

C-VORR: An Overview

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NERC/ESRC RRfW Kick-off Meeting
etc.venues, Paddington, London W2

24th July 2014

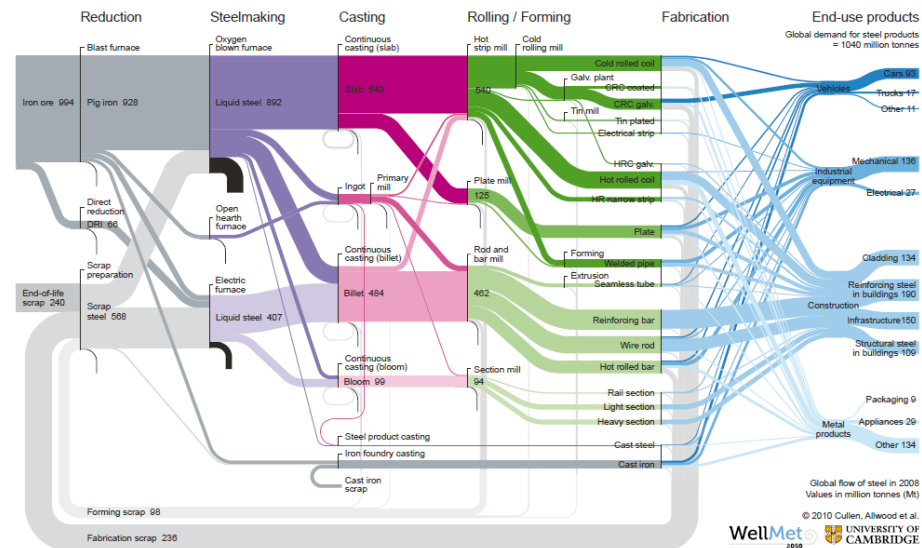
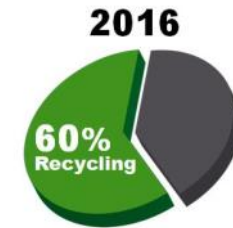
Why?

- 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.zerowasteurope.eu/category/separate-collection/)
<http://www.sankey-diagrams.com/tag/steel/>

C-VORR: The basics

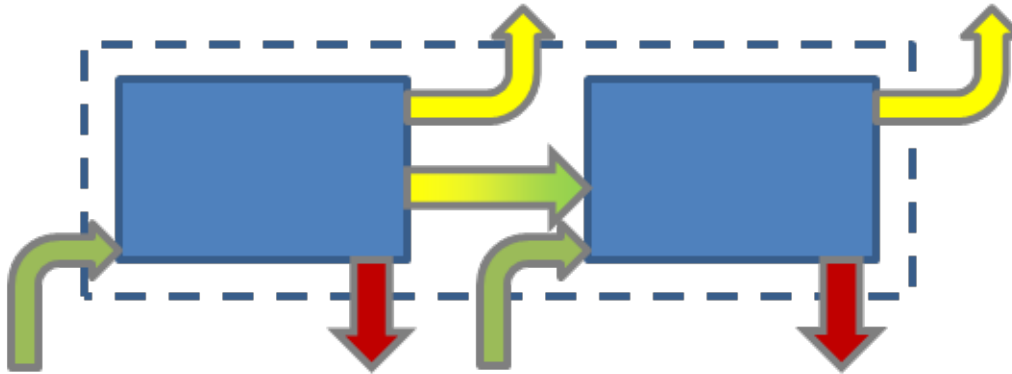
- RRfW = minimise dissipation of **value** in the **system**
- **Value** = multi-dimensional
 - Financial, social, environmental, economic, functional...
 - +ve (profit, benefit) or -ve (cost, impact)
- Waste is a **system** property
 - Up-/down-stream
 - System boundaries must consider technology, economics, 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

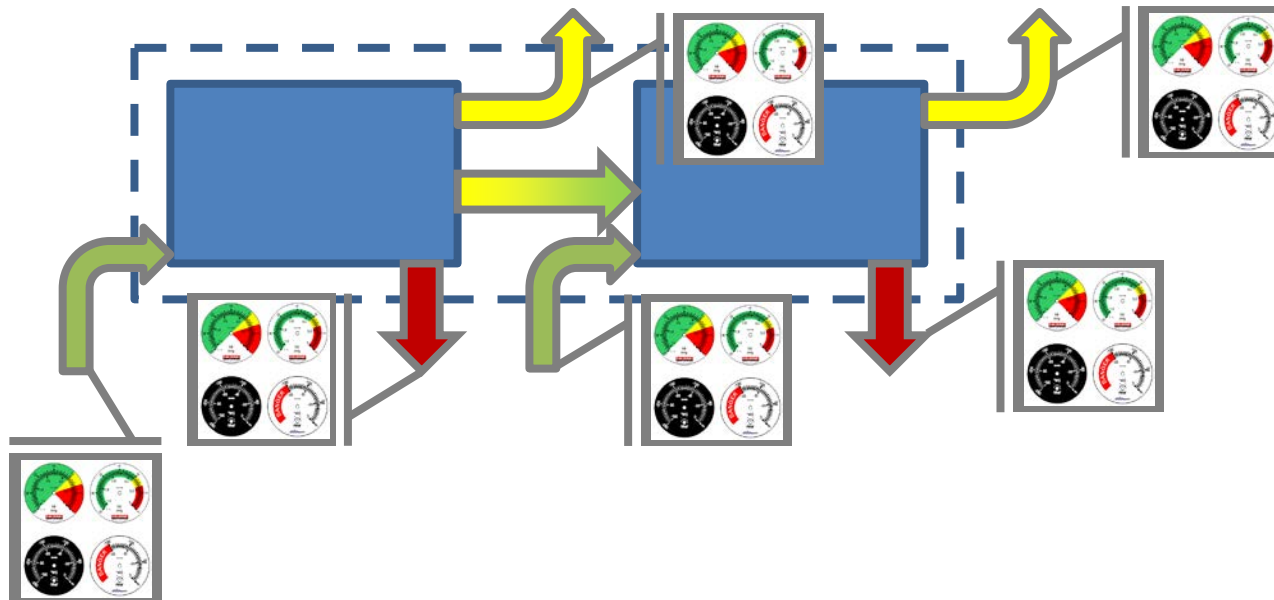
Value flow analysis: establish the initial systems and the “physical” flows



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

C-VORR: The basics

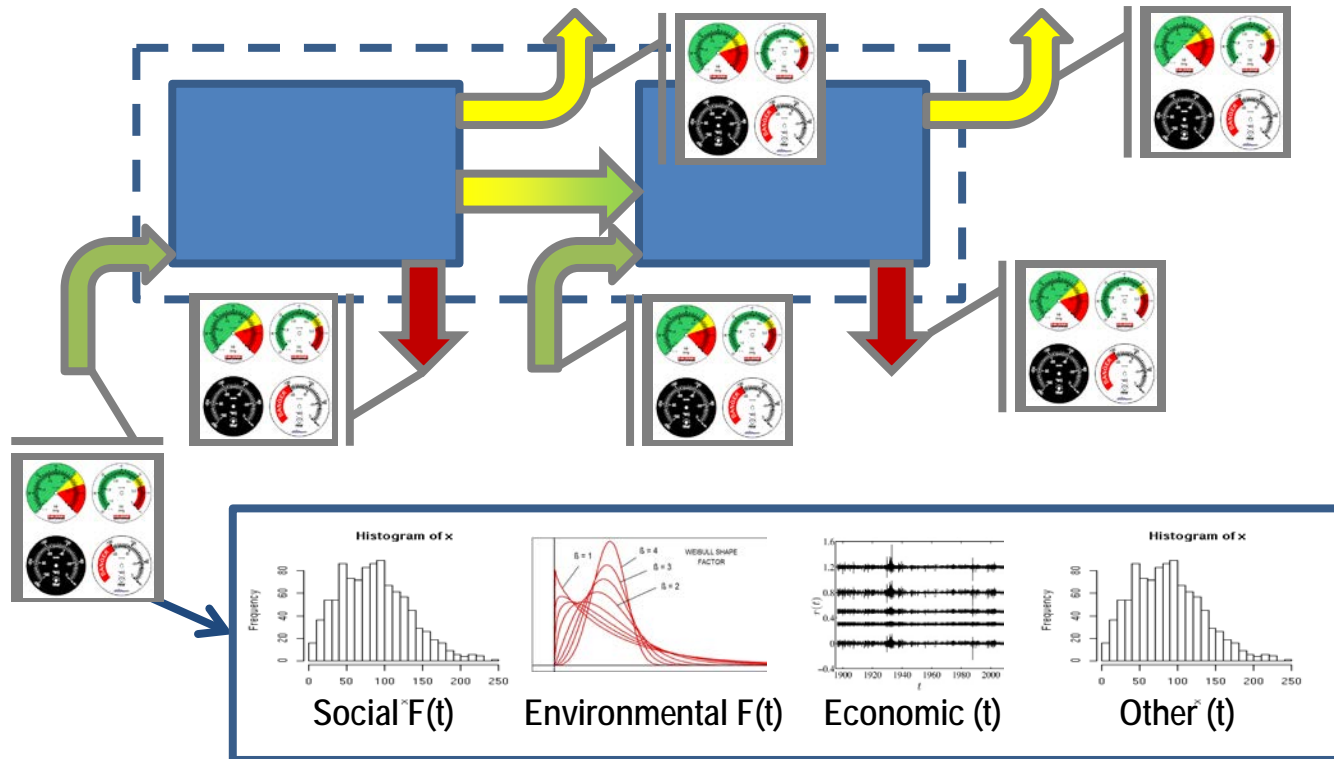
Value flow analysis: attach multi-dimensional “values” to the flows



Approaches: LCA (*lca*), value chain analysis, quality data...

C-VORR: The basics

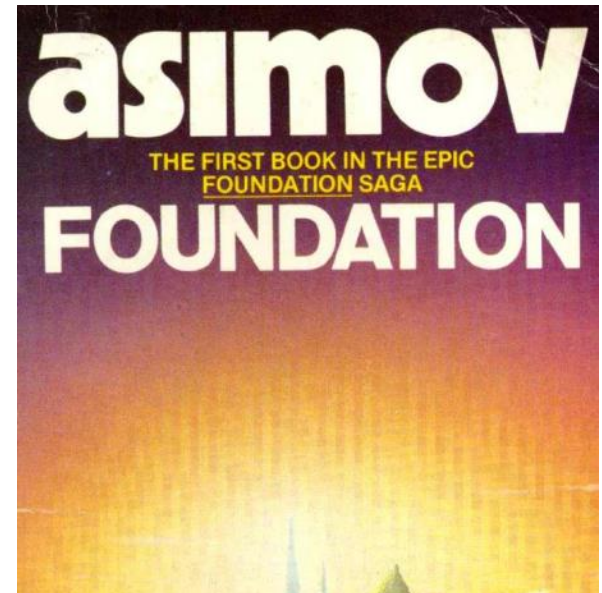
Value flow analysis: examine time-dependence, variability and sensitivity to system boundaries



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...

ARUP



ECOVER



linkenergyLtd



Viridor

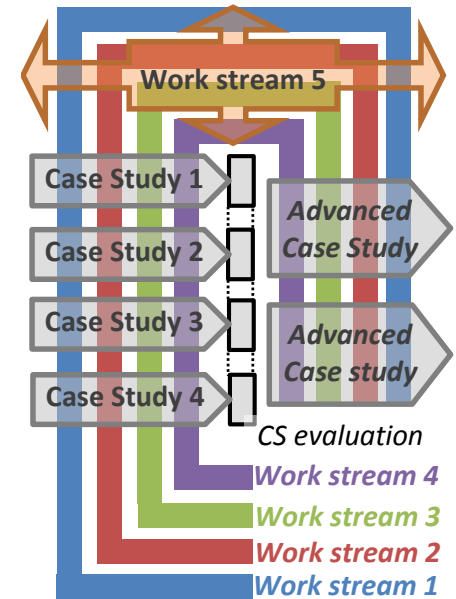
Associated activity

- 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

Activity/Month	Year 1				Year 2				Year 3			
	01-03	04-06	07-10	10-12	13-15	16-18	19-21	22-24	25-27	28-30	31-33	34-36
A: Project Start-up meeting / recruitment	①											
B: Steering committee meetings				①				②				③
C: PDRA #1: C-VORR theory, briefing note (1), papers (2-4)			①			②				③		④
D: Preliminary Case Study 1-4 analyses (PDRA #2, #3)												
E: Initial Case Study 1-4 evaluation and reporting (briefing note)					①-④							
F: Advanced CS analyses (PDRA #2, #3) & reporting (j. papers)								① ②				
G: App/software tool development: beta (1) and final (2)							①				②	
H: Academic/stakeholder exchange visits and placements												
I: Project management meetings	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
J: Expert Panel meetings	Convened on ad-hoc basis											
K: Stakeholder workshops /engagement (report within 3 months)		①				②				③		
L: Reports to funder including final report				①				②				③

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 (E ①-④)
- Detailed framework analysis on case studies presented at workshop: M18 (C ②)
- Refined framework described in case study papers (submitted for review): M24 (F ①, ②)
- Application of framework to new case studies, examples provided at workshop: M30 (C ③)
- Final papers submitted for review and final report produced: M36 (C ④, L ③)