Commoning safer chemicals

Socially robust knowledge in green chemistry?

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Regrettable substitution

replacing one harm with another

California Department of Health Services (2004). *Aerosol cleaner use in auto repair* (HESIS Fact Sheet).

Safer chemical substitution

Chemical hazard assessment

Chemical alternatives assessment

Geiser, K. (2015). *Chemicals without harm: Policies for a sustainable world.*

Knowledge challenges with safer substitution

- Data incomplete or inaccessible
- Scientific uncertainty
- Conflicting interpretations
- Adversarial deconstruction and delegitimization of science

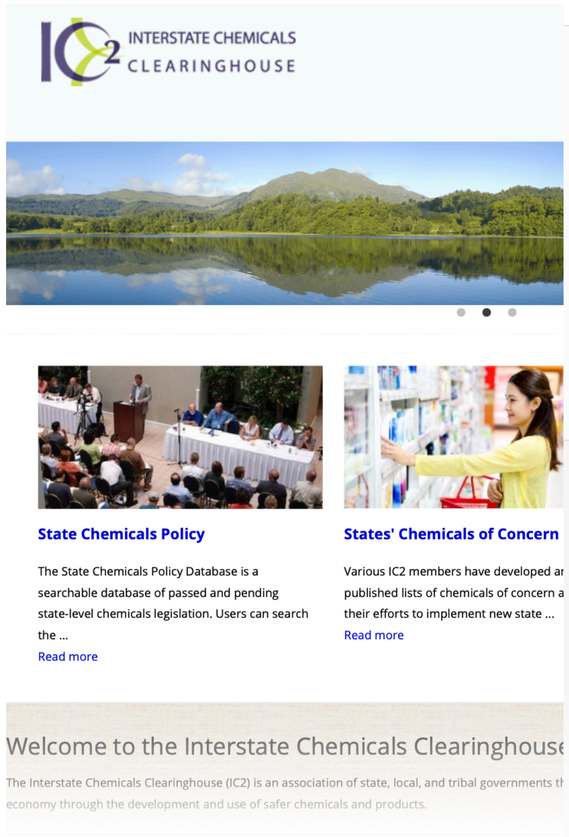
Judson, R., et al. (2009). The toxicity data landscape for environmental chemicals. *Environmental Health Perspectives*. https://doi.org/10.1289/ehp.0800168
Scruggs, C. E., & Ortolano, L. (2011). Creating safer consumer products: The information challenges companies face. *Env Sci & Pol.* https://doi.org/10.1016/j.envsci.2011.05.010
Jasanoff, S. (1987). Contested boundaries in policy-relevant science. *Social Studies of Science*. https://doi.org/10.1177/030631287017002001

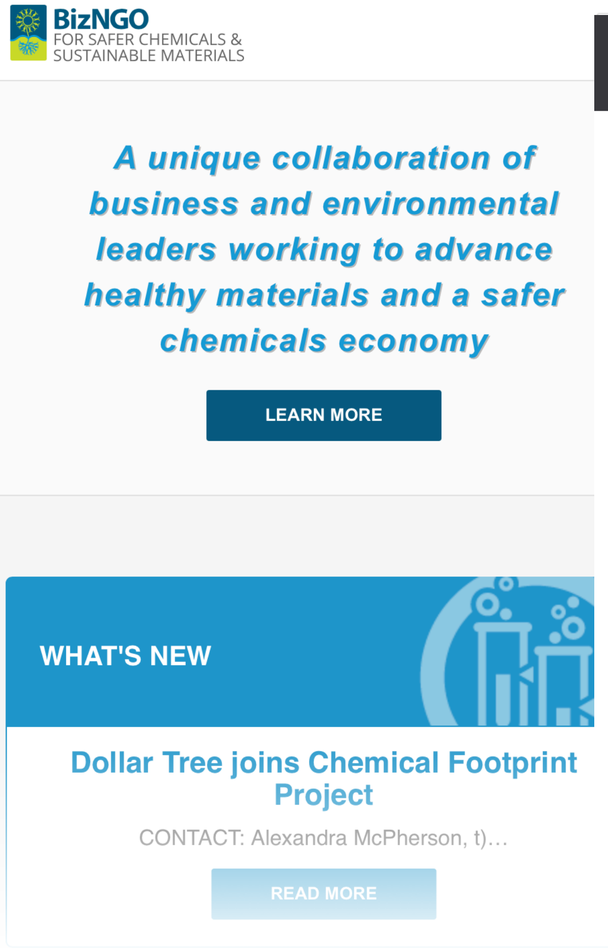
Socially robust knowledge

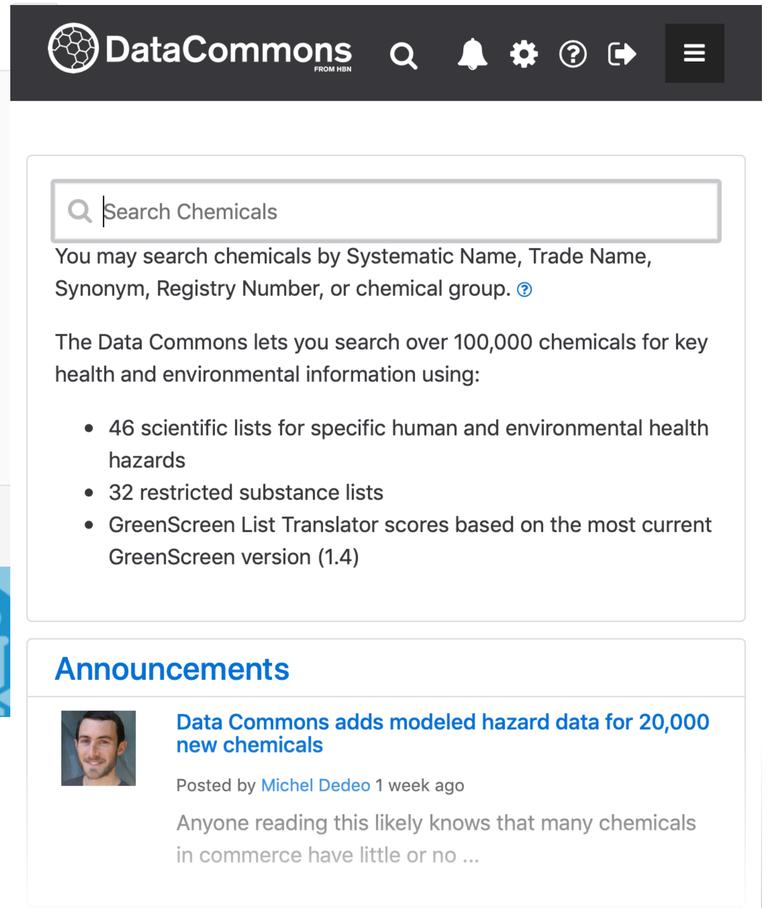
1. Tested in the real world, not just scientific labs
2. By an extended community of experts
3. Through an iterative, participatory process of testing & modification

Nowotny, H., Scott, P., & Gibbons, M. (2001). *Re-thinking science: Knowledge and the public in an age of uncertainty.* Image: Falling Walls Foundation.

Emerging collective efforts to develop knowledge



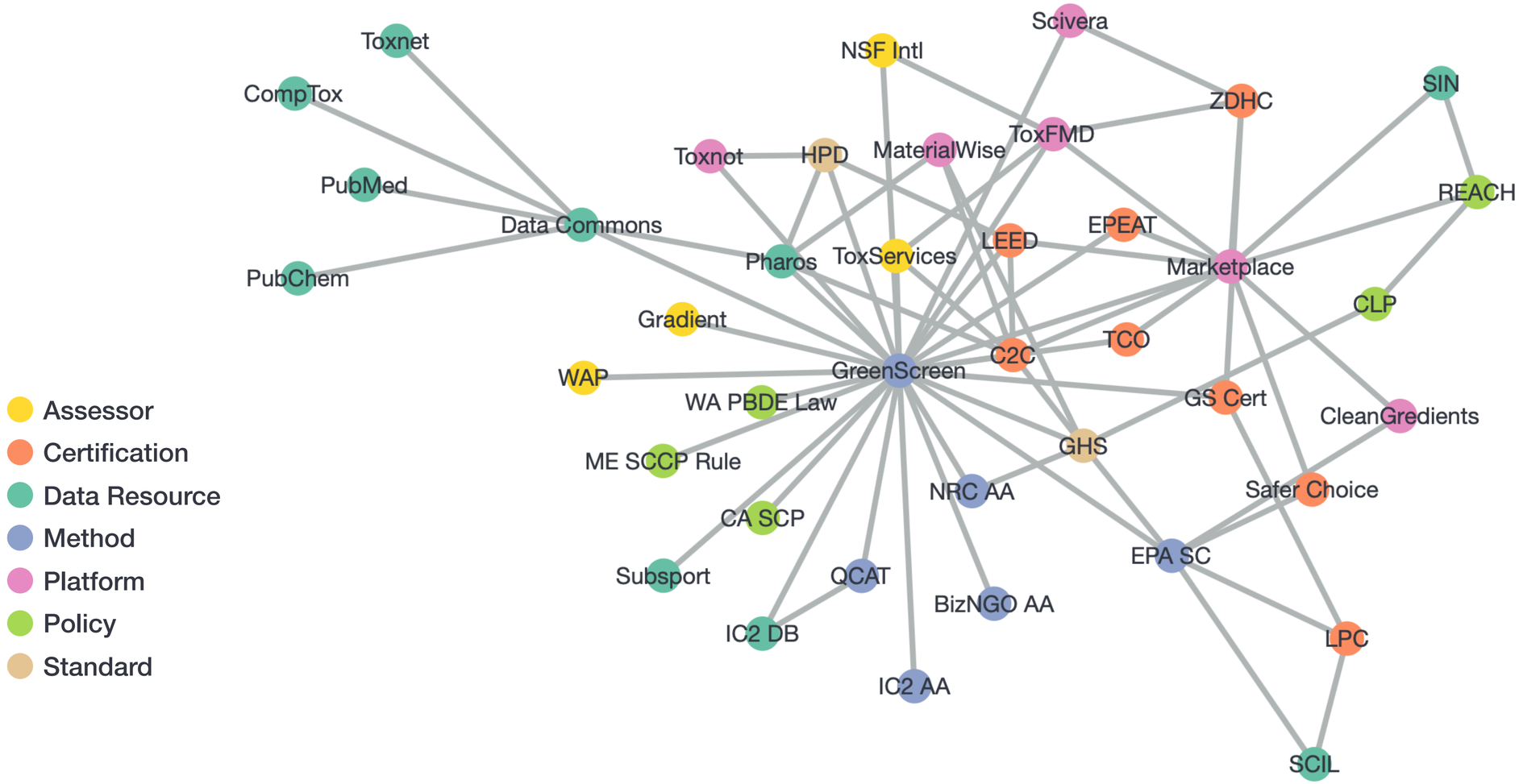




Screenshots: https://www.subsportplus.eu | https://theic2.org | https://www.bizngo.org | https://commons.healthymaterials.net

Can emerging knowledge commons produce socially robust knowledge about chemical hazards?

A knowledge network for chemical substitution



An interactive version of this diagram will be available at https://kaios.net/research/network

Case study: GreenScreen for Safer Chemicals

- **Benchmark 4** Prefer—Safer chemical
- **Benchmark 3** Use but still opportunity for improvement
- **Benchmark 2** Use but search for safer substitutes
- **Benchmark 1** Avoid—Chemical of concern

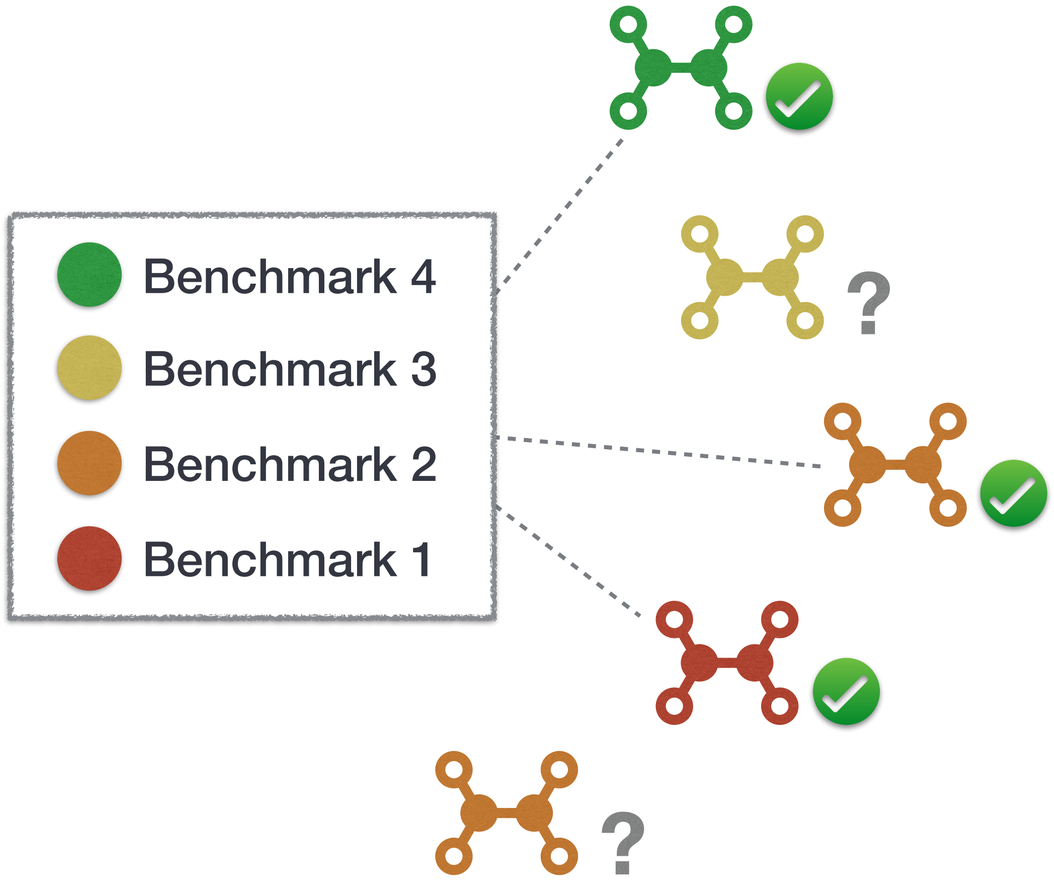
Clean Production Action (2018). https://www.greenscreenchemicals.org

The GreenScreen “ecosystem” is a knowledge commons

Resource	Access	Provision
GreenScreen method	Shared	Clean Production Action with community input
Derivative methodologies	Shared	NGOs & governments
Associated tools, databases	Shared	NGOs & firms
GreenScreen assessments	Private; some shared	Profilers

Institutional arrangements

- Decentralized knowledge production
- Open methodology, but with rules
  - Hierarchy of accreditation
  - Rules about making public claims
- GreenScreen assessments can be private IP



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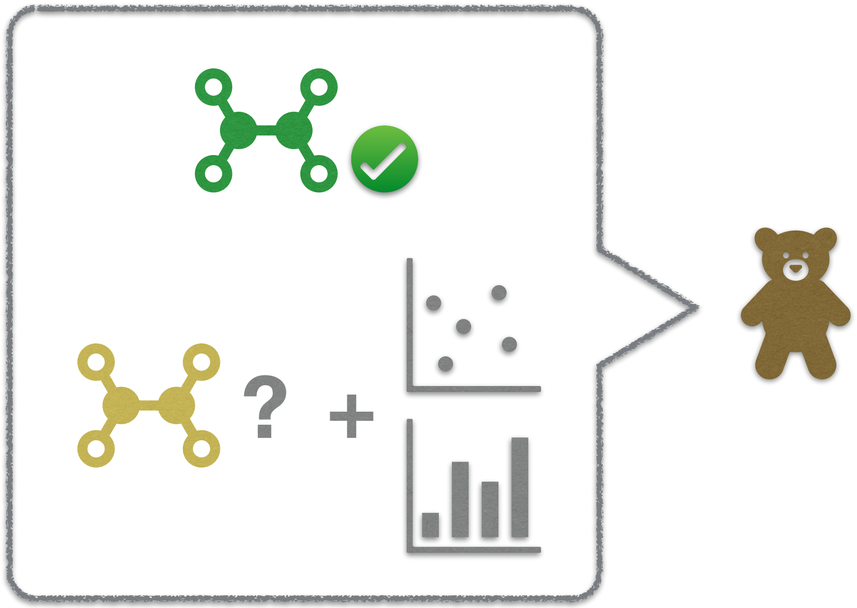

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Tests of validity: two examples of contested knowledge

	DINCH Endocrine activity	Chemical groups in authoritative lists
What is challenged	Chemical assessment conclusion Toxicology data interpretation	Refining established methodology Reinterpreting settled knowledge
Challengers	Chemical company & profiler	NGO & standards groups
Formal protocol	Yes – Benchmark Review	No – new review process created
Mediator	CPA (formal)	CPA & HBN (informal)
Open process	No	Yes
Who participated	Only challengers, mediator, neutral experts	Toxicologists & chemists from community
Result	Harmonized assessment (confidential)	Ongoing peer review New open standards created

Legitimizing knowledge

- Open verification through community peer review
- Trusted authority
  - serves as a formal mediator
  - authorizes private verification of knowledge

Commons dilemmas

- Pollution—manipulation of knowledge, or production of “negative knowledge”
- Underutilization—lack of community participation
- Underproduction of knowledge
- Privatization—enclosure or appropriation

Hess, C., & Ostrom, E. (Eds.). (2007). *Understanding knowledge as a commons: from theory to practice.*
Frickel, S., et al. (2010). Undone science. *Science, Technology, & Human Values*. https://doi.org/10.1177/0162243909345836

Commons dilemmas

- Underproduction of knowledge
  - Private sector-dominated market for hazard assessments
  - Fails to aggregate community demand for open knowledge

- Privatization—enclosure or appropriation
  - IP rights belong to profilers (consulting firms) or clients (industry)
  - Testing validity of knowledge requires privileged access

Commons dilemmas—especially privatization—affect the capacity of the commons to produce socially robust knowledge.

Social characteristics of commons knowledge

Socially robust knowledge	GreenScreen method	GS Assessments
Tested in the real world	Yes	Yes
Extended expert community	Yes	Depending on access
Iterative, participatory testing & modification	Yes	No

Commons attributes affecting social robustness

Socially robust knowledge	Chemical hazard assessment commons
Tested in the real world	Enabled by knowledge network Enabled by access to methodological knowledge
Extended expert community	Enabled by community openness Limited by protocols that protect private IP
Iterative, participatory testing & modification	Enabled by access to knowledge resources Limited by protocols that protect private IP Limited by access to chemical hazard assessments

Thank you

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