Enriching data from IoT devices for tourism

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Arctur

• 30+ years of experience
• Hi-Tech innovation driven culture
• the largest private-owned HPC provider in CEE, breaking the barriers in bringing HPC to SMEs
Industry 4.0
Key enabling technologies

High Performance Computing  Internet of Things  Big Data Analytics  Blockchain
Artificial Intelligence  Additive Manufacturing  Augmented Reality
Simulations  3D Scanning and printing  Virtual Reality
R&D into tourism

**TRL 1: Research**
- **Tourism 4.0 TRL3-6**
  - 2018 - 2021, Budget: 2.3 M EUR

**TRL 5: Prototyping**
- **Demo Pilot Tourism 4.0**
  - 2019 - 2022, Budget: 10.9 M EUR

**TRL 6: Production Dev.**
- **Tourism 4.0 for the Black Sea**
  - 2019 - 2021, Budget: 720 K EUR
- **Amazing AoE**
  - 2020 - 2022, Budget: 2.4 M EUR
- **Weave**
  - 2021 - 2022, Budget: 1.3 M EUR
- **DICV projects**
  - 2020 - 2022, Budget: 1.5 M EUR
- **Tourbit**
  - 2022 - 2024, Budget: 1.3 M EUR

**TRL 9: Demonstration, Sale**
- **Insites**
  - 2020 - 2022, Budget: 300 K EUR

**TRL = Technology Readiness Level**
Tourism can only be sustainable, when it improves quality of life of the local community.
initiator of Tourism 4.0 Partnership
Big Data Analytics, Deep Learning, Artificial Intelligence, HPC, ...
R&D into tourism

initiator of Tourism 4.0 Partnership

TOURISM IMPACT MODEL
MANAGING TOURIST FLOWS
COLLABORATION IMPACT TOKEN
DIGITAL ONLINE TOURIST IDENTITY
LIVING LAB

applications & solutions for tourism

HERITAGE +
Digital Innovation of Cultural Heritage

your playground for testing, validation & demonstration

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Can our perception be wrong?

- Destination in Slovenia with world famous tourist attraction
- Population: ≈ 16.000
- Number of visitors per year: ≈ 850.000
- Amount of waste (Jan-Dec 18)
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TIM is a tool using **real data** to create an objective picture of the impact of **tourism** in a certain micro-location.

300+ indicators
positive and negative effects of tourism
different societal aspects

By modelling the impact using different scenarios, TIM acts also as a **digital twin of tourist destination** and allows **data driven strategic planning**.
Tomi Ilijaš, CEO of Arctur, Reyes Maroto, Minister for Industry, Commerce and Tourism of Spain, Juan Espadas, the Mayor of Seville and Urška Starc Peceny, CIO and lead of Tourism 4.0 Department at Arctur.
Destination Character Chart™

4 groups of primary characters
4 positions for each
You are: **Sustainable champion**

Destination Character Chart™

Final result – Destination character
How it works

1. Definition of the most appropriate geographical Micro-location
2. Mapping the data sources
3. Completing the questionnaire and launching the Automated Assessment Tool
4. Automatic report generation
5. Validation of the results and detailed recommendations by experts (optional)
Data Collecting Tool

300+ indicators used (Impact and Collaboration)

- 5 groups
- 23 categories
- 67 question sets
- 138 SDAQ question sets
- Min 2000 up to 100,000 data inputs
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SDAQ (Standard Data Accuracy Questions):

1. **Source**: What is the source of your data?
   - A. “digital” (by device)
   - B. “analogue” (by hand)

2. **Frequency**: How frequently is the data collected?
   - A. Hourly
   - B. Daily
   - C. Monthly
   - D. Yearly
   - E. ...

3. **Accuracy**: How accurate is the data?
   - A. data precisely represents the real world situation: real values
   - B. data is based on estimations: ie. flat rate

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**Overall data accuracy level**

- low
- medium
- high

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TIM Data Accuracy Report

data accuracy assessment

Basic questions data accuracy level

- **A1.1e) Number of residents**
  - Source of the data: *Third party source: SURS (www.stat.si)*
  - Frequency of data collection: *Once per year*
  - Accuracy of data: *Data is accurate*

- **A1.1f - A1.1j) Number tourism service providers, types and scale of tourism**
  - Source of the data: *Third party source: Internal database of organizational unit for Tourism*
  - Frequency of data collection: *Monthly*
  - Accuracy of data: *Data is not accurate*

- **A1.1l) Number of one-day visitors**
  - Source of the data: *Expert estimation*
  - Frequency of data collection: *Once per year*
  - Accuracy of data: *Expert estimation*

- **A1.1m) Number of overnight stays**
  - Source of the data: *Third party source: AIJES*
  - Frequency of data collection: *Monthly*
  - Accuracy of data: *Data is not accurate*
Tourist Flows
Influencing tourist flows & behavior
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Tourism 4.0 road traffic flows

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Tourist Flows
Influencing tourist flows & behavior

Working days vs. weekend

Traffic per each month

X – Time, Y – Number of cars
Tourist Flows
Influencing tourist flows & behavior

Vršič mountain pass

Border Slovenia-Croatia (time and day)

X – Time, Y – Number of cars
Tourist Flows
Influencing tourist flows & behavior

Festival of chestnut, Šmartno pri Litiji

Festival of Kozjansko apple

X – Time, Y – Number of cars
Tourist Flows
Influencing tourist flows & behavior
T4.0 Alpine Flows
T4.0 Alpine flows

Sensors
• LoRaWan Sensors
• Narrow Band Sensors

Other data
• Weather data (Slovenian Environment Agency)
• Mobile signal (Telekom Slovenia)
• Traffic (Traffic Information Centre for Public Roads, DARS d.d.)
• Paid tourist tax in mountain huts
• Bookings in mountain huts (the Alpine Association of Slovenia)
• Accidents in mountains
T4.0 Alpine flows

Project potential

• Measuring of the visit in the mountains **based on real data**
• **Analytics and forecast** of visit flows
• Better experience
• Better safety
• Better **decision making** at DMO based on real data
• **Open data** for the use in other sectors
Measuring air quality indicators by combining geospatial data (2019-2022):

- Traffic flows (IoT),
- Overnight stays,
- Air quality data (satellite data),
- Meteorological data (satellite data).

Currently validating in Postojna.

Goal
A solutions that uses and analyses complex data and presents in a straightforward manner.
We want you!

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Tourism 4.0 Partnership

Sign up:
joinus.tourism4-0.org