The AIoD Conceptual Model

Knowledge Organisation and Categorisation

In the AIoDP

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Model Scope

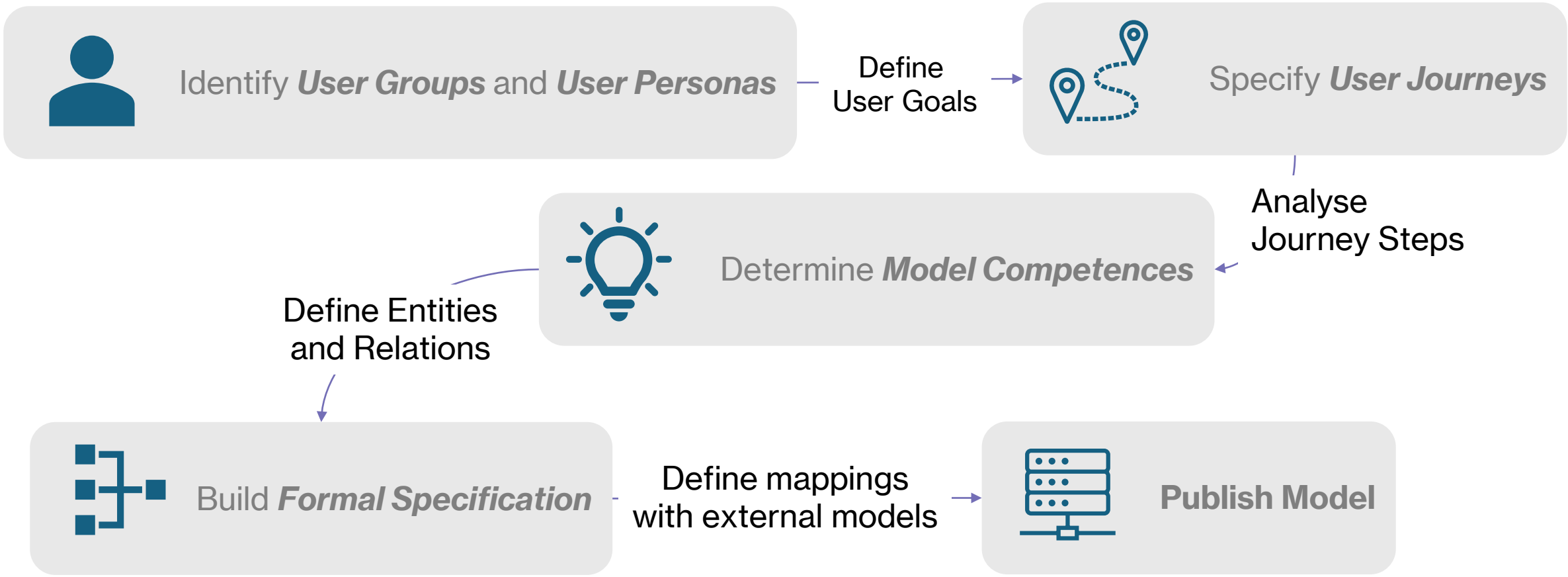
A model for all entities related to AI technology and the scientific and business knowledge ecosystems, to the benefit of the Researchers or Innovators, either consumers or providers

Model Value

Such a model supports:

- Robust Metadata descriptions
- Discoverability of AI resources
- Semantic Search Engine development
- Flexible and Open connections with other relevant Platforms and Standards

Model Design Process



Users and User Journeys

- ***User Groups***: Core classification of user expected to interact with the platform
- ***User Personas***: User profiles that represent the wants and needs of a specific subgroup
- ***User Journey***: A scenario-based sequence that a user (persona) takes in order to accomplish a high-level goal
  - Includes distinct stages (steps)
  - Users have different goals and mindsets on each step
  - Users must perform different actions for each step
  - Users face different challenges on each step

Users and User Journeys

Junior Researchers
Senior Researchers
Innovators
Research Institutions
SMEs
Research Consultants

Professors
Editors
Educational Institutions
Education Consultants

Undegraduate Students
Postgraduate Students
PhD Candidates

STUDENT
Scenario: the student looks to discover online courses relevant to their interests. Apart from the scientific relevance of the course, aspects like hours, access to material, and accreditation weigh on their decision.

EXPECTATIONS

- Course subject adheres to the student's interests
- The duration of the course suits the student's schedule
- The course provide sufficient credits for the required effort
- Course material is available and of high quality
- Prerequisites for attending the course are clearly stated
- ...

STAGES

STAGE 1: Search and Explore

STAGE 2: Compare

STAGE 3: Acquire

STAGE 1: Search and Explore

User Goals

Retrieve information on different courses fulfilling their criteria in terms of coverage, accessibility, level, and rewards

User Actions

Set filters on the criteria defined by the user goal

Touchpoints & Channels

The student contacts directly a knowledgeable person to acquire further details or instruction for their enrollment process and obligations

User Thoughts

-

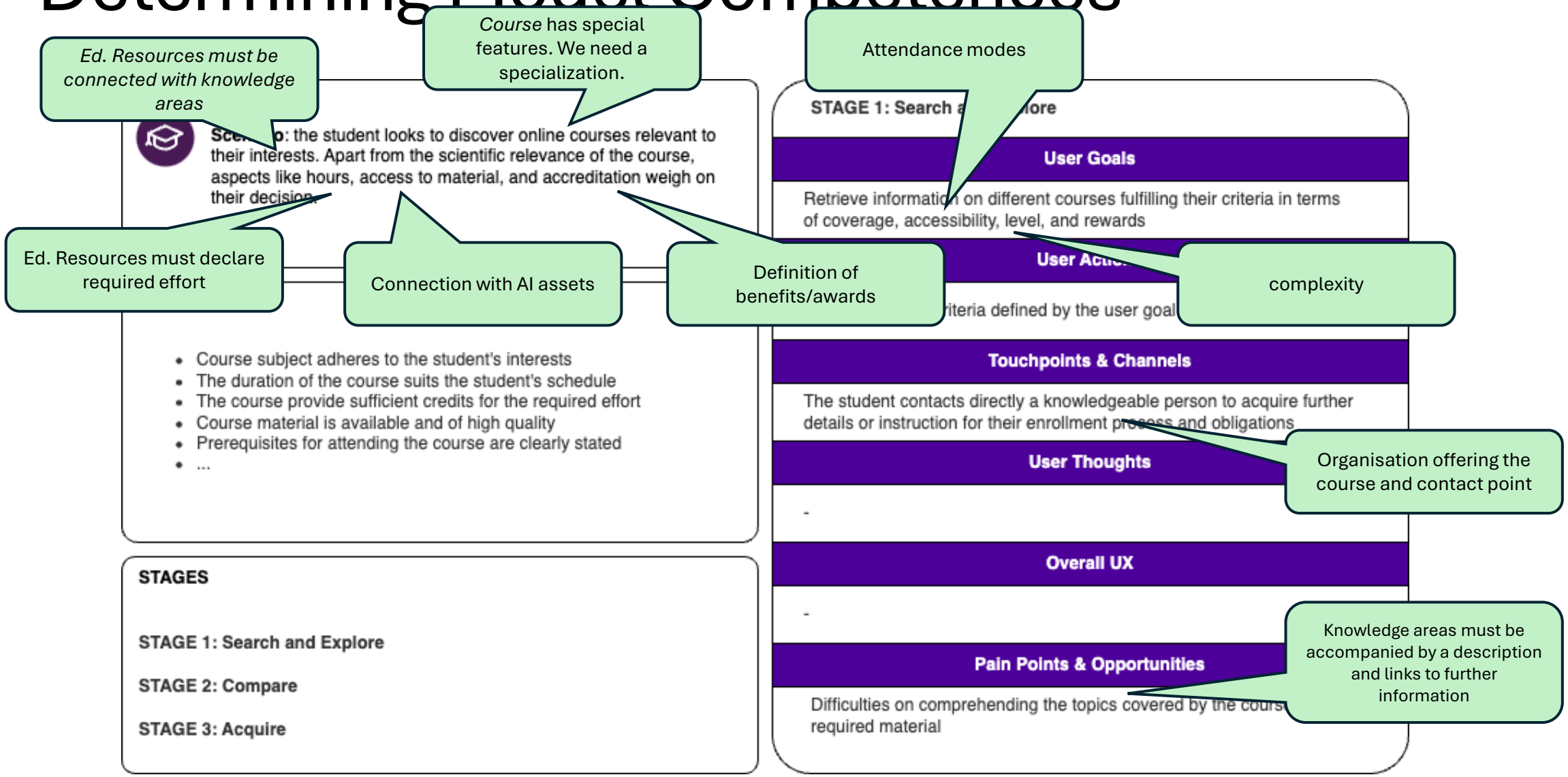
Overall UX

-

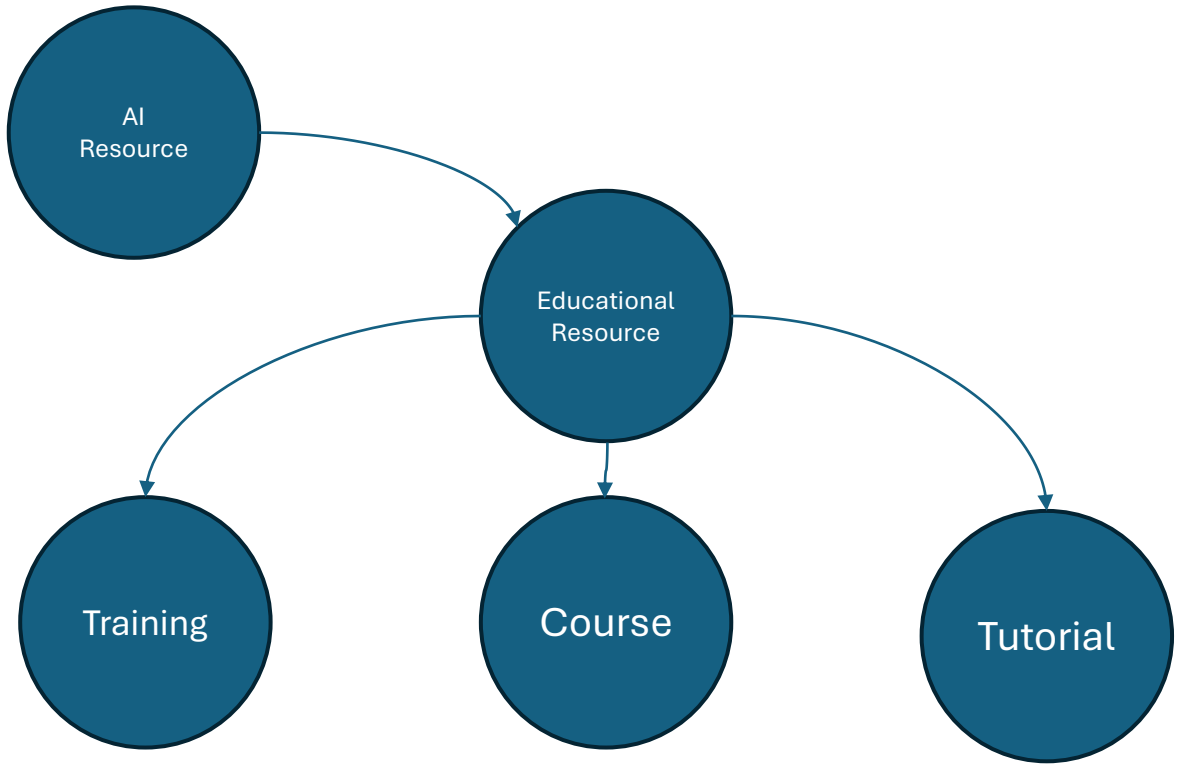
Pain Points & Opportunities

Difficulties on comprehending the topics covered by the course and the required material

Determining Model Competences



Building the Model



PROPERTY	TYPE	CARDINALITY	DESCRIPTION
identifier	URL	1	
name	String	1	A name given to the resource.
alternateName	String	0-n	An alternative name commonly used for the resource in place of its name
description	String	0-1	A usually short informative text on the resource
keyword	String	0-n	terms or phrases providing additional context for the resource.
industrialSector	ApplicationArea	0-n	An industrial sector where a resource is or can be of use (possibly in the co
researchArea	ResearchArea	0-n	A research area under which the research problems remedied by the resou
scientificDomain	ScientificDomain	0-n	A scientific domain where the activities, operations or outcomes of the reso
documentedIn	KnowledgeAsset	0-n	A Knowledge Asset describing and documenting the given resource
image	Multimedia	0-1	An image depicting or associated with the resource
contact	Person	0-n	A contact person for acquiring information on the resource
location	Location	0-n	A geographical specification of where the resource resides
sameAs	URL	1-n	A link to a web location with information on the resource
isPartOf	AIResource	0-n	An asset that includes this resouce
hasPart	AIResource	0-n	An resource that is included as a part/component of this resource
audience		0-n	The principal users(s) for which the learning resource was designed. See h
educationalLevel	String	0-n	advanced, intermediate, beginner
educationalType			see https://wiki.eoscfuture.eu/display/PUBLIC/EOSC+Training+Resource+F
taughtBy	Person	0-n	
offeredBy	Organisation	1-n	
complexityLevel			e.g. foundational, algorithmic,...
expectedOutcome	String	0-1	
qualification		0-1	Identification of certification, accreditation or badge obtained with course o
prerequisiteKnowledgeof	ResearchArea	0-n	
aiodClassification		1-n	
underClassification	Classification	0-n	
schedule	String	0-1	
enrollmentStartDate	Datetime	0-1	The date from when applications for enrolling can be applied
enrollmentEndDate	Datetime	0-1	The final date for which applications for enrolling are accepted
startDate	Date	0-1	When the resource starts running
endDate	Date	0-1	When the resource concludes
duration		0-1	(in hours)
pace		0-1	full-time, part-time, self-paced
cost	decimal	0-1	(currency)
usesResource	AIResource	0-n	
learningMode	String	0-1	online, hybrid, offline
offeredVia	URL		
license	License		

Journey-based Evaluation

- Post-usage questionnaire
- Users assess the ease and completeness of realizing their journeys, step-by-step
- Source of feedback for model, services, platform use paradigm

Role of Taxonomies in AIoDP

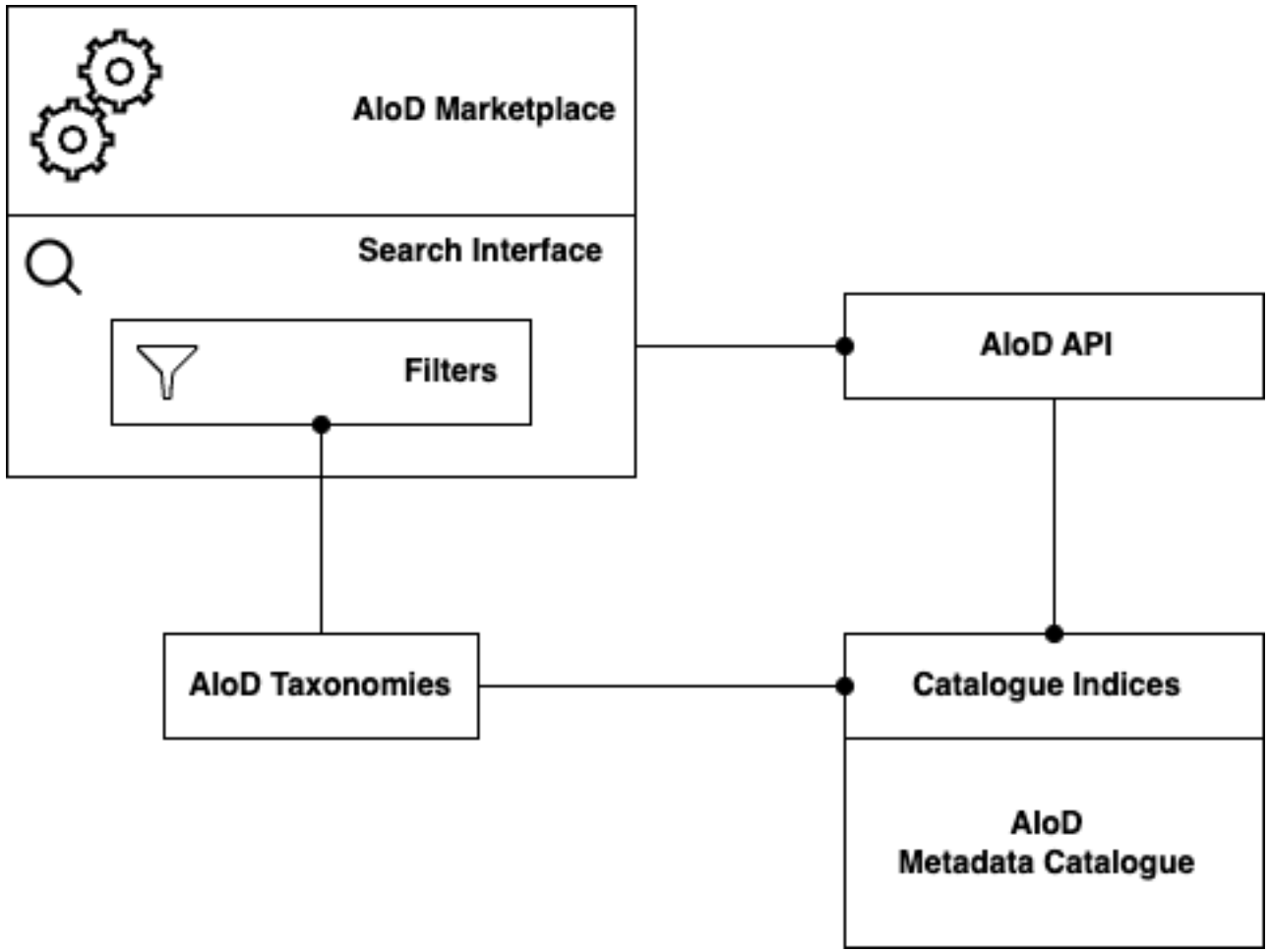
- **Modelling perspective**
  - Provide a specific, controlled value space for properties where a controlled vocabulary is an appropriate range.
  - Can be typologies, classifications, enumerations

- **Functional perspective**
  - Foundation for filtering mechanisms
  - Facilitation of error/consistency checking
  - Facilitation and promotion of interoperability with external platforms

Taxonomies in the AIoD Model

- General purpose taxonomies
  - Countries
  - MIME types
  - File Formats
  - Licenses
  - …
- Classification schemes
  - News Categories
  - Educational Formats
  - …
- ***Expertise and Scientific/Market Focus Area***

Categorical Information in Practice



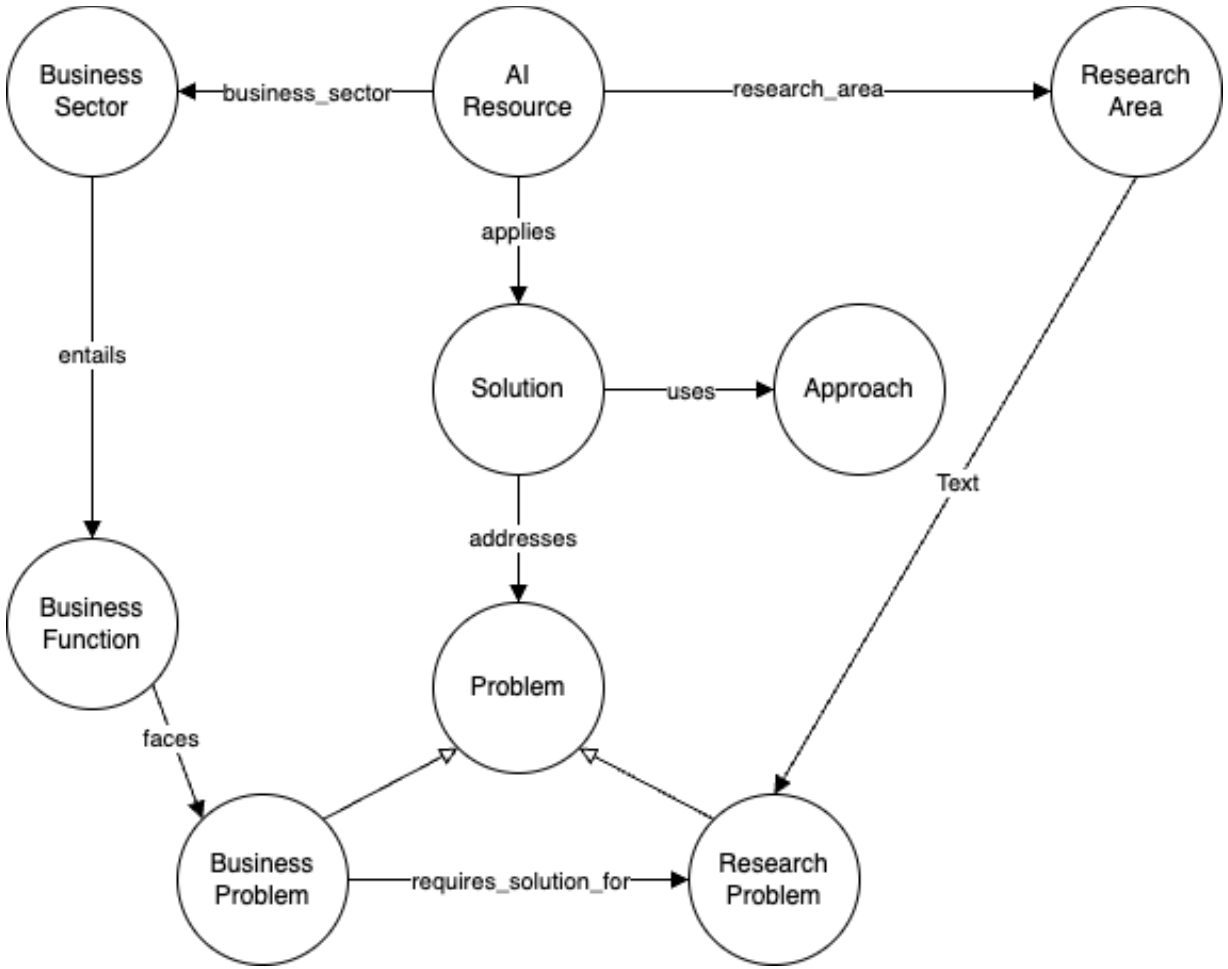
Conceptualisation of focus areas

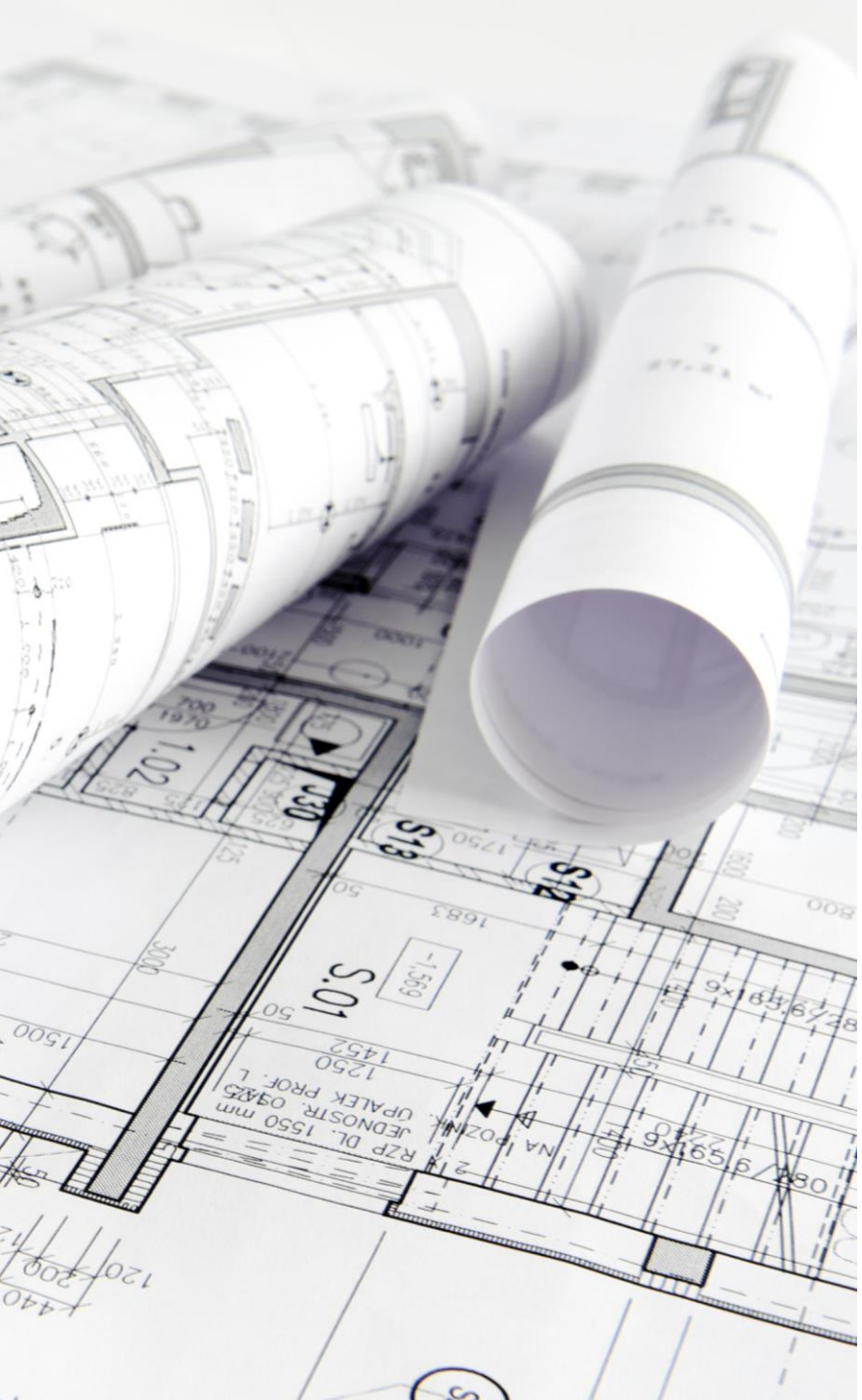
- The core top-level entities are **business sectors** and **research areas**
- **Business sectors**
  - entail business functions (probably sector-independent)
  - Business functions pose specific problems to the business
  - Business problems are solved via AI solutions -> assets and resources
- **Research Areas**
  - Remedy research problems
  - Solutions to research problems are provided as assets and resources. They solve the problem by adopting specific **approaches**

Taxonomical Perspectives

- Theoretical models and algorithms
- Cognitive abilities
- Functions performed by AI
- AI applications by business function
- AI applications by economic sector

Conceptual Organisation





Our Approach

- 2-tier organization of business sectors
- Association of business functions with business problems where AI solutions are applicable
- 2-tier organisation of AI approaches wrt their emulation of human activities

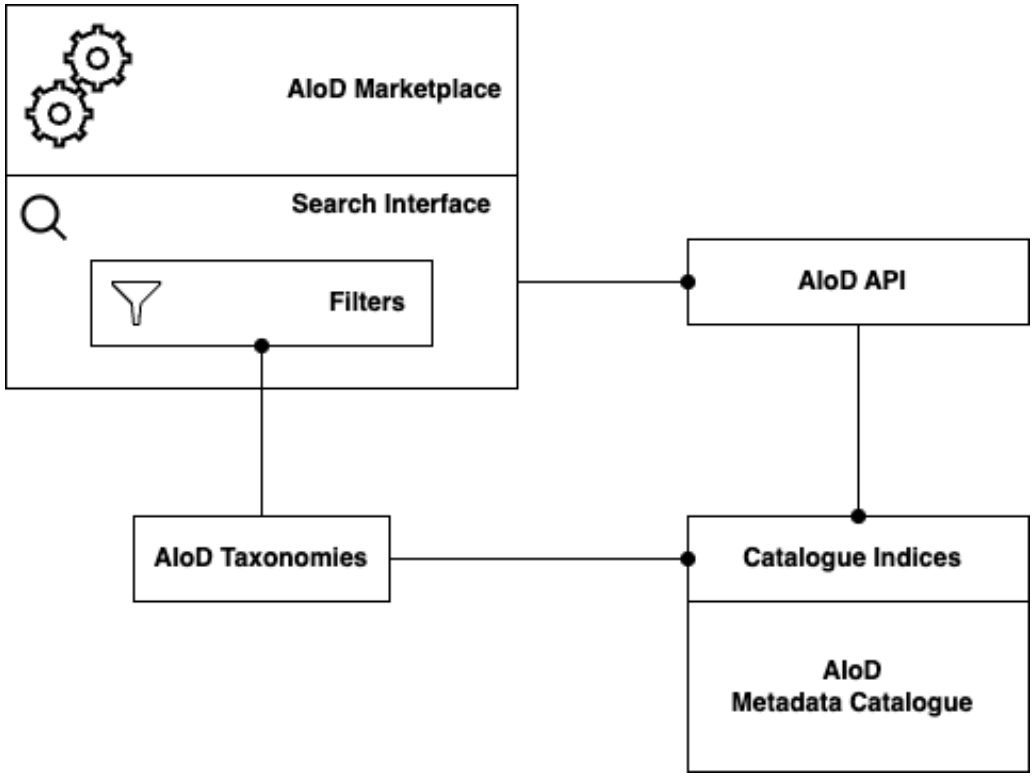
Taxonomy Population

SECTOR	SUBSECTOR
Agri-food	Agriculture
	Forestry
	Fishing
Energy	Oil and Gas
	Electricity and Gas supply
	Energy Renewables
Manufacturing	Textile
	Electronics
	Car Industry
	Other Motor Vehicles

BUSINESS FUNCTIONS	BUSINESS PROBLEMS
Marketing, Sales	Customer profiling
	personalised marketing offers and recommendations
	price optimisation
	customer service automation
	targeted advertising
	market analysis
	lead generation
	churn prevention
	customer support
	Competitive Landscape monitoring
Production processes	Predictive maintenance
	Classification of products or defect detection
	Assembly works (vehicles, equipment, components, robotics)
	Production surveillance, security, or inspection of tasks
	Production monitoring (e.g. crop, assembly)
	Precision operations (e.g. medicine, agriculture, drilling)
	Process automation
	Autonomous systems
	Additive manufacturing
	Product design
	Process optimisation
	Testing automation

HUMAN APPROACHES	GENERAL AI APPROACHES	SPECIFIC AI APPROACHES
Reasoning	KR & Reasoning	Knowledge Represantation Languages (Prolog, list, probalistic)
		case-based reasoning
		Ontologies and semantic web
		symbolic representation
		Game theory
		Fuzzy Theory
		Knowledge Graphs
		Linked Open Data
		Genetic Algorithm
		Heuristic programming
		Inference engines
		evidence reasoning
		rule-based Reasoning
		Knowledge Acquisition/ solicitation
		Automated reasoning
		Common sense reasoning

Taxonomies in Practice



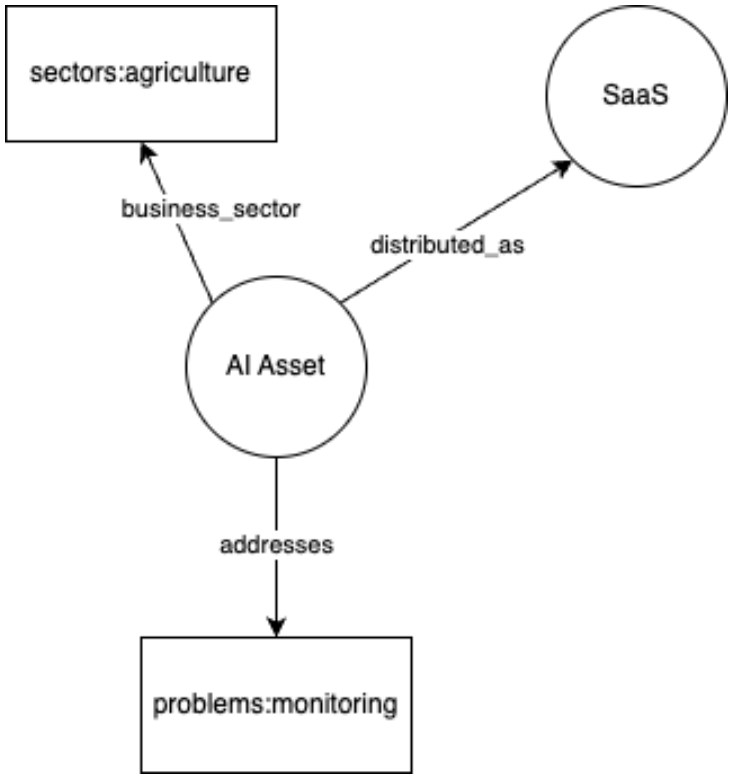
User Interest: *Applications for Crop Monitoring*

Filters:

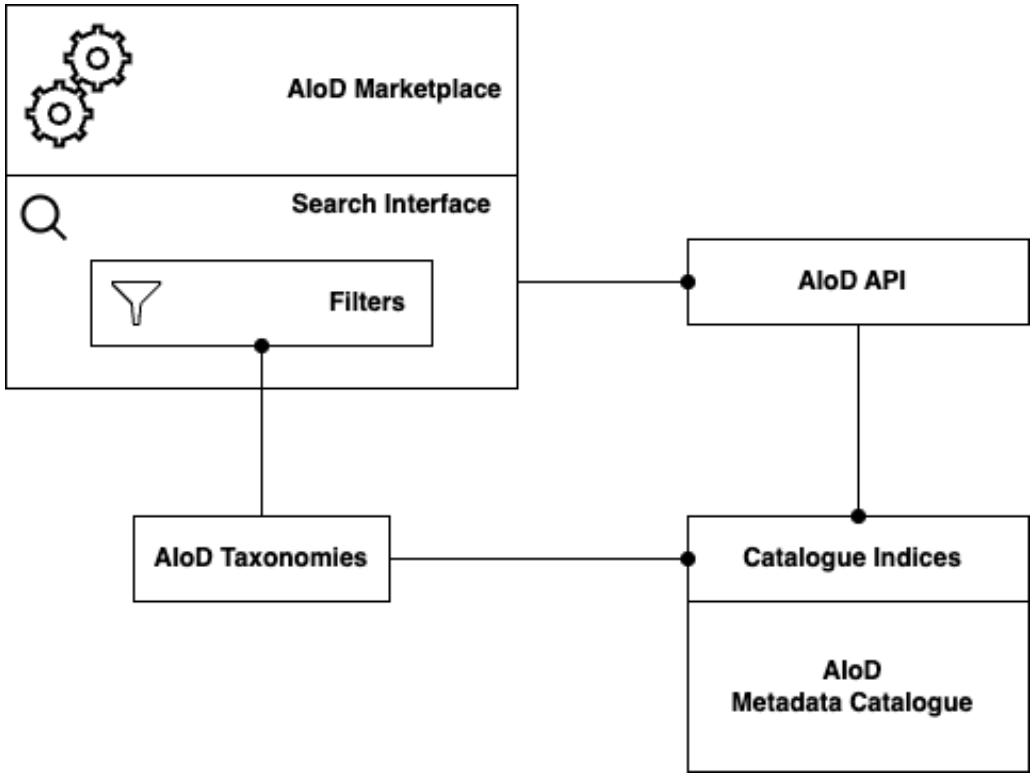
Business Sector: *Agriculture*

Business Function: *Production monitoring*

Resource Distribution: *SaaS*



Taxonomies in Practice



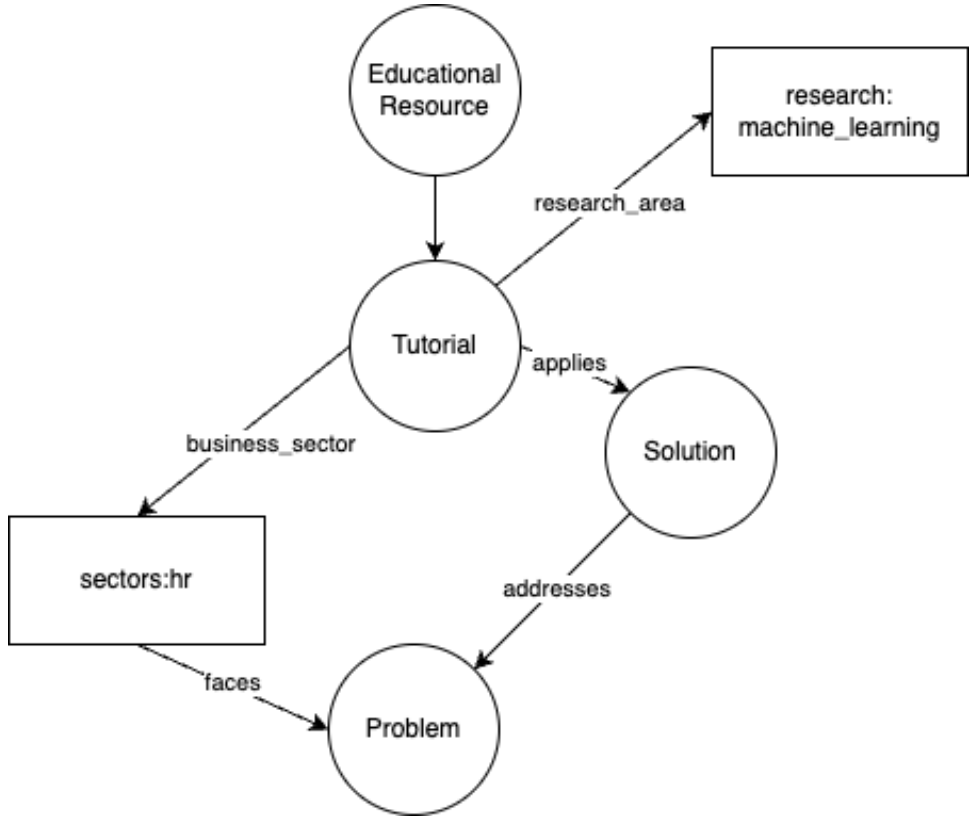
User Interest: *Tutorials for Machine Learning applications for HR management*

Filters:

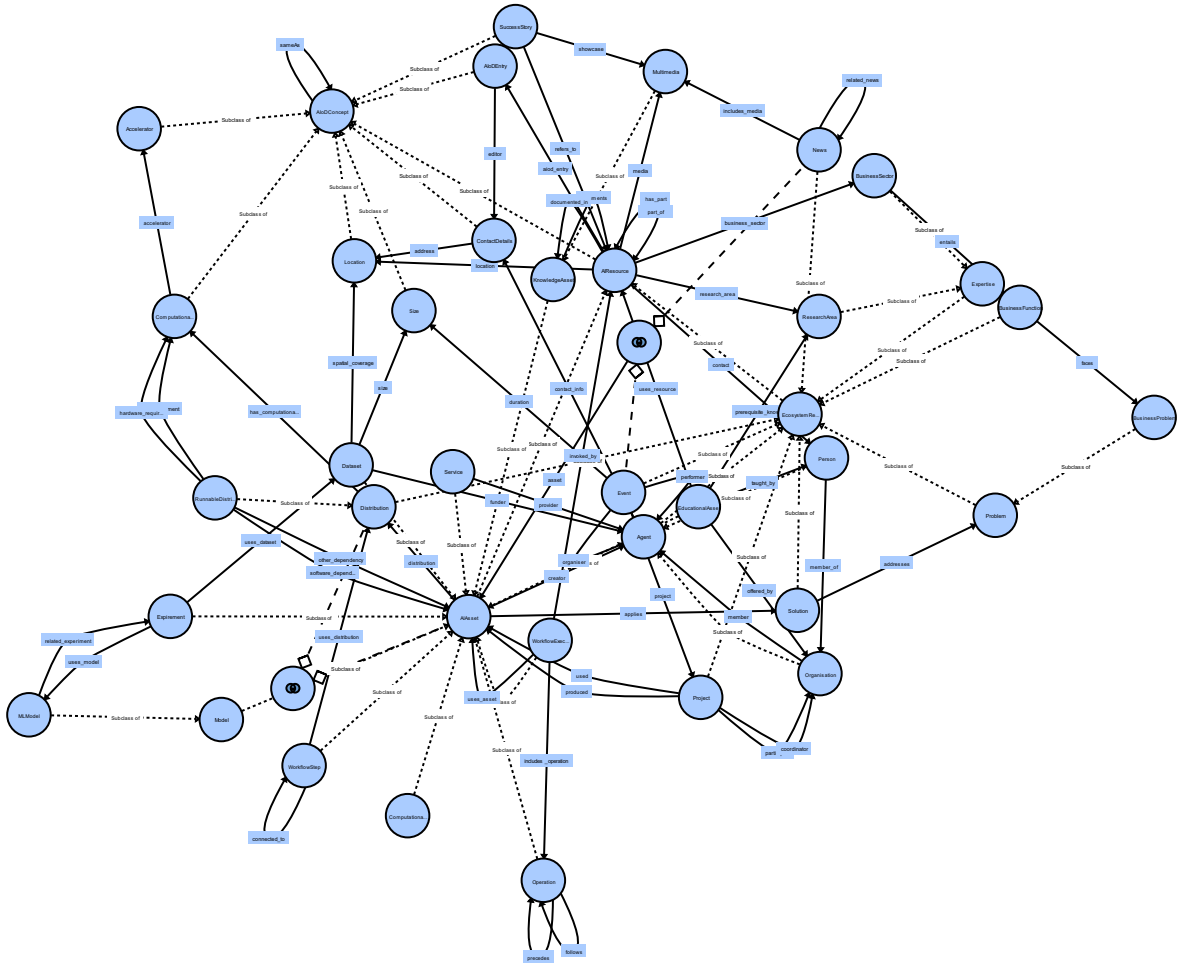
Business Function: *HR management or recruiting*

AI Approach: *Machine Learning*

AI Resource Type: *Tutorial*



Current Model Coverage



https://aiondemand.github.io/metadata-schema/doc/webvowl/index.html#

Tools and Services

- **Model exporters**
  - Ontology and taxonomies exporter
  - Returns easy-to-consume JSON representation of entities, properties and terms
- **Model mapping service (in progress)**
  - Enables mapping definition with custom schemas from legacy representations (MS Excel™, CSV)

Resources

- GitHub repository: https://github.com/aiondemand/metadata-schema
- AIoD taxonomies: https://github.com/aiondemand/metadata-schema/tree/main/taxonomies
- Ontology documentation: https://aiondemand.github.io/metadata-schema/doc/index-en.html
- Ontology visualization: https://aiondemand.github.io/metadata-schema/doc/webvowl/index.html#
- The AIoD Platform: https://aiod.eu