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DESTINI

SMART DATA PROCESSING AND SYSTEMS OF DEEP INSIGHT

http://www.destini2020.eu

Deliverable D6.8

Project Dissemination Support Material 3

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1. Introduction

1.1 Purpose

This deliverable provides information about additional dissemination material, such as project leaflets, brochures, electronic articles, etc., for the third year of the project, that is from 01/10/2021 until 30/9/2022.

The deliverable is part of Work Package 6 (WP6) - Dissemination and Exploitation that describes how the work conducted in this project will be disseminated to academia, researchers, industrial and businesses stakeholders, and the general public, demonstrating how they can benefit from the DESTINI's knowledge base and preliminary research results, and supporting sustainable engagement of SMEs and practitioners in WP4 for future research activities and project discoveries.

1.2 Definitions, Acronyms, and Abbreviations

CUT: Cyprus University of Technology

WP: Work Package

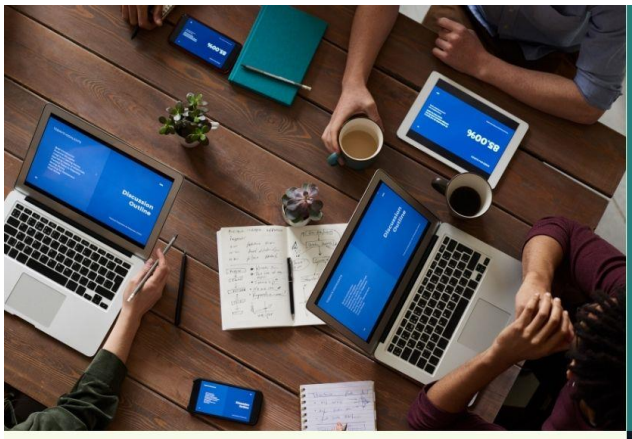
JRA: Joint Research Area

1.3 Overview

The rest of the document is structured as follows: Section 2 presents the leaflets produced for the project, while section 3 outlines the invitations created for the schools and the trainings. Section 4 presents the posters/banners created in the project, and, finally, section 5 concludes the document.

2. Second School of DESTINI

2.1 Agenda

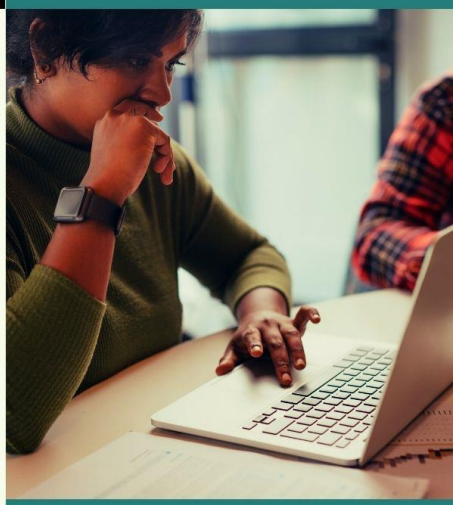


ABOUT DESTINI

DESTINI: SMART DATA PROCESSING AND SYSTEMS OF DEEP INSIGHT

TWINNING PROJECT - HORIZON2020

Smart Data ProcESsing and SysTems of Deep INsIght (DESTINI) is a H2020 Twinning Project that proposes a series of coordination and support actions for promoting research in the area of Smart Data. The Cyprus University of Technology (CUT) joins forces with two internationally recognized scientific groups from the Netherlands (Tilburg University and Jheronimous Academy of Data Science) and Italy (Sapienza Universita di Roma), aiming to strengthen its research and scientific profile in the relevant area. Specifically, DESTINI's activities revolve around exchanging scientific knowledge and transferring best research practices amongst its partners in the field of Smart Data Processing and Systems of Deep Insight.



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Cyprus University of Technology

SAPIENZA UNIVERSITÀ DI ROMA

TILBURG UNIVERSITY

SEiIS

JADS Jheronimus Academy of Data Science

School Program

Day 1 – Monday, January 24, 2022 (EET Time)

09:30 - 09:50	**Welcome - Introduction** *Prof. Andreas S. Andreou (DESTINI coordinator, Dept. of Electrical Engineering, Computer Engineering & Informatics, CUT)*
09:50 - 10:30	**Big Data: Methods and Technologies - Part A** *Prof. Donatella Firmani (Dept. of Statistical Sciences, Sapienza Università di Roma)*
10:30 - 11:10	**Big Data: Methods and Technologies - Part B** *Prof. Donatella Firmani (Dept. of Statistical Sciences, Sapienza Università di Roma)*
11:10 - 11:20	**Break**
11:20 - 11:40	**Argumentation-based Framework for Explainable Machine Learning (ARGEML)** *Nicoletta Prentzas (PhD Candidate, University of Cyprus)*
11:40 - 12:00	**Preliminary Findings on the Virtual Reality Cognitive Gaming Based on Brain Computer Interfacing** *Marios Hadjiaros (Researcher, CYENS, PhD Candidate, University of Cyprus)*
12:00 - 12:40	**Blockchain Applications - Part A** *Prof. Claudio Di Ciccio (Dept. of Computer Science, Sapienza Università di Roma)*
12:40 - 13:20	**Blockchain Applications - Part B** *Prof. Claudio Di Ciccio (Dept. of Computer Science, Sapienza Università di Roma)*

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School Program

Day 2 – Tuesday, January 25, 2022 (EET Time)

09:30 - 10:10 **Virtual Reality and Gamification - Part A**
Prof. Lauren Ferro (Dept. of Computer, Control and Management Engineering, Sapienza Università di Roma) &
Dr. *Francesco Sapio (Sapienza Università di Roma)*

10:10 - 10:50 **Virtual Reality and Gamification - Part B**
Prof. Lauren Ferro (Dept. of Computer, Control and Management Engineering, Sapienza Università di Roma) &
Dr. *Francesco Sapio (Sapienza Università di Roma)*

10:50 - 11:10 **Rule Extraction in the Assessment of Brain MRI Lesions in Multiple Sclerosis: Preliminary Findings**
Andria Nicolaou (PhD Candidate, University of Cyprus)

11:10 - 11:20 **Break**

11:20 - 12:00 **Privacy preservation - Reports from a Dutch Telecom**
Nemania Borovits (PhD Candidate, Tilburg University)

12:00 - 12:30 **Digital Twin in Electrical Spindles**
Gianluca Drudi (HSD Mechatronics)

12:30 - 13:10 **Query Answering and Query Abstraction Through Ontologies - Part A**
Prof. Maurizio Lenzerini (Dept. of Computer, Control and Management Engineering, Sapienza Università di Roma)

13:10 - 13:50 **Query Answering and Query Abstraction Through Ontologies - Part B**
Prof. Maurizio Lenzerini (Dept. of Computer, Control and Management Engineering, Sapienza Università di Roma)

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School Program

Day 3 – Wednesday, January 26, 2022 (EET Time)

09:00 - 09:40 **Complex Patterns of Biological Information Decoded with Network-based Bioinformatics**
Prof. George Spyrou (Head of Bioinformatics Department, Cyprus Institute of Neurology and Genetics)

09:40 - 10:20 **Enhanced Berth Allocation Using the Cuckoo Search Algorithm**
Sheraz Aslam (PhD Candidate, Research Associate, CUT)

10:20 - 11:00 **skillsChain: A Decentralized Application that Uses Educational Robotics and Blockchain to Disrupt the Educational Process**
Prof. Panayiotis Christodoulou (Neapolis University Pafos / Postdoc-Research Associate, SEIIS Lab, Dept. of Electrical Engineering, Computer Engineering & Informatics, CUT)

11:00 - 11:10 **Break**

11:10 - 11:50 **Unmanned Surface Vehicle for Marine Applications**
Prof. Yiorgos Demetriou (Dept. of Electrical Engineering, Computer Engineering and Informatics, Frederick University Cyprus)

11:50 - 12:30 **Transformation in Traditional Industry: Die Cutter 4.0**
Jerin George Mathew (Sapienza Università di Roma) &
Flavia Monti (PhD Candidate, Sapienza Università di Roma)

12:30 - 13:10 **Data Driven Detection and Biological Control of Food Borne Pathogens: The Case of Mycobacterium Avium Subspecies Paratuberculosis**
Prof. George Botsaris (Dept. of Agricultural Sciences, Biotechnology and Food Science, CUT)

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School Program

Day 4 - Thursday, January 27, 2022 (EET Time)

09:00 - 09:40 — **Computer Graphics - Animation**
Prof. Stephania Loizidou (Dept. of Electrical Engineering, Computer Engineering and Informatics, Frederick University)

09:40 - 10:20 — **The Art of Process Mining**
Elia Kouzari (Assistant Manager, KPMG)

10:20 - 11:00 — **The Case Study of OVER Technologies**
Adriano Cerocchi (CEO OVER technologies)

11:00 - 11:10 — **Break**

11:10 - 11:50 — **Integrating the Internet of Things in Real-life Scenarios**
Prof. Lambros Lambrinos (Dept. of Communication and Internet Studies, CUT)

11:50 - 12:30 — **Business Process Management and Process Mining - Part A**
Prof. Massimo Mecella (Dept. of Computer, Control and Management Engineering, Sapienza Università di Roma) &
Prof. Francesco Leotta (Dept. of Computer, Control and Management Engineering, Sapienza Università di Roma)

12:30 - 13:10 — **Business Process Management and Process Mining - Part B**
Prof. Massimo Mecella (Dept. of Computer, Control and Management Engineering, Sapienza Università di Roma) &
Prof. Francesco Leotta (Dept. of Computer, Control and Management Engineering, Sapienza Università di Roma)

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School Program

Day 5 - Friday, January 28, 2022 (EET Time)

09:00 - 09:40	**The WaterAnalytics Digital Twin** *George Milis (Director and Innovations Manager, PHOEBE Research & Innovation)*
09:40 - 10:20	**PandoraSEAL: An AI-based Decision Support Tool for the Selection of Non-Pharmaceutical Interventions During Pandemics** *Demetrianos Gavriel (Data Analytics Expert, PHOEBE Research & Innovation)*
10:20 - 10:40	**Ultrasound Carotid Plaque Video Data Analysis for the Estimation of the Risk of Stroke** *Georgia Liapi (PhD Candidate, CUT)*
10:40 - 11:00	**An Adaptive Semi-Automated Integrated System for Multiple Sclerosis Lesion Segmentation in Longitudinal MRI Scans Based on a Convolutional Neural Network** *Andreas Georgiou (MSc, University of Cyprus)*
11:00 - 11:10	**Break**
11:10 - 11:50	**The Service Paradigm Rebound: Data Products, Meshes & Markets** *Prof. Willem-Jan van den Heuvel (Jheronimus Academy of Data Science, Tilburg University) &* *Prof. Geert Monsieur (Dept. of Data Engineering, Tilburg University)*
11:50 - 12:30	**Demystifying Non-Fungible Tokens (NFTs)** *Prof. Klitos Christodoulou (Dept. of Digital Innovation, University of Nicosia)*
12:30 - 13:10	**Web-based Real-time Monitoring and Modeling of Managed Aquifer Recharge Applications** *Dr. Constantinos Panagiotou (Researcher, Excelsior - Eratosthenis CoE, CUT)*

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2.2 Invitation Emails

Dear colleague,

Please find attached the final program of the 2nd online school on Smart Data organized by the consortium of the DESTINI Twinning H2020 project.

The school starts on Monday 24/1/2022 and ends on Friday 28/1/2022.

Each day includes talks and presentations from a wide spectrum of scientific topics on data processing and smart systems, with emphasis on practical results and applications.

The speakers come from universities, research organizations, local institutions and SMEs in Cyprus, Italy and the Netherlands.

You are more than welcome to join us (free of charge) here:

https://us02web.zoom.us/j/85938723825?pwd=YWFWYmcvL2x2K2QvQnZMWkUwRmNJUT09

Meeting ID: 859 3872 3825

Passcode: 618596

(the link is the same for all days).

Please disseminate to your network of colleagues and collaborators or any other interested party.

Thank you.

Kind regards,

A.S. Andreou

DESTINI coordinator

2.3 Invitation Letter for the second school disseminated on the university's website

DESTINI

Smart Data Processing and Systems of Deep Insight

Twinning | Horizon2020

Ευρωπαϊκό Χρηματοδοτούμενο έργο με τίτλο: Smart Data Processing and Systems of Deep Insights - DESTINI

"Twinning (H2020-TWINN-2015) Coordination and support actions: Spreading excellence and widening participation"

2ο Σχολείο σε Ευφυή Δεδομένα (Smart Data)

24 -28 Ιανουαρίου 2022

Στα πλαίσια το ερευνητικού έργου DESTINI, το Τεχνολογικό Πανεπιστήμιο Κύπρου (ΤΕΠΑΚ) διοργανώνει στις **24-28 Ιανουαρίου 2022** το δεύτερο διαδικτυακό σχολείο στην περιοχή των Ευφυών Δεδομένων (Smart Data).

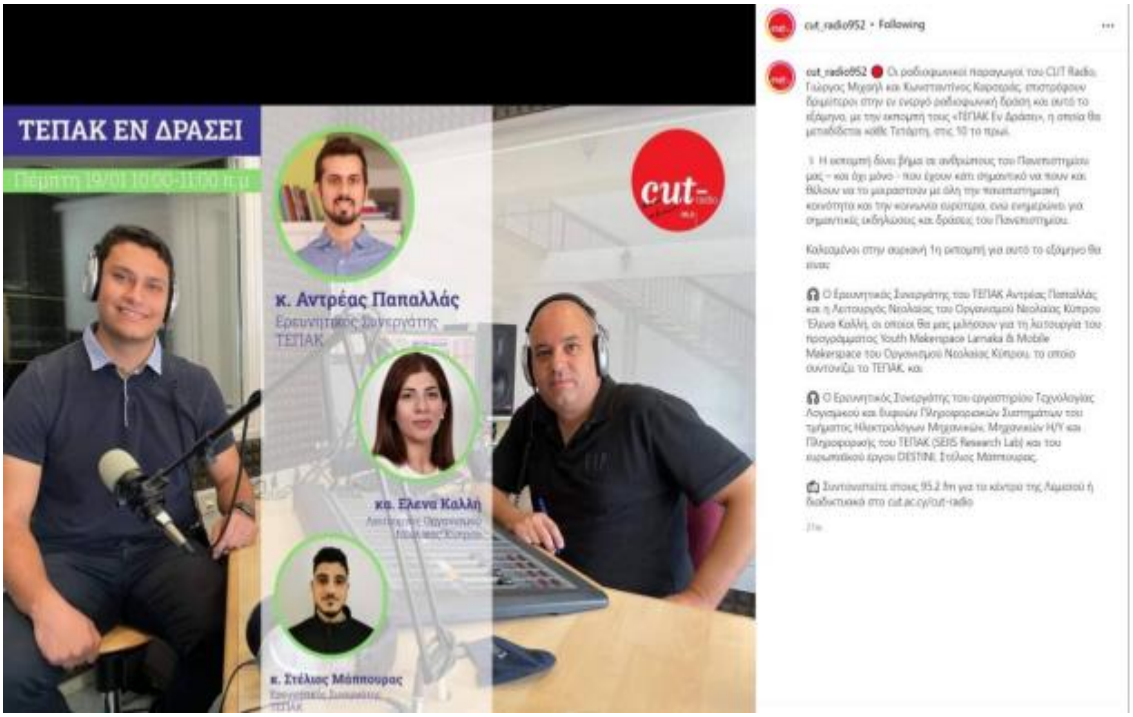
Το σχολείο θα πραγματοποιηθεί στην αγγλική γλώσσα και θα μεταδίδεται διαδικτυακά σε όλους τους συμμετέχοντες. Η διάρκεια του σχολείου θα είναι πέντε μέρες και θα περιλαμβάνει σειρά ομιλιών και παρουσιάσεων, τόσο από τους εταίρους του έργου όσο και από συνεργαζόμενους φορείς του έργου, που αφορούν κυρίως πρακτικές εφαρμογές ερευνητικών αποτελεσμάτων. Η θεματολογία του σχολείου καλύπτει ένα ευρύ φάσμα επιστημονικών περιοχών και πρακτικών εφαρμογών, τα οποία προσφέρουν λύσεις σε προβλήματα και προκλήσεις που υπάρχουν στον πραγματικό κόσμο, και αναδεικνύουν πως η εφαρμοσμένη έρευνα μπορεί να ωφελήσει επιχειρήσεις, την βιομηχανία, κρατικούς και ημικρατικούς οργανισμούς, ερευνητικούς φορείς και γενικά το ευρύ κοινό.

Στο δίκτυο συνεργασίας του DESTINI μαζί με το ΤΕΠΑΚ συμμετέχουν και δύο κορυφαία πανεπιστήμια με διακεκριμένη ερευνητική δραστηριότητα στα πεδία της Ευφυών Δεδομένων και της Επιστήμης Δεδομένων (Data Science): το Πανεπιστήμιο του Τίλμπουργκ στην Ολλανδία (University of Tilburg - (https://www.tilburguniversity.edu/) και το Πανεπιστήμιο Σαπιέντζα της Ρώμης στην Ιταλία (UNIROMA - https://www.uniroma1.it).

Κύριος στόχος του έργου είναι η ανάπτυξη ενός δικτύου συνεργασίας μεταξύ των τριών ακαδημαϊκών ιδρυμάτων για την ενίσχυση της ερευνητικής δυναμικής και δραστηριότητάς τους στους τομείς των Ευφυών Δεδομένων (Smart Data) με προεκτάσεις και στη Βιομηχανία 4ης γενιάς (Industry 4.0), μέσω της μεταφοράς τεχνογνωσίας και της από κοινού διερεύνησης και υλοποίησης νέων εφαρμοσμένων ερευνητικών ιδεών και εργαλείων. Η στενή συνεργασία μεταξύ των εταίρων του DESTINI θα επιτρέψει την κατάκτηση νέων γνώσεων και τη μεταφορά εμπειριών και τεχνογνωσίας μέσω διαφόρων δράσεων όπως, ανταλλαγή προσωπικού, επισκέψεις εμπειρογνωμόνων, διοργάνωση εργαστηρίων και σχολείων με προσφορά διαλέξεων και ομιλιών από τα δύο κορυφαία ιδρύματα, συμμετοχή σε διεθνή επιστημονικά συνέδρια / εργαστήρια, ανάπτυξη κοινών εκπαιδευτικών προγραμμάτων και προγραμμάτων κινητικότητας για νέους ερευνητές, και δημιουργία ισχυρών δεσμών με την αγορά / βιομηχανία.

Σύνδεσμος Εκδήλωσης: facebook.com/events/532801094366730/
Πρόσκληση: destini2020.eu/Second%20School%20-%20Invitation.pdf
Πρόγραμμα: Θα ανακοινωθεί σύντομα
Ιστοσελίδα: destini2020.eu/

2.4 Attendance of researchers of DESTINI to CUT radio for dissemination of the second school



2.5 Overview of Second School on smart data processing and systems of deep insight

DESTINI

HORIZON 2020

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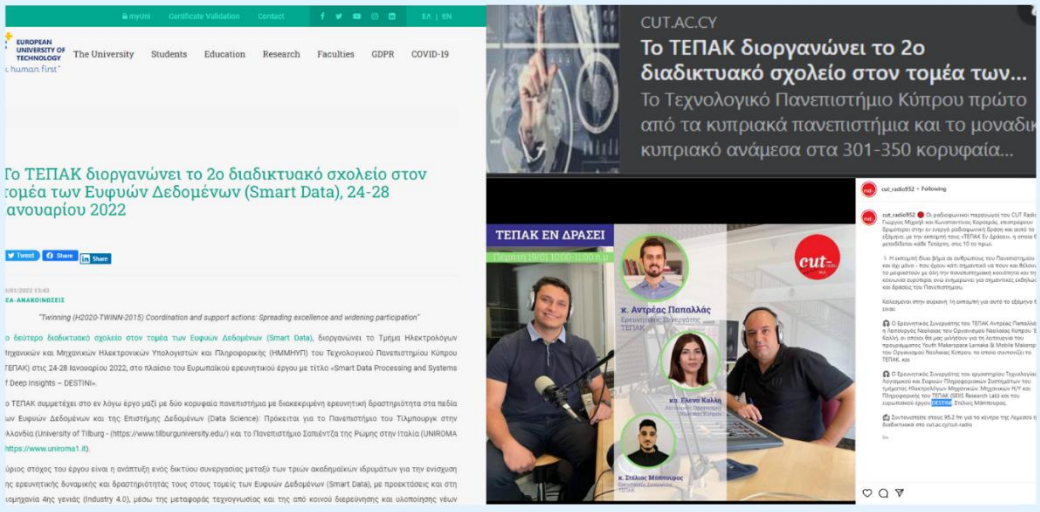
DESTINI
Smart Data Processing and Systems of Deep Insight

About School

This event is the second part of a series of schools and workshops organized by DESTINI on Smart Data and it is aligned with the project's dissemination and communication strategy. The latter has been organized and structured to present different scientific topics within the project's Joint Research Activities (JRAs) and demonstrate their benefits to real cases. This school aims to share knowledge developed in the project and to facilitate discussions, as well as exchange of expertise, between researchers, industrial and business stakeholders, governmental and decision-making bodies and the general public.

The duration of the school is five days. It comprises various talks and presentations that mainly target industrial and market stakeholders. During its sessions, the school covers a variety of topics and scientific areas which offer solutions to real-world problems and challenges, and demonstrate how applied research can benefit businesses, researchers, project stakeholders and the general public. The talks are delivered by DESTINI's partners and other project collaborators.



DESTINI
Smart Data Processing and Systems of Deep Insight

About DESTINI

TWINNING PROJECT - HORIZON2020

Smart Data ProcESsing and SysTems of Deep INsIght (DESTINI) is a H2020 Twinning Project that proposes a series of coordination and support actions for promoting research in the area of Smart Data. The Cyprus University of Technology (CUT) joins forces with two internationally recognized scientific groups from the Netherlands (Tilburg University and Jheronimous Academy of Data Science) and Italy (Sapienza Universita di Roma), aiming to strengthen its research and scientific profile in the relevant area. Specifically, DESTINI's activities revolve around exchanging scientific knowledge and transferring best research practices amongst its partners in the field of Smart Data Processing and Systems of Deep Insight.

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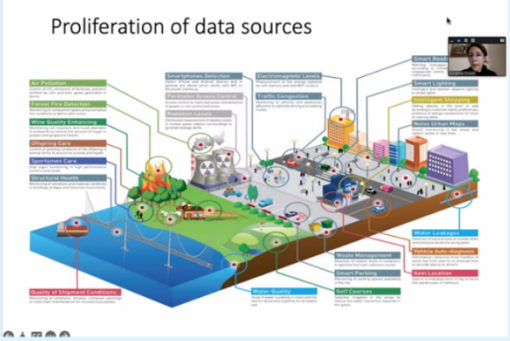
DESTINI

Smart Data ProcESsing and SysTems of Deep INsIght

24, January, 2022

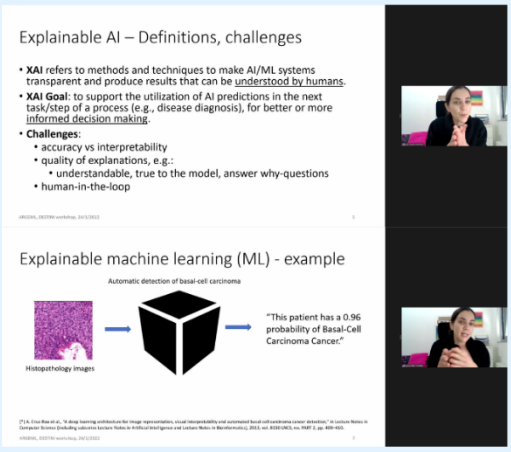
Day 1

Second School of DESTINI



Professor Donatella Firmani from Sapienza University of Rome presented **Big Data: Methods and Technologies.** Prof. Firmani illustrated methods and technologies for the management of big data. The presentation included the challenges and solutions of the aforesaid methods, through examples and discussion with the audience.

Mrs Nicoletta Prentzas, PhD candidate from the University of Cyprus presented the topic: **Argumentation-based framework for Explainable Machine Learning (ARGEML).** ARGEML is a framework built to support and offer a novel approach towards the XAI (Explainable AI), by combining the interpretability of symbolic AI with the high efficiency and accuracy of the Machine Learning models.



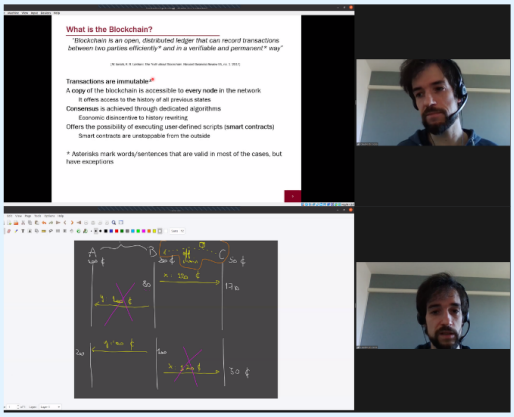
24, January, 2022

Day 1

Second School of DESTINI

Mr Marios Hadjiaros, PhD candidate from the University of Cyprus and researcher at CYENS, has given a talk on **Preliminary Findings on the Virtual Reality Cognitive Gaming Based on Brain Computer interfacing.** The presentation discusses a way of integrating Brain Computer Interfacing with Virtual Reality, in order to develop interactive applications for cognitive tasks.

Professor Claudio Di Ciccio from Sapienza Università di Roma presented the topic: **Blockchain Applications**. Throughout the presentation, Prof. Di Ciccio explained the foundations of blockchain, such as how the transactions are happening and how the security is accomplished. Furthermore, the evolution of the web from web 1 to web 3 was discussed, as well as some research-oriented directions of blockchain, with the most relevant topics.



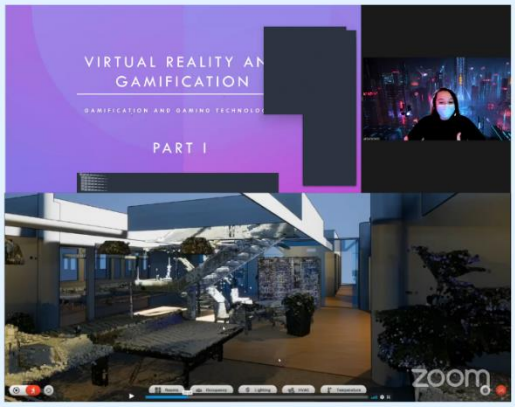
DESTINI

Smart Data ProcESsing and SysTems of Deep INsIght

25, January, 2022

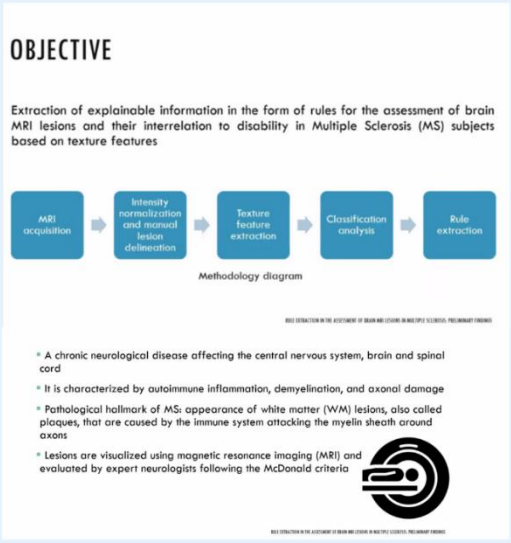
Day 2

Second School of DESTINI



Professor Lauren Ferro and Dr. Francesco Sapio from Sapienza University of Rome presented a talk on **Virtual Reality and Gamification.** The purpose of the presentation was to introduce the concept of gamification, and how it can be used to solve real world problems, followed by case studies and examples.

Mrs Andria Nicolaou, a PhD candidate from the University of Cyprus, presented a part of her recent research on **Rule Extraction in the Assessment of Brain MRI Lesions in Multiple Sclerosis: Preliminary Findings.** Mrs Nicolaou began her presentation by explaining what multiple sclerosis is, followed by some preliminary conclusions from her research about how rule extraction can help identify brain lesions related to multiple sclerosis, from MRI images.



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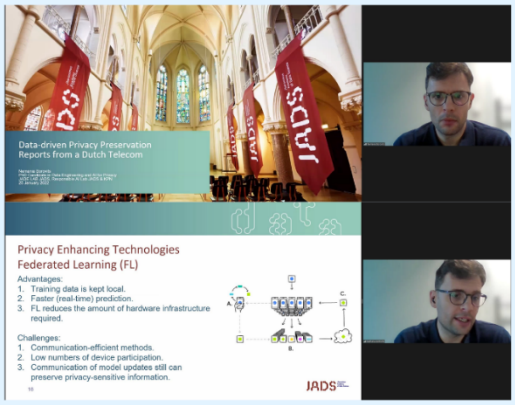
DESTINI

Smart Data ProcESsing and SysTems of Deep INsIght

25, January, 2022

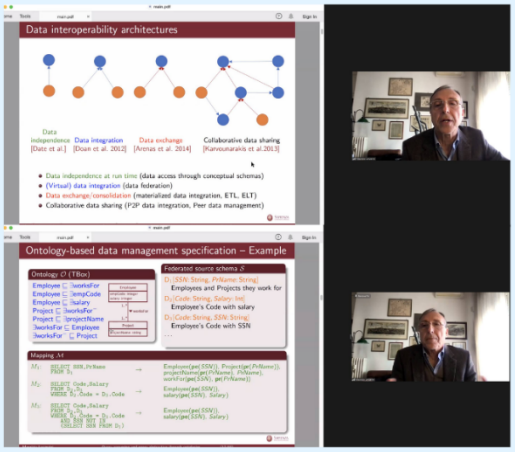
Day 2

Second School of DESTINI



Mr Nemania Borovits, PhD candidate from Tilburg University presented a talk on **Privacy preservation - Reports from a Dutch Telecom.** As part of the presentation, some principles about privacy by design were presented, followed by methodologies to enhance privacy, such as Federated Learning (FL). Moreover, advantages and challenges of the methodologies were discussed.

Professor Maurizio Lenzerini from Sapienza Università di Roma presented the topic **Query answering and query abstraction through ontologies**. During the presentation, Prof. Lenzerini explained what ontologies are, and how they can contribute to the interoperability of the data, through mapping the data into an ontology.



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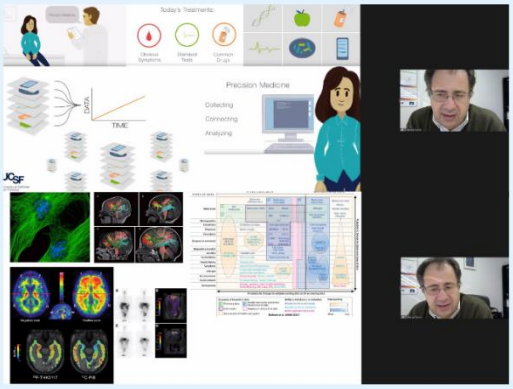
DESTINI

Smart Data ProcESsing and SysTems of Deep INsIght

26, January, 2022

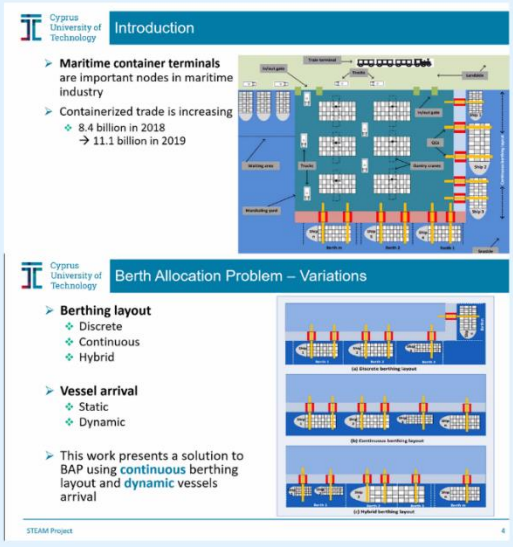
Day 3

Second School of DESTINI



Professor George Spyrou, Head of the Bioinformatics department of Cyprus Institute of Neurology and Genetics (CING), presented **Complex Patterns of Biological Information Decoded with Network-based Bioinformatics.** A key focus of the presentation was Precision Medicine, which can be accomplished by combining data science with healthcare, by decoding and analyzing the information to produce more accurate and precise medicines.

Mr Sheraz Aslam, PhD candidate and researcher at CUT provided a talk on his recent research work on **Enhanced Berth Allocation Using the Cuckoo Search Algorithm.** During the talk, an algorithm was showcased (Cuckoo) which can schedule dynamically the vessel's arrival in order to avoid conflicts. The algorithm was based on the well-known berth allocation problem which was included in the presentation. Lastly, the algorithm is a part of the EU project STEAM (Sea Traffic Management in the Eastern Mediterranean), which is undertaken by CUT.



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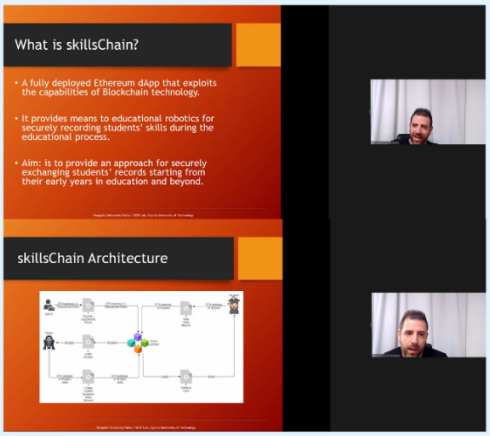
DESTINI

Smart Data ProcESsing and SysTems of Deep INsIght

26, January, 2022

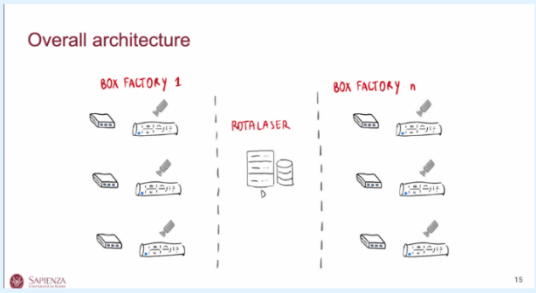
Day 3

Second School of DESTINI



Professor Panayiotis Christodoulou from Neapolis University of Pafos / researcher at SEIIS lab of CUT, provided an overview of the scientific article **skillsChain: A Decentralized Application that Uses Educational Robotics and Blockchain to Disrupt the Educational Process.** SkillsChain is a case study for a decentralized application published in an academic journal, about combining educational robotics and blockchain, aiming on providing a way to secure the exchange of students' records.

Mr Jerin George Mathew and Mrs Flavia Monti from Sapienza Università di Roma presented **Transformation in Traditional Industry: Die Cutter 4.0.** The presenters explained the evolution of the industry, concluding on industry 4.0. Then, a case study followed, on the application of a Smart Die Cutter which contains sensors that are controlled by a mini-PC. The worker interacts through a dashboard, where he monitors and manages the production.



26, January, 2022

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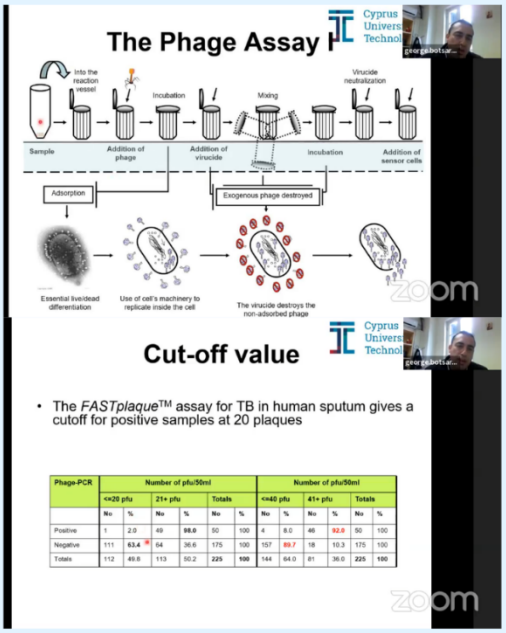

Professor George Botsaris from the department of Agricultural services, biotechnology, and food science of CUT presented the topic: **Data Driven Detection and Biological Control of Food Borne Pathogens: The Case of Mycobacterium Avium Subspecies Paratuberculosis.** Prof. Botsaris introduces a way of detecting food borne pathogens, using a data driven methodology. In the context of the presentation, the case study of Mycobacterium Avium Subspecies Paratuberculosis was examined.

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Day 4

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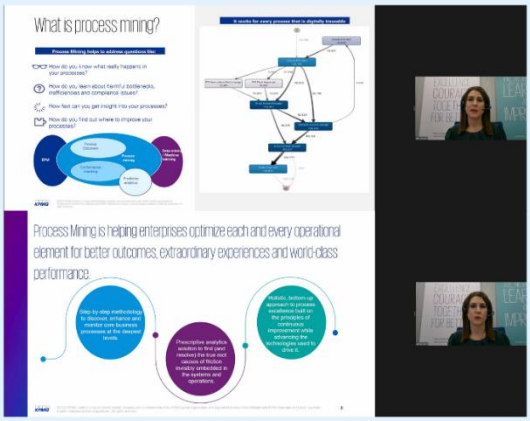
Professor Stephania Loizidou from the Frederick University of Cyprus provided a talk on **Computer Graphics - Animation.** Prof. Loizidou, introduced to the audience the concepts of computer graphics and animations, followed by some innovational topics and examples, such as Virtual Reality, motion capture, and simulations.

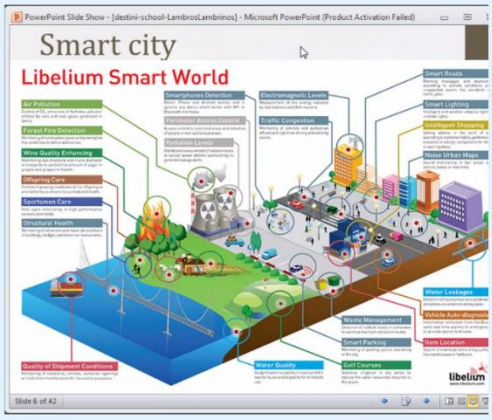
Mrs Elia Kouzari (Assistant Manager at KPMG) presented **The Art of Process Mining.** A detailed introduction on Business Process Mining was established, including the four main phases of a business process mining lifecycle (Collection, Discovery, Enhancement, Monitoring). Furthermore, the benefits of BPM, reason of existence as well as some tools, were described.



27, January, 2022

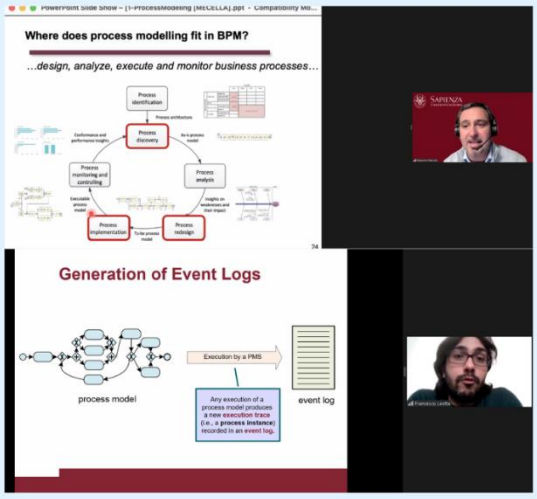
Day 4

Second School of DESTINI



Professor Lambros Lambrinos from the Cyprus University of Technology provided a talk on **Integrating the Internet of Things in Real-life Scenarios.** During the talk, the concept of Internet of Things (IoT) was explained, followed by some real world applications such as smart cities, and smart parking.

Professors Massimo Mecella & Francesco Leotta from Sapienza Università di Roma presented the topic: **Business Process Management and Process Mining.** The presentation focused on the context of business process mining and the larger area of business process management. The concepts of business process and process model were clarified, showcasing some of the multiple different ways of creating a process model. Furthermore, the speakers explained the main goals of BPM, concluding with some examples.



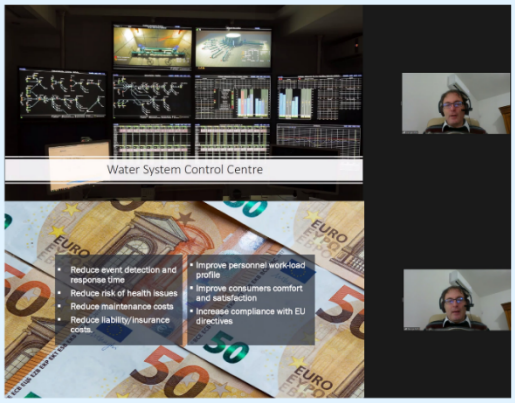
DESTINI

Smart Data ProcESsing and SysTems of Deep INsIght

28, January, 2022

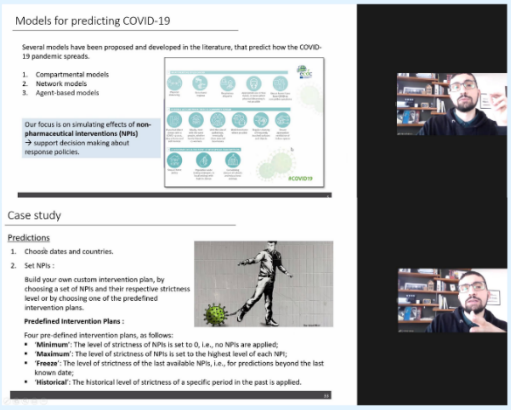
Day 5

Second School of DESTINI



Mr George Milis (Director and Innovations Manager at PHOEBE Research & Innovation) presented the topic **The Water Analytics Digital Twin.** The main focus was on the technology of Digital Twins, including the benefits, and how it can contribute to improve the quality of life of the general public. Furthermore, a case study of a Digital Twin replicating an intelligent Water System was presented.

Mr Demetrianos Gavriel (Data Analytics Expert at PHOEBE) presented the topic **PandoraSEAL: An AI-based Decision Support Tool for the Selection of Non-Pharmaceutical Interventions During Pandemics.** PandoraSEAL, is a Neural Network tool that aims to assist decision makers to select and implement the most efficient responses regarding the pandemics. Aside from the tool, a case study was also showcased, for the methodology followed in order to build the tool, including predictions, historical results, and what-if scenarios.



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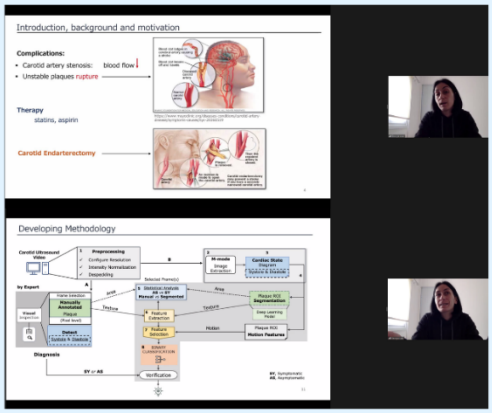
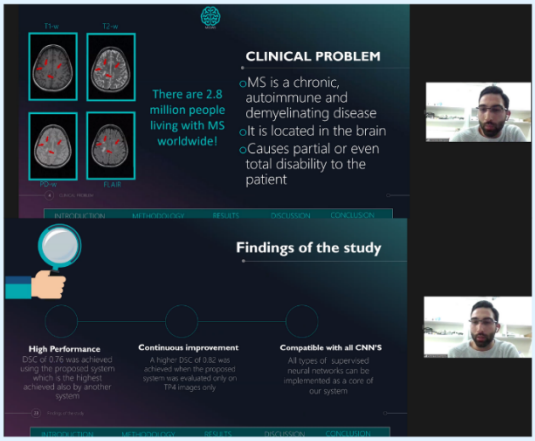


Mrs Georgia Liapi (PhD candidate at Cyprus University of Technology) presented the topic: **Ultrasound Carotid Plaque Video Data Analysis for the Estimation of the Risk of Stroke.** During the presentation, a methodology was presented for the estimation of the risk of stroke, using Ultrasound Carotid Plaque Video analysis.

Mr Andreas Georgiou (MSc student at Cyprus University of Technology) provided a talk on **An Adaptive Semi-Automated Integrated System for Multiple Sclerosis Lesion Segmentation in Longitudinal MRI Scans Based on a Convolutional Neural Network.** The presenter proposes a simple solution that comes provides lesion segmentation to MRI scans of Multiple Sclerosis, where the user has the opportunity to correct errors from the model, so the model can be constantly improved.



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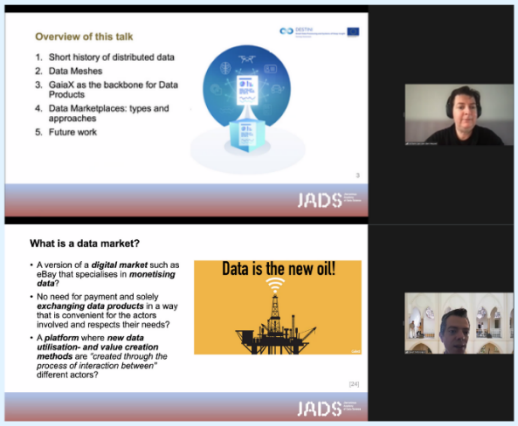
28, January, 2022

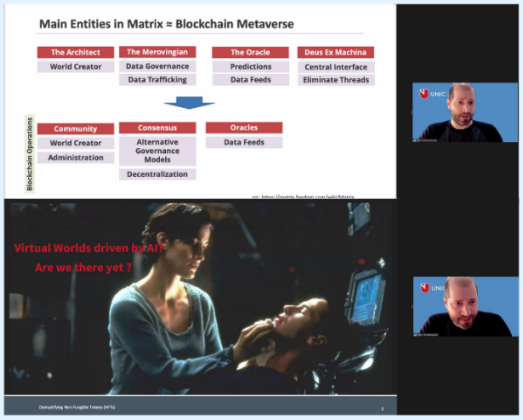
Day 5

Second School of DESTINI



Professor Willem-Jan van den Heuvel & Geert Monsieur from the Jheronymous Academy of Data Science & Tilburg University provided a talk on **The Service Paradigm Rebound: Data Products, Meshes & Markets.** The speakers initiated with a brief history of distributed data, followed with the mentioning of the latest technologies of handling big data, such as data meshes & data products.

Professor Klitos Christodoulou from University of Nicosia presented the topic: **Demystifying Non-Fungible Tokens (NFTs).** The speaker introduced the ideology behind the production and trend of NFTs, their relation with blockchain and the idea of tokenization in blockchain technology. Moreover, the presentation also mentioned the involvement of NFTs in the upcoming virtual technological ecosystem "metaverse".



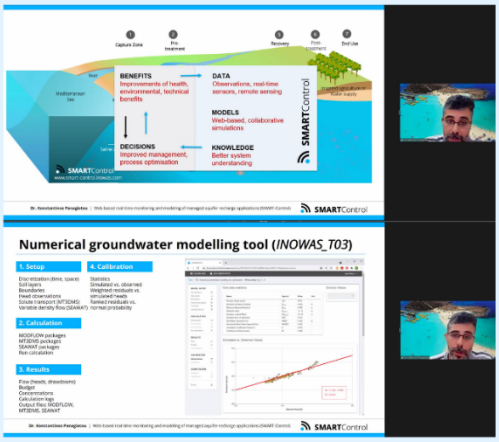
DESTINI

Smart Data ProcESsing and SysTems of Deep INsIght

28, January, 2022

Day 5

Second School of DESTINI



Dr. Constantinos Panagiotou from Excelsior – Eratosthenis CoE presented the topic **Web-based Real-time Monitoring and Modeling of Managed Aquifer Recharge Applications.** In the context of the presentation, a Smart Real Time Monitoring Web Application was presented, which gathers data from different locations of the world about groundwater systems. These data are utilized in order to make some assessments, such as the states of the groundwater systems.

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DESTINI

Smart Data ProcESsing and SysTems of Deep INsIght

Conlusion

TWINNING PROJECT - HORIZON2020

The Second School of the DESTINI project was successfully held on January 24-28, with participation from universities, researchers, students, businesses, offering their knowledge and expertise to the audience. The topics of the presentations covered a wide variety of topics and scientific areas, and it was demonstrated how applied research can the project's stakeholders and the general public.

The consortium of DESTINI would like to thank all the presenters and participants of the event, for their courtesy to be a part of this and honor us with their presence.

Contact us

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3. Satellite Event

3.1 Agenda

DESTINI SATELLITE EVENT - SUMMERSOC 2022

FINAL PROGRAM

Sunday, 03 July 2022, 10:00-14:00 – Preparation Day

10:00 – 14:00: Preparative activities for DESTINI's Satellite Event

Monday, 04 July 2022, 09:00-17:30 – Orientation Day

09:00 – 10:00: Presentation of the DESTINI project / Orientation, A.S. Andreou (CUT)

10:00 – 16:30: Talks (jointly with SummerSOC), brainstorming sessions and mentoring activities

16:30 – 17:30: Wrap-up of Orientation Day

Tuesday, 5 July 2022 – Thursday 7 July 2022, 09:00-17:30 – Working days #1 -- #3

09:30 – 10:00: Launch of the mentoring activities

10:00 – 16:30: Talks (jointly with SummerSOC), brainstorming sessions and mentoring activities

16:30 – 17:30: Wrap-up of Working Day #1 -- #3

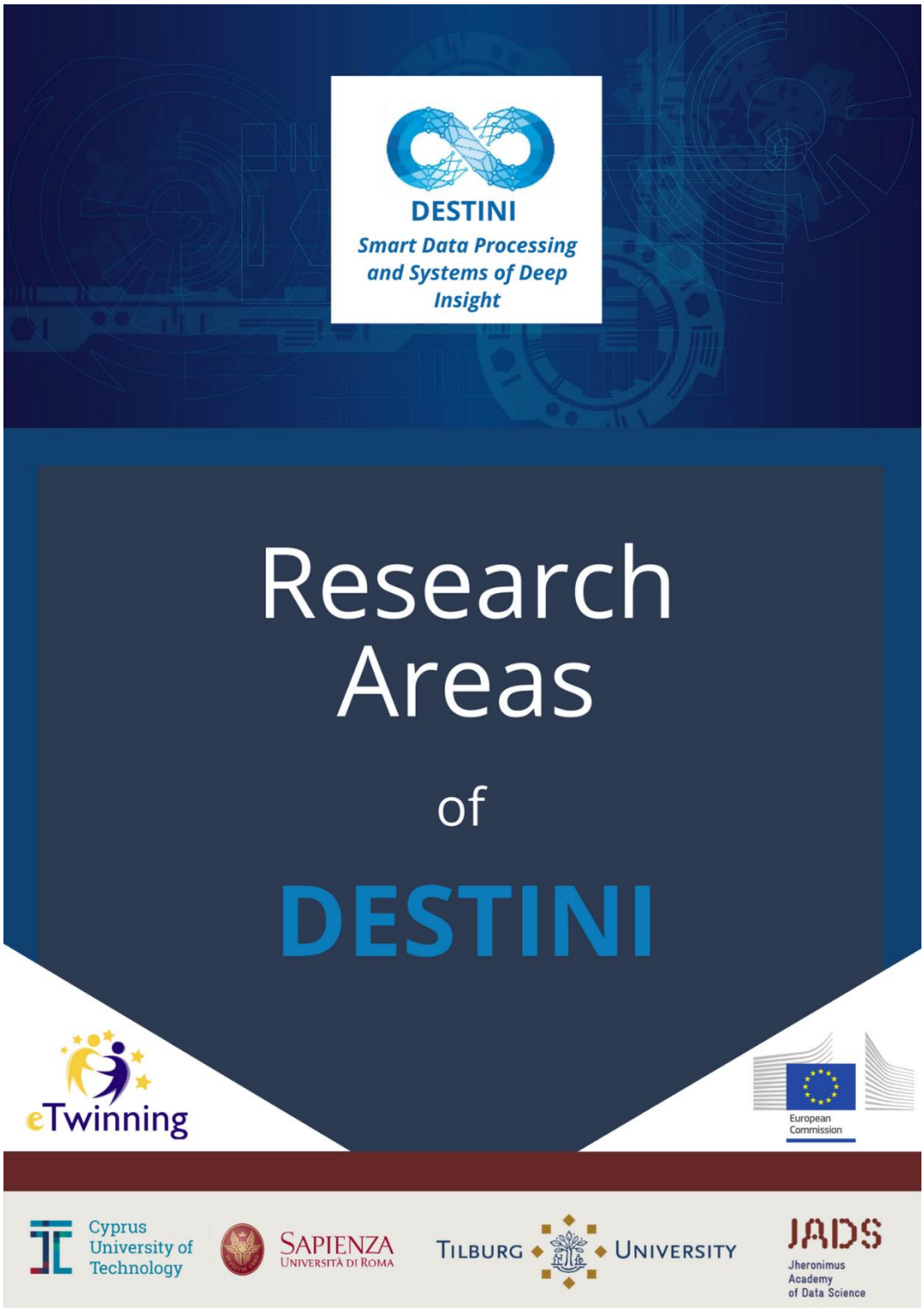
Friday 8 July 2022 – Working day #4

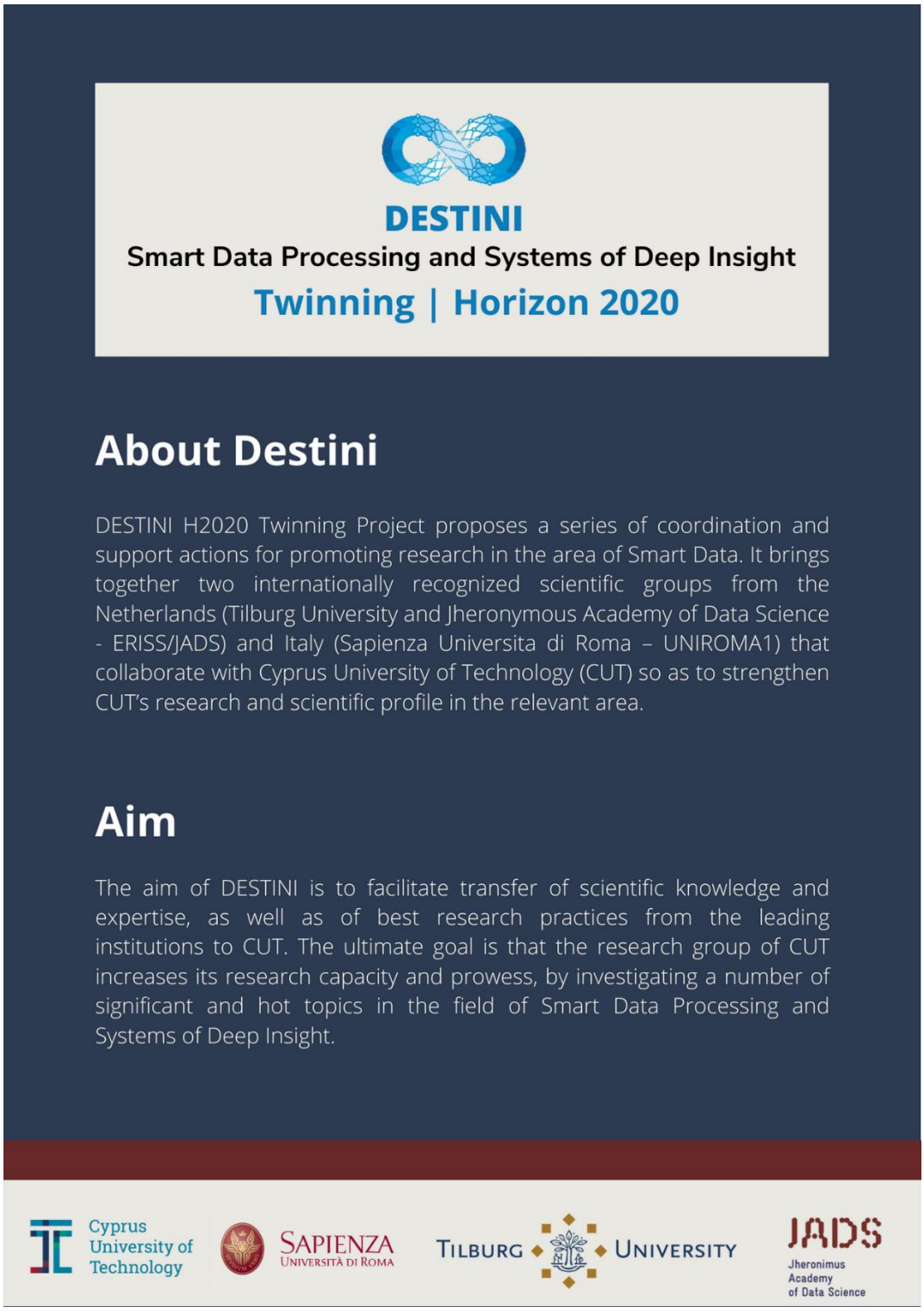
16:30 – 18.30: Presentation and selection of best ideas for the mobility program

3.2 Poster

DESTINI
TWINNING
DESTINI
MOBILITY PROGRAMME
SATELLITE EVENT
SUMMER-SOC 2022
Smart Data Processing and
Systems of Deep Insight
Crete, July 4-8, 2022
09:00AM - 05:30PM
Cyprus
University of
Technology
SAPIENZA
UNIVERSITÀ DI ROMA
JADS
Jheronimus
Academy
of Data Science

3.3 Leaflet


DESTINI
Smart Data Processing and Systems of Deep Insight
Research Areas
of
DESTINI
eTwinning
European Commission
Cyprus University of Technology
SAPIENZA UNIVERSITÀ DI ROMA
TILBURG UNIVERSITY
JADS
Jheronimus Academy of Data Science


DESTINI
Smart Data Processing and Systems of Deep Insight
Twinning | Horizon 2020
About Destini
DESTINI H2020 Twinning Project proposes a series of coordination and support actions for promoting research in the area of Smart Data. It brings together two internationally recognized scientific groups from the Netherlands (Tilburg University and Jheronymous Academy of Data Science - ERISS/JADS) and Italy (Sapienza Universita di Roma – UNIROMA1) that collaborate with Cyprus University of Technology (CUT) so as to strengthen CUT's research and scientific profile in the relevant area.
Aim
The aim of DESTINI is to facilitate transfer of scientific knowledge and expertise, as well as of best research practices from the leading institutions to CUT. The ultimate goal is that the research group of CUT increases its research capacity and prowess, by investigating a number of significant and hot topics in the field of Smart Data Processing and Systems of Deep Insight.
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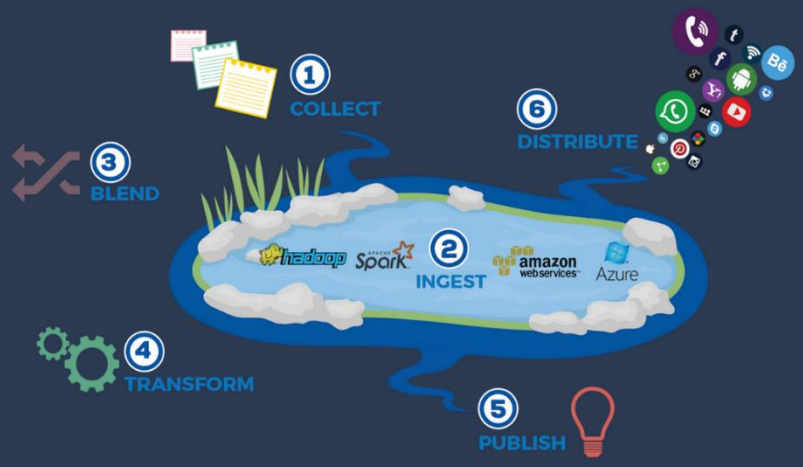
Research Areas

1. Data Lakes

- Query sources and create SPARQL subgraphs using Visual Querying
- Characterize/ build blueprints of the data sources using Visual Querying
- Apply algorithms (classification) during the process of selecting sources based on their features and options
- Run the process continuously by renewing the subgraph
- Utilize this approach after data sources are ingested in a Data Lake
- Use blockchain in Data Lakes to address one of the most important challenges according to literature, that is, Security, Privacy and Data Governance
- Utilization of algorithms such as top k-means after data sources are ingested in the Data Lake



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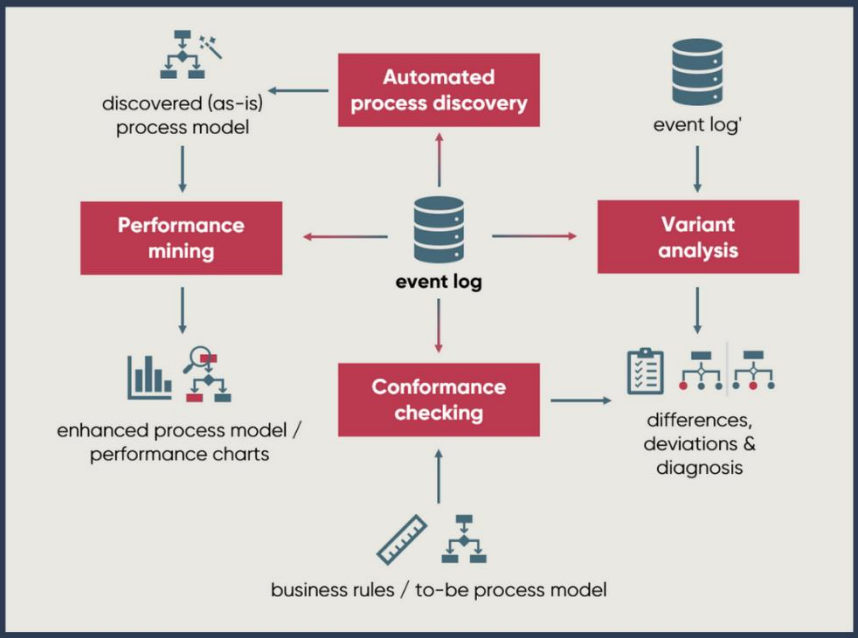
Research Areas

2. Business Process Mining

- Perform process discovery and model creation
- Analysis of the business process based on event logs
- Conformance checking
- Pre-define goals for optimization
- Evolution - enhancement of a business process using machine learning
- Applications in smart manufacturing and/or the health sector



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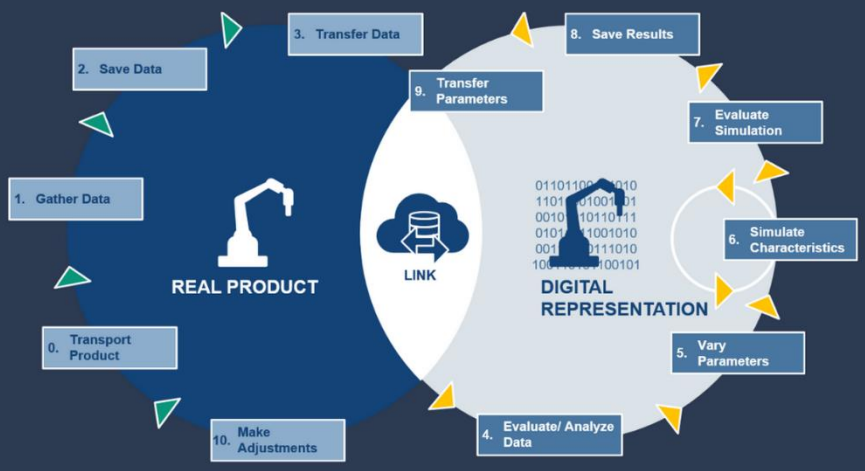
Research Areas

3. Digital Twins

- Experimental digital twins for smart manufacturing
- Interactive visualization of physical entities
- Interaction between physical and virtual worlds
- Predictions based on real-world data from physical entities
- Graphical representation of real-world data on digital twins



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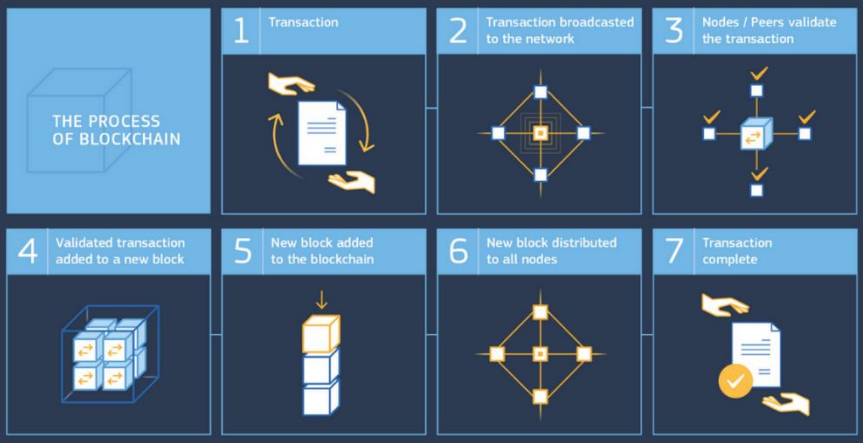
Research Areas

4. Blockchain

- Experimental Digital Twins in Blockchain
- Physical Entities as NFTs
- NFTs and Smart Contracts in a 3D environment
- Blockchain and BPM activities
- Blockchain and Data Lakes



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4. Mobility Program

4.1 Overview

DESTINI

HORIZON 2020

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13-14 Silvestro Veneruso

15-16 Flavia Monti

17-18 Jerin George Mathew

19-20 Alberto Morvillo

21-22 Francesca De Luzi

23-24 Mirella Sangiovanni

25-26 Stefan Driessen

DESTINI
HORIZON 2020

About Mobility

The mobility program aimed at bringing together Early Stage Researchers (ESRs) to collaborate and/or be recruited by CUT for a specific period of time, to conduct research with CUT's team in areas revolving around smart data processing and systems of deep insight.

Due to the traveling restrictions posed by the COVID-19 virus outbreak, the mobility program was delayed and moved towards the end of the project.
The corresponding activities were executed in two stages:

1. Organization of Satellite Event in the context of SummerSoc

During this event, lectures, presentations, trainings, and brainstorming sessions were conducted. ESRs presented ongoing research work that align with the areas of interest to DESTINI and new ideas were proposed and discussed for future research. The best ideas were selected for further elaboration and the ESRs were invited to continue taking part to the mobility program through site visits and short relocation to Cyprus.

2. Execution of the mobility program in Cyprus

ESRs that were invited to Cyprus to investigate further their ideas, comprised PhD candidates from Sapienza and JADS. During their period of stay, they worked closely with researchers at CUT, both within the Cypriots partner's group and beyond that, to explore further subjects identified and to suggest new research topics of mutual interest. In this context, new methods, techniques, algorithms, models and approaches on areas such as Digital Twins, Data Lakes, Data Meshes, Blockchain, Predictive Maintenance and Analytics, AI-supported smart data processing were proposed, discussed, elaborated and analyzed. The ultimate goal of all these activities will be to produce new research papers for publication and establishing further research collaboration. Finally, this exercise led to investigating the potential of writing and submitting new proposals for attracting external funding at National or European level.

DESTINI
HORIZON 2020

About DESTINI

TWINNING PROJECT - HORIZON2020

Smart Data ProcESsing and SysTems of Deep INsIght (DESTINI) is a H2020 Twinning Project that proposes a series of coordination and support actions for promoting research in the area of Smart Data. The Cyprus University of Technology (CUT) joins forces with two internationally recognized scientific groups from the Netherlands (Tilburg University and Jheronimous Academy of Data Science) and Italy (Sapienza Universita di Roma), aiming to strengthen its research and scientific profile in the relevant area. Specifically, DESTINI's activities revolve around exchanging scientific knowledge and transferring best research practices amongst its partners in the field of Smart Data Processing and Systems of Deep Insight.

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04, July, 2022

Day 1

Day 1 included an introductory presentation from Professor Andreas Andreou, explaining the context of the mobility program, the activities to be conducted and the agenda of the event. In addition, brainstorming sessions were held throughout the day about research-oriented topics.

05, July, 2022

Day 2

Day 2 began with presentations from the Dr Andreas Christoforou and Panayiotis Christodoulou, so as to give ideas in sub-areas of DESTINI and establish discussions and ideas for brainstorming. In addition, Flavia Monti, ESR from Sapienza University presented her research work on Industry 4.0.

06, July, 2022

Day 3

Day 3 included several presentations from ESRs. Stelios Mappouras, a researcher of DESTINI initiated the day by presenting his research work on Blockchain and NFTs. Then, ESRs from JADS presented their research work. Stefan Driessen presented his work on Data Product marketplace, Stefano Dalla Palma on MLOps, testing, Mirella Sangiovanni on Sustainable cities and Smart Healthcare Intelligence and lastly Nemania Borovits on Privacy Preservation. The day concluded with brainstorming on these ideas, and discussing about coupling them with DESTINI's research activities.

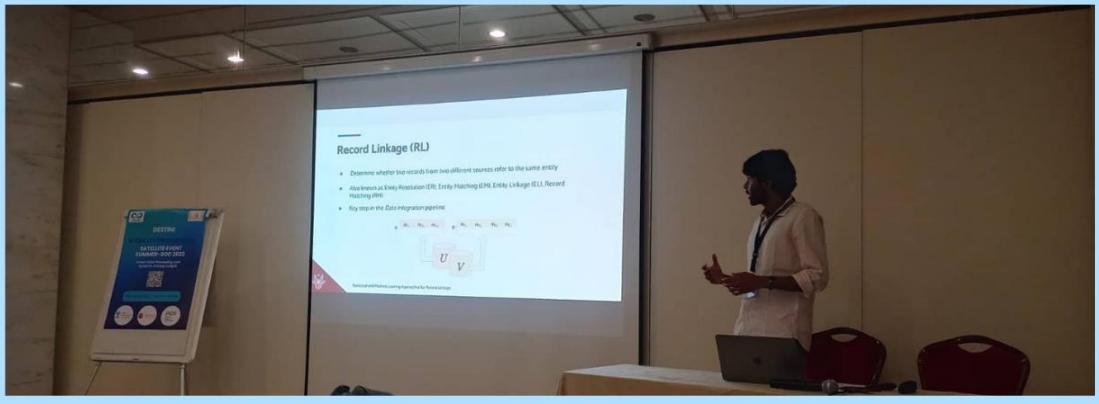
07, July, 2022

Day 4

During Day 4, Presentations from ESRs continued with 2 ESRs of CUT, Michalis Pingos and Spyros Loizou presented their PhD work on Data Lakes and semantic enrichment mechanism and Digital Twins for visual querying and process mining. In addition, 3 ESRs from Sapienza University followed, Alberto Morvillo presented Geo-based visual exploration of digital document collections, Silvestro Veneruso presented Applying Process Mining to Human Daily Activities and Jerin George Mathew presented Statistical and Machine Learning Approaches to Record Linkage. Following the presentations, the day concluded with brainstorming sessions.

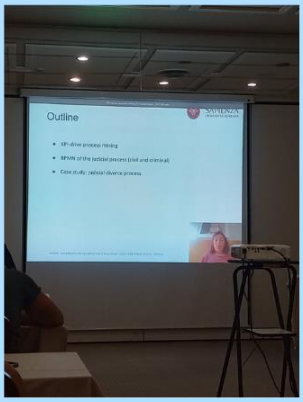
07, July, 2022

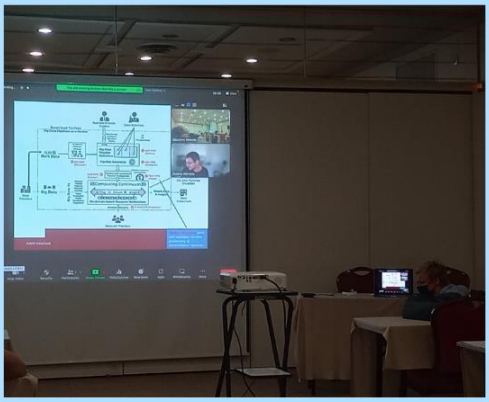
Day 4



08, July, 2022

Day 5





Day 5, the final day of the event, included presentations from the Professor Andrea Marella on Big Data Pipelines Discovery from Dark Data: Challenges and Some Solutions. Also, the remaining ESRs from Sapienza presented their research work: Dario Benvenuti on Event Log Extraction and Generation in the context of Big Data Pipeline and Francesca De Luzi on KPI-driven process mining in E-government. After the conclusion of the presentations, The Professors Andreas Andreou, Massimo Mecella and Willem Jan Van Den Heuvel discussed, and selected the best ideas that align with the project's JRAs.

Dario Benvenuti

- Development of a rigorous and structured set of both manual and automated techniques to drain the data swamp based on:
1. The 5 Vs of Big Data.
2. Special properties of Big Data Pipelines.
3. Generation of process-centric metadata.

- Generation of everything that is needed to build and maintain a data lake, with particular emphasis on:
1. Ad-hoc blueprints for Big Data Pipelines.
2. Process Discovery through querying the Data Lake.

In practice, this research direction can be split in six phases:

1. Collection of the most popular manual and automated (or semi-automated) techniques to drain DSs (e.g., data cleaning, data integration, metadata management/enrichment).

2. Analysis of the collected techniques to make a clear map of what can be automated and under which conditions.

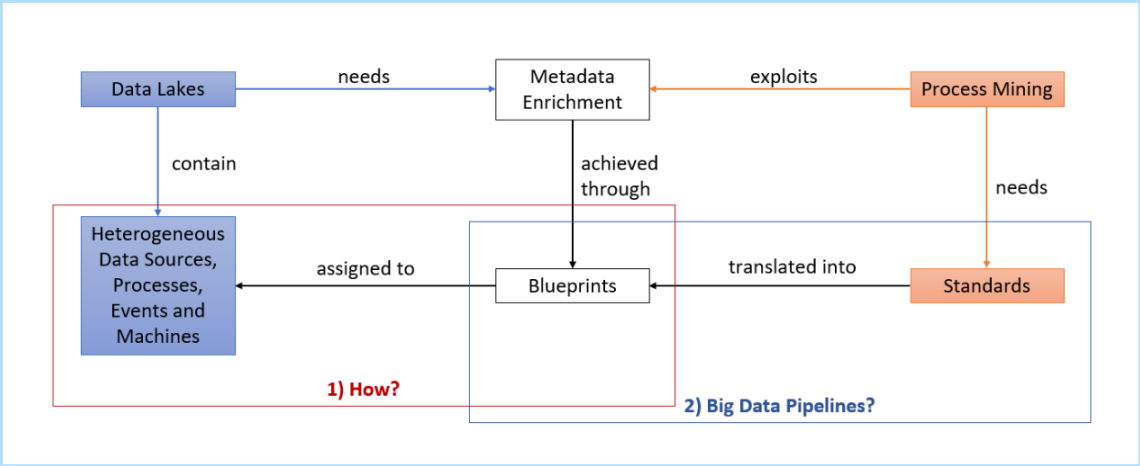
3. Development of the required ad-hoc blueprints to work in the Big Data Pipeline context and to assign process-centric parameters in a strictly data-centric environment.

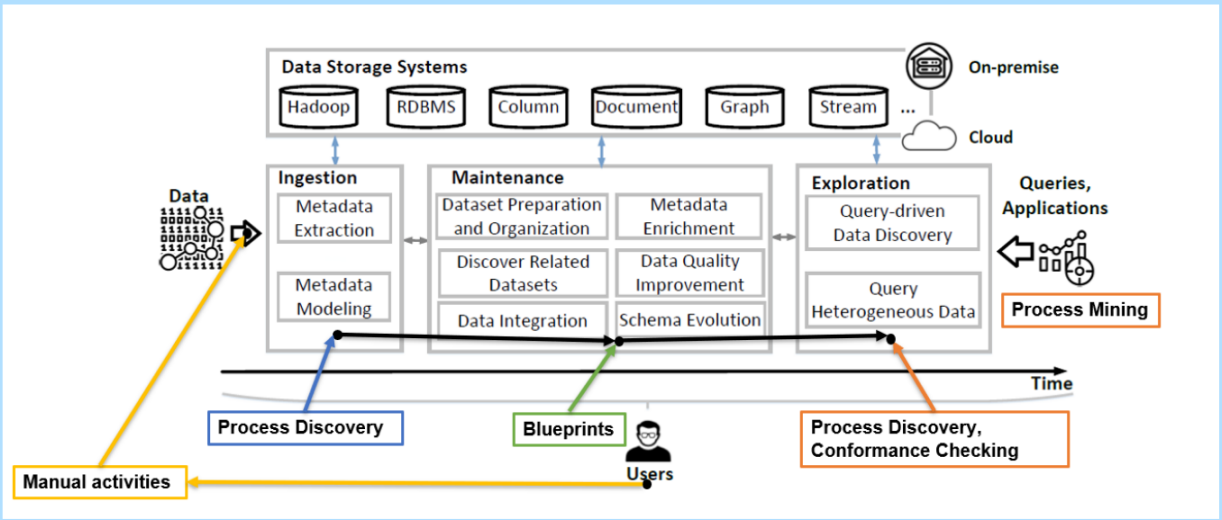
4. Development of the draining and maintenance techniques, and analysis of the role of PM as an automated technique to build blueprints and to exploit the DL itself to extract knowledge from every kind of data (e.g., even from unstructured data with no timestamp).

5. Validation with a real organization.

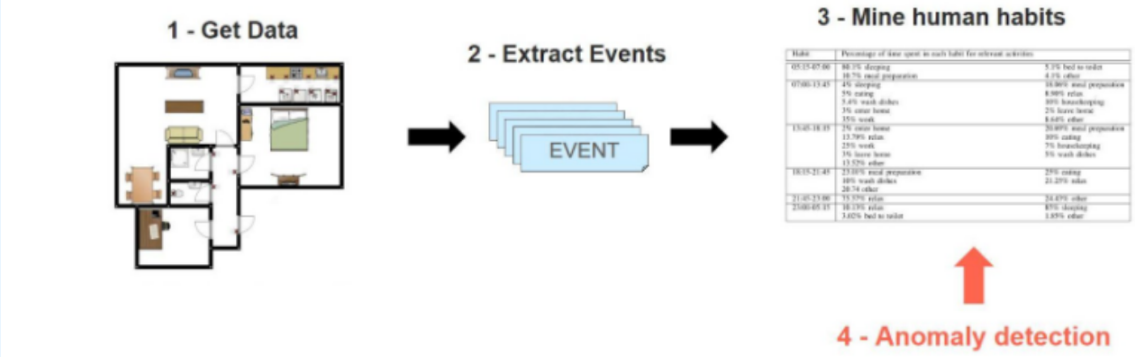
6. Writing of the paper.

Dario Benvenuti





Silvestro Veneruso



Research Proposal #1

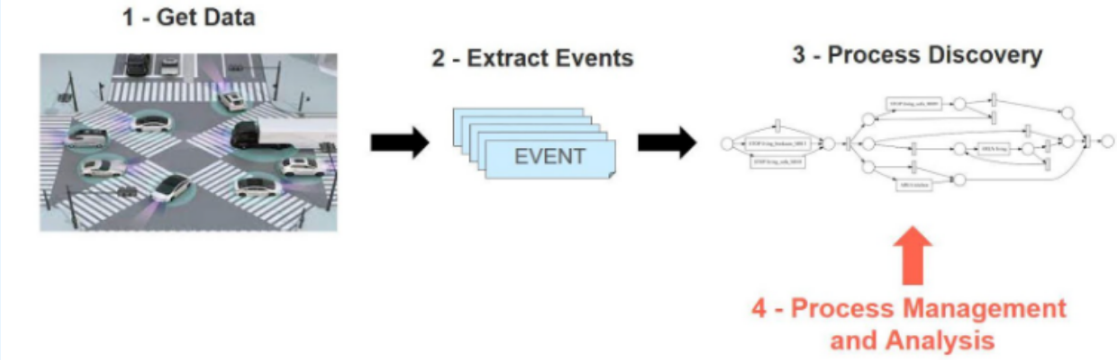
TARGET: Elderly people living alone, people with some mental diseases (e.g., dementia) or who are rehabilitating from some trauma (e.g., a stroke).

SETTING: Smart environments. E.g., elderly homes, nursing homes, rehabilitation's centers.

PROBLEM: How can we ensure that their daily routines go the right way?

GOAL: Starting from a sensor log, we propose an approach to automatically mine human habits on a daily basis and then perform anomaly detection to capture any possible wrong behavior from the observed inhabitants.

Silvestro Veneruso



Research Proposal #2

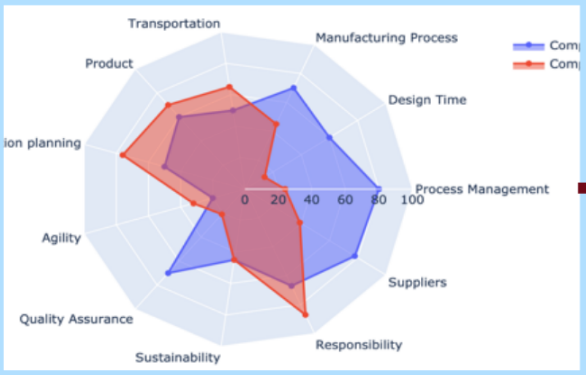
TARGET: Civil Protection's institution.

SETTING: Public environments. E.g., roads.

PROBLEM: How is a car crash usually managed? Who intervenes first: public officers or the ambulance? Which is the timing?

GOAL: We want to mine models describing how car crashes are handled in order to perform some analysis over this information.

Flavia Monti



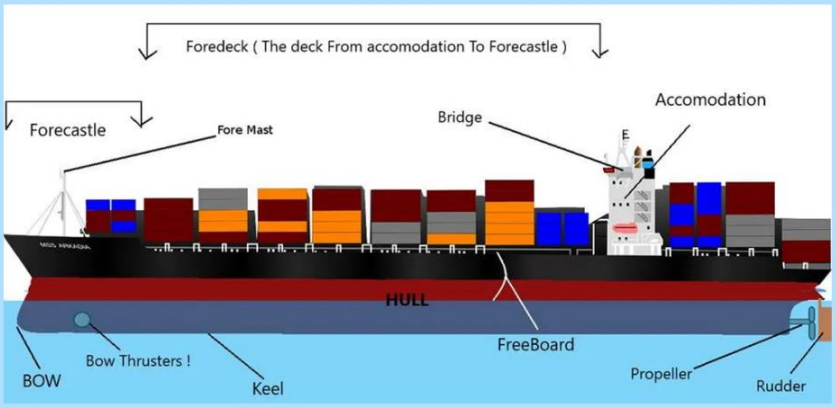
Research Proposal #1

- Construct the Maturity Model FCM
- Execute the model to:
  - Study dependencies between dimensions
  - Find roadmaps towards Industry 4.0 readiness

Methodology:

- Define concepts
  - Dimensions and levels of the maturity model
- Validate the concepts through questionnaire to the experts
  - Industry and academia
- Define concept causalitythroughquestionnaire to the experts
- Execute the map for static and dynamicanalyses

Flavia Monti



Predictive Maintenance (PdM) Strategies in Maritime using Digital Twins

- Maritime domain is undergoing a digital transformation
  - Promotes automation and digitization of processes and control operations
- Maintenance in the maritime domain is crucial
  - Failures in ship components may have significant consequences

Goal: run ships avoiding extraordinary problems

- Detecting anomalies and possible defects and fix them before they run into failure

Short-term approach

- Identification of criticalcomponents
  - Availability of data
  - FMEA, FMECA, 4-quadrants selectionmethods
- Definition of Digital Twin architecture
  - Service-based digital twin
  - Maritime Digital Twin Architecture (MDTA)

Jerin George Mathew

Schema Alignment

Source 1

Studio Album	Artist name	Genre	Release date
Stadium Arcadium	RHCP	Alternative Rock	February 24, 2004

Album name	Artist name	Genre	Release date
Stadium Arcadium	RHCP	Alternative Rock	February 24, 2004

Source 2

Album name	Artist	Release month	Release year
Stadium Arcadium	Red Hot Chili Peppers	02	2006

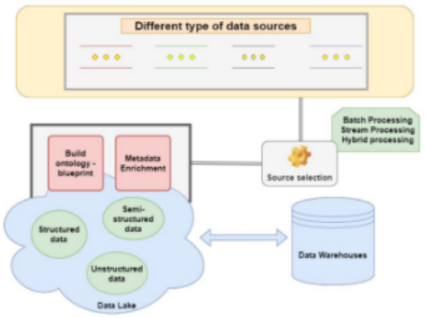
Album name	Artist name	Genre	Release date
Stadium Arcadium	Red Hot Chili Peppers	-	02-2006

Statistical and ML approaches: a comparison

	Statistical approaches	ML approaches
Statistical guarantees	Yes	No
Scalability (blocking)	somewhat	Yes
Data types	categorical and numerical	textual data
Supervised	no	yes
Core techniques	missing data estimation techniques, MLE	Transformer based nets
Popular techniques	Fellegi-Sunter[2], Blink [3], DBlink [4]	DeepMatcher [5], DeepER [6], Ditto [7]

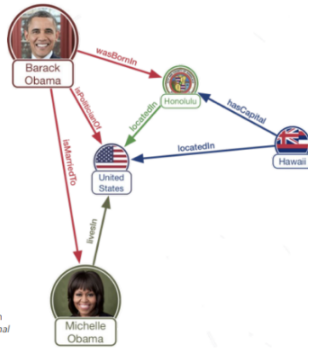
Jerin George Mathew

Proposed framework



Knowledge graph (KG)

- Graph-based model used to represent *knowledge* about real-world objects
- Nodes represent real-world entities (e.g. "Barack Obama")
- Arcs represent relationships between nodes (e.g. "was born in")
- We continuously interact with a KG on a daily basis: Google Knowledge Graph



[10] Rossi, Andrea, et al. "Explaining link prediction systems based on knowledge graph embeddings." *Proceedings of the 2022 International Conference on Management of Data*. 2022.

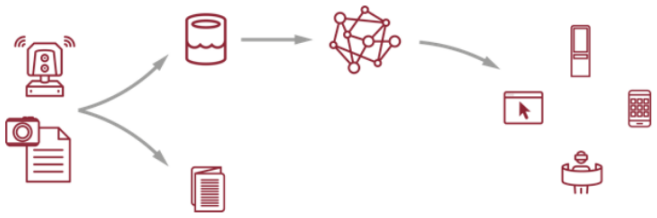
Paper extension proposal: key ideas

- Initial setting: Data Lake of healthcare-related data sources
- Main idea: extend the framework by extracting more fine-grained details from the data lake
  - Retrieve the set of medical examination of a patient across different hospitals
  - Find patients having a similar medical treatment history
- Such details can be arranged as a KG
- Such KG provides an additional view of the Data Lake that can coexist with the blueprint-based view

High-level overview of the methodology

1. Finding record pairs in the Data Lake that refers to the same patient:
   a. Temporal record linkage
2. Data cleaning and data fusion
3. Knowledge graph building
4. Knowledge graph update (when the content of the Data Lake changes)

Alberto Morvillo



Research Proposal #1 - Digitalization of a place of interest

Target: Tourists, visitors and researchers of all ages and gender.
Setting: Any physical place that represents a place of interest (e.g.: monuments, small villages, museums) and does not already allow a digital fruition of his content.
Goal: Facilitate a place fruition in order to

- Increase tourism by providing easy-to-access content, which will also increase the accessibility of the place (e.g., people with disabilities, people who cannot reach the physical place, etc.)
- Facilitate the research by acquiring and managing detailed data of the place, which the researcher can explore using search engines or data navigation techniques.
- Preserve the physical place, by applying analysis and preservation techniques based on the data collected for digitization.

The proposal is to first use data acquisition technologies, like digital 3D scanners (LIDAR) for artifacts, monuments and place, text recognition (OCR) for manuscripts and manual acquisition for other contents.

The collected data is then inserted in a Data Lake and, with the use of knowledge graphs, they will be organized in a concept-oriented way in order to facilitate searches and navigation.
This approach will require a standardized metadata and data parsing.

Following a user-oriented approach, the data could be presented using different media and interfaces specifically designed for a designed target that could beBrochures, multimedia kiosks, website, mobile apps, VR devices or Braille stands.

Alberto Morvillo

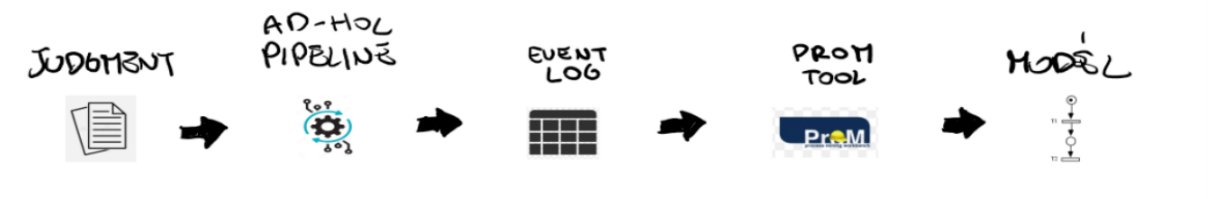
Research Proposal #2 - Tracking of an artifact transaction using blockchains

Target: Entities or companies that must manage artifact transitions.
Goal: Allow to track artifact transactions easily and securely.

Blockchains are a decentralized approach to store information and are widely used in financial and business fields to avoid the use of a central Certification Authority to validate the transactions. In respect to a centralized approach, which a central entity manages all the transactions and stores all the information in single place; the blockchains uses a peer-to-peer approaches and each party involved in a transaction have a copy of the data, while the validation of them is demanded to other parties.

As logistic and supply chains can take advantage of a distributed approach to store the product history and in the food industry there is already some use cases, the proposal is to apply the same methodology to physical artifact, like archaeological or fine arts, to track their transactions or logistic.

Francesca De Luzi



Research Proposal #1

TARGET: Judge and other persons in the domain of justice (e.g., administrative and technical employee)

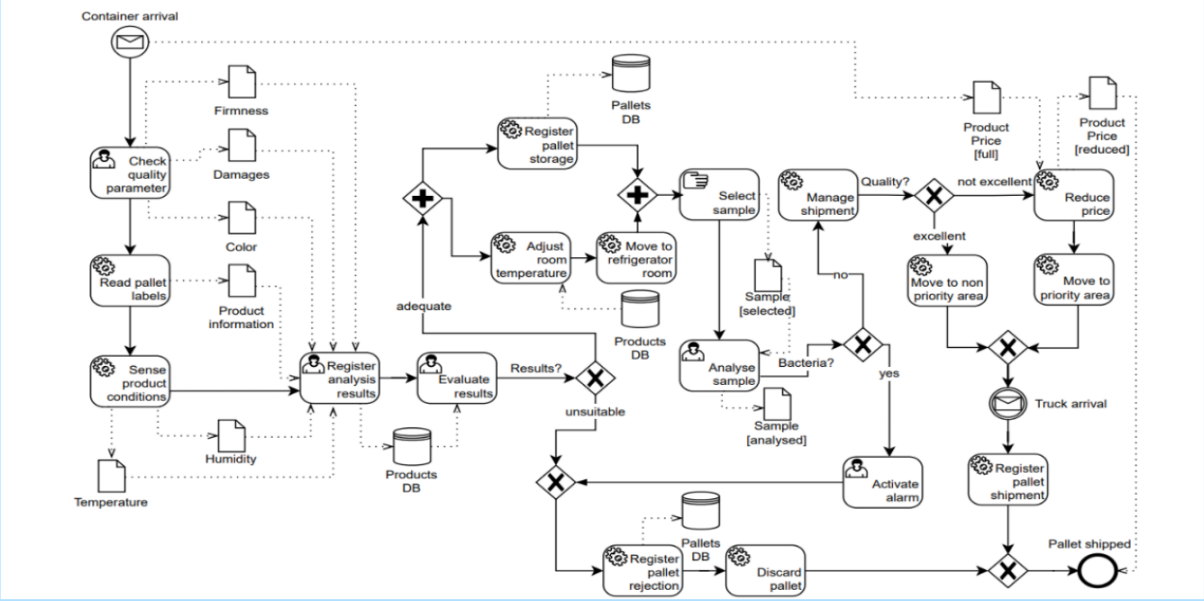
SETTING: E-justice

PROBLEM: Management of the backlog in justice processes
oFor example, the judge often fails to read all the papers carefully, or it is often necessary to differentiate the work immediately

GOAL: combine Digital Twins and process mining in a unified graphical and interactive dashboard to deliver support to the judge to write judicial documents and other tasks such as calendaring through a visual representation of business data and logs

ADVANTAGES: flexible and user-friendly dashboard, generic framework that can be able applied in every business and data context

Francesca De Luzi



Research Proposal #2

TARGET: BP designer – domain expert

SETTING: IoT-aware BPs (e.g., smart manufacturing, logistics, smart health or whatever application domain)

PROBLEM: IoT data quality - due to their limitations in terms of computational power and energy autonomy, they often compromise the quality characteristics with the risk of preventing the correct execution of the entire BP.

GOAL: show how a Digital Twin of data can be used to validate its quality in terms of completeness, accuracy, timeliness, consistency, uniqueness, integrity, compliance

ADVANTAGES: automatically detection of faulty data with the possibility to correct measurement errors

Mirella Sangiovanni

During visiting week in Cyprus

Health & Well-being

Crime, Security & Safety

Nature & AgriFood

My domains as Biologist and future Data Scientist

Talk with
dr. Andreas Christoforou

Sustainability &
Social Entrepreneurship

[6]

JADS

JADS Jheronimus Academy of Data Science
Tilburg University

Cyprus University of Technology

Defining the future steps:

1. Exploring the Forensics Data of NFI
2 .Make more clear the Reseach Problems
3. Starting with simple algorithms to extract informations
4. Look forward to define an Architecture and possibilities to how procide in this project
5. Looking to find correlations with FCM

Discussion of Fuzzy Cognitive Maps (FCMs) model

Mirella Sangiovanni

During visiting week in Cyprus

Health & Well-being

Crime, Security & Safety

Nature & AgriFood

Talk with
Prof. George Botsaris

My domains as Biologist and future Data Scientist

Sustainability &
Social Entrepreneurship

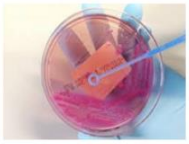
[12]

JADS

JADS Jheronimus Academy of Data Science

TILBURG UNIVERSITY

Cyprus University of Technology



Problems: contaminations and diseases of cow (Mastitis) -> effects on people

1. some ideas came up to write a proposal to support and alert the farms in time
2. Evaluate monitoring systems to get results faster and predict "types of contamination"
3. Data from labs (input)

Department of Agricultural Sciences, Biotechnology and Food Science

Stefan Driessen

Proposal 1: Extending Metadata Blueprints for Data Meshes

Stefan Driessen[1] Michalis Pingos[2]
[1] *Jheronimus Academy of Data Science, Tilburg University, 's-Hertogenbosch, the Netherlands.*
E-mail: s.w.driessen@jads.nl
[2] *SEiIS Research Lab, Cyprus University of Technology, Limassol, Cyprus.*
E-mail: mfpingos@gmail.com

This document briefly introduces the first of two possible research collaborations based on the research areas of Stefan and Michalis. The ideas discussed herein are intended to serve as high-level early-stage talking points that can be communicated between interested parties.

Short Overview

The proposal focuses on extending the current blueprint for a metadata ontology based on the 5 V's for big data. The blueprints could include new entities that are explicitly relevant for data products on data meshes or data markets.

1 Background and Problems Addressed

Data Lakes were proposed in the 2010's as architectures suitable for dealing with "Big Data" and for assisting organisations towards being *data-driven*. Current literature shows a trend towards more decentral data exchange architectures such as data markets and data meshes [1]. Data Meshes, in particular, attempt to address some of the shortcomings of monolithic data platforms such as data lakes [2, 3]. Creating proper data products puts requirements on metadata templates that are not yet addressed by existing approaches.

2 Proposed Work and Links to Undergoing Research

Currently, Michalis has proposed some blueprint for a metadata ontology based on the 5 V's that drive data lake development [4]. Since data meshes are also designed for handling big data, these metadata aspects should still be relevant. However, as indicated by Stefan's undergoing research collaborations with companies (e.g., Automotive and Telecom), data mesh imposes new requirements and restrictions on the metadata of their data products. One potentially interesting approach is therefore to extended Michalis' templates to include new metadata that is required for data products such as *data product owner*, *usage policy*, *Domain*, etc. This ties into Stefan's current work of setting up a standardised metadata template for data products.

Stefan Driessen

Proposal 2: Discovering Data Products and Domains

Stefan Driessen[1] Michalis Pingos[2]
[1] *Jheronimus Academy of Data Science, Tilburg University, 's-Hertogenbosch, the Netherlands.*
E-mail: s.w.driessen@jads.nl
[2] *SEiIS Research Lab, Cyprus University of Technology, Limassol, Cyprus.*
E-mail: mfpingos@gmail.com

This document briefly introduces the second of two possible research collaborations based on the research areas of Stefan and Michalis. The ideas discussed herein are intended to serve as high-level early-stage talking points that can be communicated between interested parties. Both Michalis and Stefan currently believe this to be the more interesting approach.

Short Overview

The proposal focuses on addressing one of the largest challenges in transitioning towards a data mesh architecture: how to create domains and prioritise data products.

1 Background and Problems Addressed

Many (large) companies and organisations have initiatives to transition from their existing, monolithic, data platforms towards more decentral data exchanges, such as internal data markets or data meshes [1, 2]. One of the main challenges for this transition, in addition to the novelty of the concepts, is how to divide up the data landscape into domains and identifying data assets that should be turned into data products [3]. These organisational challenges are in fact often perceived to be more daunting than the technical challenges associated with data mesh design [4]. Methods for creating domains can (presumably) be found in domain-driven design literature? Methods for prioritising data products are supposedly related to data product valuation techniques, which are currently lacking.

2 Proposed Work and Links to Undergoing Research

Based on Michalis' existing metadata framework it could be possible to establish a hierarchical structure within the domain assets. On the one hand primarily static metadata attributes such as origin and type of data can be used to establish domain boundaries that are neither too large nor too small. On the other hand, dynamic metadata on usage can be used to help organisations and companies prioritise which data assets to turn into data products first.

DESTINI

Smart Data ProcESsing and SysTems of Deep INsIght

Conlusion

TWINNING PROJECT - HORIZON2020

The mobility program of DESTINI executed succesfully, and resulted in interesting research outcomes, such as exploration of new research fields, establishment of future collaboration between partners and ESRs.

Contact us

destini2020.eu

facebook.com/destini2020eu

twitter.com/destini2020eu

5. Site Visit to Rome/Amsterdam Agenda

MEETING AGENDA ROME

19/09/2022

Sapienza University of Rome

TIME	DESCRIPTION	FACILITATOR
09:00 - 10:00	Evaluation of the mobility program	Andreas Andreou
10:00 - 11:00	Survey Papers, Joint degree	Francesco Leotta
11:00 - 12:00	Deliverables	Andreas Andreou
12:00 - 13:00	break	---
13:00 - 14:00	Future Collaboration	Massimo Mecella
14:00 - 17:00	Brainstorming	Stelios Mappouras

Attendees

CUT	SAPIENZA
• Andreas Andreou • Panayiotis Christodoulou • Michalis Pingos • Spyros Loizou • Stelios Mappouras	• Massimo Mecella • Francesco Leotta • Silvestro Veneruso • Dario Benvenuti • Francesca de Luzi

MEETING AGENDA ROME

20/09/2022

Sapienza University of Rome

TIME	DESCRIPTION	FACILITATOR
09:00 - 12:00	ESR research collaboration	Francesco Leotta
12:00 - 14:00	Ideas, Research Challenges, Big Data Methodologies	Donatella Firmani
14:00 - 15:00	break	---
15:00 - 17:00	Brainstorming	Stelios Mappouras

Attendees

CUT	SAPIENZA
• Andreas Andreou • Panayiotis Christodoulou • Michalis Pingos • Spyros Loizou • Stelios Mappouras	• Francesco Leotta • Donatella Firmani • Dario Benvenuti • Silvestro Veneruso

MEETING AGENDA ROME

21/09/2022

Sapienza University of Rome

TIME	DESCRIPTION	FACILITATOR
09:00 - 10:00	BPM Methodologies	Andrea Marella
10:00 - 11:00	Blockchain and BPM	Claudio di Ciccio
11:00 - 13:00	Future Proposals	Andreas Andreou
13:00 - 14:00	break	---
14:00 - 16:00	Brainstorming	Francesco Leotta

Attendees

CUT	SAPIENZA
• Andreas Andreou • Michalis Pingos (first 2 slots) • Spyros Loizou (first 2 slots) • Stelios Mappouras (first 2 slots) • Panayiotis Christodoulou (first 2 slots)	• Francesco Leotta • Andrea Marella • Claudio di Ciccio • Dario Benvenuti

MEETING AGENDA NETHERLANDS

22/09/2022

Amsterdam

TIME	DESCRIPTION	FACILITATOR
09:00 - 10:30	Meeting with ASML (Hotel Levell)	Ekhtiar Syed
17:00 - 19:00	DESTINI coordination meeting (Courtyard by Marriott hotel)	Willem-Jan van den Heuvel

Attendees

CUT	JADS	ASML
• Andreas Christoforou • Stelios Mappouras • Andreas Andreou (Afternoon slot)	• Willem-Jan van den Heuvel • Damian Tamburri	• Ekhtiar Syed

MEETING AGENDA NETHERLANDS

23/09/2022

Jheronimus Academy of Data Science - Den Bosch

TIME	DESCRIPTION	FACILITATOR
10:30 - 11:00	Tour in JADS	Stefan Driessen
11:00 - 12:00	Quantile startup company	Bernard Wezeman
12:00 - 13:00	JADS SME datalab	Matthijs Bookelmann
13:00 - 15:00	ESRs, Post-docs discussion	Andreas Christoforou
15:00 - 16:00	Future research & sustainability	Andreas Andreou

Attendees

CUT	JADS
• Andreas Andreou • Andreas Christoforou • Stelios Mappouras	• Stefan Driessen • Bernard Wezeman • Matthijs Bookelmann • Willem-Jan van den Heuvel • Damian Tamburri

MEETING AGENDA NETHERLANDS

24/09/2022

Amsterdam (Hotel Mariott courtyard)

TIME	DESCRIPTION	FACILITATOR
10:00 - 12:00	Meeting with Blockchain 2050 BV	Peter Tjia
12:00 - 14:00	Meeting with ForceApp BV	Dimitrios Mantelis

Attendees

CUT	FORCEAPP
• Andreas Andreou	• Peter Tjia • Dimitrios Mantelis

6. Closing Meeting

6.1 Agenda

DESTINI

CLOSING MEETING AGENDA

29/09/2022

Cyprus University of Technology

TIME	DESCRIPTION	FACILITATOR
09:00 - 09:45	Introduction	Andreas Andreou
09:45 - 10:15	Content fruition in Digital Humanities	Alberto Morvillo
10:15 - 10:45	Applying Process Mining to Human Daily Activities	Silvestro Veneruso
10:45 - 11:15	Data Lakes/Swamps and Process Mining	Dario Benvenuti
11:15 - 11:45	Digital transformation in manufacturing: towards the Industry 4.0 model	Flavia Monti
11:45 - 12:15	break	---

DESTINI
CLOSING MEETING AGENDA

29/09/2022
Cyprus University of Technology

TIME	DESCRIPTION	FACILITATOR
12:15 - 12:45	From Record Linkage to Knowledge Graphs: an application in the healthcare domain	Jerin Mathew
12:45 - 13:15	Business Process Management in a Hyper-Connected IoT World	Francesca De Luzi
13:15 - 13:45	DNA identification and classification, Forensic DNA analysis	Mirella Sangiovanni
13:45 - 14:15	Discovering Data Products and Domains	Stefan Driessen
14:15 - 14:45	Brainstorming	---
14:45 - 15:15	Closing Remarks	Andreas Andreou

DESTINI
CLOSING MEETING AGENDA

30/09/2022

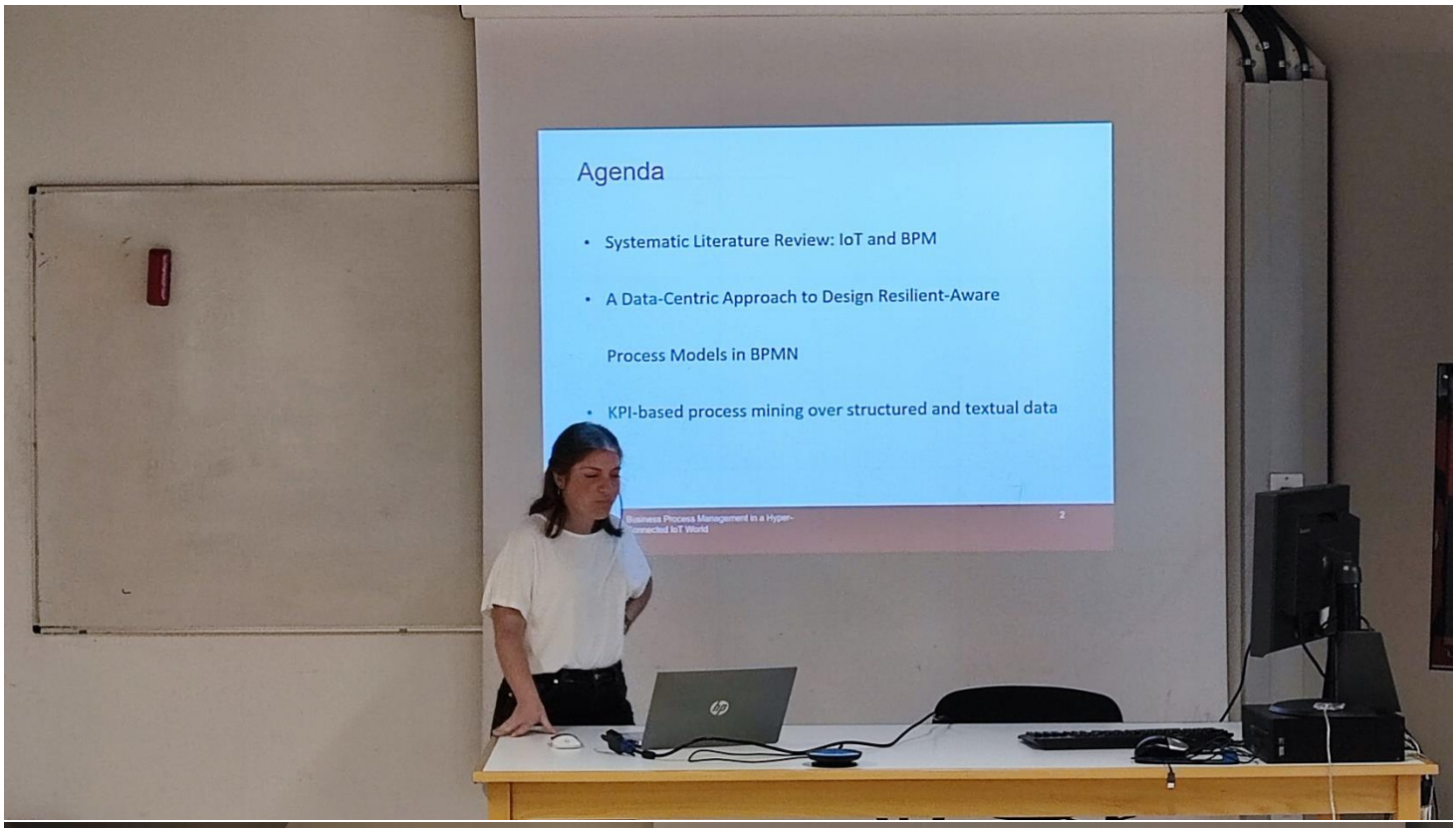
Cyprus University of Technology

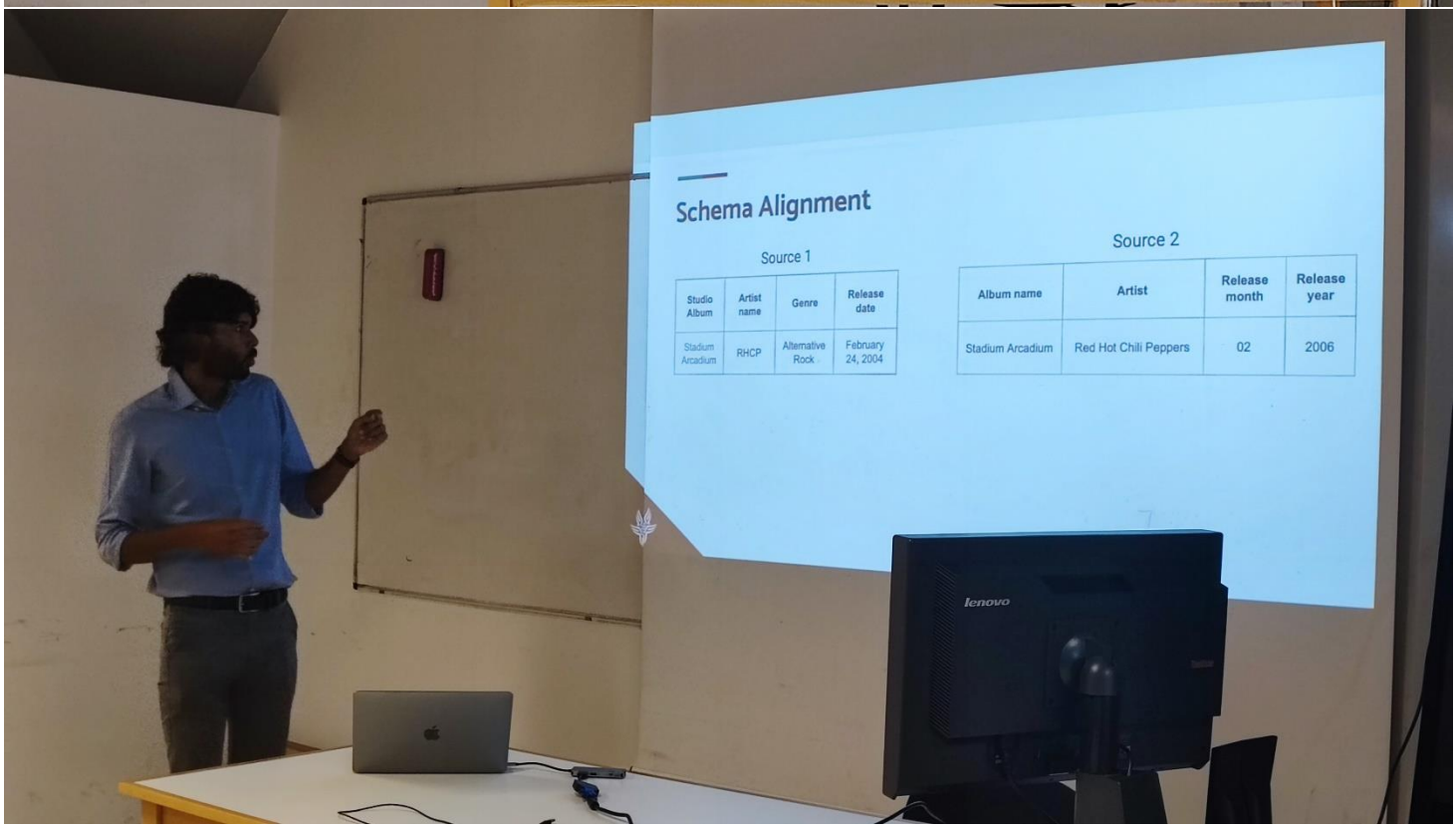
TIME	DESCRIPTION	FACILITATOR
09:00 - 11:00	Project Management Issues	Andreas Andreou
11:00 - 12:00	Financials	Andreas Andreou
12:00 - 13:00	Timesheets	Stelios Mappouras
13:00 - 14:00	Deliverables	Stelios Mappouras
14:00 - 15:00	Effort & Resources	Andreas Andreou

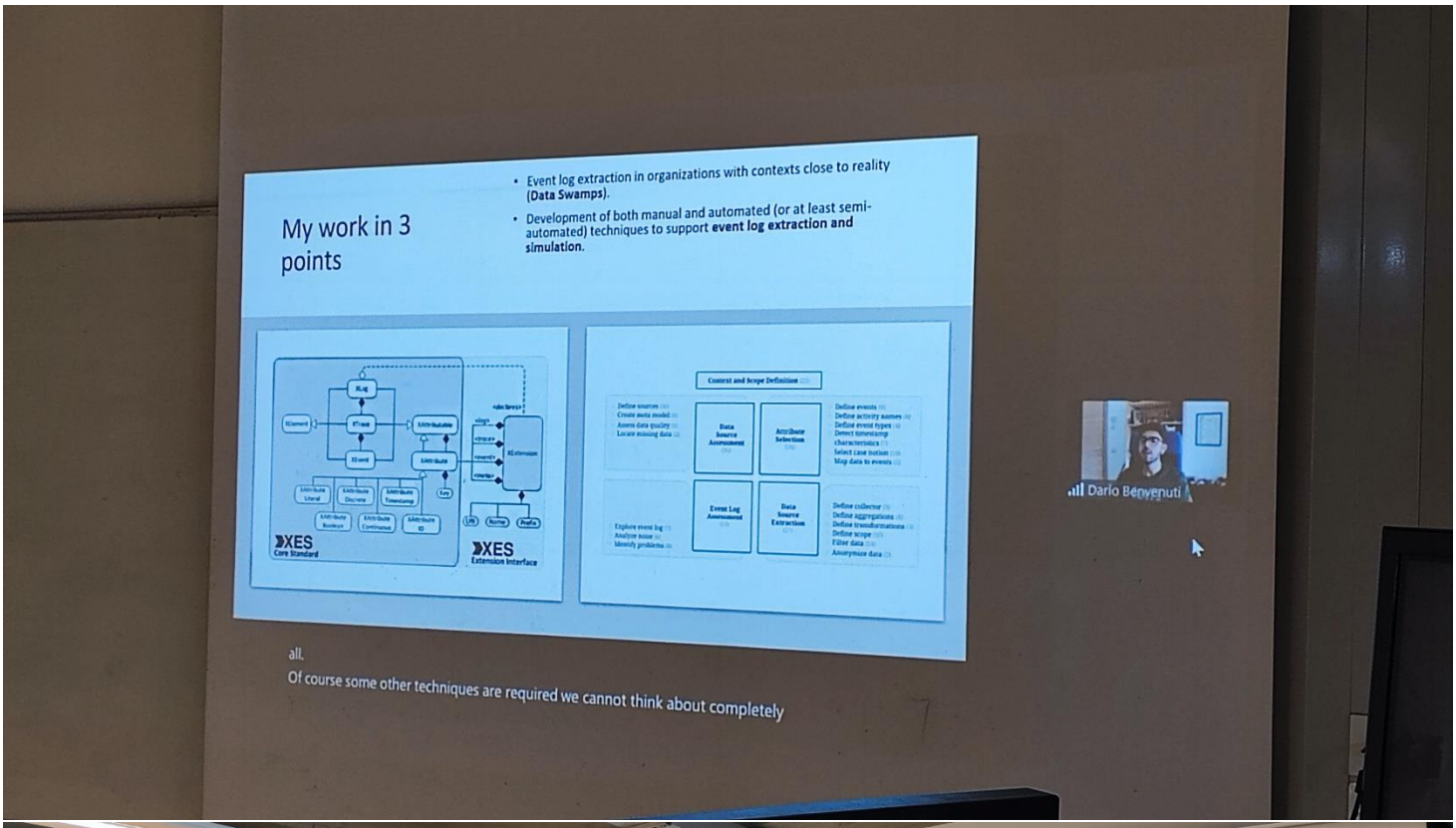
6.2 Closing Meeting Photos

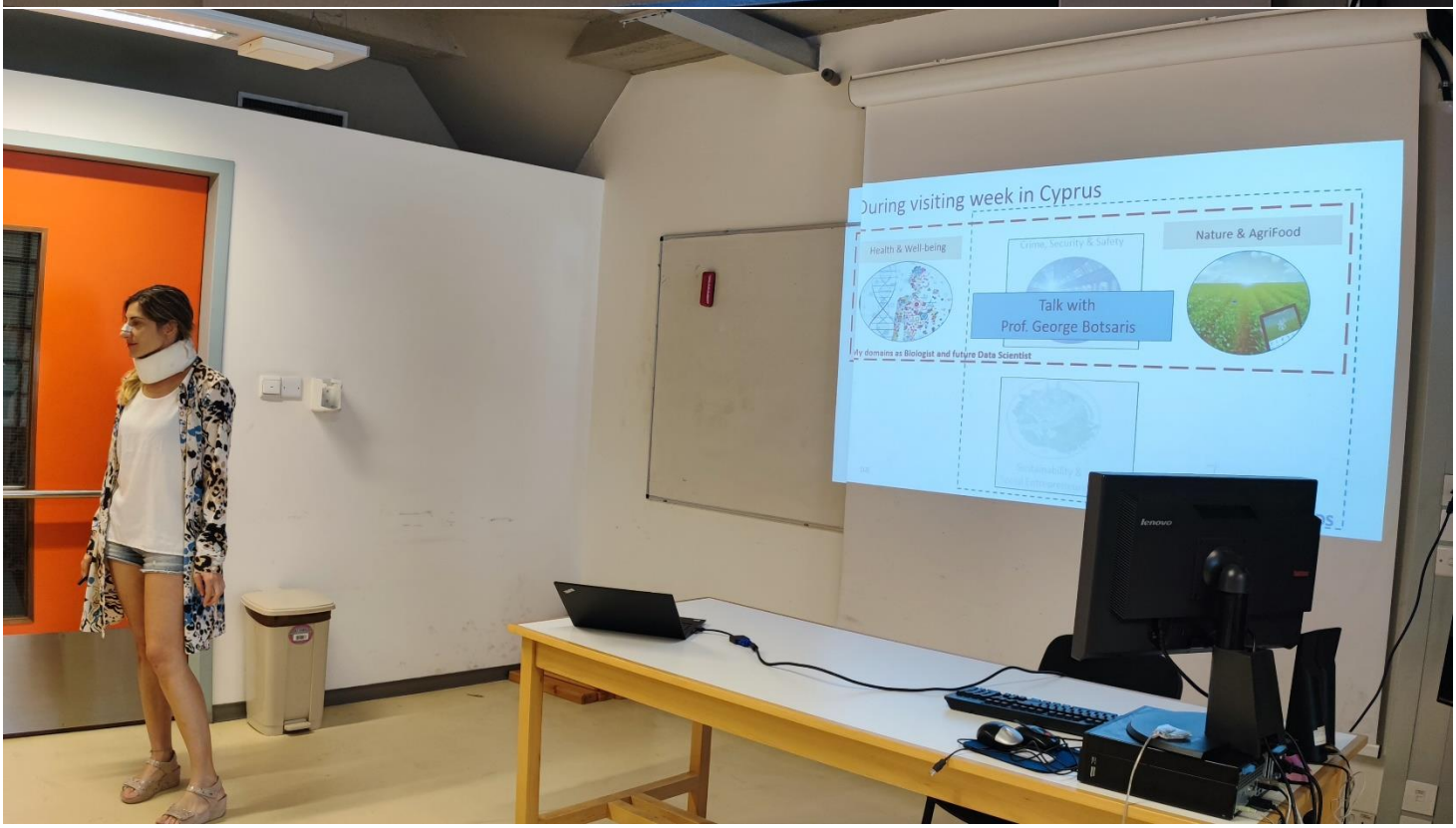
Digital Humanities: main challenges
• Data sources
Data sources may not be mean for a digital platform
(i.e., an historical book)
• Cross-references and implied information
Contents may be referred each other and/or implies
implicit concepts
• Data retrieval and visualization
Researches may require to deal with digital content
in a similar way they does with non-digital ones

Quality assessment (of the production)
Detection of defects during the manufacturing process
Ensure quality assurance to the manufactured products


Agenda
• Systematic Literature Review: IoT and BPM
• A Data-Centric Approach to Design Resilient-Aware Process Models in BPMN
• KPI-based process mining over structured and textual data
Business Process Management in a Hyper-Connected IoT World
2


Schema Alignment
Source 1
Studio Album
Artist name
Genre
Release date
Stadium Arcadium
RHCP
Alternative Rock
February 24, 2004
Source 2
Album name
Artist
Release month
Release year
Stadium Arcadium
Red Hot Chili Peppers
02
2006
lenovo


My work in 3 points
• Event log extraction in organizations with contexts close to reality (Data Swamps).
• Development of both manual and automated (or at least semi-automated) techniques to support event log extraction and simulation.
Context and Scope Definition
Data Source Assessment
Attribute Selection
Event Log Assessment
Data Source Extraction
XES Core Standard
XES Extension Interface
Dario Benvenuti
all.
Of course some other techniques are required we cannot think about completely

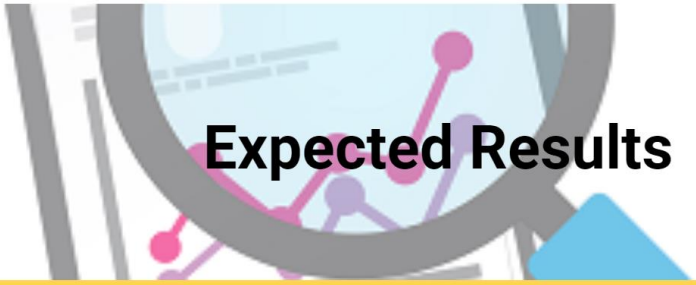

During visiting week in Cyprus
Health & Well-being
Crime, Security & Safety
Nature & AgriFood
Talk with
Prof. George Botsaris
My domains as Biologist and future Data Scientist
lenovo

7. General

7.1 Molise

SDDS Summit - Termoli, UniMol

Home Schedule Speakers Venue Contacts Registration



Core Mission. The ideal target missions for such a network aim at the **social good**; sample objectives under such missions would be: (1a) to improve the **quality of life** in cities, (1b) to produce and distribute **energy** more efficiently, (1c) to solve fundamentals of **(e-)health**, or (1d) address other **environmental services** (e.g., mobility and transport) **and challenges**.

Under the premises of DESTINI project—an EU H2020-funded initiative coming to a close in late October 2022—has been laying the foundations for the aforementioned network and is now looking to promote: (2a) a **brainstorming session** to find and crystallize the next-in-line priorities for the S4 network; (2b) lay the **foundations** for the definition of a **DESTINI follow-up project**, in pursuit of objectives [1a-1d].

The **overall goal** of the summit will be to garner a **baselines and tools/techniques** understanding to be poured in the **next 3-5 years around smart data and services** (as amalgamated in EU-level platforms such as Gaia-X) research featuring:

(a) the combination of EU project results (e.g., from the NFI and CSA's such as DESTINI) along with emerging technologies such as multi-echelon AI, Blockchain-oriented designs and more;

(b) sustainable community-building around the Horizon Europe scientific assets;

(c) cross-fertilization between attendees from industry and all points at (b).

The end-goal will be the bootstrap and continuation of a SDDS community which shall span the original borders all along the duration of the Horizon Europe framework programme.

7.2 Establishment of partnership with SoftOne by signing MoU

Cyprus university partners up with multinational software company

By Kyriacos Nicolaou July 13, 2022 2 Comments 1151

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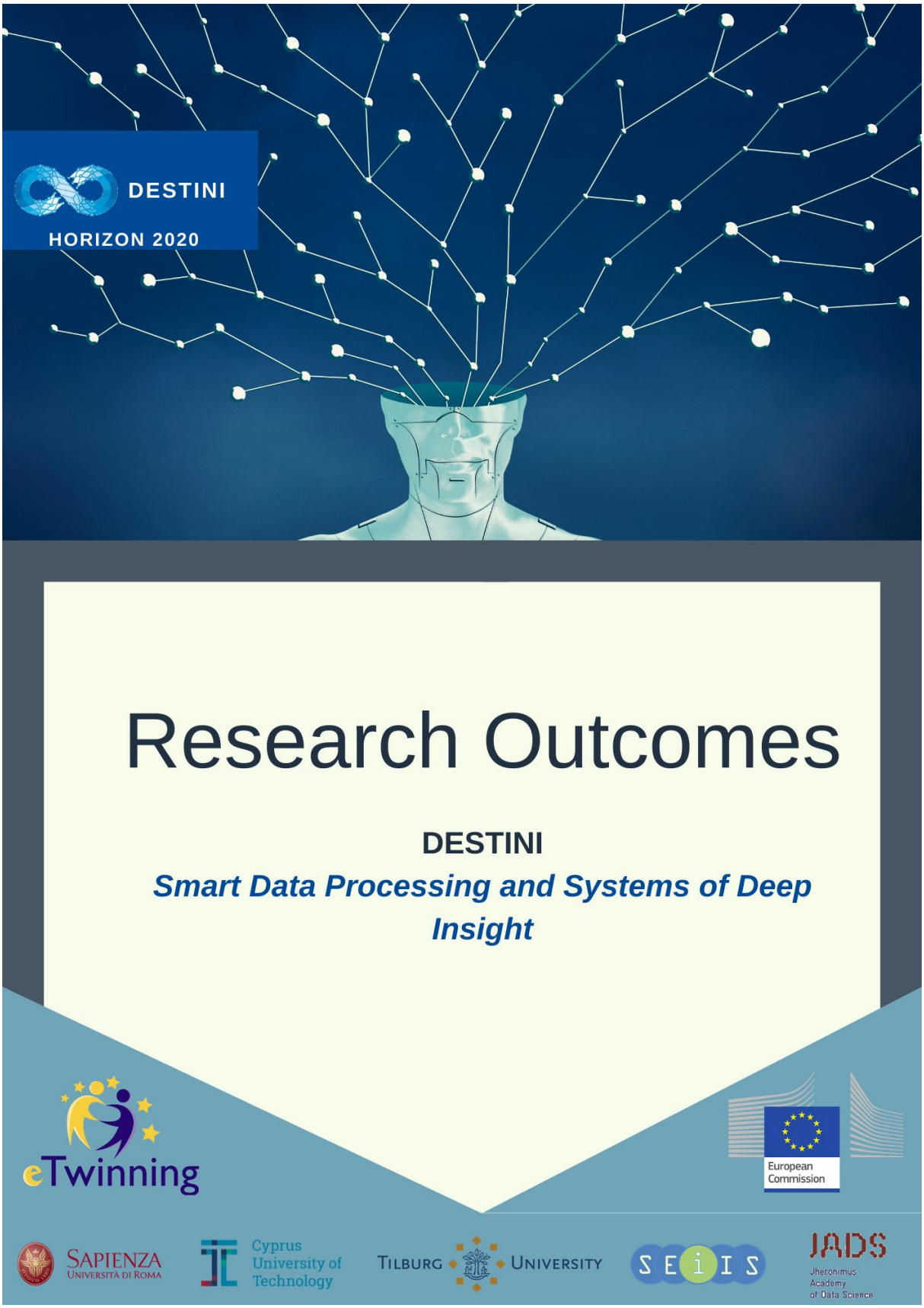
Tepak rector Panayiotis Zafiris and SoftOne CEO Panos Martinis sign the memorandum

The Cyprus University of Technology (Tepak) earlier this week entered into a partnership agreement with software company SoftOne Cyprus.

7.3 Research Outcomes of DESTINI



DESTINI

HORIZON 2020

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BPM in Healthcare

Business process mining is a must-have set of techniques for top management to better organize and automate operational processes. Process management enables business owners to turn processes into visual flows and flows into automations. This is also the way to keep operations aligned with goals and strategies, track performance, and detect gaps or process bottlenecks to fix. This thesis aims to apply BPM models, specifically process discovery, conformance checking and process optimization, to Healthcare data. The thesis utilizes data from health services in Cyprus (e.g., Ambulance).

BPM on Data Lakes

Process mining is a family of techniques combining data science and process management to support the analysis of operational processes based on event logs. Process mining aims to turn event data into insights and actions. Process mining techniques use event data to show what people, machines, and organizations are really doing. Process mining provides novel insights that can be used to identify the execution path taken by operational processes and address their performance and compliance problems. This thesis's goal is to apply Business Process Mining (BPM) by processing not only event logs (structured data) but also semi-structured and unstructured data stored in their raw/natural format in Data Lakes system repositories. The thesis experimented with data that are expressed as RDBMS tuples, images, videos, tweets etc. The data are first transformed into a standardized format (e.g. metadata) and then BPM techniques are applied to this format.

Blockchain - Data Lakes Blueprint - Metaverse – NFTs

The Metaverse is an online, three-dimensional universe that combines multiple virtual spaces. It can be compared to a future version of the internet. With Metaverse, users can collaborate, meet, play games, and socialize in these 3D spaces. NFTs are digital items that can be bought and sold using this blockchain technology. Users can have complete control over their digital assets in the Metaverse, thanks to NFTs. Blockchain technology provides immutable confirmation of ownership that underpins these virtual worlds. This thesis aims to use Blockchain and NFTs' technologies to make Data Lakes Blueprint (an existing work) available to the Metaverse.

Methodology for assessing the accuracy of logs in Process Mining

This thesis investigates the challenge of the accuracy of logs used in the area of Process Ming to perform process discovery. Data accuracy is paramount for producing a reliable process model and then experimenting with it to improve tasks and steps within the discovered process. If accuracy is low, then any decision made to modify and optimize a process or any information retrieved from the analysis of the data projects on this model is biased and flawed. Therefore, the thesis surveys the literature to find appropriate metrics and techniques that could enable the assessment of the accuracy level of logs and proposes possible ways to improve it.

Real-time processing and visualization of heterogeneous data streams

The purpose of this thesis is a methodological approach to gather data streams and discover data values. All this information is taken and represented with Digital Twin. Digital Twin monitors the structure of streaming data to interact with gathering data to customize and finally visualizes the data with graphical techniques.

Graphical techniques to show how people and tasks are integrated into reality

The purpose of this thesis is to collect all the information of task flow that people execute a business process from event data and process logs. This is achived with the Digital Twin to define and collect the flow of tasks and metrics (total time of execution, number of steps, time for each step, etc). Finally, all this information is shown in a graphical dashboard that studies business flows.

Interactive Dashboard for business flow changes using Blockchain

This thesis aims to interact with the business flow to reduce time, cost and human resources. This interaction must record all the flow and parameter changes in Blockchain. Moreover, the Blockchain gives the resources and analytical changes to users. When a business flow succeeds in reducing cost, for example, updating all the users using Blockchain technology.

3D Training platform

This thesis aims to create a 3D training platform to train and increase employees' skills for resolving real problems in production line machines. The 3D environment is being designed in the virtual world (Metaverse) with if-scenarios and interactions. All steps and processes of training are stored on Blockchain to certify the training.

Business Process Mining with Visual Querying

This master thesis uses Digital Twin to mainly use a graphical technique to investigate the relations between the data. Users can use standard steps to obtain the desired result without programming skills. This thesis converts process mining into an interactive procedure that utilizes Digital Twins to visualize data of historical data and processes that were retrieved from logs or data warehouses.

Metaverse in Healthcare

This thesis aims to create a virtual environment that visualizes patients' files. Users can read and interact with humans in the virtual environment to see the patient's problem and suggest treatment. The idea of this interaction patient is to propose a treatment and see the progress of treatment in real-time.

Survey on Industry4.0 - Smart Data Processing and Systems of Deep Insight Current Research and Future Challenges

This survey is conducted in the context of a DESTINI project which aims to identify and quote the most significant research findings, challenges and open problems on Smart Data Processing and Systems of Deep Insight approaches in the area of Industry 4.0 and Smart manufacturing that are reported in the relevant literature. The survey is organized as follows: First, the survey presents the research questions that motivate this study and describes the methodology followed to identify relevant studies published in various venues. Secondly, it outlines the most important aspects of these studies organized in specific scientific areas accompanied by their literature review, introducing the problem dealt with, the methodology followed, and the results produced. The scientific areas included are: Infrastructures, frameworks and technologies supporting SDP (Data Lakes, Data Meshes, CPS) and Tools and Techniques supporting SDI (Predictive Maintenance and predictive analytics, BPM, Blockchain, Optimization, Decision Support and Prediction) in the area of Smart Manufacturing. Finally, the survey summarizes the research challenges and open problems identified in the corresponding studies reviewed.

Survey on Graphical methods and models that contribute to the area of Smart Data to identify the most significant challenges and open problems

The new scientific trends nowadays worldwide are the Internet of things (IoT), big data, cloud computing, artificial intelligence (AI) and other new generation information technologies. All these generate a large volume of data that may be structured, semi-structured and unstructured. Big data analysis models and algorithms can run to organize, analyze and mine these raw data to obtain valuable knowledge. These data, when visualized you, can provide different information with the use of some filters. Data visualization represents data in some systematic form, including attributes and variables for the unit of information. Visualization data allows users and businesses to mash data sources to create custom analytical views.

In manufacturing, we see that big data involve a large volume of structured, semi-structured and unstructured data generated from the product lifecycle. Internet of Things (IoT) devices collect these manufacturing data in real time and sometimes automatically. Manufacturers aim to find a way to increase efficiency, manage the storage of all these data and visualize them to improve and increase productivity and quality of manufacturing. Nowadays, industries are being transformed with the rise of IoT, autonomous robots, cyber-physical systems, cloud computing and cognitive computing. This transformation is called Industry 4.0 or Smart Industry. Industry 4.0 aims to construct an open, smart manufacturing platform for industrial information applications based on various technologies.

KnowGo: An Adaptive Learning-Based Multi-model Framework for Dynamic Automotive Risk Assessment (https://doi.org/10.1007/978-3-031-11510-3_18)

In autonomous driving systems, the level of monitoring and control expected from the vehicle and the driver change in accordance with the level of automation, creating a dynamic risk environment where risks change according to the level of automation. Moreover, the input data and their essential features for a given risk model can also be inconsistent, heterogeneous, and volatile. Therefore, risk assessment systems must adapt to changes in the automation level and input data content to ensure that both the risk criteria and weighting reflect the actual system state, which can change at any time. This paper introduces KnowGo, a learning-based dynamic risk assessment framework that provides a risk prediction architecture that can be dynamically reconfigured in terms of risk criterion, risk model selection, and weighting in response to dynamic changes in the operational environment. We validated the KnowGo framework with five types of risk scoring models implemented using data-driven and rule-based methods.

Exploring Forensic DNA analysis and profiling with intelligent techniques.

This research is tightly connected with the study of relevant and critical aspects like Smart Healthcare Intelligence, Crime Security & Safety, Nature & AgriFood, and Sustainability. These domains align with the actual objectives and issues to improve the quality of life and reduce manual and time-consuming approaches.

So far, in the context of Forensics investigations, new approaches and implementations to support traditional manual methods in identifying genetic profiles have been explored, such as convolutional neural networks to improve electropherogram classification performance. The results interpretation appears to be a highly complex problem due to abnormalities in the laboratory steps. This obstacle inevitably leads to possible wrong identification of matching between DNA profiles and consequently mistakes about the people involved in the crime scene. These problems highlight the challenge that arises since more of the applied approaches fall short of performing on an acceptable level. An investigation of applying more techniques coming from the computational intelligence area will be conducted, followed by the introduction of the relevant results.

Usage of FCM for evaluating a Maturity Model

Industry 4.0 has introduced many technologies requiring absolute knowledge to be implemented correctly. Because of the multitude of solutions and techniques, it is not easy for a company to schedule and plan the roadmap and the investments required to shift towards Industry 4.0. Moreover, it is not straightforward for a company to understand its readiness as an Industry 4.0 player. The presence of a maturity model to assess the maturity and readiness of a company as an Industry 4.0 actor, according to the complexity and the type of software and hardware installed and their usage, can bring significant advantages. Companies can use it to evaluate and analyze their strengths and weaknesses, but, more importantly, they can use it to define a roadmap of investments to reach a higher "maturity level." This work aims to provide a maturity model based on Multi-Layer Fuzzy Cognitive Map approach.

8. Conclusions

This deliverable presented an overview of the dissemination material created for DESTINI during the third year of execution. In this context, dissemination material for each event was produced, specifically for the second school of DESTINI on Smart Data Processing and Systems of Deep Insight, the Satellite event organized in Crete in the context of the SummerSoc to initiate the mobility program, and lastly, the closing meeting of the project. This material covers the period between 01/10/2021 until 30/09/2022. This material was also uploaded on DESTINI's website, as well as disseminated in the social media accounts. Lastly, the material was distributed to the stakeholders of the project, the scientific community, external collaborators and the general public, so as to inform the about the events of the project, and at the same time invite them to join the training activities where applicable.