



# Applied Game Design

Course Introduction

Prof. Fabrizio Fornari

2<sup>nd</sup> May, 2023



# Who is Fabrizio Fornari?

**2022** Research fellow in Computer Science at UNICAM

**2020** Postdoc in Computer Science at UNICAM

**2018** PhD title in Computer Science at UNICAM. 3 months in Brisbane Queensland University of Technology (Australia)

**2012-2013** Master's degree in Computer Science at UNICAM and University of Reykjavik (Iceland)

**2010-2011** Bachelor degree in Computer Science at UNICAM









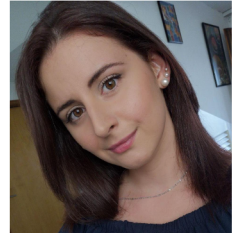






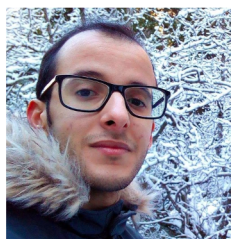







# Who is Fabrizio Fornari?

- **Applied Game Design** at “University of Camerino”, Department of Computer Science 2022/2023
- **Software Project Management Laboratory** at “University of Camerino”, Department of Computer Science 2018/2019, 2020/2021, 2021/2022, 2022/2023
- **Logic and Constraint Programming** at “University of Camerino”, Department of Computer Science 2021/2022
- **Computer Science** at “Università di Macerata”, Faculty of “Economia e diritto” 2018/2019, 2019/2020

# PROS Lab Members

									
<b>Flavio Corradini</b> FULL PROFESSOR	<b>Andrea Polini</b> ASSOCIATE PROFESSOR	<b>Barbara Re</b> ASSOCIATE PROFESSOR	<b>Lorenzo Rossi</b> RESEARCH FELLOW	<b>Massimo Callisto De Donato</b> RESEARCH FELLOW	<b>Marco Piangerelli</b> RESEARCH FELLOW	<b>Ivan Compagnucci</b> PHD STUDENT	<b>Sara Pettinari</b> PHD STUDENT	<b>Arianna Fedeli</b> PHD STUDENT	<b>Luca Ruschioni</b> PHD STUDENT
									
<b>Francesco Tiezzi</b> ASSOCIATE PROFESSOR	<b>Andrea Morichetta</b> RESEARCH FELLOW	<b>Fabrizio Fornari</b> RESEARCH FELLOW	<b>Alessandro Marcelletti</b> PHD STUDENT	<b>Caterina Luciani</b> PHD STUDENT	<b>Khalid Bourr</b> PHD STUDENT	<b>Morena Barboni</b> PHD STUDENT	<b>Vincenzo Nucci</b> PHD STUDENT	<b>Umair Qureshi</b> PHD STUDENT	

<https://pros.unicam.it/members>

# PROcesses and Services Lab

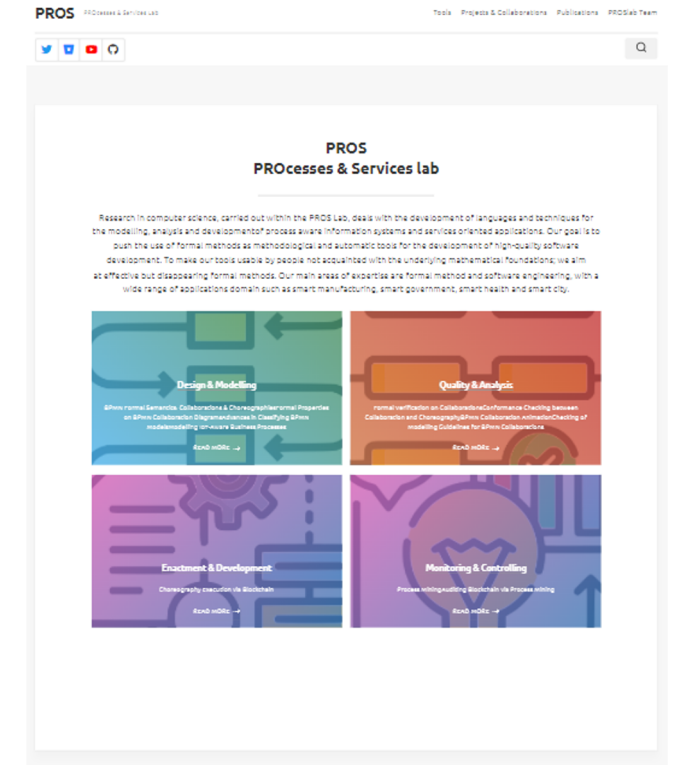
Our journey started promoting the usage of **formal methods** and **automatic tools** for the **development of high-quality software** having care of hiding the complexity of formal methods to the final user

## HOW?

By developing:

- **Languages, techniques, approaches** for the *modelling* and *analysis* of systems
- Complex systems based on **process-** and on **service-oriented applications**

<https://pros.unicam.it/>

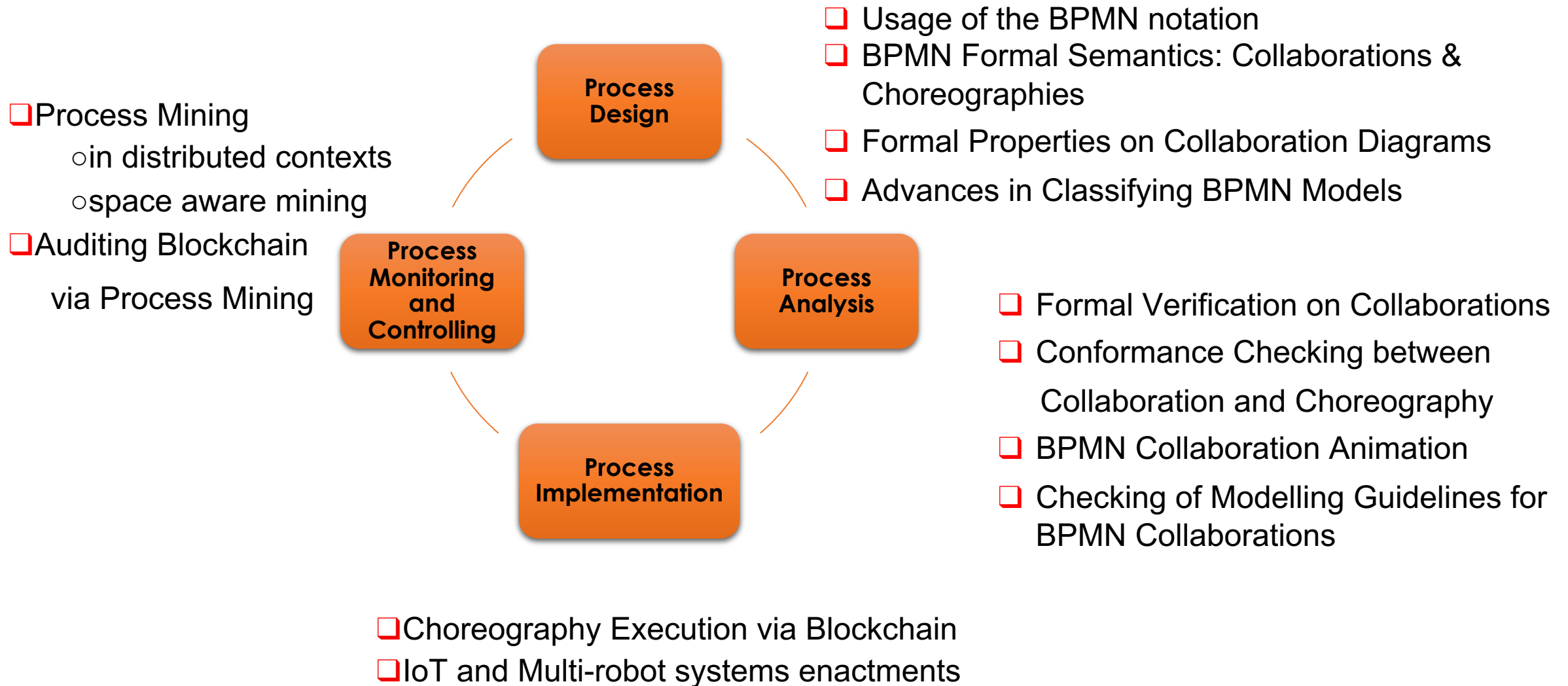


PROS - PROcesses & Services Lab

via Madonna delle Carceri, 9 Camerino (MC) - Italy  
pros@unicam.it  
PROS-POC

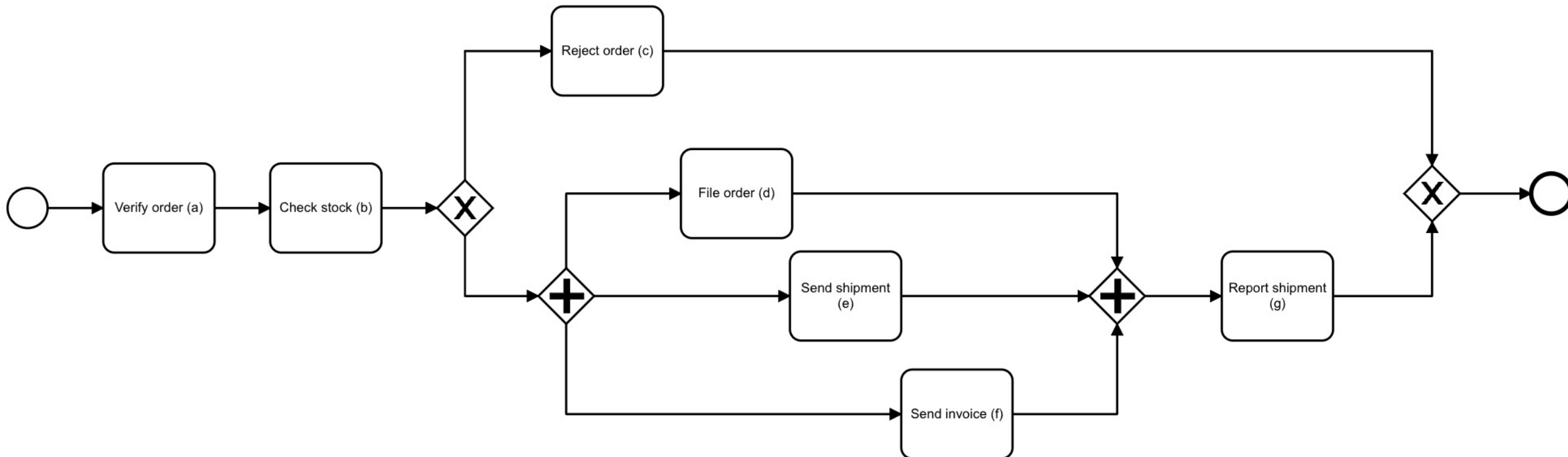


# Main Topics and Contributions



# Business Process Model and Notation

- ❑ **Business Process Model and Notation** is an OMG standard graphical language to design business process models
- ❑ It is a "*de-facto*" standard notation to **supporting business process modelling for all business stakeholders**



# Operational Semantics

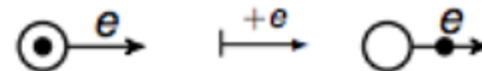
The Operational semantics is based on a set of **inference rules** defined at different layers:

- Collaboration Layer
- Process Layer
  - Control Flow Constructs
  - Task Constructs
  - Node Collections

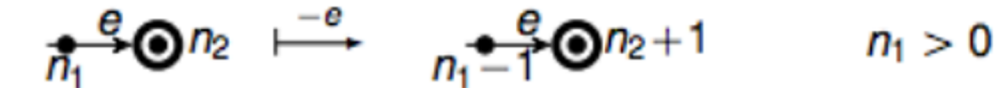
## Marking

A marking is a distribution of tokens over pool, messages, edges, and process elements, that indicates message arrivals and the process nodes that are active or not in a given step of the execution.

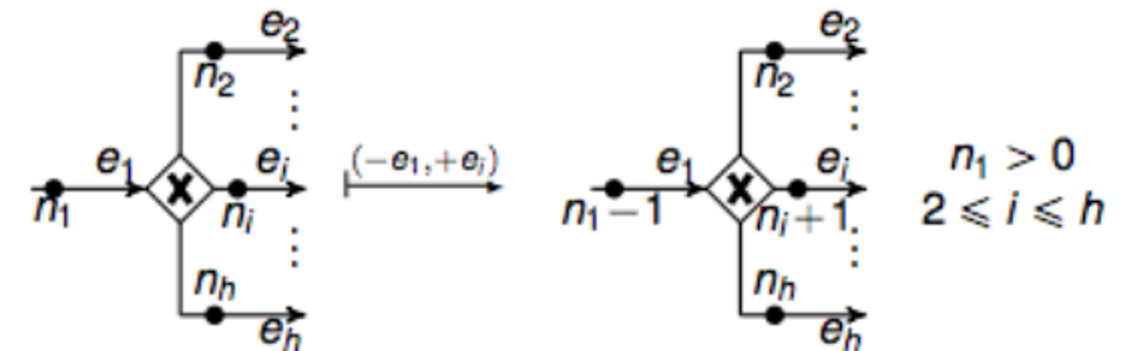
Start event:



End event:



XOR Split:





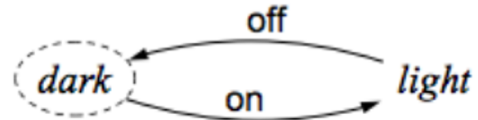
# Labelled Transition System (LTS)

**Definition:** A labelled transition system  $(S, s_0, L, \delta)$  consists of

- a set  $S$  of states
- an initial state  $s_0 : S$
- a set  $L$  of action labels
- a transition relation  $\delta : \mathbf{P}(S \times L \times S)$ .

**Example:**

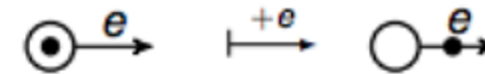
$LightSwitch_1 = (\{dark, light\}, dark, \{on, off\}, \{(dark, on, light), (light, off, dark)\})$



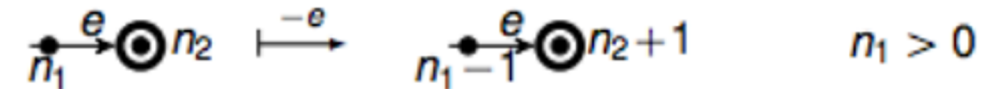
--- E-Start acts on a start with Status = enabled, and it changes the Status to disabled increasing the output EdgeToken.

```
r1 [E-Start] : start( enabled , IName . IEToken )
=> {tUpd(emptyEdgeSet , IName . IEToken)}start(
disabled , IName . increaseToken( IEToken ) ) .
```

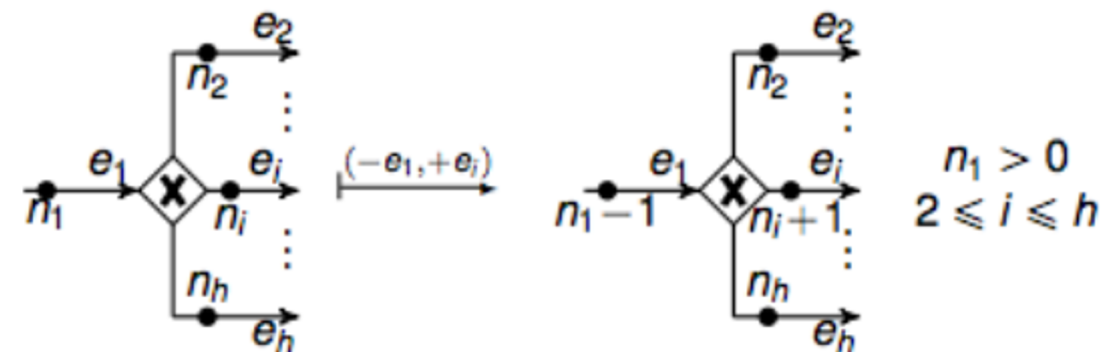
Start event:



End event:



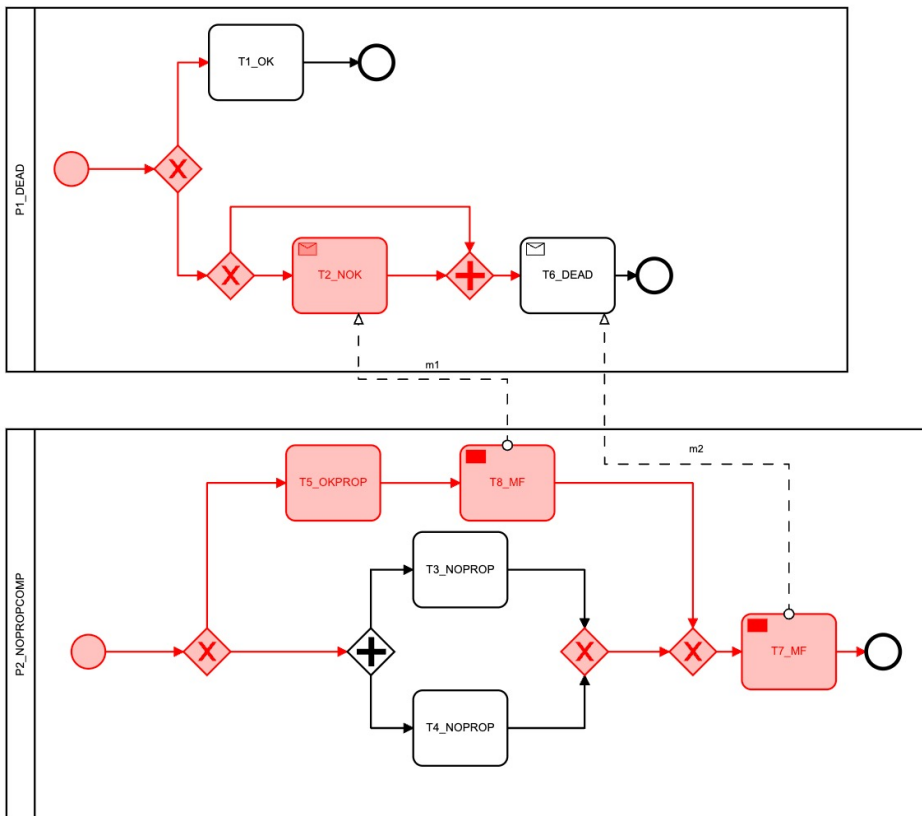
XOR Split:



# BProVe – Business Process Verifier

Welcome to the BProVe Web Interface!

[Create a New BPMN Model](#)
[Load a BPMN Model](#)
[Download Displayed Model](#)
[Parse a Model](#)
[Open Verification Menu](#)
[Zoom to Fit](#)



The image shows two BPMN diagrams. The top diagram, labeled 'P1\_DEAD', features a start event leading to an XOR gateway, which then splits into two paths: one leading to a task 'T1\_OK' and another to another XOR gateway. This second gateway leads to a task 'T2\_NOK' (with a red background), which then leads to an AND gateway. This AND gateway has two outgoing paths: one to a task 'T6\_DEAD' and another to a task 'T8\_MF'. The bottom diagram, labeled 'P2\_NOPROPOMP', starts with an XOR gateway leading to an AND gateway. This AND gateway has two outgoing paths: one to a task 'T3\_NOPROP' and another to a task 'T4\_NOPROP'. Both 'T3\_NOPROP' and 'T4\_NOPROP' lead to an XOR gateway, which then leads to another XOR gateway. This second XOR gateway has two outgoing paths: one to a task 'T5\_OKPROP' and another to a task 'T7\_MF'. There are also message flows: 'm1' connects 'T2\_NOK' to 'T8\_MF', and 'm2' connects 'T8\_MF' to 'T7\_MF'. A toolbar on the left contains various icons for navigation and editing.

### BProVe Verification Menu

Non-Domain dependent properties

Domain dependent properties

LTL Property Builder

```
((aBPstartsParameterized("Customers") -> <>
aBPoolendsParameterized("Customers"))
```

Select Verification Tool

LTL Maude Model Checker  MultiVeStA Statistical Model Checker:

Display elements id on click

## Property verification result:

The collaboration does not respect the Option to Complete property in time 19ms



# Process Mining



For humans, Footprints represent the path we took, what we have done, or someone else has done.

In BPM, especially supported by an informatic system, we talk about event logs.



Case ID	Activity	Start Date	End Date	Agent Position	Customer ID	Product	Service Type	Resource
Case 1	Inbound Call	9.3.10 8:05	9.3.10 8:10	FL	Customer 1	MacBook Pro	Referred to Servicer	Helen
Case 1	Handle Case	11.3.10 10:30	11.3.10 10:32	FL	Customer 1	MacBook Pro	Referred to Servicer	Helen
Case 1	Call Outbound	11.3.10 11:45	11.3.10 11:52	FL	Customer 1	MacBook Pro	Referred to Servicer	Henk
Case 2	Inbound Call	4.3.10 11:43	4.3.10 11:46	FL	Customer 2	MacBook Pro	Referred to Servicer	Susi
Case 3	Inbound Call	25.3.10 9:32	25.3.10 9:33	FL	Customer 3	MacBook Pro	Referred to Servicer	Mary
Case 4	Inbound Call	6.3.10 11:41	6.3.10 11:51	FL	Customer 4	iPhone	Referred to Servicer	Fred
Case 5	Inbound Call	18.3.10 10:54	18.3.10 11:01	FL	Customer 5	MacBook Pro	Product Assistance	Kenny
Case 6	Inbound Call	25.3.10 17:09	25.3.10 17:13	FL	Customer 6	MacBook Pro	Referred to Servicer	Harold

# From Raw Data to Process Mining

Four steps are necessary to apply process mining techniques:

01

## Digital Footprint



Every process leaves digital footprints. The corresponding IT systems for each process must be identified to utilize the data.

02

## Data Collection



Data is extracted and transformed into event logs. The quality of the data is fundamental to obtain reliable results.

03

## Data Preparation



The event log can be prepared by consolidating different data sources and assigning a semantics to each data attribute.

04

## Process Mining



The event log is then ready to be consumed by process mining techniques such as automated discovery and performance mining.



# Business Processes & Internet of Things

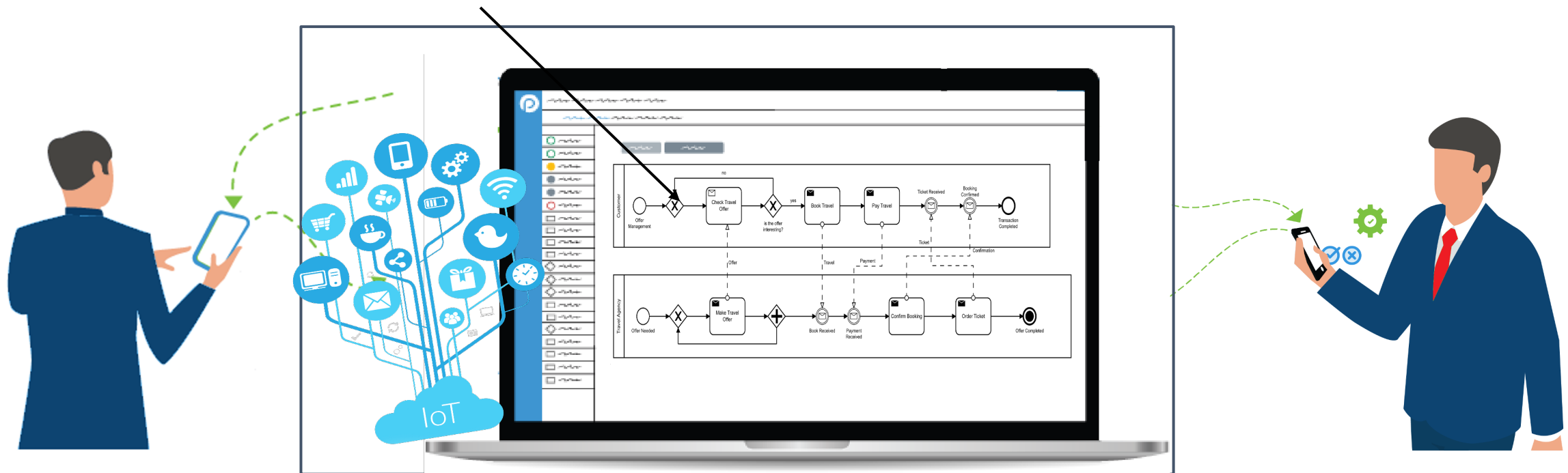
## Business Processes

A set of activities, tasks or actions to carry out a specific organizational goal such as a service or a product

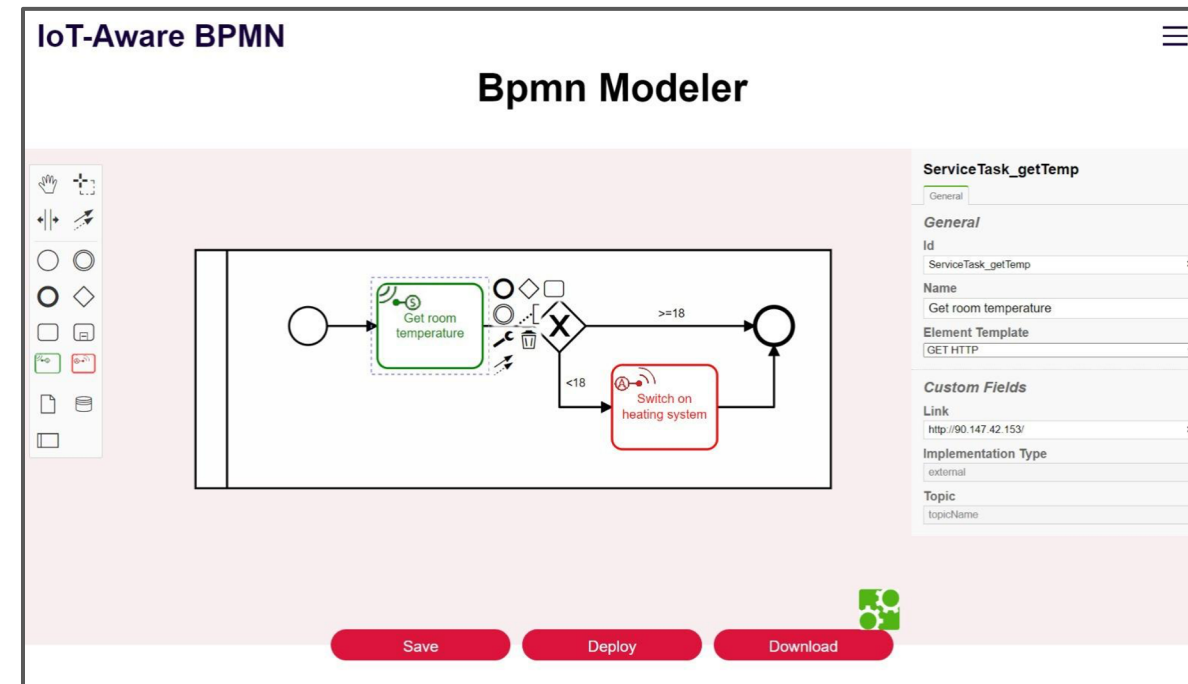
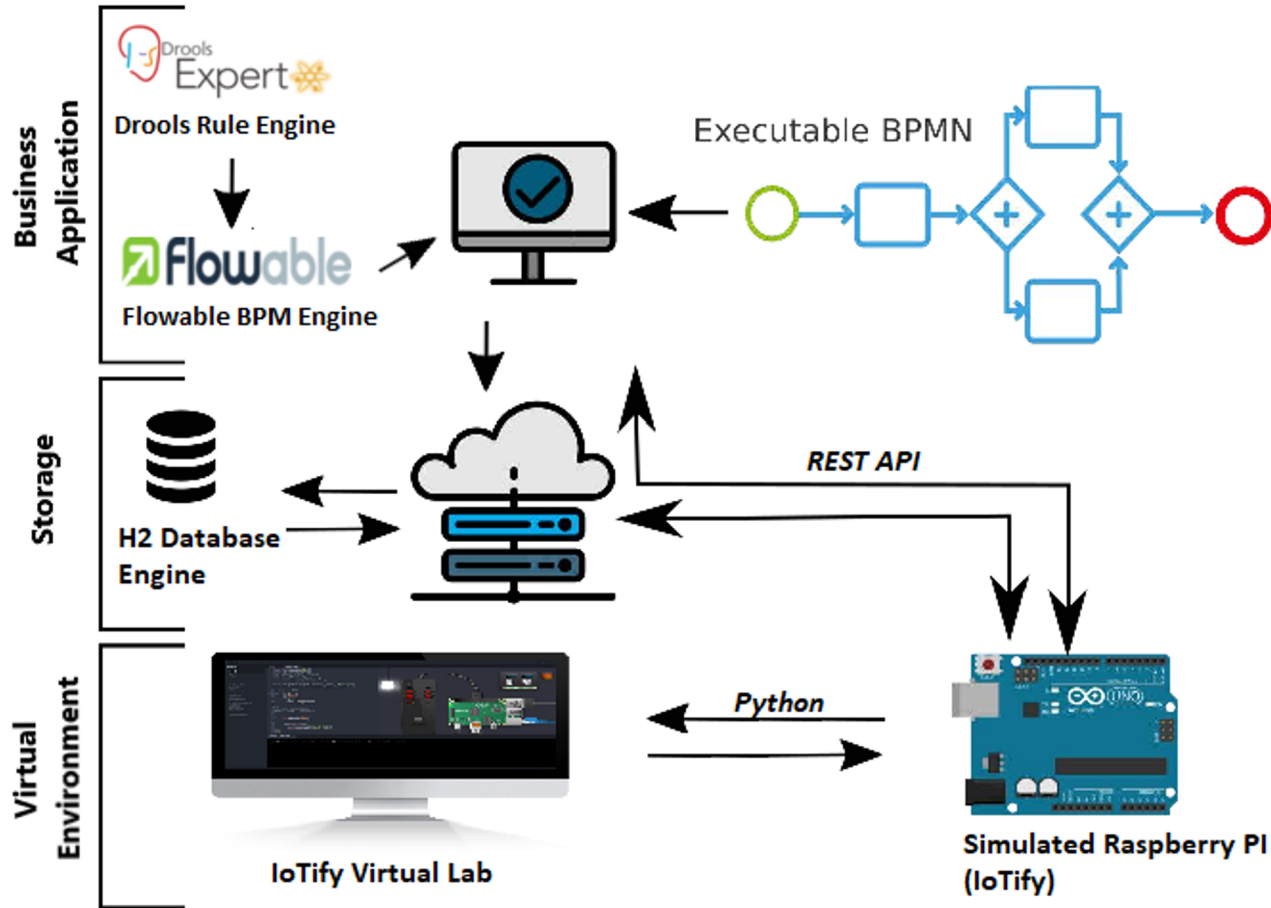
## Internet of Things

Network of interconnected devices that collect and exchange data to monitor, control or transfer relevant information so as to be able to perform consequent intelligent actions

### BPMN

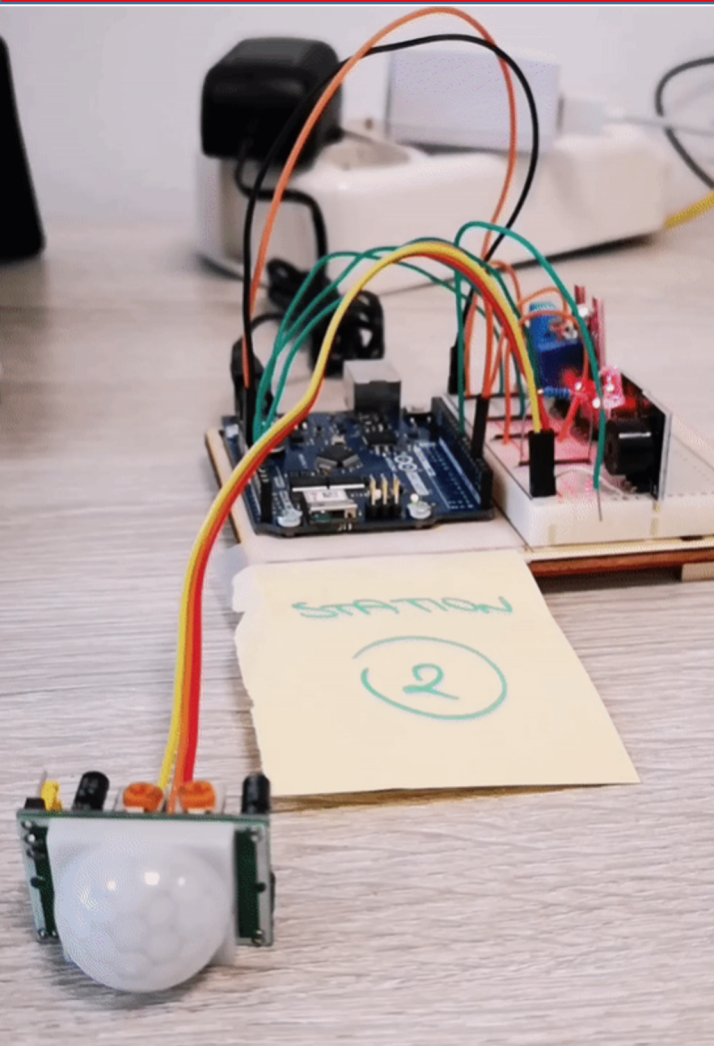


# BPMN & IoT

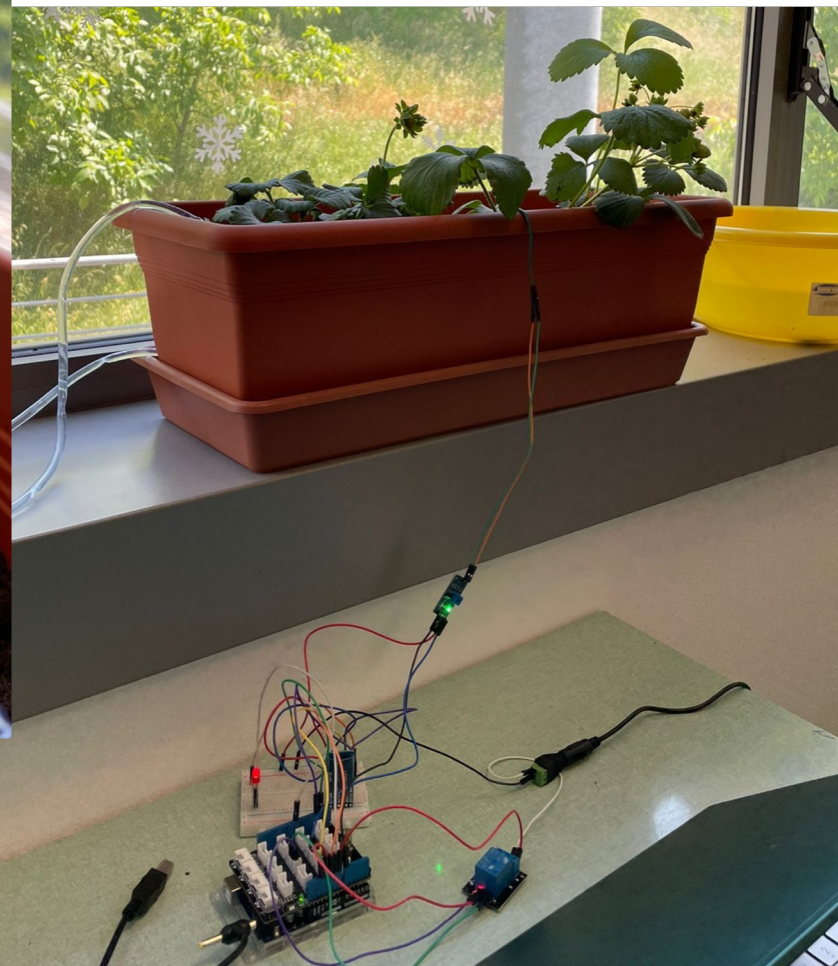




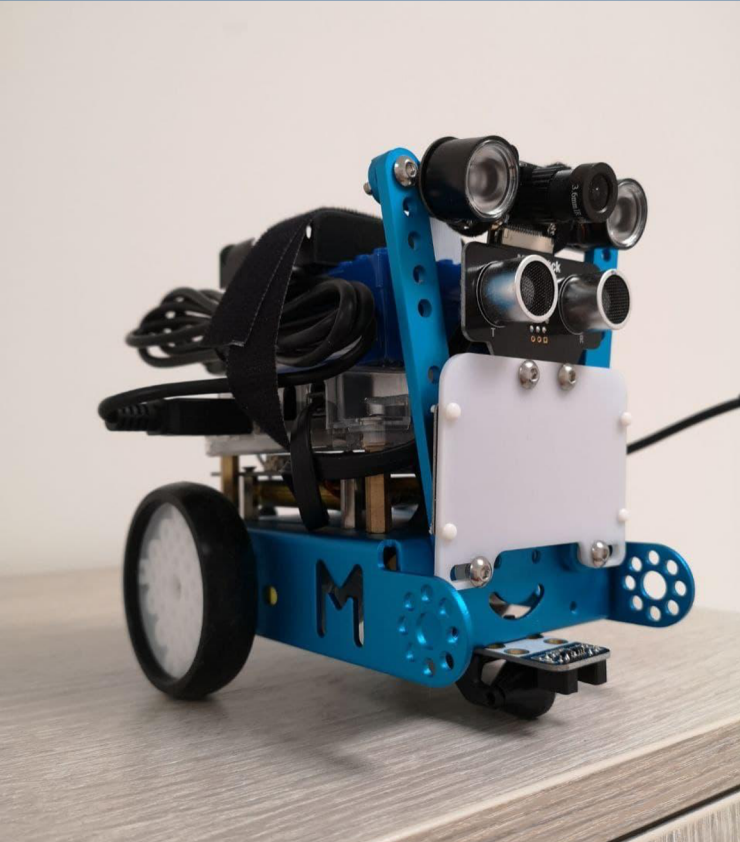
## Smart Garden



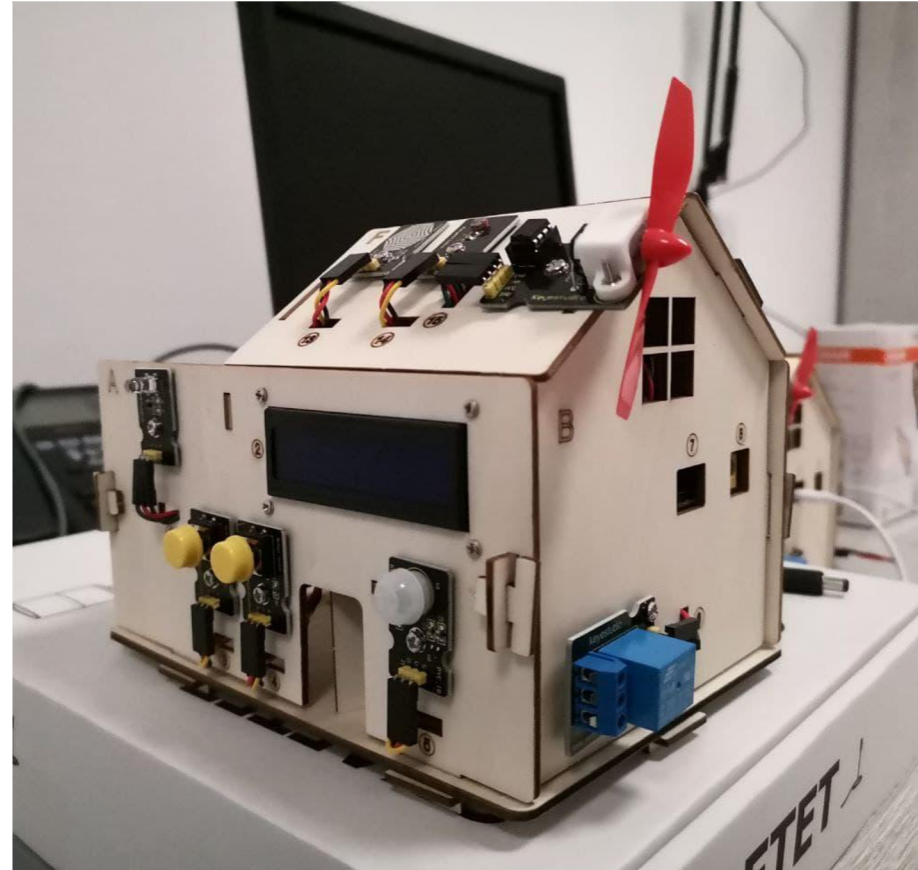
Environmental Monitoring  
Station







Automatic Car



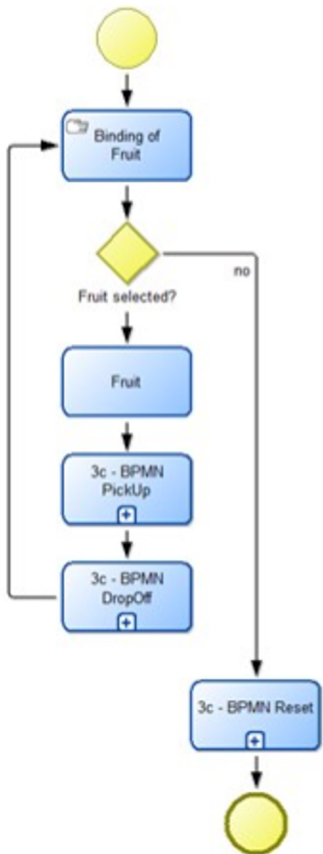
Smart Home  
prototype

Robotic Arm

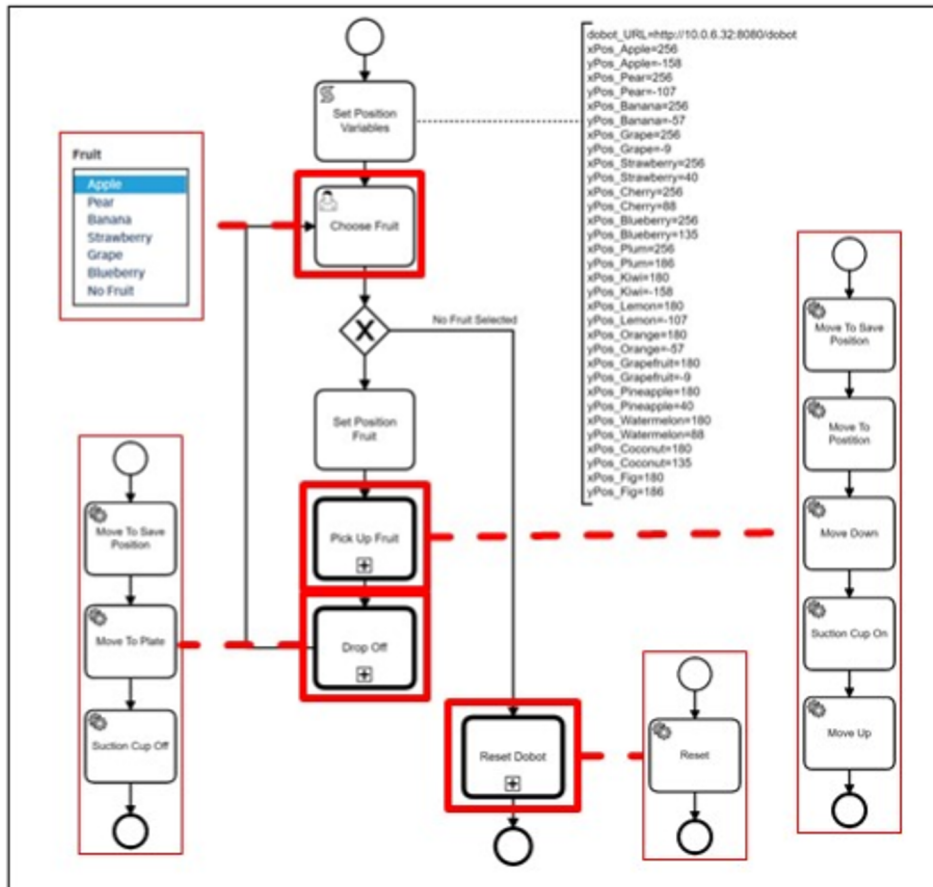


# Smart Workflows for the Robotic Arm

BPMN



BPMN for Workflow Engine

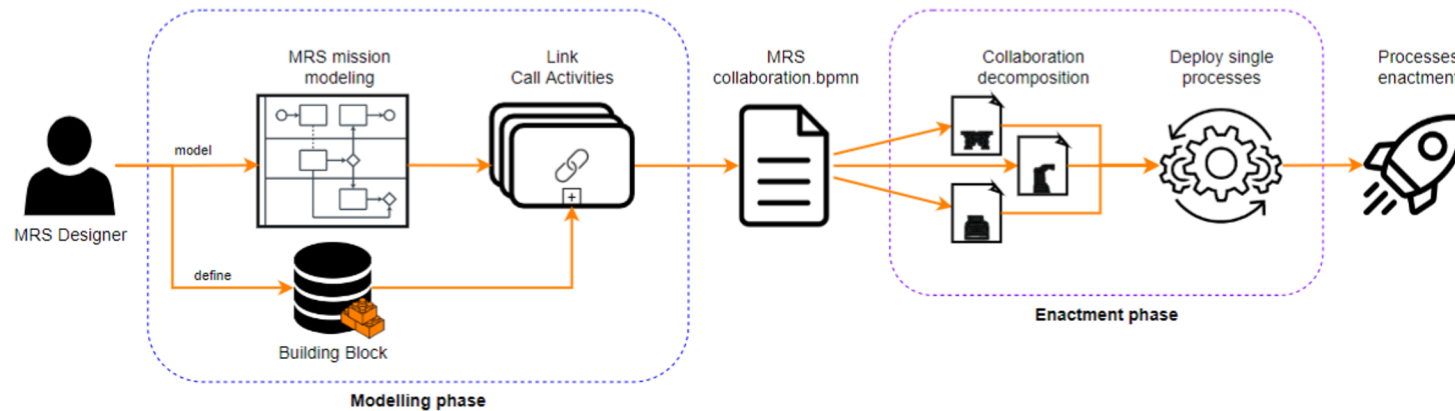
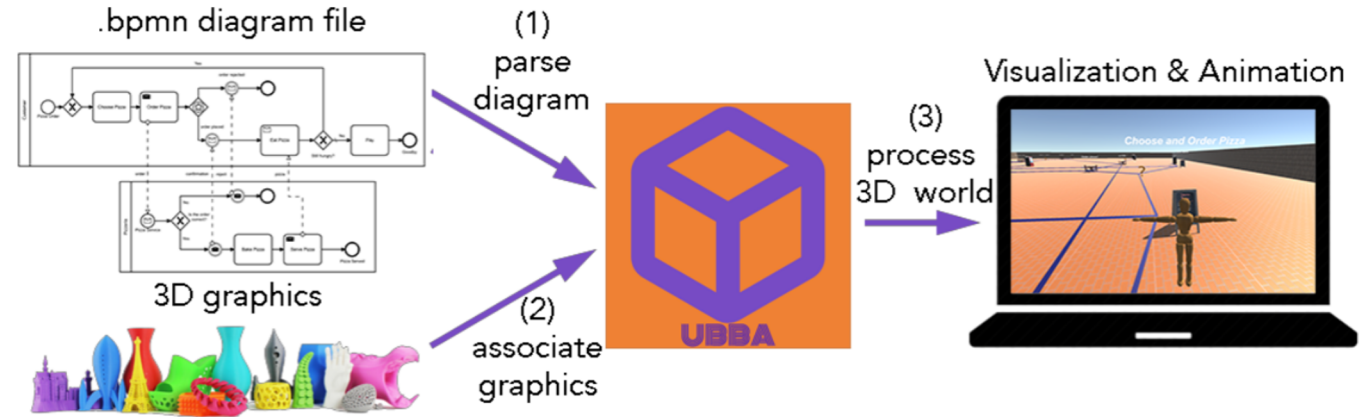
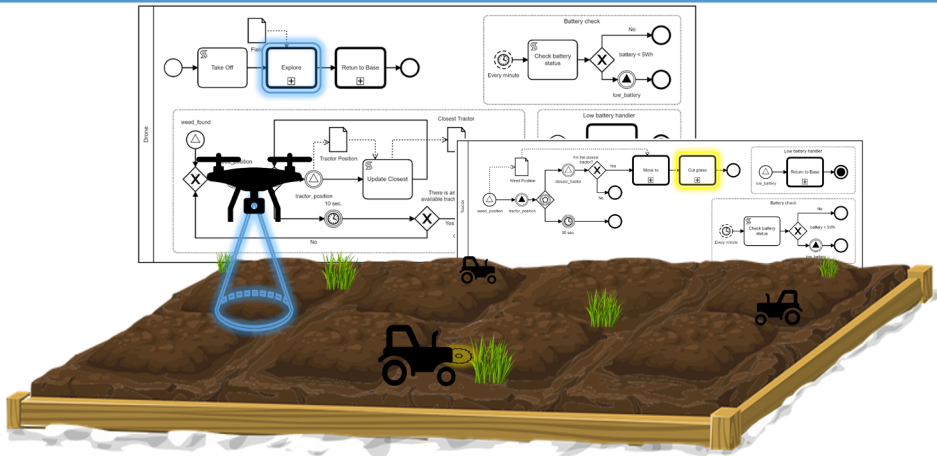


Robot Arm



# Business Process and MDE

## Multi-robot systems



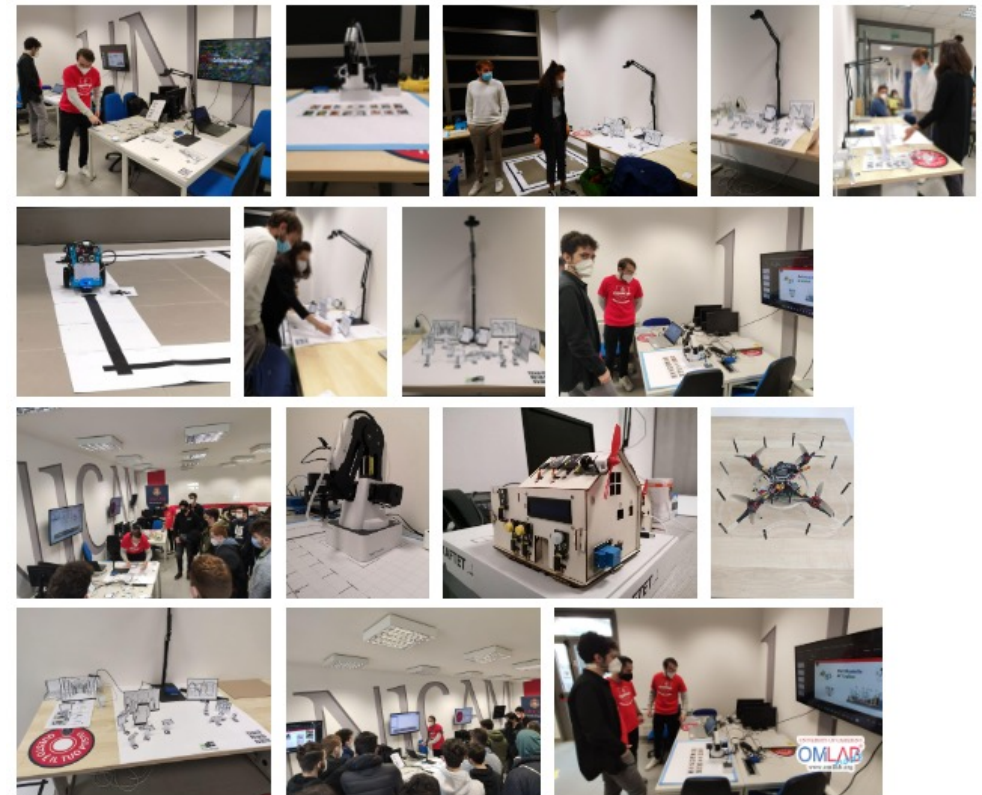
## 3D environments



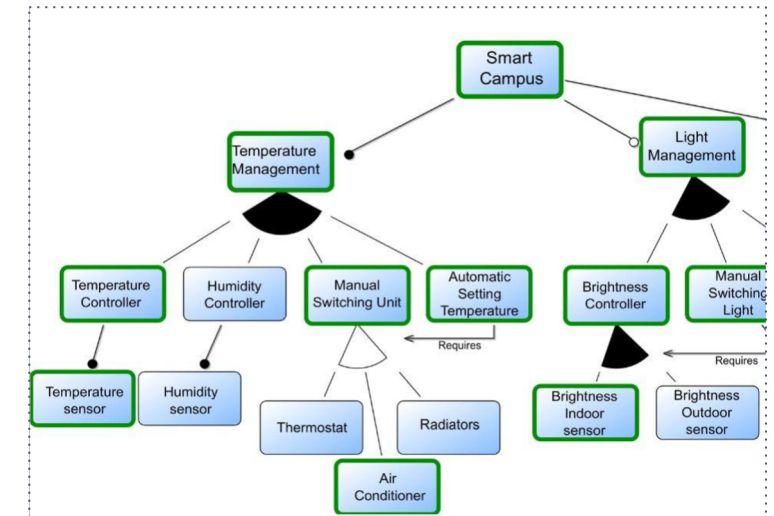
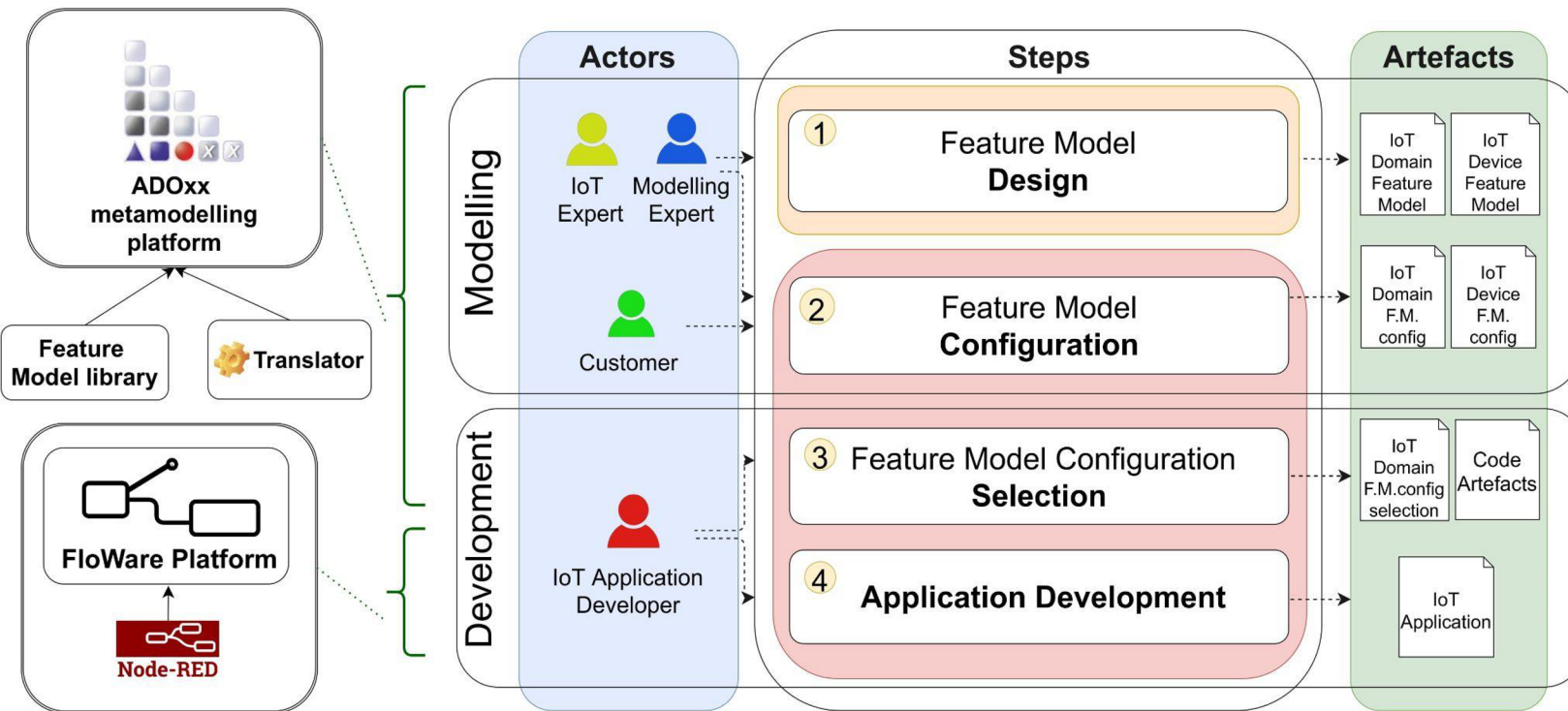


# OMILAB@University of Camerino

The OMiLAB Node at the University of Camerino (OMiLAB@UNICAM) aims at fostering the encounter of students, researchers, professors, and practitioners in the sector of model driven engineering and IoT favouring the development and the put in practice of model driven engineering approaches.



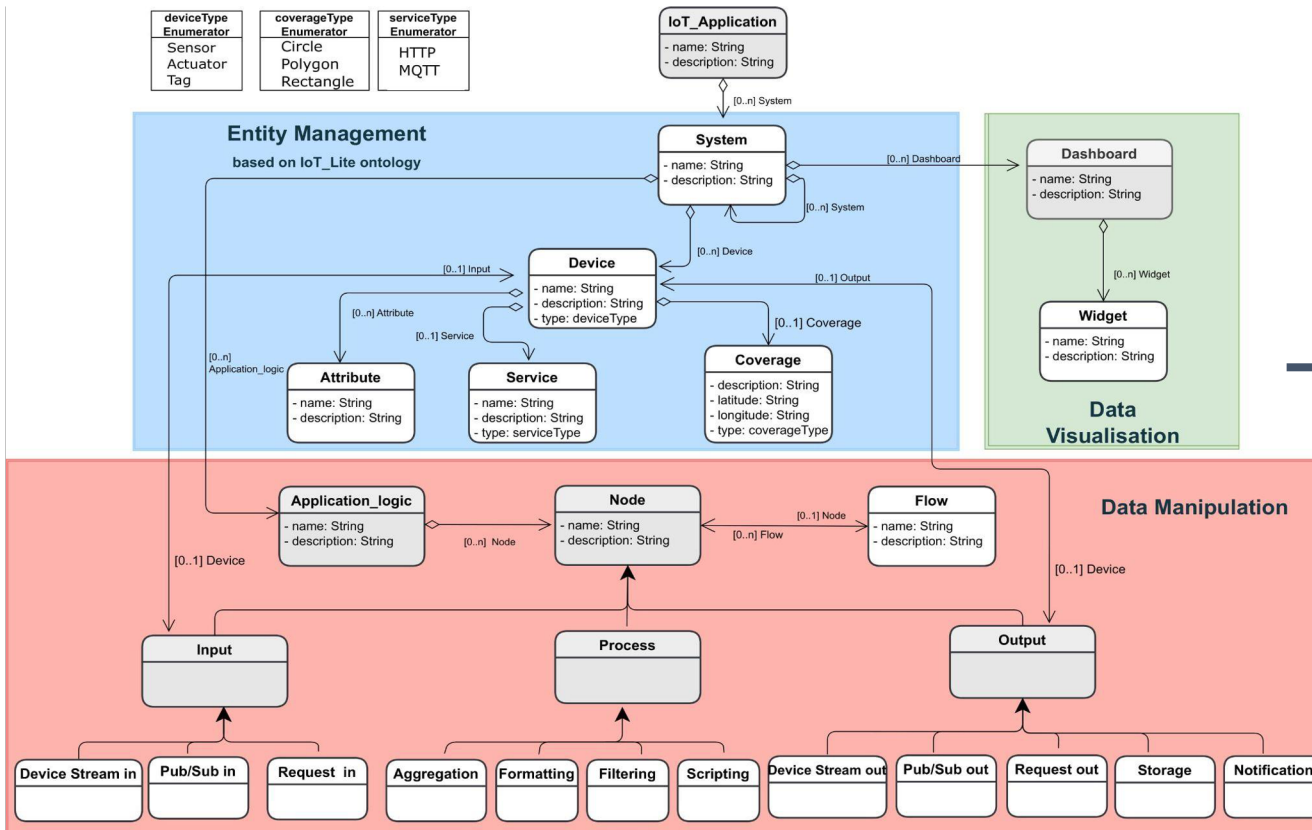
# Model Driven Engineering for IoT



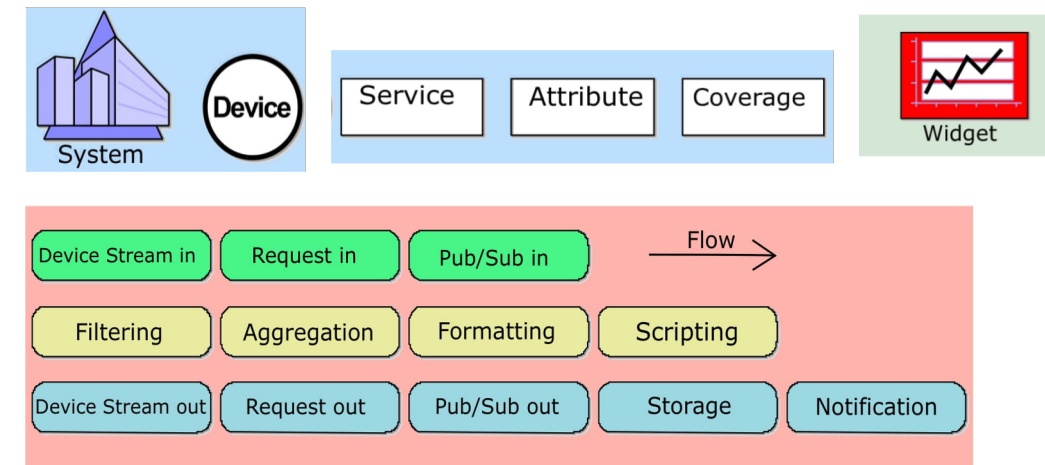
- Feature Models
- ADOxx metamodeling Platform
- Node-RED, ThingsBoard, Losant

# Domain Specific Modeling Languages

## Meta-Model

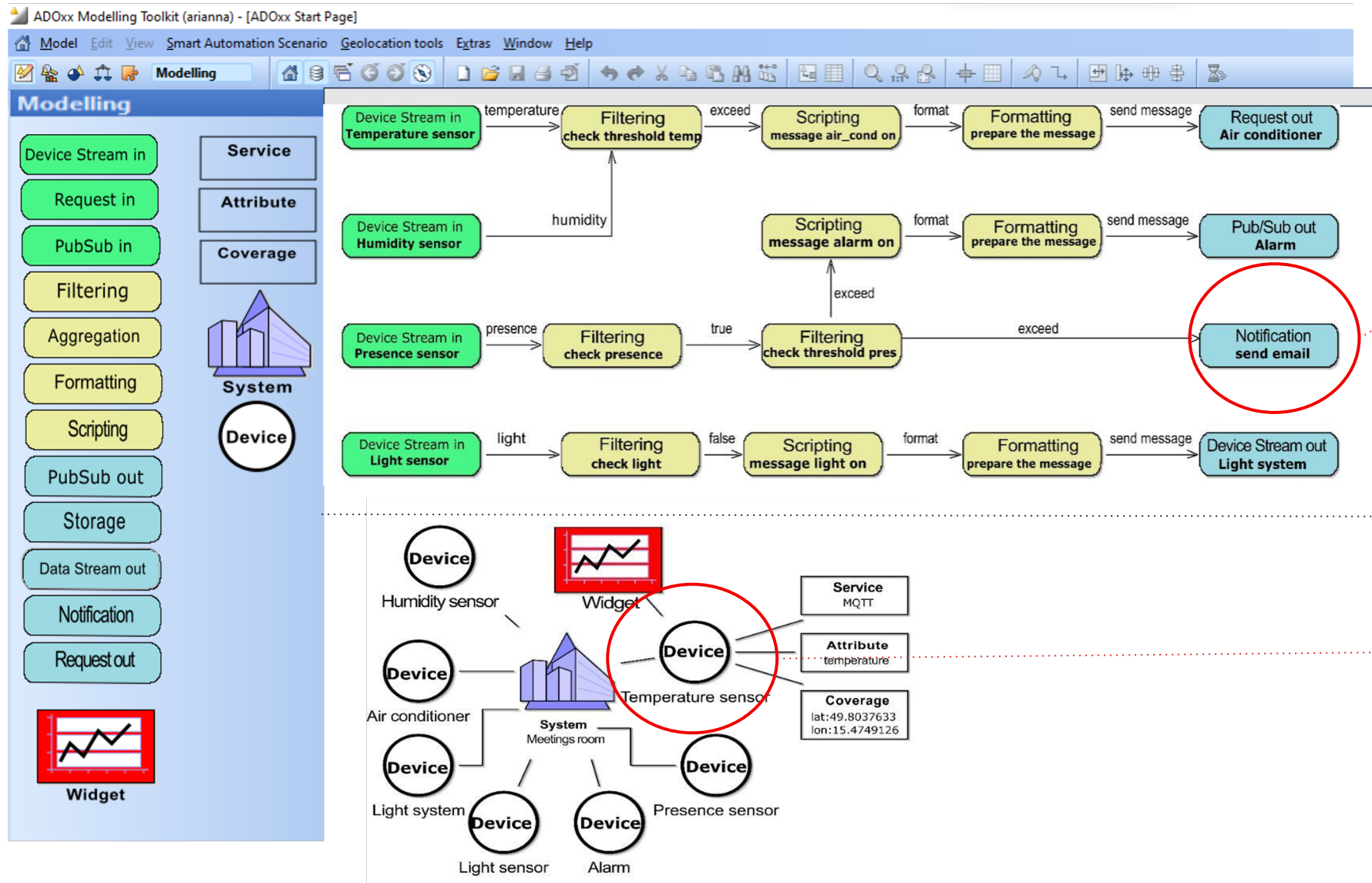


## Graphical Notation





# Domain Specific Modeling Languages



**notification-58224 (notification)**

name:	send email
description:	send email to the manager
from:	system@company.com
email:	enterprise.manager@company.com
content:	Overcrowding on the meetings room

**device-58221 (device)**

name:	Temperature sensor
description:	the device capture the temperature
type:	sensor
manufacturer:	Cisco
uuid:	dfgrt357-fgj5473-eggfp3-8ebmn9

# Cross-platform IoT Application

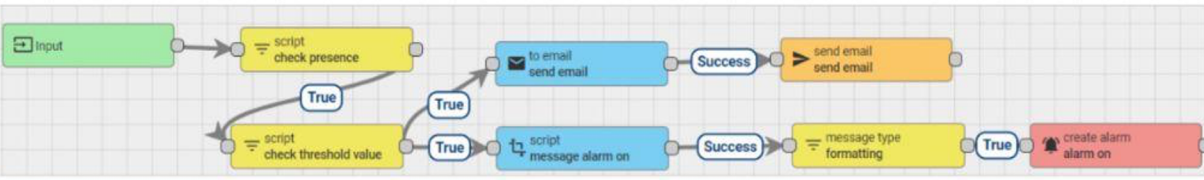
## ThingsBoard

## Losant

(a)

Device	Device Profile	Manufacturer	Transport Type
Presence sensor	Presence	Cisco	MQTT

(b)

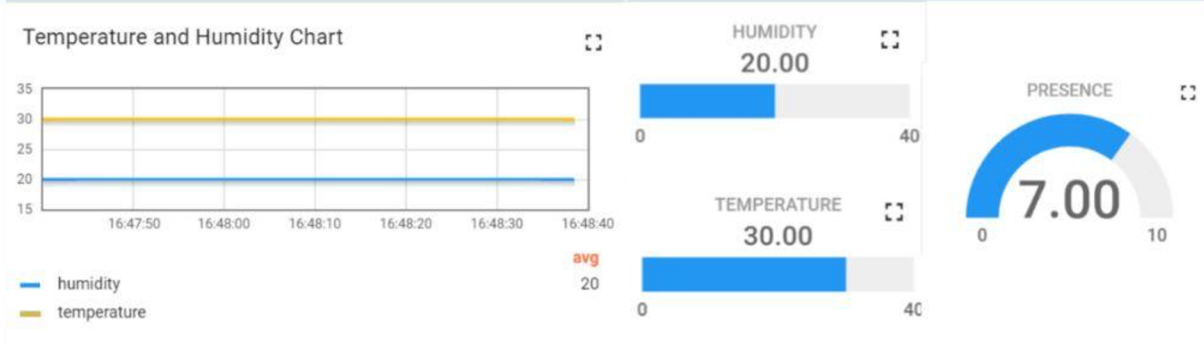


```

graph LR
    Input[Input] --> CheckPresence[script check presence]
    CheckPresence -- True --> SendEmail[send email]
    CheckPresence -- True --> CheckThreshold[script check threshold value]
    CheckThreshold -- True --> MessageAlarm[script message alarm on]
    SendEmail -- Success --> SendEmail2[send email send email]
    MessageAlarm -- Success --> FormatMessage[message type formatting]
    FormatMessage -- True --> CreateAlarm[create alarm alarm on]
  
```

Dashboard > Meetings room

(c)



Temperature and Humidity Chart

HUMIDITY 20.00

TEMPERATURE 30.00

PRESENCE 7.00

(a)

Name	Device Class	Type
Presence sensor ID: 608003b8b11dc30006856971	Standalone	MQTT

the device measure the presence in the room

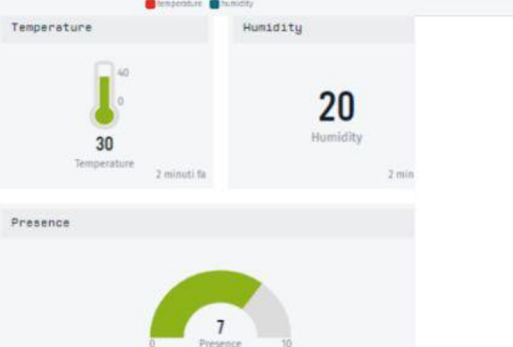
(b)



```

graph TD
    Device[Device: Input] --> CheckPresence[check presence]
    CheckPresence --> CheckThres[check thres...]
    CheckThres --> MessageAlarm[message ala...]
    CheckThres --> SendEmail[send email]
    MessageAlarm --> Format[Formatting]
    Format --> AlarmOn[alarm on]
  
```

(c)



Temperature and Humidity chart

Temperature 30

Humidity 20

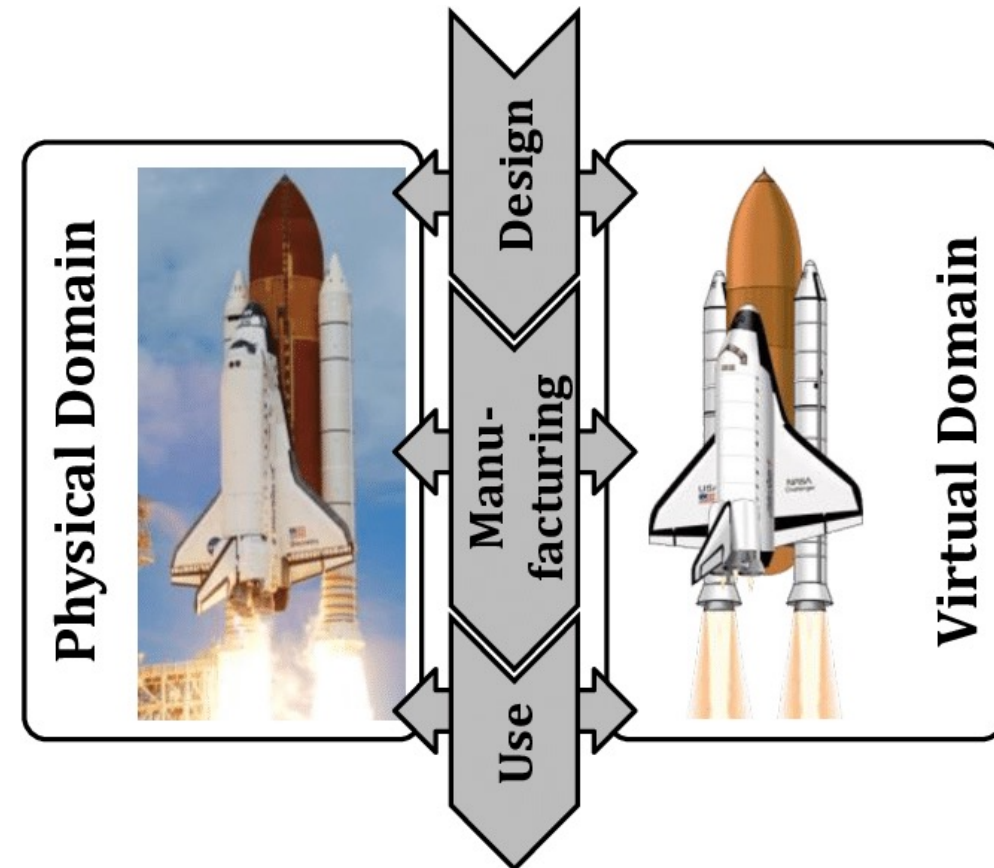
Presence 7

# Digital Twins

A **Digital Twin** is a virtual representation of real-world entities and processes, synchronized at a specified frequency and fidelity [1]

DTs are recognised as the **pioneer** of the **fourth industrial revolution** [2]

The global DT market size was valued at \$3 billion in 2020 and is estimated to reach \$48 billion by 2026 [3]

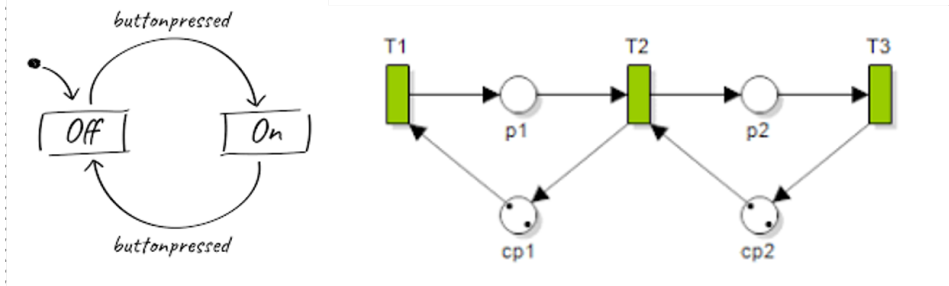
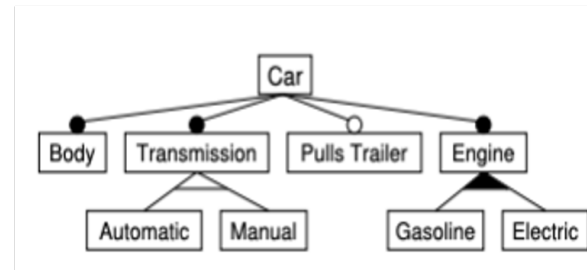
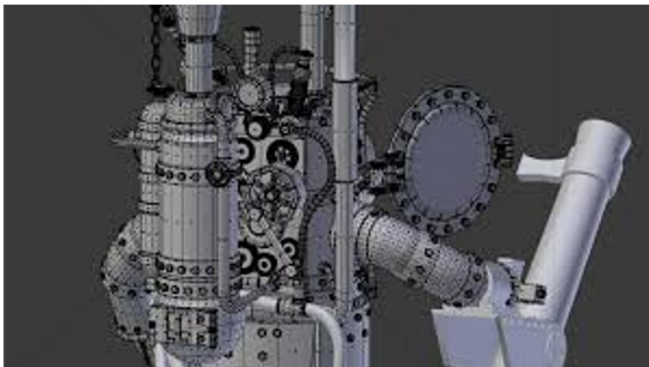


[1] Digital Twin Consortium, Definition of a Digital Twin, 2020

[2] M. Singh, E. Fuenmayor, E. P. Hinchy, Y. Qiao, N. Murray, and D. Devine, "Digital twin: Origin to future," Applied System Innovation, vol. 4, no. 2, 2021

[3] A. Velosa and P. Middleton. Emerging Technologies: Revenue Opportunity Projection of Digital Twins, Gartner, Stamford, Conn. Available online. Last time accessed September 2022

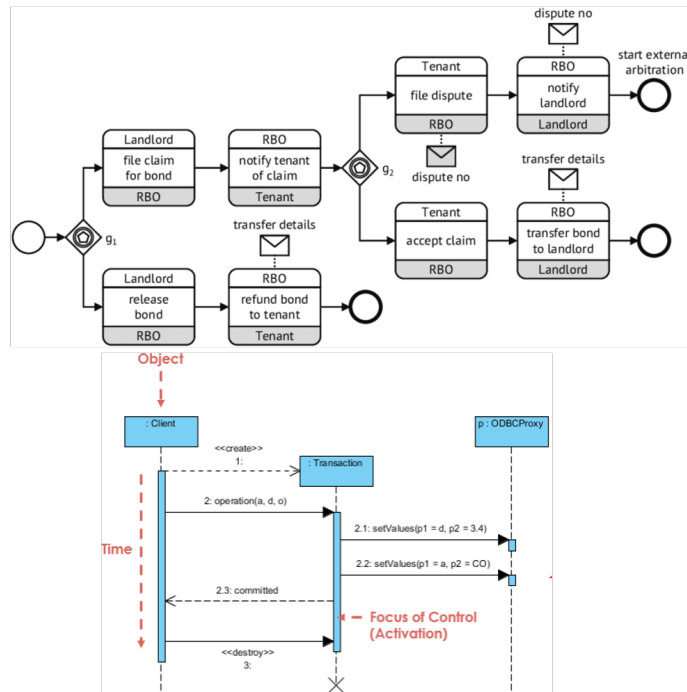
# Digital Twin - Representation



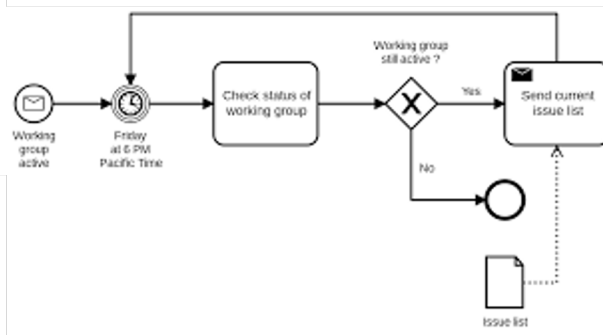
Blueprint, 2D, 3D models and feature diagram with enhanced information

Petri Nets, State Machines, BPMN, UML Component Diagrams

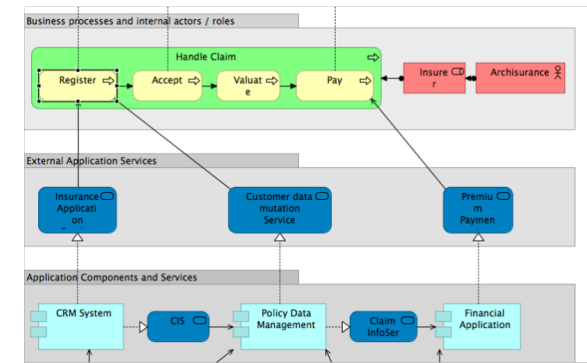
# Digital Twin - Interaction



BPMN Choreography and UML Sequence diagram



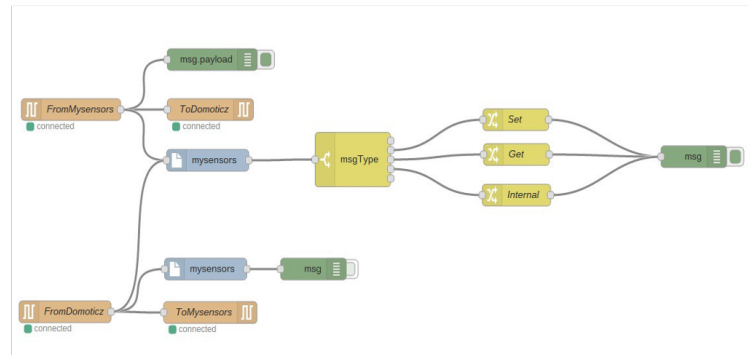
BPMN Collaboration Diagram



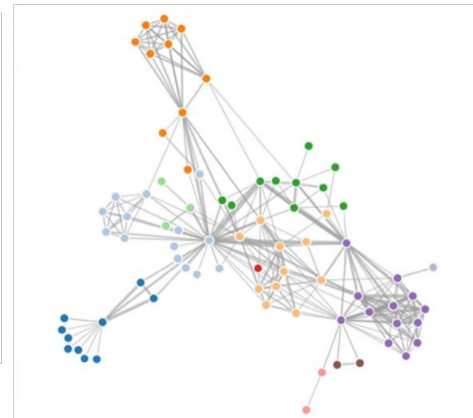
ArchiMate diagram



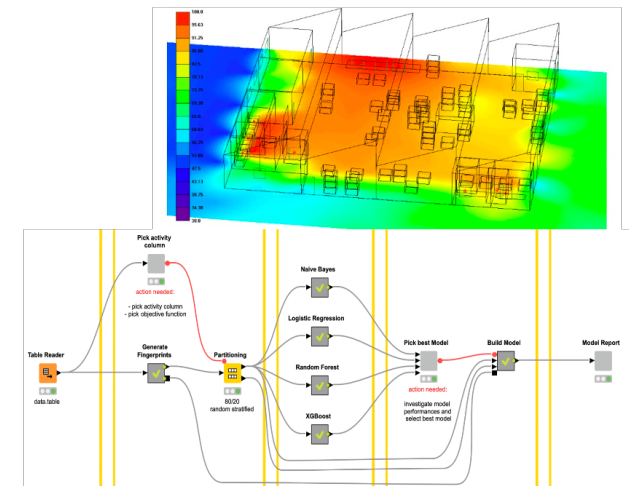
# Digital Twins - Functionalities



Visual Programming Models



Visual Data Modelling



Train Predictive Model

# Digital Twins



## Design and build

Accelerate time to market by empowering creative collaboration and efficient review in 3D design, building and manufacturing workflows.

[Learn more](#)

## Training

Upskill your workforce and improve information retention and safety outcomes with immersive learning experiences.

[Learn more](#)

## Simulation

Identify issues and improvements, and anticipate future operations by emulating, visualizing and simulating real-world assets.

[Learn more](#)

## Sales and marketing

Improve customer engagement and conversion with interactive and customizable 3D shopping experiences.

[Learn more](#) [Start interactive demo](#)

## Operations

Reduce costs and improve performance by managing, operating and optimizing large-scale infrastructure, facilities, and manufacturing plants.

[Learn more](#) [Start interactive demo](#)

# PROS Research Projects & Collaborations

**PROJECTS**

**SEDUCE**

Designing Spatially Distributed Cyber-Physical Systems under Uncertainty (MIUR-PRIN 2017) These systems are, and will be more and more, pervasive and ubiquitous,...

[READ MORE →](#)

**PROJECTS**

**Odeco**

ODECO is a 4-year Horizon 2020 Marie Skłodowska-Curie Innovative Training Network initiative (H2020-MSCA-ITN-2020, grant agreement 955569). The central aim of the...

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**PROJECTS**

**LearnPAD**

Model-Based Social Learning for Public Administrations, EU-FP7-ICT In modern society public administrations (PAs) are undergoing a transformation of their perceived...

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**COLLABORATIONS**

**Fachhochschule Nordwestschweiz**

In collaboration with Prof. Knut Hinkelmann, since 2007, a Double Degree Program between Master of Science in Business Information Systems @ FHNW...

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**COLLABORATIONS**

**Apromore**

In collaboration with Prof. Marcello La Rosa, @UniCam we hosted a local node of the Apromore Platform.

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**PROJECTS**

**Fluidware**

PRIN PROJECT FLUIDWARE FUNDED BY ITALIAN GOVERNMENT (MIUR) N. 2017KRC7KT The objective of the project is to develop a novel...

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**PROJECTS**

**Choreos**

Large Scale Choreographies for Future Internet, EU-FP7-ICT The CHOReOS project positions itself in the context of the Ultra-Large-Scale (ULS) Future...

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**Regional Projects:** [Miracle](#)

**National Projects:** [Vitality](#), [SAFE](#), [Fluidware](#), [SEDUCE](#)


**European Projects:** [LearnPAD](#), [ODECO](#)

**Internal Projects:** Group Projects and Thesis can be carried out within the PROS Lab


# Gam-related Events/Activities

# Orientation Activity

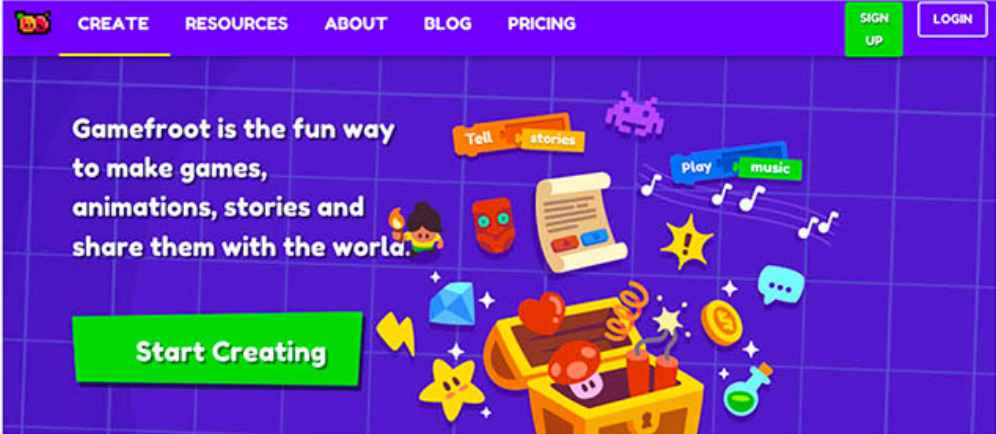
[www.unicam.it](http://www.unicam.it)



Università di Camerino  
Scuola di Scienze e Tecnologie  
Sezione di Informatica



**IVIPRO**  
italian  
videogame  
program



CREATE RESOURCES ABOUT BLOG PRICING SIGN UP LOGIN

Gamefroot is the fun way to make games, animations, stories and share them with the world.

Tell stories play music

Start Creating

Contest  
edizione IV  
**2023**

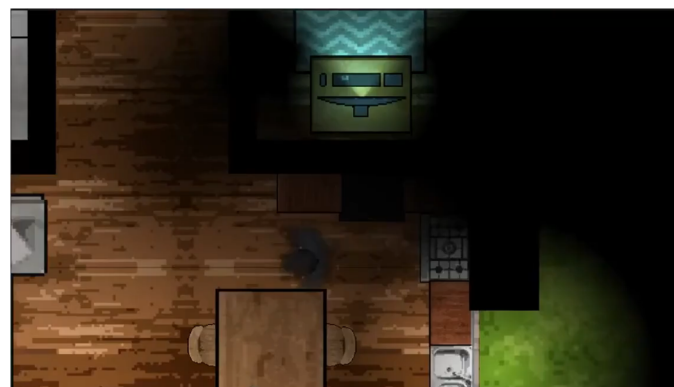
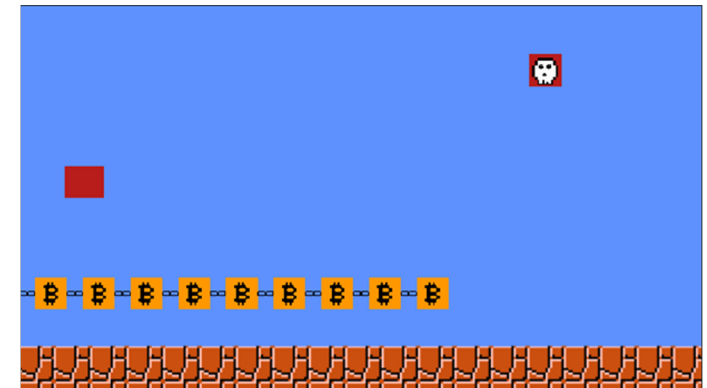
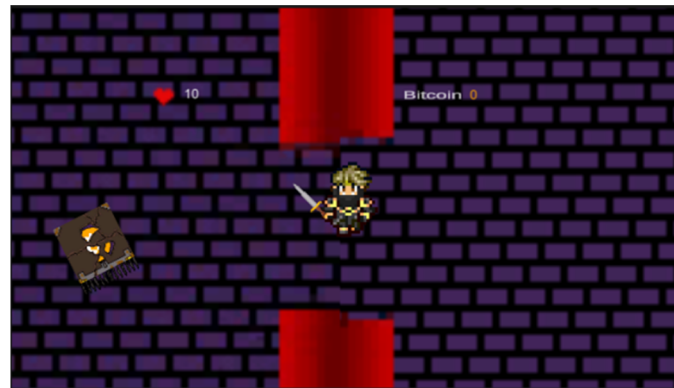
**Informatica × Gioco = Fantasia + Regole**  
**PREMIAZIONE SCUOLA VINCITRICE**

**venerdì 19 maggio 2023**, ore 10:00  
<https://unicam.webex.com/meet/InformaticaUnicamPCTO>



# Orientation Activity

Games on Blockchain e Cybersecurity developed by high school students



# Orientation Activity



computerscience.unicam.it

**GAME DESIGN nelle discipline STEM**

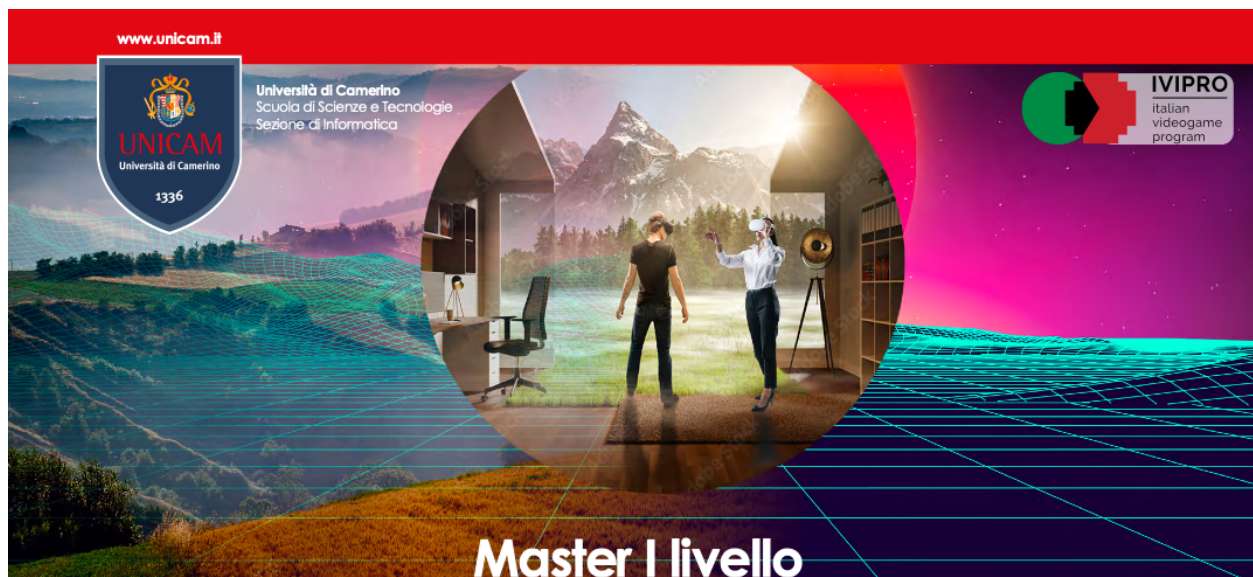
The graphic features a central 'STEM' text in a digital font, surrounded by various icons representing technology, education, and innovation. At the top, two stylized figures of a boy and a girl are shown pointing towards the center. The background is dark blue with glowing lines and dots, creating a futuristic atmosphere.

per raccontare come eroine geniali e visionarie hanno fatto la storia dell'informatica

Summer orientation activity aimed at 50 male and female students attending the third and fourth year of secondary schools in the 2021-22 school on a national level.

# Master in Game Design

<https://computerscience.unicam.it/mastergamedesign>



## Game design per la valorizzazione dei territori e del patrimonio culturale

Realizzato in Collaborazione con l'Associazione IVIPRO - Italian Videogame Program

Il **Game designer** per i territori e il patrimonio culturale è una figura ibrida e duttile, **competente sia nell'ambito del game design che nella programmazione base di videogiochi**. Un profilo in grado di contribuire - su più fronti e in differenti momenti del processo - a progetti ludici, con un focus particolare sulla valorizzazione del territorio e del patrimonio culturale e sugli aspetti divulgativi dell'esperienza videoludica. Il Game designer per i territori e il patrimonio culturale sarà in grado di concepire la struttura di gioco a partire dagli elementi di gameplay e design per arrivare alle fasi di ricerca e scrittura per videogame. In parallelo, sarà dotato degli strumenti necessari per rapportarsi con il team di programmazione, comprenderne le esigenze e fornire supporto tecnico in un'ottica di team working e team building.

Il profilo formato potrà trovare occupazione all'interno di studi di sviluppo e di istituzioni interessate a valorizzare il patrimonio culturale e territoriale tramite le nuove tecnologie. Potrà essere figura di raccordo tra realtà di sviluppo ed enti locali. Concepire e attuare percorsi di valorizzazione e di studio in grado di mettere in relazione patrimonio, contesti culturali tradizionali e videogiochi. Potrà trovare impiego in ambito didattico ed educativo, con particolare riferimento al filone della media education, sempre più spesso inclusa nei percorsi scolastici.

**Piano Didattico**

- Modulo 1 - **Storia e teoria del videogioco** (6 CFU - 42 ore)
- Modulo 2 - **Concept e Game design** (6 CFU - 42 ore)
- Modulo 3 - **Game design per il territorio** (6 CFU - 42 ore)
- Modulo 4 - **Programmazione e piattaforme di sviluppo** (20 CFU - 120 ore)
- Modulo 5 - **Tecniche Avanzate** (10 CFU - 60 ore)
- Modulo 6 - **Videogiochi per la formazione** (4 CFU - 24 CFU)
- Stage** (6 CFU - 150 ore)
- Prova Finale** (2 CFU)

Il percorso formativo ha **durata di 1 anno**. Le lezioni di didattica frontale saranno svolte prevalentemente on-line con esami in presenza. Le attività didattiche **inizieranno** entro il mese di **dicembre 2022** e si concluderanno entro il mese di **luglio 2023**. Le altre attività formative, stage e tesi, termineranno entro il mese di dicembre 2023.

<https://computerscience.unicam.it/mastergamedesign>

La quota di iscrizione ammonta a € 2.800

Scadenza iscrizioni **14/10/2022**, esclusivamente on-line, nell'apposita sezione su: [www.unicam.it/miiscrivo](http://www.unicam.it/miiscrivo)

[segreteria.scienze@unicam.it](mailto:segreteria.scienze@unicam.it)

tel: 0737 402126



# Game-related Seminar

www.unicam.it



Università di Camerino  
Scuola di Scienze e Tecnologie  
Sezione di Informatica



**Francesco Basile**, Co-founder  
King Esport

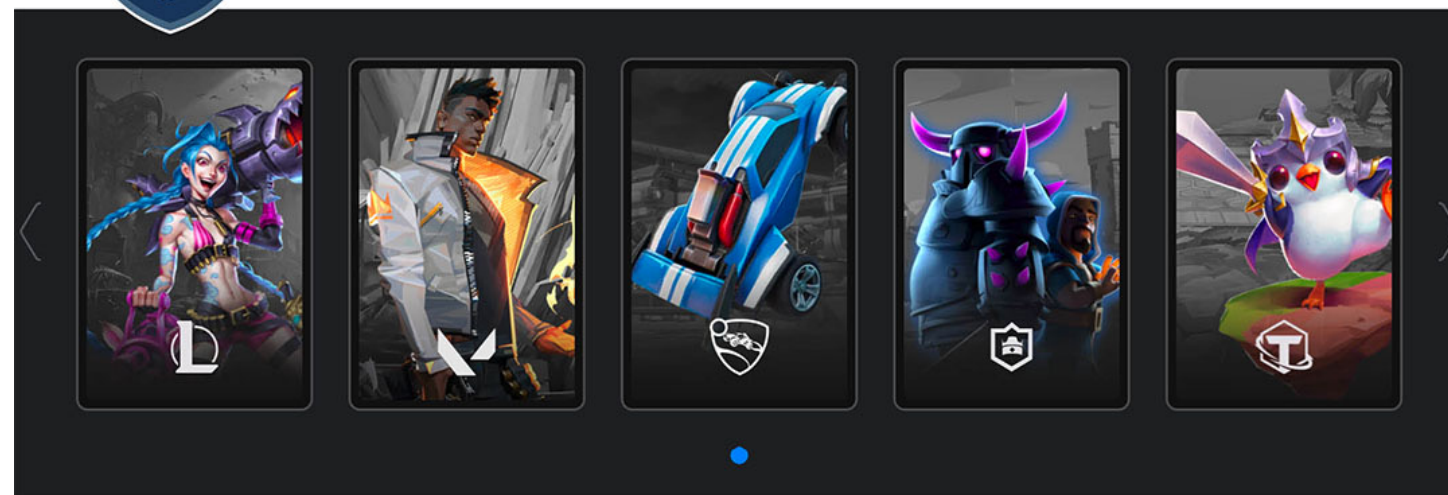
([www.kingessport.com](http://www.kingessport.com))

**Davide Deodati**, Co-founder di  
Bamboo Studio Game

([www.bambostudio.com](http://www.bambostudio.com))

**Claudio David**, CEO di Kibe  
Software House

([www.kibesh.com](http://www.kibesh.com))



## Game design: dalla progettazione di un videogioco alla vendita sul mercato

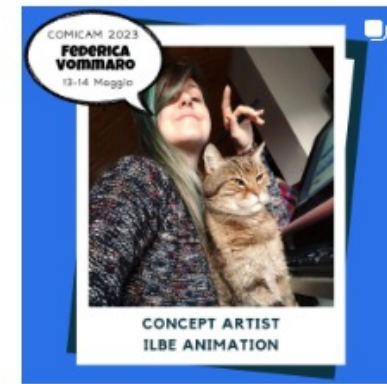
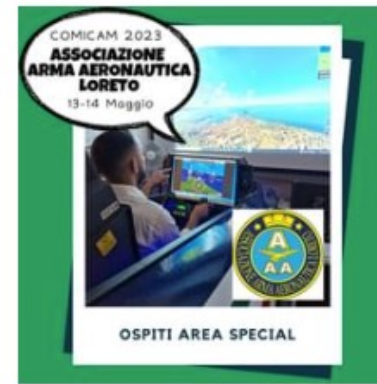
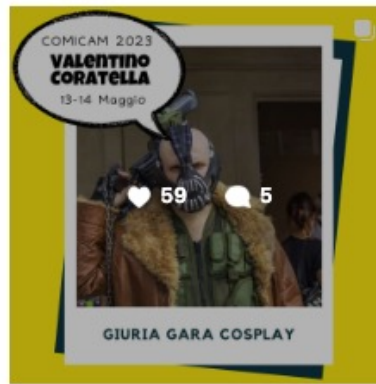
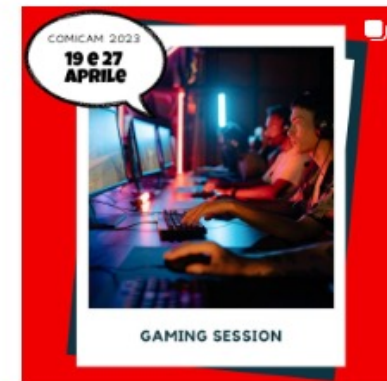
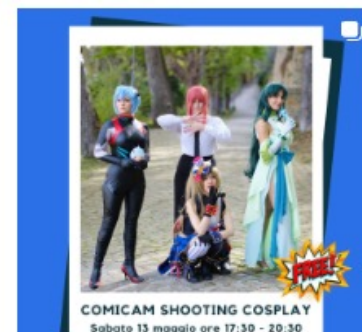
**Camerino** martedì **21 marzo** 2023

Polo Informatico "Lodovici"- **Aule Team Lab e AA1** - via Madonna delle Carceri 7

link webex: <https://unicam.webex.com/meet/InformaticaUnicam>

# COMICAM 13-14 Maggio

<https://www.comicam.it/>





# Game-related Projects

# UNICAM Playground

<http://playground.unicam.it/>



Welcome in Unicam PlayGround!

We are a community of students (Bachelor's, Master's and  
Doctorate) and professors of Computer Science Department of  
University of Camerino

interested in developing and studying softwares about games.  
We believe that these can be used in many research fields and  
viceversa, games can benefit from the research.

Main Contact:  
Nicola del Giudice



# Sec Game

<https://sec-game.unicam.it/>



# PlayWithUnicam

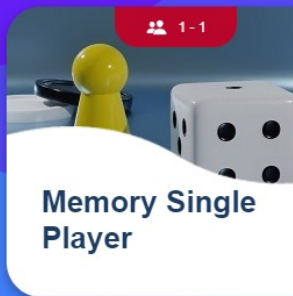
<https://github.com/UnicamPlayGround/PlayWithUnicam>

PlayWithUnicam



## Catalogo dei giochi

1-1



**Memory Single Player**

### Info lobby

Partecipanti

MIN  
1

Visibilità pubblica

Se attivo, permette a tutti i giocatori online di trovare la lobby e di partecipare.

Condividi link

Salva modifiche

Codice Lobby

**454694**

Gioco dell'Oca

ABBANDONA LA PARTITA

LANCIA DADO



Memory

Classifica

- Mario 0
- Luigi 0
- Lorenzo 0
- Marco 0

Torna alla lobby

Giocatore corrente  
Mario





# PlayWithUnicam



# VR Escape Room

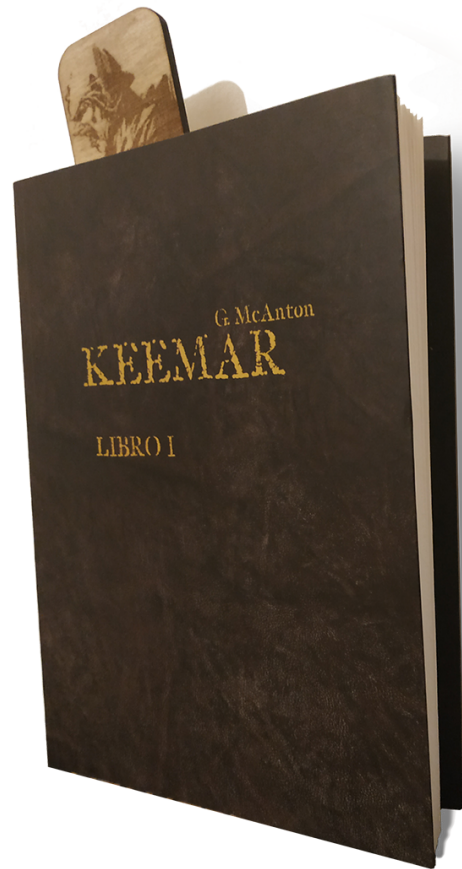


HP Reverb G2





# Keemar



## Land of Keemar

Grazie alla collaborazione con Unicam, la APP veicolerà attivamente il turista da un luogo all'altro. **SOLO** giungendo sul luogo indicato sulla mappa e scansionando il Codice QR si attiverà la tappa nella quale il viaggiatore avrà la possibilità di scegliere tra la storia del Keemar e quella Reale. Perché il vero protagonista rimane il territorio.

# App



# TEnCu

<https://github.com/UnicamPlayGround/TEnCu>

## TEnCu Framework

---

### Tool for Entertainment and Culture

---

 Made with   Made with   Unity 2020.2.1f1  license  MIT  issues  1 open  pull requests  2 open  contributors  2

 Forks  2

---

## Intro

Nowadays many applications show 3D models or 2D sprites. Is also common to let the user explore the environments or interact with these objects. TEnCu: Tool for Entertainment and Culture, is a framework that aims to help the development of games and apps that have to show models and sprites.

# Future Projects



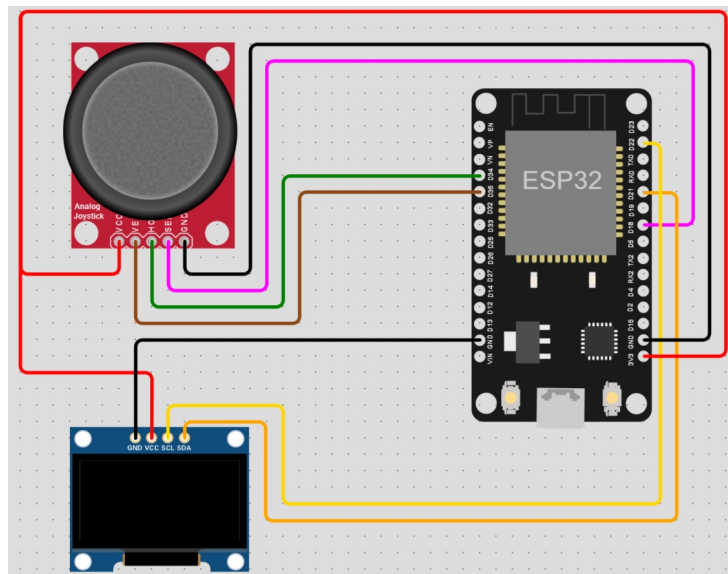
# IoT & Games

Team:

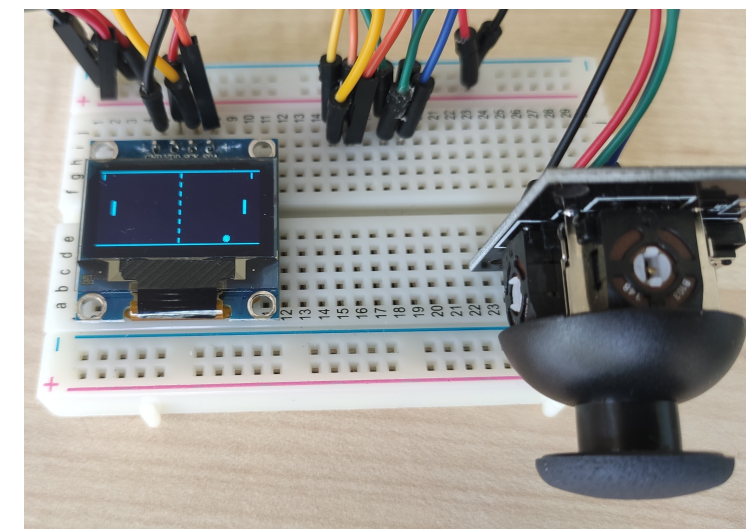
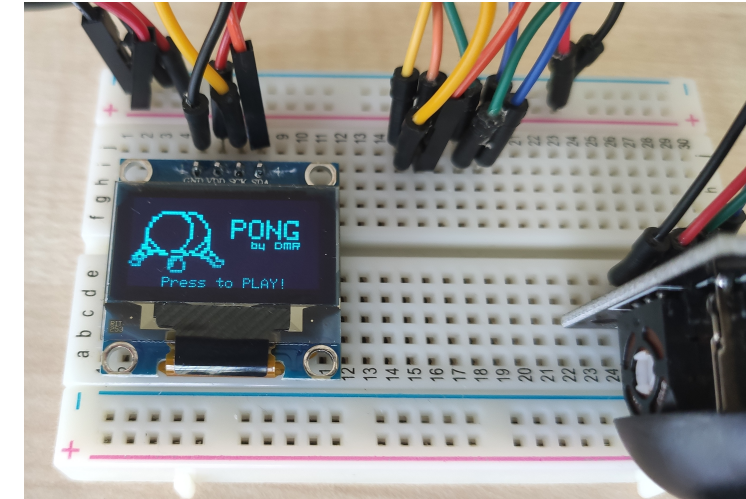


The following hardware is required to run this project:

- 2 x ESP32 modules;
- 2 x OLED displays (SSD1306, 128x64 pixels);
- 2 x Joystick modules;



Main Contacts:  
Fabrizio Fornari  
Massimo Callisto De Donato





# AI vs MAN

**Objective:** To develop an application that will allow a human to play checker against a robotic arm controlled by an AI

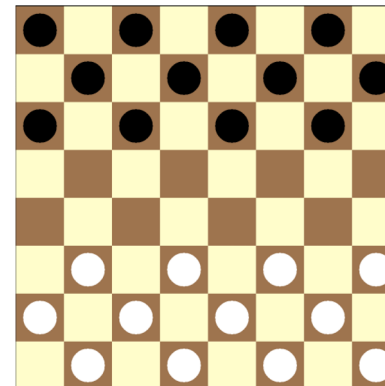
**Working Phases:** Study of the robotic arm, Study of the technologies to be used, Design of the software, implementation, testing

**Tecnologie:** Dobot Magician

## Main contact:

Fabrizio Fornari

[fabrizio.fornari@unicam.it](mailto:fabrizio.fornari@unicam.it)



# UNICAM Virtual Environment

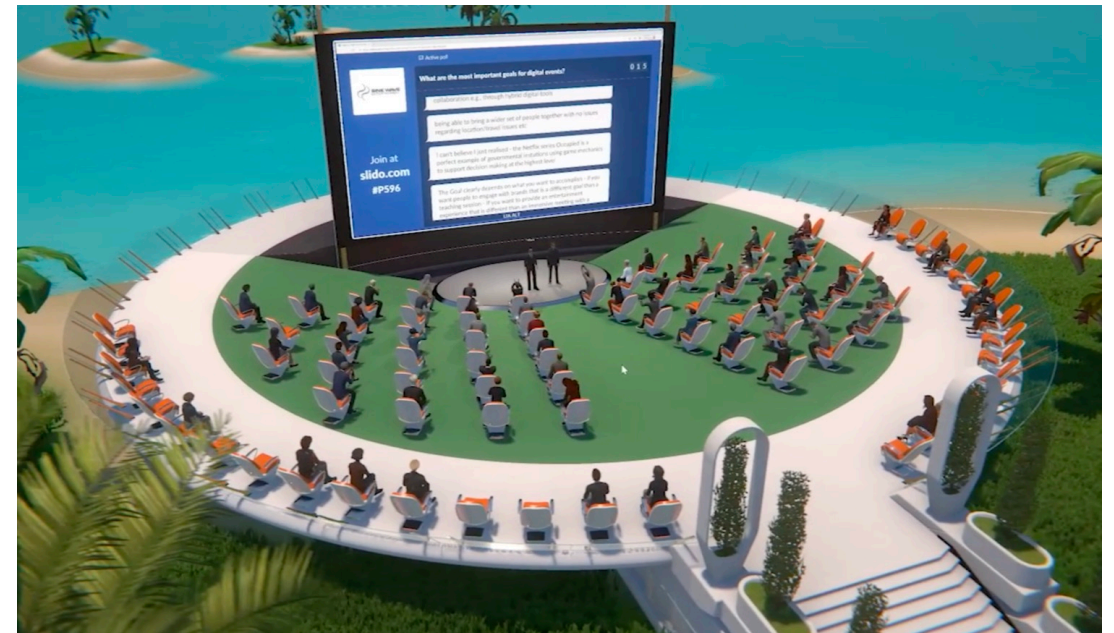
**Objective:** To design and create an immersive virtual environment that can act as a showroom for the activities carried out within the computer science faculty with embedded video, the possibility of interacting with teachers, researchers, students, etc.

## Examples

<https://www.gather.town/>

<https://framevr.io/>

Contact:  
Fabrizio Fornari  
Nicola Del Giudice



# UNICAM GAME Community



Main Contact: Francesco Moschella



# Game-related Courses



# Game-related Courses

**Laurea Triennale in Informatica per la Comunicazione Digitale**  
**3° anno (Erogato nel 2023/24)**

**Game Design (6 CFU) - 1° Semestre**

**MSc in Computer Science - Methodologies and Technologies  
for Digital Communication (MTDT) Curriculum**

**Applied Game Design (6 ETCS) - 2nd Semester**

# Back to the origin





Reykjavík University



University of Camerino



# Specification and Prototype Implementation of an OpenSource Interactive Ambient Application

School of Computer Science

*Master of Science in Computer Science*

October 2013

Candidate:  
Fabrizio Fornari

Supervisors:  
Prof. Kristinn R. Thórisson  
Prof. Luca Tesei



# LivingShadows



*Art technology project run by*

ICELANDIC INSTITUTE FOR INTELLIGENT MACHINES



VITVÉLASTOFNUN ÍSLANDS

# Why Shadows?

**Because it is something you don't expect to interact with!**

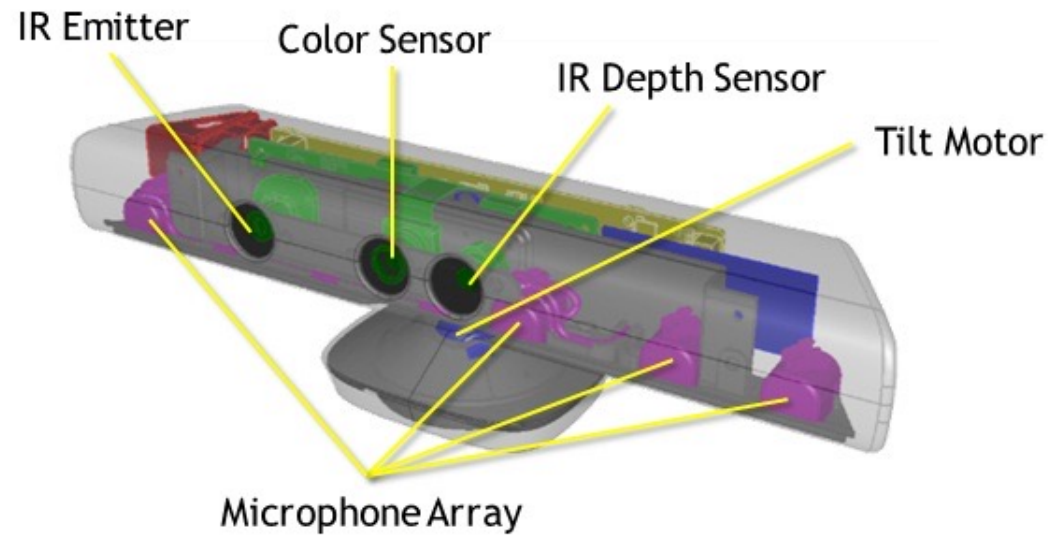


# Spatial Augmented Reality (SAR)

SAR doesn't require any extra display device, such as monitors, head mounted displays, etc. it makes use of real-world objects like workbenches or walls as display screens.



# 3D Sensor



## Provided Data

- Depth and segmentation map





# 3D Sensors on the Market

- XBOX 360 KINECT



- WINDOWS KINECT



- ASUS XTION PRO LIVE
- CARMINE 1.08 PrimeSense

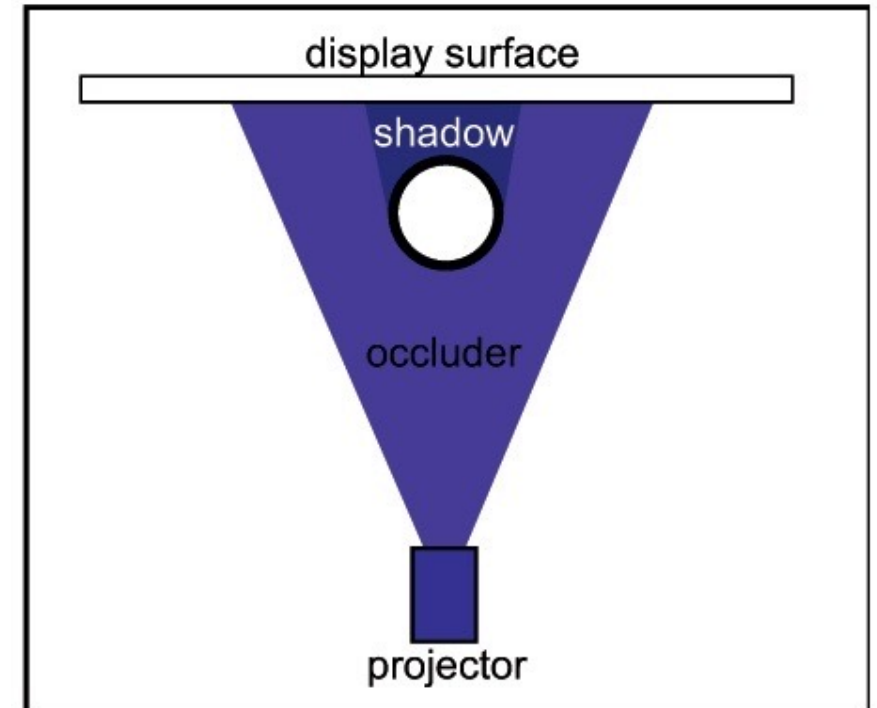


# Other Hardware

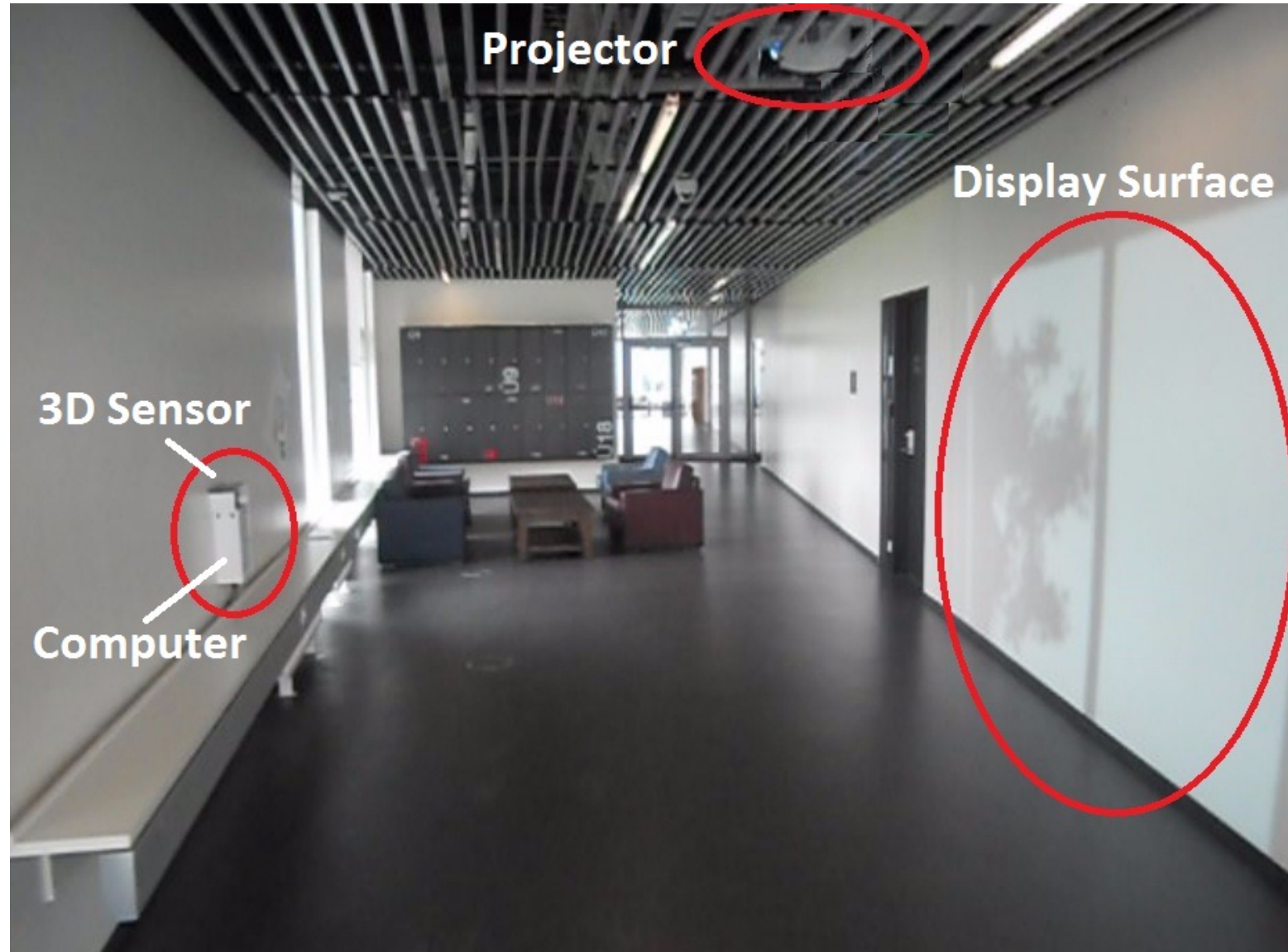


Mac-Mini

NEC U260W Ultra-short range projector to avoid →



# The Prototype



# Passers-by



LivingShadows: passers-by with their projected shadows and a virtual tree.

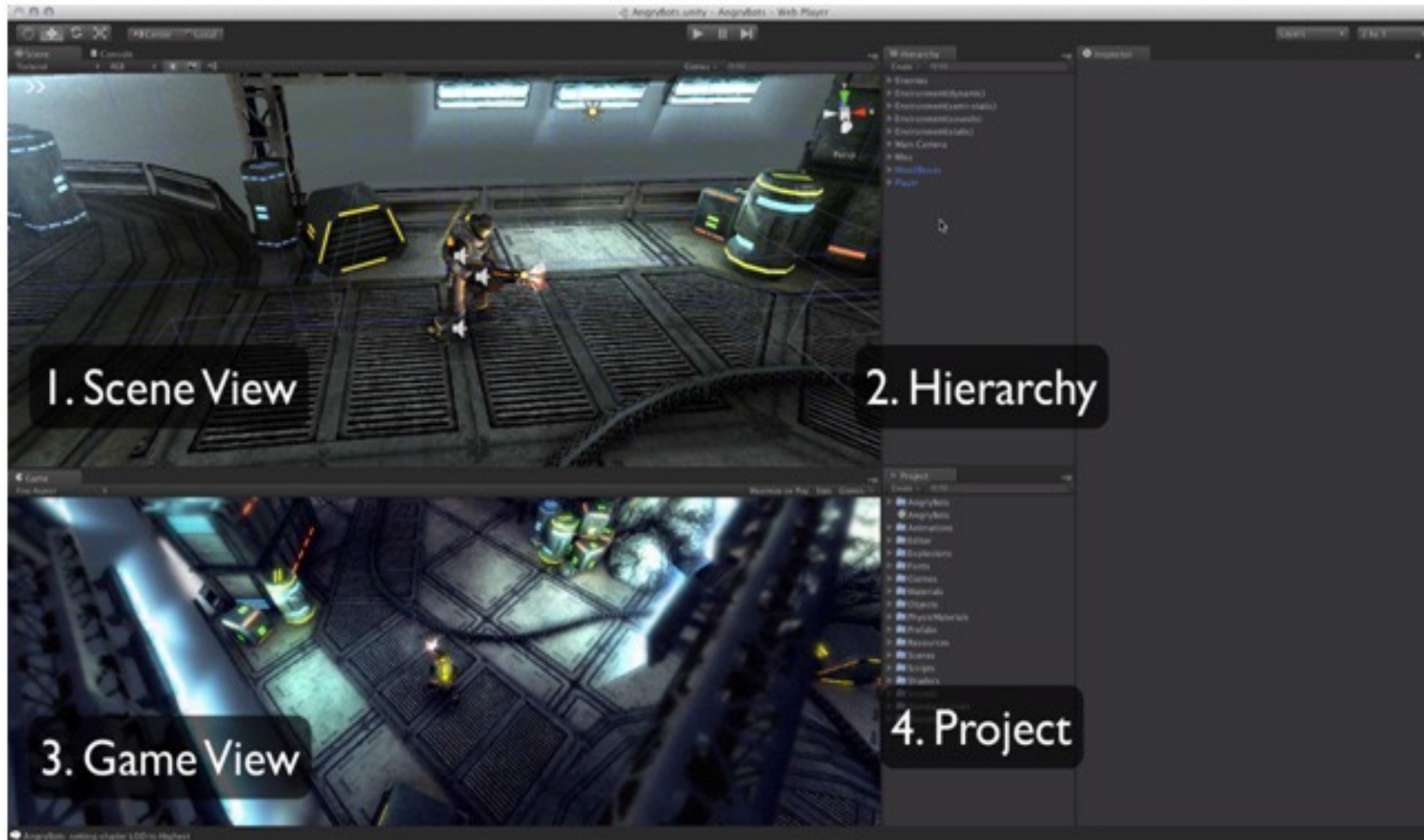


# Software

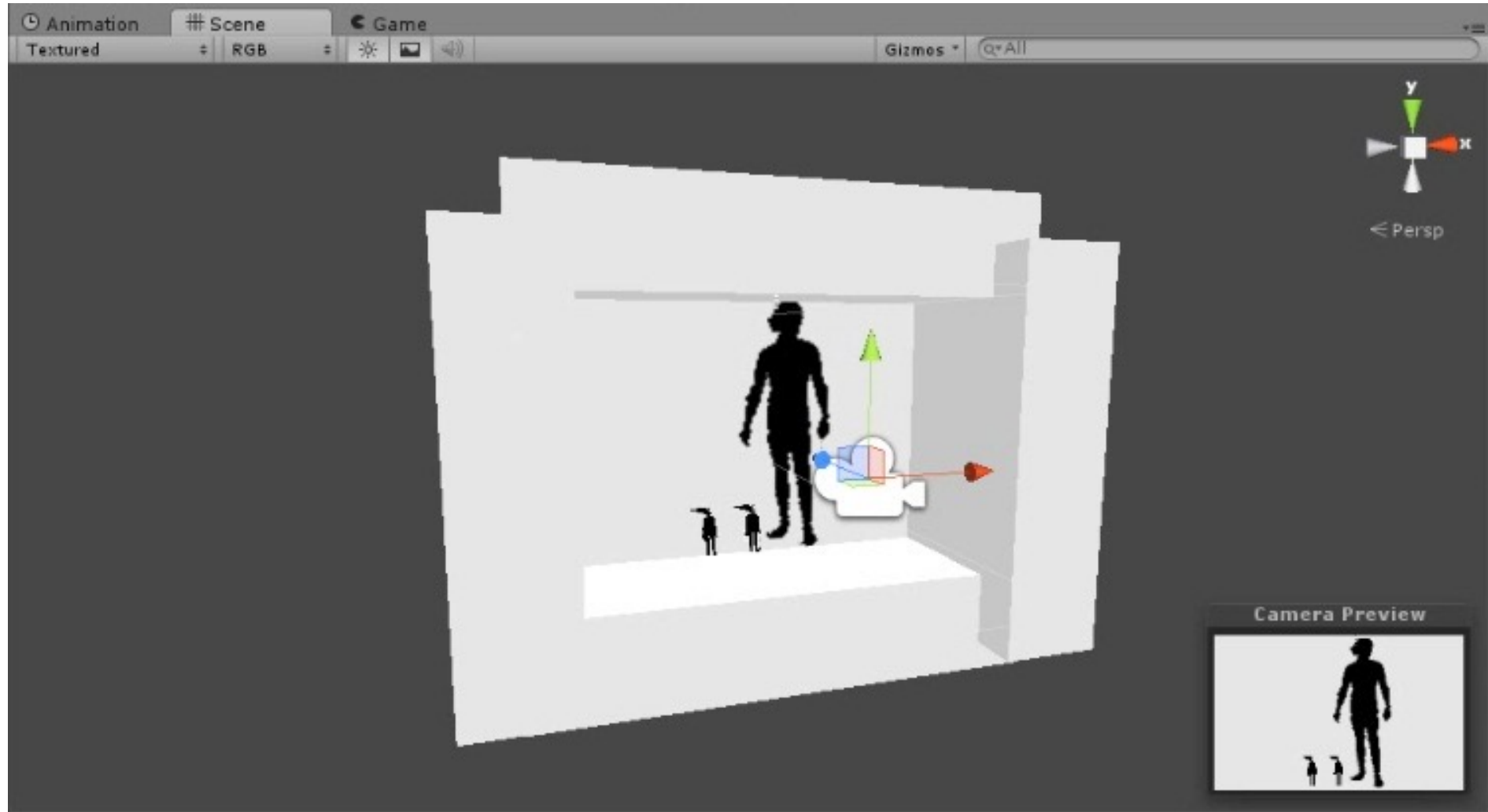
- Unity3D
- OpenNI
- Zigfu



# Unity

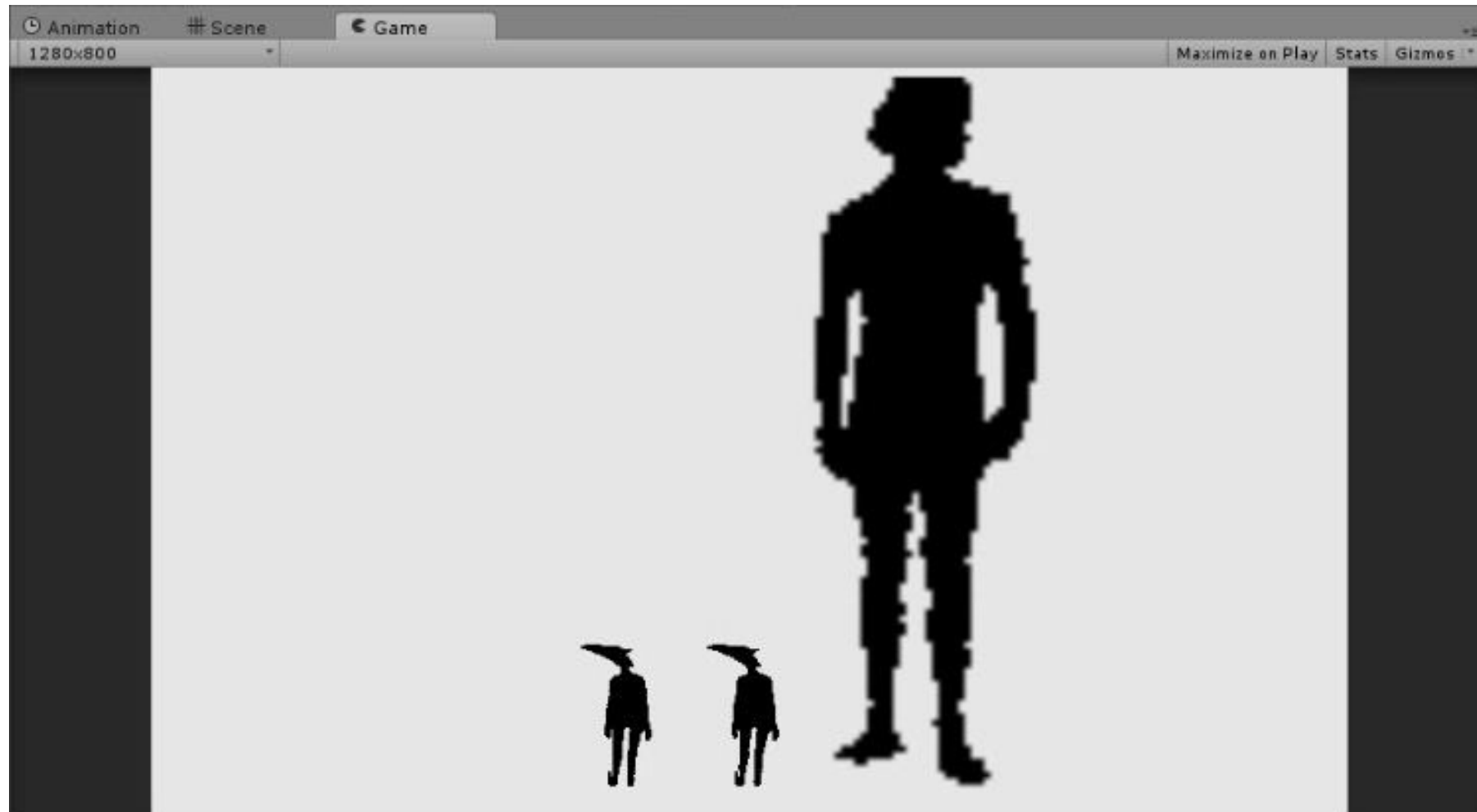


# Implementation



Basic scene with: plane, texture, 3D models and camera.

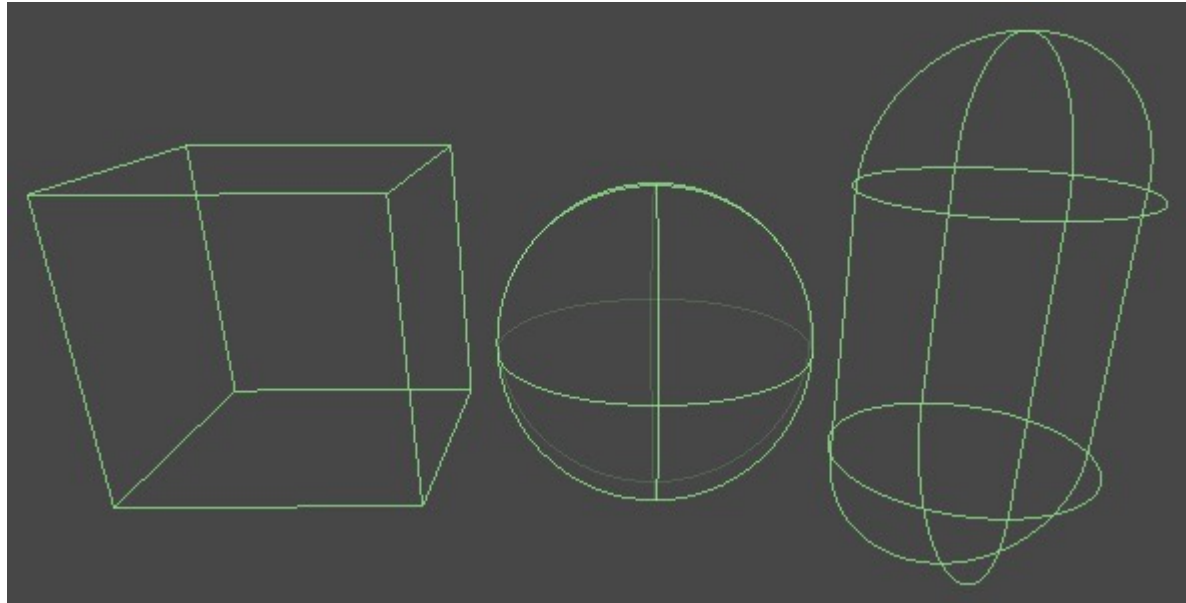
# Camera View





# Shadows-3D models Interactions (1)

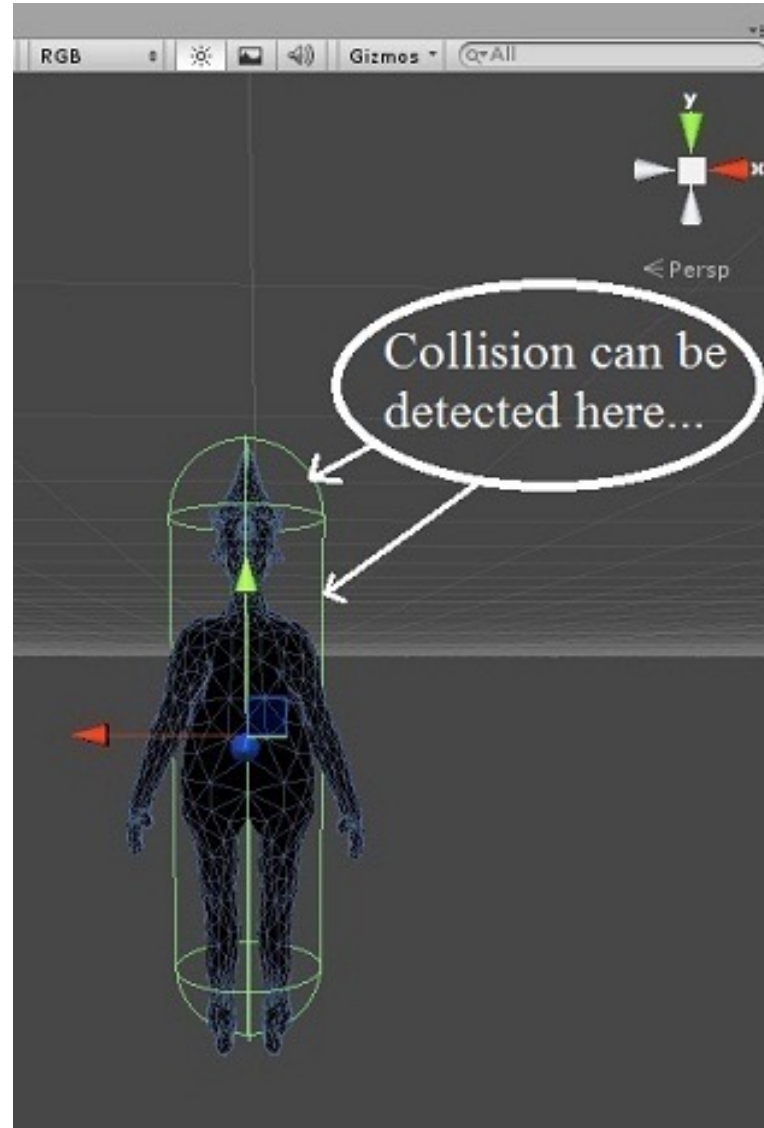
- Colliders are used to detect collision between models inside Unity3D



# Shadows-3D models Interactions (2)



# Colliders issue

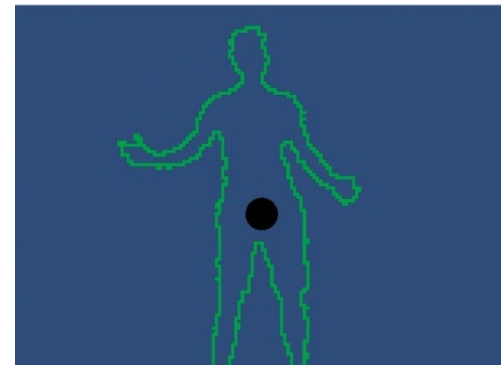
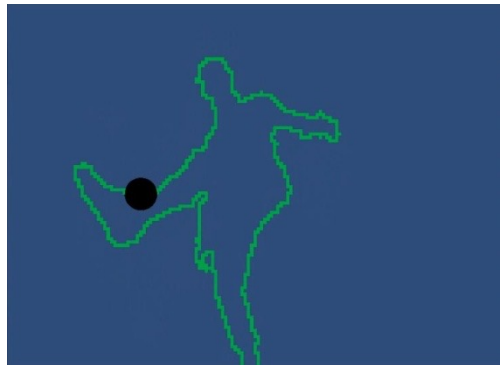


# Other ways to identify interactions

- 3D model from skeleton tracking



- Edge detection and 3D object instantiation

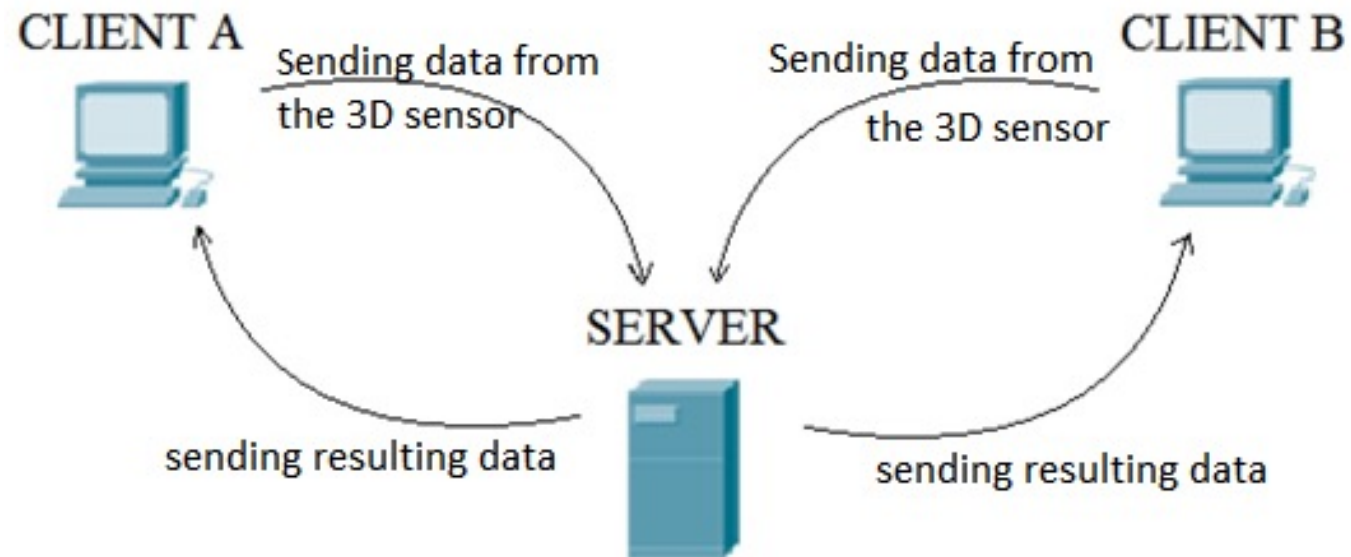




# Communication



## Client-Server Architecture

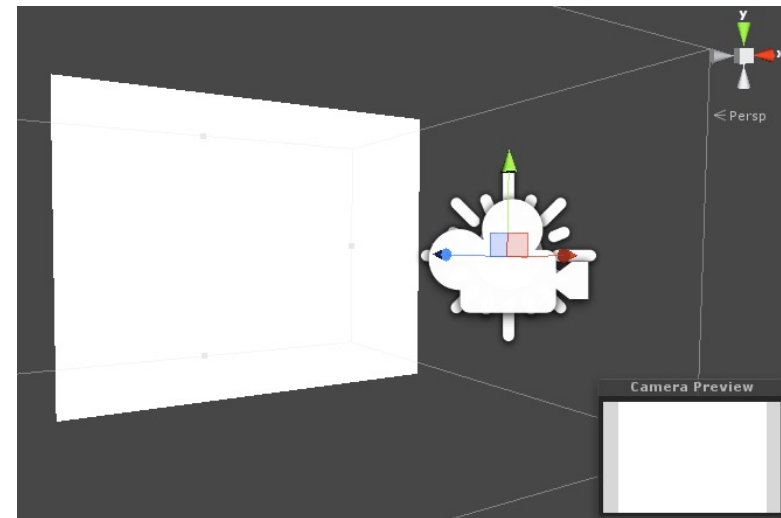


# Client

- Menù scene



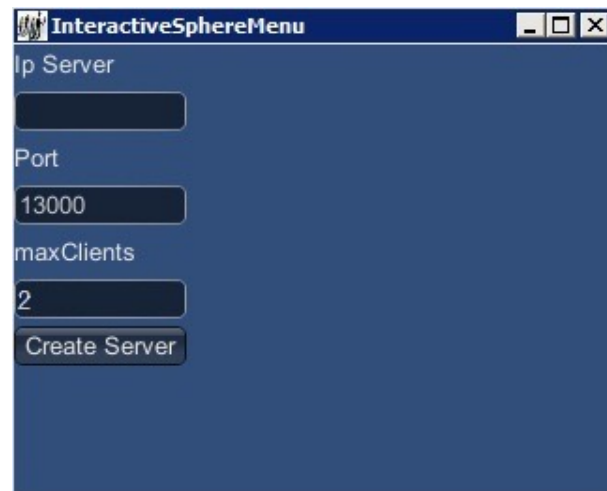
- Client scene



# Server

## Server Connection Handler

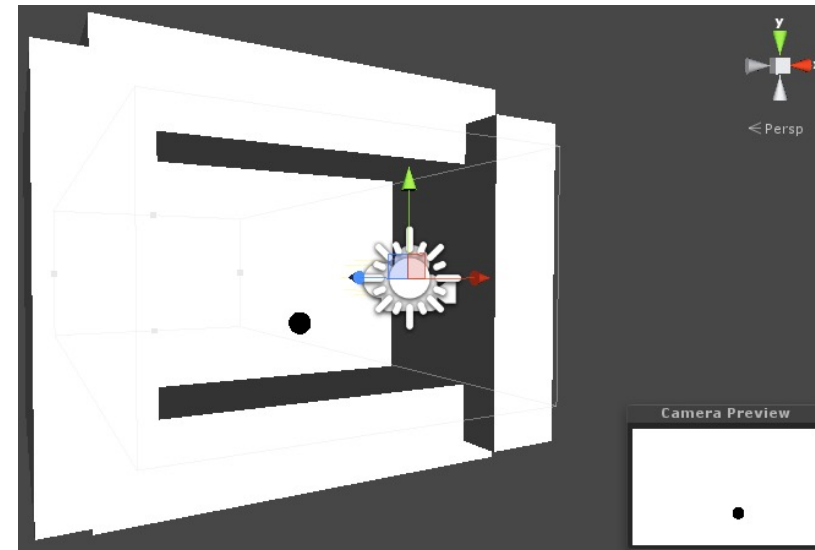
- Menù scene



- Server Connection scene

## Server Interaction Handler

- ServerInteraction



# Applications

- **Burst Them All!**





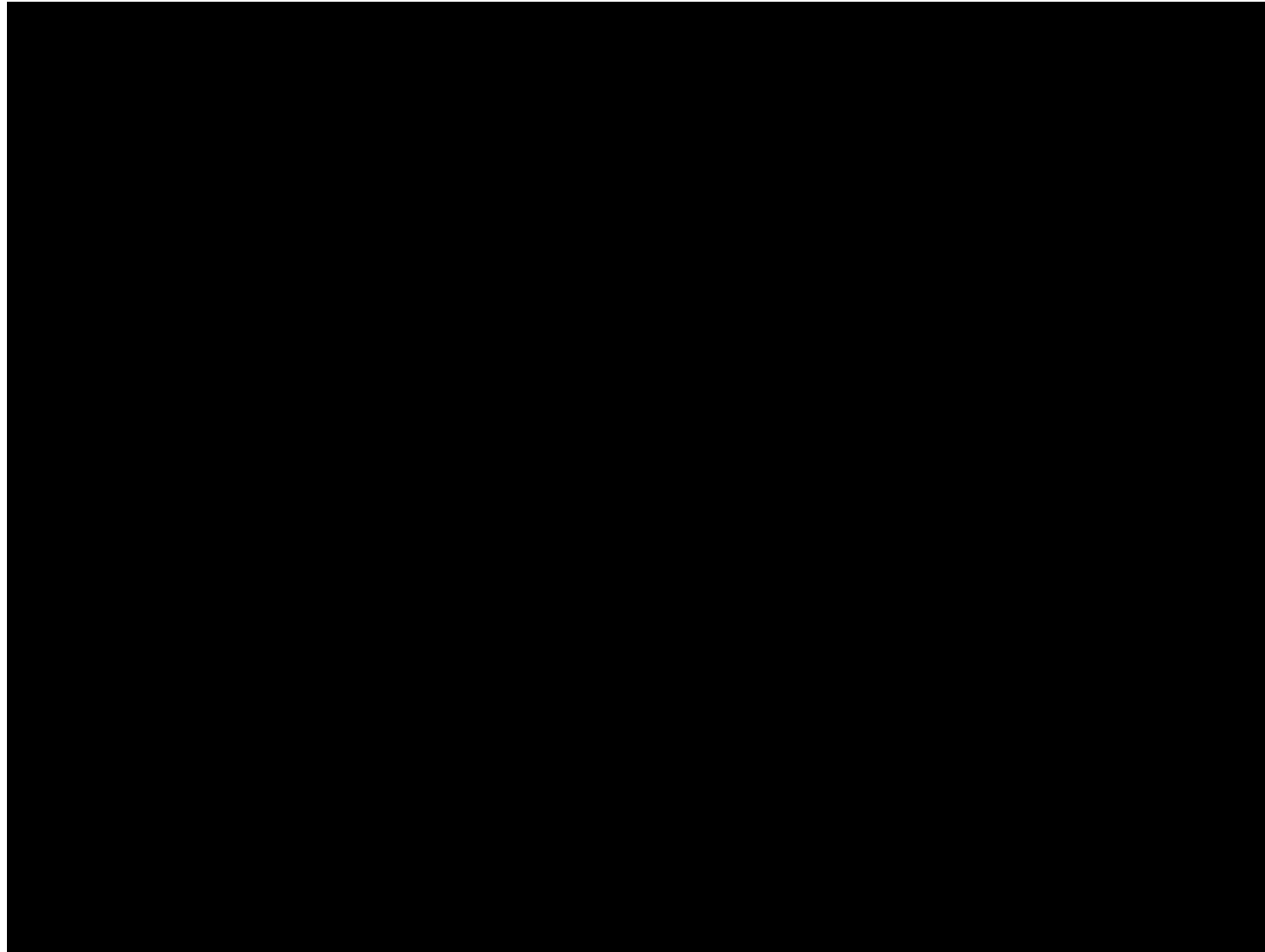
- **Bouncing Ball**



- **Client-Server**



# Client-Server Bouncing Ball



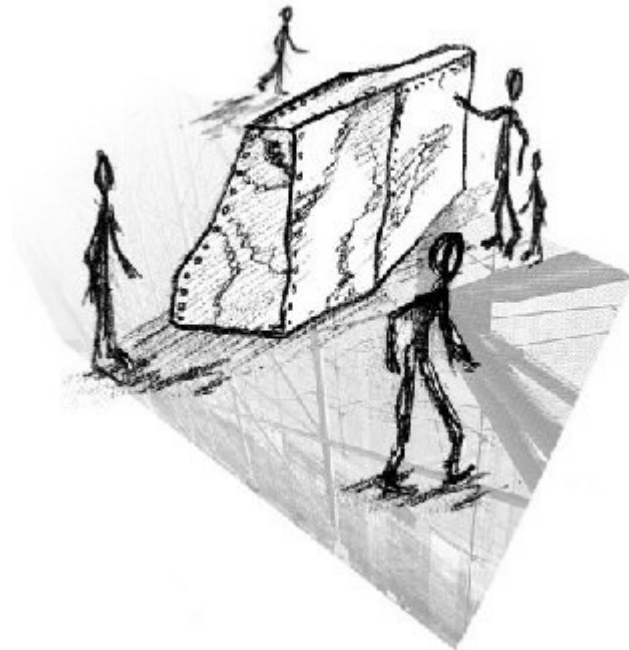
# Related Works

- Culture Walls
- ShadowTalk
- Scott Snibbe's art works
- Myron Krueger and Videoplace
- OneSpace



# Culture Walls

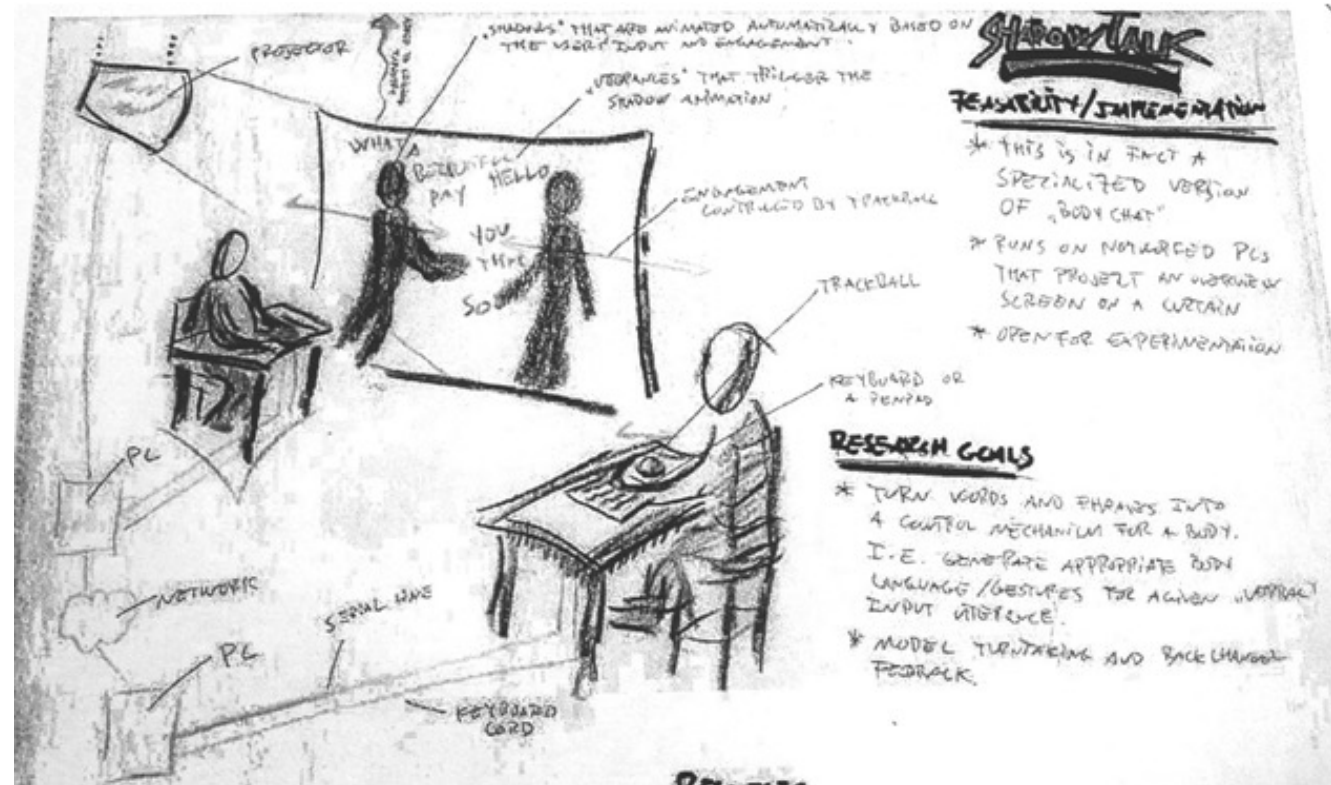
Walls integrate technologies that allow to capture sounds from one wall in a country A and reproduce them in another country B.  
Together the Walls create a way to connect societies and people from "different worlds" using modulated audio ambience.



Kristinn R. Thórisson (2000)

# ShadowTalk

One of the components of the Literary Salon, a café environment which aims to encourage the interaction between the guests interacting with the use of shadows.



Hannes and Joey Chang (1997)

# Scott Snibbe's art works



## Shadow Bag.

Shadows unpredictably chase, follow and collapse.



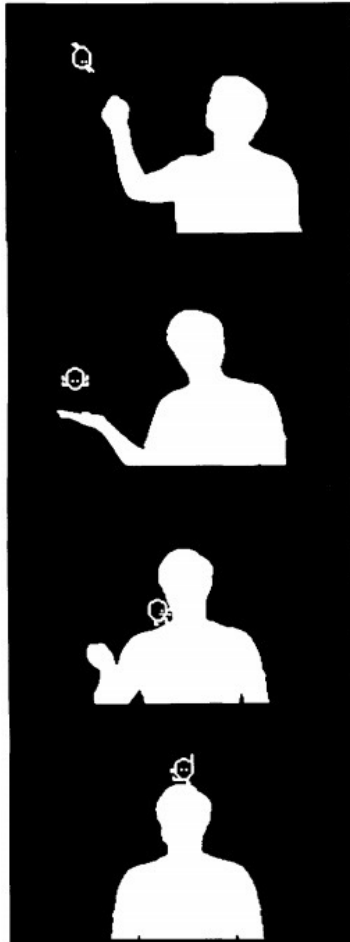
**Visceral Cinema: Chien.**  
Interactive reinterpretation of surrealist film.



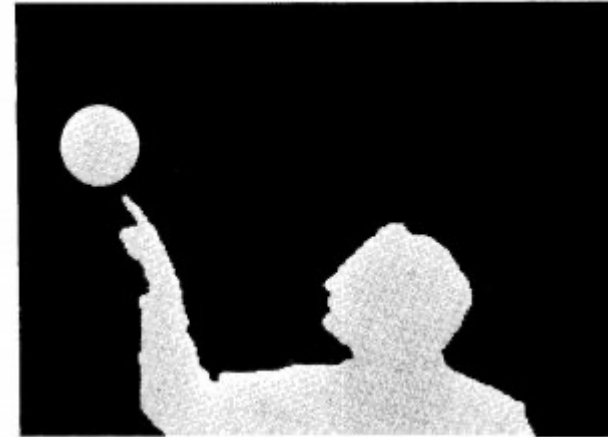
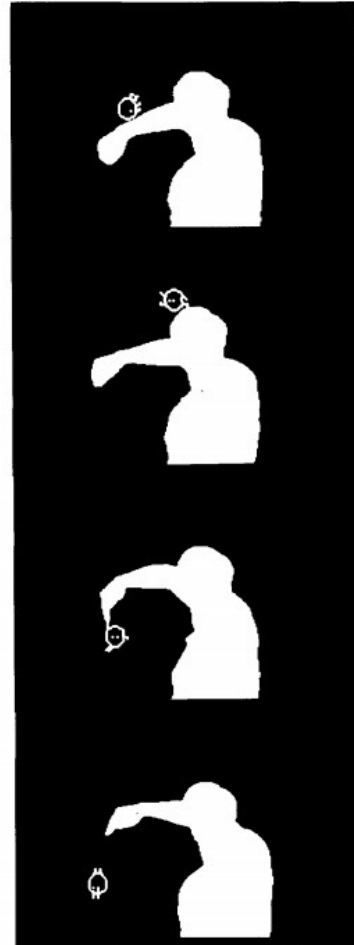
## Deep Walls.

A cabinet of cinematic memories.

# Myron Krueger and Videoplace



VIDEOPLACE: Users and creatures.



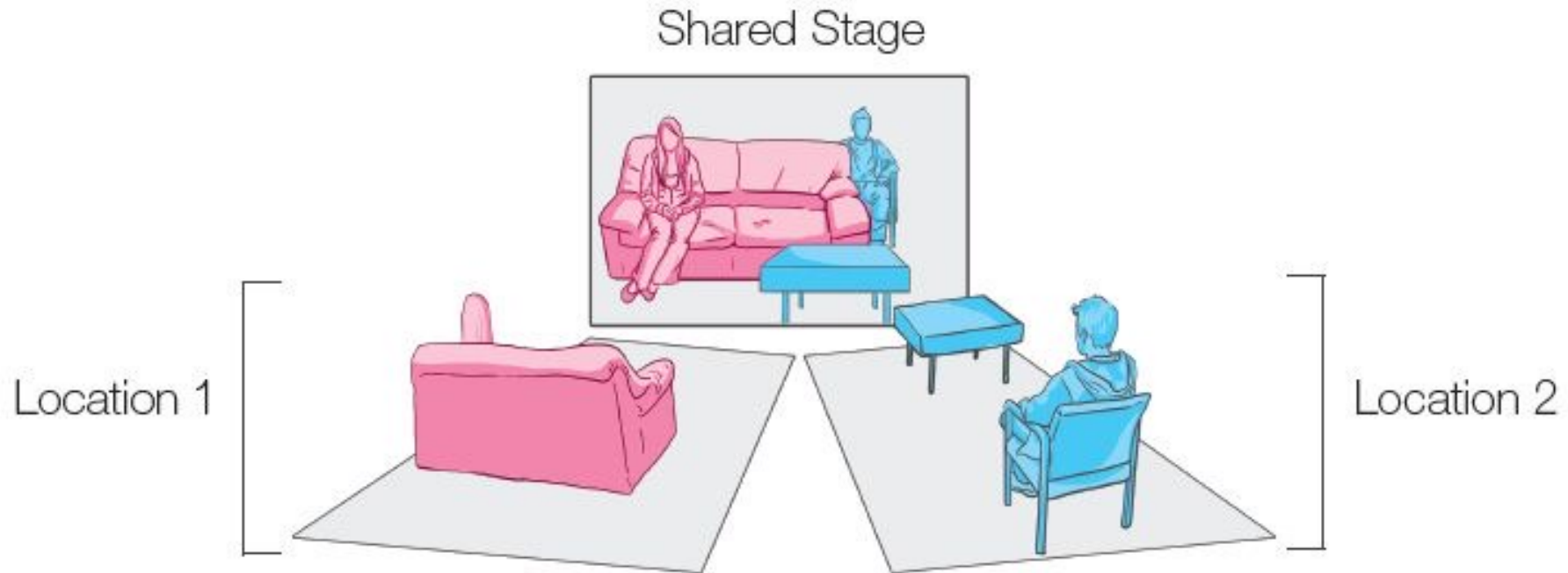
VIDEOPLACE: User and virtual object.

***"When people see their image displayed with a graphic object, they feel a universal and irresistible desire to reach out and touch it."***

- Myron W. Krueger et al.  
(1985)

# OneSpace

Video conferencing system where the video images of two different spaces are merged into a single shared, depth-corrected video.



David Ledo et al. (2013)



# The Archive

<https://fabrizio89.wordpress.com/the-archive/>

# Applied Game Design Information

# Course Content

## Frontal Lectures

- Introduction to Game Design
- Psychological Aspects in Games
- Applied Game Design
- Game Design Document
- Pitch

## Laboratory

- Study Tool for Game Development

## Seminars

- Seminars from Professionalist of Game Design & Game World

# Lectures & Meetings

WILL BE UPDATED SO CHECK IT COSTANTLY !

May is the month of  
Applied Game Design

Tuesday	02-05-2023	09-13	AB1	
Thursday	04-05-2023	14-16	LB1	
Friday	05-05-2023	14-18	AB1	
Monday	08-05-2023	14-18	AB1	
Tuesday	09-05-2023	09-13	AB1	
Thursday	11-05-2023	14-16	LB1	
Friday	12-05-2023	14-18	AB1	Online Seminar by Fortuna Imperatore, Axel Fox
Monday	15-05-2023	14-18	AB1	Online Seminar by Carlo Cuomo, il Prof dell'Edutainment
Thursday	25-05-2023	14-16	LB1	
Friday	26-05-2023	14-18	AB1	Online Seminar by Maurizio Amoroso, Entertainment Game Apps. Ltd.
Monday	29-05-2023	14-18	AB1	
Tuesday	30-05-2023	09-13	AB1	

Students Meeting:

- After each lesson or,
- By requesting a meeting by sending an email to [fabrizio.fornari@unicam.it](mailto:fabrizio.fornari@unicam.it)

**Note: only email coming from the @studenti.unicam.it domain will be processed.**

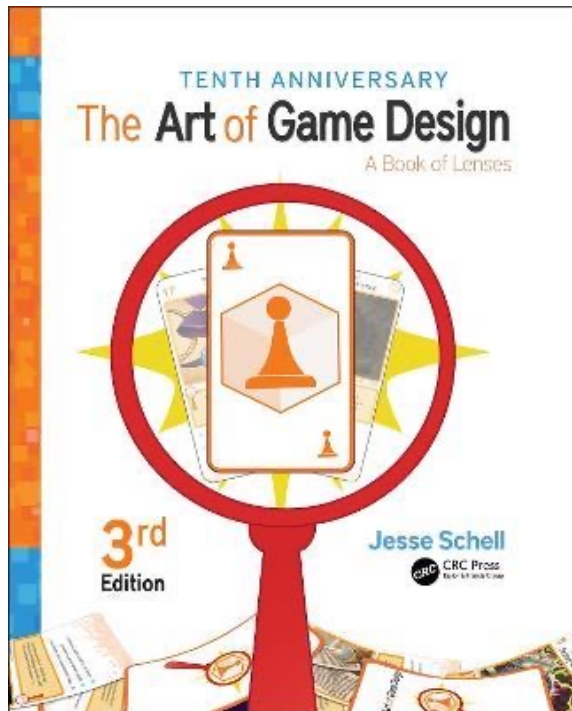
# Lectures

Lectures will be characterized by open discussions. Which means you will be asked to reason about things and discuss it in class.





# Support Material



Jesse Schell. (2008). *The Art of Game Design: A book of lenses*. CRC press. 3<sup>rd</sup> Edition.



Bycer, J. (2022). *Game Design Deep Dive: Free-to-Play*. CRC Press.

# Final Evaluation

1. Deliver a **document** reporting games you played with and characteristics that will emerge during the lectures
2. Design an videogame. It will take the form of a **Game Design Document**
3. Develop a **prototype** implementation of a game or part of a game
4. Give a **Pitch**

# Where to find course information?

AGD Wiki Page

<http://didattica.cs.unicam.it/doku.php?id=didattica:ay2223:agd:main>

Any Question?

# Let us know each other better

Applied Game Design Questionnaire

<https://forms.gle/TVPp78qGwWicjkPC9>



# Activity 1

# Game Report

Start with an Google Sheet or Excell File

Game Title	Game Genre	Game Platform	Year of Release	Playing Age	Game Modality
	Platform game	Playstation 1			Single Player
	First person shooter	PC			Multiplayer
		Nintendo 64			Co-op
	Role Playing Game	Xbox			
	MMORPG				

End for Today!