Contextual Analysis of Remote Experimentation Using the Actor-Network Theory

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Presentation outline

- Introduction
- Actor-Network Theory
- Influencing Contexts
- Identification of Actors and Associations
- A new Actor in the RE Actor-Network
- Conclusion

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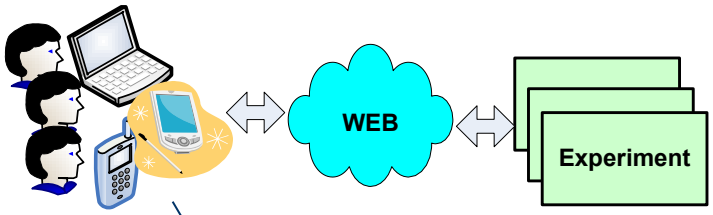
Introduction

To understand a specific domain it is necessary to analyze :
i) associations among elements (human or non-human - things/concepts -) that comprehend the domain;
ii) internal and external influences of other contexts.

Remote Experimentation (RE) is an example of a domain !



- Extension of Virtual Learning Environments;
- Ability to conduct real experiments through the internet using remote laboratories or weblabs;
- Many educational advantages (flexibility, motivation, reduction of costs, etc.)
- Prestigious schools are already adopting weblabs in S&E courses (e.g. MIT iLab)

Important to contextualize and analyze factors that influence RE adoption in an educational context.

Actor-Network Theory [Callon & Latour contributions, since 1986]

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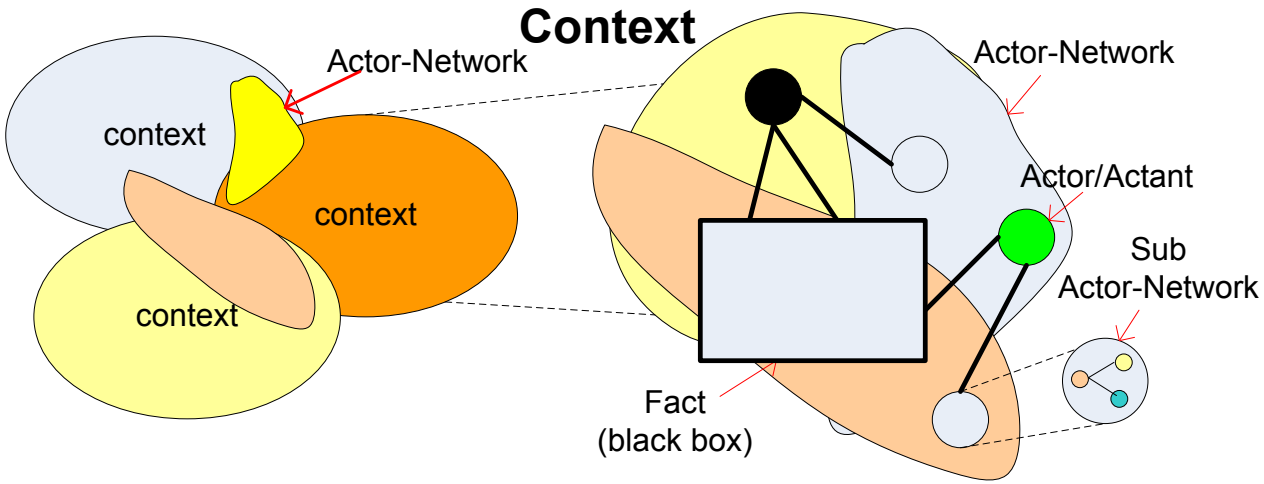
Actor-Network Theory



Comprehends Elements (actors / actants) + associations belonging to contexts;
Actors shape their attitudes during life-time;
Several actors associated may create facts (black boxes);
An actor may represent a sub-actor network;
Alignment of interests is fundamental;
Actor-networks are usually dynamic structures (unstable / difficult to analyze).

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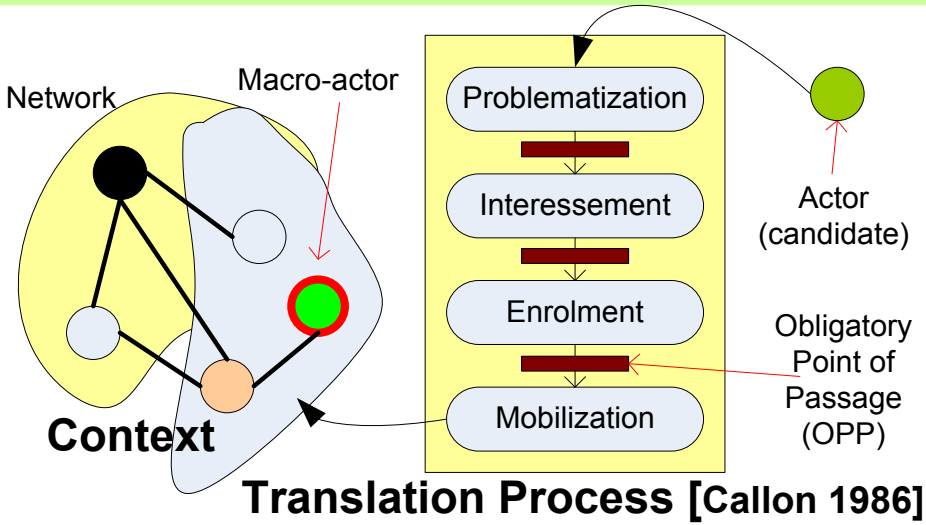

Translation Process [Callon 1986]

The challenge is to persuade actors to follow a direction aligned with the *macro-actor* interests.

Problematization: the macro-actor defines the identities and the interests of other actors that are consistent with its own interests.

Interessement: represents the process of convincing other actors that a macro-actor has specific relevance in the whole network.

Enrolment: achieved when a specific actor accepts that the interests of the macro-actor are really fundamental to include the candidate actor into the network. This represents the successful outcome of the problematization and interessement processes.

Mobilization: when actors, belonging to the network, are persuaded to accept the enrolled actor, since its interests were accepted by all actors already in the network. The aim of this stage is to maintain the commitment among actors within the network.

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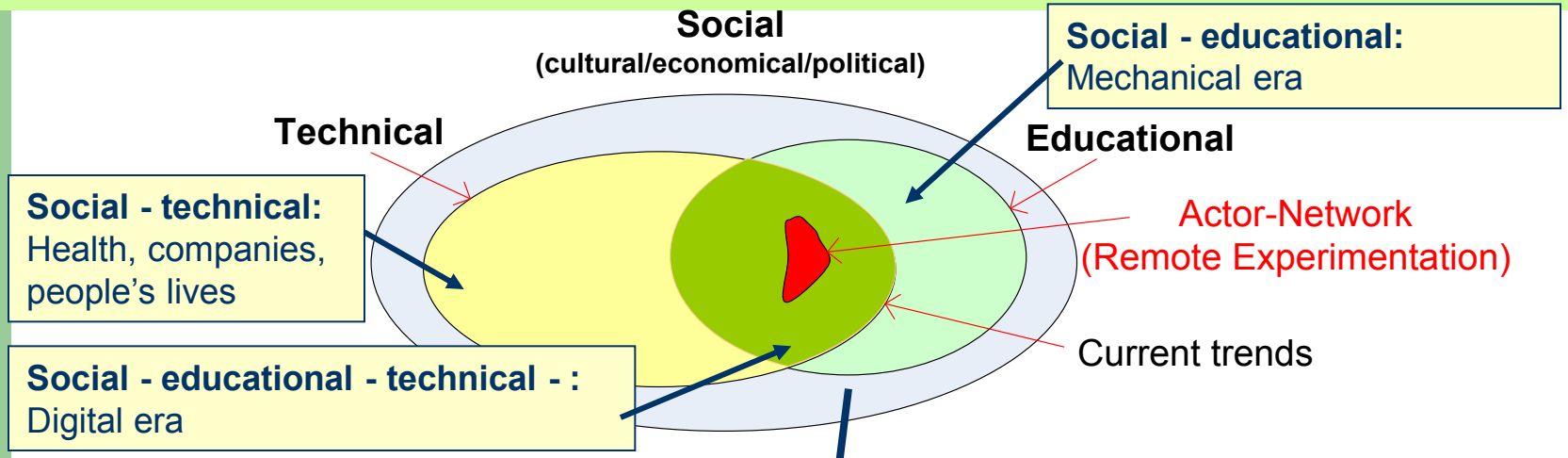
Influencing Contexts



		Components in S&E courses	
		Theoretical	**Practical**
Learning	**Traditional (local)**	Classes	Laboratories
	Distance	Virtual Learning Environments	Virtual, Hybrid and Remote laboratories

Costa R. et al., 2010. Reconfigurable weblabs based on the IEEE1451 Std. 1st IEEE Engineering Education 2010 – The Future of Global Learning in Engineering Education (EDUCON'2010), Madrid - Spain.

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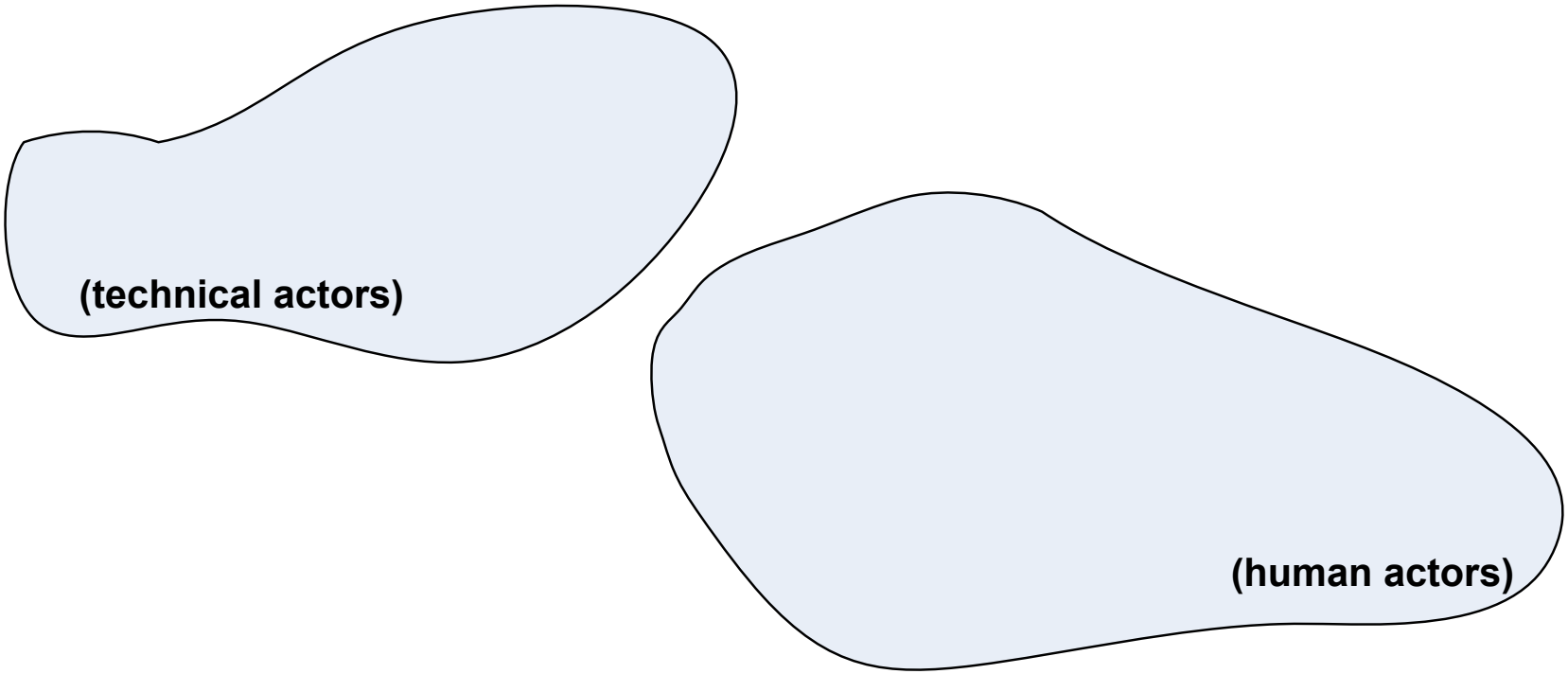
Identification of Actors and Associations



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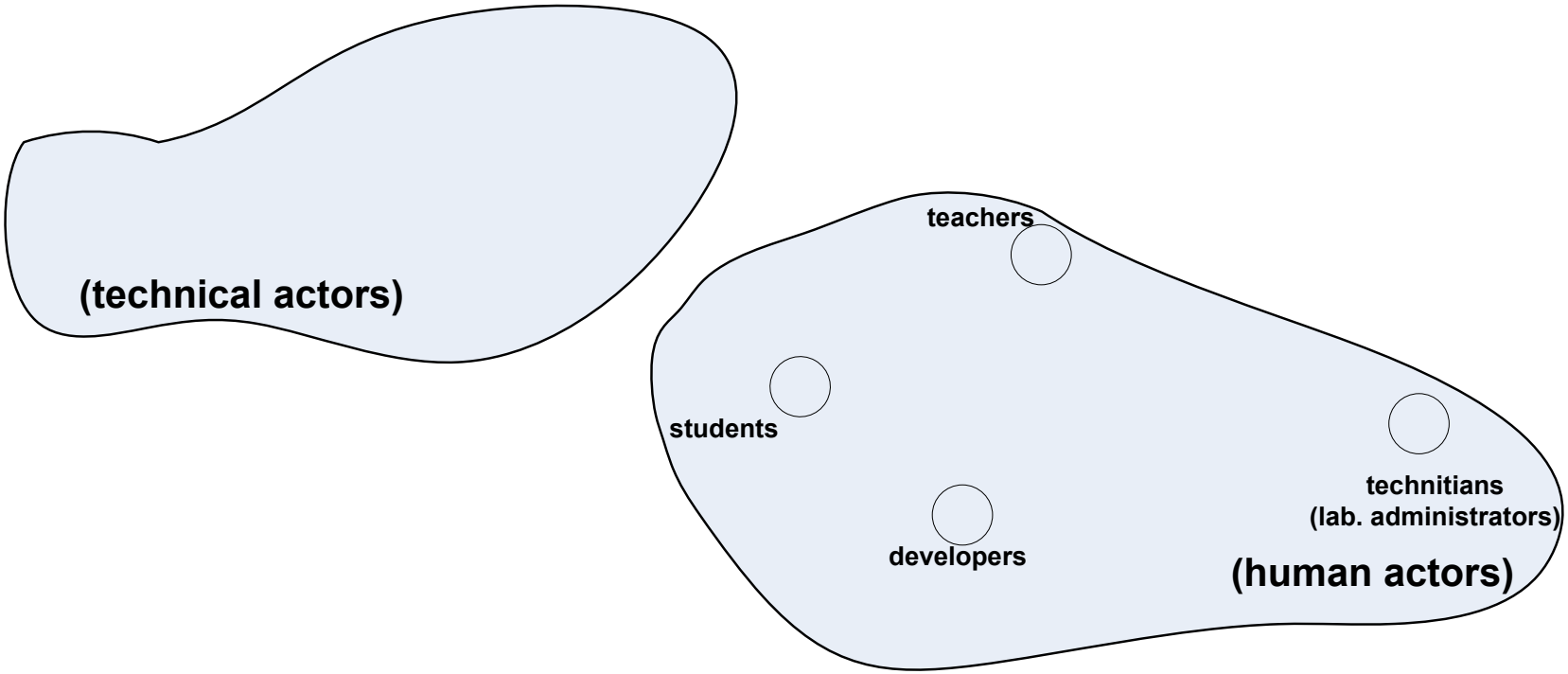

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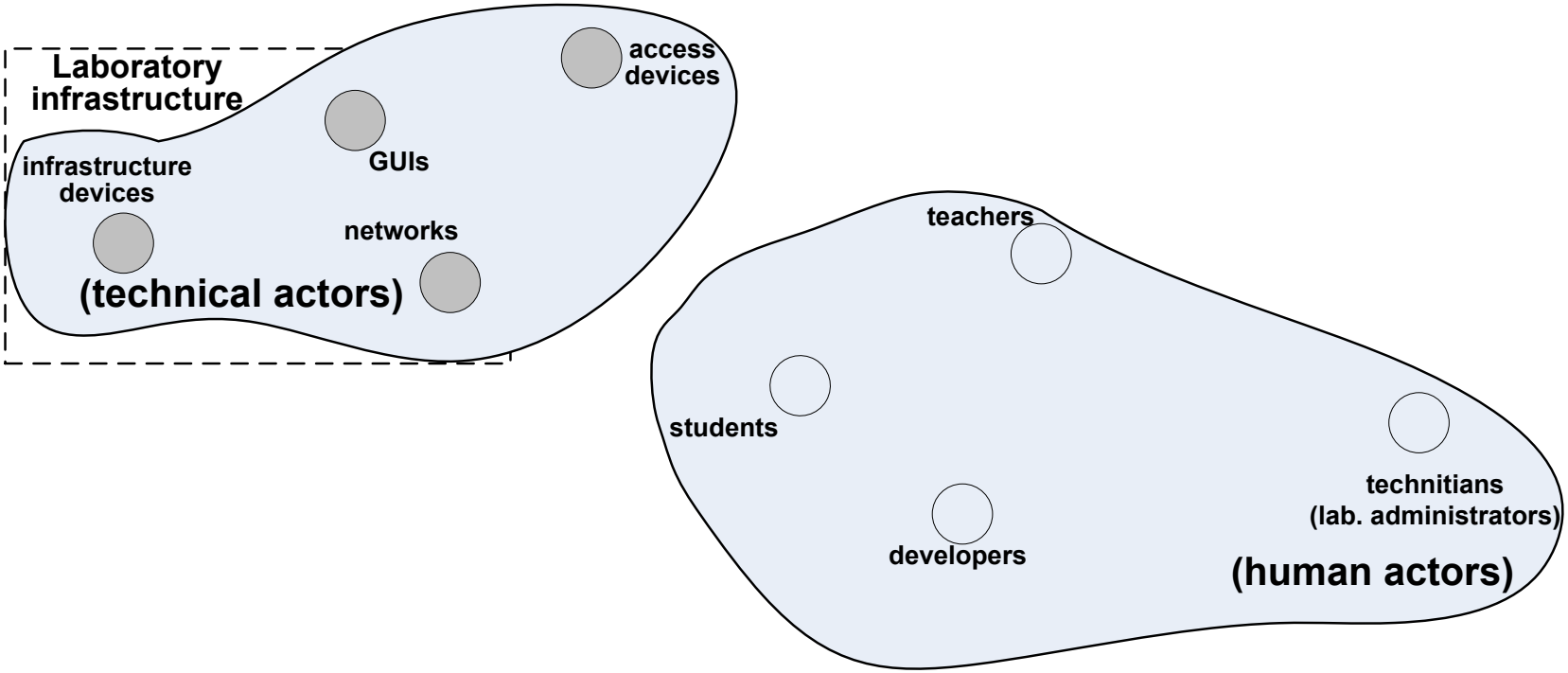

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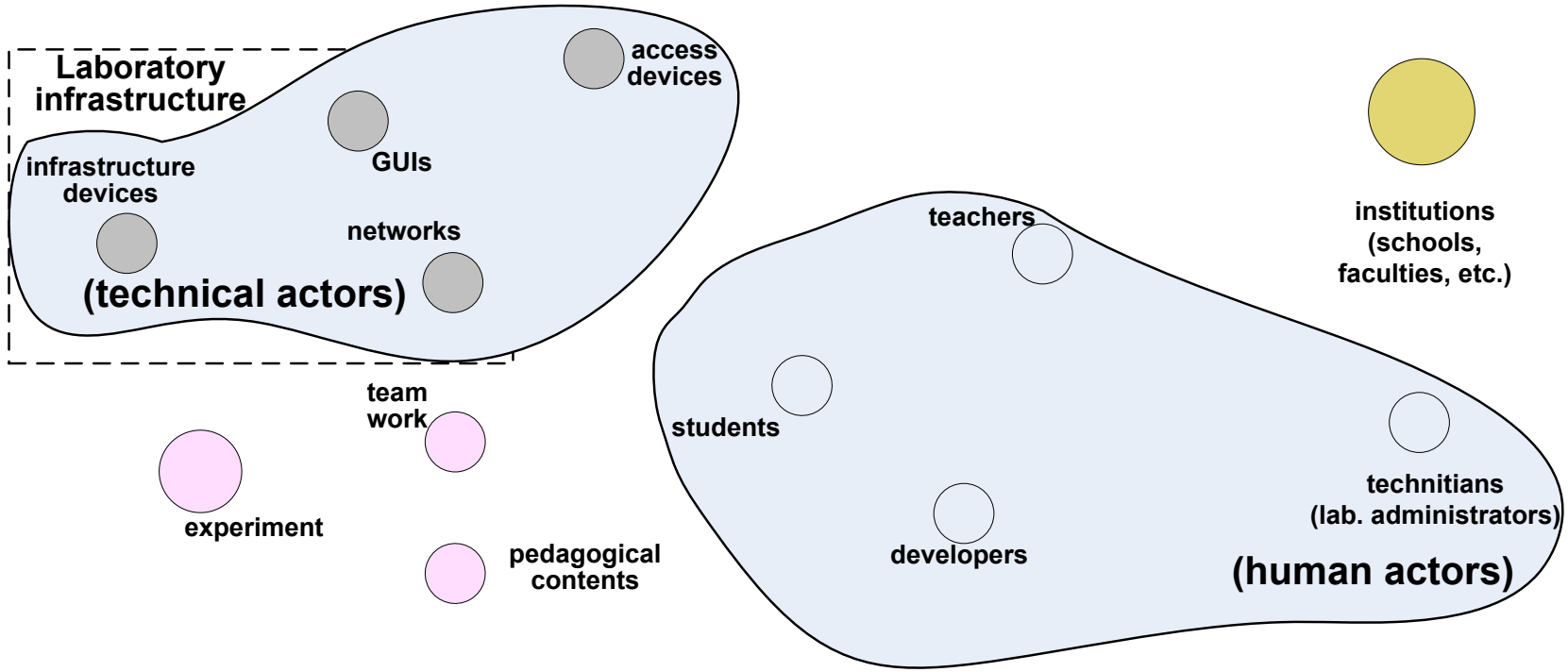

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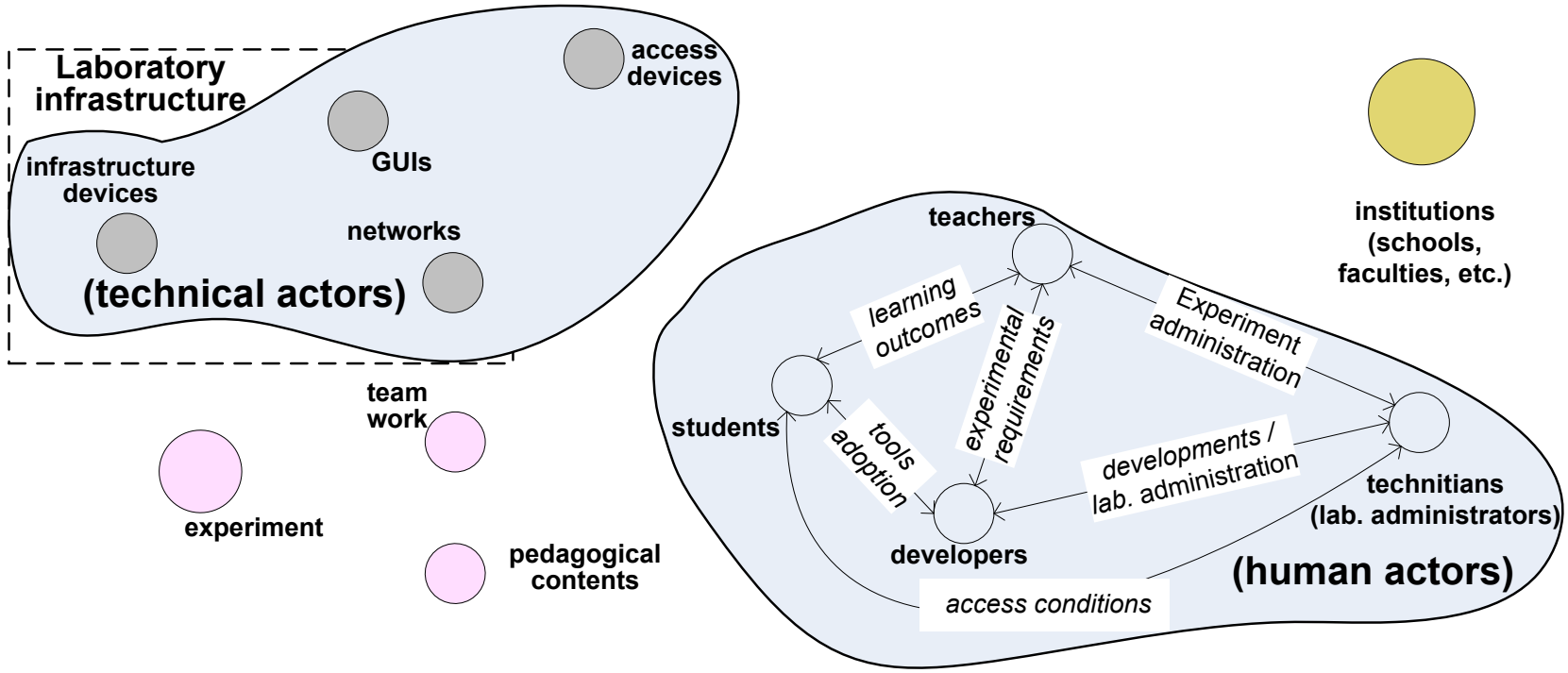

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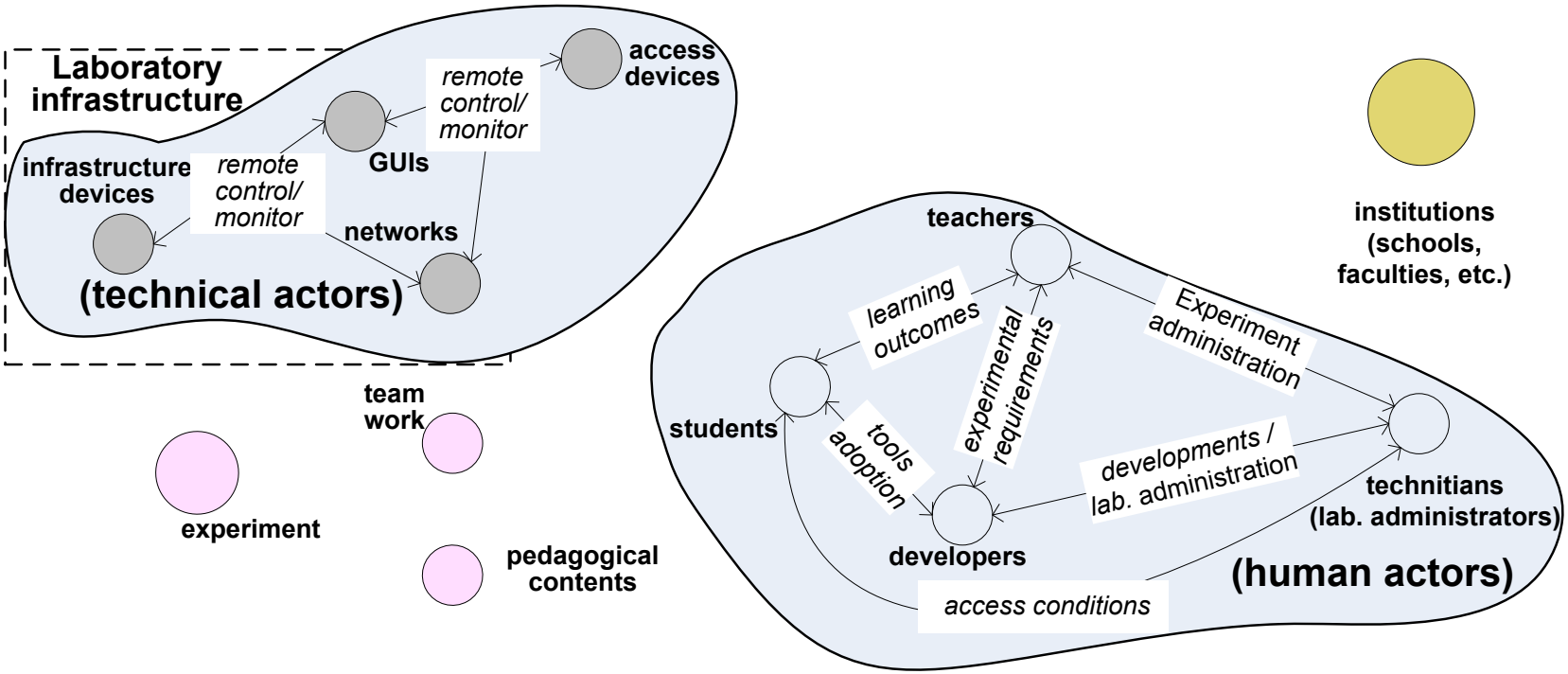

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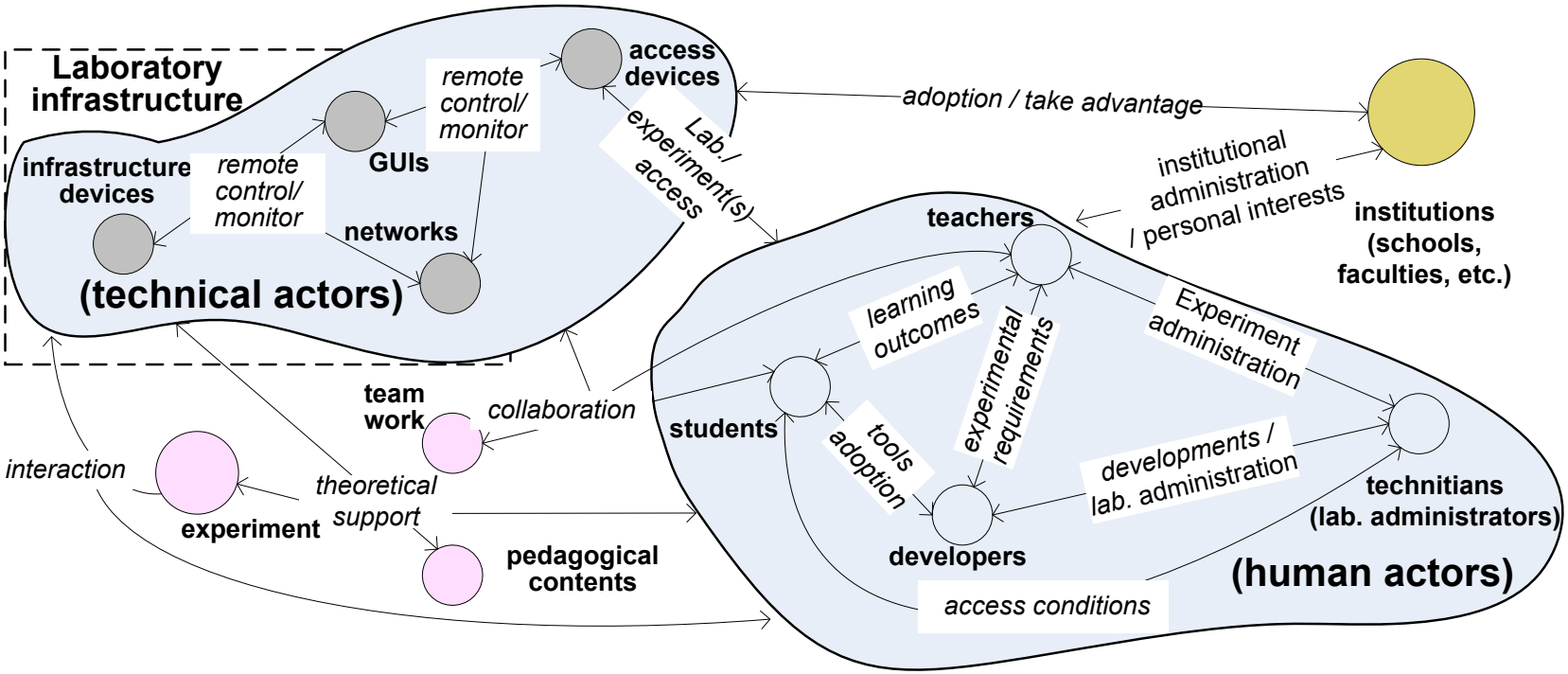

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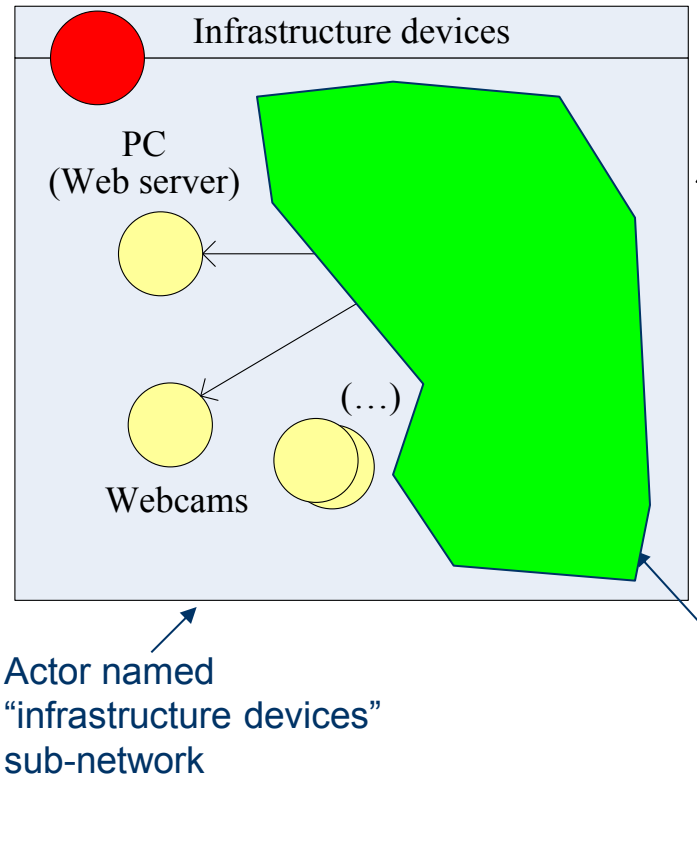
A new Actor in the RE Actor-Network



Main interests of the macro-actor:
i) Costs savings;
ii) Increase collaboration.

IEEE

1451.0 Std.

defines a set of operating modes and interfaces for controlling sensors and actuators

I&M developed using HDL languages and following the IEEE 1451.0 Std.

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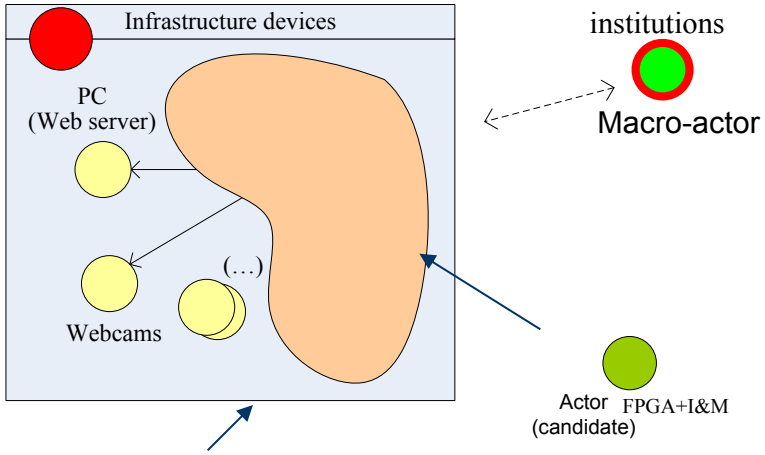

Actor named "infrastructure devices" sub-network

To be analysed in the future !

Applying the Translation process:

1- Problematization:

high costs and few collaboration are problems identified by the macro-actor (macro-actor interests that should be solved).

2- Interessement:

the macro-actor easily convince other actors that the candidate actor is fundamental to solve those problems.

3- Enrolment:

other actors are convinced that the candidate actor is fundamental to solve the problems (e.g. students / technicians are also interested that the problems can be solved – they will get advantages).

4- Mobilization:

changes to the RE actor-network are advantageous for the whole network and, therefore, for the actors (future commitments among all actors should be maintained).

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Conclusion

Education is fundamental to the social sustainability
(for guaranteeing values, attitudes and knowledge);

Technology is influencing people in those values and attitudes;

The educational landscape changed (from a mechanical era to a digital era)
E.g. the adoption of ***remote labs*** in S&E courses [***Remote Experimentation***];

However: it is important to analyze the whole context (actors + associations) using ANT.

So:
i) it was identified actors and associations > the RE actor-network
(intersection of social-educational-technical contexts);

ii) it was analyzed the inclusion of a new actor (FPGA-based boards + I&M) into the RE actor-network using the translation process;

Future changes in the RE actor-network should follow a similar process to guarantee sustainability on the associations among actors !

Thanks for your attention !

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