



Designing Collaborative Learning Systems: Current Trends & Future Research Agenda

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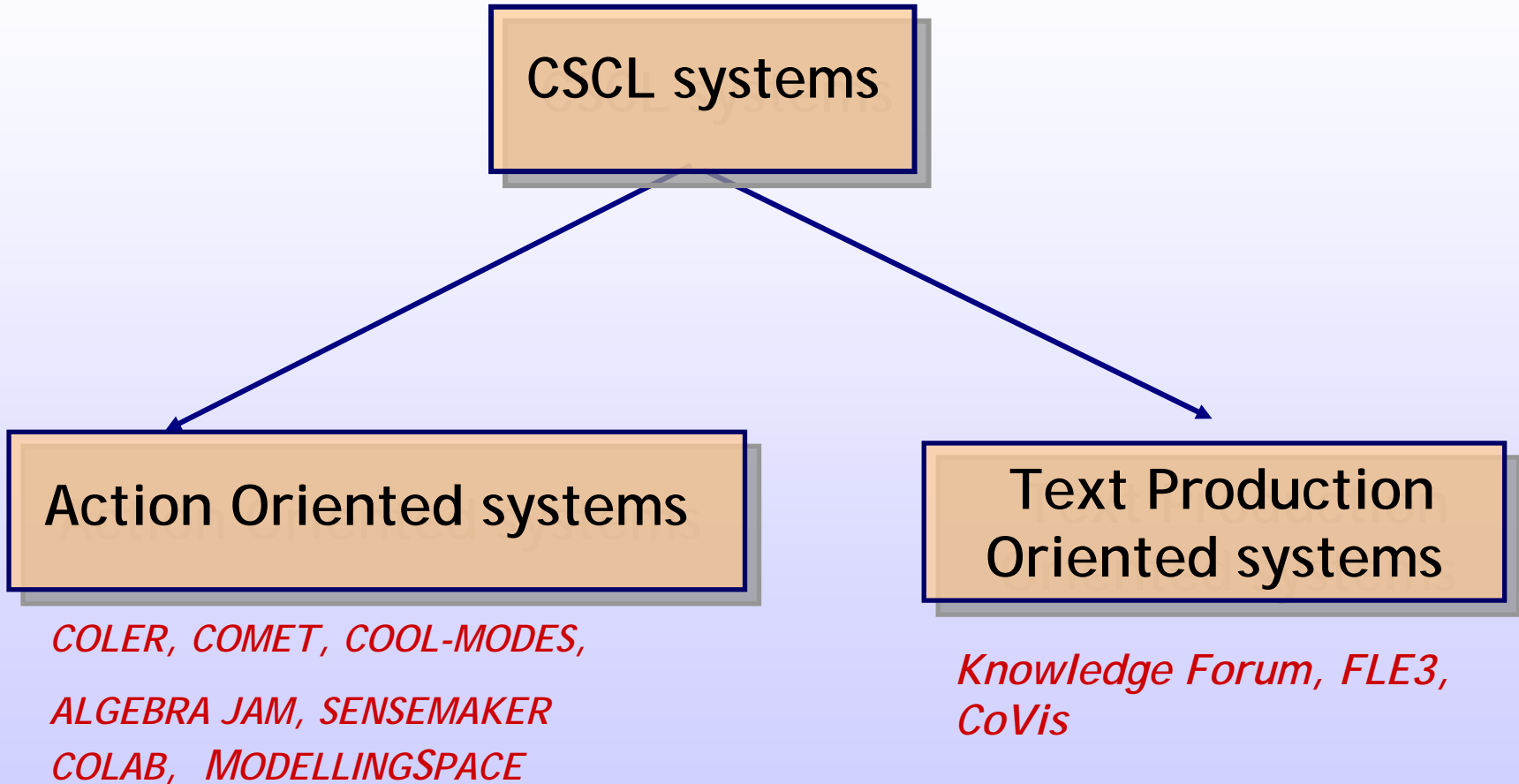
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- ⇒ “What are the *main design achievements* of this research field?”
- ⇒ “What are the *current trade-offs* and what are the various designers’ choices concerning significant design aspects?”
- ⇒ “What are the main *actual design questions* that preoccupy researchers and form a *research agenda* for the next years?”



CSCCL systems categories





CSCL systems functions

CSCL systems functions

Means for action & dialogue

*Forum, Chats, annotation tools,
artifacts centered discourse tools*

Students' self-regulation & guidance

Metacognitive tools, advisory tools

Workspace Awareness

On-line awareness

Teachers' assistance

*Supervision, actions historic,
assessment*

Community level management

Repositories, group formation, time management



CSCL Design trade-offs

Trade offs on the Means of Dialogue

Trade off on the Coordination of action-dialogue

Trade offs between ⇒ self regulation vs guidance
⇒ students vs teachers' support



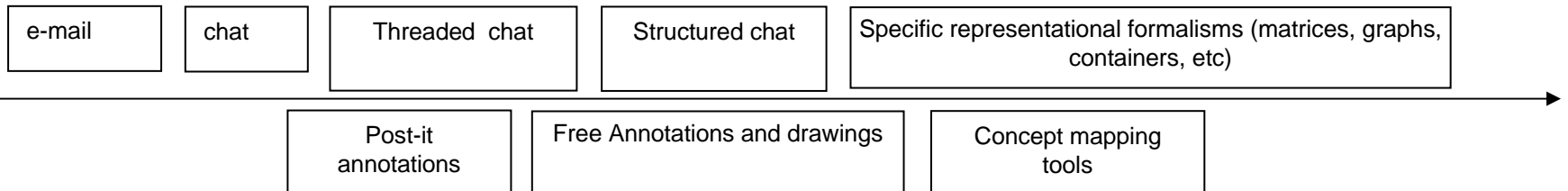
Design trade-offs on the means of dialogue

Trade offs on the means of dialogue between:

Free vs structured dialogue

Parallel vs embedded communication tools

Text based vs oral based dialogue tools





Design trade-offs on the means of dialogue

1.1 Trade off between free and structured dialogue

- ⇒ **Structured dialogue:** (e.g. via chat) intended to promote argumentative dialogue
- ⇒ **Free dialogue:** immediacy, liberty in expression

Questions/problems of structured dialogue

- ◆ if users select/prefer or not the structured one
- ◆ if the structured chat changes the nature of communication
- ◆ if it provoke cognitive load phenomenon
- ◆ if the predefined sentence openers are not used as intended



Design trade-offs on the means of dialogue

1.1 Trade off between free and structured dialogue

↪ *The appropriateness of free vs structured dialogue depends from:*

- ◆ **the various phases of the activity:** [e.g. initial brainstorming, discussion on strategy to follow, role distribution-management => free dialogue, task contribution= structured one]
- ◆ **the difficulty of the task -> cognitive overload effect:**
- ◆ **the level of familiarisation:** with the environment, the task, the collaborative activity itself



Design trade-offs on the means of dialogue

1.2. Trade off between parallel and embedded tools

- ⇒ **Parallel** : the shared artifacts and the discussion tools are on entirely separate windows.
 - ⇒ **Embedded**: assure coordination between the discourse and the disciplinary representations of the shared workspace
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↳ *Tools that contribute to the embedded approach:*

- ◆ **Annotation tools**: e.g. sticky notes
- ◆ **Drawings**: enclosing a 'region'
- ◆ **Highlighting**: the parts on which users they discuss



Design trade-offs on the means of dialogue

1.2. Trade off between parallel and embedded tools

↪ Disadvantages to recover in case of embedded tools:

- ◆ record of discourse is fragmented across the artifact => 'negative' for students and teachers, intended to reflect on the previous process
- ◆ the artifact becomes cluttered with comments

↪ Propositions to recover the conflict:

- ◆ **Linked dialogue- representations:** logical linkage between them
- ◆ **Switching between parallel and embedded:**



Design trade-offs on the means of dialogue

1.3. Trade off between written and oral dialogue

➤ Disadvantages of oral dialogue (voice group-ware):

- (a) The noise produced in a school class
- (b) It facilitates the communication, but allow avoiding the cognitively demanding written argumentation
- (c) The data based on free-natural language cannot be analysed

↳ Resolving the conflict: Estimate the learning value

- ⇒ Voice groupware especially for initial or brainstorming discussions
- ⇒ For foreign language students, dialogue via audio is used for practice oral skills (*Luceum's Project, Open University*)



Design trade-offs on the means of dialogue

2. Trade off on the coordination of action or dialogue

- ⇒ **Coordinated action on the shared workspace** : restricted protocol of synchronous collaboration, using metaphors (key-pencil/exchange, traffic light, or 'microphones')
- ⇒ **Free synchronous activity** : students must assure the coordination of their contributions

Coordinated action:

- ⇒ **Disadvantage**: deadlocks can be created in cases when one partner refuses to pass the key over to the other partner
- ⇒ **Advantage**: the protocol maintains clear semantics of actions and roles in the shared activity space



Design trade-offs on the means of dialogue

2. Trade off on the coordination of action or dialogue

Free action:

- ⇒ **Disadvantage:** the one does not follow the other, or delete 'entities', many 'tools' or objects opened simultaneously (chaos)
- ⇒ **Advantage:** fluidity of action

↳ Resolving the conflict: Their appropriateness depends from factors:

- the previous familiarisation with syn collaborative activities,
 - the pre-existing' friendship of members, etc
- ⇒ **Dispose, both possibilities and leave the members of the students' groups to choose by themselves**



Design trade-offs on action coordination

2. Trade off on the coordination of action or dialogue

Locked mechanisms vs free permission

Rights on partners modifications and authorship identification

⇒ **Disadvantage of free permission:**

delete or modify ‘contributions’ without mentioning

⇒ **Optimistic concurrent control by supporting awareness:**

a clear indication of the ‘authorship’ indicating who uses currently which component. Gives freedom, fosters teamwork, avoiding modifications of others work



Design trade-offs on (self)-regulation

3.1. Trade off on guiding vs self-regulation

Supportive Scaffolding ⇒
⇒ *Artificial agents-Advisors*
⇒ *Guiding*

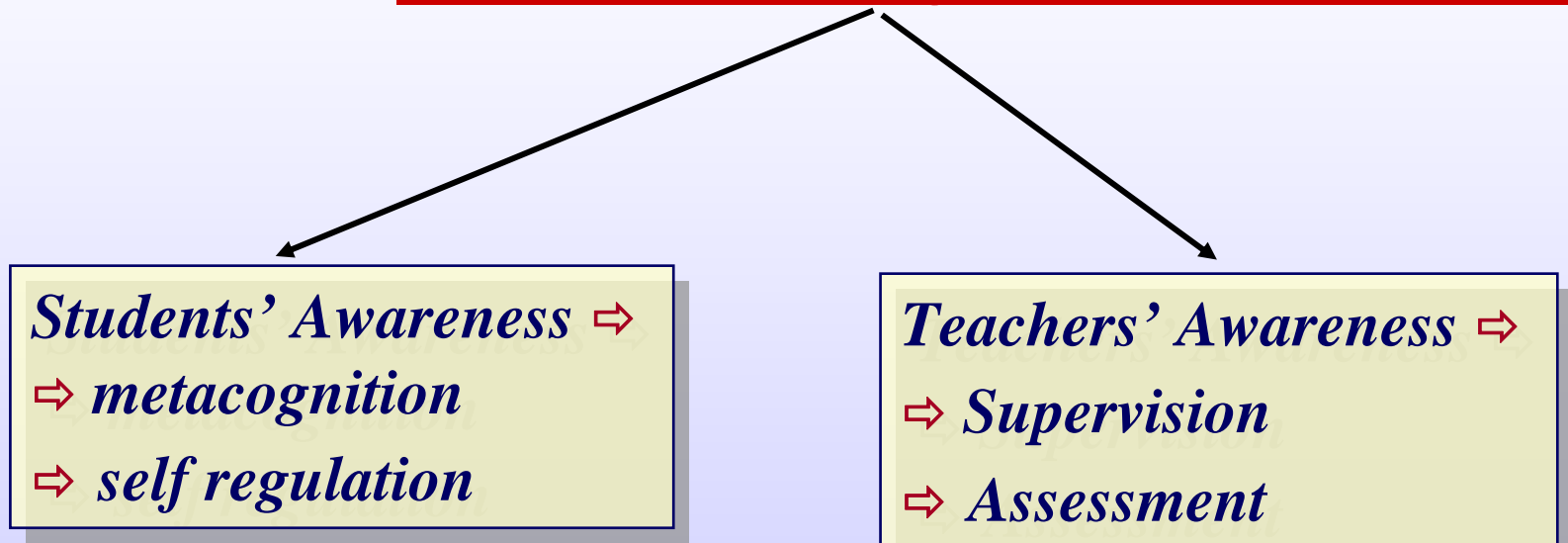
Meta-conceptual Awareness ⇒
⇒ *strategic awareness*
⇒ *metacognition*
⇒ *self regulation*

⇒ *More Research is required focusing on complementarities*



Design trade-offs on (self)-regulation

3.2. Trade off on students' metacognition vs teachers sup.

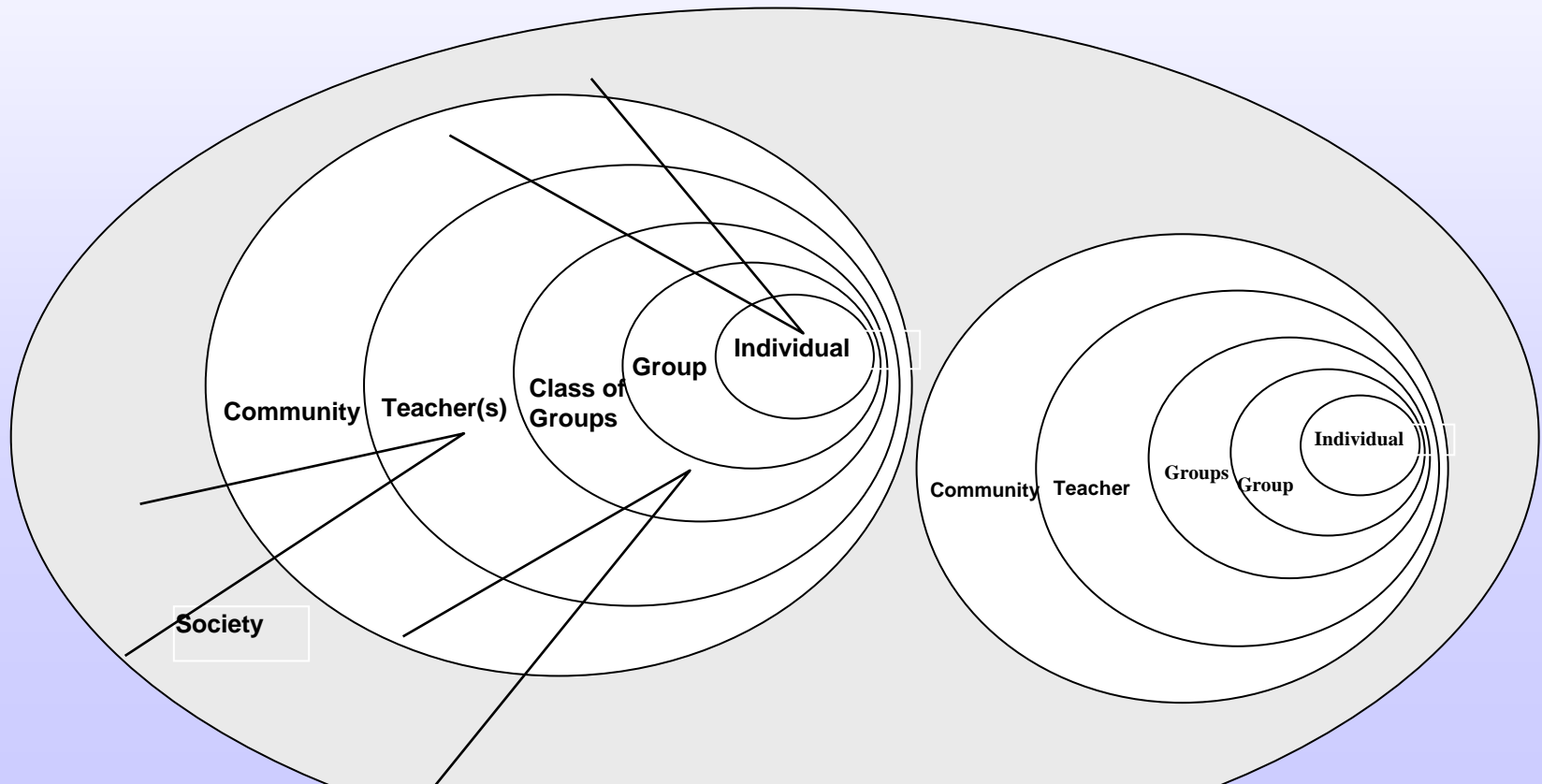


⇒ *More Research is required focusing on complementarities*



Trends on tools and functionalities

- ↪ 1. *A vision of all agents and cognitive systems involved in collaborative learning settings*
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Trends on tools and functionalities

↪ 2. *A vision of a “unified” category of CSCL*

Action driven ↔ text driven



Small group ↔ wide community



synchronous ↔ asynchronous communication

↪ *These two categories are actually sufficiently developed. It is currently possible to develop systems that are enriched from both.*



Trends on tools and functionalities

↪ 3. *A complete view of necessary tools and functions supporting collaborative learning*

(a) Action and discussion functions



(b) Workspace awareness' functions



(c) Course Management



(d) Interaction Analysis for supervision, self-regulation

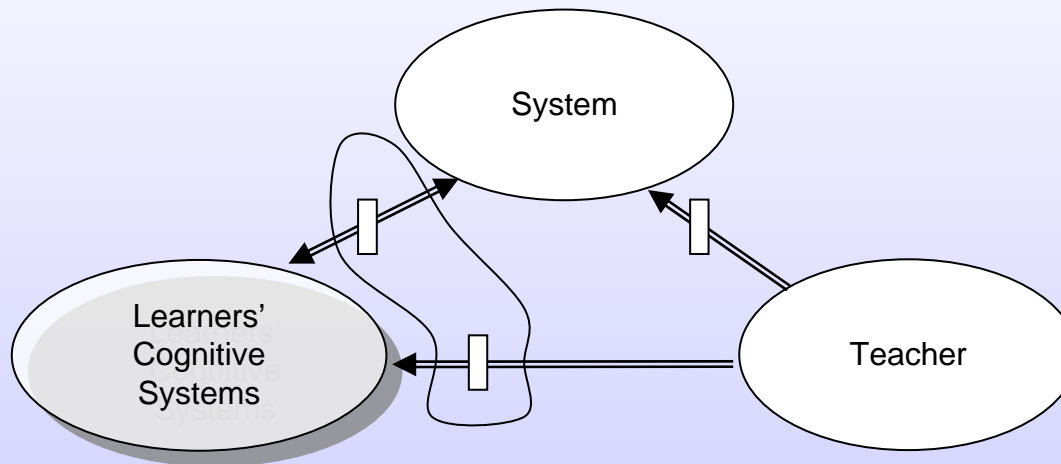


(e) Help and Advising functions



Trends on tools and functionalities

4. *A vision of the control of collaborative process as distributed to all the agents*

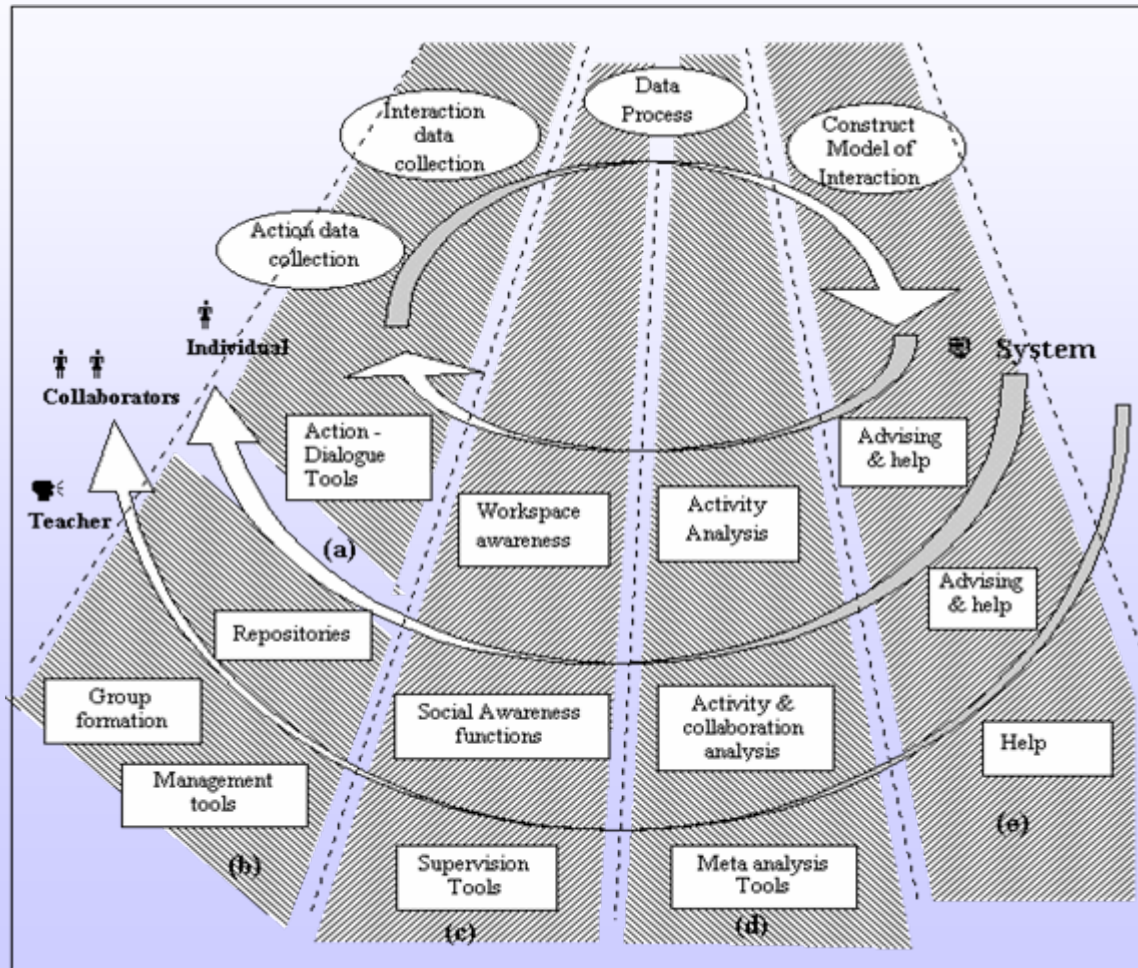


- ◆ **Self-regulation (via metacognitive support)**
- ◆ **Teacher supervision and/or evaluation & also self-assessment**
- ◆ **Advisors ('pedagogical agents') from the system**



Trends on tools and functionalities

Generic System





Research Agenda => advanced CSCL systems

↪ *_Accentuation of the effort to produce rich, more complete & appropriate systems*

↪ *_Production of flexible and negotiable environments (optional and customisable) that respect the sustainability and reusability of the elaborated work*



Research Agenda => advanced CSCL systems

↳ *Elaboration of powerful analysis methods of collaborative interactions:*

- ◆ *Development of meta-cognitive tools addressed to students*
- ◆ *Development of analysis tools addressed to teachers*



Research Agenda => advanced CSCL systems

↳ Parallel agenda:

Collaborative learning activities and tasks regarding various collaboration modes

↳ New agenda:

*Exploration of the new possibilities offered by technological advances
(ubiquitous computing, wireless devices, etc)*