



5TH INTERNATIONAL WORKSHOP ON TOOL SUPPORT DEVELOPMENT AND MANAGEMENT IN DISTRIBUTED SOFTWARE PROJECTS (REMIDI'11)

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An Architecture for Creating Simulators for Training Global Software Development

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- The evolution in Global Software Development (GSD) has led to the need for universities and practitioners to train their students and engineers.
- Managers of multinational companies frequently complain that recent graduates lack the skills required in GSD.
- Communication and collaboration problems derived from cultural and language differences.
- Participants must be trained in the problems of GSD. However, this training is rarely part of their education.





- Training the skills needed in GSD is not easy - it necessitates providing real experiences.
- Reproducing the complexity of real settings is difficult in educational environments.
- Companies are not always willing to invest their resources in training programs.



Academic courses

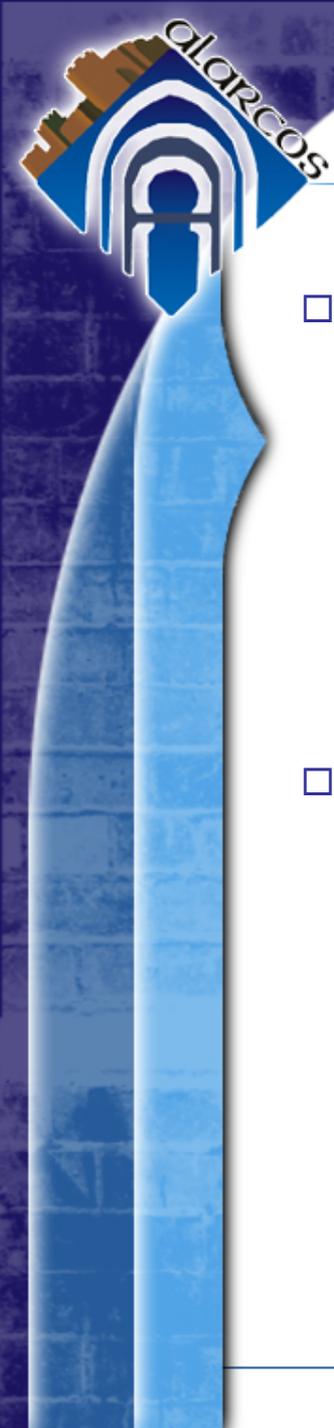
- Classes in universities.
- Masters programs on GSD.



Problems:

- Coordination and collaboration problems between institutions.





- **Learning Environments**

- Collaborative learning platforms.



- **Problems:**

- If a distant member fails, they harm the whole team.

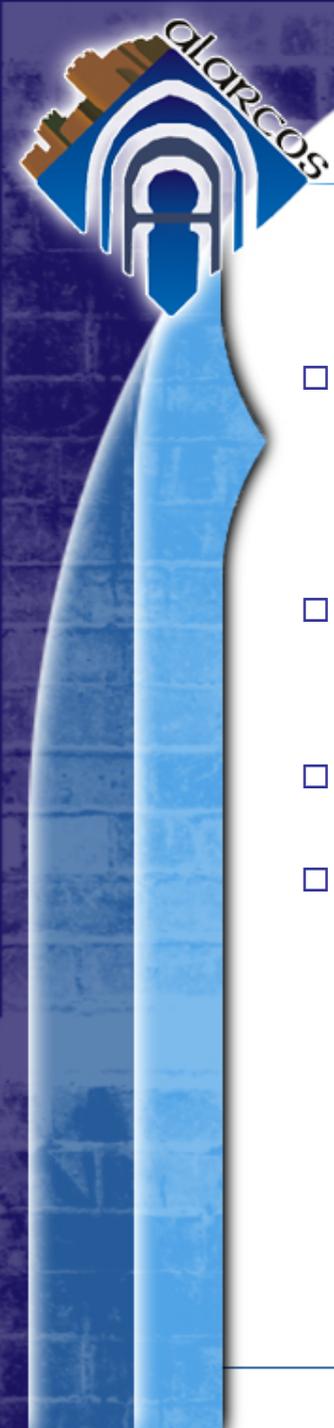


Teaching GSD in enterprises

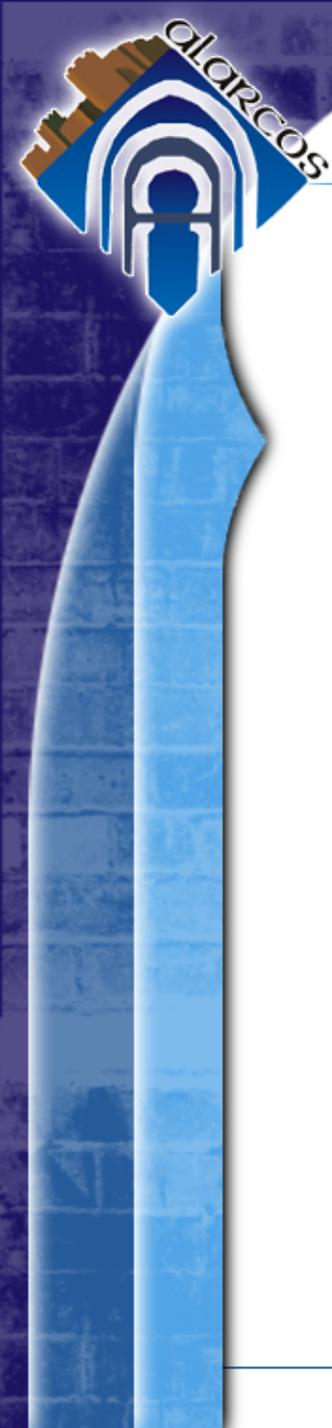
- Experiences of multinational organizations which offer their engineers GSD training courses.

Problems:

- Companies are not always willing to invest time and resources in these training programs.



- Students involved in these training programs usually experience a lack of motivation, scheduling problems and communication difficulties.
- We present an architecture for teaching and training GSD skills based on simulation.
- Using this architecture the students will *learn by doing*.
- The aim is to avoid the problems of the previously mentioned proposals.



Skills Needed

- Formal and informal communication skills
- Ability to communicate with a multidisciplinary team
- Use of a common language, communication protocols and customs
- Ability to manage ambiguity and uncertainty
- Use of typical GSD tools
- Leadership, negotiation skills, conflict resolution and time management skills

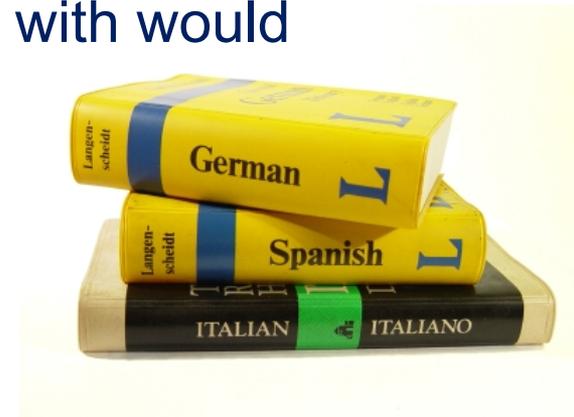


Some of the cultural problems in GSD are:

- Being too direct can seem very rude in some cultures.
- Participants do not speak during team discussions until invited to do so
- Team behaviour and the manager's authority are understood in different ways in different cultures
- People from some cultures tend to say that they have understood something when they have not really
- Mum Effect: tendency to cover up critical information or to distort negative news towards more positive information

The language knowledge considers typical problems, such as:

- ❑ the incorrect use of “false friends”
- ❑ incorrect plural formations
- ❑ incorrect past tense and past participle formations
- ❑ avoidance of passive forms
- ❑ the absence of the third person –s
- ❑ the if-part of conditional clauses with would
- ❑ misuse of prepositions





VENTURE: Simulating the GSD Environment

- VENTURE: a virtual training tool that enables learners to get immersed in realistic GSD scenarios.
- The **Virtual Agents** simulate stakeholders of different nationalities, by displaying emotions and personality (anger, annoyance, nervousness, etc.).
- The **Virtual Colleague** corrects the learner by concentrating on the language and cultural knowledge associated with the scenario definition

The screenshot displays a simulation interface with two virtual agents. On the left is a male agent in a dark suit and red tie, labeled "Virtual Customer". On the right is a female agent in a blue blazer, labeled "Virtual Colleague". In the center, the following text is displayed: "Scenario: Requirements Elicitation Meeting", "Agent Culture: en-US", "Student Culture: es-ES", and "Time consumed: 4:05 of 25:00 min". Below this text is a green arrow pointing right with the text "Next phase" inside a rounded rectangle. At the bottom center, it says "Phase 3 of 12".

Scenario: Requirements Elicitation Meeting

Agent Culture: en-US
Student Culture: es-ES
Time consumed: 4:05 of 25:00 min

Next phase

Phase 3 of 12

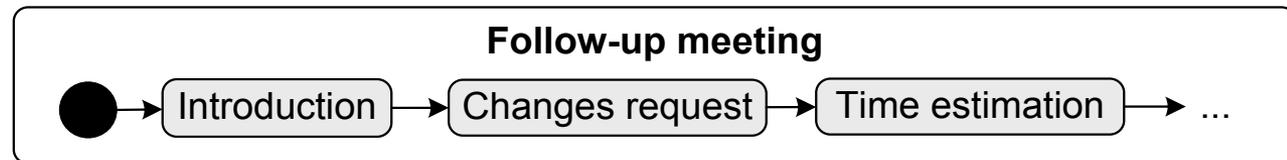
Virtual Customer **Virtual Colleague**



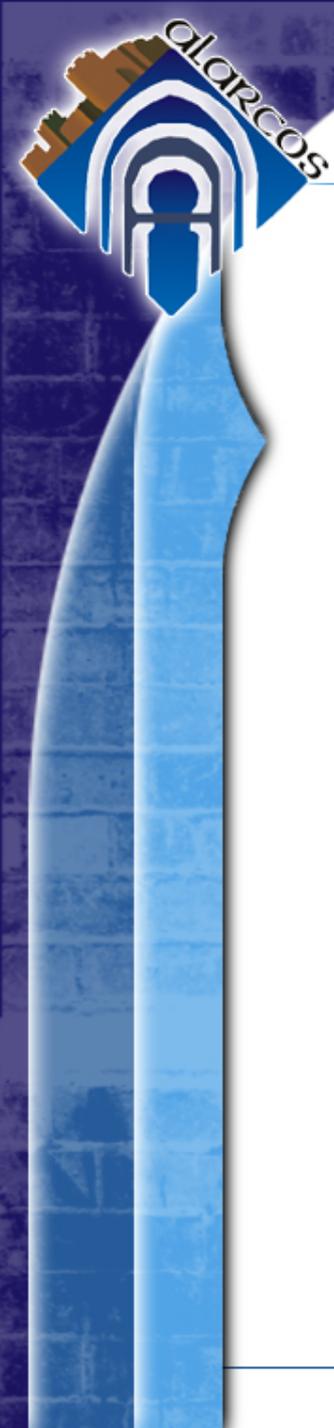
VENTURE: Simulating the GSD Environment

- The virtual meetings are designed to reflect typical problematic or controversial situations of GSD.
- Learners must interact with the VAs playing a specific role.
- They must get as much information as possible in order to complete the exercises.

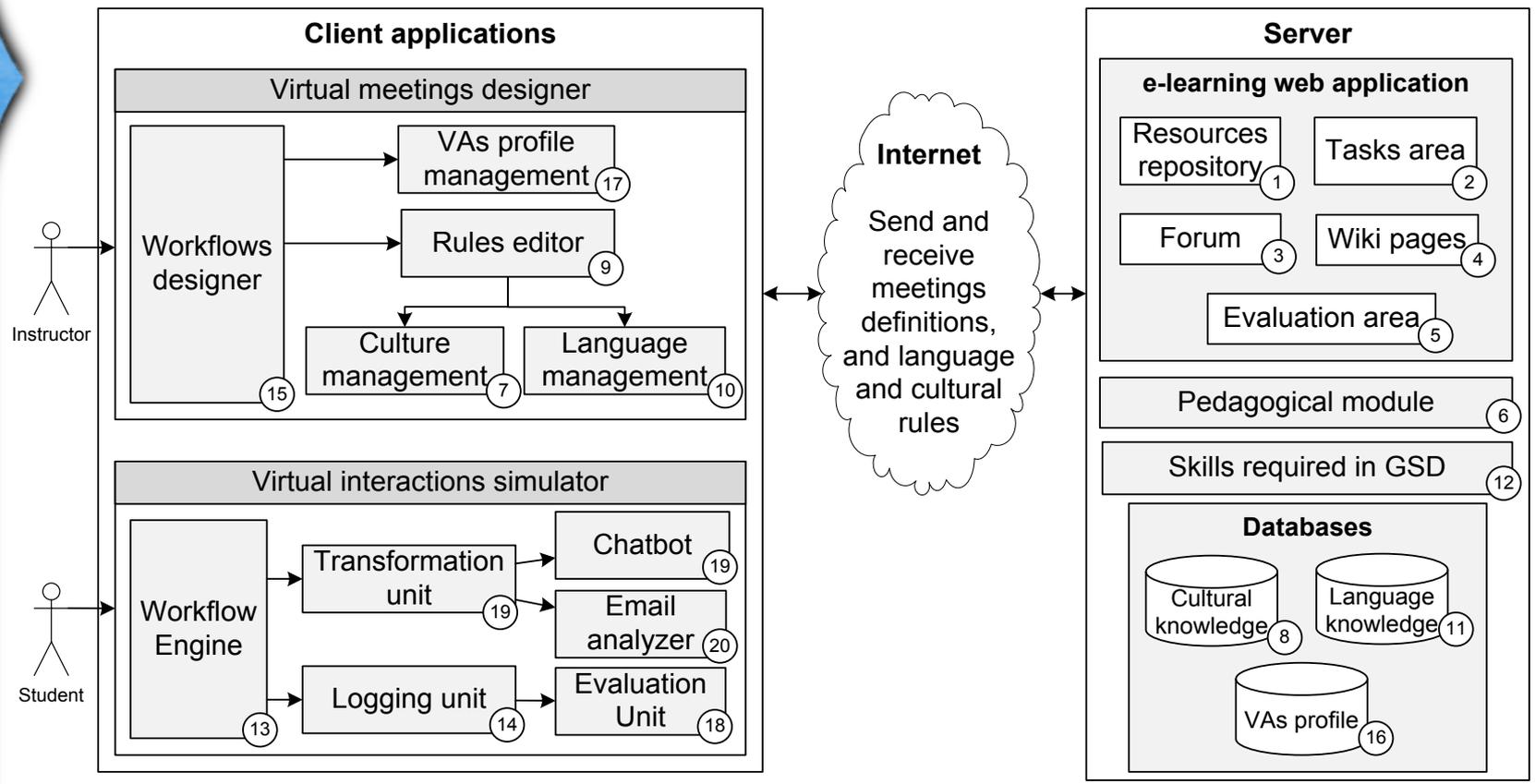
- The virtual meetings are defined by a workflow model. Each phase contains the contextual information required.

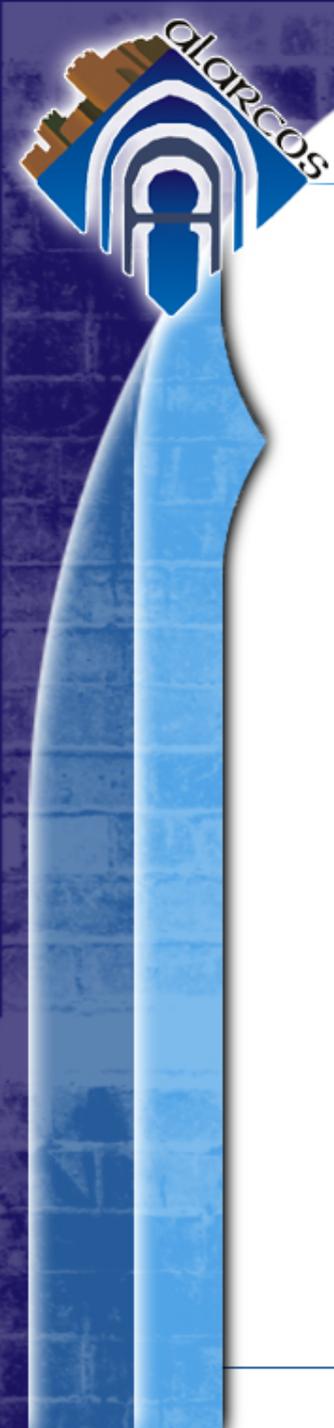


- The **conversational knowledge** is used for the VAs to answer the learner's questions.
- It is defined by using AIML (*Artificial Intelligence Markup Language*), interpreted by a chatbot engine.
- Each phase it is defined at a high granularity level containing the details of a concrete part of the conversation.



- The **cultural and linguistic rules** are triggered by detecting *patterns* in the conversation.
- When a rule is triggered, the **Virtual Colleague** will provide feedback to the user.
- These rules can be imported from a repository in which they are stored for their reutilization.
- A rule can also contain additional metadata: *type of cultural or language problem, its severity, emotions and gestures.*





- The **Requirements Elicitation** stage is particularly affected by distance.
- A Spanish learner, playing the role of analyst, interacts with a virtual customer from USA.
- The **Virtual Colleague** will introduce the problem to be solved.
- **Virtual Customers** will answer in order to give the software requirements.
- Learners will eventually fill in a requirements specification document.



A Requirements Elicitation Scenario

Chat simulator

Chat Simulator

Options Help

A 3D rendered male avatar with short brown hair, wearing a dark suit, white shirt, and a red and black striped tie.

Virtual Customer

Scenario: Requirements Elicitation Scenario 1

Agent Culture: en-US
Student Culture: es-ES
Meeting Duration: 25 min

A 3D rendered female avatar with short dark hair, wearing a blue blazer over a dark top.

Virtual Colleague

Virtual Colleague: We should focus on security issues

Student: Who is the person responsible for establishing the security politic?

Virtual Colleague: "Politic" is a false friend in Spanish, Do you mean "policy"?

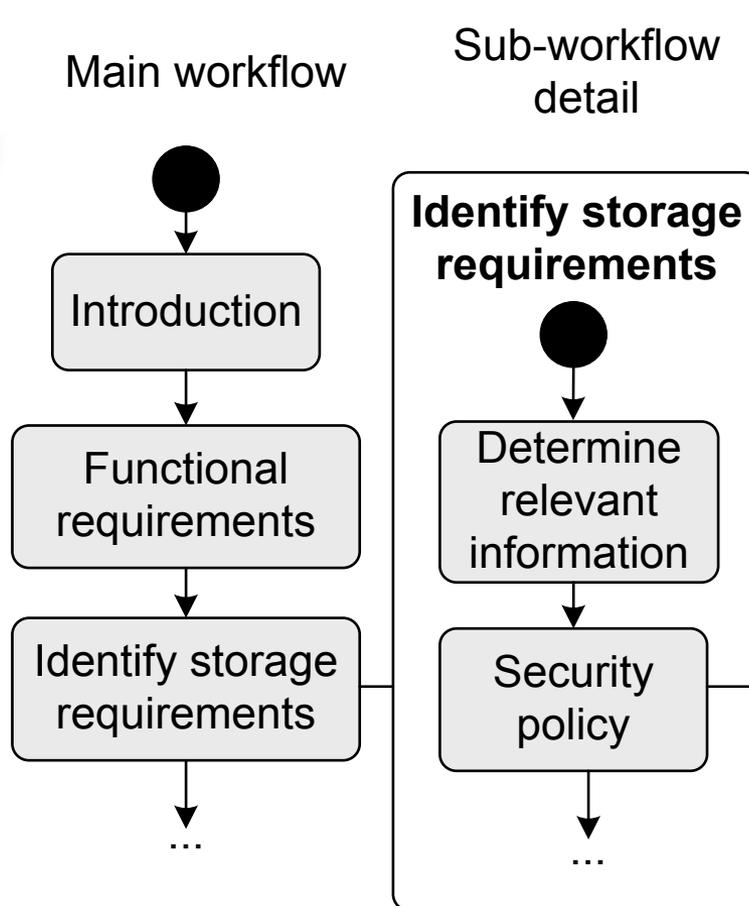
Student: Who will establish the security policy?

Virtual Customer: Security will be managed by the person responsible for our Administration Department

Virtual Colleague: We should have a meeting with the person responsible for the department, but we don't know who it is.

Student: Who is the person responsible for the Administration department?

Send



Phase detail

Security policy

Conversational Knowledge

Virtual Colleague: We should focus on security issues. We first should know who must we address?

Virtual Customer: <pattern>Who * security policy *?</pattern>

<template>Security will be managed by Mr. Edwards, who is responsible for our Administration Department</template>

Language problem

Type: false friend

Pattern: "politic"

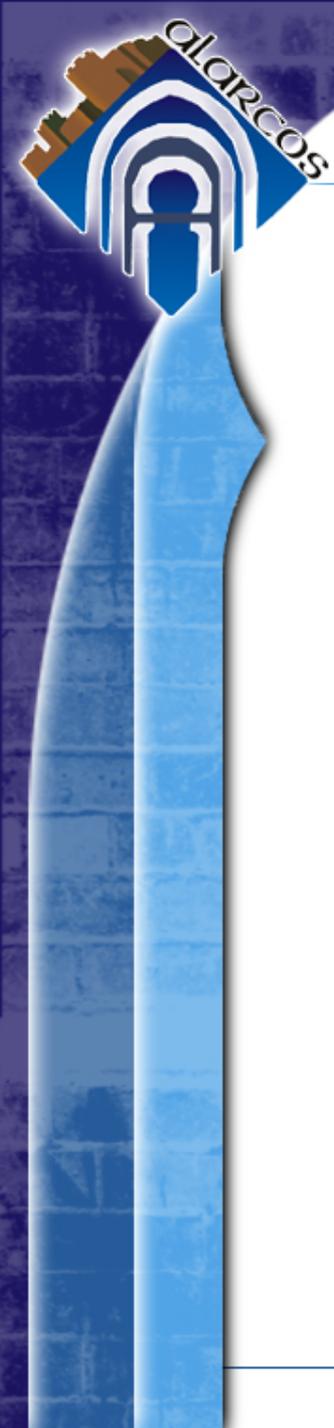
Definition: "Politic" is a false friend in Spanish. Do you mean policy?

Cultural problems

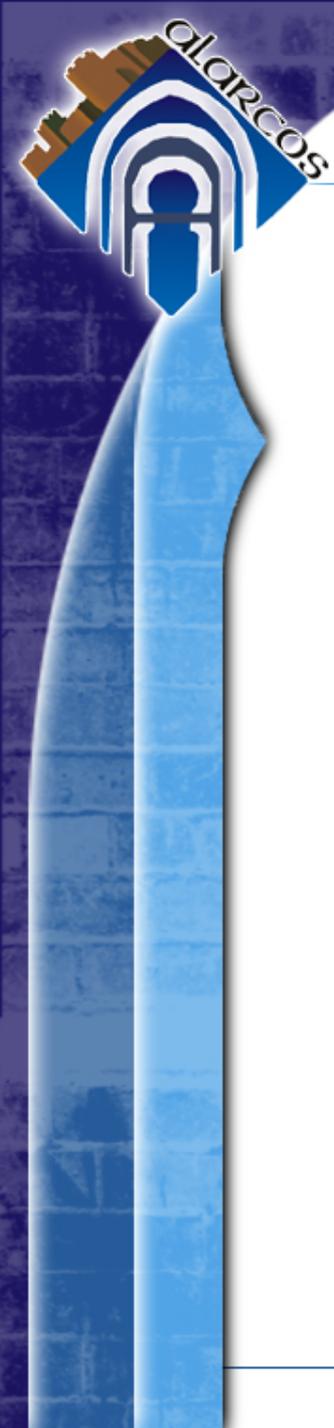
Type: qualification

Pattern: "? Edwards" **Trigger:** "? <> Mr."

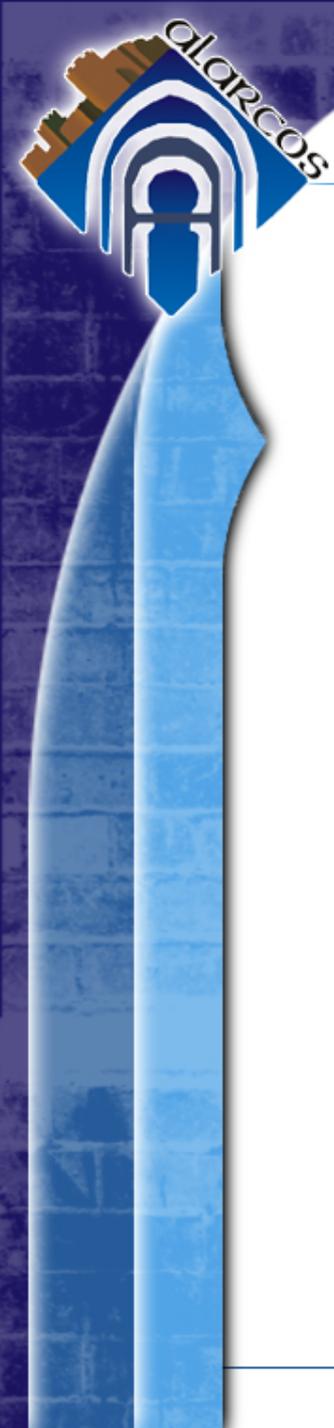
Definition: You should refer to Mr. Edwards using his title (Mr.).



- Provides rigorous training in the skills required in GDS by focusing on cultural dimensions.
- Avoids coordination and collaboration problems between institutions and students.
- Explains the consequences and rationales.
- Customization of the existing training scenarios.
- Learners can play different roles.



- Learners can play the same scenario again and again.
- Controlled environment: learners actions monitored for improvement.
- Reutilization and management of cultural and language rules.



Future work

- Provide a wide set of training scenarios oriented towards several stages of GSD.
- Define scenarios in which more than one learner can be involved.
- Evaluate the architecture: by comparing the performance of members of a company involved in GSD projects.



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Thank you very much for your attention

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