

On the Collaborative Development of Application Ontologies: a Practical Case Study with a SME

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joint work with:

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What's this talk about?

- A **collaborative** and **interdisciplinary** ontology development experience
- **Application** ontology
- In a **concrete industrial** context (SME)

Edizioni
Erickson

Modelling Context

- Individual Education Plan (IEP)
 - “a document that describes integrated and balanced *interventions*, prepared for students with disabilities in a given period of time, for the purpose of executing the right to education and training” [Italian Law 104 / 1992]
 - Consists of:
 - Functional Diagnosis (incl. compromised *Functional Abilities*)
 - Dynamic Functional Profile (incl. *Goals*)
 - *Activities* and *Materials*
- Preparing IEPs *ain't easy*...
- SOFIA, an *ontology-based system* supporting IEP preparation

Modelling Process

Phase I: Ontology Requirements Specification

- IEP **O**ntology **R**equirements **S**pecification **D**ocument (ORSD)
 - purpose, scope, implementation language, intended users and uses, functional and non functional requirements, pre-glossary
- Main outcomes:
 - **dual-purpose** ontology
 - **support** the preparation of IEPs via an **intelligent system**
 - provide a **classification** of functional and cognitive abilities in a **standard** fashion
 - summary of the content to be covered
 - e.g., functional and cognitive **abilities**, educational **goals, activities, materials**
 - a number of **application-specific** requirements
 - e.g., well-annotated, no multi-inheritance
 - ontology **meta-model** vs **content**

Modelling Process

Phase 2: Definition of the Ontology Meta-model

- Ontology **Meta-model**: defines the basic structures, definitions, and properties to be used in the ontology
 - classes: e.g., “Ability”, “Goal”, “Activity”, and “Material”
 - properties: e.g., to relate abilities to goals, to define precedence between abilities
- **Double**-formalization to cope with **dual**-purpose

Modelling Process

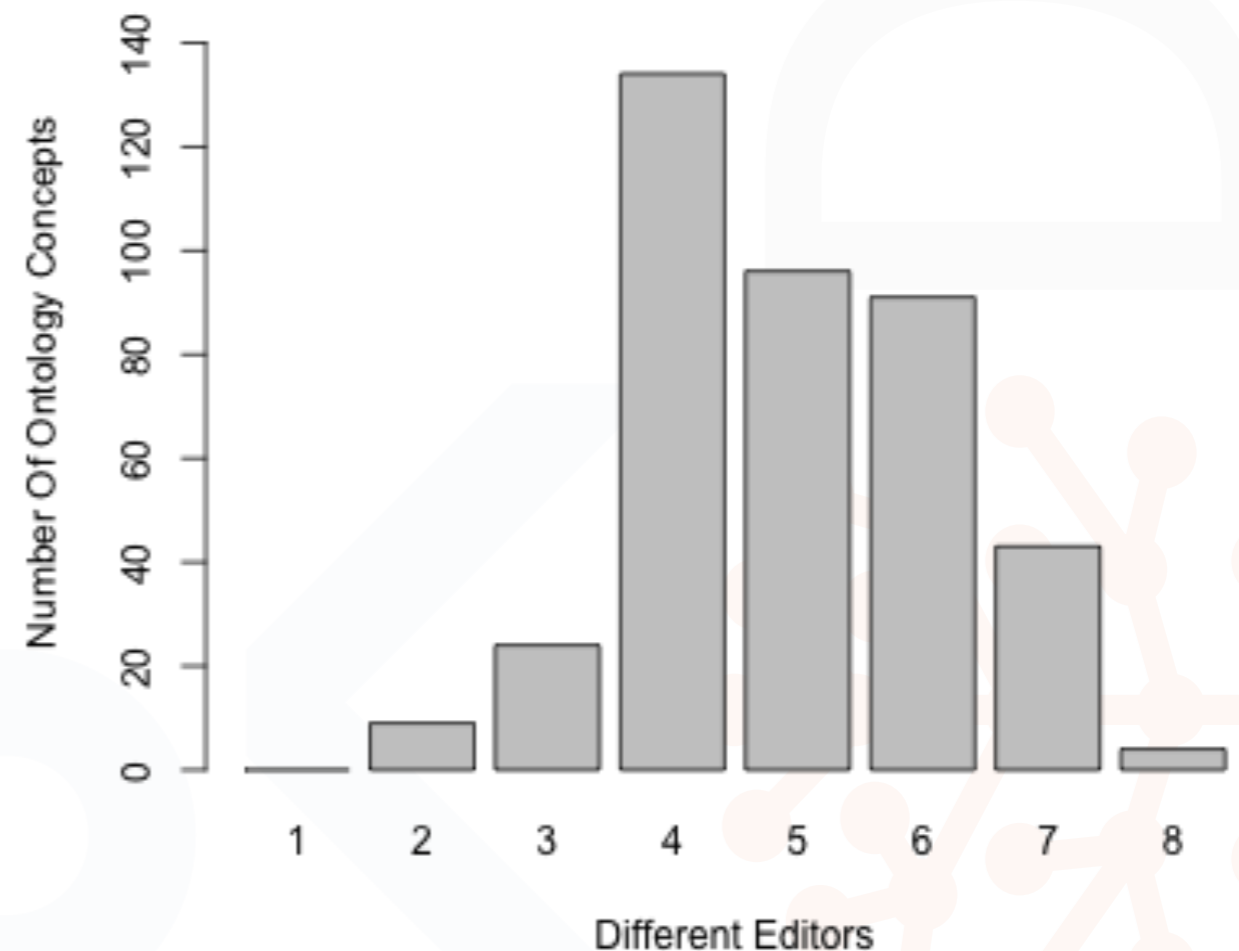
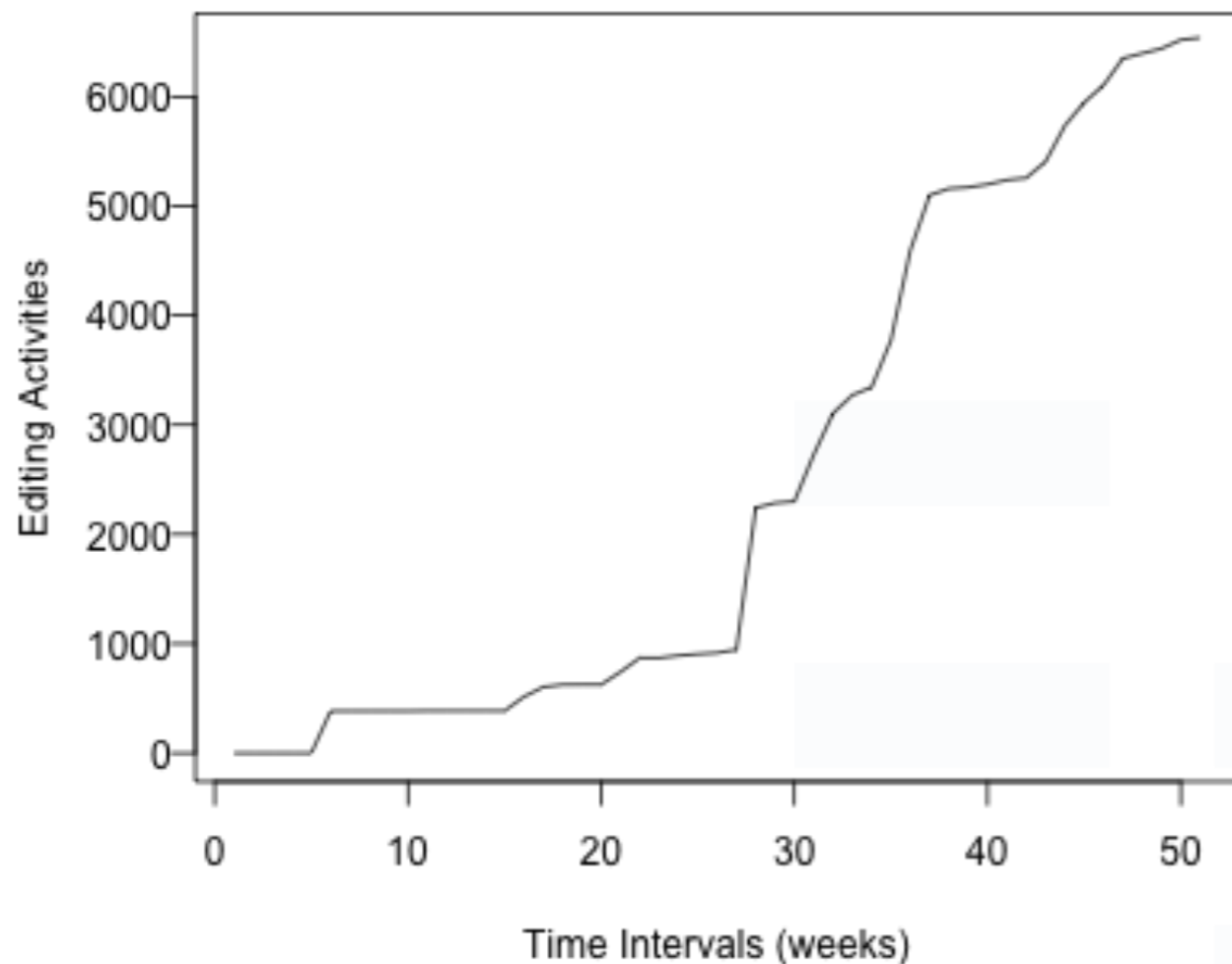
Phase 3: Formalization of abilities, goals, activities, and materials

- An interdisciplinary team of **domain experts** collaboratively defined a taxonomy of functional **abilities** (and related content: **goals, activities, materials**) grounded in the meta-model
- Powered by **MOKi** (moki.fbk.eu)
the Modelling Wiki ---
 - one **page** for each **functional ability**
 - **customized forms**, rooted in the meta-model

Modelling Process

A MoKi for SOFIA: Usage Statistics

- One year modelling period [Jul 2013 - June 2014]
- 13 active users, ~500 changes/user
- 399 pages, ~16 changes/page



Modelling Process

Phase 4: Ontology evaluation

- Ontology vs. **competency questions** (ORSD) via SPARQL
- Indirect domain experts and application engineers **evaluation via the application prototype**
 - favoured the **development of the application** prototype
 - enabled to spot **anomalies**, modelling **mistakes**, or **short-comings** of the ontology, **by actually “using” the ontology** within the prototype
- Triggered revision of ontology meta-model and/or content

Outcome: IEP Ontology

- 399 Abilities, 9278 Goals, 9171 activities, and 962 materials
- 305 mappings to WHO ICF-YC, 101 mappings to WHO ICD-10

	metamodel	IEP Ontology
DL Expressivity	$SRQIF(\mathcal{D})$	$SRQIF(\mathcal{D})$
Classes	20	419
Object Properties	44	44
Datatype Properties	3	3
Individuals	40	20339
Class Axioms	31	1066
Object Properties Axioms	155	155
Datatype Property Axioms	9	9
Individual Axioms	74	198095
Annotations	75	21571

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Messages from the Experience...

- Benefits in adopting an **ad-hoc, on-line, collaborative** modelling tool
 - initially, the modelling team was **moderately reluctant** to adopt MoKi...
 - ... but then **they did use it** (6K changes, 22K activities)
- Importance of having a **flexible** modelling tool
 - **flexibility of the form** definition / **seamless plug-in** of functionalities
- **Early deployment** of an application ontology in its corresponding system to **improve ontology quality**
 - missing or inaccurate competency questions
 - mismatch of implicit assumptions
 - missing ontology non-functional requirements
- **Double-formalisation** for **dual-purpose** ontology

Conclusions

- An experience of **collaborative ontology modelling**
 - **truly collaborative** ontology development effort, various “stakeholder”
 - **application ontology** for a commercial ontology-based application
 - **concrete business** context (SME)
- S♥FIA was commercially released in September 2014

Thank you!

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