



Deliverable D3.1

Report on Training Content, Material, Webinars

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1. Introduction

1.1 Purpose

This document includes all the presentations and other content used for training purposes during lectures, talks, seminars, webinars, virtual labs and any other material delivered or used by the experts of ERISS/JADS and UNIROMA during the knowledge creation/transfer to CUT members. The training material is divided into three parts, each targeting a specific Joint Research Area (JRA). The first two JRAs were covered by lectures, seminars and talks given by the leading institutions in the first two years of the project. The third and final JRA was covered through selected presentations that were performed at SummerSOC2022 school/conference held in Crete 4-8 July 2022, (<http://www.summersoc.eu>). Representatives of the partners from Sapienza and JADS who participated in the SummerSOC2022 subsequently transferred the knowledge delivered or acquired during that event to CUT during the DESTINI Satellite Event organized in the context of SummerSOC2022 in combination with brainstorming sessions. More details on the DESTINI Satellite event organized during SummerSOC2022 can be found in deliverable D5.3. Additional training content in the context of the mobility program can be found in deliverable D5.5 which was a follow-up of the satellite event.

Two online schools were performed in the context of DESTINI. Each school is documented in deliverables D3.3 and D3.4, which is the reason why the schools are not a part of this document which includes a report on the training activities performed within DESTINI.

The present deliverable is part of Work-Package 3 (WP3) that describes the actions to support the successful transfer of knowledge, best practises and research skills from the leading institutions to CUT to tackle the research challenges that exist within the JRAs and the key knowledge areas identified in WP2. The actions of WP3 mostly refer to the organisation of summer schools and workshops, the delivery of virtual training sessions, exchanges short-term staff, experts visits and short-term on-site trainings at the leading institutions' labs and infrastructure.

1.2 Definitions, Acronyms, and Abbreviations

CUT: Cyprus University of Technology

JADS: Jheronimus Academy of Data Science

MLops: Machine Learning Operations

BPM: Business Process Mining

IoT: Internet of Things

VQs: Visual Query Systems

1.3 Overview

The rest of the document is structured as follows: Sections 2, 3 and 4 include material from the online trainings in the form of online lectures/talks or webinars/workshops delivered by Sapienza Università di Roma, and JADS, to the Cyprus University of Technology respectively. Finally, section 5 concludes the deliverable.

2. Online Lectures / Webinars

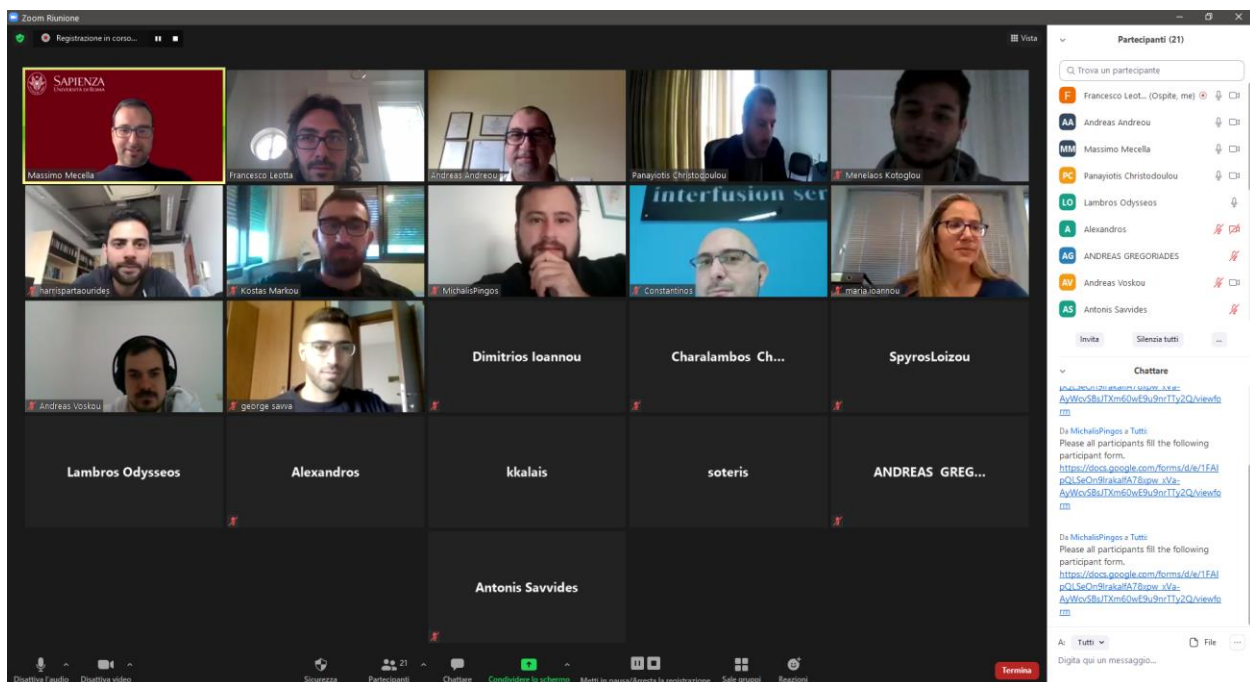
2.1 JRA-1: Developing Smart Integrative Solutions Introductory tutorial on BPM and IoT - 11 November 2022

Session 1: Business Process Management (BPM)

Speakers: Francesco Leotta, Massimo Mecella - Sapienza Università di Roma

Summary: This lecture presented all the aspects of what BPM is. Currently, business processes are the core of most information systems production line, such as of a car manufacturer's procedures or for buying tickets on-line. This requires that organisations specify their flow of work (their business processes) for the orchestration of participants, information and technology for the realisation of products and services. An information system that supports a business process is called Process Management System (or Process Aware Information System).

[Presentation Link](#)



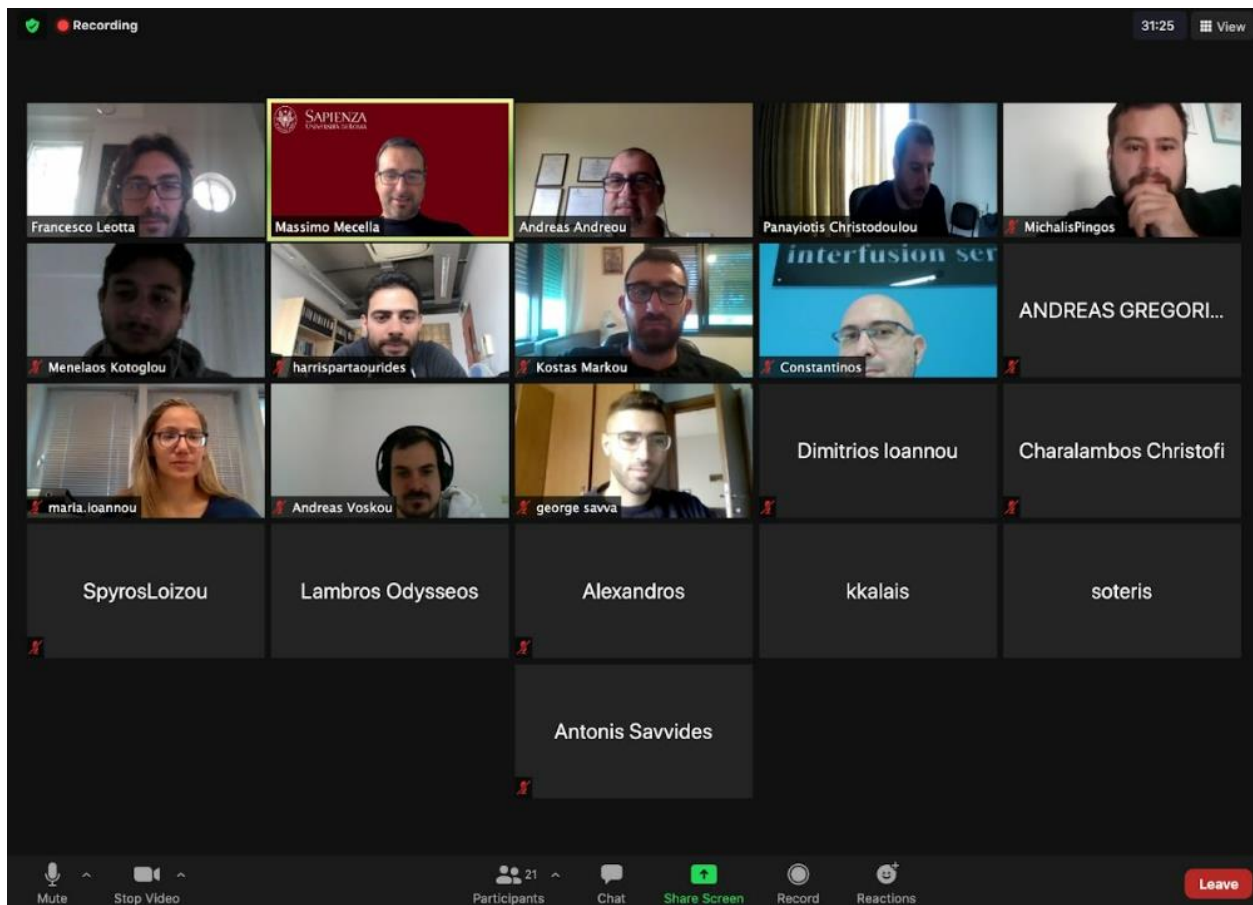
The image shows a Zoom meeting interface with 21 participants. The main grid displays video thumbnails for several participants, including Massimo Mecella (Sapienza University), Francesco Leotta, and others. Some participants have their video off, indicated by a red 'X' icon. The chat window on the right shows a message from MichalisPingos asking participants to fill out a form. The Zoom control bar at the bottom includes options for audio, video, security, and participants.

Session 2: A Short Introduction to IoT

Speakers: Francesco Leotta, Massimo Mecella - Sapienza Università di Roma

Summary: The speakers of this webinar made a short introduction to IoT. IoT drives demand for data brokers and data analytics. Data must be managed, integrated and analysed. IoT drives demand for cloud computing. There are Interoperability issues and Security and privacy concerns as the authors presented. IoT data are very fine-grained, not at the proper granularity level typical of BPM approaches. The Digital Twin abstraction is the proper abstraction layer in which such granularity-mismatch is solved, but it should be devised how to solve the mismatch semi-automatically and not necessarily ad-hoc.

[Presentation Link](#)

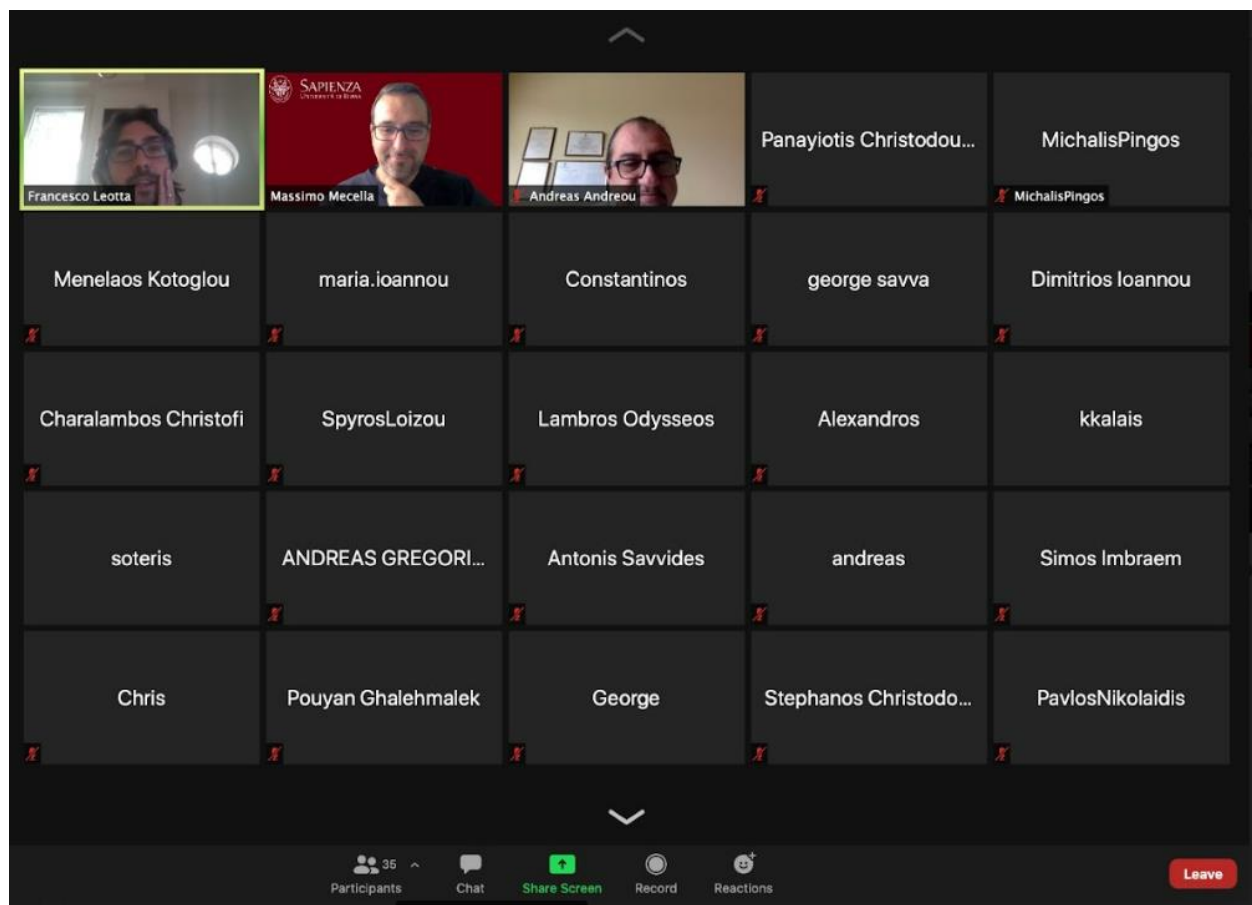


Session 3: SmartPM Adaptation of cyber-physical processes

Speakers: Francesco Leotta, Massimo Mecella - Sapienza Università di Roma

Summary: In this third session of the online lectures the speakers presented the SmartPM Adaptation of cyber-physical processes. Cyber-physical systems are characterised by the presence of heterogeneous devices with different architectures, computing and communication capabilities. In SmartPM, contextual information is represented through a domain theory consisting of discrete objects and variables which may change as effects of task outcomes and exogenous events. SmartPM provides some web tools that allow us to associate some of the data objects defined in the domain theory with the continuous data values collected from the environment.

[Presentation Link](#)

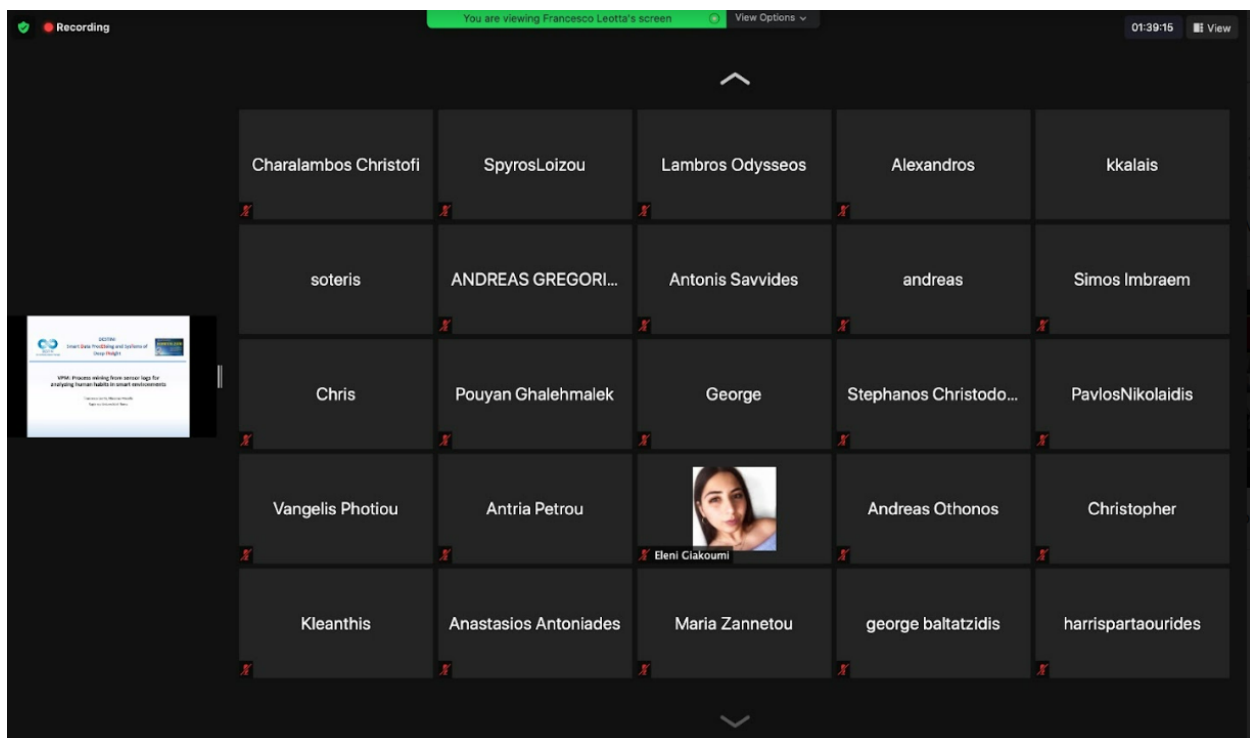


Session 4: VPM: Process mining from sensor logs for analysing human habits in smart environments

Speakers: Francesco Leotta, Massimo Mecella - Sapienza Università di Roma

Summary: This lecture presented process mining based on sensor logs for analysing human habits in smart environments. BPM can be helpful at modelling human habits and activities due to the different application contexts, challenges must be addressed. Few approaches using workflows are already proposed but they do not leverage the strong and recent research in process mining. The Speaker's proposed pipeline for learning and visual analysis based on fuzzy mining Human expert is involved in visually analysing the log and the extracted models as a final goal is analysis of human habits.

[Presentation Link](#)

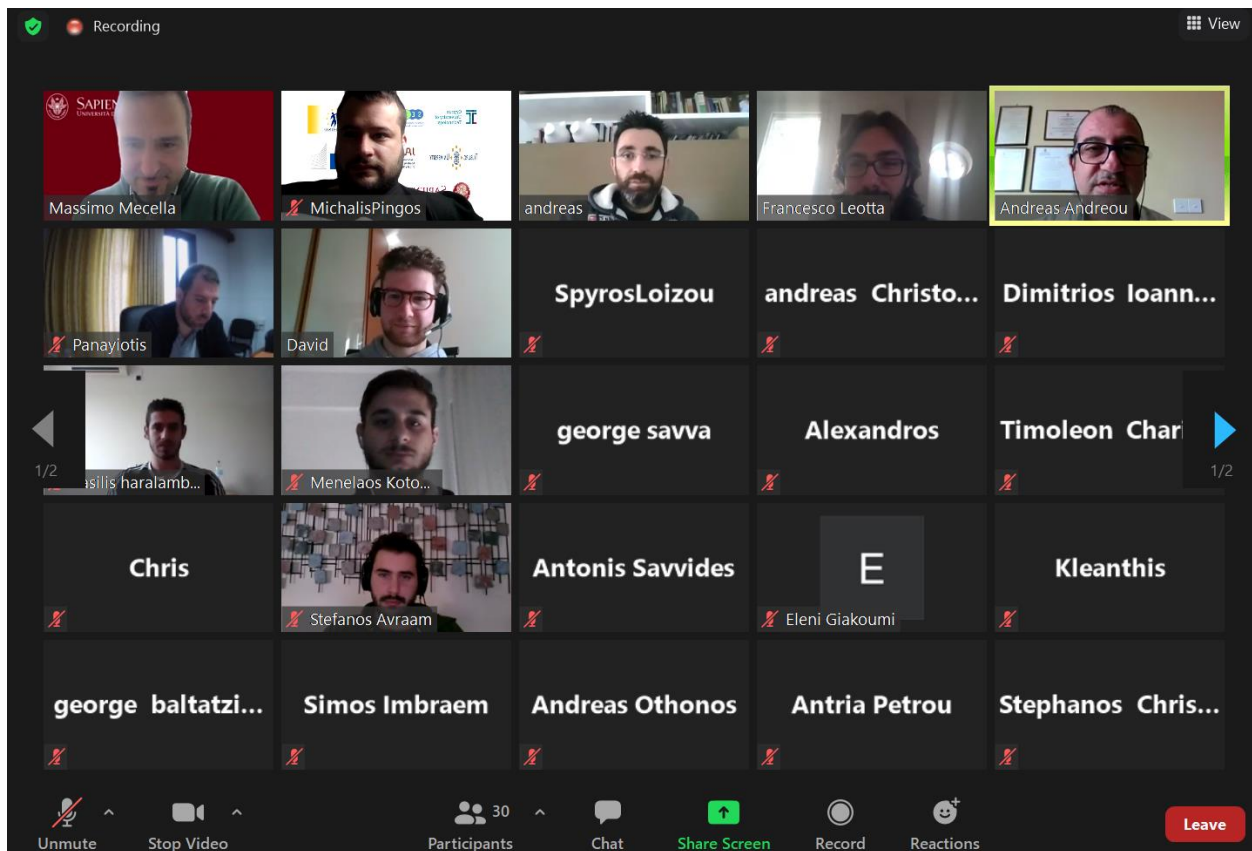


2.2 JRA-1: Developing Smart Integrative Solutions Architectures for Smart Factories - 25 November 2020

Session 1: An Architecture for Smart Factories

Speakers: Francesco Leotta, Massimo Mecella - Sapienza Università di Roma & David Ghedalia Università di Modena e Reggio Emilia

Summary: This lecture presented the evolution of the traditional world of industrial automation continuously evolving technologies for networking, storage and computing. Factories and machines, increasingly complex human-centricity and robot collaboration are crucial. There are different categories of physical actors in digital factories processes humans (i.e., final users or participants in the production process) and industrial machines. These physical entities must have a faithful representation in the digital world, usually referred to as digital twins (DTs) to provide software interface (APIs) to receive instructions and to query data in order to synchronizing the physical world with the digital world.



[Presentation Link](#)

[Video Presentation Link](#)

Session 2: Digital Twin Support Technologies

Speakers: Francesco Leotta, Massimo Mecella - Sapienza Università di Roma & David Ghedalia
Università di Modena e Reggio Emilia

Summary: The speakers presented during the lecture two frameworks for Digital Twins Ditto and Bosch IoT Things. Eclipse Ditto is an Open-source platform implementing the software pattern of DTs with the following main features:

- API abstracting from the hardware
- Routing requests between hardware and customer apps
- Access control policies management
- Persisting last reported state of hardware
- Change notifications to interested parties

While Bosch IoT Things builds upon the foundation of Eclipse Ditto in order to realize a cloud-based Digital Twin platform. The core concepts remain unchanged. However, there are few major differences:

- The built-in integration with other Eclipse IoT projects
- The graphical user interface
- The possibility to extend the functionalities of

Eclipse Ditto with other services belonging to the Bosch IoT suite.

The screenshot shows a Zoom meeting with four participants: MichalisPingos, Andreas Andreou, Francesco Leotta, and Massimo Mecella. The main content is a presentation slide from DESTINI titled "Smart Data ProcEssing and SysTems of Deep INsight". The slide details "JRA-1.1: Developing Smart Integrative Solutions Architectures for Smart Factories" and lists an agenda for November 25, 2020. The agenda includes sessions on architecture, digital twin support, AI for adaptivity, hands-on CPM adaptation, and visual process maps, followed by a Q&A session.

Agenda	
November 25, 2020	
09:00 – 09:45 CET	An Architecture for Smart Factories (Massimo Mecella)
09:45 – 10:15 CET	Digital Twin Support Technologies (David Ghedalia)
10:15 – 11:00 CET	AI to support Adaptivity (Francesco Leotta)
11:00 – 11:20 CET	Hands-on SmartCPM Adaptation (Massimo Mecella)
11:20 – 11:40 CET	Hands-on Visual Process Maps (Francesco Leotta)
11:40 – 12:00 CET	Question & Answers (All)

[Presentation Link](#)

[Video Presentation Link](#)

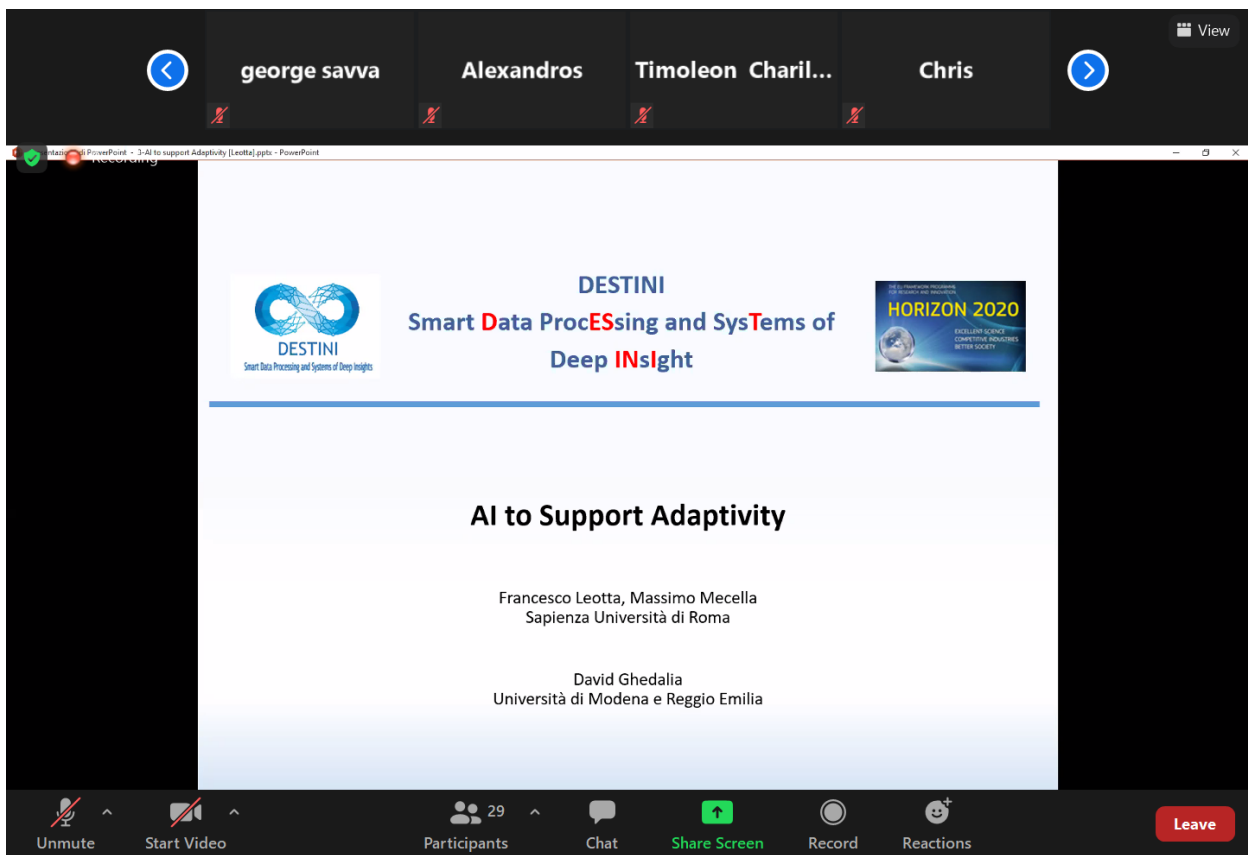
Session 3: AI to Support Adaptivity

Speakers: Francesco Leotta, Massimo Mecella - Sapienza Università di Roma & David Ghedalia Università di Modena e Reggio Emilia

Summary: This session of the lectures was entitled “AI to Support Adaptivity and predictive maintenance”. The key problem is to select the action to do next. This is the so-called control problem. Three approaches to this problem:

- Programming-based: Specify control by hand
- Advantage: domain-knowledge easy to express
- Disadvantage: cannot deal with situations not anticipated by programmer
- Learning-based: Learn control from experience

- Model-based: Specify problem by hand, derive control automatically
- Approaches not orthogonal though; and successes and limitations in each



[Presentation Link](#)

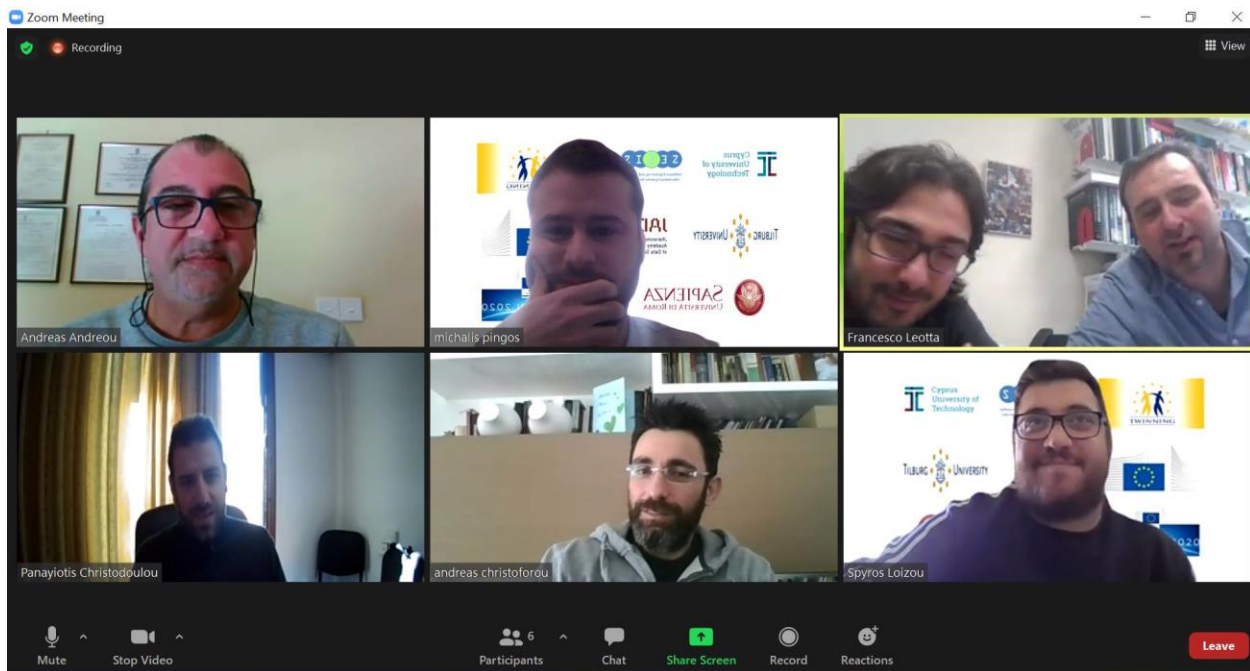
[Video Presentation Link](#)

Session 4: Hands-on SmartPM Adaptation

Speakers: Francesco Leotta, Massimo Mecella - Sapienza Università di Roma & David Ghedalia Università di Modena e Reggio Emilia

Summary: This lecture presented a Hands-on SmartPM Adaptation. The key fact of this concept: recovery procedures depend on the actual context (e.g., the positions of actors and robots, robot's battery levels, the range of the sensors, whether a location has become dangerous to get it, etc.)

- 1) the number of anticipated exceptions to be identified at the outset (and ways to overcome them) is often too large;
 - 2) many unanticipated exceptions may arise during process execution, and their resolution should be performed on a case-by-case basis, by exploiting information gathered at run-time.
- The main challenge is to build real-time monitoring and automated adaptation features during process execution, in order to:
- 1) synthesize on-the-fly recovery procedures that solve all exceptions (anticipated and not anticipated) into the original process;
 - 2) achieve the overall objectives of the original process still preserving its structure by minimizing any human intervention.



[Presentation Link](#)

[Video Presentation Link](#)

2.3 JRA-1: Developing Smart Integrative Solutions Data Visualisation and Reasoning in Smart Spaces - 9 December 2020

Session 1: Querying and Visualising Smart Space Data

Speakers: Francesco Leotta, Massimo Mecella - Sapienza Università di Roma

Summary: This lecture presented different aspects of the *Smart Vortex Project* which specialised products encompass a complex lifecycle with different streams of tractable product data are generated coming from different data sources. The union of all product data streams is called SMART VORTEX. VQs are defined as systems for querying databases that use a visual representation to depict the domain of interest and express related requests. The two main different approaches to develop UI able to query databases:

- Restricted natural languages
- Direct manipulation languages applied on a proper external representation of the data model concepts

[Presentation Link](#)

[Video presentation Link](#)

Session 2: Ambient Intelligence

Speakers: Francesco Leotta, Massimo Mecella - Sapienza Università di Roma

Summary: The lecture presented the topic of Ambient Intelligence. Building Automation is a sector born back in the 70s. There are different evolutions throughout years while rule definition frameworks represent their latest evolution. Aml intelligence results from the application of artificial intelligence and machine learning to building automation. Models can support complex reasoning and automatically can be learnt and updated while human-in-the-loop approaches are possible.

Program

Wednesday,
December 09

10:00 – 10:45 – Data Visualization and Querying in the SmartVortex EU Project
(Massimo Mecella)

10:45 – 11:45 – Smart Space Automation Part 1
(Francesco Leotta)

11:45 – 12:00 – Break

12:00 – 13:00 – Smart Space Automation Part 2
(Francesco Leotta)

[Presentation Link](#)

[Video presentation Link](#)

2.4 JRA-1: Introductory tutorial on Smart Healthcare - 22 December 2020

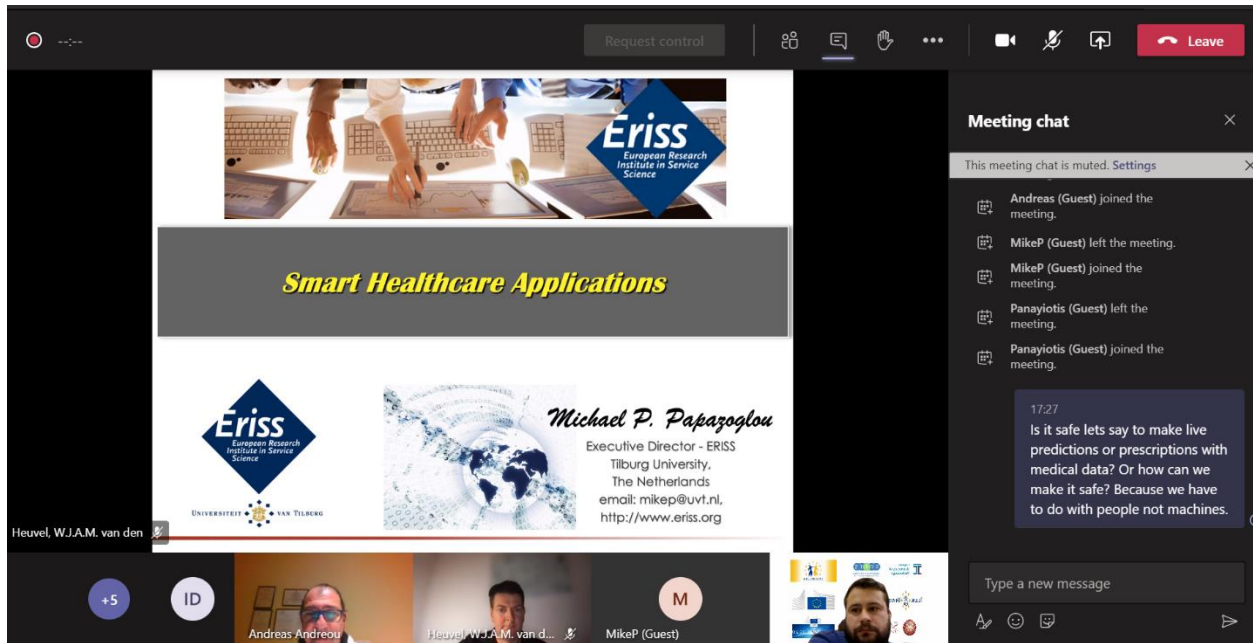
Session 1: Smart Healthcare Applications

Speakers: Executive Director - ERISS Tilburg University, The Netherlands

Summary: The speaker described how the world needs smarter solutions – more automated, inter-connected, interoperable solutions that lead to improved decision making & complex problem-solving. The webinar presented the Data-driven Digital Transformation Strategy of Smart Healthcare: ensures the delivery of an effective transformation strategy by considering:

- What are the digital focus areas aligned with the strategy?

- What operating model is required to drive digitalization?
- What are the key capabilities needed to execute digitalization?
- What external partnerships are needed for the digitalization initiatives?
- What is the governance and resource plan for digitalization initiatives?



[Presentation Link](#)

[Video Presentation Link](#)

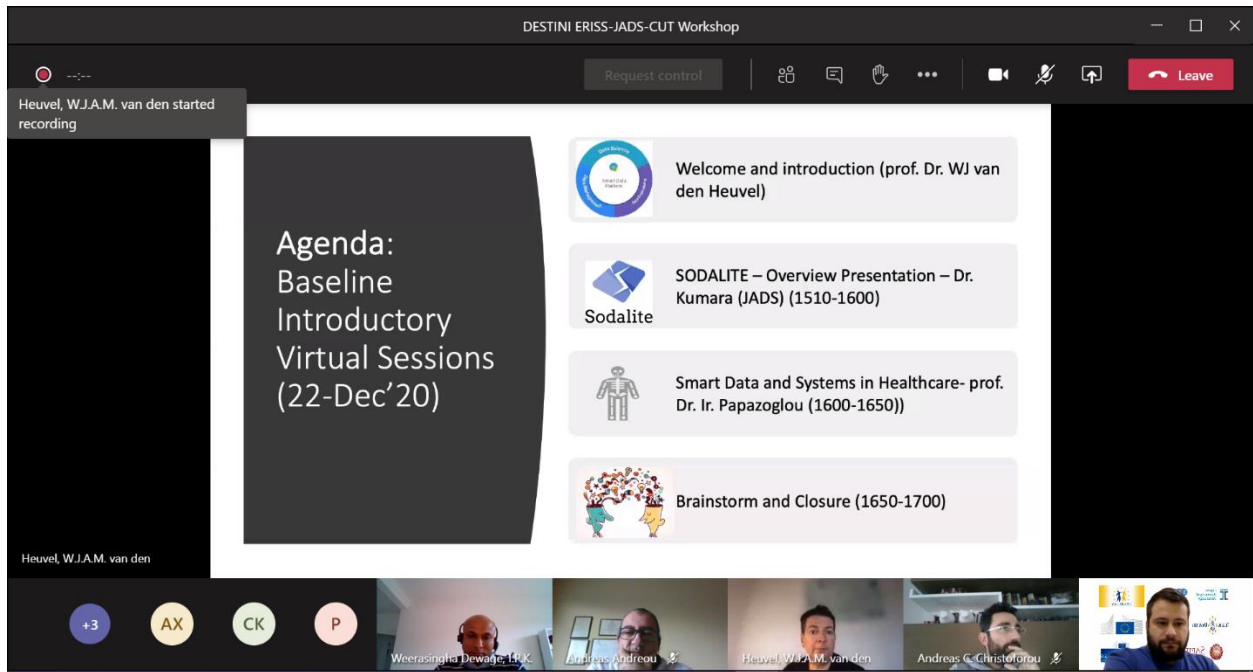
Session 2: Potential SODALITE-Related Research Topics

Speakers: Indika Kumara (JADS)

Summary: This lecture presented related research topics and the potential of SODALITE. MLOPs concerns deploying machine learning models into production and managing its subsequent continuous lifecycle. Deployment models become suboptimal or diagnosed with performance issues over time. Thus, the refactorings need to be applied continuously to fix such issues. Predicting the impacts of the refactorings is challenging. One approach is to remember history of refactorings and their impacts, and use such historical data to predict the impacts of new refactorings using ML/DL techniques

[Presentation Link](#)

[Video presentation Link](#)



2.5 JRA-1: Introductory tutorial on Smart Healthcare - 27 January 2020

Session 1: Smart Data and Systems in Healthcare

Speakers: Mike Papazoglou

Summary: Professor Mike Papazoglou presented the positive impact and capabilities that a smart system comprising smart data can have in Healthcare. The presenter explained where smartness can be found in health care, the current standards regarding the health care data in the industry and overviewed some examples of smart applications.

The screenshot shows a Zoom meeting interface. The main content is a slide titled "What is Smartness?". The slide features a diagram with three stacked blue boxes: "Orchestration- achieve optimal actions across specific environment at the speed of business" (top), "CONTEXT - give raw data meaning to do something effective with the information" (middle), and "DATA - retrieve related data, communicate to multiple sources, map it for RICH context" (bottom). A white arrow points upwards from the DATA box to the Orchestration box. To the left of the diagram is a white box with red text: "Smartness lies in the ability of applications to have:" followed by a bulleted list: "unobstructed visibility of services," "optimize use of resources," "provide help & guidance for making efficient and effective decisions, &" and "plan a coordinated response to individualized application needs". The slide footer includes the Eriso logo and "Michael P. Papazoglou ©" and the number "6".

On the right side of the Zoom window, there is a list of participants: "ANDREAS AND..." (highlighted with a yellow border), "michalis pingos", and "Mike P.". Below the list is a video thumbnail for "Panayiotis Christod...".

The Zoom control bar at the bottom includes icons for Mute, Start Video, Participants (17), Chat, Share Screen, Record, Reactions, and a red "Leave" button.

2.6 JRA-2: Introduction on Community Smells - 19 July 2021

Session 1: What is Community Smells?

Speakers: Gemma Catolino, JADS

Summary: This lecture presented recent work about community smells, including some background information about Community Smells. Community Smells is a set of socio-technical characteristics and patterns, which may lead to the emergence of social debt, which can lead to the increase of the project cost.

[Video presentation Link](#)

EMPIRICAL STUDY

How does the number of community smells differ in teams without women and in teams with women?

Distribution of Community Smells

non-gender diverse

gender-diverse

NUMBER OF COMMUNITY SMELLS

Statistically assess the differences observed with **Mann Whitney test**

Catolino, Gemma (Guest)

SM TN LO PC MP

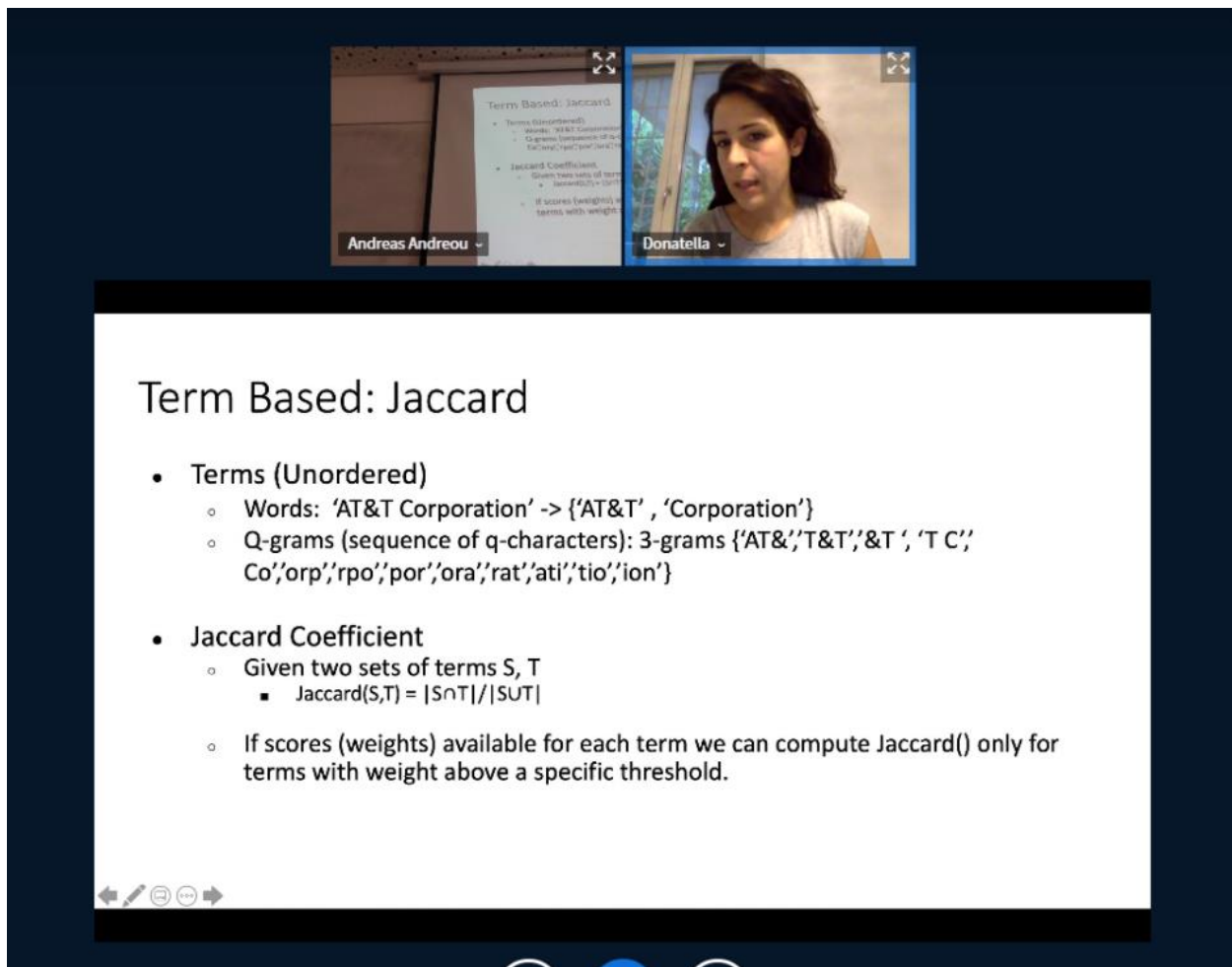
Catolino, Gemma (Guest)

2.7 JRA-2: Data Integration Challenges - 5 October 2021

Session 1: Data Integration Challenges

Speakers: Donatella Firmani, Sapienza Università di Roma

Summary: Training was divided into two sections: The first section included an introduction to Entity Resolution as well as Data integration and Modern Approaches for Recognition of Duplicates. The second section included Modern Approaches for Clustering and Reducing the Duplicates Search Space and Explainable AI methods for Entity Resolution.



The image shows a video conference interface. At the top, there are two video thumbnails. The left one shows a presentation slide titled "Term Based: Jaccard" with the following content:

- Term Based: Jaccard
 - Terms (Unordered)
 - Words: 'AT&T Corporation' -> {'AT&T', 'Corporation'}
 - Q-grams (sequence of q-characters): 3-grams {'AT&', 'T&T', '&T', 'T C', 'Co', 'orp', 'rpo', 'por', 'ora', 'rat', 'ati', 'tio', 'ion'}
 - Jaccard Coefficient
 - Given two sets of terms S, T
 - $Jaccard(S,T) = |S \cap T| / |S \cup T|$
 - If scores (weights) available for each term we can compute Jaccard() only for terms with weight above a specific threshold.

The right thumbnail shows a woman named Donatella. Below the thumbnails are the names "Andreas Andreou" and "Donatella". The main part of the image is a large white slide with the same title and content as the thumbnail on the left. At the bottom left of the slide, there are navigation icons: a back arrow, a search icon, a refresh icon, and a forward arrow.

2.8 JRA-2: Blockchain Applications - 12 October 2021

Session 1: Blockchain Applications

Speakers: Claudio di Ciccio, Sapienza Università di Roma

Summary: The subject of the training was Blockchain. The training involved many different aspects around blockchain, such as how it works, where can be implemented, why is it useful and popular, which are the most important on understanding the main principles of blockchain.

The image shows a video lecture interface. At the top, there is a small video window of the speaker, Claudio Di Ciccio. Below it is a slide titled "What is the Blockchain?". The slide content includes a definition of blockchain, a quote from a Harvard Business Review article, and several key characteristics of blockchain technology, such as immutability, network accessibility, consensus, and smart contracts. A note at the bottom of the slide explains that asterisks mark words or sentences that are valid in most cases but have exceptions.

What is the Blockchain?

"Blockchain is an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent* way"*

[M. Iansiti, K. R. Lakhani: *The Truth about Blockchain*. Harvard Business Review 95, no. 1, 2017]

Transactions are immutable*
A copy of the blockchain is accessible to every node in the network
It offers access to the history of all previous states

Consensus is achieved through dedicated algorithms
Economic disincentive to history rewriting

Offers the possibility of executing user-defined scripts (smart contracts)
Smart contracts are unstoppable from the outside

* Asterisks mark words/sentences that are valid in most of the cases, but have exceptions

2.9 JRA-2: Robot Process Automation -13 October 2021

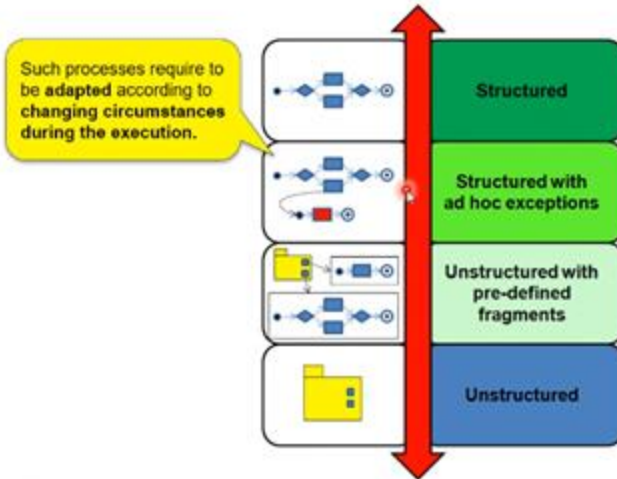
Session 1: Robotic Process Automation

Speakers: Andrea Marella, Simone Agostinelli (Sapienza Università di Roma)

Summary: The subject of the training session was Robotic Process Automation. The training involved Introduction to Robotic Process Automation, Developing SW robots on UiPath Studio and New frontiers: Robotic Process Mining.



Classifying Business Processes



3. JRA3 - SUMMERSOC selected presentations

This section includes selected presentations from SummerSOC2022 school/conference.

Specifically, the following topics were covered:

Topic 1: "Enhancing IoT Platforms for Autonomous Device Discovery and Selection", Jan Schneider and Pascal Hirmer

Topic 2: "Data Market Design", Stefan Driessen, Willem-Jan v.d. Heuvel, (JADS)

Topic 3: "Choreo: The Next-Generation Digital Platform As A Service", Srinath Perera (WSO2)

Topic 4: "AstraKode's low code IDE for Smart Contracts and NFTs", Fabiano Izzo, Damiano D'Amici, (AstraKode)

Topic 5: "From Data Asset to Data Product – The Role of the Data Provider in the Enterprise Data Marketplace", Rebecca Eichler, Christoph Gröger, Eva Hoos)

Topic 6: "Democratizing Data through Enterprise Data Marketplaces – Data Shopping for Data Consumers", Rebecca Eichler (U of Stuttgart)

Topic 7: "Data-aware service placement in the Cloud-IoT continuum", Jacopo Massa, Stefano Forti and Antonio Brogi

Topic 1: "Enhancing IoT Platforms for Autonomous Device Discovery and Selection", Jan Schneider and Pascal Hirmer

1. Topic summary

This work proposes:

- a method allowing IoT platforms to autonomously and reliably execute pre-defined use cases within IoT ecosystems by discovering and selecting the most suitable devices

- an architecture supporting this method, introducing Discovery Repositories as additional abstraction layer between the IoT platform and the devices to achieve loose coupling

Outcome of the paper:

Overcomes the issue of static references by dynamically finding suitable devices

Future Work:

- Tests in larger IoT ecosystems to empirically verify the results
- Inclusion of availability predictions into the evaluation of candidate devices

2. Attendees		
Name	Department	E-mail
Prof. Andreas Andreou	CUT / Cyprus	andreas.andreou@cut.ac.cy
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Prof. Damian Andrew Tamburri	JADS/Netherland	d.a.tamburri@tue.nl

Topic 2: "Data Market Design", Stefan Driessen, Willem-Jan v.d. Heuvel, (JADS)

1. Topic summary

This paper presents that:

- Data Lakes and Data Warehouses often do not scale well enough to enable big data-driven organisations because:
 - Monolithic platforms cannot support and harmonise heterogeneous data coming from different domains.
 - Monolithic platforms cannot support heterogeneous use cases for data.
 - Data provider expertise is separated from data consumer expertise.
- Decentral data exchanges such as enterprise data markets, data mesh and data spaces are promising alternatives but relatively untested.
- We can learn from data markets, which are better understood.

2. Attendees

Name	Department	E-mail
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Topic 3: "Choreo: The Next-Generation Digital Platform As A Service", Srinath Perera (WSO2)

1. Topic summary

Lessons Learned from this paper

- Multi-cloud slows you down; embrace the cloud you are in
- Choice of VSCode saved us a lot of work
- Making sure the team has understood the user stories is hard
- Defining APIs between subsystems early lets us move fast
- Working hard to use standards (Swagger, containers, k8s) and available tools help a lot
- Making ML work in real life, and MLOps are hard

2. Attendees

Name	Department	E-mail
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Prof. Damian Andrew Tamburri	JADS/Netherland	d.a.tamburri@tue.nl

Topic 4: "AstraKode’s low code IDE for Smart Contracts and NFTs", Fabiano Izzo, Damiano D’Amici, (AstraKode)

1. Topic summary

Problem:

“Main difficulties encountered while developing blockchain solutions?” A survey:

- Limited access to the technology due to its complexity and stack size
- Scarcity of qualified professionals able to develop production grade solutions
- Scarcity of documentation and other similar resources www.astrakode.tech

In addition to AstraKode’s own experience with the development of similar solutions, the problems identified have also been validated through market research.

Solution:

AstraKode Blockchain (AKB), a low-code solution for (enterprise) blockchain development based on four pillars:

- Network Composer, a visual environment for blockchain (Hyperledger Fabric) network creation
- Smart Contract IDE, another visual environment for smart contract development
- Assisted deployment and testing functionalities for both visual environments

- Built-in community for peer-to-peer support and documentation/wikis

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Topic 5: "From Data Asset to Data Product – The Role of the Data Provider in the Enterprise Data Marketplace", Rebecca Eichler, Christoph Gröger, Eva Hoos)

1. Topic summary

Challenges addressed by the paper on providing data in the enterprise:

- (1) Assembly of metadata
- (2) Supplying provisioning options
- (3) Registering data in several publishing tools
- (4) The process involves several parties

Provider Journey challenges address through Enterprise Data Lake that (supports data democratization):

- Offers explicit Provider Functionality
- Integrates with Existent Data Catalogs
- Data Asset & Data Product Distinction

2. Attendees

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Topic 6: "Democratizing Data through Enterprise Data Marketplaces – Data Shopping for Data Consumers", Rebecca Eichler (U of Stuttgart)

1. Topic summary

Challenges addressed by the paper on Data Democratization:

- (1) The process involves several parties
- (2) Metadata for understanding the data is spread across a variety of tools
- (3) The tools are not integrated across the access process

Provider Journey challenges address through Enterprise Data Marketplace (supports data democratization):

- Consumer Journey
- Provider Journey

2. Attendees

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Topic 7: " "Data-aware service placement in the Cloud-IoT continuum", Jacopo Massa, Stefano Forti and Antonio Brogi

1. Topic summary

Paper Progress w.r.t the state-of-the-art:

- data-aware modelling of data services and IoT devices
- joint placement of both data and services
- security requirements
- runtime adaptation (via continuous reasoning)

Limitations and future work:

- extend the model to account for serverless/FaaS
- multi-objective optimisation (evaluate the goodness of a solution)
- further management decision (scalability, undeploy, MELs)
- validate placement and routing solutions on real testbeds,
- increase prototype usability (e.g. user-friendly tools)

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4. Conclusions

In the context of Work Package 3, a number of actions and activities were organised and performed aiming to transfer scientific knowledge to CUT members in the area Smart Data Processing and Systems of Deep Insights to tackle the research challenges that exist within the JRAs and the key knowledge areas identified during WP2. The corresponding lectures were described in this document.

Sapienza and JADS attended the 16th Symposium and Summer School On Service-Oriented Computing (<http://www.summersoc.eu>) and selected material that was also used as training content presented to CUT is included in this deliverable. This training content was presented to CUT during DESTINI Satellite Event - SummerSoc2022 in Crete 4-8 July 2022.

Some key performance indicators have been identified related the training sessions and are described below.

The main areas of application identified were:

1. ICT
2. Healthcare
3. Maritime
4. Industry 4.0

The following Focus Groups were created during the training sessions:

1. Business Process Mining
2. Data Lakes / Data Meshes
3. Blockchain
4. Digital Twins
5. Smart Data Processing
6. Ambient Intelligence

Number of people participated in the training sessions per category:	
Faculty Members	16
Post-Docs	8
PhD Students	25
Others (MSc, BSc, etc.)	More than 100 (Including BSc/MSc classes from CUT that participated in selected training activities)

Number of delivered sources of knowledge transfer (tutorial, lectures, etc.)	
First School Presentations	30
Second School Presentations	28
Training Sessions	> 35 9 training sessions, on average 3-4 lectures, plus 7 topics transferred from SummerSOC2022
Webinars	16

Number of ESRs participated in the mobility program: 25	
Sapienza	6
JADS	2
CUT	10
External ESRs (Participated during DESTINI's satellite event as SummerSOC2022)	7

It is worth noting also that the consortium devoted significant effort for preparing the training material prior to performing the lectures/talks/webinars, but more significantly, it exploited the results of knowledge transferred after each training activity with follow-up meetings (mostly virtual), brainstorming, and further built-up of knowledge so that a solid background would be formed to enable initiating research activities.