



Sustainable Water Management Methodology for Water Quality Management



AquaFit4Use

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Ulfiana Anika Sari

Methodology of Water Quality Management

Water Quality Management (WQM)

An approach toward sustainable water use in industrial process
(AquaFit4Use → Chemical, Paper, Textile, and Food industries)

Two fundamental elements of WQM

Water Quality Definition (WQD) and Water Quality Control (WQC).

Water Quality Definition (methodology)

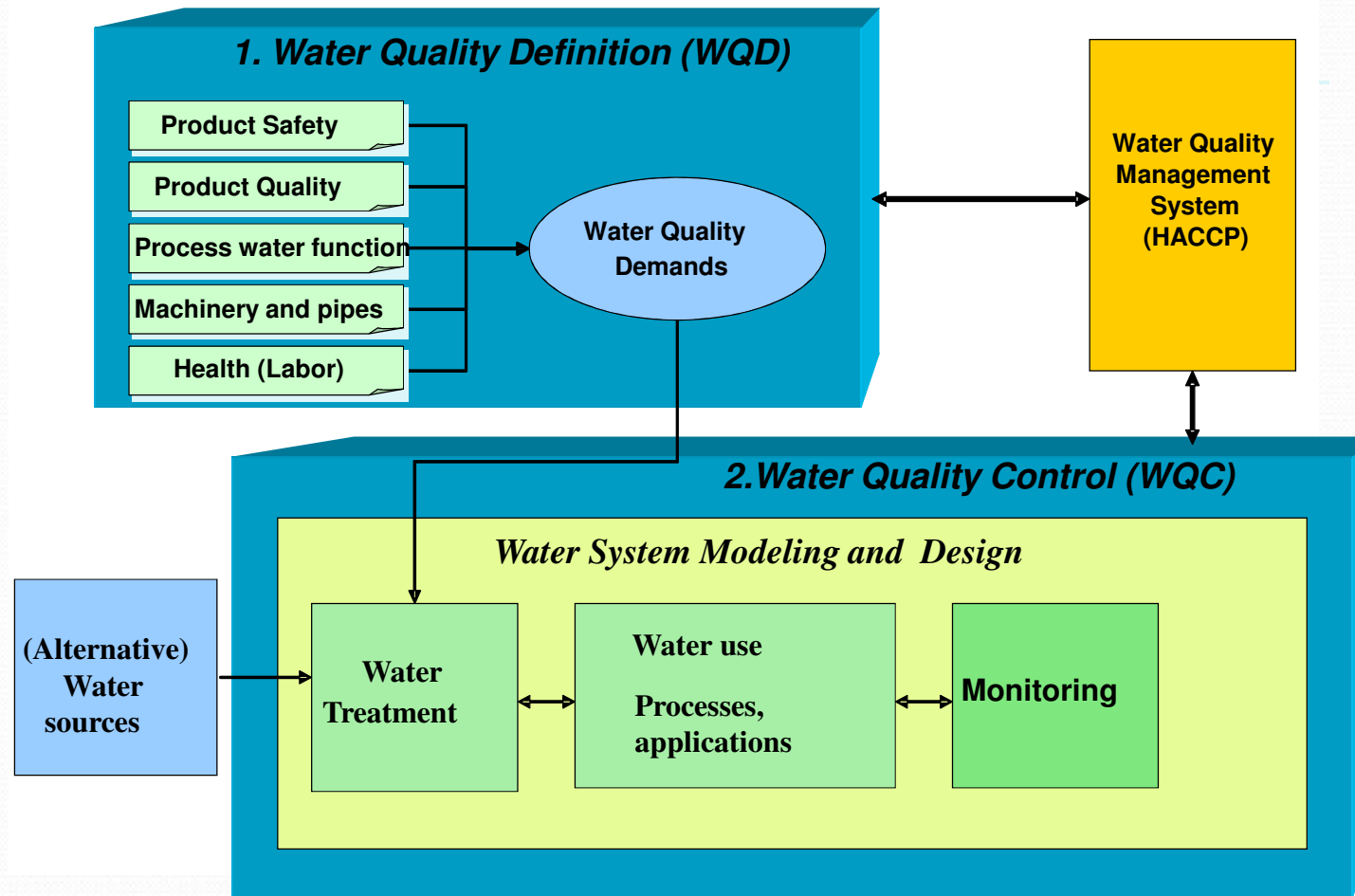
A structured method for the definition of the required water quality in industrial processes and other industrial water use.

A concept of water quality definition (WQD) methodology is presented for integration in the basic Water Quality Management Tool (WQMT).

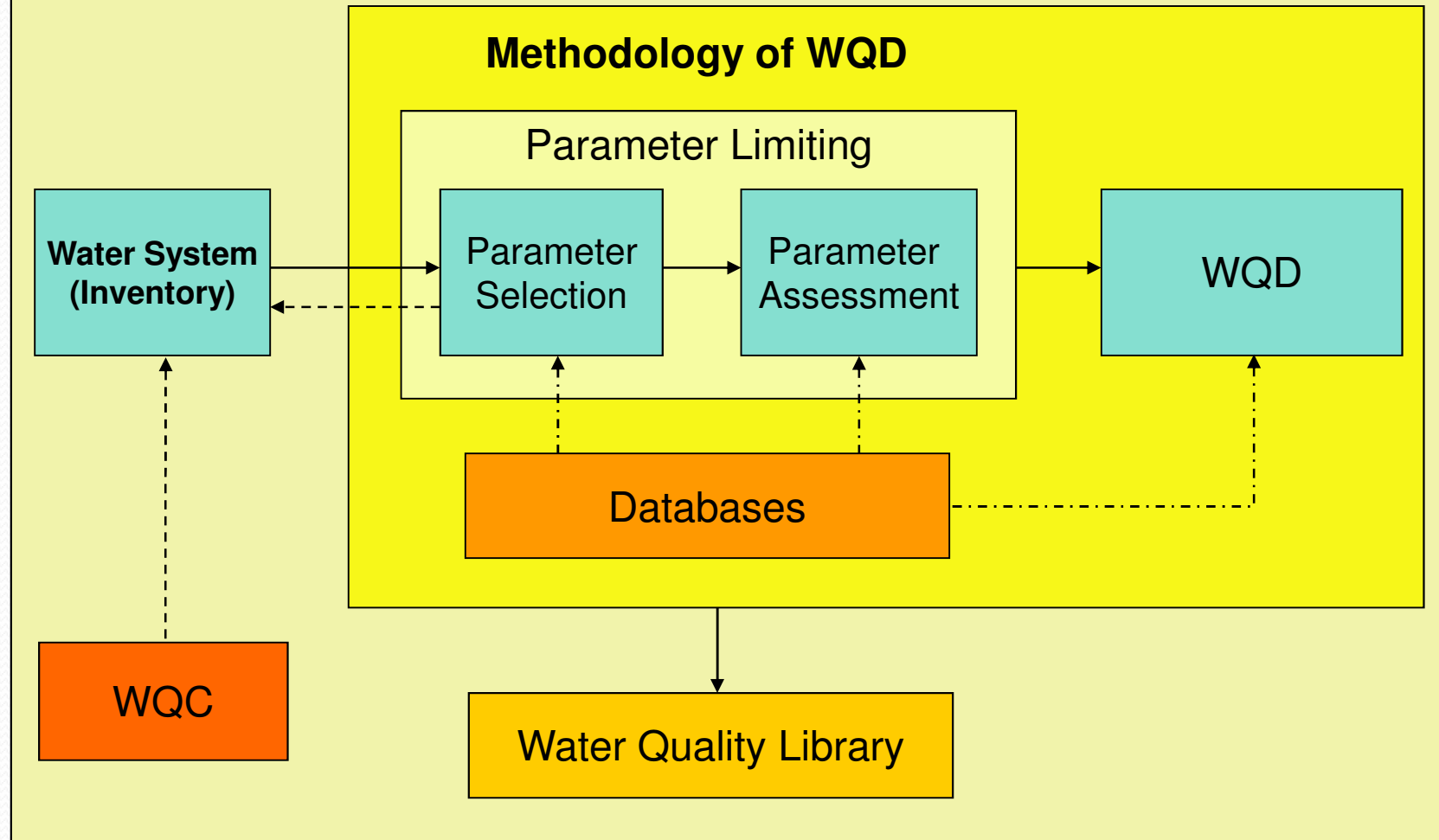
Water Quality Control (methodology)

The methodology of WQC structures the assessment of the different quality concerns like product safety, product quality and process equipment (machinery) in relation to the application of the different water qualities defined by the WQD methodology.

Water Quality Management (WQM)



Water Quality Management



Definition of Existing Water System

Country, industry, and sector options as general specifications.

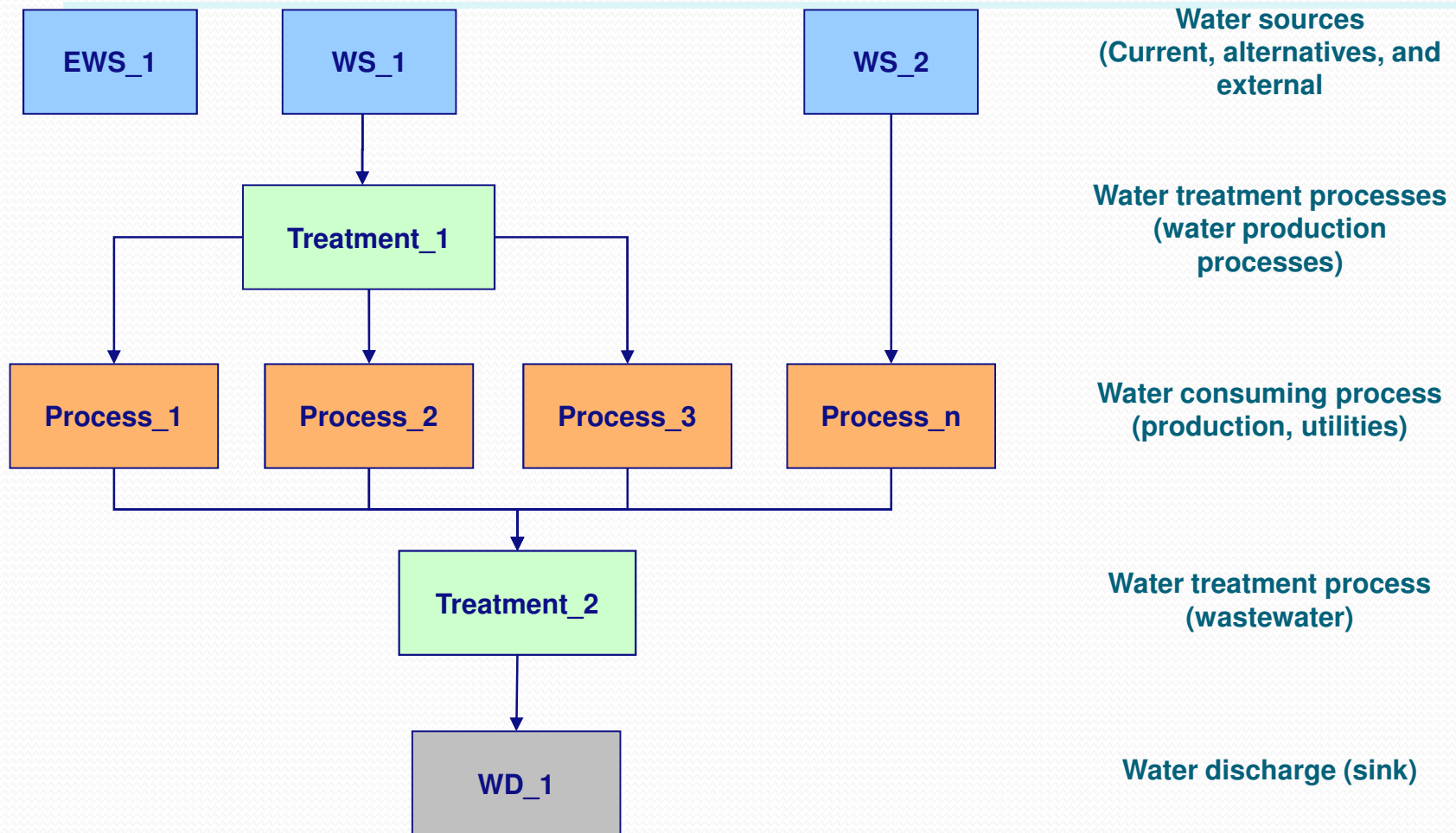
In every industry, diversity in sector has to be considered as different process that may require different water quality.

As an example in the food industry, various type of sector including dairy, vegetable processing, breweries, and starch may have different process.

The elements of existing water system → water system inventory, including:

- Current water sources
- Process
- Treatment
- Water discharge
- Alternative external water sources

Existing Water System



Water System (Inventory)

Process description

Information of the water consuming process steps is relevant

Water balance

Information must be collected about water intake, water preparation, process water use, and wastewater discharge.

This quantitative information is necessary for selection of alternative water sources and applications (process steps).

Composition process water streams

The composition of process water streams is relevant for limiting number of parameters (selection and assessment).

Parameter Selection and Assessment

Water quality parameters are selected based on the impacts in five aspects:

- Product safety
- Product quality
- Process water function
- Machinery and pipes
- Health & working condition (labour).

Classification of parameters is necessary:

- defining the level of required attention
- reducing the number of parameters
→ to be thoroughly evaluated (parameter limiting)

Three classes have been defined for those purpose

Class 1: Relevant parameters

Class one parameters will have impacts on one or more aspects of the production: machinery, pipeline, process consistency, consumer health and product quality and safety. Thus, their impacts should be recognized and according to their impact, means of controlling and eliminating their adverse effects should be extensively evaluated.

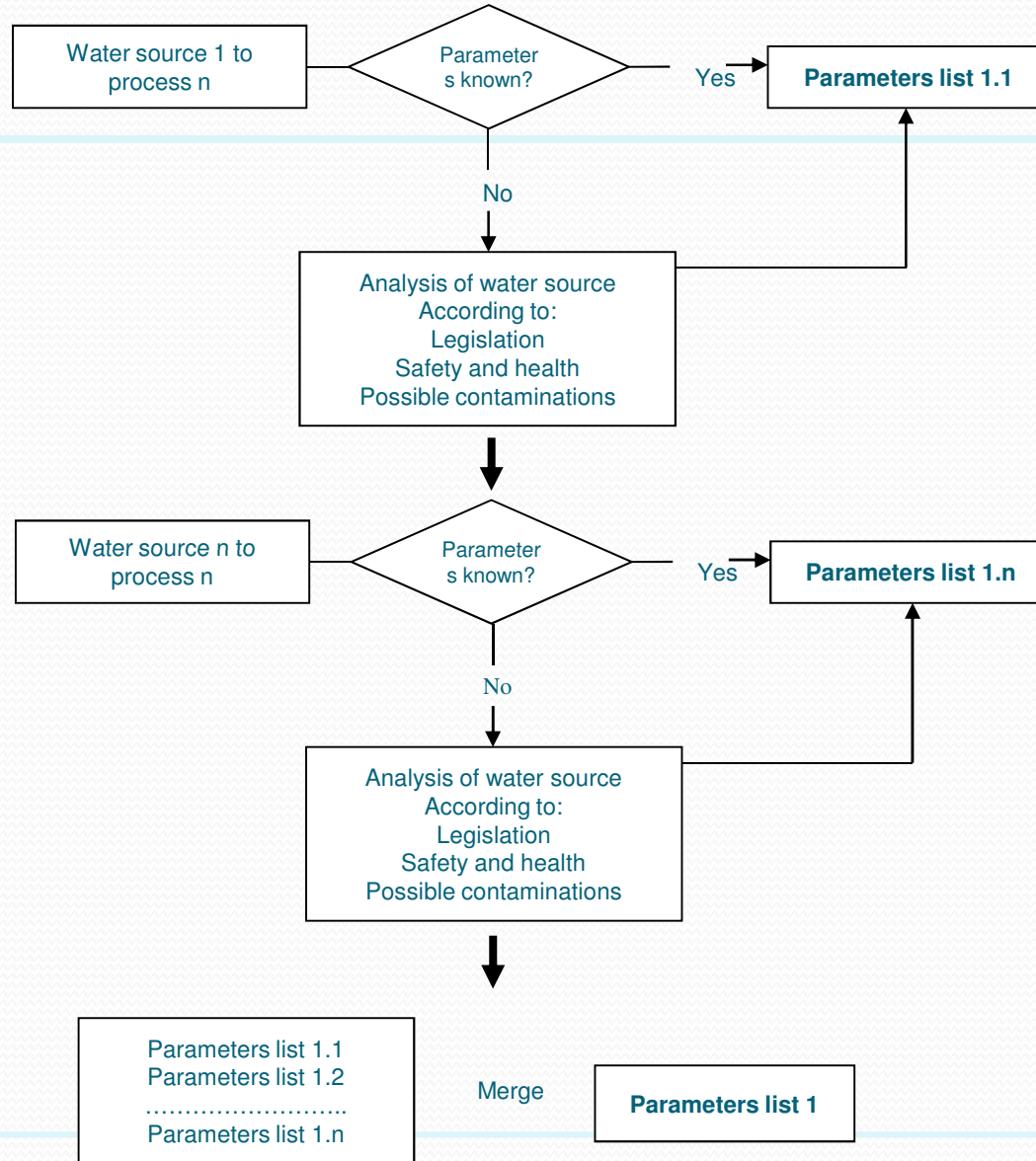
Class 3: Not relevant parameters (minor significance in the evaluation)

These parameters either do not exist in the streams, or will never exceed the Drinking Water Standard (DWS) levels until the application level or are effectively controlled. A quick survey of this category will be sufficient.

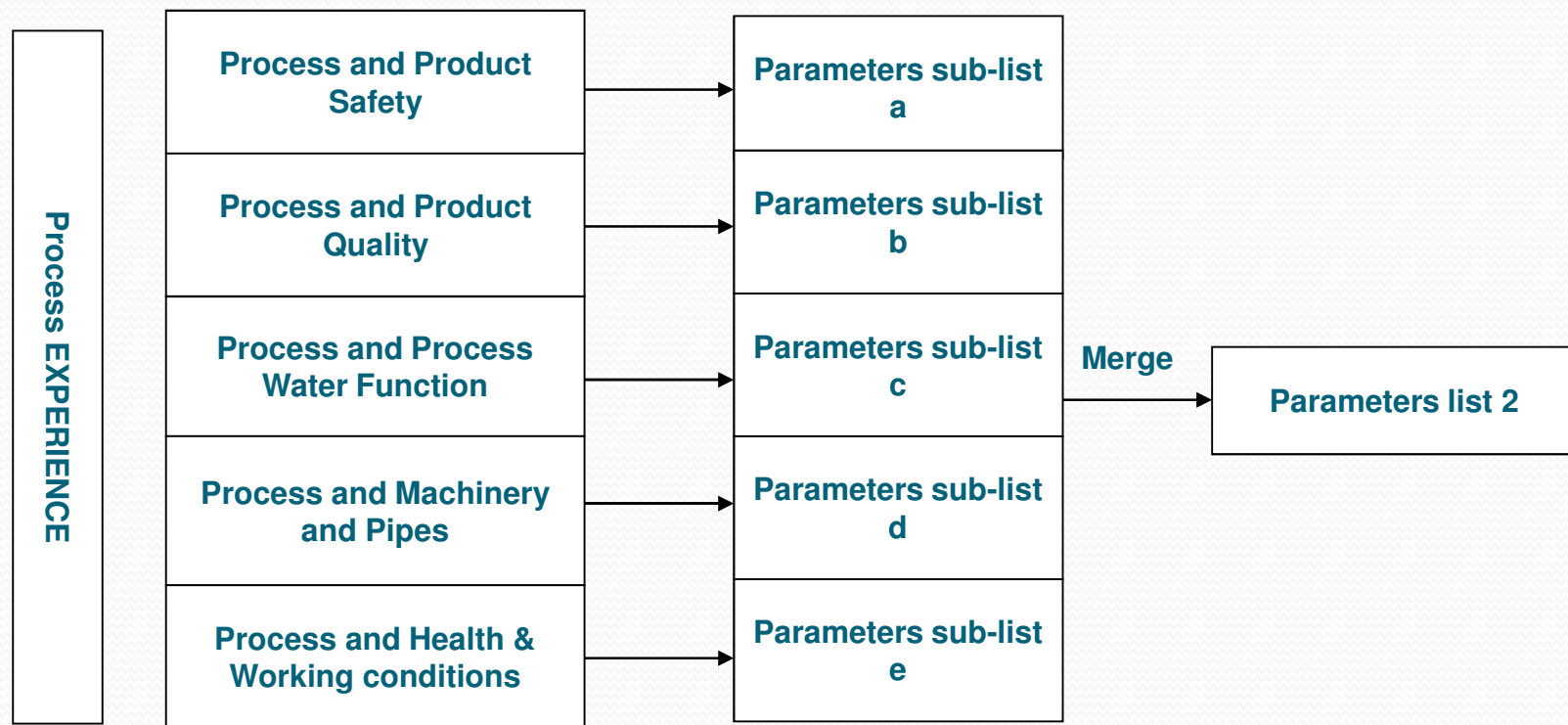
Class 2: The parameters in an intermediate grade, possibly relevant.

Any parameter placed in this category, later in the evaluation will be defined as class one or three.

Parameter list 1

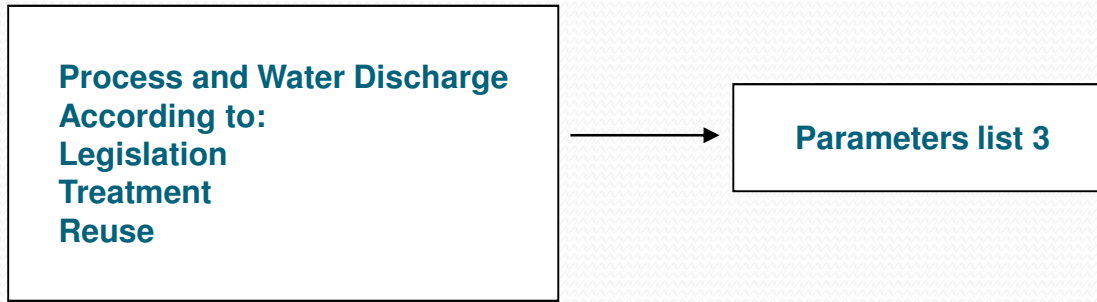


Parameter list 2

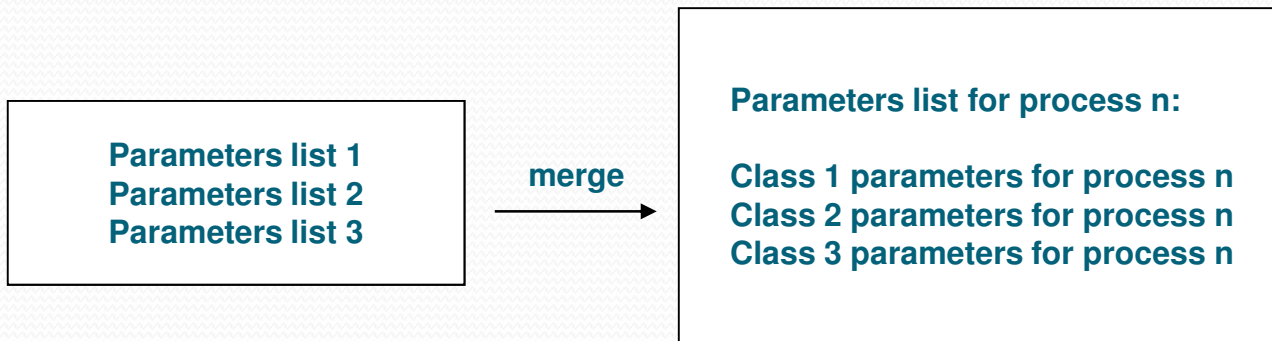


Parameters list 3

Information about the restrictions due to the water discharge of the process and related to legislation, possible treatment and reuse.



“Parameters list” for process n is a combination of the three parameters lists



Water Quality Library (Databases)

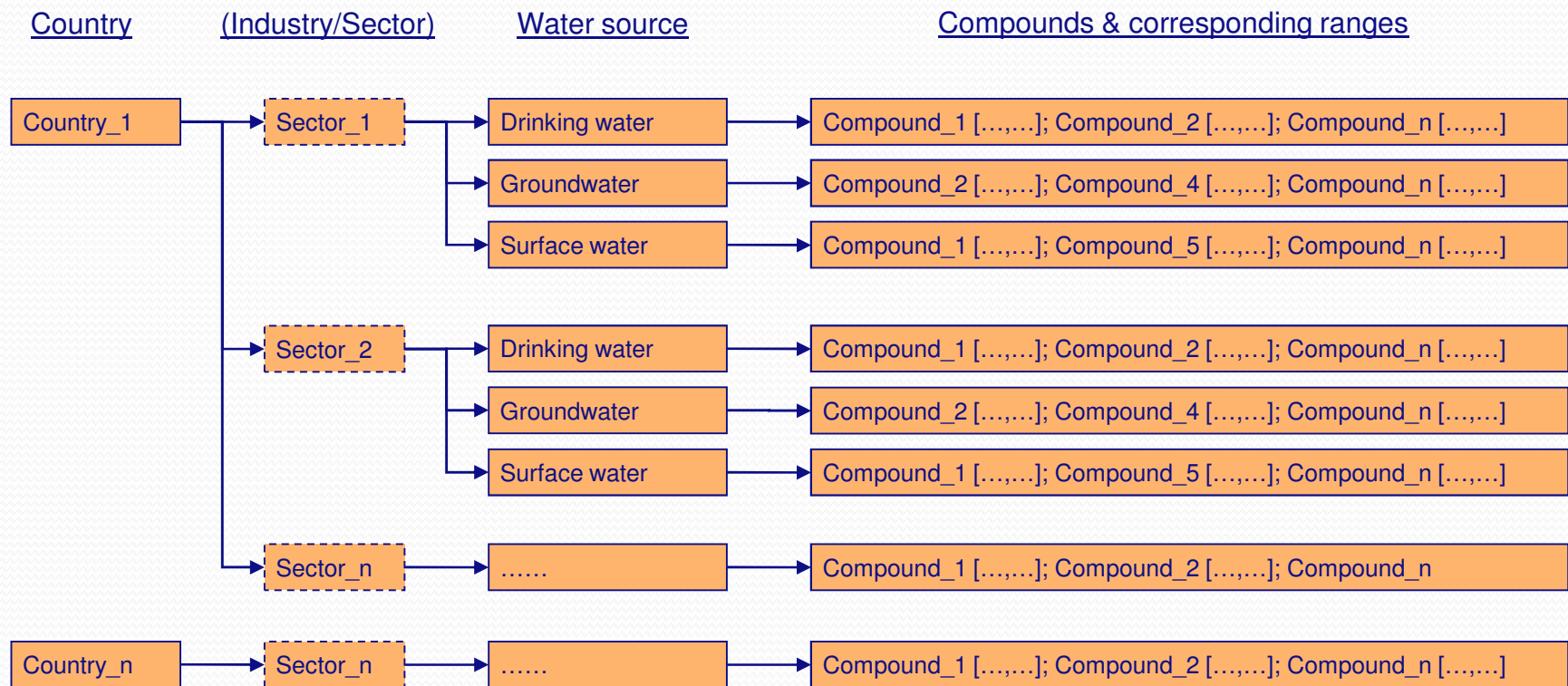
Database in water quality library (WQL):

- Water sources (compounds and ranges)
- Processes:
 - Product quality (& safety): compounds and quality demands
 - Process water function: compounds and quality demands
 - Machinery and pipes: compounds and quality demands
 - Health and working condition: compounds and quality demands
- Treatments: compounds and quality demands (operational limits)
- Water discharge (compounds and discharge limits)

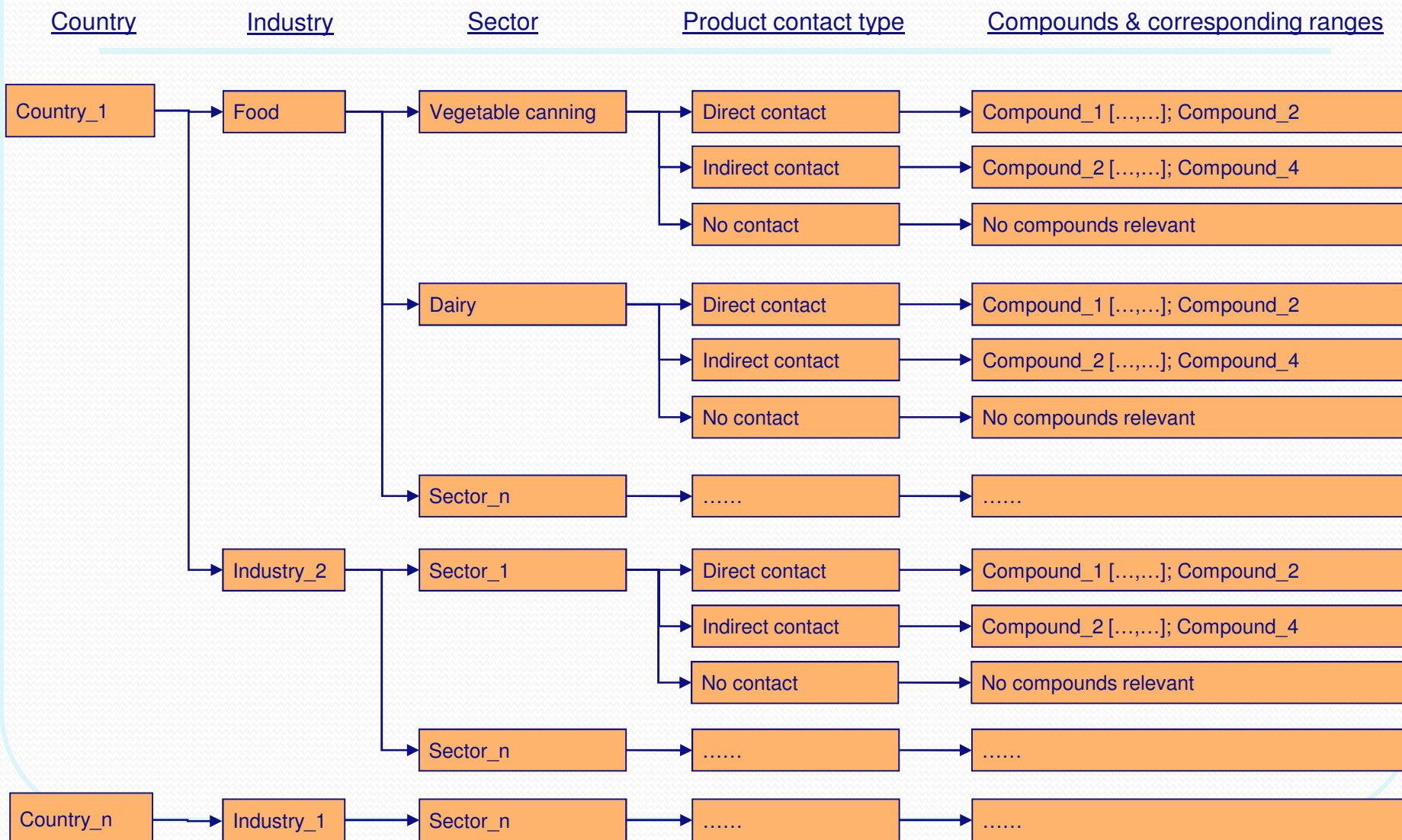
Database in model library:

- Processes → process models (parameter values, set points)
- Treatments → treatment process models, including compounds to be removed, process conditions (combinations of treatment techniques), parameter values (removal rates), set points

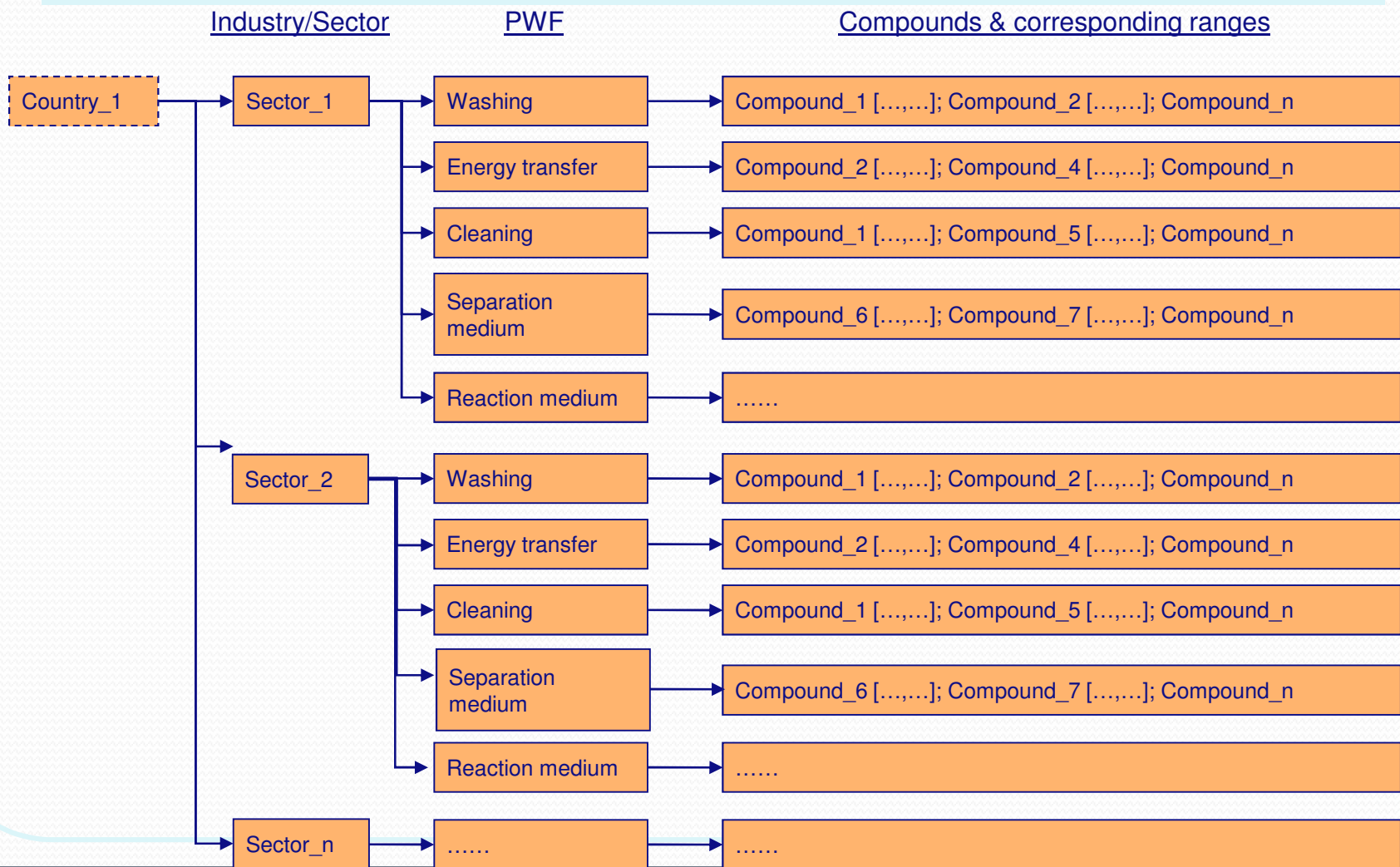
Database Water Sources



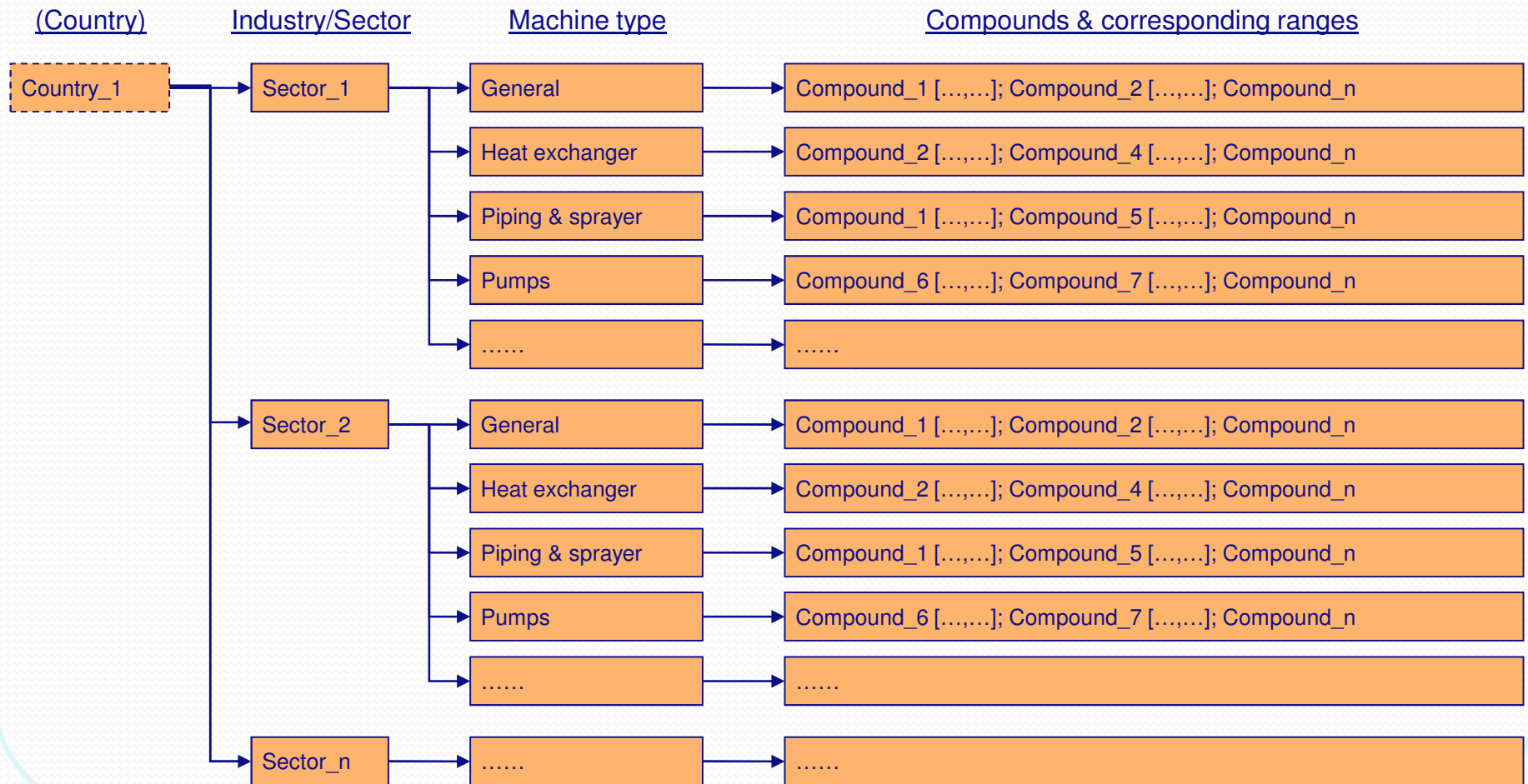
Database Product Quality & Safety



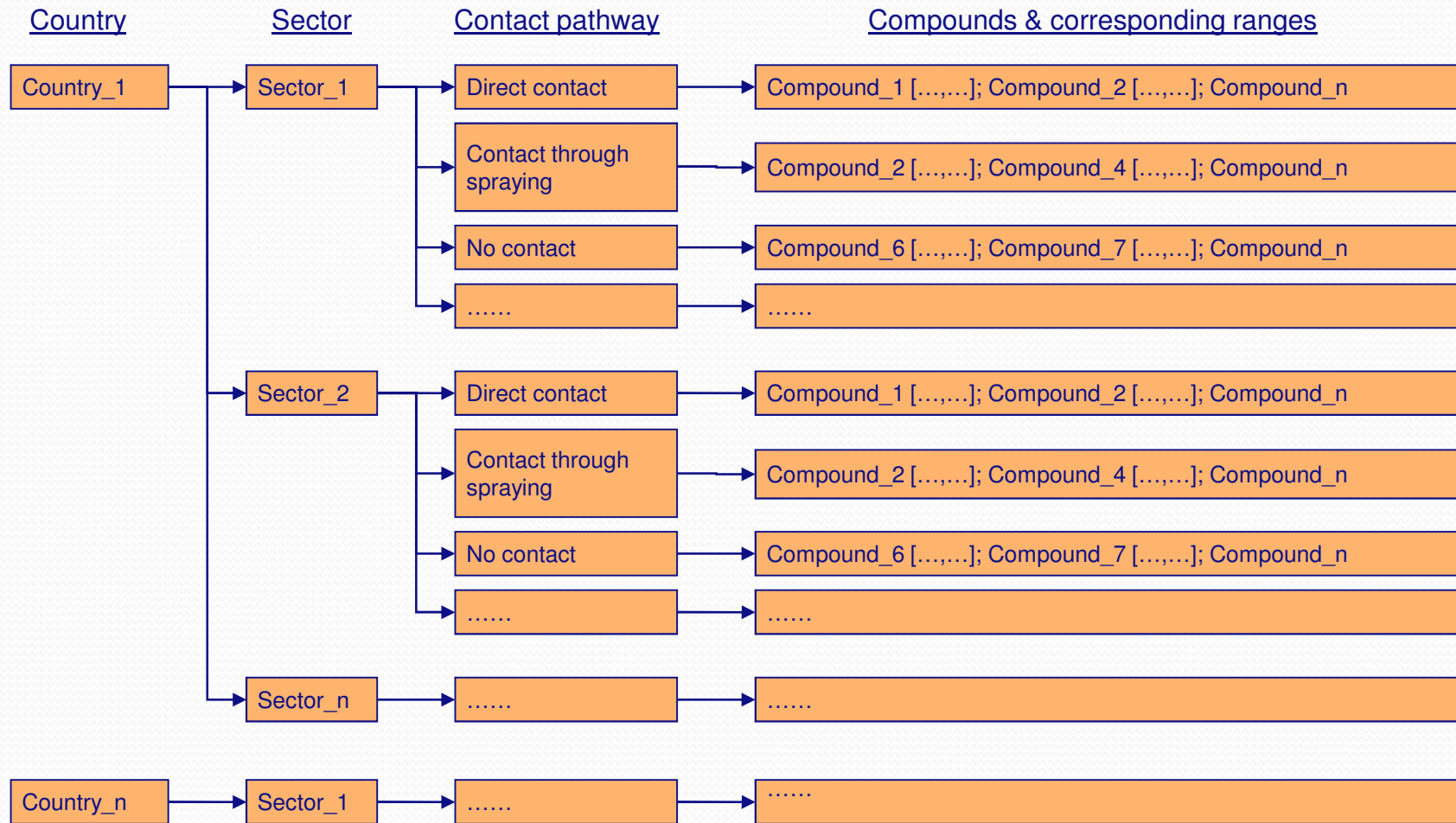
Database Process Water Function



Database Machinery and Pipes



Database Health and Working Condition



Water Quality Control (WQC)

Water quality guarantee according to WQC (for the final water system)

- Risk safety analysis
- Identification CCP's
- Determine critical limits
- Set up monitoring procedures
- Identify of correcting measures
- Validation and verification

Potential risks for WWT steps: exceeding limits for physical, chemical or biological parameters

Clustering of components:

- COD, N- en P-
- Salts
- Biological components

Most important dangers:

- Wrong process conditions
- To high concentrations of contaminants (cleaning agents)
- Leakages
- Failure
- Microbiological or other grow in pipes

