Process Characterization

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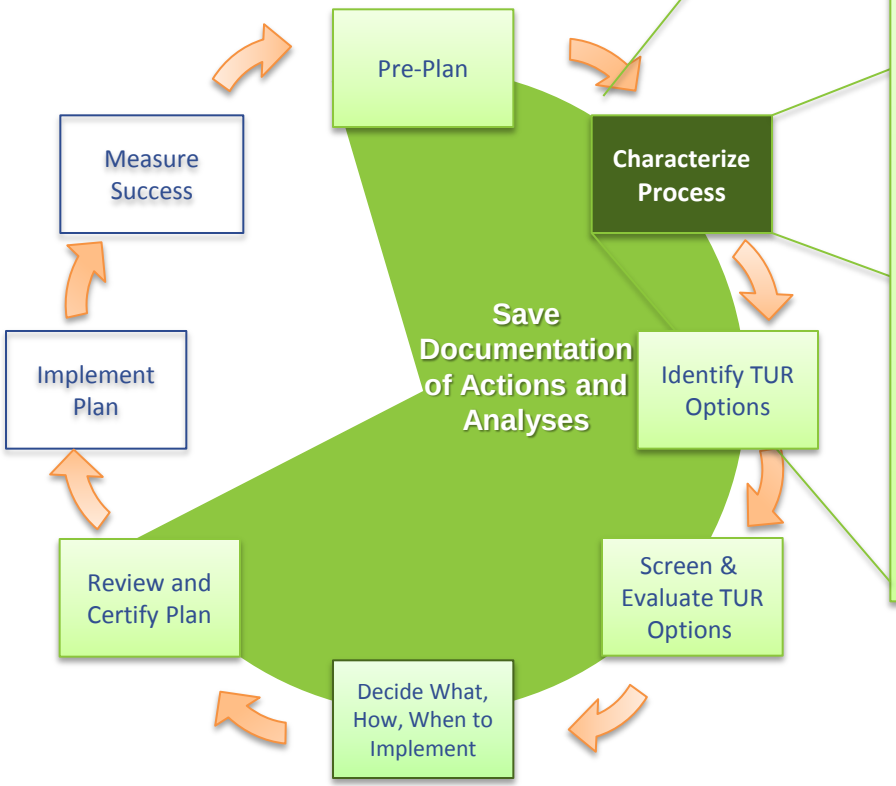
Agenda



- **Production Unit(s) Description**
  - Units of product
  - Process, inputs, and outputs of each stage
  - Purpose chemicals serve
- **Process Mapping**
  - Visual representation of production units
  - Show chemical movement into, through, and out of production unit including storage, treatment , recycling
- **Material Balance**
  - Determine amounts of toxic used
  - Amounts generated as byproduct, treated or recycled on-site, or released as emissions
- **Toxics Use Characterization**
  - How and why the toxic(s) are used
  - Chemical pathway analysis
  - Qualitative estimate of toxics costs: key cost components, relative importance

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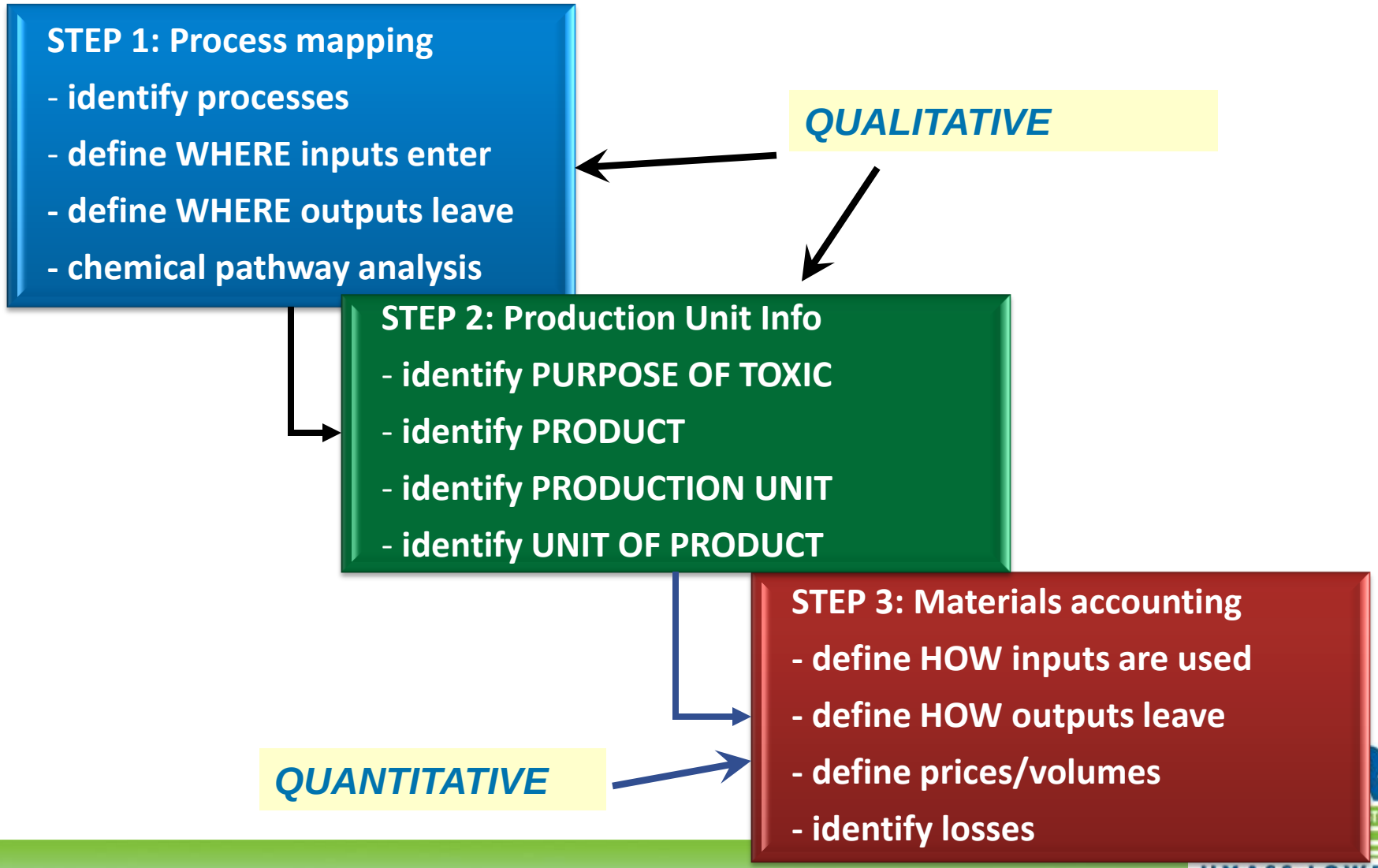
What's Involved?



Why Do Process Characterization?

- Pinpoints where wastes originate
- Helps determine true costs of toxics
- Helps to identify TUR opportunities
- Provides basic "unit of analysis" for TUR

Process Characterization

The method by which a process or series of processes are broken down into smaller components

- Identification of inputs and outputs
- Degree of dissection dependent on the needs of the analysis
- "PROCESS FLOW DIAGRAM"

Process Flow Diagrams

Technique to pictorially define steps of process

Visual outline that communicates a procedure or process

The Process Flow Diagram provides:

- **Clear concept of the process**
- **All the relevant pieces of the process**
- **All the input/output points**
- **Means of discussing the process with TUR Team**

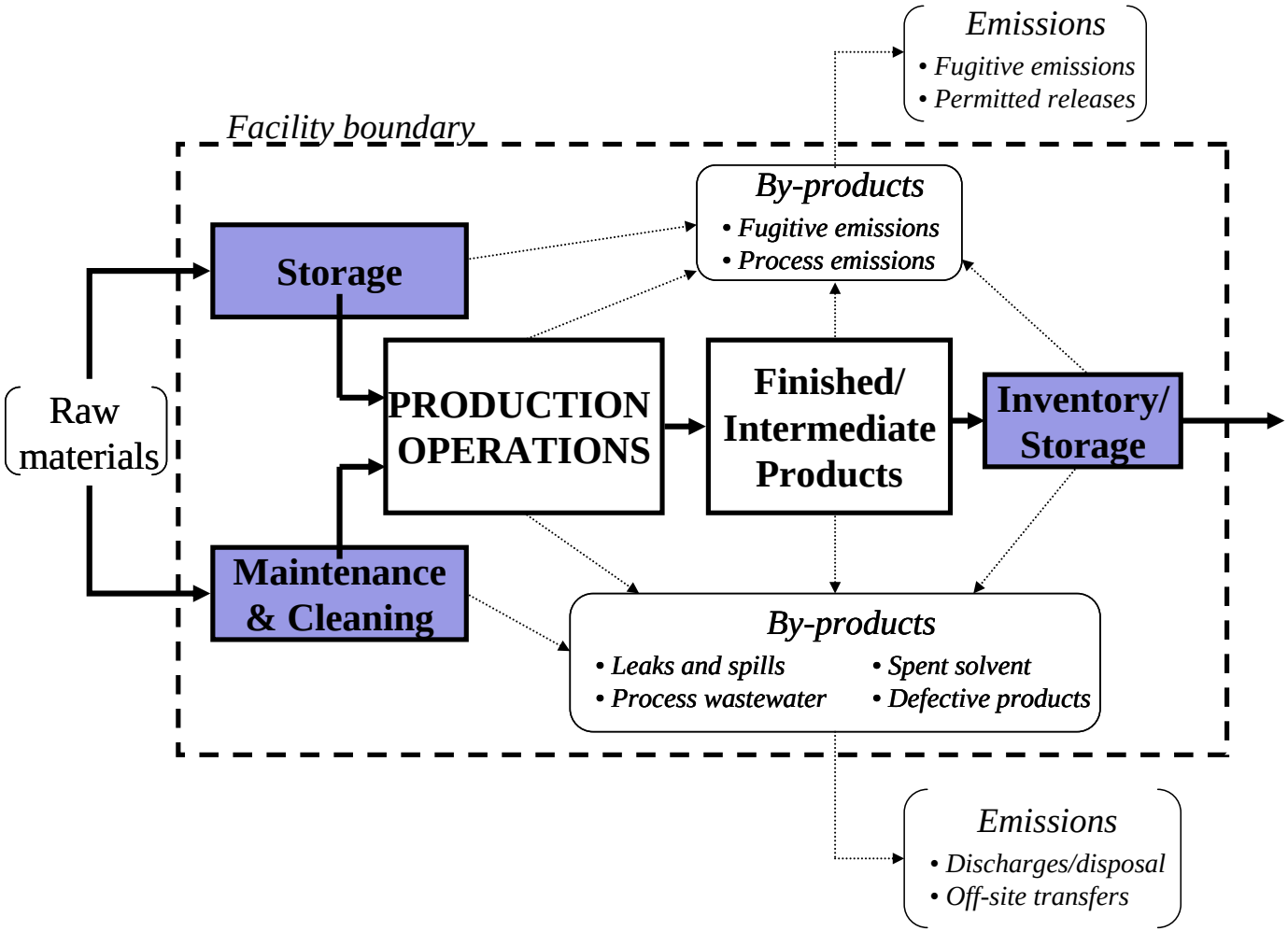
Basic Block

TURA Requirements

Process Flow Diagram must:

- Show all the steps in the production unit
- Show the point(s) at which toxic(s) enter and leave the production unit
- Include fate of byproduct: waste treatment, recycling, transfer or release
- Include production unit number

Example TUR Process Flow Diagram



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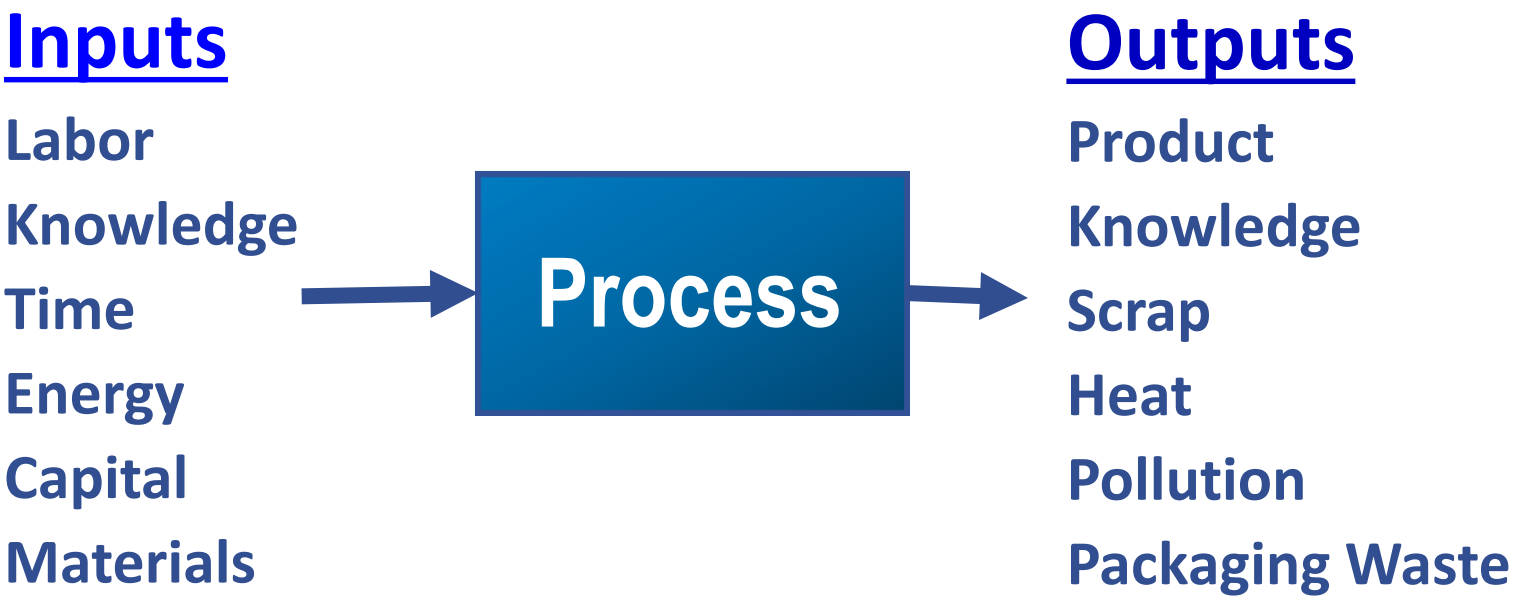
Manufacturing Model

Facility Level Process Flow Diagram



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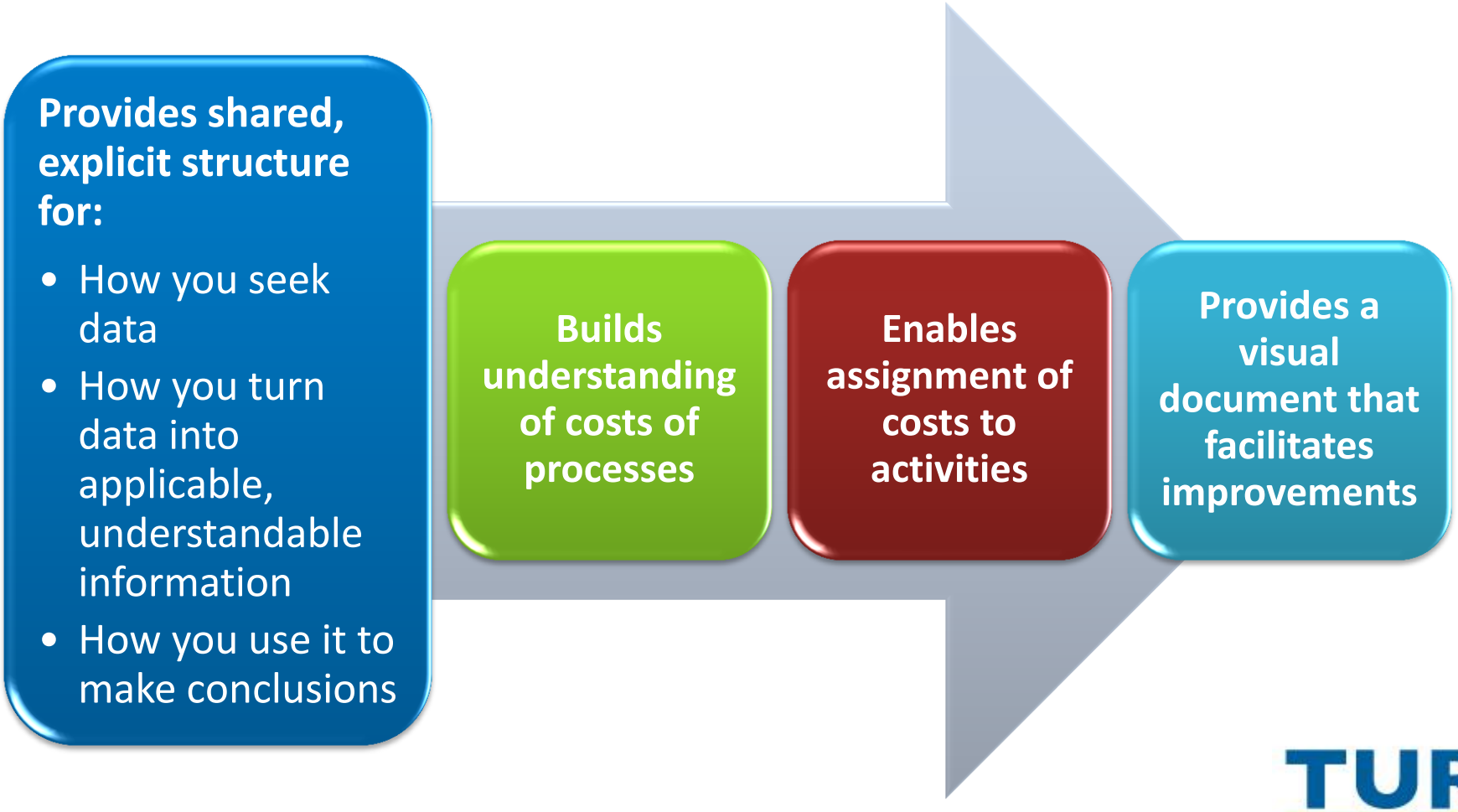
Why Use Process Flow Diagrams?



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Chemical Pathway Analysis

Identifies flow of specific chemicals (toxics), byproducts, or emissions, through processes

Traces flow of toxics through process flow diagram

Helps identify potential environmental emission points or safety problems

Product

The outcome of a production process

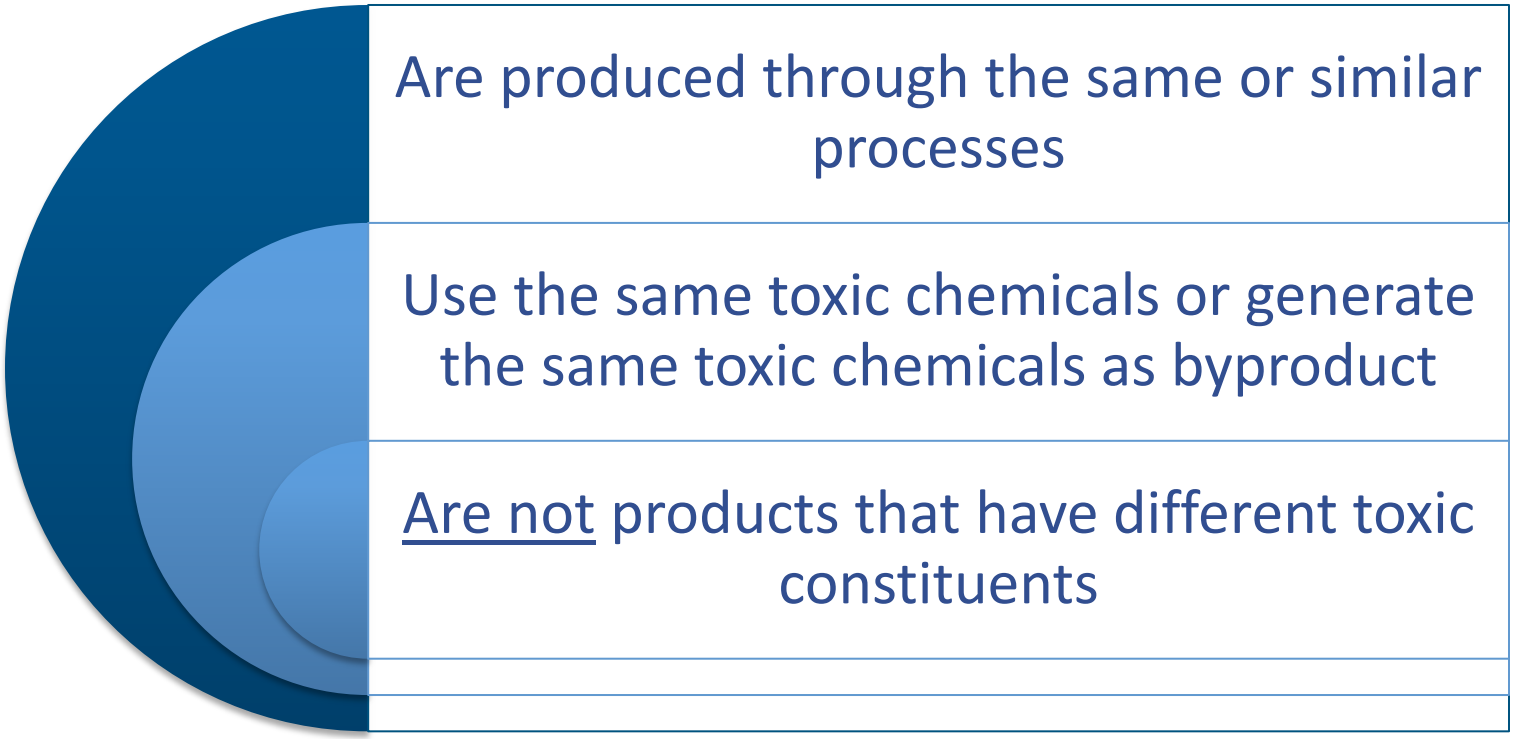
Can be a byproduct used as a raw material without treatment

Under TURA, a product can be:

- **A Product**
- **A Family of Products**
- **An Intermediate Product**
- **A Family of Intermediate Products**
- **A desired Result or Family of Results**

Family of Products

Products that:



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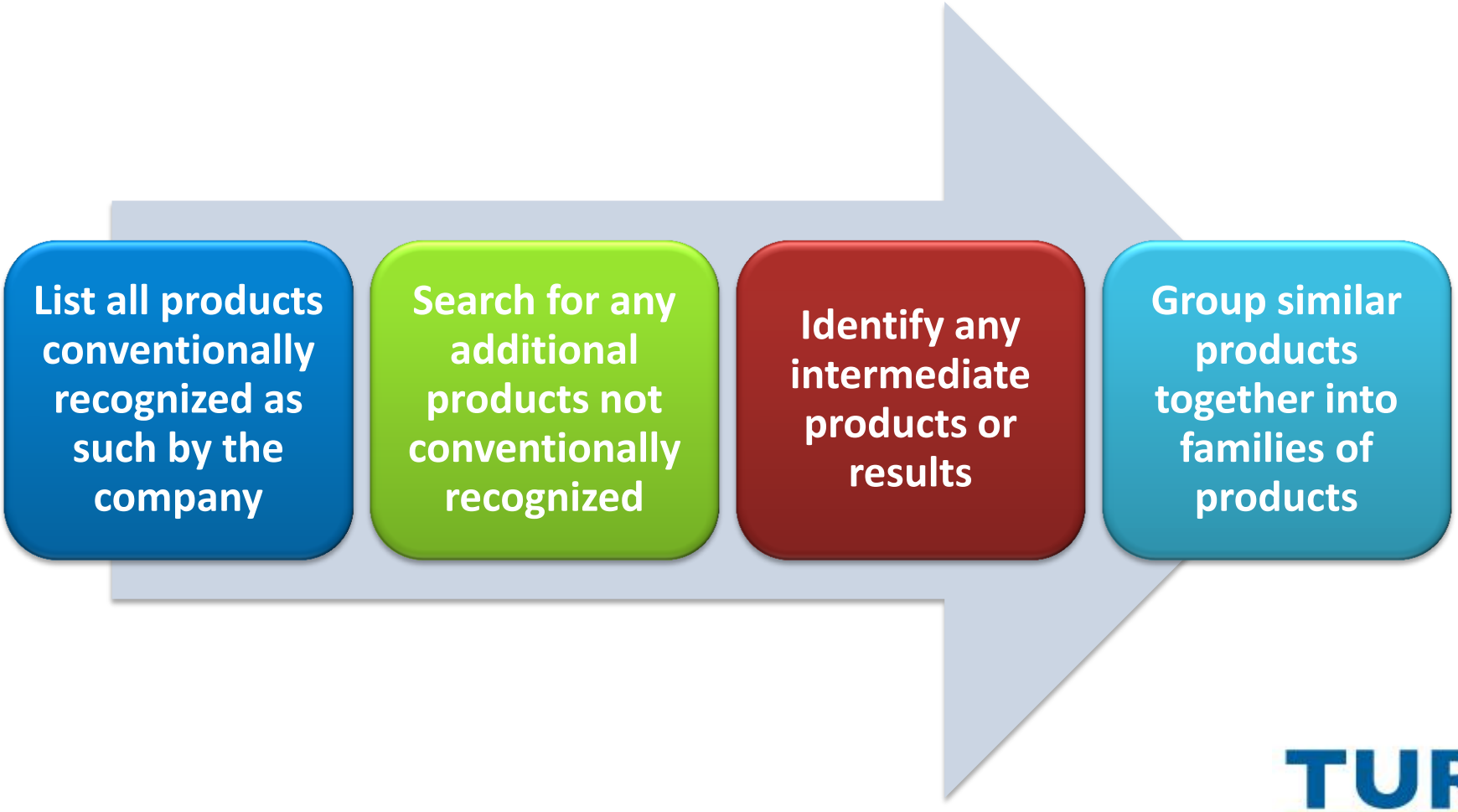
Protocol for Identifying Products



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Production Unit

"A process, line, method, activity, or technique or a combination or series thereof, used to make a product“

Process or group of processes regarded as a distinct entity for the purpose of TUR planning

Production Unit = Toxic + Process + Product

Production Unit examples

	Production Unit =	Listed Toxic +	Process +	Product
1	Fountain Pen Assembly	Trichlor-ethylene	Assembly	Fountain Pens
2	Cleaning Work Uniforms	Perchlor-ethylene	Cleaning	Clean Uniforms
3	Plating Sports Trophies	Hexavalent Chromium	Plating	Sports Trophies

Protocol for Identifying Production Units

Only 1 product?	• Whole production process = production unit
Multiple products?	• Consider each one-at-a-time • ID processes necessary for each product • Each process cluster = 1 production unit
Several products require same process elements?	• Lump them together as product family or families • ID processes necessary for each family • Each process cluster = 1 production unit

Different TUR Planners will make different choices – ALL ARE VALID!

Unit of Product

A measure that reflects the *level of production* associated with use of toxic OR generation of toxic as a byproduct

Toxics use reduction *must* be normalized against the level of production

Select a measure of facility productivity that closely reflects activities involving toxics

Unit of Product

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Doing It in Real Life

Walk-Arounds:
Identify points where chemicals are entering or leaving process

- Fugitive, Point, and Area emissions to all medias
- Byproduct flows to pollution control units
  - fume scrubbers
  - wastewater treatment
  - on-site recycling
  - etc.
- Leaks, spills, evaporative losses, maintenance activities

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Doing It in Real Life

Process Flow Diagrams: Use Existing Data

- Operational Data
- Piping diagrams
- Operating manuals
- Work flow diagrams
- Architect's plans

Do Not Re-Invent The Wheel !

Use of Data in Planning

Compile data for current materials use, toxics use, production processes

- Serves as base-line for all future TUR possibilities
- Provides comprehensive view of current work practices
- Indicates areas of high toxics use, or inefficiency

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DEP Notes

- Process Flow Diagram must include:
  - Each Step including treatment and recycling
  - Movement of each reportable chemical through the process including all points of entry and **exit** as product, byproduct or emission