The landscape of tools to support the transition to safer chemicals: lessons learned

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Finding Safer Alternatives

Substitution is not just tools, it's a process

- Substitution: "the replacement or reduction of hazardous substances in products or processes by less hazardous or non-hazardous substances, or by achieving an equivalent functionality via technological or organizational measures"
- Significant growth over the last decade in the methods, tools and resources to support substitution
- Tools designed to serve substitution planning and assessment processes
  - The goal is: Informed Substitution

Function Matters

Advancing **Innovative** Substitution

Functional Substitution Level	**Chemical in Product** Bisphenol-a in Thermal Paper	**Chemical in Process** Methylene Chloride in Degreasing Metal Parts
Chemical Function (Chemical Change)	Is there a functionally equivalent chemical substitute (i.e., chemical developer)? **Result: Drop-in chemical replacement**	Is there a functionally equivalent chemical substitute (i.e., chlorinated solvent degreaser)? **Result: Drop-in chemical replacement**
End Use Function (Material, Product, Process Change)	Is there another means to achieve the function of the chemical in the product (i.e., creation of printed image)? **Result: Redesign of thermal paper, material changes**	Is there another means to achieve the function of the process (i.e., degreasing)? **Result: Redesign of the process** (e.g., ultrasonic, aqueous)
Function As Service (System Change)	Are cash register receipts necessary? Are there alternatives that could achieve the same purpose (i.e. providing a record of sale to a consumer)? **Result: Alternative printing systems** (e.g., electronic receipts)	Is degreasing metal parts necessary? Are there other alternatives that could achieve the same purpose (i.e., providing metal parts free of contaminants for other end uses)? **Result: Alternative metal cutting methods**

Tickner, et al., Environmental Science and Technology, 2014

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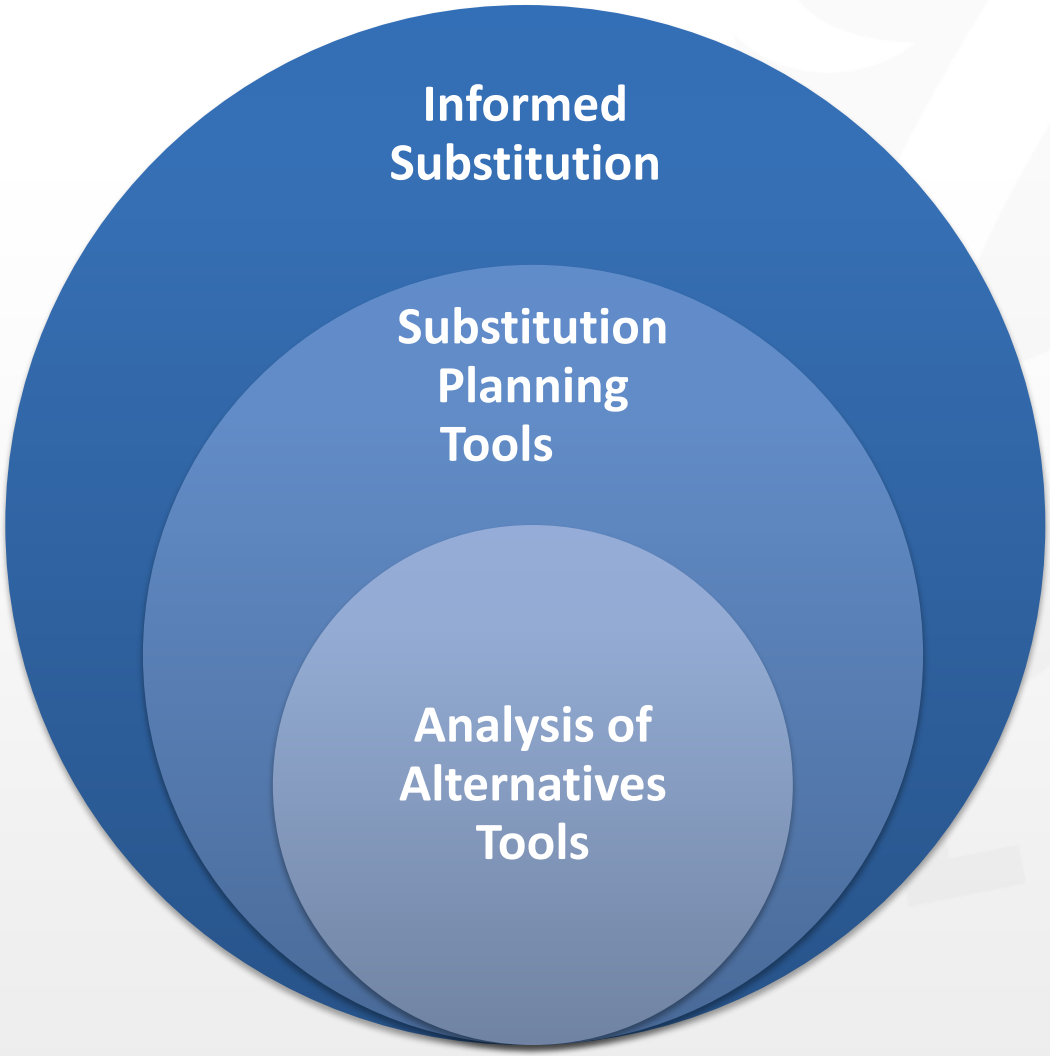
Substitution Process and Support Tools



Substitution

- **Tools** to plan and support the substitution project
- **Tools** for connecting with partners/innovators

AoA

- **Tools** for screening and comparing alternatives based on hazards, performance, and economic viability
- **Data tools** to support AoA

Landscape of Substitution Support Tools

(Not comprehensive, or mutually exclusive)

Connector tools

- ChemSec's Market Place
- EEN's Partnership Opportunities Database

Restricted/preferred lists

- SIN List
- Sector-based lists (e.g., Global Automotive Declarable List)
- US EPA Safer Chemical Ingredient List

Screening tools

- GreenScreen List Translator
- PRIO
- RISTOX
- SINimiarity
- UL The Wercs

Comparative assessment tools

- GreenScreen®
- Quick Chemical Assessment Tool (QCAT)
- Scivera Lens
- Column Model
- P2OAYSys

Data tools

- ECHA data
- EChem Portal
- OECD QSAR Toolbox
- EPISuite

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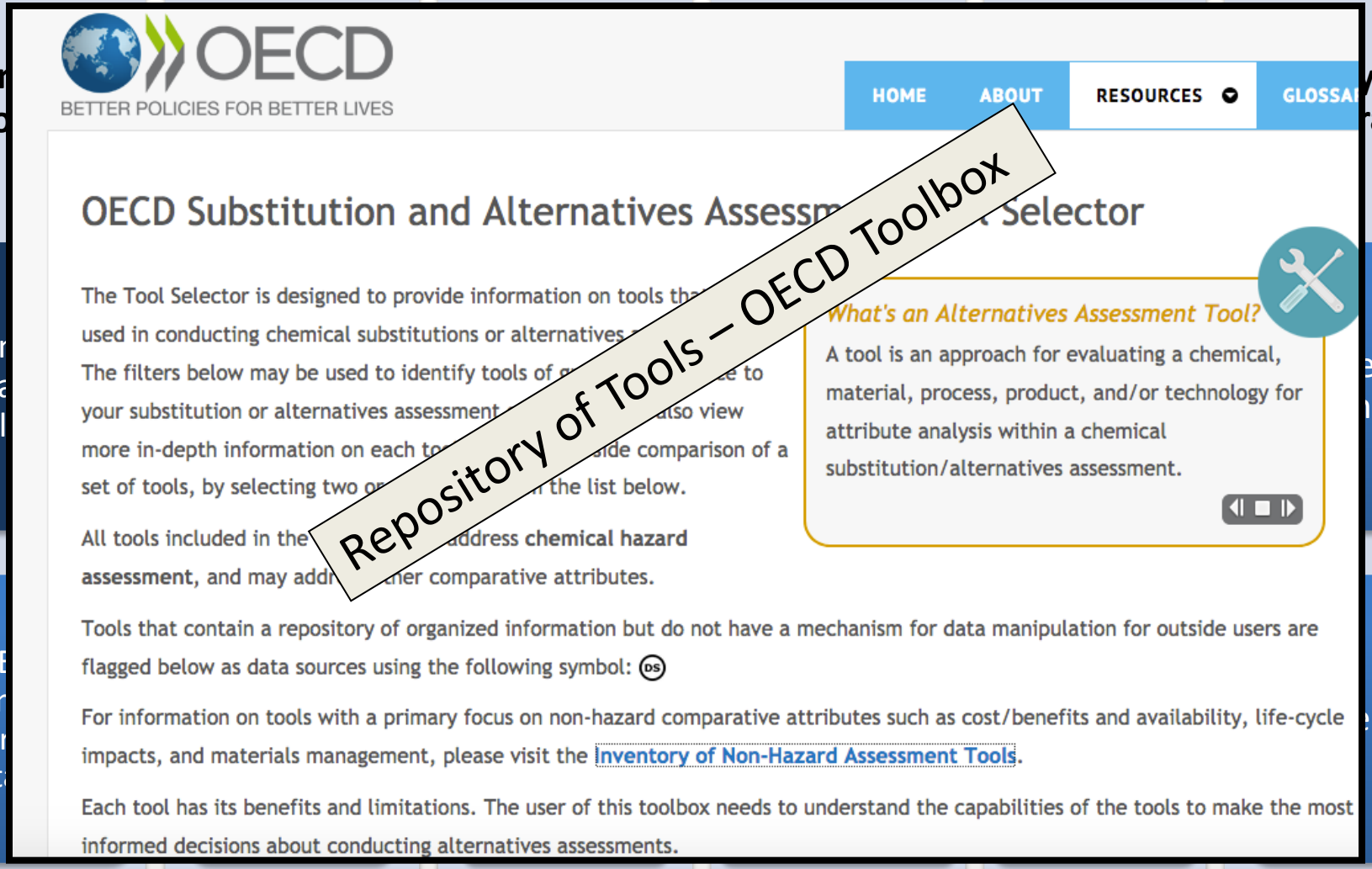

Some Lessons

- Chemical screening tools are “quick and dirty” ways to identify and avoid known chemicals of concern
  - limited in helping to identify safer alternatives and avoid regrettable substitutes
  - more useful therefore are the comparative assessment tools
- Some comparative tools provide guidance for decision-making (e.g., GreenScreen benchmarks), other tools array data and decision is left to user
  - wherever there is decision-making, transparency regarding the methods is essential
- Tools specific for the substitution/analysis of alternatives context are needed for
  - the non-hazard attributes: e.g., life cycle attributes and performance
  - comparing chemical to non-chemical alternatives

Remember the Goal: Informed Substitution

- Supporting a considered transition from chemicals of higher concern to safer, feasible alternatives
  - Using data and associated support and assessment tools to minimize the likelihood of untended consequences when substituting a hazardous chemical without fully understanding the profile of alternatives

Thank you

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