Dipartimento di Ingegneria e Scienza dell'Informazione

– KnowDive Group –

Trentino Territory & Tourism Facilities

Document Data:	Reference Persons:
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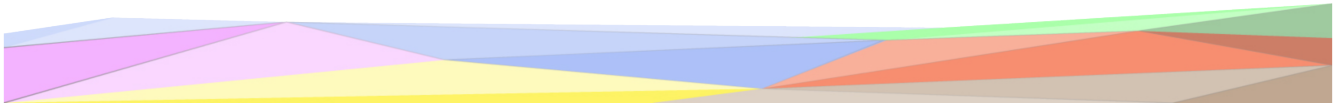

Index:

Revision History:

Revision	Date	Author	Description of Changes
0.1	October 10, 2023	Marina Bueno García, Lucía Trillo Carrera	Document created
0.2	October 10, 2023	Marina Bueno García, Lucía Trillo Carrera	Purpose and Domain of Interest
0.3	October 10, 2023	Marina Bueno García, Lucía Trillo Carrera	Project Development
0.4	October 10, 2023	Marina Bueno García, Lucía Trillo Carrera	Purpose formalization

1 Introduction

2 Purpose and Domain of Interest (DoI)

2.1 Project purpose

The purpose of this project is to provide in a single place all the information that is available on nature tourism in the Trentino territory. To provide that service we will build a knowledge graph (KG) that provides all the information about the natural tourism attractions such as lakes, natural parks, camp sites, waterfalls... and how to get there via bus/train/bike/taxi.

2.2 Project Domain of Interest

The domain of interest for this project is natural tourism in the 176 municipalities of the Trentino province 1. There is no temporal boundary as the region receives tourism throughout the cold (ski tourism) and hot seasons.

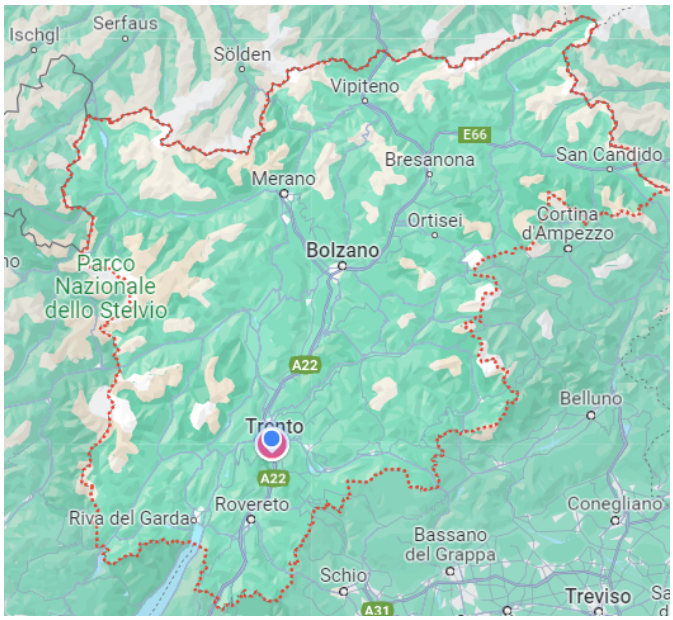

Figure 1: Trentino Autonomous Province

3 Project Development

To achieve the project's purpose described before, we divide the project development into two main subsections:

3.1 Data Production

In the data production phase, we focus on the role of the data producer and how to acquire the necessary data to later build the KG given the purpose.

As data producers, our mission is to make this data as available and reusable as possible, (compliant with the quality and reusability guidelines defined by iTelos. 6*, or at least 5*). We will document and publish the project result on Github and on the KnowDive group so that future researchers or tourists can easily access it.

3.2 Data Composition

As data consumers, our mission is to compose the high quality formal resources produced into the final Knowledge Graph. We will perform this task using the iTelos methodology, after thoroughly defining our Language, Knowledge and Data. The quality of this Knowledge graph will be evaluated based on the Competency questions that will be developed in the next section.

4 Purpose Formalization

In this section, with the goal of identifying the possible use cases of our resources, we first divide the purpose formalization into 3 different subsections: scenarios definition, personas and competency questions (CQs). Once we have listed down the competency questions, we fill a Purpose Formalization sheet (PFsheet) to extract the concepts identifying the information entities and their properties. Finally, the last part of the purpose formalization and the first phase of the iTelos is to shape a ER model to representate formally the initial purpose.

4.0.1 Scenarios definition

In this section, we outline three distinct scenarios designed to cater to diverse preferences and interests in exploring the natural wonders of Trentino. Each scenario offers a unique perspective, guiding individuals through different levels of adventure and nature immersion:

1. Challenging Adventure: a plan to enjoy adventurous hike in Trentino's mountains, looking for challenging trails and stunning views.
2. Moderate Nature Experience: an exploration of Trentino's hills, combining nature with cultural experiences, seeking easy to moderate trails.
3. Relaxing Scenic Strolls: gentle walks around picturesque locations in Trentino, focusing on easy trails and accessible spots.

4.0.2 Personas

In this section, we introduce six diverse personas, each bringing a unique perspective and set of preferences to the exploration of Trentino's natural treasures.These personas provide a diverse lens through which we can tailor scenarios and recommendations, ensuring a personalized and enriching experience for each individual exploring Trentino.

Id	Origin	Nature expertise	Age	Description
1	Italy,Lombardy	High	55	**Antonio** is a local outdoor enthusiast, familiar with Trentino's trails, seeks challenging hikes and hidden gems. He enjoys skiing after picking it up from his business trips to the Alps. He has a car.
2	Italy,Toscana	Medium	28	**Giulia** is a young professional traveling with her boyfriend, Matio. Giulia enjoys art, history and good coffee .She is visiting Trentino for the first time, seeks diverse trails and wants detailed information. Matio loves biking
3	Italy,Toscana	Low	27	**Mario** is a young professional traveling with her wife, Julia, and children by car. A tourist with minimal nature experience, wants picturesque spots, child-friendly and needs guidance on transportation options.
4	Czech Republic, Brno	High	23	**Veronica** is doing her Erasmus for 6 months in Trento and wants to thoroughly explore everything the region has to offer. Time is not a limitation on her travels, but money is. She's into climbing and doing challeging hikes.
5	Germany, Munich	Low	32	**Dalim** is a novice hiker on a weekend vacation, interested in scenic spots and gentle walks, prefers easily accessible locations.
6	Poland, Krakow	Medium	26	**Tymoteusz** is a nature lover, keen on exploring Trentino's beauty at a relaxed pace, enjoys both hills and mountains. He loves swimming and beautiful rocks

4.0.3 Competency questions

In this section, we articulate a set of key competency questions that serve as the foundation for unlocking the information within the Trentino Knowledge Graph. These questions are strategically designed to cater to the diverse needs and interests of individuals exploring Trentino's natural wonders.

1. What are the top three challenging mountain trails in Trentino?
2. Can you suggest a moderate hill trail with historical points of interest?
3. Are there any beginner-friendly walks with scenic views near Trento?
4. How can I reach the Dolomites?
5. Can you provide a list of must-visit lakes in the Trentino region?
6. Who can I ask for general touristic info in each comune?
7. Can you recommend a nature guide/tours or group?

8. What public transportation options are available from Trento to the starting point of a beginner-friendly trail?
9. Any recommendations for family-friendly nature activities in Trentino?
10. Where can I buy sleeping bags and a basic tent?
11. What points of Trentino's natural landscape can be visited in a day without strenuous physical activity?
12. What transportation is available from Trento to popular hiking destinations?
13. Where I can rent a bike?
14. How can I access the different skis stations in Trento?
15. Can you suggest a budget-friendly transportation option?
16. What are the top three panoramic viewpoints accessible by car?
17. Which caves or grottoes are worth exploring for those interested in geological formations?
18. Can you provide a list of mountain shelter of camping sites along their chosen mountain trails?
19. What is the closest gas station to every ski station?
20. Which natural attraction is close to this train station?

4.0.4 PF Sheet

In this table, we present a comprehensive overview of the relationships between scenarios, personas, competency questions (CQs), entities, properties, focus, and popularity within the context of our Trentino Knowledge Graph project. The table encapsulates the intricate web of connections, guiding the design and implementation of our knowledge graph.

Scenarios	Personas	CQs	Entities	Properties	Focus	Popularity
2,3	1,3,5	3,16	tourist_trip	itinerary, tourist_type, trip_origin, arrival_time, departure_time	Core	Core
1,2,3	1,2,3,4,5	1,2,4,9	mountain	address, aggregateRating, geo, hasMape, photo, publicAccess, review, specialOpeningHoursSpecification, tourBookingPage, telephone, description, image, name, url	Core	Contextual
1	1,2,4,6	18	accomodation	accommodationCategory, numberOfBedrooms, occupancy, petsAllowed, tourBookingPage, address, aggregateRating, photo	Contextual	Contextual
1,2,3	3,6	5	lake	address, geo, aggregateRating	Core	Contextual
1,2,3	2,3,4,5,6	6,7	person	name, email, affiliation, birthdate, gender, nationality, owns	Common	Common
1,2,3	2,4,5,6	8,12,15	BusStation	arrivalBusStop, departureBusStop, openingHours	Contextual	Contextual
1,2,3	2,4,5,6	8,12,15	TrainStation	arrivalStation, departureStation, openingHours	Contextual	Contextual
1,2,3	2,4,5	10,13	store	address, brand, department	Common	Common
1,2,3	1,3	19	GasStation	adress, brand	Contextual	Contextual
1,2,3	1	14	SkiResort	address, name	Core	Contextual
1,2,3	2,4,5,6	17,11,20	Landform	adress,geo	Core	Contextual
1,2	1,3	16,19	Car	name	Common	Common

4.0.5 ER model

In the landscape of Trentino's natural tourism, we have designed a robust Entity-Relationship (ER) model to encapsulate the information tpresented . The ER model is the backbone of our knowledge graph, crafted to establish meaningful connections between entities, personas, scenarios, and competency questions. It serves as the architectural blueprint that not only structures our data but also provides a comprehensive framework for users to navigate and explore the diverse facets of Trentino's natural tourism.

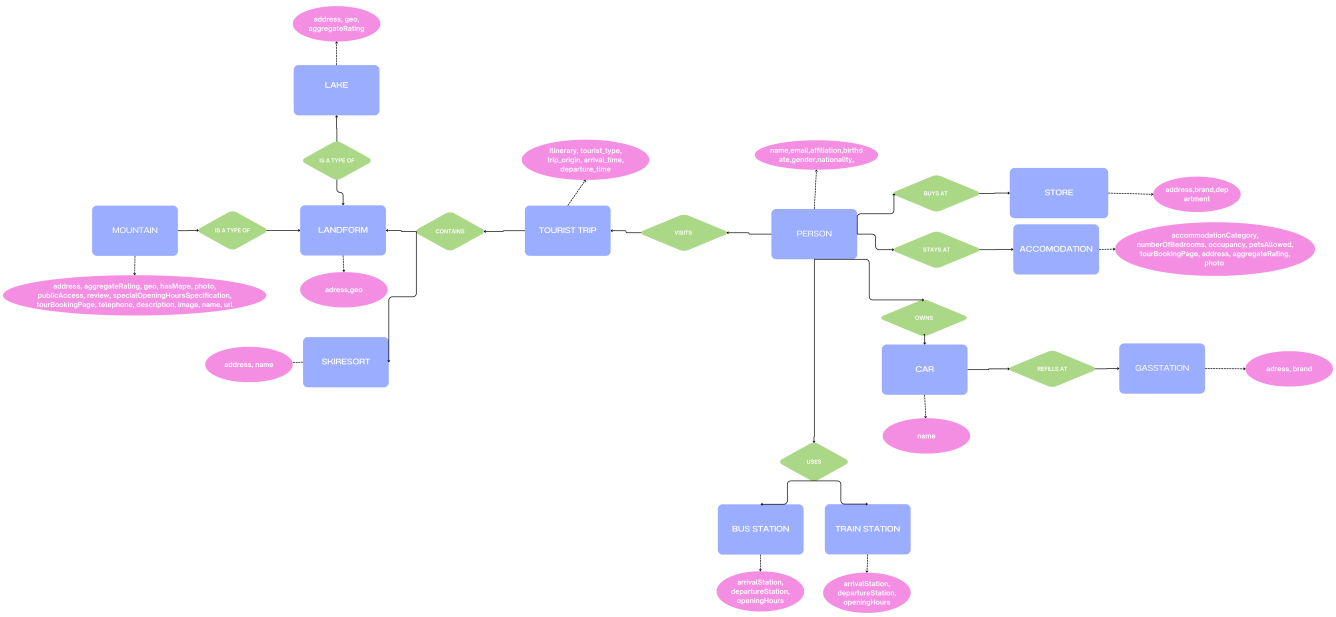

Figure 2: ER model

5 Information Gathering

5.0.1 Knowledge resources

- Formal: Open Street Map - Trentino Territory Lightweight Ontology
- Standard references:
  - SCHEMA.ORG describes the hierarchy of different Entity types and data types.
  - SCHEMA.ORG LOV schema of the schema.org vocabulary
  - GTFS STATIC is the General Transit Feed Specification, that allows to get data in the correct format. This link describes the format and structure of the files.
  - GTFS LOV describes the GTFS vocabulary.
  - GTFS UPGRADED (Subashish) describes the GTFS ontology
  - GEOSPATIAL ONTOLOGY (Subashish) is a data model for the geospatial domain.
  - TIME ONTOLOGY is a vocabulary for temporal entities such as time intervals, their properties and relationship.

5.0.2 Data resources

- Formal: Trentino OSM places

  This dataset contains information scraped from Open Street Maps about the Trentino region: springs, peaks, cave entrances and other natural wonders are listed here.
- Semi-Formal:KGE22 - Trentino Tourist Facilities This source contains individual datasets of bus,train and bike stops; taxi companies; bars and restaurants; campsites, hotels and vacation houses;gas stations and souvenir shops; and museums, ski stations and natural attractions.

- Informal:
  - ISTAT Turismo This source contains contact emails of experts in the ISTAT declaration (economic activity classification) by municipality. For the moment, we see no relevance to the project.
  - OPEN DATA TRENTINO: This source contains 6.556 different datasets of the Trentino province of different data formats and topics.

6 Language Definition

7 Knowledge Definition

8 Data Definition

9 Evaluation

10 Metadata Definition

11 Open Issues

References