



# Introduction to Life Cycle Assessment and Carbon Footprinting

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# Direct Environmental Impacts

- Where regulation affects the business
- Under a business' direct control
- Link to costs associated with energy and materials consumption
- Data generally available
- May be a small part of the overall product footprint

# Impacts Across Value Chains

- Impacts occur at every stage of the product life cycle
- Controlling direct impacts can lead to 'burden shifting' and may be counter-productive
- Need to take an holistic view

INDIRECT

DIRECT



# Life Cycle Assessment

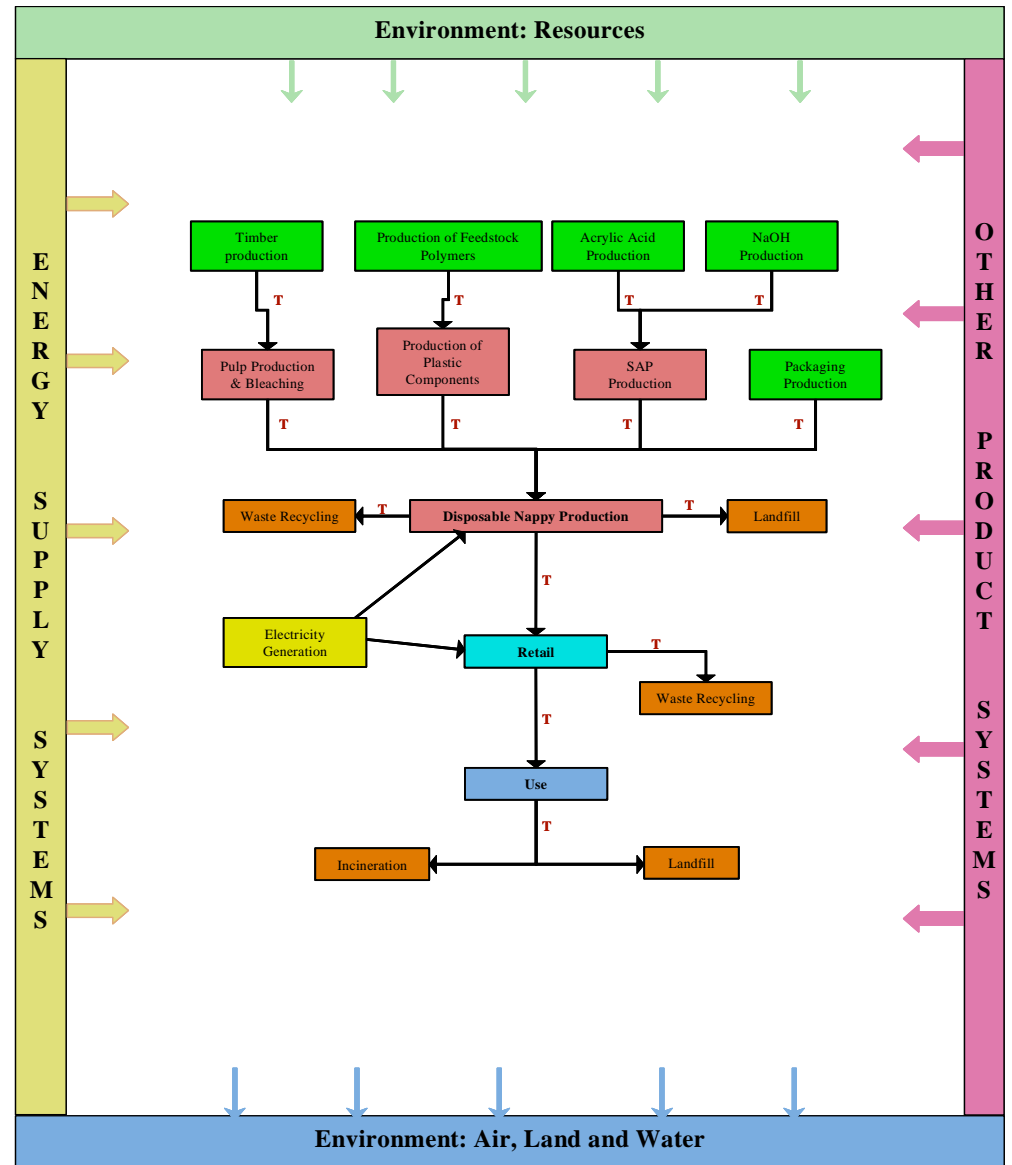
- **‘Cradle to grave’, from raw material extraction, through manufacture and use, to disposal**
- **Environmental accounting**
  - Exchanges of energy and materials with the environment at each stage of the life cycle
  - Emissions to air, land and water
- **Evolved from energy analysis in the 1960s and developed in the 1980s by the Society for Environmental Toxicology and Chemistry (SETAC)**
- **Standards published by the International Standards Organisation (ISO)**

# ISO Standards

- *“LCA is a technique for assessing the environmental aspects and potential impacts associated with a product by:*
  - *Compiling an inventory of relevant inputs and outputs of a product system;*
  - *Evaluating the potential environmental impacts associated with those inputs and outputs; and*
  - *Interpreting the results of the inventory analysis and impact assessment phases in relation to the objectives of the study”*

# The Life Cycle System

- System boundary – appropriate cut-off
- Ensure product ‘equivalence’
- Define study flow
- Identify life cycle stages
- Quantify flows and impacts
- Data collection and selection is key



# Environmental Impacts

- Typically
  - Greenhouse warming (climate change)
  - Ozone depletion
  - Photo-oxidant formation
  - Depletion of non-renewable resources
  - Eutrophication (nutrification of freshwater)
  - Human toxicity
  - Ecotoxicity
- **Carbon footprinting is a 'streamlined' LCA**

# Peer Review Requirements

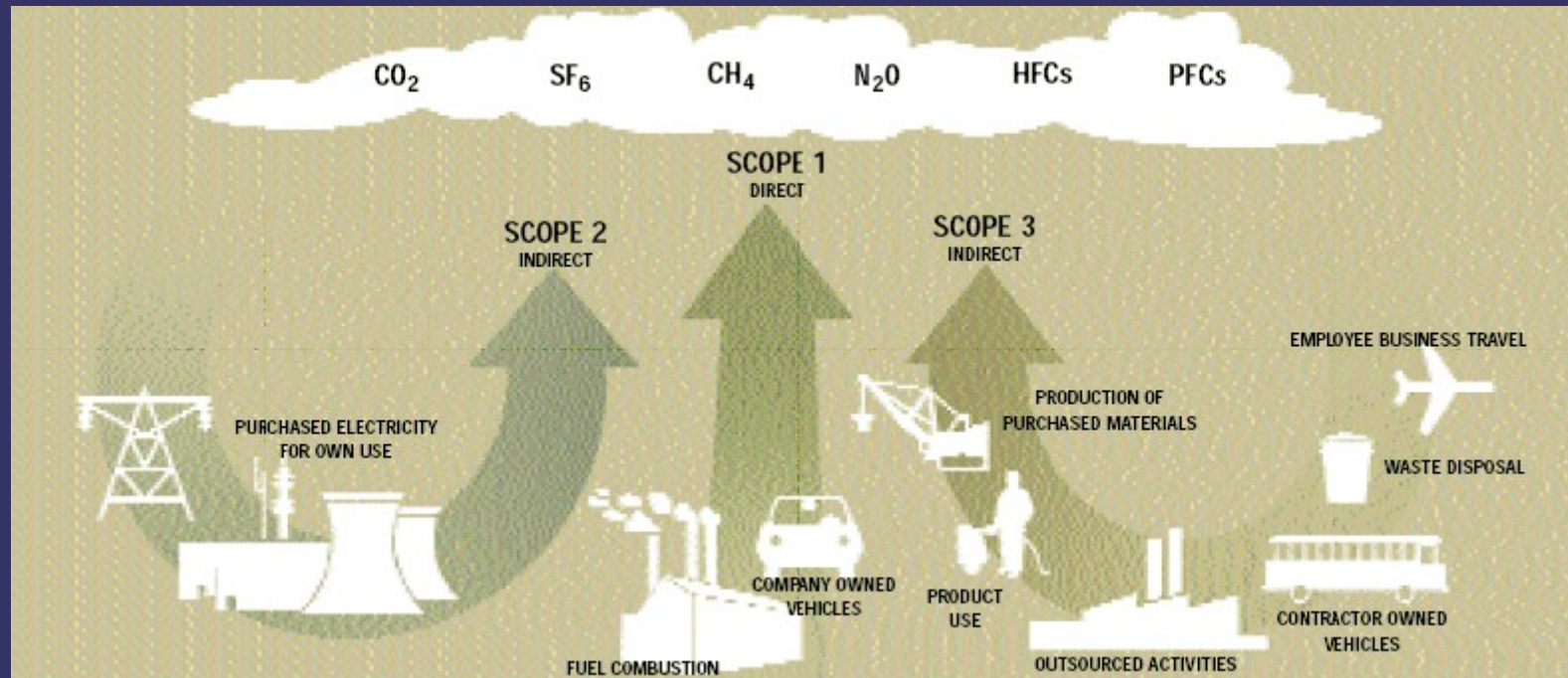
- If a LCA study is to be relied upon as robust in the public domain
- **Critical review by a panel to establish**
  - Methods are consistent with the ISO standard
  - Methods are scientifically and technically valid
  - Data are appropriate and reasonable
  - Interpretations reflect limitations identified and the goal of the study
  - The study report is transparent and consistent

# Carbon Footprinting Benefits

- Greenhouse gas emissions across the life cycle (not 'carbon' and not just carbon dioxide)
- Identifying opportunities for reduction of greenhouse gas emissions and providing a sound evidence base
- Avoiding 'burden-shifting'
- Guiding cost-effective reduction with an increasing value of carbon and market over time
- First mover advantage
- If you can't measure it, you can't manage it

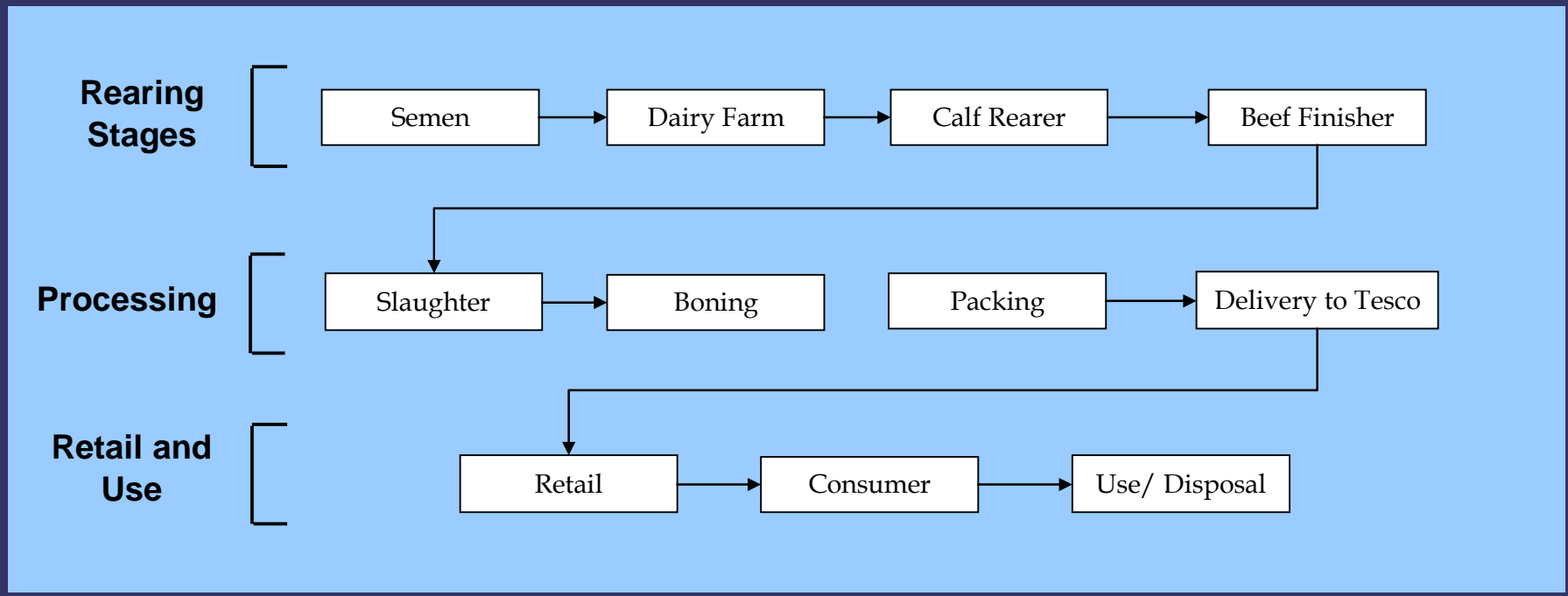
# The Carbon Footprint

- The WBCSD / WRI GHG Accounting Protocol:
  - a 'basket' of greenhouse gases
  - both direct and indirect scopes for reporting

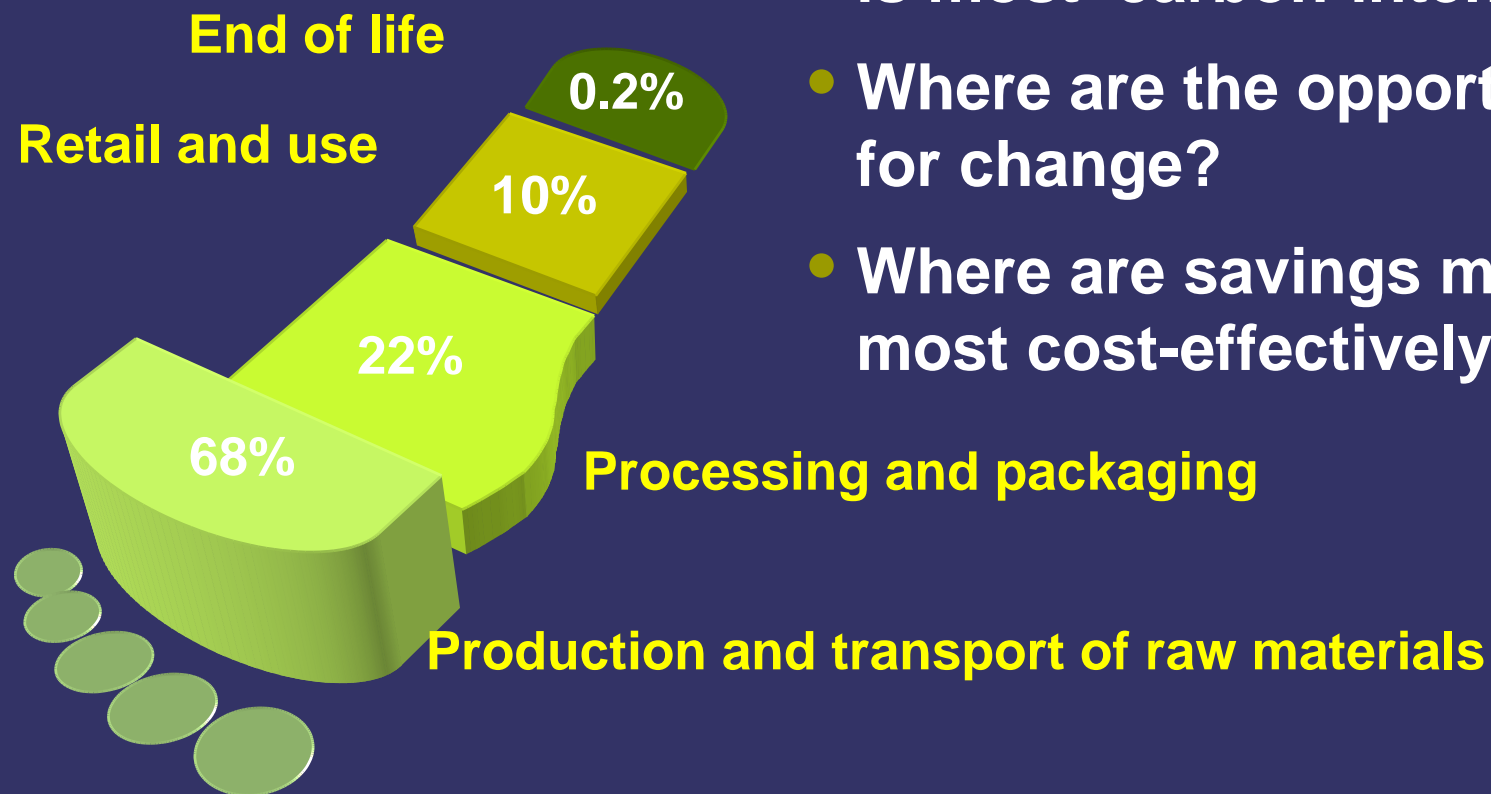


# The Beef Life Cycle

- A series of life cycle stages, from 'cradle to grave'
- Greenhouse gas emissions 'embodied' at each stage

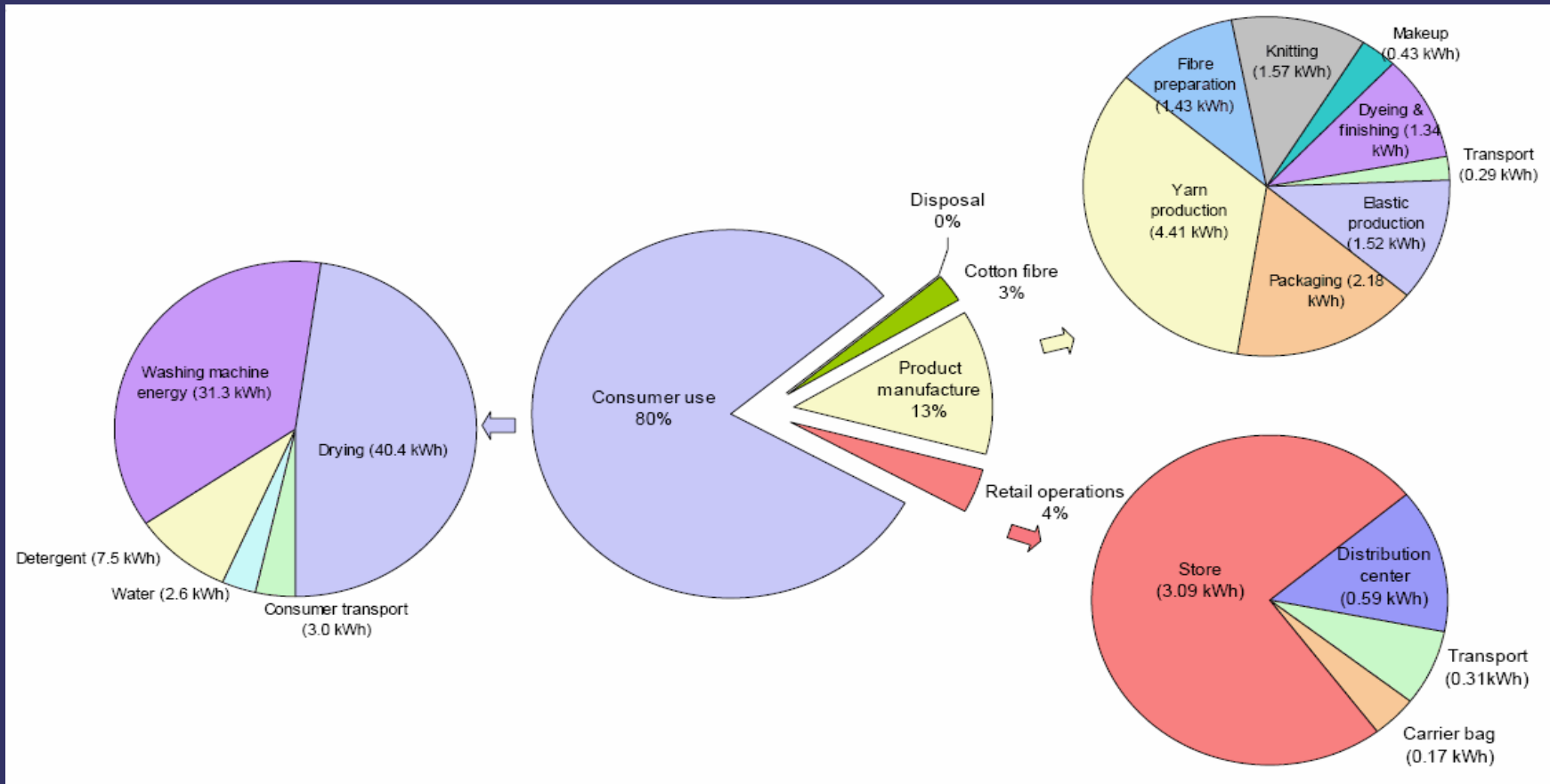


# The Beef Carbon Footprint



- Which stage of the life cycle is most 'carbon-intense'?
- Where are the opportunities for change?
- Where are savings made most cost-effectively?

# Complex Carbon Footprint



# Carbon Footprinting Methods

- **The WRI/WBCSD GHG Accounting Protocol**
- **The Carbon Trust method (Walker's Crisps) – includes a commitment to reduction**
- **British Standards Institute (BSI) Publicly Available Standard (PAS) 2050 – due summer 2008**
- **European Commission Joint Research Centre statement on carbon footprinting**
- **New WRI/WBCSD initiative on products emerging**

# LCA Footprinting Challenges

- **Defining boundaries (temporal and spatial)**
- **Access to data on complex supply chains**
- **Allocation to multiple products**
- **Variation in performance ('known unknowns')**
- **Which generic data sets (electricity etc.)?**
- **Consumer and post-consumer behaviours (eg disposal...)**
- **What level of precision is fit for purpose?**

# Dealing with Uncertainty

- **Indicative numbers are valuable**
  - Informing policy and engaging and educating
  - Identifying hotspots and guiding reduction
- **A scoping approach:**
  - Streamlined studies
  - Research on key areas requiring more precision
- **Sensitivity analysis (and uncertainty analysis)**
- **Building databases and product modelling capability over time**

# Resolution Fit for Purpose?

- **Trying to inform?**
  - The footprint directs supply chain improvement
- **Seeking to communicate with consumers?**
  - The challenge is in labelling as much as footprinting
- **Attempting to discriminate between products?**
  - Can we deal with the sources of error?
  - Can we manage 'equivalence'?
- **Looking to compete between brands?**
  - Can the numbers stand up to challenge?

# Beyond Carbon

- **Climate change is the most significant environmental threat that we must deal with**
- **But**
  - Resource depletion
  - Toxicological effects
  - Water pollution
  - Social and landuse impacts...
- **There will be a trade-off, and society will continue to emit greenhouse gases**

# Summary

- **Clear LCA/carbon footprinting methods exist**
- **Robust to ISO standards**
- **Methodological challenges**
- **ISO standard studies are relatively involved**
- **Opportunities in streamlined approaches**
- **Footprinting is achievable, deliverable and valuable**
  - But it's subject to many sources of error
- **Labelling is either:**
  - Broadly indicative, expensive or inaccurate