

Framing Alternatives Assessment: The Lowell Center Approach

Joel A. Tickner, ScD

Lowell Center for Sustainable Production

University of Massachusetts Lowell

www.chemicalspolicy.org

Joel_tickner@uml.edu



Outline of presentation

- **Rationale for Alternatives Assessment**
- **Examples of alternatives assessment in policy/action**
- **The Lowell Center Framework**
- **Moving Alternatives Assessment Forward**



Why Safer Alternatives Processes

- **Definition**: A flexible, holistic analysis of alternatives and opportunities to prevent impacts from potentially harmful activities including considering the need for the activity.
- Focus on solutions rather than problems. Opportunities rather than inevitabilities. Drives discussions on what a government agency or proponent of an activity could be doing rather than the “acceptability” of a particular potentially harmful activity.
- Gets us out of never-ending discussions of “how risky”. More efficient use of resources.
- We won’t find solutions if we don’t look for them.



Why Alternatives Assessment (cont.)

- Potentially more certainty about outcomes. Its easier to assess if something is “safer” than its absolute safety.
- Allows for a greater range of information and consideration in decision-making processes
- Stimulates innovation and prevention
- Multi-risk reduction opportunities.
- Greater opportunities for citizen involvement. Decision-makers and the public may see risks as unnecessary when there are safer alternatives.
- *One of the most essential, and powerful steps to change is understanding that there are alternatives.*

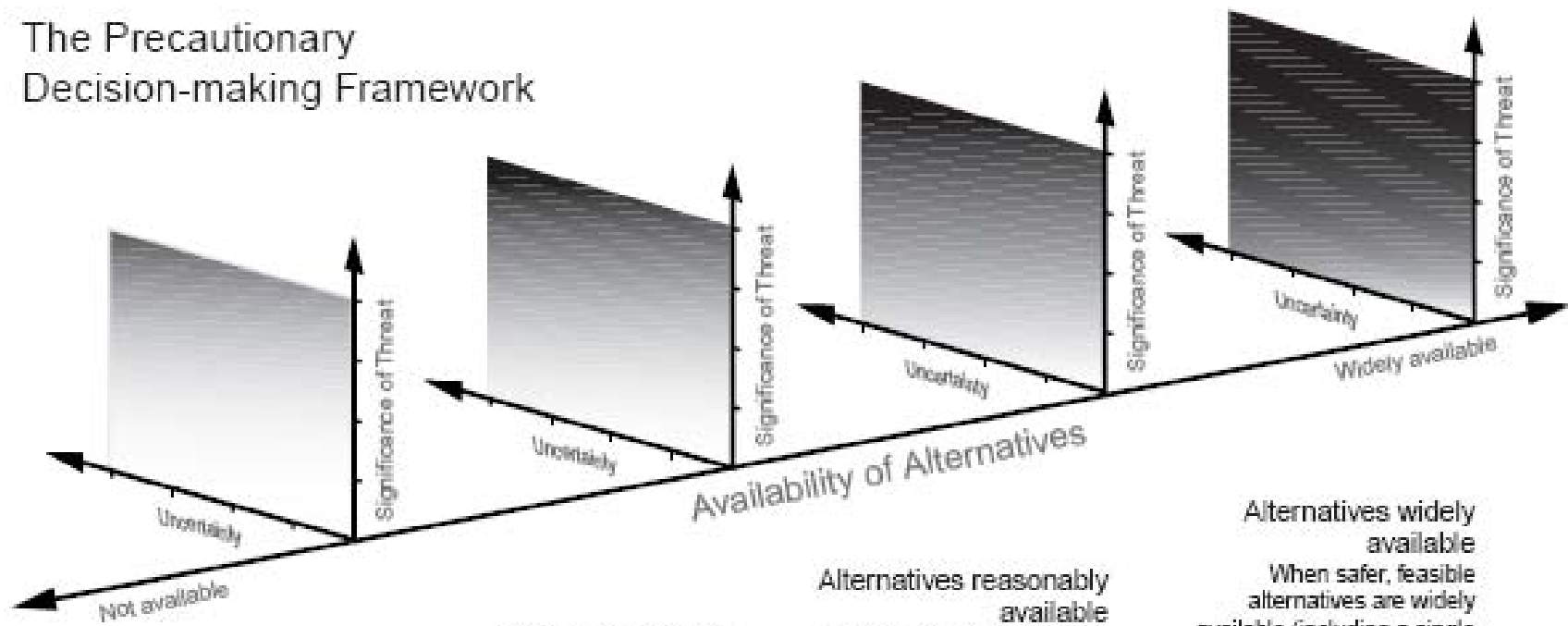


Alternatives Assessment Steps

- **Examine/understand impacts and purpose of activity. Broadly define**
- **Identify wide range of alternatives.**
- **Conduct detailed comparative analysis of alternatives (pros/cons, economic, technical, h&s)**
- **Select “best” alternative and institute implementation and follow-up plan.**
- **Identify technical/research support needs**
- **Develop metrics to measure successes**



The Precautionary Decision-making Framework



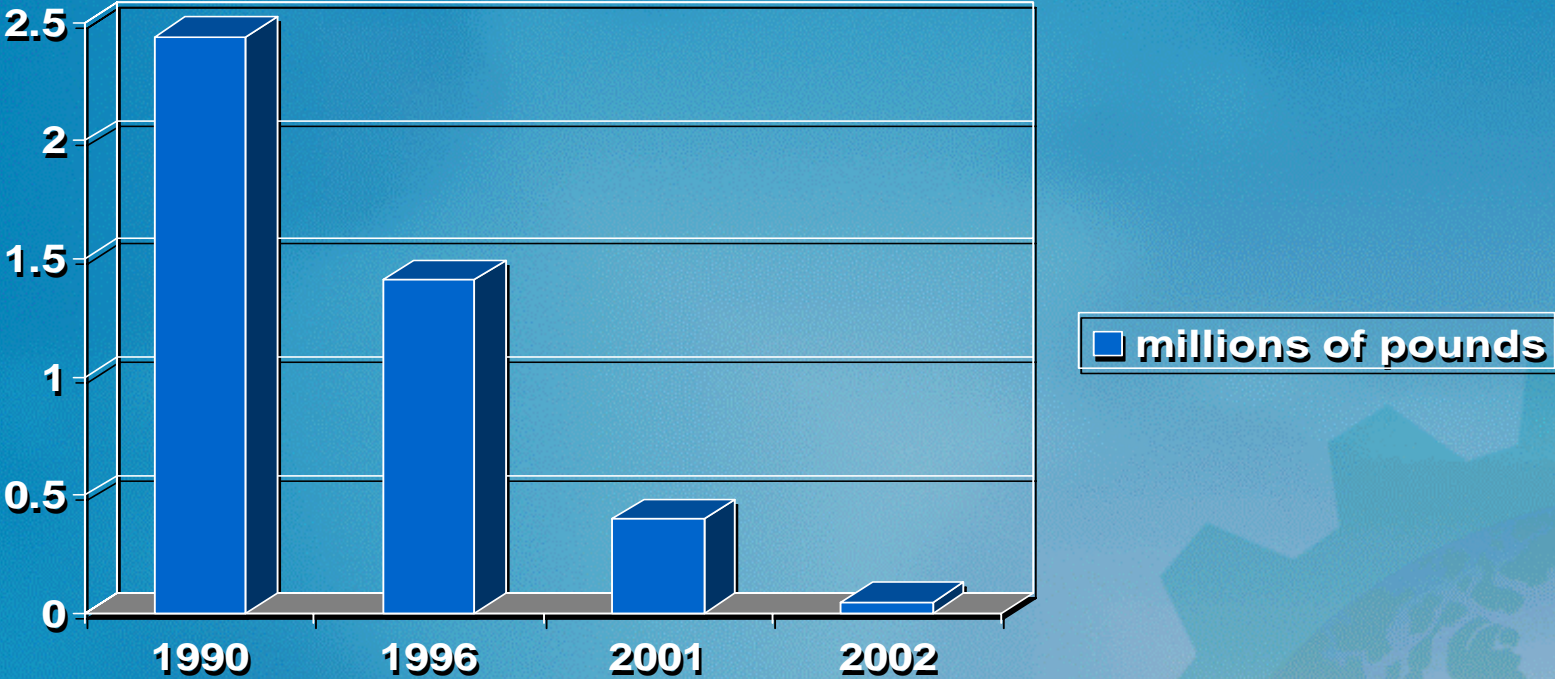
Alternatives Currently Not Available
 When safer alternatives are not currently available or infeasible, strict to weak precautionary measures should be taken depending on the significance of the threat and uncertainty of exposure and impacts. In the meantime, efforts should be undertaken to explore safer and feasible alternatives.

Alternatives limited
 When safer alternatives are limited because of feasibility or potentially significant trade-off risks, strict to weak precautionary measures should be taken depending on the significance of the threat, uncertainty about exposure and impacts, and the potential for safer alternatives to be developed.

Alternatives reasonably available
 When safer alternatives are available but may have technical or economic feasibility concerns, strict to moderate precautionary measures should be applied depending on the significance of the threat, uncertainty about exposure and impacts, and the potential of the alternatives to be refined.

Alternatives widely available
 When safer, feasible alternatives are widely available (including a single alternative), strong or strict precautionary measures should generally be applied. The choice of alternative will depend on the particular characteristics of the situation.

MA TCE Cleaning Use Data



U.S. Early Substitution/Alternatives assessment Policies

- 1956 Delaney Clause of the Food Drug and Cosmetic Act
- 1970 National Environmental Policy Act
- 1976 Toxic Substances Control Act
- 1977 Great Lakes Water Quality Agreement
- 1989 Massachusetts Toxics Use Reduction Act and now 5 chemical study
- Recently: State PBT policies, procurement policies, state chemical restrictions, green chemistry efforts



Defining substitution

- **Substitution means the replacement or reduction of hazardous substances in products and processes by less hazardous or non-hazardous substances, or by achieving an equivalent functionality via technological or organizational measures (Okopol and Kooperationsstelle Hamburg)**



History of Substitution in Europe

- **Anyone handling or importing a chemical product shall take such steps and otherwise observe such precautions as are necessary to prevent or minimize harm to human beings or to the environment. This includes avoiding chemical products for which less hazardous substitutes are available.**
- **1985 Swedish Act on Chemical Products – but first written in the 1970s**
- **Non-Toxic Environment Goal (generational goal)**



More European Policies

- **OSPAR and North Sea Convention Calls for Phase outs of problem substances**
- **1977 European Union Limitations Directive**
- **Occupational Health Directives**
- **Restrictions on Hazardous Substances Directive**
- **Cosmetics Directive**
- **REACH**
- **National Projects**
 - **German Substitution Project**
 - **UK Worker Health efforts**
 - **Danish and Swedish action plans**

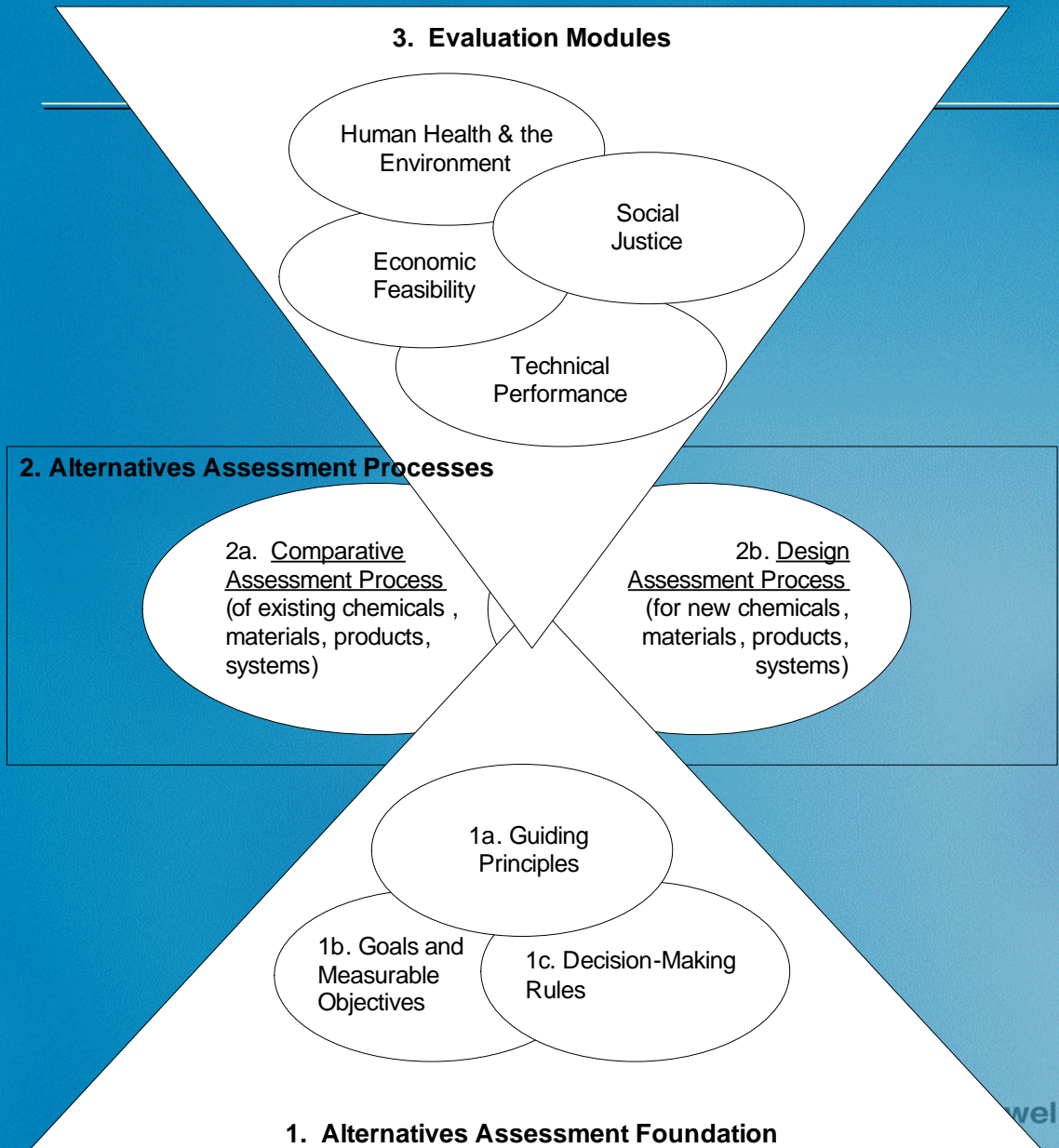


The Lowell Center Alternatives Assessment Framework - Goal

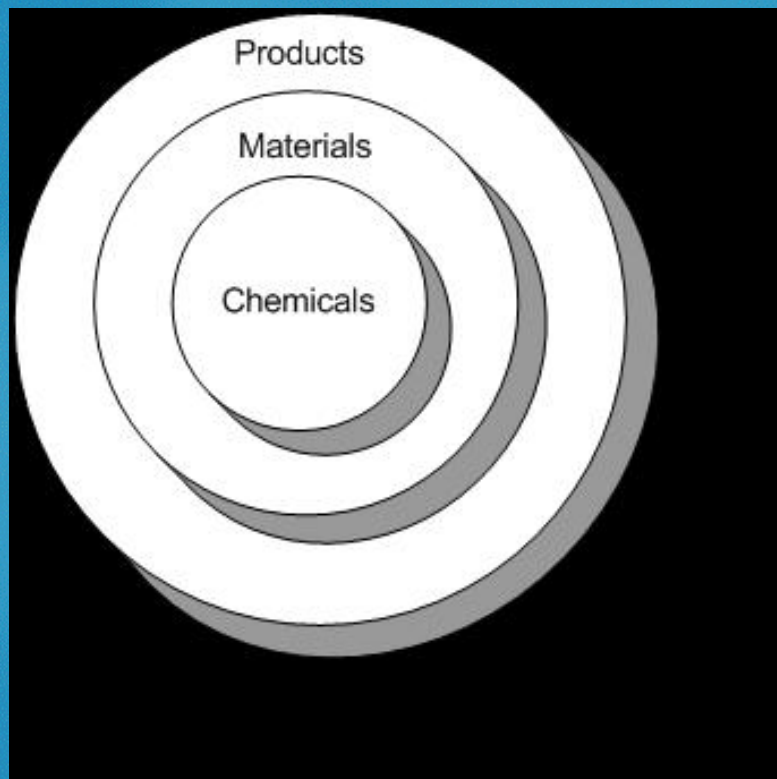
- **Creating an open source framework for the relatively quick assessment of safer and more socially just alternatives to chemicals, materials and products of concern. “Open source” means the collaborative development, sharing, and growth of methods, tools, and databases that facilitate decision making. “Relatively quick assessment” means that the process results in robust decisions informed by the best available science, while avoiding paralysis by analysis.**



Figure 1. Alternatives Assessment Framework : Overview



Focus of the Lowell Center Framework



Parts of the Lowell Center Alternatives Framework

- Foundation, where values are made explicit by clearly articulating the Principles, Goals, and Rules that guide decisions made during the assessment of alternatives.
- Assessment Processes -- The methods, tools, and criteria used to evaluate which chemicals, materials, or products are safer and socially preferable. The Comparative Assessment Process and the Design Assessment Process are two separate yet overlapping tracks, varying depending on whether the subject of evaluation is an existing product or a product under development. For both having positive design criteria helps to set the stage and provide a benchmark for whether alternatives are moving towards safer materials/processes
- Evaluation Modules, which evaluate the economic feasibility, technical performance, human health and environment impacts, and social justice impacts of alternatives.



Guiding Principles – “Values Matter”

- **Precaution**
- **Prevention**
- **Substitution**
- **Lifecycle Thinking**
- **Transparency**
- **Enhancing Decisions**
- **Continuous improvement**
- **Open Source**



Goals and measurable objectives

- **Achieve a non-toxic environment by 2020**
- **Use renewable energy and resources**
- **Use materials that can be closed loop recycled or composted**
- **Eliminating PVC**
- **Design for disassembly**

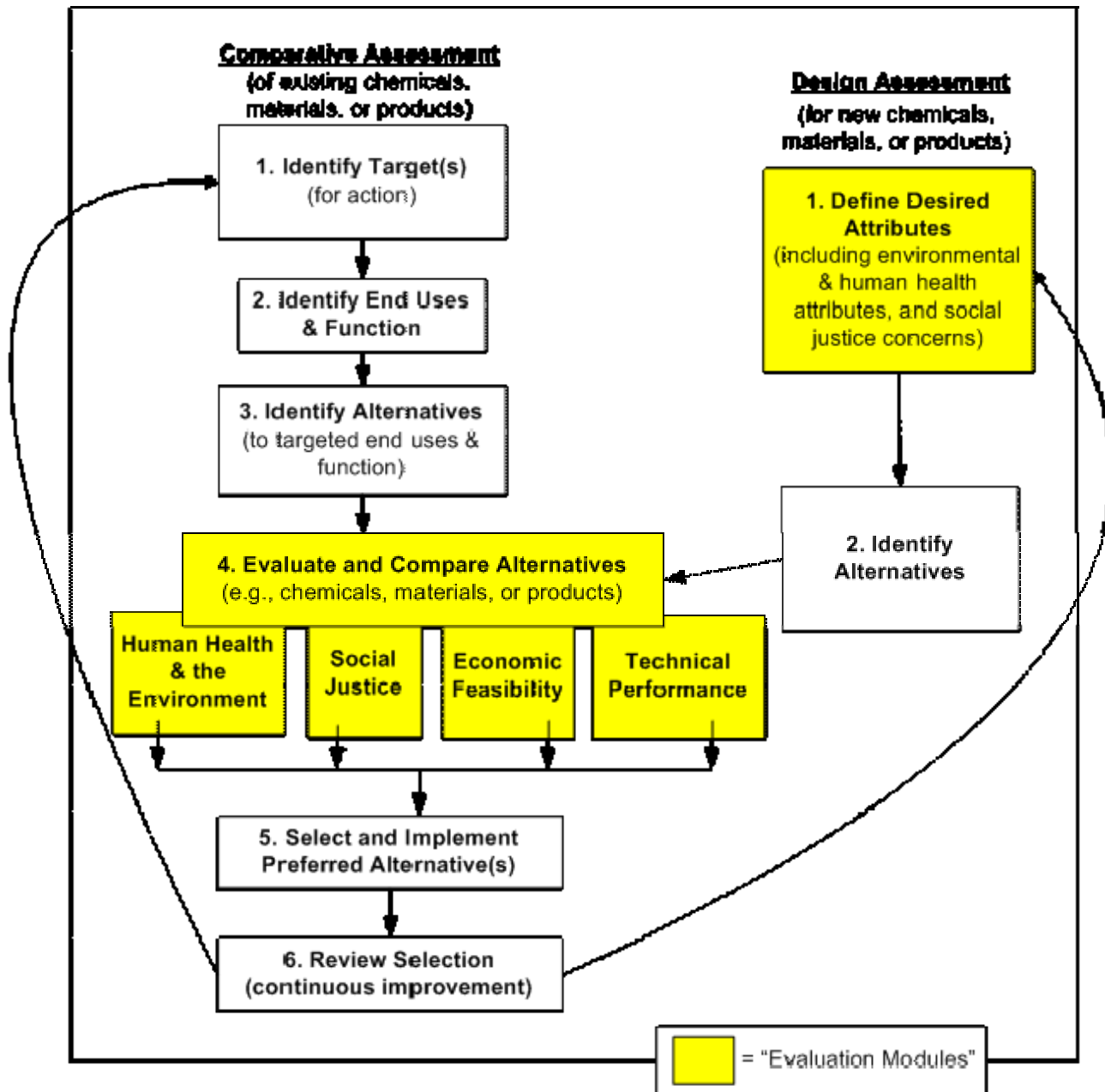


Decision-Making Rules

- **Treat all chemicals lacking data as if they were chemicals of moderately high concern.**
- **Prefer solutions that eliminate the function of a problematic chemical, material, or product.**
- **Prefer methods that present disaggregated data. Such methods would present data across evaluation categories or hazards in their actual value terms – rather than creating a single number to compare across options – allowing a more transparent evaluation of trade-offs between options.**
- **Accept hazard assessment data as sufficient for determining whether to avoid a chemical.**
- **Avoid alternatives that are the direct source of persistent, bioaccumulative toxics (PBTs) across their lifecycle.**



Figure 4. Alternatives Assessment Processes



Design Assessment Steps

- 1) Define Desired Attributes
- 2) Identify Alternatives
- 3) Evaluate and Compare Alternatives
- 4) Select Preferred Alternative(s)
- 5) Review Selection

- Tools for identifying desired attributes:
 - Principles of Green Chemistry
 - Principles of Green Engineering
 - Natural Step steps



Comparative assessment approaches

- Well defined for economic analysis – full cost accounting
- Several models for technical performance – though often case specific
- Few models for social impacts assessment

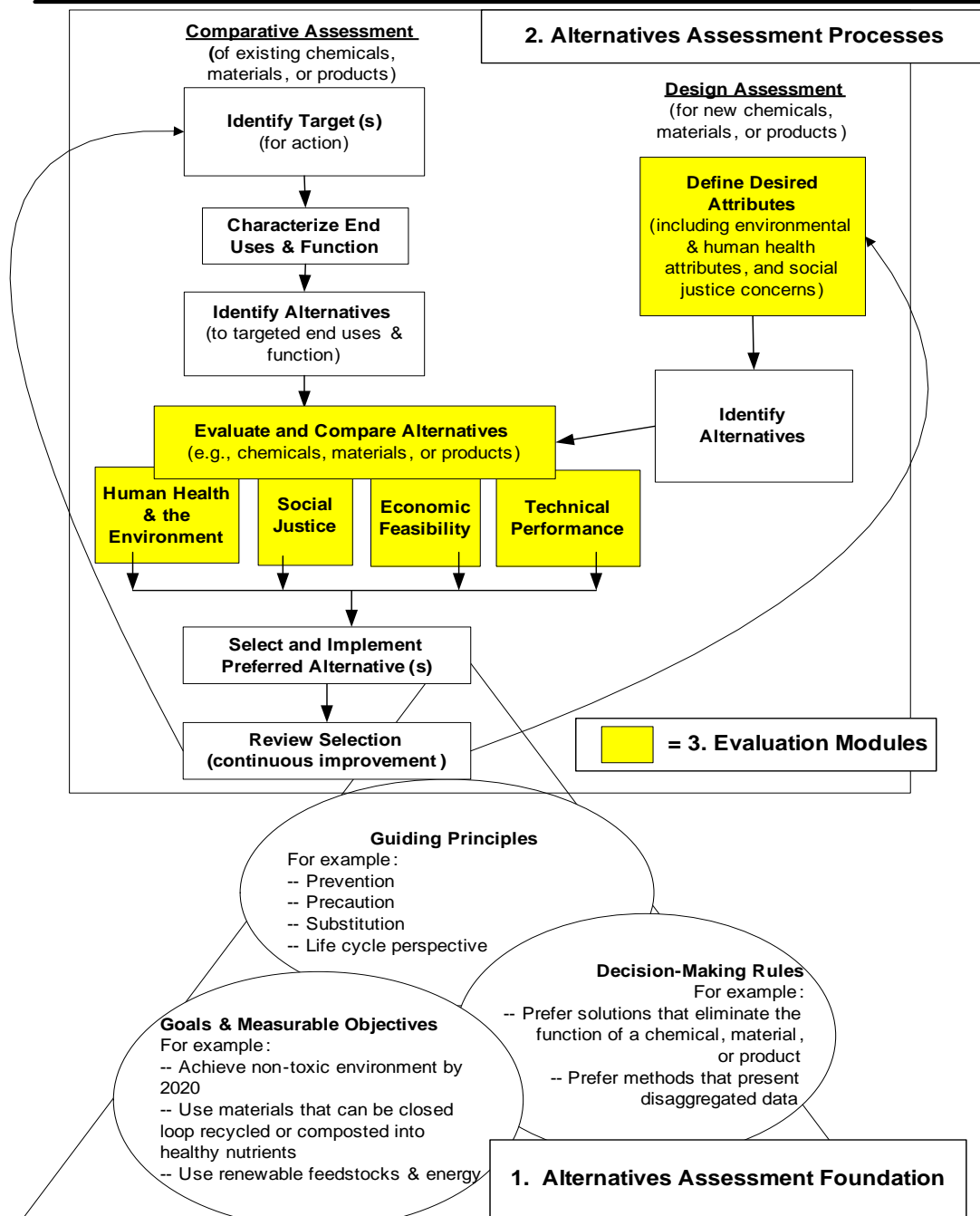


Comparative Options Approaches For Environment Health and Safety

- “Quick Scan” developed by The Netherlands.
- “PRIO” developed by the Swedish Chemicals Inspectorate (KemI).
- “The Column Model” developed by the German Institute for Occupational Safety (BIA).
- The “Pollution Prevention Options Analysis System” (P2OASys) developed by the Massachusetts Toxics Use Reduction Institute.
- The “Cradle to Cradle Design Protocol” developed by McDonough Braungart Design Chemistry (MBDC). The MBDC Cradle to Cradle Design Protocol also encompasses material and product assessment.
- The “Chemicals Assessment and Ranking System (CARS) designed by the Zero Waste Alliance.
- The “P2 Framework Models” developed by the US Environmental Protection Agency, which includes “EPI Suite,” ECOSAR Aquatic Toxicity,” “OncoLogic,” and the “PBT Profiler.”
- The Cleaner Technologies Substitutes Assessment (CTSA) method developed by the US EPA DfE Program and the University of Tennessee Center for Clean Products and Clean Technologies.
- The US EPA’s chemical alternatives assessment developed in *Furniture Flame Retardancy Partnership: Environmental Profiles of Chemical Flame-Retardant Alternatives for Low-Density Polyurethane Foam* (2005).
- The “GreenList” Process developed by the SC Johnson Company



Figure 5. Alternatives Assessment Framework : Detailed Summary



Alternatives assessment should occur with in a planning process

- Understanding materials flows and supply chain linkages
- Understanding production processes and product design – why and how chemicals/materials are being used
- Understand options for reducing problem chemical use either in production process or product design – maintaining desired function.
- Understanding the performance, health safety and environmental trade-offs involved.
- Establishing priorities, performance targets and measuring progress towards more sustainable process and product design.



Alternatives assessment and implementation are not always that easy

- **Need for research and development support to firms**
 - Training in planning
 - Demonstration projects/sites
 - Networking of firms/communities
 - Research support
 - Technical assistance to firms/communities
- **Need networking of supply chains/communities**
- **Rewarding leaders for their efforts**



Lessons Learned – rapid screening and assessment tools

- **Need for tools to rapidly characterize chemical hazards, exposures and risks**
- **Need effective prioritization schemes**
- **Tools that identify positive criteria in chemicals – design criteria**



Importance of goals/design criteria to guide alternatives assessment

- Sets stage – where are we going
- Provides a benchmark/metric – are alternatives getting us towards goals
- Provides a new use of science towards solutions rather than figuring out how bad things are



Conclusion

- **Alternatives assessment gets us out of the never ending and never won battles over risk and focuses on solutions, opportunities and innovation.**
- **The Lowell Center Framework provides a flexible though defined approach to outline the minimum components and considerations in any thorough alternatives assessment**
- **Alternatives assessment and implementation of alternatives is possible and necessary to move towards a safer, cleaner environment.**

