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# Computational Thinking and Coding for student creativity and innovation capability

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Erasmus+

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# Context

- According to the National Center for Education Statistics in the US, **women represent** just **18%** of the university **graduates** in **computer science**. Whereas in the **top universities**, this number falls to **14%**;

- **Computer science** is the only STEM field in which **female participation** has **dropped** ;

- In **Europe** the situation is even **worse**: “Of **1,000** women with a Bachelors or other first degree, only **29** hold a degree in Information and Communication Technologies (**ICT**s) (as compared to 95 men), and only **4** out of **1000** women will eventually **work** in the **ICT** sector”;

# Partnership

University *of Ljubljana*

South-West University "Neofit Rilski", Bulgaria

University of Rijeka, Croatia

UNIVERSITY OF THESSALY

University of Thessaly, Greece

eu-track

EU-Track Association, Italy

virtualcampus

VIRTUAL CAMPUS LDA, Portugal

T.C. İSTANBUL VALİLİĞİ

Governorship of Istanbul European Union and Foreign Affairs Department, Turkey

# The main target

The project **addresses** the **gap** between **male** and **female participation** in technology education and in related **professional careers** by introducing **more attractive** learning **methods** for both girls and boys.

These methods are aimed at addressing the **factors** that induce girls to **avoid IT**, that is:

- the wrong perception of professional roles and careers;
- lack of interest in the discipline;
- low skills.

# Specific targets

- To validate a structured **learning framework** through the **design** and **implementation** of a **serious game**.
- **Students** will be encouraged to **design** and **program games**.
- Furthermore, the project will develop **content** to **support educators** to integrate technological activities into teaching practice.

# Activity and results

The objectives will be achieved through 3 main project results (Intellectual Outputs):

**IO1** - *Methodological Reference Framework*

**IO2** - *Promoting the Development of Programming Skills among Girls through Serious Games*

**IO3** - *Instructional Support Content*

# The first result of the project

A **methodological reference framework (MRF)** that will support the **development** of **programming skills** among young people, with particular attention to girls, taking into consideration the **status quo** in schools and the emerging needs in the **labor market**.

**September 2018-April 2019**

# MRF

The **framework** will **exploit** "**design thinking**" approach that encourage learners to **think innovatively** and **critically** and to take into account user needs.

Through the proposed design thinking learning methodology learners will be exposed at an early age to processes applied by the ICT sector.

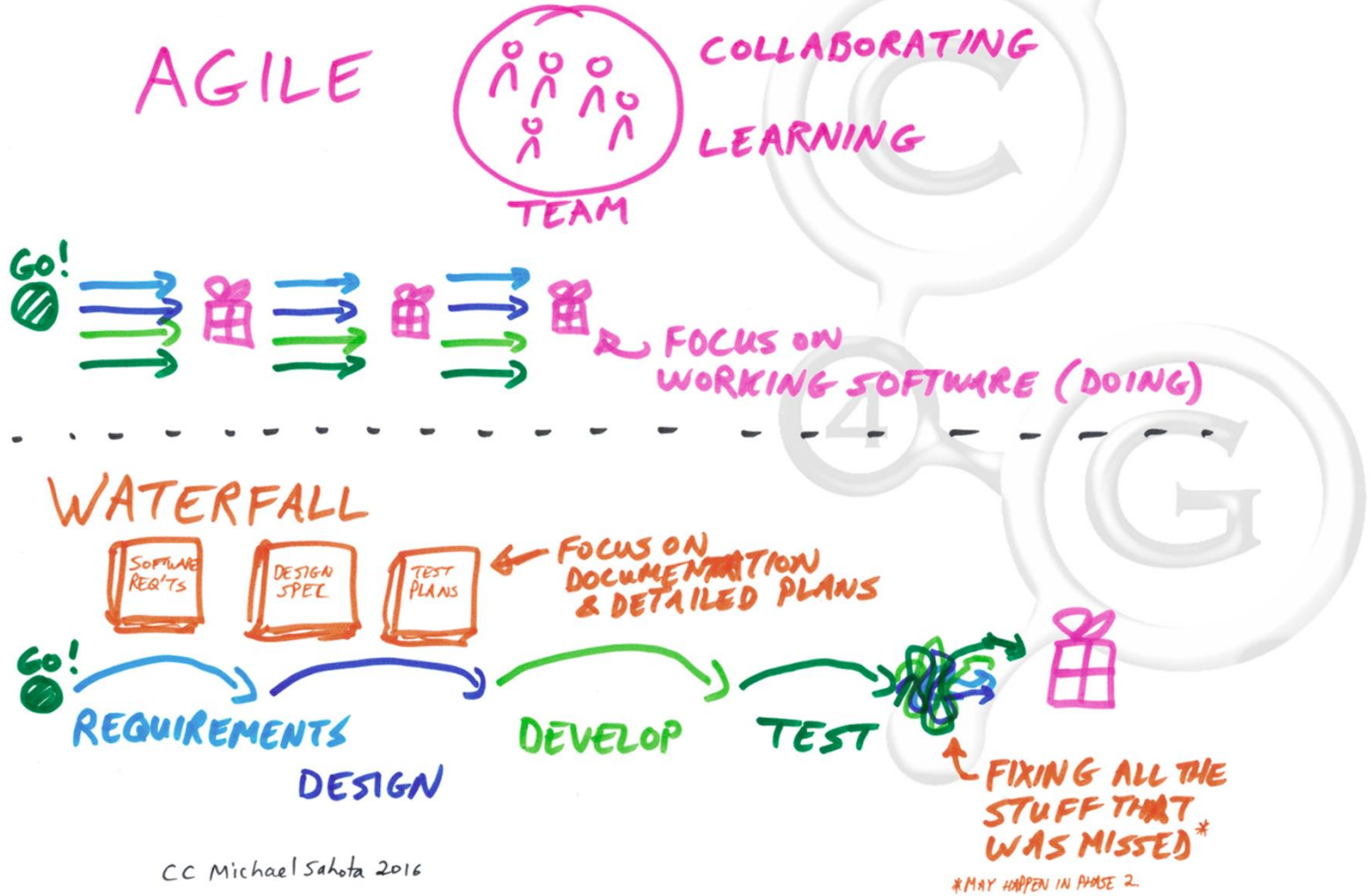
# The second result of the project

A **set of games** designed for **educational** and **training** purposes that will be used for the development of children's technological skills and knowledge.

Both the software and the teaching materials constructed will be validated in **Greece, Turkey, Italy, Slovenia** and **Portugal** to provide a **European perspective** on the efficiency and effectiveness of the proposed methodology and tools.

**March 2019 – August 2020**

# The development methodology adopted




Source: agilitrix.com/2016/04/agile-vs-waterfall/

# The third result of the project

A **report** (Instructional support content) that will describe the **activities** and **results** obtained in the experimental phase, and will also report a set of **good practices** on how to **integrate** the **methodologies** and **teaching tools** proposed in their teaching practice.

**January 2020 – August 2020**

# ISC aims

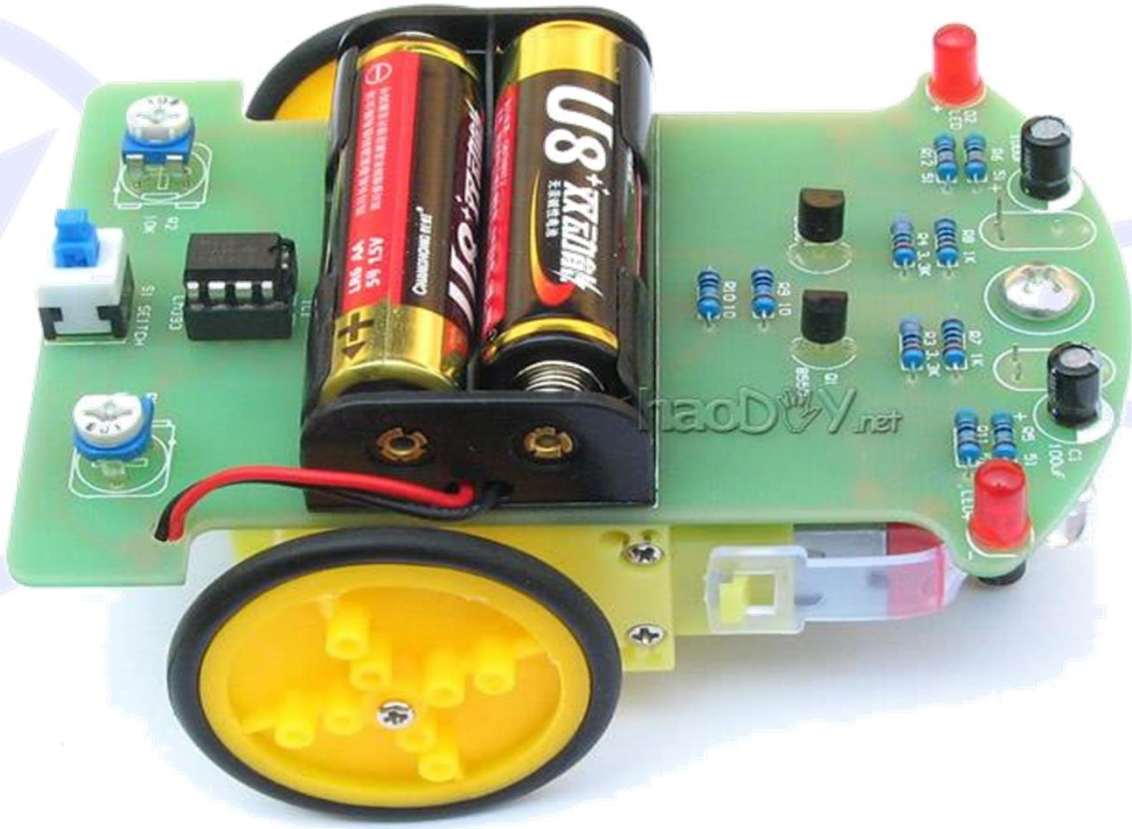
- Facilitate a more effective adoption of project outcomes on **developing programming skills among girls** through **serious games** into wider, blended learning school practices;
- Provide teachers with the **information** they need **for enhancing** their **teaching** on programming through the proposed **serious games** approach and **design thinking** learning methodologies;
- Build the **skills** of teachers on the **integration of ICT** into **instructional practices** through supporting content.

# Computational and design thinking: experiences acquired

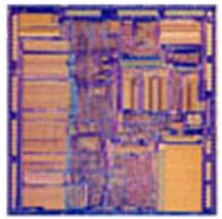
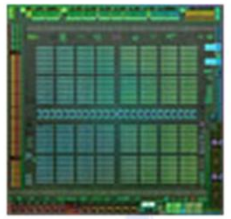
1. Robotics with Arduino for teenagers 16-17 years old.
2. Microbit for children from 7 to 13 years old.

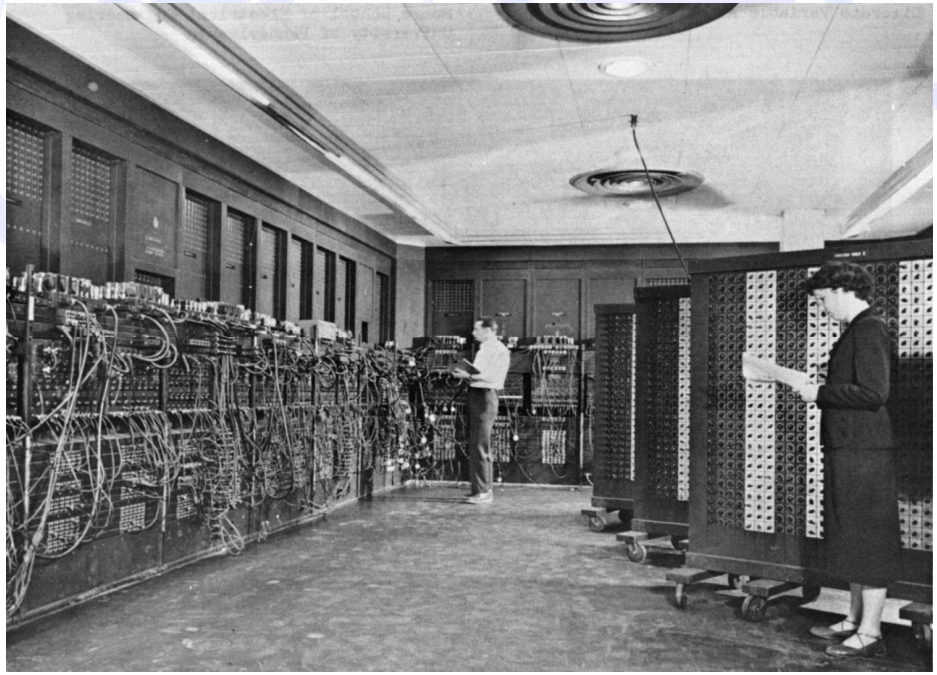
The **main goal**: **to introduce** Arduino and Microbit to the children of relevant age categories **with no previous experience**.

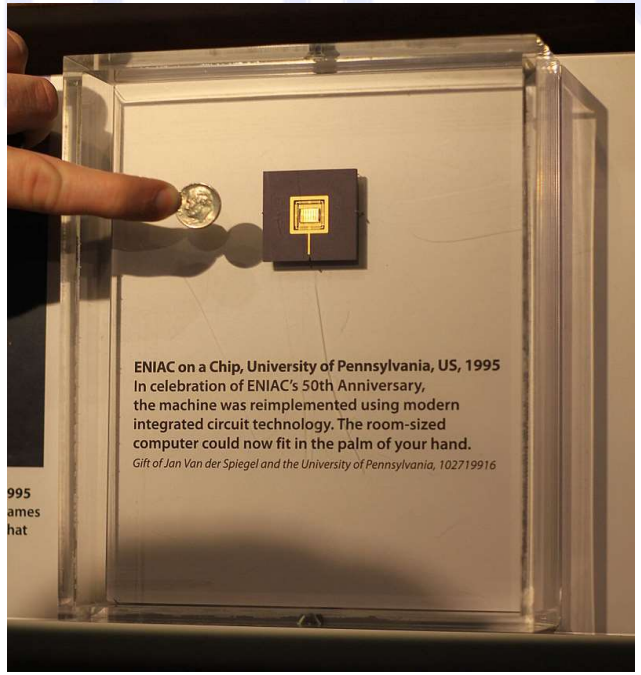
# What is a Robot? An Example



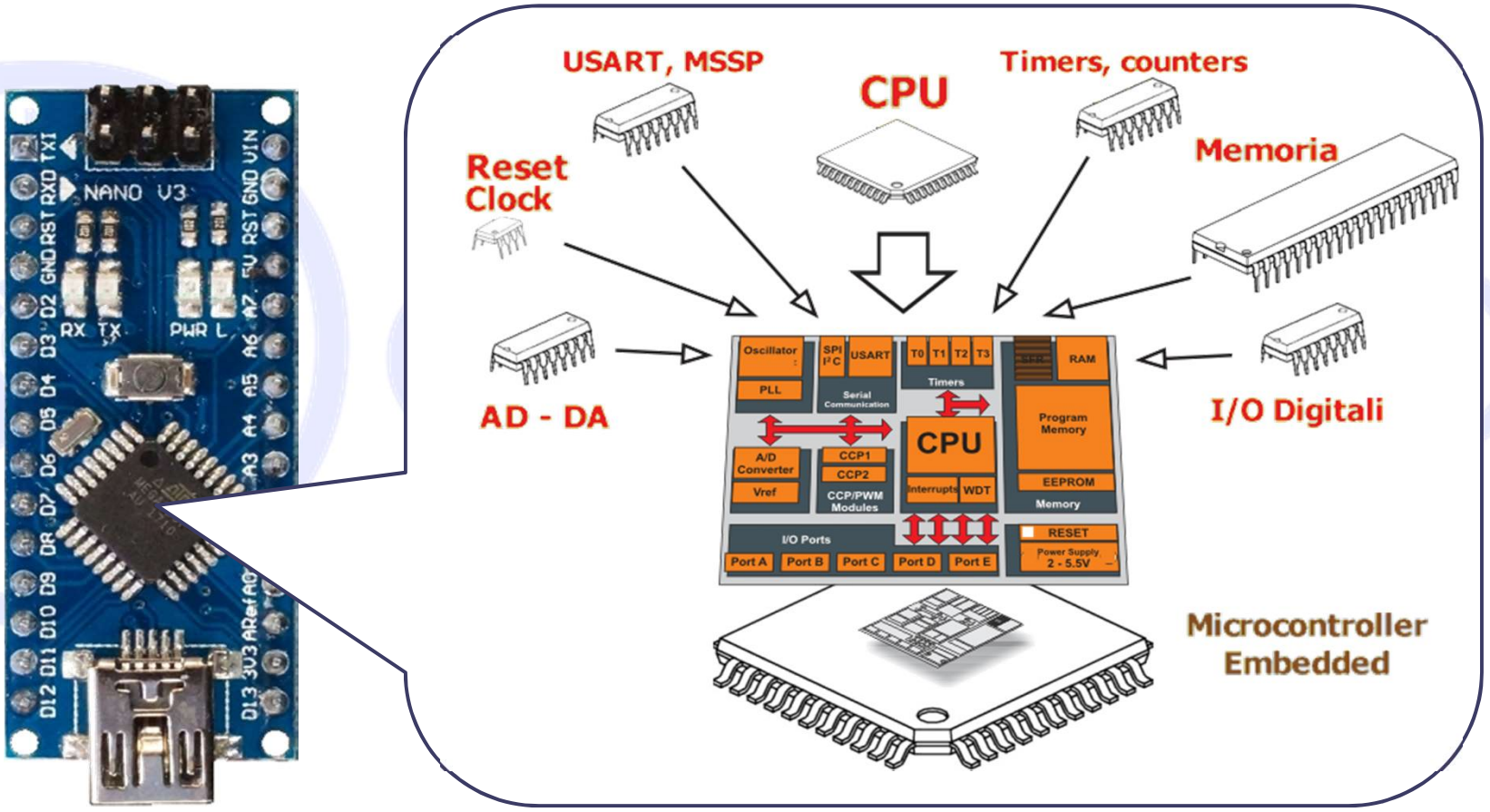
# From ENIAC to modern microprocessors

| 1950s | 1960s | 1970s | 1980s | 1990s | 2000s | 2010s |
|---|---|---|---|---|---|---|
| Silicon Transistor | TTL Quad Gate | 8-bit Microprocessor | 32-bit Microprocessor | 32-bit Microprocessor | 64-bit Microprocessor | 3072-Core GPU |
|  |  |  |  |  |  |  |
| 1 Transistor | 16 Transistors | 4500 Transistors | 275,000 Transistors | 3,100,000 Transistors | 592,000,000 Transistors | 8,000,000,000 Transistors |

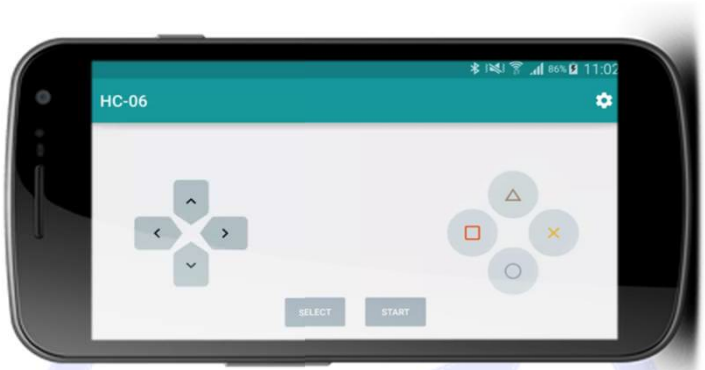


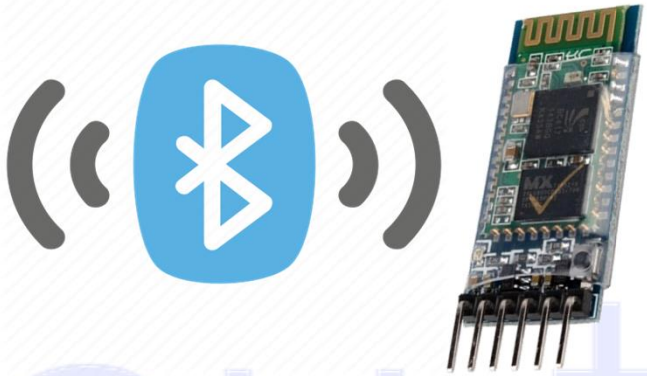


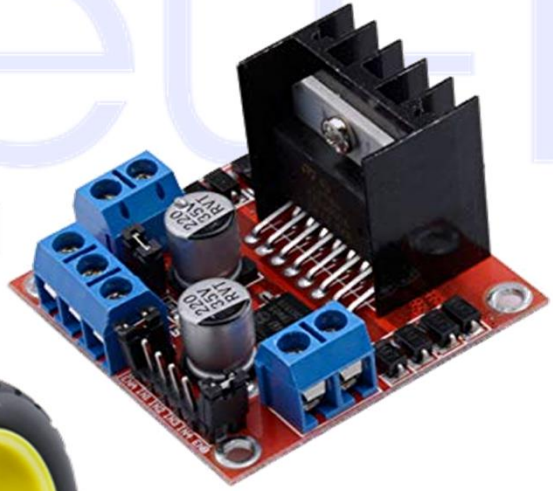
# Microcontroller: Computer-On-Chip



# Our task



# Microbits: introduction

1.What is an algorithm?

2. Example 1: cardbox

3. Example 2: commands,

If…then clause, etc.

# Thank you very much for attention!
# Questions?

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