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# Model of articulation between elements of a pedagogical assistance

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**Abstract.** The AGATE project proposed the SEPIA system that allows an assistance designer to define assistance systems added in target applications. In Interactive Learning Environments, such assistance systems are useful to promote the acquisition of knowledge. These assistance systems consist of a set of aLDEAS rules. Our study of assistance in existing applications shows that the articulation between the rules of assistance can take many forms. We propose and implement a model of articulation between assistance rules with the five modes of articulation that we have identified. This model makes explicit and facilitates the definition of articulation between the rules of an assistance system.

**Keywords:** User assistance, pedagogical assistance, epiphytic approach, mode of articulation

## 1 Introduction

More and more applications are used in different contexts: professional, personal and educational. However, because of handling difficulties, users can under-exploit application or abandon it, and lose their motivation. In ILEs (Interactive Learning Environments), learners use various applications to acquire knowledge, but technical difficulties can compromise this acquisition. Additionally, some applications don't meet the teachers' pedagogical goals. Adding an assistance system is considered as a solution for both technical and pedagogical problems of an existing application. Such pedagogical assistance systems consists in varied and complex assistance actions (explanation message, error detection, etc.). They can have different modes to sequence assistance events which describe the articulation between the assistance elements. For instance, successive assistance gives *one message after another* in order to guide learners.

The SEPIA system [1] allows assistance designers (teachers in the pedagogical context of this paper) to add an assistance system in an existing ILE by creating and executing aLDEAS rules [2]. SEPIA is a full solution to create rich assistance systems. However, the definition of the articulation between the assistance elements is still implicit and difficult in our system. So, this paper presents the evolution that we proposed and implemented into SEPIA to overcome these limitations.

## 2 SEPIA system

The AGATE project (Approach for Genericity in Assistance To complEx tasks) aims at proposing generic models and unified tools to enable the setup of assistance systems in various existing applications, that we call target-applications, through a generic and epiphytic approach [2]. Within this project, the SEPIA system [1] implements this approach in two tools: an assistance editor and an assistance engine. The assistance editor allows assistance designers to define an assistance system; while the assistance engine executes this assistance system to provide assistance to final users in the target application.

The **aLDEAS language** (a Language to Define Epi-Assistance Systems) [2] is proposed in order to connect these both tools. The assistance systems are defined by a set of aLDEAS rules. An aLDEAS **rule** begins with an event wait called **trigger event**. When this event occurs, the **assistance actions** are immediately launched (see upper path in Fig. 1), or constrained by a **condition** (see lower path in Fig. 1). This condition takes the form of a consultation associated with different alternatives, each associated with one or more actions. The rule can be terminated by an **end event** that ends all actions launched by this rule. For instance, Fig. 1 shows one of the rules that define an assistance system. This rule waits until a click on the button ‘help’ in order to verify the answer of the learner and to provide an error message when this answer is not correct (text written by learner is not equal to 1). This message is closed after 10 seconds.

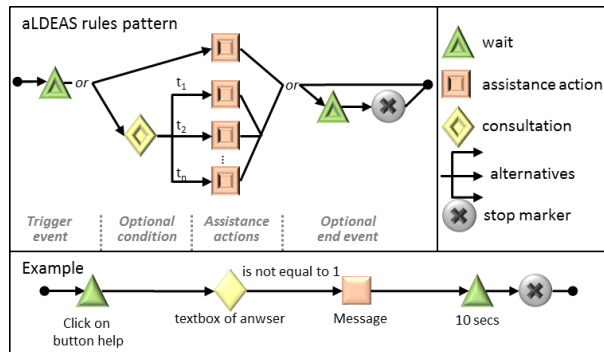


Fig. 1. aLDEAS rules pattern [2]

## 3 Modes of articulation between assistance elements

In ILE, pedagogical assistance can be found in some applications. This assistance can be executed according to different modes in sequencing assistance events. These modes describe articulation between the different assistance elements. Through a study of numerous applications, we identified five modes of articulation between assistance elements: independent, simultaneous, successive, progressive and interactive [3]. In the *independent mode*, an assistance element is given independently from another. In the

*successive mode*, the assistance elements are given one after the other. In the *simultaneous mode*, all assistance elements are given at the same time. In the *progressive mode*, the given assistance elements are more and more detailed and concrete. In the *interactive mode*, the given the assistance elements depends of information such as the application state, the user profile or the choice of user.

#### 4 Model of articulation between aLDEAS rules

If aLDEAS language and its implementation in SEPIA already allow the definition of articulation between assistance elements such as those presented in the section 3. An assistance system is currently always defined in SEPIA by a set of same level aLDEAS rules. In the aLDEAS rules pattern (Fig. 1), trigger event, end event and trigger condition are central elements to form the articulation between rules. On the one hand, we must carefully define elements in the rules in order to ensure correct articulation between them. On the other hand, we must examine them in order to understand which mode of articulation to choose. So, this articulation between rules is only implicitly expressed and is complex to define with aLDEAS.

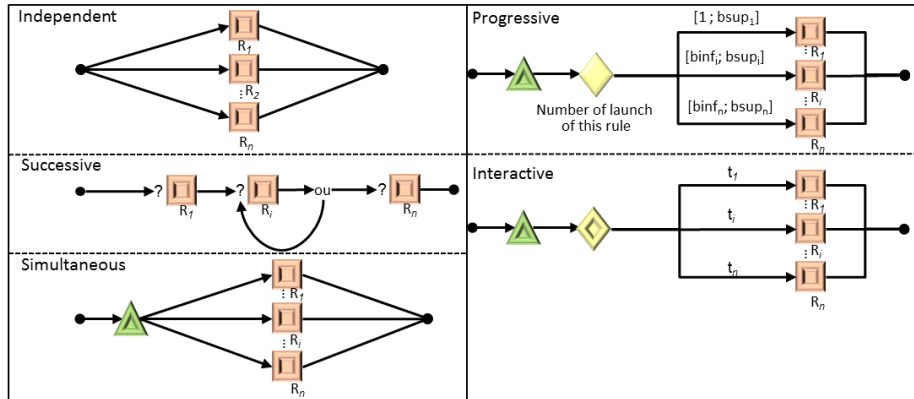
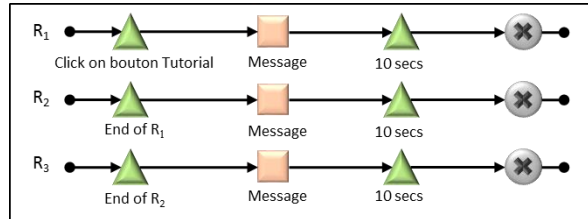


Fig. 2. Model of articulation between aLDEAS assistance rules

For these reasons, we propose to complete aLDEAS language by a model of articulation between assistance rules. To simplify the representation of the model, we note that rules between which we want to make an articulation are named  $R_i$  with  $i \in [1, n]$ , ( $n \geq 2$ ). The representation of our model (Fig. 2) gives an overview of the five modes of articulation that we identified from a study of existing works: independent, successive, simultaneous, progressive and interactive. In each mode of articulation, there are constraints that rules must respect to ensure the correct articulation between them (for instance, for successive mode, each rule should be launched by the end of the previous rule). These constraints are represented by the aLDEAS rules.



**Fig. 3.** Detail of three rules articulated in successive mode in aLDEAS

Let's take the example of an assistance system only consisting of the three steps of a tutorial. This assistance is created through three rules articulated in successive mode (defined in Fig. 2 and in more detail in Fig. 3). This mode forces the previous rules to end with any event and the next rules to start at the end of the previous rules. Thus, the three rules in this example respect these constraints of successive mode. The first rule R<sub>1</sub> waits until a user click on button "Tutorial" in order to show a welcome message that will be closed after 10 seconds. The rule R<sub>2</sub> that waits until the end of R<sub>1</sub> shows a message explaining a first part of the screen that will be closed after 10 seconds, etc.

## 5 Conclusion and future work

In this article, we presented our model of articulation between the rules of an assistance system which completes the aLDEAS language. This model explicitly express the notion of articulation between rules of an assistance system. It offers five modes of articulation corresponding to those we have identified in our bibliographical study. We implemented this model in the SEPIA system by adding the notion of block of rules articulated in a mode. This implementation has two main advantages: it makes explicit the definition of blocks of rules within a graphical interface and it applies semi-automatically constraints on rules, which simplifies the user's work [3]. With the introduction of this model in our approach, an assistance system is defined not only by a set of rules, but also by a set of blocks that explain the articulation between these rules. We evaluated our propositions by experiments that confirmed their potentials [3].

However, an assistance system can be described by many blocks of rules articulated in different modes. Therefore, in the future, we will aim at a global graphical representation of assistance systems which will allow to show many blocs at the same time.

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