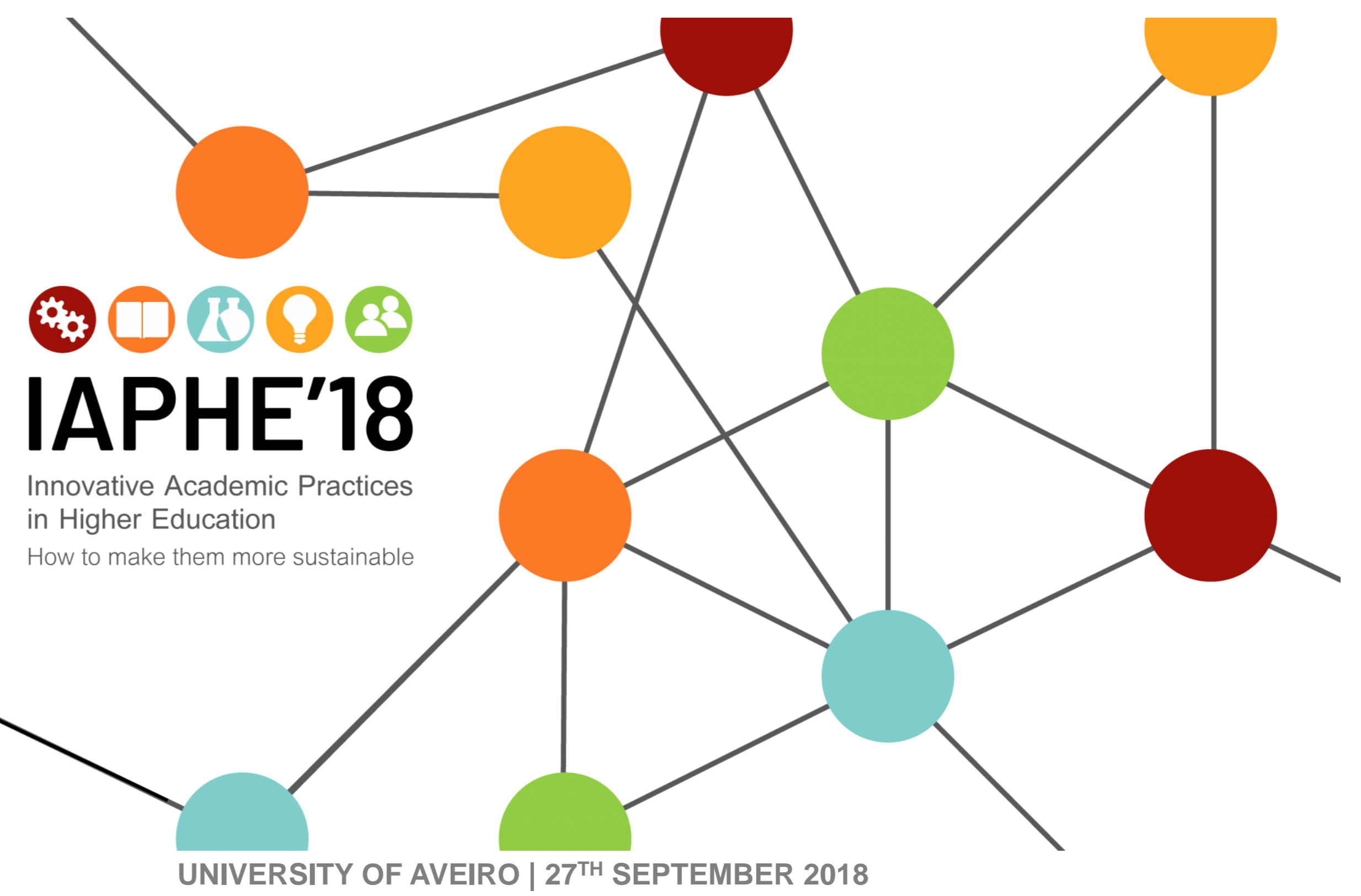


A PROJECT FOR HIGHER EDUCATION INNOVATION IN SCIENCE AND MATHEMATICS



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Introduction

CreativeLab_Sci&Math® is a project of the teachers of the Department of Mathematics and Natural Sciences of Polytechnic Institute of Santarém/School of Education. This project focuses in higher education innovation for teaching, learning and assessment in Science and Mathematics (S&M).

The CreativeLab_Sci&Math® is based on the following academic practices:

1 Use of the 7E instructional model and Inquiry-Based Learning

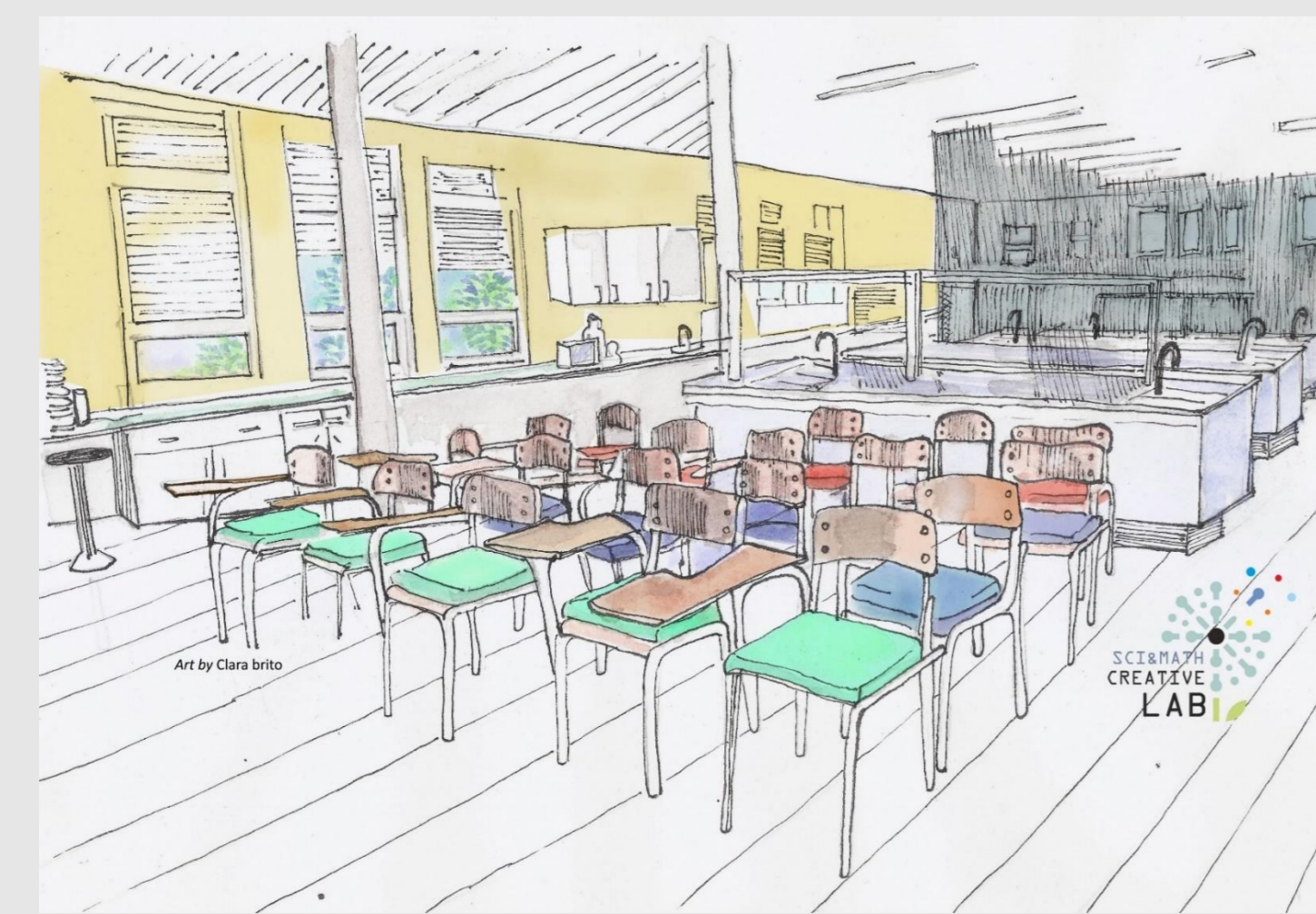
Immersion in this type of **teaching-learning scenarios** prepare prospective teachers with inquiry-based learning approaches, and to actively participate in solving social issues related to science, technology and environment (Linhares & Reis, 2017).

Inquiry-based learning activities allow students to describe objects, raise questions, construct and evaluate explanations, considering current scientific knowledge and communicating their ideas (Pedaste et al., 2015).



2 Working in innovative educational environments

CreativeLab_Sci&Math® has a **spatial organization**, inspired by the initiative *Future Classroom Lab* (European Schoolnet, 2017), with **different learning areas**. These areas were designed to promote diverse teaching strategies and new teachers' and students' roles (OECD, 2013). The areas are related to the 7E teaching moments and promote skills associated to S&M.



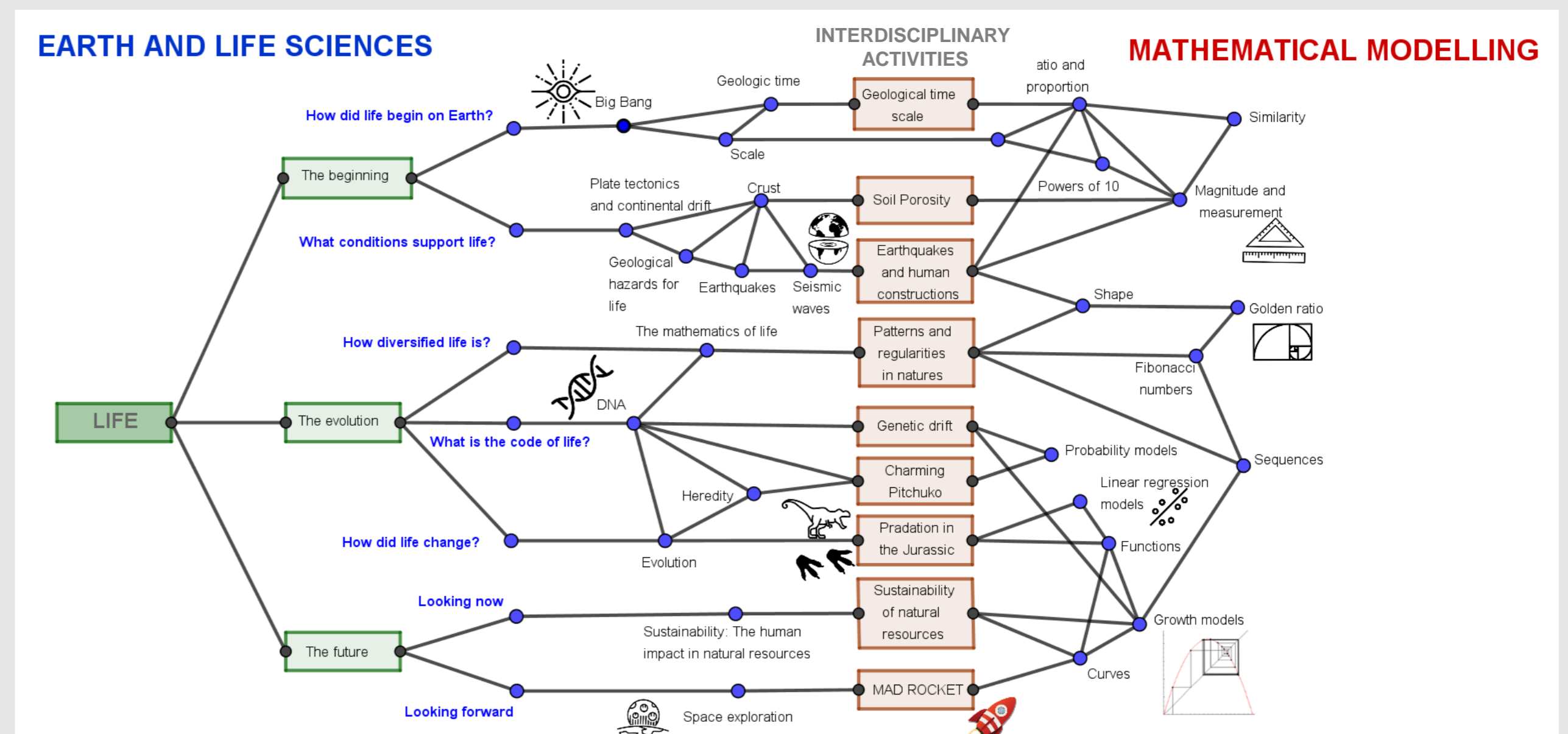
3 Interdisciplinarity and co-teaching

Prepare citizens to be able to **integrate knowledge** from multiple areas (Zhang & Shen, 2015), specifically the integration of S&M teaching and learning (AAAS, 2011; Czerniak, 2007) is an educative major outcome. **Interdisciplinarity (ID)** could contribute to this outcome because promotes student learning, engagement, problem-solving skills, critical thinking, real-life application (Riordáin, Johnston & Walshe, 2016), and better understanding of S&M. **ID collaboration** also improves teachers' development of pedagogical and content knowledge (Frykholm & Glasson, 2005; Morrison & McDuffie, 2009).

Creating an **ID syllabus** is a challenging task (Lyll, Meagher, Bandola & Kettle, 2015). However, a solution to improve the performance of the students in S&M is to combine them into **one field of study** (Hollenbeck, 2007). Feistel and Maestrelli (2012) also said that ID could be intended as a relation of knowledge between different subjects.

Therefore, ID is a key feature of our project and involves:

- **Co-teaching:** these activities are implemented with two teachers sharing responsibilities as joint planning, instruction, and evaluation of learning experience.
- **Co-creation:** definition of **learning goals and specific learning outcomes** of common S&M activities and resources; CreativeLab_Sci&Math® teachers also crossed the syllabus of the curricular units of Earth and Life Sciences and Mathematical Modelling (Basic Education Degree) into a **curricular interdisciplinary network** with common activities.



4 Disseminate educational innovation and share S&M activities

Our **open educational resources** (designed for students from kindergarten to high school) are shared in online platforms for S&M teachers, with peer review, as **Casa das Ciências**® (House of Sciences).

Some of our activities were awarded with **annual prizes** that distinguishes the best activities published by teachers in Portugal.

Other shared activities were **elaborated by students**. We think involving our students in the process of design, implement and share S&M activities for different school levels contributes to their development as future teachers.

Find more on our **web page**.

Join us on **Facebook**®



Future challenges

- Create sustainability for curricular innovation in S&M within our higher education institution;
- Improve the dynamics of co-creation and co-teaching;
- Develop a collaborative network with national and international researchers interested in higher education innovation in S&M.

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