2024

SciNoBo Taxonomy

Version 2

1. Introduction

This report provides an analysis of the new version of the taxonomy, addressing the issues identified by various stakeholders and detailing the steps taken to resolve them. The approach we employed is as follows:

- We started by cataloguing the issues within the existing taxonomy and grouping them into specific categories.
- To understand the taxonomy's structure and resolve these issues, we compared it with other well-established taxonomies, namely EuroSciVoc and Scopus.
- This analysis allowed us to identify missing elements, understand how other taxonomies tackle similar challenges, and pinpoint areas for improvement.
- Based on these insights, we made adjustments, including deletions, reorganization (changed the path of an FoS), and additions based on other taxonomies.

The changes between versions can be summarized numerically as follows:

Version 1			
L0	L1	L2	L3
6	43	176	594
Version 2			
L0	L1	L2	L3
6	40	220	560

One important convention for this document is that we refer to the Levels of the taxonomy starting with zero (i.e. L0 is the first level, L1 the second level and so on).

2. Issues and Cases Addressed

In this section, we list the different types of issues we encountered with the taxonomy revision process and the solution we employed to address them. These issues were categorized into four main cases, each representing a structural or conceptual issue within the existing taxonomy. The first case deals with **Parent Nodes with Only One Child Node**, where the taxonomy lacked sufficient complexity. The second case addresses **Nodes with Child Nodes Sharing the Same Name as the Parent**, where redundancy could potentially cause confusion. The third case focuses on **Different Nodes with Child Nodes Sharing the Same Name**, which led to ambiguities that hindered usability and navigation. Finally, we examine cases where **the Taxonomy Stops at Level 2**, highlighting instances of incomplete hierarchies.

2.1 Color Coded System

To keep the changes organized and clear, we used a **color-coded system**. This system categorizes the changes and highlights specific actions or statuses for each element. Below is an overview of each color and its corresponding meaning:

- **Lilac**: This color denotes elements that are **pending decisions, under validation**, or **requiring expert review**. These items are still in the process of being finalized and may undergo further revisions based on additional input.

- **Green**: Items marked in green indicate **additions sourced from EuroSciVoc or Scopus**. These are newly Sintroduced elements that were integrated from external, taxonomies to enhance the SciNoBo's

taxonomy comprehensiveness. The additions are also the most difficult cases to handle when it comes to classification. The inference algorithm must be updated to account for these new additions.

- **Yellow**: Yellow signifies **items that have been moved** from other levels or paths within the SciNoBo taxonomy. These changes reflect reorganizations or reclassifications to ensure better alignment with the overall structure.
- **Red**: The red color represents **elements removed entirely from the taxonomy**. These entries have been deleted due to redundancy, irrelevance, or because they no longer fit within the updated structure.

Pending decisions, under validation, or requiring expert review.
Additions sourced from EuroSciVoc or Scopus.
Items moved from other levels or paths within the SciNoBo taxonomy.
Elements removed entirely from the taxonomy.

2.2 Cases Review

In this section, we will delve into the issues within the taxonomy and provide an analysis of each issue. For every challenge, we will present the proposed adjustments and solutions developed for inclusion in version 2 of the taxonomy. By addressing these cases, we aim to enhance the taxonomy's structure, usability, and alignment with domain-specific needs.

A. Case 1: Parent Nodes with Only One Child Node

This issue arises when a parent node in the taxonomy has only a single child node, raising questions about its necessity and structural coherence. Below, we examine specific instances of this issue in **SciNoBo V1** and how they were addressed or reconsidered in **SciNoBo V2**.

C1: Natural Sciences → Computer and Information Sciences → Computation Theory & Mathematics

	SciNoBo V1		
C1	Natural sciences	Computer and information sciences	Computation Theory & Mathematics
	SciNoBo V2		
C1	Natural sciences	Computer and information sciences	Computation theory & mathematics

This node has been flagged for further discussion due to a broader debate about whether **Computer and Information Sciences** should remain as an independent field or be incorporated under **Engineering Fields**. The difference between SciNoBo 's current taxonomy and EuroSciVoc's approach underlines the need for expert input, as discussed further in Chapter 3.4.

C2: Agricultural and Veterinary Sciences → Agricultural Biotechnology → Food Science

	SciNoBo V1		
C2	Agricultural and veterinary sciences	Agricultural biotechnology	Food Science

	SciNoBo V2		
C1	Agricultural and veterinary sciences	Agricultural biotechnology	Food Science

Food Science remains the only L2 under **Agricultural Biotechnology**. However, **Food Science** is being further developed in the lower levels of the taxonomy. Furthermore, neither EuroSciVoc nor Scopus taxonomies feature equivalent Fields of Science (FoS) in this area.

C3: Social Sciences → Media and Communications → Communication & Media Studies

	SciNoBo V1		
C3	Social sciences	Media and communications	Communication & Media Studies
	SciNoBo V2		
C3	Social sciences	Media and communications	Communication & Media Studies

Like the abovementioned case, **Communication & Media Studies** is further developed at lower levels. Additionally, EuroSciVoc and Scopus do not have a similar category.

B. Case 2: Nodes with Child Nodes Sharing the Same Name as the Parent

This issue occurs when a child node shares the same name as its parent node. These cases hinder the taxonomy's comprehensiveness and introduce confusion. In **SciNoBo V2**, these cases were addressed through a combination of additions, deletions, and reorganizations, often informed by comparisons with EuroSciVoc and Scopus taxonomies. Below are the respective cases and an explanation of how each case was handled:

C1: Engineering and Technology → Civil Engineering → Civil Engineering

	SciNoBo V1		
C1	Engineering and technology	Civil engineering	Civil Engineering
	SciNoBo V2		
C1	Engineering and technology	Civil engineering	Fire protection/Building engineering
	Engineering and technology	Civil engineering	Structural engineering

	Engineering and technology	Civil engineering	Water Engineering
	Engineering and technology	Civil engineering	Construction Engineering
	Engineering and technology	Civil engineering	Transportation Engineering
	Engineering and technology	Civil engineering	Urban & Regional Planning
	Engineering and technology	Civil engineering	Building & Construction

By incorporating detailed subfields and moving some L3 nodes into L2 (yellow ones), the redundancy was resolved. Additionally, integration of EuroSciVoc elements enhanced coverage.

C2: Engineering and Technology → Chemical Engineering → Chemical Engineering

	SciNoBo V1		
C2	Engineering and technology	Chemical engineering	Chemical Engineering
	SciNoBo V2		
	Engineering and technology	Chemical engineering	Petroleum production/Fossil fuels
	Engineering and technology	Chemical engineering	Engineering disciplines/Systems engineering
	Engineering and technology	Chemical engineering	Carbon dioxide/Gas technologies
	Engineering and technology	Chemical engineering	Catalysis/Chemical engineering
	Engineering and technology	Chemical engineering	Chemical Process Engineering
	Engineering and technology	Chemical engineering	Biochemical Engineering
	Engineering and technology	Chemical engineering	Separation Technologies

Some values have been moved from L3 to L2 (yellow ones), to resolve the redundancy. Also, some values have been added from the EuroSciVoc taxonomy to improve coverage.

C3: Engineering and Technology → Environmental Engineering → Environmental Engineering

	SciNoBo V1		
C3	Engineering and technology	Environmental engineering	Environmental Engineering
	SciNoBo V2		
C3	Engineering and technology	Environmental engineering	Carbon Capture Engineering
	Engineering and technology	Environmental engineering	Natural Resources Management
	Engineering and technology	Environmental engineering	Geological & Geomatics Engineering
	Engineering and technology	Environmental engineering	Hydrology/Water And The Environment
	Engineering and technology	Environmental engineering	Sanitation/Sewerage
	Engineering and technology	Environmental engineering	Hydrology/Hydraulic Engineering

In this case, some additions have been made from the EuroSciVoc taxonomy, and some values have been moved from L3 → L2 of the same field (Hydrology/Water And The Environment, Sanitation/Sewerage, Hydrology/Hydraulic Engineering). Finally, there has been a reassignment of L2 fields from the L1 field "Other Engineering and Technology" (Geological & Geomatics Engineering).

C4: Nano-Technology → Nanoscience & Nanotechnology → Nanoscience & Nanotechnology

	SciNoBo V1		
C4	Engineering and technology	Nano-technology	Nanoscience & Nanotechnology
	SciNoBo V2		
C4	Engineering and technology	Nano-technology	Nanoscience & Nanotechnology

It seems that the L2 category is more specific than its L1. This case has been marked lilac as we want to further discuss it with experts.

C5: Agricultural and Veterinary Sciences → Veterinary Science

	SciNoBo V1		
C5	Agricultural and veterinary sciences	Veterinary science	Veterinary Sciences
	SciNoBo V2		

C5	Agricultural and veterinary sciences	Veterinary science	Animal viral diseases/Swine diseases
	Agricultural and veterinary sciences	Veterinary science	Behavioural sciences/Cognitive psychology
	Agricultural and veterinary sciences	Veterinary science	Horse anatomy/Horse management
	Agricultural and veterinary sciences	Veterinary science	Livestock/Dairy farming
	Agricultural and veterinary sciences	Veterinary science	Oncology/Dog diseases
	Agricultural and veterinary sciences	Veterinary science	People in health professions/People working with animals
	Agricultural and veterinary sciences	Veterinary science	Ticks/Tick-borne diseases

The lower level FoS of veterinary sciences have been moved to the 3rd level of the taxonomy. However, they have been marked lilac as we want to further discuss it with experts, to ensure the FoS are correct and cover a large portion of veterinary science.

C6: Social Sciences → Education → Education

	SciNoBo V1		
C6	Social sciences	Education	Education
	SciNoBo V2		
C6	Social sciences	Education	E-learning/Education and training occupations
	Social sciences	Education	Science education/Philosophy of education
	Social sciences	Education	Educational technology/Learning
	Social sciences	Education	Educational stages/Undergraduate education
	Social sciences	Education	Special education/Learning disabilities
	Social sciences	Education	Education and training occupations/Career advice services
	Social sciences	Education	Mathematics education/Educational psychology
	Social sciences	Education	Gifted education/Educational psychology
	Social sciences	Education	Educational stages/School types
	Social sciences	Education	Inclusive education
	Social sciences	Education	Pedagogy
	Social sciences	Education	Didactics

	Social sciences	Education	Special education

Previously L3-level nodes were elevated to L2, marked with yellow. Terms marked green were drawn from EuroSciVoc**.** The FoS in the yellow changes are also flagged for further review, and possibly to be discussed with experts.

C. Case 3: Different Nodes with Child Nodes Sharing the Same Name

This case focuses on the challenges arising from **duplicate child nodes under different parent nodes**, which can cause confusion, redundancy, and inefficiency in our taxonomy. Below, we analyze the problem and solutions for each instance.

C1: Engineering and Technology → Environmental Biotechnology vs. Environmental Engineering

	SciNoBo V1		
C1	Engineering and technology	Environmental biotechnology	Environmental Engineering
	Engineering and technology	Environmental engineering	Environmental Engineering
	SciNoBo V2		
C1	Engineering and technology	Environmental biotechnology	Biosensing
	Engineering and technology	Environmental biotechnology	Bioremediation
	Engineering and technology	Environmental engineering	Carbon capture engineering
	Engineering and technology	Environmental engineering	Natural resources management
	Engineering and technology	Environmental engineering	Geological & geomatics engineering
	Engineering and technology	Environmental engineering	Hydrology/Water and the environment
	Engineering and technology	Environmental engineering	Sanitation/Sewerage
	Engineering and technology	Environmental engineering	Hydrology/Hydraulic engineering

In this case, we deleted "Environmental Engineering" at the 3rd level since it also exists at the 2nd level. Furthermore, we moved fields within the taxonomy from other subfields to this one (yellow changes). Also, there were additions from **EuroSciVoc**, and certain terms (Bioremediation) require further discussion as they exist elsewhere in the taxonomy (e.g. Bioremediation also exists as a 4th level FoS). These terms need validation to determine where they fit best.

C2: Agricultural and Veterinary Sciences → Food Science

	SciNoBo V1		
C2	Agricultural and veterinary sciences	Other agricultural sciences	Food Science

	Agricultural and veterinary sciences	Agricultural biotechnology	Food Science
	SciNoBo V2		
C2	Agricultural and veterinary sciences	Agricultural biotechnology	Food Science
	Agricultural and veterinary sciences	Other agricultural sciences	Food Science

This is a straightforward solution, as the L1 "Other Agricultural Sciences" is becoming obsolete. Its L2 categories were moved to more specific L1s. Consequently, the duplicate entry under this L1 was deleted, resolving the issue.

C3: Medical and Health Sciences → Overlapping Disciplines

	SciNoBo V1		
C3	Medical and health sciences	Basic medicine	Anatomy & Morphology
	Medical and health sciences	Basic medicine	Biochemistry & Molecular Biology
	Medical and health sciences	Basic medicine	Biophysics
	Medical and health sciences	Basic medicine	Developmental Biology
	Medical and health sciences	Basic medicine	Genetics & Heredity
	Medical and health sciences	Basic medicine	Microbiology
	Medical and health sciences	Basic medicine	Microscopy
	Medical and health sciences	Basic medicine	Mycology & Parasitology
	Medical and health sciences	Basic medicine	Nutrition & Dietetics
	Medical and health sciences	Basic medicine	Physiology
	Medical and health sciences	Basic medicine	Toxicology
	Medical and health sciences	Basic medicine	Virology
	Medical and health sciences	Health sciences	Anatomy & Morphology
	Medical and health sciences	Health sciences	Biochemistry & Molecular Biology
	Medical and health sciences	Health sciences	Biophysics
	Medical and health sciences	Health sciences	Developmental Biology
	Medical and health sciences	Health sciences	Genetics & Heredity
	Medical and health sciences	Health sciences	Microbiology
	Medical and health sciences	Health sciences	Microscopy
	Medical and health sciences	Health sciences	Mycology & Parasitology
	Medical and health sciences	Health sciences	Nutrition & Dietetics
	Medical and health sciences	Health sciences	Physiology
	Medical and health sciences	Health sciences	Toxicology
	Medical and health sciences	Health sciences	Virology
	SciNoBo V2		
C3	Medical and health sciences	Basic medicine	Anatomy & Morphology
	Medical and health sciences	Basic medicine	Biochemistry & Molecular Biology

	Medical and health sciences	Basic medicine	Mycology & Parasitology
	Medical and health sciences	Basic medicine	Biophysics
	Medical and health sciences	Basic medicine	Developmental Biology
	Medical and health sciences	Basic medicine	Genetics & Heredity
	Medical and health sciences	Basic medicine	Microbiology
	Medical and health sciences	Basic medicine	Pharmacology and pharmacy
	Medical and health sciences	Basic medicine	Inflammatory diseases
	Medical and health sciences	Basic medicine	Physiology
	Medical and health sciences	Basic medicine	Toxicology
	Medical and health sciences	Basic medicine	Virology
	Medical and health sciences	Health sciences	Nutrition & dietetics
	Medical and health sciences	Health sciences	General medicine
	Medical and health sciences	Health sciences	Social biomedical sciences
	Medical and health sciences	Health sciences	Health care sciences
	Medical and health sciences	Health sciences	Medical ethics
	Medical and health sciences	Health sciences	Personalized medicine

This has been one of the most challenging cases. We have sought expert assistance, providing them with all three taxonomies—ours, **EuroSciVoc**, and **Scopus**—to develop an inclusive structure. This is the reviewed version, keeping all the important fields where they best fit.

C4: Social Sciences → Criminology

	SciNoBo V1		
C4	Social Sciences	Law	Criminology
	Social Sciences	Other Social Sciences	Criminology
	Scinobo V2		
C4	Social Sciences	Law	Criminology
	Social Sciences	Other Social Sciences	Criminology

The duplicate entry for "Criminology" under the more general L2 "Other Social Sciences" was deleted. It was retained under the more specific L2 "Law," resolving the redundancy.

D. Case 4: The Taxonomy Stops at Level 2

This case involves extending a taxonomy that previously stopped at Level 2 by adding more specific subfields to create greater depth and detail.

C1: Medical and health sciences → Medical biotechnology

	SciNoBo V1

C1	Medical and Health Sciences	Medical Biotechnology	
	Scinobo V2		
C1	Medical and Health Sciences	Medical Biotechnology	Cells Technologies
	Medical and Health Sciences	Medical Biotechnology	Tissue Engineering
	Medical and Health Sciences	Medical Biotechnology	Nanomedicine
	Medical and Health Sciences	Medical Biotechnology	Genetic Engineering
	Medical and Health Sciences	Medical Biotechnology	Implants

In this case, new terms from **EuroSciVoc** were added to extend the taxonomy under the L2 category "Medical Biotechnology."

3. Collection of Changes Made in the New Taxonomy Version

This chapter outlines the adjustments implemented in the updated taxonomy, providing a comprehensive view of the modifications made to update its structure. Each adjustment is categorized using the color-coded system introduced earlier, offering a framework for understanding the scope of the revisions.

The table below provides an overview of all the changes introduced in the updated taxonomy, categorized by levels (L0-L3) and the color-coded system. Each case reflects a specific type of modification, including additions, deletions and movements (re-organization).

Cases per Color					
	L0	**L1**	**L2**	**L3**	**Totals per Color**
RED	0	3	13	7	**23**
YELLOW	0	0	5	40	**45**
GREEN	0	0	28	0	**28**
Totals per Level	**0**	**3**	**46**	**47**	**96**

In the following subsections, we will examine the exact number and nature of these changes, breaking them down by level and type of adjustment.

3.1 RED

The **RED** changes in the taxonomy indicate deletions of fields at various levels (L1, L2, and L3). These deletions can be categorized into three types, each with specific criteria and reasoning:

1. Deleted Fields from L1

Fields under L1 were removed because they were deemed redundant or overly general.

Deleted field from L1	
L0	L1
Agricultural and veterinary sciences	Other agricultural sciences
Natural sciences	Other natural sciences
Humanities and the arts	Other humanities

2. Deleted Fields That Exist Elsewhere

In this type, the deleted fields were redundant because they existed in more appropriate or specific locations within the taxonomy.

Deleted but exist in other paths		
L0	L1	L2
Agricultural and veterinary sciences	Other agricultural sciences	Food science
Engineering and technology	Other engineering and technologies	Energy
Engineering and technology	Other engineering and technologies	Mining & metallurgy
Medical and health sciences	Basic medicine	Microscopy
Medical and health sciences	Basic medicine	Nutrition & dietetics
Engineering and technology	Other engineering and technologies	Optoelectronics & photonics
Agricultural and veterinary sciences	Other agricultural sciences	Horticulture

3. Deleted Fields That Do Not Exist Elsewhere

Fields in this category were removed entirely from the taxonomy because they were either obsolete, overly broad, or not deemed necessary for inclusion in the updated structure. These deletions were evaluated to ensure they did not impact the comprehensiveness of the taxonomy.

Deleted and do not exist elsewhere		
Agricultural and veterinary sciences	Veterinary science	Veterinary sciences
Social sciences	Education	Education
Engineering and technology	Environmental engineering	Environmental engineering

Engineering and technology	Chemical engineering	Chemical engineering
Engineering and technology	Civil engineering	Civil engineering
Engineering and technology	Environmental biotechnology	Environmental engineering
Engineering and technology	Environmental engineering	Environmental Engineering

4. Deleted Fields from L2-L3

These fields were removed from deeper levels of the taxonomy. Often, they were highly niche topics that were either redundant or outside the intended scope of the taxonomy.

Deleted field from L1-L3			
L0	L1	L2	L3
Engineering and technology	Civil engineering	Civil engineering	Maritime incidents/Ship collision
Engineering and technology	Civil engineering	Civil engineering	Educational practices/Oxbridge
Engineering and technology	Civil engineering	Civil engineering	Clay minerals group/Phyllosilicates
Engineering and technology	Civil engineering	Civil engineering	Composite materials/Fibre-reinforced polymers
Medical and health sciences	Basic medicine	Biochemistry & Molecular Biology	Finance stubs/Sales taxes
Engineering and technology	Chemical engineering	Chemical engineering	Membrane technology/Water technology
Engineering and technology	Chemical engineering	Chemical engineering	Ionic liquids/Ions

3.2 YELLOW

YELLOW changes represent fields that have been moved within the taxonomy. These movements are aimed at ensuring better alignment and logical organization of topics, either by relocating them to more suitable positions or by promoting them to higher levels.

1. L2 Moved Inside the Taxonomy

These are cases where an L2 field was relocated to another part of the taxonomy but retained its level.

L2 Moved inside the taxonomy					
VERSION 1 POSITION			**VERSION 2 POSITION**		
L0	L1	L2	L0	L1	L2
Engineering and technology	Other engineering and technologies	Building & construction	Engineering and technology	Civil engineering	Building & construction
Engineering and technology	Other engineering and technologies	Design practice & management	Engineering and technology	Architecture	Design practice & management
Engineering and technology	Other engineering and technologies	Geological & geomatics engineering	Engineering and technology	Environmental engineering	Geological & geomatics engineering
Engineering and technology	Other engineering and technologies	Urban & regional planning	Engineering and technology	Civil engineering	Urban & regional planning

2. L2 Moved Inside the Taxonomy, Promoted to L1

In this type of change, an L2 field was deemed significant enough to be elevated to L1 status. This reflects its broader importance.

L2 Moved inside the taxonomy, promoted to L1					
VERSION 1 POSITION			**VERSION 2 POSITION**		
Engineering and technology	Other engineering and technologies	Architecture	Engineering and technology	Architecture	

3. L3 Moved Inside the Taxonomy

These changes involve relocating L3 fields within the taxonomy. The goal is to group them under more relevant or logically fitting L2 categories.

L3 Moved inside the taxonomy							
VERSION 1 POSITION				**VERSION 2 POSITION**			
L0	L1	L2	L3	L0	L1	L2	L3
Engineering and technology	Other engineering and technologies	Building & construction	Heating, ventilation, and air conditioning	Engineering and technology	Civil engineering	Building & construction	Heating, ventilation, and air conditioning/ Heat transfer

			/Heat transfer				
Engineering and technology	Other engineering and technologies	Building & construction	Building materials/Concrete	Engineering and technology	Civil engineering	Building & construction	Building materials/ Concrete
Engineering and technology	Other engineering and technologies	Building & construction	Building engineering/ Construction and extraction occupations	Engineering and technology	Civil engineering	Building & construction	Building engineering/ Construction and extraction occupations
Engineering and technology	Other engineering and technologies	Building & construction	Lighting/ Windows	Engineering and technology	Civil engineering	Building & construction	Lighting/ Windows
Engineering and technology	Other engineering and technologies	Building & construction	Composite materials/ Fibers	Engineering and technology	Civil engineering	Building & construction	Composite materials/ Fibers
Engineering and technology	Other engineering and technologies	Design practice & management	3D printing/ Structural engineering	Engineering and technology	Architecture	Design practice & management	3D printing/ Structural engineering
Engineering and technology	Other engineering and technologies	Geological & geomatics engineering	Soil/Natural materials	Engineering and technology	Environmental engineering	Geological & geomatics engineering	Soil/Natural materials
Engineering and technology	Other engineering and technologies	Geological & geomatics engineering	Petrology/ Barrages (dam)	Engineering and technology	Environmental engineering	Geological & geomatics engineering	Petrology/ Barrages (dam)
Engineering and technology	Other engineering and technologies	Geological & geomatics engineering	Geographic data and information/ Geographic information systems	Engineering and technology	Environmental engineering	Geological & geomatics engineering	Geographic data and information/ Geographic information systems
Engineering and technology	Other engineering and technologies	Geological & geomatics engineering	Concrete/ Building materials	Engineering and technology	Environmental engineering	Geological & geomatics engineering	Concrete/ Building materials
Engineering and technology	Other engineering and technologies	Geological & geomatics engineering	Remote sensing/ Imaging	Engineering and technology	Environmental engineering	Geological & geomatics engineering	Remote sensing/ Imaging
Engineering and technology	Other engineering and technologies	Urban & regional planning	Sustainable food system/ Agroecology	Engineering and technology	Civil engineering	Urban & regional planning	Sustainable food system/ Agroecology
Engineering and technology	Other engineering and technologies	Urban & regional planning	Sustainable urban planning/	Engineering and technology	Civil engineering	Urban & regional planning	Sustainable urban planning/

			Urban planning				Urban planning
Engineering and technology	Other engineering and technologies	Urban & regional planning	Environmental social science concepts/ Systems ecology	Engineering and technology	Civil engineering	Urban & regional planning	Environmental social science concepts/ Systems ecology
Engineering and technology	Other engineering and technologies	Urban & regional planning	Systems thinking/ Urban planning	Engineering and technology	Civil engineering	Urban & regional planning	Systems thinking/ Urban planning

4. L3 Moved Inside the Taxonomy, Promoted to L2

This type involves L3 fields that were upgraded to L2 status due to their broader scope or increased relevance within the updated taxonomy. Furthermore, most of the times their parent was deleted (refer to section 3.1.3).

L3 Moved inside the taxonomy - promoted to L2						
VERSION 1 POSITION				**VERSION 2 POSITION**		
L0	L1	L2	L3	L0	L1	L2
Agricultural and veterinary sciences	Veterinary science	Veterinary sciences	Animal viral diseases/ Swine diseases	Agricultural and veterinary sciences	Veterinary science	Animal viral diseases/ Swine diseases
Agricultural and veterinary sciences	Veterinary science	Veterinary sciences	Behavioural sciences/ Cognitive psychology	Agricultural and veterinary sciences	Veterinary science	Behavioural sciences/ Cognitive psychology
Agricultural and veterinary sciences	Veterinary science	Veterinary sciences	Horse anatomy/Horse management	Agricultural and veterinary sciences	Veterinary science	Horse anatomy/ Horse management
Agricultural and veterinary sciences	Veterinary science	Veterinary sciences	Livestock/Dairy farming	Agricultural and veterinary sciences	Veterinary science	Livestock/ Dairy farming

Agricultural and veterinary sciences	Veterinary science	Veterinary sciences	Oncology/Dog diseases	Agricultural and veterinary sciences	Veterinary science	Oncology/ Dog diseases
Agricultural and veterinary sciences	Veterinary science	Veterinary sciences	People in health professions/People working with animals	Agricultural and veterinary sciences	Veterinary science	People in health professions/ People working with animals
Agricultural and veterinary sciences	Veterinary science	Veterinary sciences	Ticks/Tick-borne diseases	Agricultural and veterinary sciences	Veterinary science	Ticks/Tick-borne diseases
Engineering and technology	Chemical engineering	Chemical engineering	Membrane technology/Water technology	Engineering and technology	Chemical engineering	Membrane technology/ Water technology
Engineering and technology	Chemical engineering	Chemical engineering	Ionic liquids/Ions	Engineering and technology	Chemical engineering	Ionic liquids/Ions
Engineering and technology	Chemical engineering	Chemical engineering	Petroleum production/ Fossil fuels	Engineering and technology	Chemical engineering	Petroleum production/ Fossil fuels
Engineering and technology	Chemical engineering	Chemical engineering	Engineering disciplines/ Systems engineering	Engineering and technology	Chemical engineering	Engineering disciplines/ Systems engineering
Engineering and technology	Chemical engineering	Chemical engineering	Carbon dioxide/Gas technologies	Engineering and technology	Chemical engineering	Carbon dioxide/ Gas technologies

Engineering and technology	Chemical engineering	Chemical engineering	Catalysis/ Chemical engineering	Engineering and technology	Chemical engineering	Catalysis/ Chemical engineering
Engineering and technology	Civil engineering	Civil engineering	Fire protection/ Building engineering	Engineering and technology	Civil engineering	Fire protection/ Building engineering
Engineering and technology	Civil engineering	Civil engineering	Structural engineering/ Civil engineering	Engineering and technology	Civil engineering	Structural engineering/ Civil engineering
Social sciences	Education	Education	E-learning/ Education and training occupations	Social sciences	Education	E-learning/ Education and training occupations
Social sciences	Education	Education	Science education/ Philosophy of education	Social sciences	Education	Science education/ Philosophy of education
Social sciences	Education	Education	Educational technology/ Learning	Social sciences	Education	Educational technology/ Learning
Social sciences	Education	Education	Educational stages/Undergraduate education	Social sciences	Education	Educational stages/ Undergraduate education

Social sciences	Education	Education	Special education/ Learning disabilities	Social sciences	Education	Special education/ Learning disabilities
Social sciences	Education	Education	Education and training occupations/ Career advice services	Social sciences	Education	Education and training occupations /Career advice services
Social sciences	Education	Education	Mathematics education/ Educational psychology	Social sciences	Education	Mathematics education/ Educational psychology
Social sciences	Education	Education	Gifted education/ Educational psychology	Social sciences	Education	Gifted education/ Educational psychology
Social sciences	Education	Education	Educational stages/School types	Social sciences	Education	Educational stages/ School types
Engineering and technology	Environmental engineering	Environmental engineering	Hydrology/ Water and the environment	Engineering and technology	Environmental engineering	Hydrology/ Water and the environment
Engineering and technology	Environmental engineering	Environmental engineering	Sanitation/ Sewerage	Engineering and technology	Environmental engineering	Sanitation/ Sewerage
Engineering and technology	Environmental engineering	Environmental engineering	Hydrology/ Hydraulic engineering	Engineering and technology	Environmental engineering	Hydrology/ Water and the environment

3.3 GREEN

GREEN changes represent fields that were introduced into the taxonomy, sourced directly from the EuroSciVoc or Scopus taxonomies. These additions are made at the L2 level to enhance the taxonomy's comprehensiveness and to include underrepresented areas of science.

All green changes involve new L2 fields brought into the taxonomy.

L0	L1	L2
Agricultural and veterinary sciences	Animal and dairy science	Apiculture
Engineering and technology	Civil engineering	Water engineering
Engineering and technology	Civil engineering	Construction engineering
Engineering and technology	Civil engineering	Transportation engineering
Engineering and technology	Environmental biotechnology	Biosensing
Engineering and technology	Environmental engineering	Carbon capture engineering
Engineering and technology	Environmental engineering	Natural resources management
Social sciences	Education	Inclusive education
Social sciences	Education	Pedagogy
Social sciences	Education	Didactics
Social sciences	Education	Special education
Medical and health sciences	Basic medicine	Histology
Medical and health sciences	Basic medicine	Infectious diseases
Medical and health sciences	Basic medicine	Pharmacology and pharmacy
Medical and health sciences	Basic medicine	Inflammatory diseases
Medical and health sciences	Health sciences	General medicine
Medical and health sciences	Health sciences	Social biomedical sciences
Medical and health sciences	Health sciences	Health care sciences

Medical and health sciences	Health sciences	Medical ethics
Medical and health sciences	Health sciences	Personalized medicine
Medical and health sciences	Medical biotechnology	Cells technologies
Medical and health sciences	Medical biotechnology	Tissue engineering
Medical and health sciences	Medical biotechnology	Nanomedicine
Medical and health sciences	Medical biotechnology	Genetic engineering
Medical and health sciences	Medical biotechnology	Implants
Engineering and technology	Chemical engineering	Chemical process engineering
Engineering and technology	Chemical engineering	Biochemical engineering
Engineering and technology	Chemical engineering	Separation technologies

3.4 LILAC

Lilac signifies fields or areas within the taxonomy that are under review for various reasons, such as overlapping definitions, unclear boundaries, or the need for expert input. These changes often involve discussions around categorization, relevance, or whether certain fields should exist at all.

Defining Boundaries: Is Computer Science a Distinct Field or Part of Engineering?

This issue examines whether Computer Science should stand as a distinct L1 field within the taxonomy or remain categorized under Engineering. The decision hinges on whether the discipline's theoretical and applied aspects justify its independence or whether its close integration with engineering principles warrants its inclusion under the broader engineering domain. Further discussion and expert input are required to clarify its proper placement.

Defining Boundaries: Is Computer Science a Distinct Field or Part of Engineering?			
L0	**L1**	**L2**	**L3**
Natural sciences	Computer and information sciences	Computation theory & mathematics	Statistical randomness
Natural sciences	Computer and information sciences	Computation theory & mathematics	Model theory/Artificial intelligence
Natural sciences	Computer and information sciences	Computation theory & mathematics	Computational problems in graph theory/NP-complete problems
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Artificial intelligence & image processing	Natural language processing/Computational linguistics

Engineering and technology	Electrical engineering, electronic engineering, information engineering	Artificial intelligence & image processing	Mathematical optimization/Evolutionary algorithms
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Artificial intelligence & image processing	Biometrics/Authentication methods
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Artificial intelligence & image processing	Fuzzy logic/Artificial neural networks/Computational neuroscience
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Artificial intelligence & image processing	Medical monitoring/Telehealth
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Artificial intelligence & image processing	Applications of computer vision/Computer vision/Image processing
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Artificial intelligence & image processing	Evolutionary algorithms/Cybernetics/ Mathematical optimization
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Artificial intelligence & image processing	Machine learning/Social Info Processing
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Computer hardware & architecture	Parallel computing/Computer memory
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Distributed computing	Operating system technology/Virtual machines
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Information systems	Information systems/Recommender systems
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Information systems	Cryptography/Information governance
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Information systems	Data management/Big data
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Information systems	Artificial intelligence/Computational fields of study
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Medical informatics	Anatomy/Medical education
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Networking & telecommunications	Metamaterials/Electromagnetism
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Networking & telecommunications	Wireless networking/History of radio
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Networking & telecommunications	Network performance/Road traffic management

Engineering and technology	Electrical engineering, electronic engineering, information engineering	Networking & telecommunications	Wireless sensor network/Wireless networking
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Networking & telecommunications	Radar/Navigation
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Networking & telecommunications	Ubiquitous computing/Artificial intelligence laboratories
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Networking & telecommunications	Information theory/Wireless networking
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Networking & telecommunications	Electric power/Electronics and the environment
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Software engineering	Concurrency (computer science)/Debugging
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Software engineering	Software engineering/Computer occupations
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Software engineering	Visualization (graphics)/Infographics
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Software engineering	Graphic design/Communication design
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Software engineering	Vision/Stereoscopy
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Software engineering	Computing output devices/Haptic technology
Engineering and technology	Electrical engineering, electronic engineering, information engineering	Software engineering	Cross-platform free software/Dynamic programming languages

Post-Validation Review: Determining Which Fields Should Remain

This case involves evaluating the L2 fields under specific L1 domains to determine whether all listed L2s are relevant, complementary, and appropriately categorized. Some L2s may clash, lack alignment, or appear inconsistent in specificity. The goal is to refine and validate these relationships through a semi-automatic validation process or with expert guidance, ensuring the taxonomy maintains coherence and logical structure.

Post-validation review: determining which fields should remain		
L0	**L1**	**L2**

Agricultural and veterinary sciences	Veterinary science	Animal viral diseases/swine diseases
Agricultural and veterinary sciences	Veterinary science	Behavioural sciences/cognitive psychology
Agricultural and veterinary sciences	Veterinary science	Horse anatomy/horse management
Agricultural and veterinary sciences	Veterinary science	Livestock/dairy farming
Agricultural and veterinary sciences	Veterinary science	Oncology/dog diseases
Agricultural and veterinary sciences	Veterinary science	People in health professions/people working with animals
Agricultural and veterinary sciences	Veterinary science	Ticks/tick-borne diseases

Post-validation review: determining which fields should remain			
L0	**L1**	**L2**	**L3**
Natural sciences	Earth and related environmental sciences	Environmental sciences	Sanitation/water pollution
Natural sciences	Earth and related environmental sciences	Environmental sciences	Pollution/air pollution
Natural sciences	Earth and related environmental sciences	Environmental sciences	Earth sciences

Natural sciences	Earth and related environmental sciences	Environmental sciences	Environmental social science concepts/environmental terminology
Natural sciences	Earth and related environmental sciences	Environmental sciences	Pollution/environmental effects of pesticides
Natural sciences	Earth and related environmental sciences	Environmental sciences	Biofuels/biodegradable waste management
Natural sciences	Earth and related environmental sciences	Environmental sciences	Chemical elements/nuclear materials
Natural sciences	Earth and related environmental sciences	Environmental sciences	Membrane technology/water desalination

Post-validation review: determining which fields should remain		
L0	**L1**	**L2**
Engineering and technology	Chemical engineering	Membrane technology/water technology
Engineering and technology	Chemical engineering	Ionic liquids/ions
Engineering and technology	Chemical engineering	Petroleum production/fossil fuels
Engineering and technology	Chemical engineering	Engineering disciplines/systems engineering

Engineering and technology	Chemical engineering	Carbon dioxide/gas technologies
Engineering and technology	Chemical engineering	Catalysis/chemical engineering
Engineering and technology	Chemical engineering	Chemical process engineering
Engineering and technology	Chemical engineering	Biochemical engineering
Engineering and technology	Chemical engineering	Separation technologies

Post-validation review: determining which fields should remain			
L0	**L1**	**L2**	**L3**
Social sciences	Media and communications	Communication & media studies	Anglophone-centric
Social sciences	Media and communications	Communication & media studies	Social media
Social sciences	Media and communications	Communication & media studies	News/journalism
Social sciences	Media and communications	Communication & media studies	Applied linguistics/social media

Social sciences	Media and communications	Communication & media studies	Concepts in metaphysics/causality

Post-validation review: determining which l3 fields should remain		
L0	**L1**	**L2**
Social sciences	Education	E-learning/education and training occupations
Social sciences	Education	Science education/philosophy of education
Social sciences	Education	Educational technology/learning
Social sciences	Education	Educational stages/undergraduate education
Social sciences	Education	Special education/learning disabilities
Social sciences	Education	Education and training occupations/career advice services
Social sciences	Education	Mathematics education/educational psychology
Social sciences	Education	Gifted education/educational psychology

Social sciences	Education	Educational stages/school types
Social sciences	Education	Inclusive education
Social sciences	Education	Pedagogy
Social sciences	Education	Didactics
Social sciences	Education	Special education

Finding the Right Fit: Positioning Environmental Biotechnology within L2 Domains

This case focuses on determining the most appropriate placement for Environmental Biotechnology within the taxonomy's L2 structure. As this field spans multiple interdisciplinary areas, it raises questions about its alignment with related domains. Expert input and validation tools will play a key role in resolving its placement effectively.

Finding the Right Fit: Positioning Bioremediation within L2 Domains				
L0	**L1**	**L2**	**L3**	**L4**
Engineering and technology	Environmental biotechnology	Bioremediation		
Natural sciences	Earth and related environmental sciences	Environmental sciences	Biofuels/Biodegradable waste management	Bioremediation

Should Industrial Engineering Stand Alone? Evaluating Its Position as an L1 Field

This case explores whether Industrial Engineering warrants its own designation as an L1 field within the taxonomy. Given its interdisciplinary nature and overlap with other engineering domains, the question arises whether it should remain embedded within broader categories or be elevated to a standalone field. This evaluation will involve considering the field's specificity, connections to other areas, and its prominence in academia and industry. Expert insights will guide this decision to ensure clarity and coherence in the taxonomy.

Should Industrial Engineering Stand Alone? Evaluating Its Position as an L1 Field			
L0	**L1**	**L2**	**L3**
Engineering and technology	Industrial biotechnology	Industrial engineering & automation	Machining/Machine tools
Engineering and technology	Industrial biotechnology	Industrial engineering & automation	Control theory/Advanced driver assistance systems
Engineering and technology	Industrial biotechnology	Industrial engineering & automation	Robotics/Robots
Engineering and technology	Industrial biotechnology	Industrial engineering & automation	Industrialisation/Industrial engineering
Engineering and technology	Industrial biotechnology	Industrial engineering & automation	Mechanisms (engineering)/Machines
Engineering and technology	Industrial biotechnology	Industrial engineering & automation	Electric motors/Energy conversion
Engineering and technology	Industrial biotechnology	Industrial engineering & automation	Crewed spacecraft/Embedded systems

Seeking Expert Insights: Could These L2-L3 Go Under the L1 "Industrial Engineering" If This L1 Is Created?

This case focuses on evaluating whether specific L2-L3 fields align with the proposed L1 category of *Industrial Engineering*. The fields under review span topics such as *Operations Research*, *Risk Analysis*, and *Sustainable Energy*, highlighting the broad interdisciplinary nature of industrial engineering. If this L1 is established, these subfields may fit well under it, but consideration is needed to avoid misclassifications. Expert feedback and analysis of thematic relevance will help determine the most logical placements for these fields within the taxonomy.

Seeking Expert Insights: Could these L2-L3 go under the L1 "Industrial engineering" if this L1 is created?			
L0	**L1**	**L2**	**L3**
Engineering and technology	Other engineering and technologies	Operations research	Supply chain management/Business terms
Engineering and technology	Other engineering and technologies	Operations research	Mathematical optimization/Evolutionary algorithms

Engineering and technology	Other engineering and technologies	Operations research	Mathematical economics/Business terms
Engineering and technology	Other engineering and technologies	Operations research	Sustainable energy/Electric power distribution
Engineering and technology	Other engineering and technologies	Operations research	Maintenance/Mechanical engineering
Engineering and technology	Other engineering and technologies	Strategic, defence & security studies	Risk analysis/Actuarial science
Engineering and technology	Other engineering and technologies	Strategic, defence & security studies	Natural disasters/Disaster management

Seeking Expert Insights: Addressing Why L1 Fields Appear Less Specific Than Their L2 Subfields
In this case, we examine why this L1 field, appears broader or less specific compared to their L2 subfield, *Nanoscience & Nanotechnology*. This discrepancy raises questions about whether the L1 captures the specificity and scope of its subfields. Expert guidance will be essential in resolving whether adjustments to the structure or terminology are needed.

Seeking expert insights: addressing why l1 fields appear less specific than their l2 subfields		
L0	**L1**	**L2**
Engineering and technology	Nano-technology	Nanoscience & nanotechnology

Seeking Expert Insights: Should This L3 Be moved Under This L2?

This case examines whether the L2 Design Practice & Management and its associated L3 3D Printing/Structural Engineering could be placed under the L1 Architecture. The concern lies in whether this hierarchical arrangement aligns conceptually, or if the L2 and L3 would be better positioned under a different L1 category that more accurately reflects their scope and focus. Expert feedback is necessary to evaluate if their inclusion under *Architecture* maintains logical consistency within the taxonomy.

Seeking Expert Insights: Should This L3 Be Reclassified Under this L2?			
L0	**L1**	**L2**	**L3**
Engineering and technology	Architecture	Design practice & management	3D printing/Structural engineering

Are These Fields Useful?

This case raises a general concern about the relevance and necessity of specific L2 levels within the taxonomy. The aim is to evaluate whether these fields add meaningful value. Determining their usefulness involves assessing their distinctiveness, applicability, and alignment with the overall taxonomy goals. Feedback from experts will guide our decision about retaining, merging, or removing these fields.

Are these fields useful?			
L0	**L1**	**L2**	**L3**
Social sciences	Other social sciences	Family studies	Centuries/Decades
Social sciences	Other social sciences	Family studies	Family/Interpersonal relationships
Social sciences	Other social sciences	Family studies	Geography/Cultural geography

4. Conclusion and Future Steps

Conclusion

This report serves to outline the changes introduced in the second version of the taxonomy. It provides explanations of the updates, organized by the color-coded categories used throughout the document, and highlights areas that remain under review or require further expert input. By clarifying the adjustments made, we aim to offer a comprehensive understanding of how the taxonomy has evolved.

Next Steps

As we move forward, our primary focus is on developing and implementing a semi-automatic validation approach powered by large language models (LLMs). This method will help identify edge cases where subcategories may not align with their parent categories, enabling us to manually address and resolve these discrepancies.

This system will play a pivotal role in reviewing the Taxonomy and ensuring consistency, accuracy, and alignment across all levels and categories. The system will also help in streamlining final validation, by automating the identification of inconsistencies or overlaps to simplify the refinement process.