

# ISIEA 2022

**1<sup>ST</sup> INTERNATIONAL SYMPOSIUM  
ON INDUSTRIAL ENGINEERING  
AND AUTOMATION**

**MANAGING AND IMPLEMENTING  
THE DIGITAL TRANSFORMATION**

**20<sup>th</sup>–23<sup>rd</sup> June 2022**

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Dear Colleagues and Friends,

it is a pleasure for me to welcome you to Italy and Bozen-Bolzano!

I would like to deliver my warm greetings and heartfelt welcome to all participants of the 1<sup>st</sup> International Symposium on Industrial Engineering and Automation (ISIEA 2022).

The Symposium will provide an opportunity for the presentation of recent results related to both theoretical and applied research in the field of Industry 4.0 and Digital Transformation, bringing together scientists from many different countries from Europe and over the globe. Furthermore, the Symposium includes a Special Session regarding Innovative Higher Education for Industry 4.0.

A very attractive and stimulating social program will be also set up, which will start with a Welcome Aperitivo on Monday evening and it will continue on Tuesday evening with the Social Gala Dinner at Castle Maretsch. On Wednesday afternoon you will visit several labs at the

NOI Techpark, South Tyrol's new research and innovation district. Finally on Thursday morning you will have the opportunity to see hands-on Industry 4.0 applications at our industrial partner company Duka Ag.

Many thanks go out to the members of the Organising Committee, the Scientific Committee and the Paper Award Selection Committee for their support.

We hope you enjoy your stay with us and that this event leads to many stimulating conversations and future collaborations.

Yours  
Prof. Dominik Matt  
Chair, ISIEA 2022



## Chairs

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### Chair

Prof. Dominik Matt

### Co-Chair

Dr. Erwin Rauch

Dr. Patrick Dallasega

Prof. Renato Vidoni

### Special Session Chair

Dr. Emmanuel Francalanza

## International scientific committee

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### University of Malta

Dr. Emmanuel Francalanza

Prof. Jonathan Borg

Dr. Joseph Paul Zammit

### KTH Royal Institute of Technology

Dr. Magnus Lundgren

### University of Minho

Prof. Goran Putnik

### Polytechnic University of Bucharest

Prof. Catalin Amza

### Chiang Mai University

Prof. Wasawat Nakkiew

Dr. Korrakot Tippayawong

### Free University of Bozen-Bolzano

Prof. Alfredo De Massis

Prof. Guido Orzes

Dr. Cristian Cappellini

### Technical University of Kosice

Prof. Vladimir Modrak

Prof. Jan Pitel

Dr. Zuzana Soltysova

### University of Bologna

Dr. Federico Fraboni

### Fraunhofer Italia Research

Dr. Michael Riedl

Dr. Andrea Giusti

### University Passau

Dr. Minica Ciolacu

### Technical University Graz

Dr. Matthias Wolf

Prof. Bernd Zunk

### Technical University of Munich

Dr. Susanne Vernim

### University of Udine

Dr. Lorenzo Scalera

### University of Modena and Reggio Emilia

Dr. Fabio Pini

### Montanuniversität Leoben

Prof. Helmut Zsifkovits

Dr. Manuel Woschank

### SACS MAVMM Engineering College India

Prof. R. Sudhakara Pandian

### EURAC Research

Dr. Roberto Monsorno

### Worcester Polytechnic University

Prof. Christopher Brown

### University of Applied Science Carinthia

Prof. Christian Madritsch

### University of Antwerp

Dr. Cosmin Copot

### Purdue Fort Wayne University

Prof. David Cochran

## **Management Center Innsbruck**

Dr. Benjamin Massow

Dr. Andreas Mehrle

## **University of Applied Sciences and Arts of Southern Switzerland**

Dr. Loris Roveda

## **University of Applied Sciences Düsseldorf**

Prof. Reinhard Langmann

## **Organizing Committee**

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Dr. Luca Gualtieri – Organization Co-Chair

Dr. Tanel Aruväli

Mirjam Beltrami

Matteo De Marchi

Dr. Benedikt Mark

Chiara Nezzi

Andrea Revolti

Felix Schulze

## **Keynote Speakers**

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### **Shaping Future of Manufacturing in EU.**

#### **Industry 5.0 from Theory to Practice**

Prof. Tauno Otto

Prof. Tauno Otto is tenured full professor in Department of Mechanical and Industrial Engineering and development manager in Faculty of Engineering in Tallinn University of Technology. He is active member in various European level committees and work groups, just to name some of them: Partnership Board for the Horizon Europe Public-Private-Partnership "Made in Europe" and Manufature High Level Group (HLG).

### **Guess what is the biggest room in the world?**

Ing. Miloslav Karaffa

Miroslav Karaffa is vice president of Chamber of Commerce of Slovakia. Additionally, he is owner and CEO of ELCOM sro.

### **NOI Techpark – A Sustainable Industry 4.0 and Digital transformation Enabler**

M.Sc.Eng., Executive MBA Vincent Mauroit

Vincent Mauroit is Director of Innovation & Tech Transfer at NOI AG (NOI Techpark in Südtirol-Alto Adige).

### **Digi-VET Digitally enriched curriculum**

Mattias Döbler

Mattias Döbler works in Berlin at the College of Further Education for Information Technology and Medical Equipment Technology. Additionally, he is active in EduNet World Association (EWA).



## Day 1 → Welcome to unibz

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**Monday 20 June 2022**

unibz – Cafeteria at main entrance

**06.00 PM** Get Together and  
Welcome Aperitivo

## Day 2 → Symposium – Industry 4.0 and Digital Transformation

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**Tuesday 21 June 2022**

unibz – Room D1.01

**08.30 AM** Registration  
**09.00 AM** Welcome  
**09.20 AM** Keynote Speech 1  
Prof. Tauno Otto  
**09.45 AM** Keynote Speech 2  
Ing. Miloslav Karaffa  
**10.10 AM** Keynote Speech 3  
M.Sc.Eng., Executive MBA  
Vincent Mauroit  
**10.35 AM** Coffee Break  
**11.00 AM** Technical Presentations  
**12.00 PM** Lunch at unibz Canteen  
**01.30 PM** Technical Presentations  
**02.30 PM** Coffee Break  
**03.00 PM** Technical Presentations  
**04.00 PM** Visit Smart Mini Factory Lab  
**07.00 PM** Aperitivo and Get Together at  
Castle Mareccio  
**07.30 PM** Start of the Social Dinner at  
Castle Mareccio



## Day 3 → Special Session Higher Education

## Day 4

**Wednesday 22 June 2022**

NOI Techpark – Room Seminar 2

- 09.00 AM** Registration
- 09.10 AM** Welcome
- 09.20 AM** Keynote Speech 4  
Matthias Döbler
- 09.45 AM** Technical Presentations
- 10.30 AM** Coffee Break
- 11.00 AM** Technical Presentations
- 11.45 AM** Panel Session “Synergies and  
Lessons Learned in Erasmus+”
- 12.15 AM** Closing and ISIEA Best Paper  
Award / Best Student Paper Award
- 12.30 PM** Lunch at NOIsteria
- 02.00 PM** Visit NOI Techpark and Visit  
Fraunhofer ARENA lab for  
Industry 4.0 applications
- 05.30 PM** Guided sightseeing tour of  
Bozen–Bolzano. Meeting point  
in front of unibz’s main entrance

**Thursday 23 June 2022**

Field Trip

- 08.45 AM** Meeting in front of Kolpinghaus  
Largo Adolph Kolping, 3  
Adolph Kolping Straße 3
- 09.00 AM** Trip to Brixen–Bressanone by bus
- 10.00 AM** Welcome by Duka Ag
- 10.15 AM** Production Tour with focus on  
Industry 4.0
- 11.30 AM** Duka’s vision towards smart and  
sustainable production
- 12.00 PM** Closure and Sandwich Lunch
- 01.00 PM** Return to Bozen–Bolzano by bus

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Smart Manufacturing	11.00 AM	<b>Mechatronic handling solution for a robotized pizza-chef assistant</b> Giovanni Carabin, Ilaria Palomba, Martin Stimpfl, Renato Vidoni
Session chair: Catalin Gheorghe Amza		
	11.15 AM	<b>Mechanical property degradation of Polylactic Acid (PLA) 3D printed parts under ultraviolet radiation</b> Aurelian Zapciu, Gheorghe Amza Catalin, Monica Ciolacu, Emmanuel Francalanza, Erwin Rauch
	11.30 AM	<b>Transformability in material flow systems: towards an improved product development process</b> Maximilian Wuennenberg, Pia Vollmuth, Josef Xu, Johannes Fottner, Birgit Vogel-Heuser
	11.45 AM	<b>Two different numerical approaches for supporting vibration-based structural health monitoring of gear train systems</b> Ronant de Paula Monteiro, Franco Concli, Renato Vidoni
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AI and Data Analysis in Manufacturing	01.30 PM	<b>Information model to advance explainable AI-based decision support systems in manufacturing system design</b> David S. Cochran, J. Smith Joseph, G. Mark Benedikt, Erwin Rauch
Session chair: David S. Cochran		
	01.45 PM	<b>Classification framework for machine learning support in manufacturing</b> Baris Ördek, Yuri Borgianni, Eric Coatanea



**Introducing and Implementing Industry 4.0**

Session chair:  
Poti Chaopaisarn

- 11.00 AM **Industry 4.0: from illusion to revolution through digital transformation**  
Pedro Pinheiro, Goran D. Putnik, Zlata Putnik, Cátia Alve
- 11.15 AM **Industry 4.0. in family firms**  
Samuel Wayne Appleton, Mirjam Beltrami, Marco Mismetti, Guido Orzes, Dominik Matt, Alfredo De Massis
- 11.30 AM **Haze problem solving for resilience living society: a case study in northern thailand**  
Paipan Thanalerdsopit, Sermkiat Jomjunyong
- 11.45 AM **Development of knowledge capability model for Industry 4.0: A Thai SMEs perspective**  
Poti Chaopaisarn, Anurak Sawangwong

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**Advanced Scheduling and Optimization**

Session chair:  
Vladimir Modrak

- 01.30 PM **A Contribution to the systematic review of manufacturing scheduling for the Industry 4.0**  
Leonilde Varela, Goran Putnik, Catia Alves, Nuno Lopes, Maria Manuela Cruz-Cunha
- 01.45 PM **The impact of technological implementation decisions on scheduling heuristic performance: secondary storage and parallel processing**  
N. Lopes, B. Costa, C.F. Alves, G.D. Putnik, M.L.R. Varela, M.M. Cruz-Cunha, L. Ferreira

02.00 PM [Development of a system for the analysis of surface defects in die-cast components using machine vision](#)  
Giorgio Cavaliere, Yuri Borgianni, Elena Rampone

02.15 PM [Performance prediction of thin-walled tube energy absorbers using machine learning](#)  
Mostafa Ghasemi, **Mohammad Silani**, Vahid Yaghoubi, Franco Concli

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Digital Twin and Simulation

Session chair:  
Cappellini Cristian

03.00 PM [Development of a FEM model for the digital twin application and the monitoring of Cor-Ten road barriers in the Autonomous Province of Bozen-Bolzano](#)  
Lorenzo Pagliari, **Chiara Nezzi**, Lorenzo Fraccaroli, Franco Concli

03.15 PM [A digital twin approach to automotive wheel flow forming process](#)  
**Cristian Cappellini**, Luca Giorleo, Gabriele Allegri, Aldo Attanasio, Elisabetta Ceretti

03.30 PM [Simulation of heavy duty vehicles for the use in digital twins](#)  
**Alejandro Secades**, Davide Bagnara, Jasper Volmer

03.45 PM [Digital twin in a dairy factory](#)  
**Sergio Salimbeni**, Nahuel Romera, Andrés Redchuk

02.00 PM [Scheduling optimization for mass customized production using simulation tool](#)

Zuzana Soltysova, Vladimir Modrak, Julia Nazarejova

02.15 PM [Applying Grey relational analysis based multi-response optimization of huskers process parameters in paddy husking machine](#)

Suwattananarwong Phamphet, Surapong Bangphan, Phiriphan Bangphan, Athiwat Wangmai, Sermkiat Jomjunyong

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**New Ways of  
Engineering Education**

Session chair:  
Manuel Woschank

03.00 PM [Competence-based realignment of engineering education at higher education institutions: using the example of industrial logistics engineering project "CoR-Ilog"](#)

Manuel Woschank, Corina Pacher

03.15 PM [Learning based on SmartTechLab for I4.0](#)

Ján Piteľ, Kamil Židek, Vladimír Modrák,  
Alexander Hošovský

03.30 PM [Personnel and area assessment models for thailand provincial industry office toward Industry 4.0](#)

Apichat Sopadang, Tanyanuparb Anantana,  
Jutamat Jintana, Yaibuethet Tippayawong Korrakot,  
Salinee Santiteerakul, Sakgasem Ramingwong

03.45 PM [A contribution to the learning factory architecture implementations for engineering education](#)

Goran Putnik, Cátia Alves, Leonilde Varela,  
Pedro Pinheiro

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Innovative Higher Education for Industry 4.0 (I)  Session chair: Emmanuel Francalanza	09.45 AM	<b>An innovative higher education institution training toolbox to effectively address industry 4.0 skills gap and mismatches</b> Emmanuel Francalanza, Pierre Vella, Erwin Rauch, Catalin Amza, Magnus Lundgren, Goran Putnik
	10.00 AM	<b>Design and implementation of the ICARUS Industry 4.0 mobile training unit</b> Amberlynn Bonello, Emmanuel Francalanza, Jonathan Borg, Joseph Zammit
	10.15 AM	<b>"ICARUS" pedagogical methodologies FRAMEWORK</b> Goran Putnik, Cátia Alves, Emmanuela Francalanza, Jonathan Borg, Catalin Amza, Erwin Rach, Magnus Lundgren, Leonilde Varela, Pedro Pinheiro
Innovative Higher Education for Industry 4.0 (II)  Session chair: Erwin Rauch	11.00 AM	<b>Network architecture of ETAT Education and training centers for automation 4.0</b> Matteo DeMarchi, Prajaks Jitngernmadan, Pongpat Singsri, Norangsak Putpuek, Saman Kumpakeaw, Supaporn Bundasak, Warangkhana Kimpan, Erwin Rauch
	11.15 AM	<b>ETAT pedagogical modules for automation 4.0 training program structure in training centres in Thailand</b> Mateos Felipe, Alvarez Antonio Robles, Arguelles Maria De Los Reyes Poo, Fongsamut Chalermpan, Jitngernmadan Prajaks
	11.30 AM	<b>Hands-on PLC training approach for IT students using virtual reality</b> Kubola Kanuengnij, Jantarakongkul Benchaporn, Boonmee Prawit, Jitngernmadan Prajaks

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## Single ticket for regional trains and buses

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A single-fare ticket can be used for a single or return journey by bus or train and for unlimited journeys within 60 minutes made in the same fare zone (Bozen-Bolzano belongs to same fare zone).

### → Fares

15¢ per km and price category (rounded to 50¢)

### → Minimum fare per journey 1.50€

### → Where to buy

On the bus, ticket machines, südtirolmobil ticket offices. Onboard trains an additional cost of 5€ may be added.

### → Validating

Check in at the start of each journey — either at the train station from which you are departing or directly on the bus. If you have a return ticket, both journeys must be made on the same day and checked in at the start of each journey.

## Day ticket for urban buses in the city of Bozen-Bolzano

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Valid on the day on which you first activate it.

### → Fares 4€

### → Where to buy

On the bus (on some routes only), ticket machines, südtirolmobil ticket offices.

## Important routes

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### → Bus N° 111

unibz, Universitätsplatz 1 – Piazza Università, 1  
→ NOI Techpark (also Fraunhofer Arena)

More information about routes and fares

[suedtirolmobil.info/en](https://suedtirolmobil.info/en)



## Informations regarding the conference

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[isiea.events.unibz.it](https://isiea.events.unibz.it)

[info.isiea2022@unibz.it](mailto:info.isiea2022@unibz.it)



## Covid Informations

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[italia.it/en/covid19](https://italia.it/en/covid19)

[infocovid.viaggiare Sicuri.it/en](https://infocovid.viaggiare Sicuri.it/en)



## Travel Restrictions

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As of June 1<sup>st</sup>, a Green Pass equivalent certificate is no longer needed to enter Italy. All Covid-19 related entry restrictions have been lifted. From June 16<sup>th</sup>, **wearing a protective mask is not mandatory except for public transport**, both regional and interregional. The use of masks is still suggested in crowded environments.

## Important Numbers in South Tyrol

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### → Emergency number

112

### → State Police

+39 0471 947611

### → Bozen-Bolzano Hospital (emergency)

+39 0471 908330

## WiFi in unibz

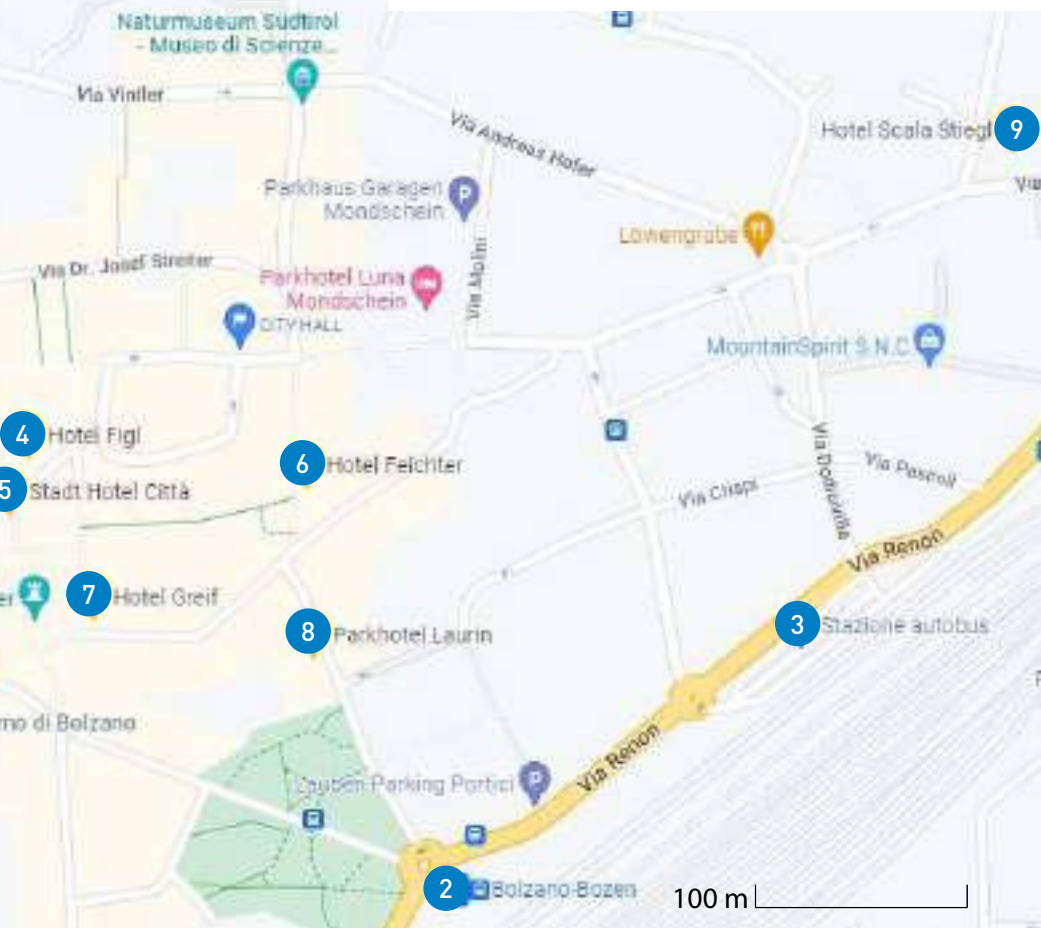
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### → Network openAiR

→ Password 0128-1940



- 1 unibz
- 2 Train Station
- 3 Bus Station
- 4 Hotel Figl
- 5 Stadt Hotel Città
- 6 Hotel Feichter
- 7 Hotel Greif
- 8 Parkhotel Laurin
- 9 Hotel Scala Stiegl
- 10 Mareccio Castle
- 11 Smart Mini Factory



## Free University of Bozen-Bolzano

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Universitätsplatz 1, Bozen  
Piazza Università, 1, Bolzano



## Fraunhofer ARENA

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Alessandro-Volta-Straße 13A, Bozen  
Via Alessandro Volta, 13A, Bolzano



## NOI Techpark

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Alessandro-Volta-Straße 13A, Bozen  
Via Alessandro Volta, 13A, Bolzano



## Mareccio Castle

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Claudia-de'-Medici-Straße 12, Bozen  
Via Claudia de Medici, 12, Bolzano





## SMART Mini Factory (SMF Lab)

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Antonio-Rosmini-Straße 7, Bozen  
Via Antonio Rosmini, 7, Bolzano



## Cablecar to Renon

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12-minute drive by gondola (one way). Departures in every 4 minutes. Return ticket 10€



## Duka AG

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Duka Straße 2, Bressanone  
(Special bus on the 23<sup>rd</sup> at 9 am in front of unibz)



## Trauttmansdorff

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An extraordinary botanical garden located near Meran-Merano. Entrance fee 15€



## Lake of Carezza

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Green mountain lake which is known as "Rainbow Lake" and "Fairytale Lake of the Dolomites"



## Alto Adige wine road

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It is characterised by its unique grapevine landscape fascinating in every season



## Ötzi the Iceman

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Mummy from the Copper Age, which was preserved in ice for 5300 years. Entrance fee 13 €



## Verona Arena

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Amphitheatre for opera performances. Tickets starting from 32€





### SME 4.0 – Industry 4.0 for SMEs

This project has received funding from the European Union’s Horizon 2020 R&I programme under the Marie Skłodowska-Curie grant agreement No 734713



Co-funded by the Erasmus+ Programme of the European Union

### ICARUS – An Innovative Higher Education Institution Training Toolbox to Effectively Address the European Industry 4.0 Skills Gap and Mismatches

Erasmus+ Project No. 2019-1-MT01-KA203-051265



Co-funded by the Erasmus+ Programme of the European Union

### ETAT – Education and Training for Automation 4.0 in Thailand

Erasmus+ Project No. 610154-EPP-1-2019-1-DE-EPPKA2-CBHE-JP

## MasterMIL



### MASTERMIL – Mastering the Digital Transformation in the Family Business: Getting Ready for the Millennial Generation

unibz grant agreement No WW201N

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Reisehu, Unsplash

Alto Adige wine road  
Marcus Ganahl, Unsplash

Cablecar to Renon  
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