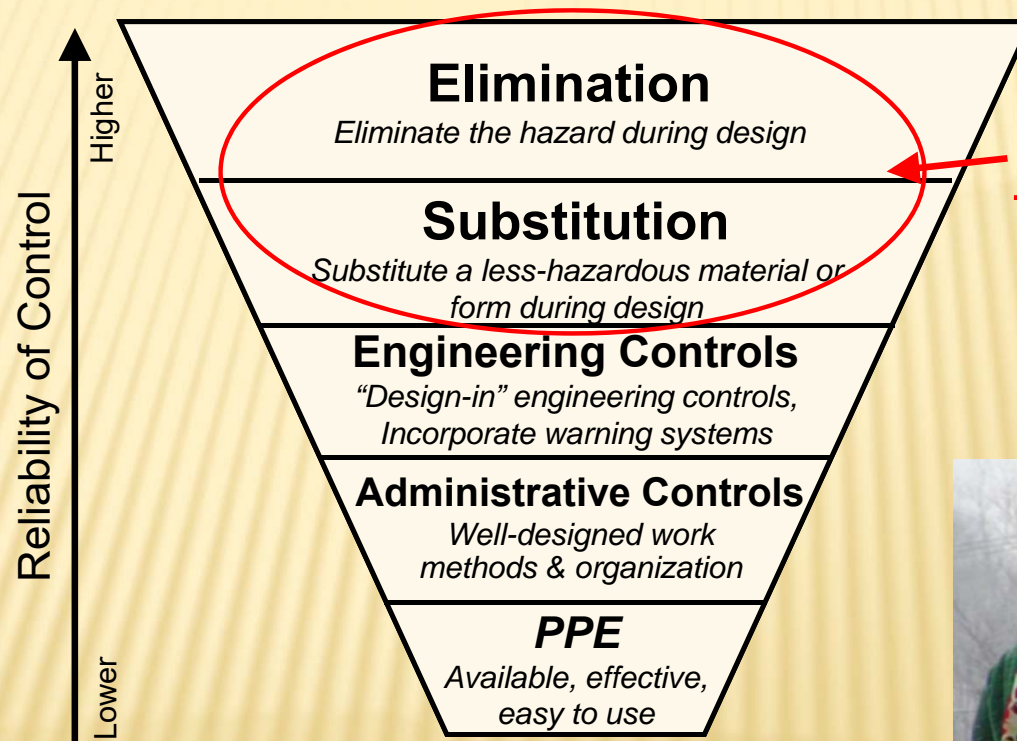
PTD IN CONSTRUCTION IS...

- ❑ Explicitly considering construction and maintenance safety in the design of a project.
- ❑ Being conscious of and valuing the safety of construction and maintenance workers when performing design tasks.
- ❑ Making design decisions based in part on a design element's inherent safety risk to construction and maintenance workers.

“Safety Constructability and Maintainability”



HIERARCHY OF CONTROLS



Prevention through Design



PTD AROUND THE GLOBE

- ❑ Required in UK since 1995
- ❑ Required now in:
 - European Union
 - Australia
 - South Africa
 - Singapore

ECONOMIC BENEFITS OF DESIGNING FOR SAFETY

- ❑ Reduced site hazards
 - **Fewer worker injuries and fatalities**
- ❑ Reduced workers' compensation premiums
- ❑ Increased productivity and quality
- ❑ Fewer delays due to accidents
- ❑ Improved operations/maintenance safety

ASCE CODE OF ETHICS AND CONSTRUCTION SAFETY

Canon 1: Hold Safety Paramount

- Engineers shall hold paramount the safety, health and welfare of the public and shall strive to comply with the principles of sustainable development in the performance of their professional duties.

- a. Engineers shall recognize that the lives, safety, health and welfare of the general public are dependent upon engineering judgments, decisions and practices incorporated into structures, machines, products, processes and devices.

SOCIAL SUSTAINABILITY FUTURE ISSUES

- ❑ Do not our duties include minimizing all risks that we have control over?
- ❑ Do not we have the same duties for construction and maintenance workers as for the “public”?
- ❑ Is the “good” associated with Prevention through Design outweighed by the risks to individuals firms who adopt it and to the profession as a whole?
- ❑ How can we reduce the risks of adopting Prevention through Design for individual firms and the profession?

MORE ECONOMIC SUSTAINABILITY FUTURE ISSUES

- ❑ Does Prevention through Design really provide the expected economic benefits to the project owner?
- ❑ If so, how can we enable Prevention through Design to occur without incurring economic harm to design professionals?

ENVIRONMENTAL SUSTAINABILITY AND CONSTRUCTION SAFETY

- ❑ Environmental Sustainability have helped us to take a life cycle approach
- ❑ Research has shown that green building has new hazards
- ❑ LEED BC has a pilot credit for prevention through design

PREFABRICATION: THE LINK BETWEEN ENVIRONMENTAL SUSTAINABILITY AND SAFETY

- ❑ Prefabricated construction is inherently safer than “stick-built.”
- ❑ Work is shifted from dangerous work environments to engineered work environments and processes.
 - at height
 - in trenches
 - in confined spaces
 - exposed to weather (wind, water, ice, mud, lightning)
- ❑ Prefabricated construction has
 - lower construction waste
 - lower embodied energy
 - lower embodied greenhouse gases
- ❑ Effective prefabrication often requires designer-constructor collaboration

ENVIRONMENTAL SUSTAINABILITY FUTURE ISSUES

- ❑ How will we convince all stakeholders that our project will not unfairly affect the natural environment?
- ❑ How are we doing to achieve ASCE's "Vision for Civil Engineering in 2025"?
 - "Entrusted by society to create a sustainable world and enhance the global quality of life, civil engineers serve competently, collaboratively, and ethically as master:
 - • stewards of the natural environment and its resources;
- ❑ How can we better collaborate to enable prefabrication?
- ❑ Should prefabrication receive more credit in sustainability rating systems?

SO WHAT DOES THIS MEAN FOR YOU?

- ❑ Every one (owners, designers, constructors) should be thinking about all three aspects of sustainability.
- ❑ We must collaborate DURING DESIGN to maximize a project's sustainability.
- ❑ We can use Design-Assist and other processes to enable needed collaboration even on Design-Bid-Build projects.

CLOSING

- ❑ Our clients, employees and children will increasingly be demanding that we proactively consider the triple bottom line in the design and construction of our projects.
- ❑ Achieving ASCE's vision 2025 and improving the reputations of the civil engineering profession and construction industry require collaborative approaches to construction safety.

THANK YOU FOR YOUR TIME!

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www.designforconstructionsafety.org