C-VORR: An Overview
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NERC/ESRC RRfW Kick-off Meeting
etc.venues, Paddington, London W2
24th July 2014
Why?

• Questionable RRfW decisions e.g.:
  ▪ Electricity / Concrete production system: chemistry of PFA?
  ▪ PET bottle recycling system: eCO₂?
  ▪ EU waste recycling system: social, environmental impacts of resultant (legal, illegal) exports?

But... why?

- Inadequate **system analysis** tools
  - **Dogma** (waste hierarchy, zero waste, circular economy...)
  - Single **dimension** (LCA, EU recycling target) or **focus** (MFA/Sankey diagrams)
  - **End-of-pipe** approach
  - **Static** analyses

http://www.zerowasteurope.eu/category/separate-collection/
http://www.sankey-diagrams.com/tag/steel/
C-VORR: The basics

• RRfW = minimise dissipation of value in the system

• Value = multi-dimensional
  ▪ Financial, social, environmental, economic, functional...
  ▪ +ve (profit, benefit) or -ve (cost, impact)

• Waste is a system property
  ▪ Up-/down-stream
  ▪ System boundaries must consider technology, economics, geopolitics, regulation: “systems of provision”
  ▪ Where in the system is value lost/dissipated?
C-VORR: The basics

- **Two stage process** combining and modifying existing flow & valuation techniques:
  - **The Framework**
  - **The Value Flow Analysis**

- **Framework**: Heuristic, narrative pre- and post-analysis procedure
  - **Pre**: establish the vision, approach and capabilities
  - **Post**: critical reflection on limitations, **system boundaries** and proposed interventions
  - Informed by **systems of provision** approaches
C-VORR: The basics

Value flow analysis: establish the initial systems and the “physical” flows

Approaches: MFA (mfa), input-output, stocks & flows modelling, physical data...
C-VORR: The basics

Value flow analysis: attach multi-dimensional “values” to the flows

Approaches: LCA (lca), value chain analysis, quality data...
C-VORR: The basics

**Value flow analysis:** examine time-dependence, variability and sensitivity to system boundaries

**Approaches:** multi-criteria analysis, expert elicitation, hierarchical modelling...
Theory of everything / “42”?

• No.

• “in context of sustainability, the simile of a car dashboard is useful – we may have one destination (objective) in mind, but we have a range of instruments (value attributes) in front of us that support the driver (decision maker) in achieving the objective.”

  – G. Mitchell

Catalyst Outcomes

- C-VORR is not an abstract intellectual exercise
  - Co-created with industry partners
  - Systems thinking critical to achieving real sustainability goals in the waste industry
  - >£1M of industrial support
  - Internationally leading academic partners on MFA, LCA...
Associated activity

• Links with iBUILD
  ▪ EPSRC/ESRC £4M infrastructure interdependencies project: *Value* work stream
  ▪ HMG Treasury group on valuing resilience/passive provision: heterodox economics approaches
    • Changes to *Green Book*

• On-going dialogue with DEFRA
  ▪ data, existing preliminary analyses
C-VORR project outline

- 4 challenges/objectives ➞ primary workstreams
  - Methodology for $n$-D value attribution to flows
  - Dynamics and uncertainty
  - Data gathering and archiving
  - Complex value theory development
  - Additional comms. workstream
- 4 initial case studies (tbc. with NERC) ➞ advanced case studies
  - Power generation and PFA
  - Waste plastics
  - Biosolids from wastewater treatment
  - Nutrient recovery in UK farming
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<tr>
<th>Activity/Month</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
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<td>01-03</td>
<td>04-06</td>
<td>07-10</td>
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<tr>
<td>A: Project Start-up meeting / recruitment</td>
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<td>B: Steering committee meetings</td>
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<td>3</td>
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<td>C: PDRA #1: C-VORR theory, briefing note (1), papers (2-4)</td>
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<td>D: Preliminary Case Study 1-4 analyses (PDRA #2, #3)</td>
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<td>E: Initial Case Study 1-4 evaluation and reporting (briefing note)</td>
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<td>F: Advanced CS analyses (PDRA #2, #3) &amp; reporting (j. papers)</td>
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<td>G: App/software tool development: beta (1) and final (2)</td>
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<td>H: Academic/stakeholder exchange visits and placements</td>
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<td>I: Project management meetings</td>
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<td>J: Expert Panel meetings</td>
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<td>K: Stakeholder workshops /engagement (report within 3 months)</td>
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<td>L: Reports to funder including final report</td>
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**Key milestones:**
- Case study review, data gathering: draft CS reports shared across the team, Project Partners and expert/steering panels for comment by M12; final reports by M14 (E①-④)
- Detailed framework analysis on case studies presented at workshop: M18 (C②)
- Refined framework described in case study papers (submitted for review): M24 (F①,②)
- Application of framework to new case studies, examples provided at workshop: M30 (C③)
- Final papers submitted for review and final report produced: M36 (C④, L③)