

PROVIDING SCORM WITH ADAPTIVITY



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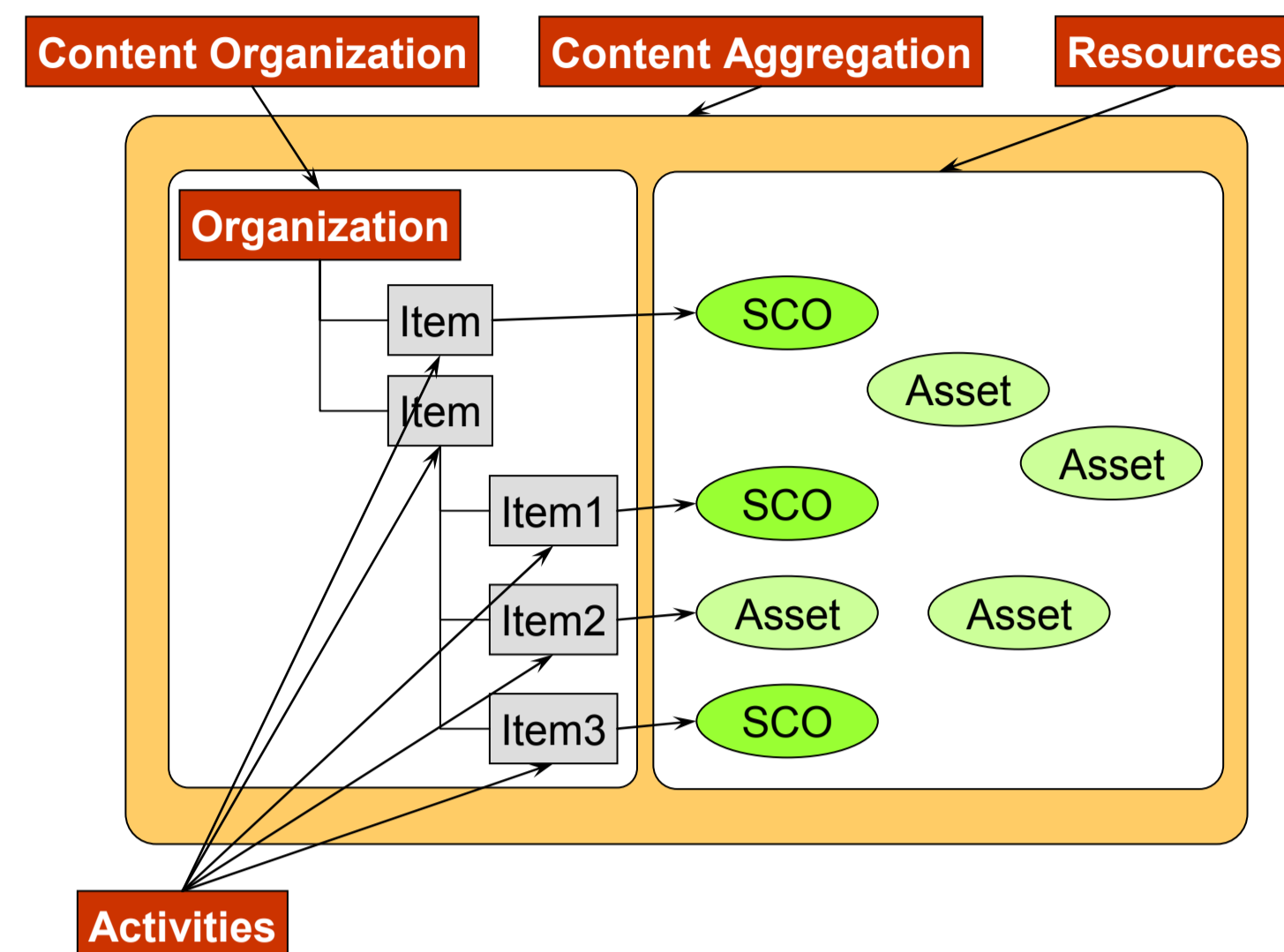
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The SCORM Standard

- Due to the rapid progress of e-learning, diverse standardization efforts have emerged.
- ADL SCORM (Sharable Content Object Reference Model, <http://www.adlnet.org>) has reached great acceptance.
- It brings together several standards of various standardization institutes in different fields of e-learning.



SCORM learning elements

- Asset** Electronic representation of media.
- SCO** (Sharable Content Object): Collection of Assets that represents a single launchable learning object that communicates with the LMS (Learning Management System) by means of the SCORM RTE (Run-Time Environment).
- Activity** Structured unit of instruction.
- Content Organization** It represents the intended use of the content through Activities.
- Content Aggregation** (Content Package), compressed file containing the physical resources of educational content as well as a manifest containing a structured inventory of the package.

Adaptivity in SCORM

SCORM repeatedly mentions the importance of personalization in education, however, its current adaptation abilities are very restricted and focused on the following aspects.

- Defining several Organizations** for the same course. The LMS is responsible, using the metadata available for this organization, for deciding which one suits the user profile better. In practice, most LMSs let the election in user's hands.
- Sequencing information** allows establishing a set of rules that the LMS uses to select the next activity to be shown. This election takes place using information about the current course and does not permit taking into account external aspects such as user's characteristics.

Our Proposal

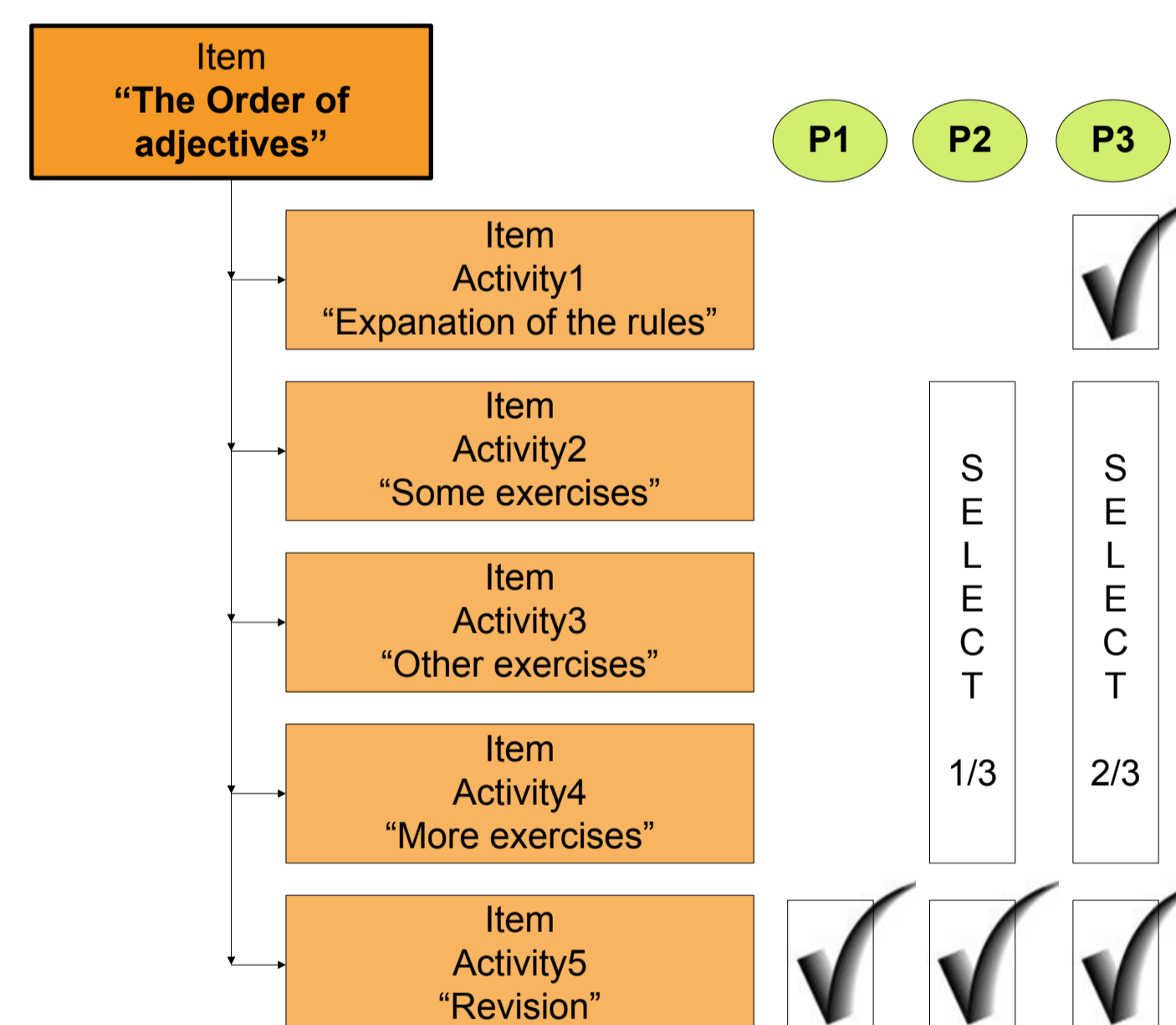
We suggest providing SCORM with the appropriate structures to obtain adaptivity at two levels:

Adaptation at Activity Level

- We propose different ways of completing the objectives of an activity according to the learner profile.
- In relation to the student's characteristics, different set of subactivities are offered. These relationships are established by means of adaptation rules.

Example: An Activity belonging to a Spanish course to learn the order of adjectives.

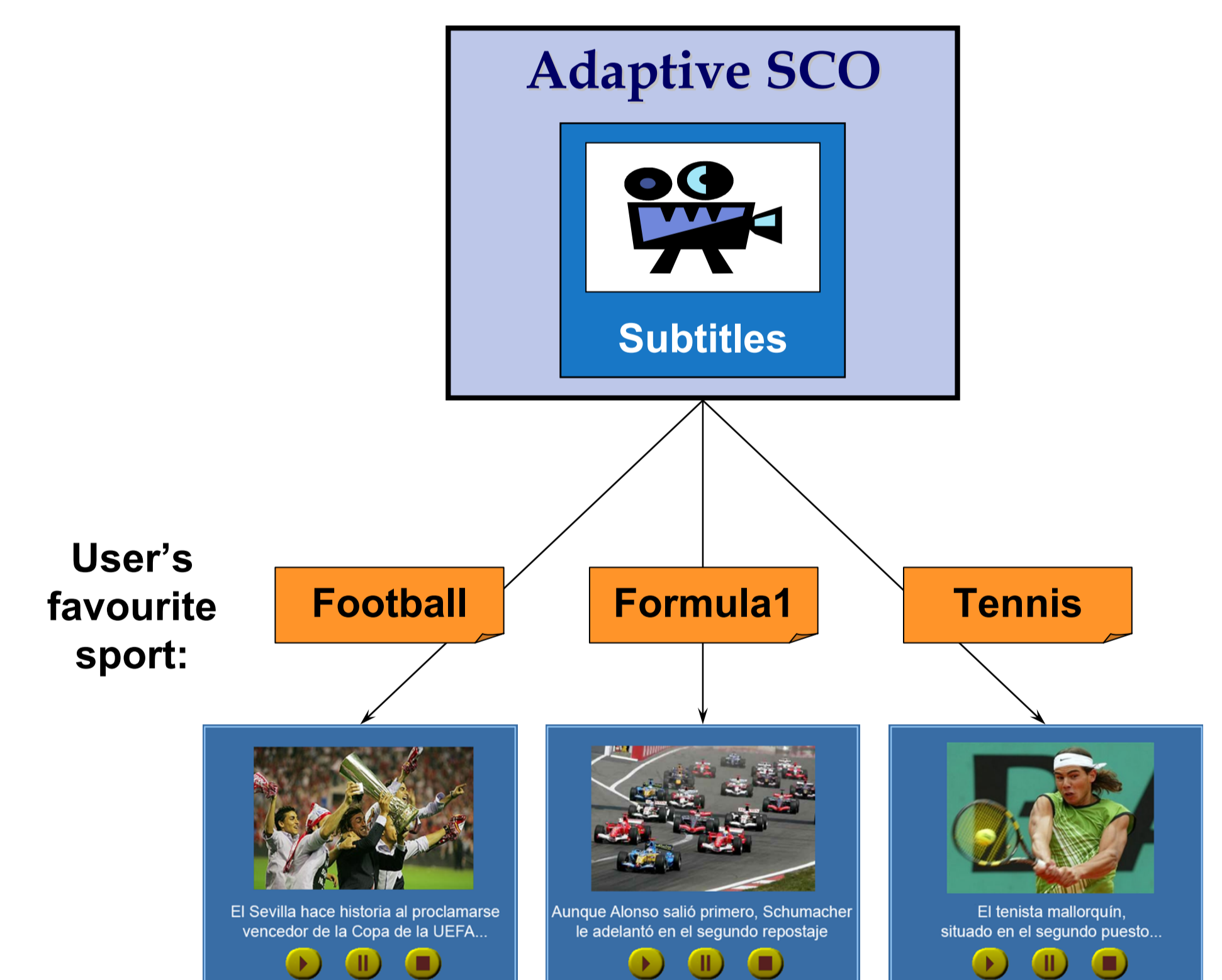
	Profile 1 (P1)	Profile 2 (P2)	Profile 3 (P3)
Mother tongue	A romance language	Not Romance	Not Romance
Spanish writing level	Information Not needed	≥ 5	< 5



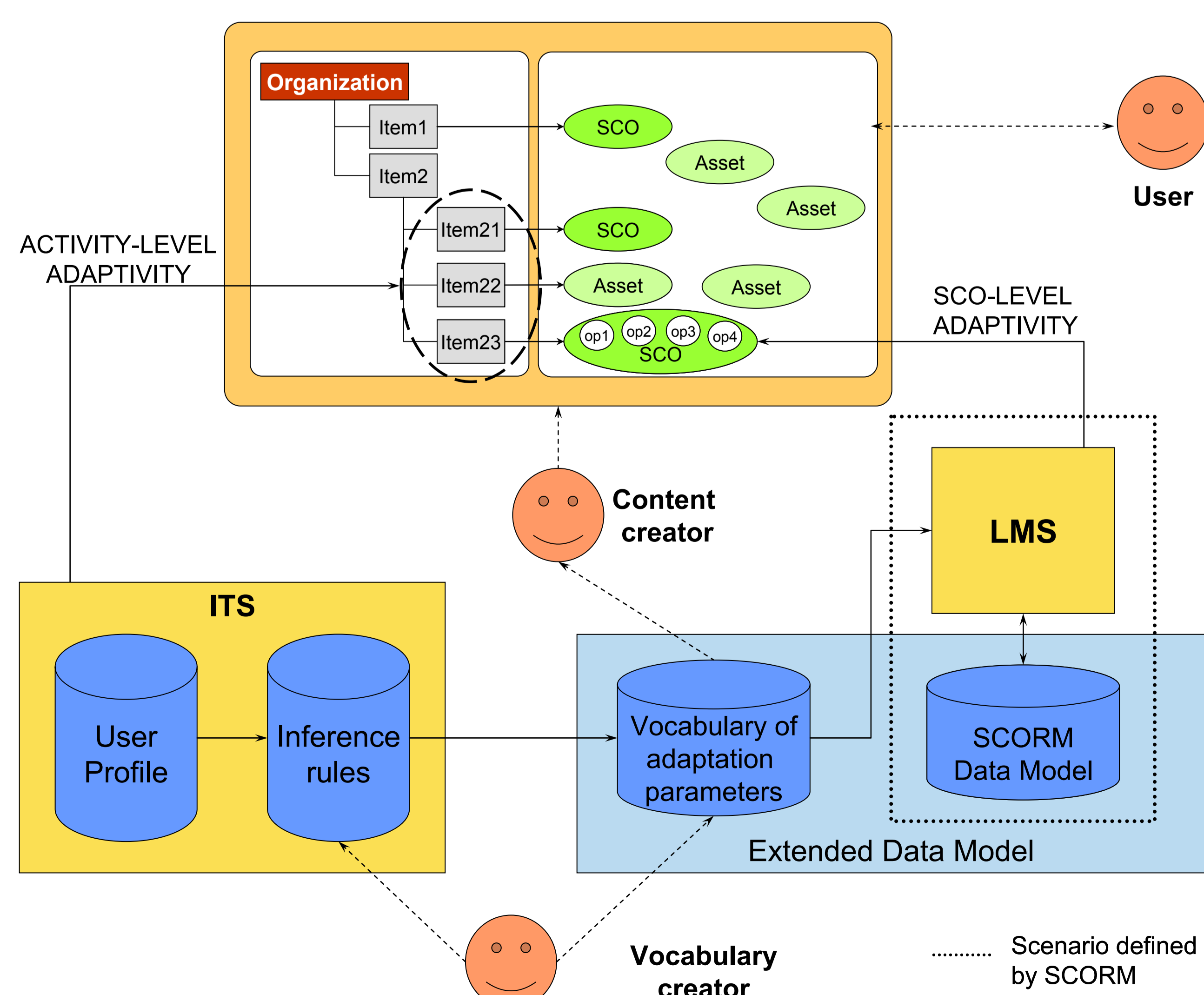
Adaptation at SCO Level

- We propose **Self-adaptive SCOs**.
- They are able to show different behaviours according to the characteristics of the target student.
- Its creator provides them with adaptation rules to carry out the adaptation process.
- Each rule indicates which is the behaviour to be shown for a given set of user's characteristics.

Example: A SCO belonging to a Spanish course to practice listening comprehension.



Scenario



- The **vocabulary creator** extends the SCORM Data Model with new vocabularies of adaptation parameters, that consist of a set of user's characteristics that are relevant in the concrete environment where the courses are broadcast. He/she also provides the Intelligent Tutoring System (ITS) with inference rules. These rules permit to obtain the actual values of these parameters from the user's characteristics stored in the user profile. They also make possible that the proposed extensions work independently of how the user profile is stored in the ITS.
- The **content creator** creates SCORM-conformant courses. He/she is responsible for searching, organizing and labelling learning content. Concerning our extension, he/she should know the available adaptation parameters and generate the appropriate adaptation rules for the activities and SCOs based on these parameters. These rules relate some values of the adaptation parameters with the appropriate subactivities to offer (in case of adaptation at Activity level) or which behaviour to show (in case of adaptation at SCO level).
- The **ITS** maintains the user profile, which stores the user's preferences, knowledge and history. The existence of this profile is basic in order for the ITS to keep up to date the actual values of the adaptation parameters using the inference rules for these parameters provided by the vocabulary creator. These values allow the ITS to apply adaptation rules to adapt the course at activity level.
- Finally, the **LMS** has the responsibility of storing the actual values of the adaptation parameters and showing the course to the user. This system has to provide the values of adaptation parameters to self-adaptive SCOs when requested, so as they can resolve the adaptation rules and show the appropriate behaviour to the student.

Acknowledgements

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