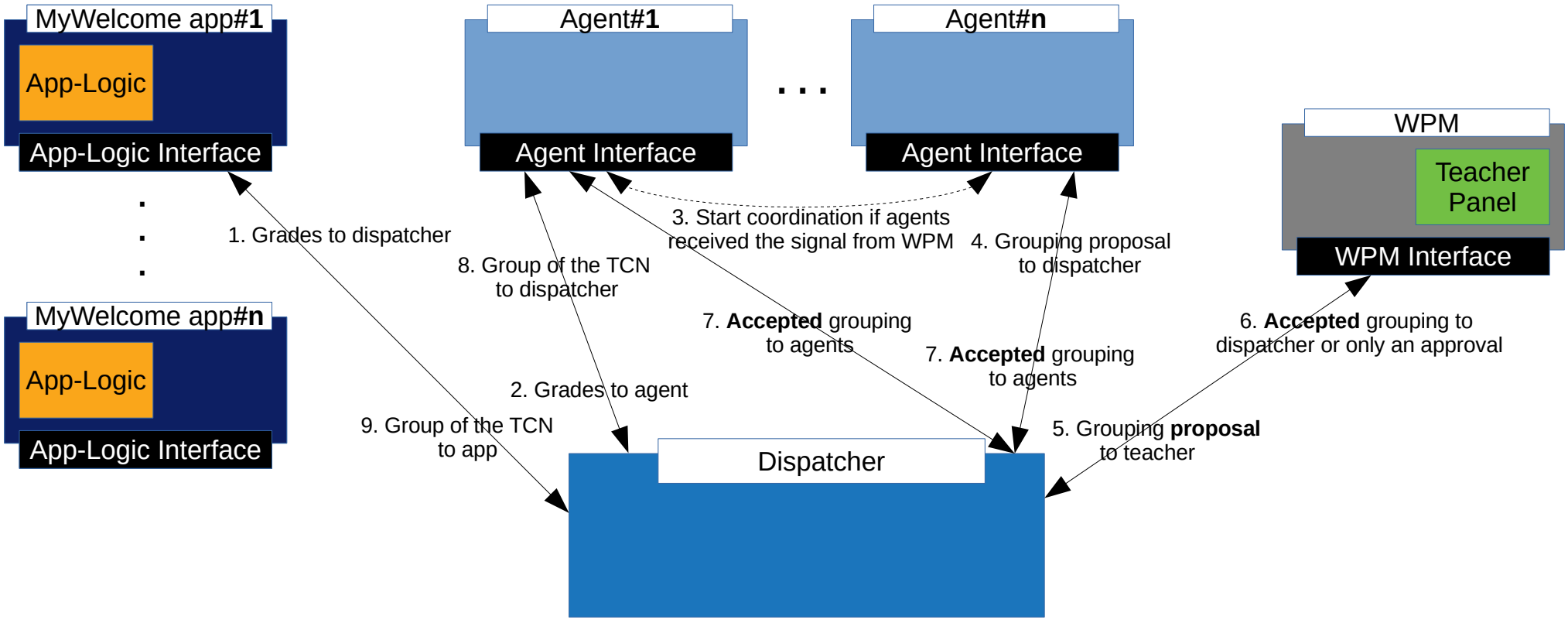
Langage Course Coordination (LCC) Process Workflow

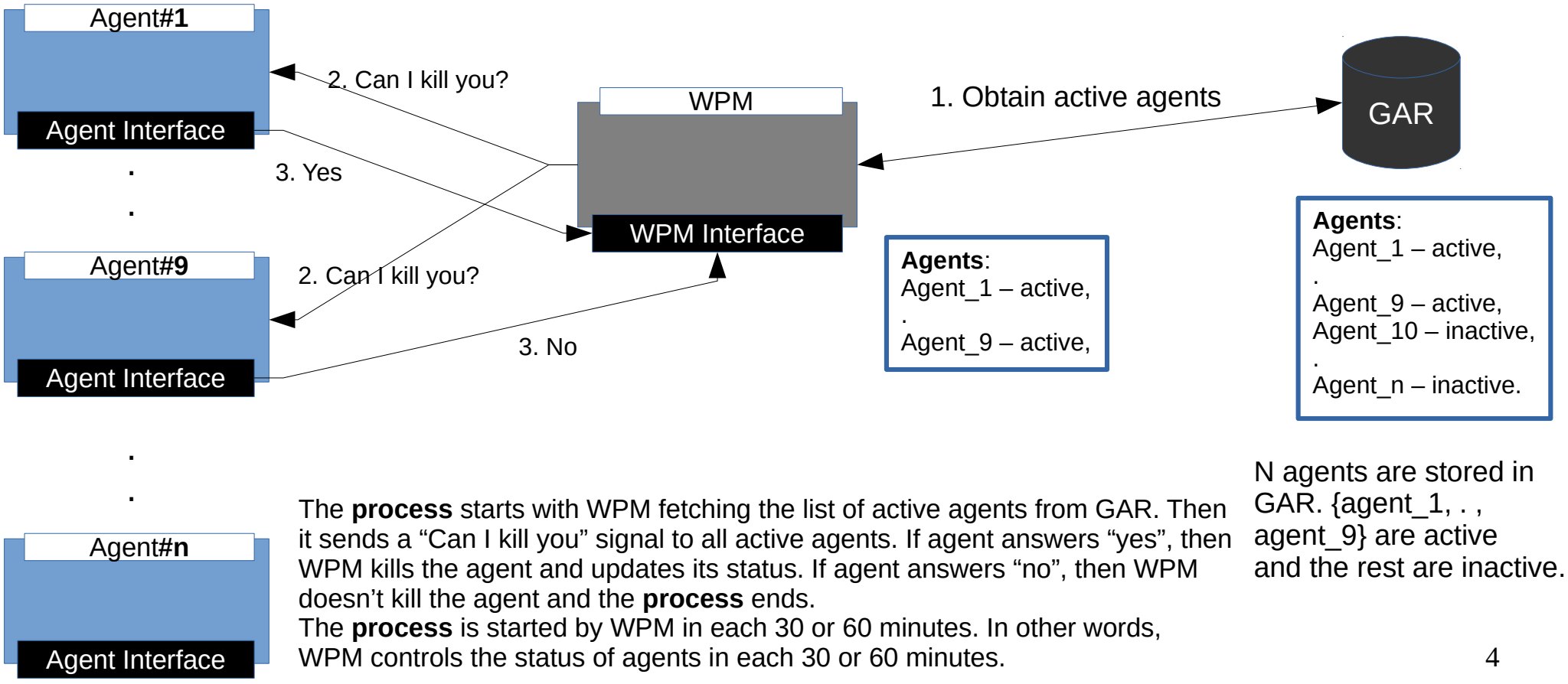
General Overview of Workflow



Questions

1. **How the status of agents are updated in GAR?**
2. **How each agent is informed about its classmate agents?**
3. **How the approved solution is sent to all agents?**
4. **How the coordination is initialized in LCC scenario?**
5. **Which agent sends the grouping to WPM?**

Q1. How the status of agents are updated in GAR?



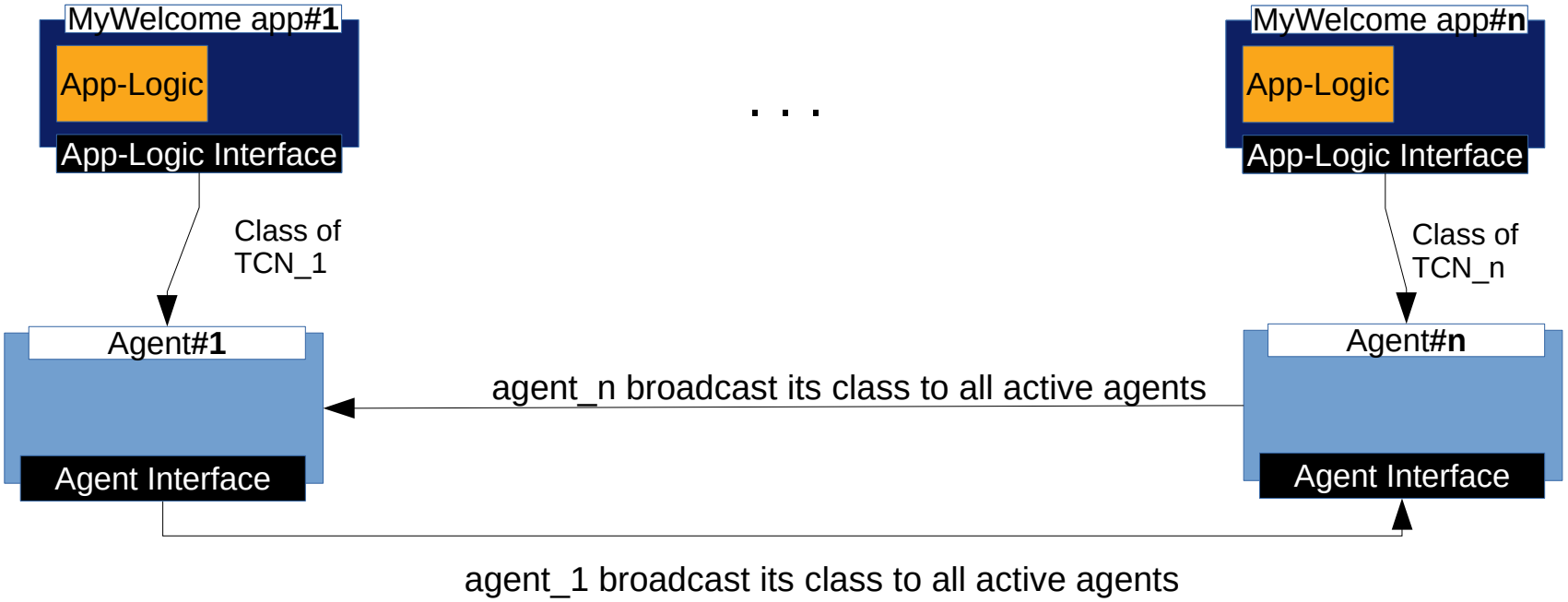
The **process** starts with WPM fetching the list of active agents from GAR. Then it sends a “Can I kill you” signal to all active agents. If agent answers “yes”, then WPM kills the agent and updates its status. If agent answers “no”, then WPM doesn’t kill the agent and the **process** ends.
The **process** is started by WPM in each 30 or 60 minutes. In other words, WPM controls the status of agents in each 30 or 60 minutes.

N agents are stored in GAR. {agent_1, . , agent_9} are active and the rest are inactive.

Q2. How each agent is informed about its classmate agents?

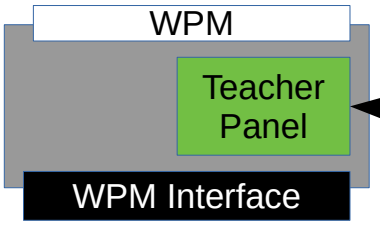
2 methods:
1) Each **TCN** enters his/her class via Welcome app
2) **Teacher** sends this information via WPM

Q2_Approach 1: Agents are informed by “TCNs”



Each TCN enters his/her classroom name (the classroom where he/she is officially assigned) to MyWelcome app. MyWelcome app sends this info to the respective agent. To determine which agents belong to the same classroom, each agent broadcasts its classroom to all active agents.

Q2_Approach 2: Agents are informed by “Teacher”



Teacher panel displays the list of agents (active and inactive), teacher sets a class to each agent and WPM stores the info to GAR

Agents:
Agent_1 – active, **class_1**
.
Agent_9 – active, **class_2,**
Agent_10 – inactive, **class_3**
.
Agent_n – inactive. **class_1** ,

Since each agent populates the GAR when it is created (by WPM), it will know to which class it belongs to, when it is created.

GAR stores the agents with their status and with the class they are in

Q2_Implications

Approach	Pros	Cons
By **TCNs**	**1)** Teacher is not included in this specific process (less work for her)	**1)** TCNs might enter incorrect class **2)** n*(n-1) number of communications for n agents **3)** Application should provide a UI to enter class and app should get the name of classrooms from somewhere
By **Teacher**	**1)** Info can be stored in GLAR as well	**1)** WPM should provide a UI/functionality for teacher to enter the respective classes of TCNs

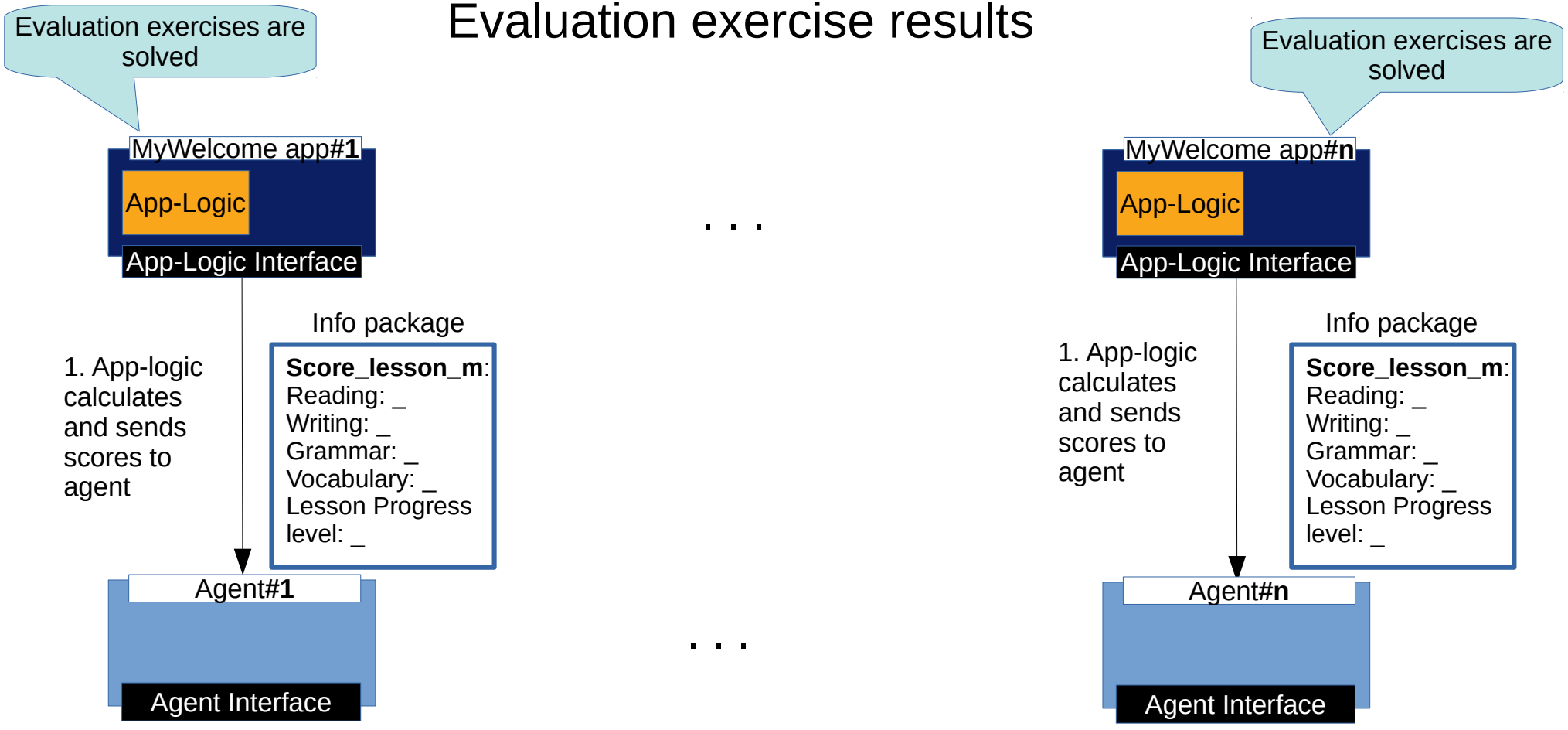
* Pros and cons of a method is, respectively, cons and pros of the other method.

LCC Process Workflow

App-Agent communication:
TCN solves evaluation exercises

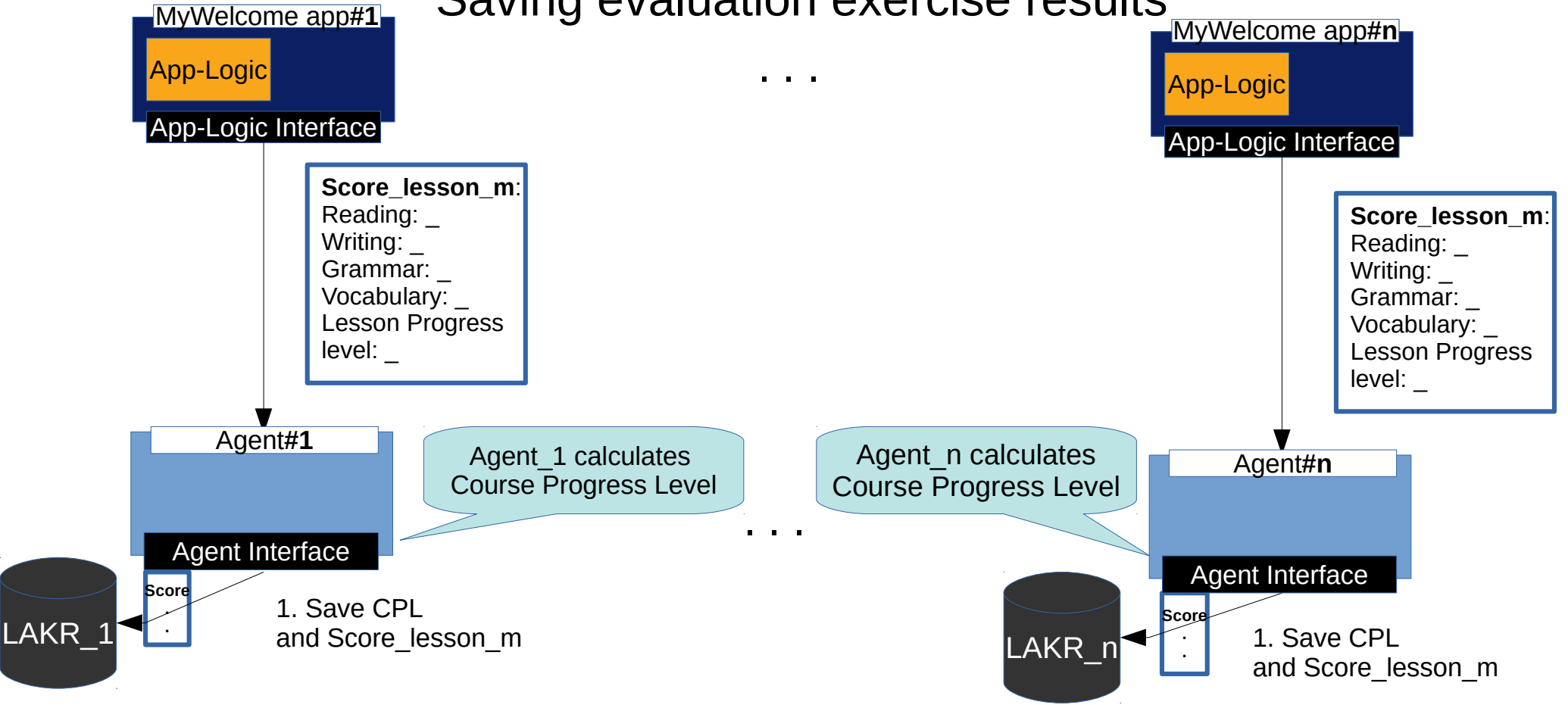
* At the end of each lesson, each TCN solves evaluation exercises in MyWelcome app.

App-Agent communication:
Evaluation exercise results



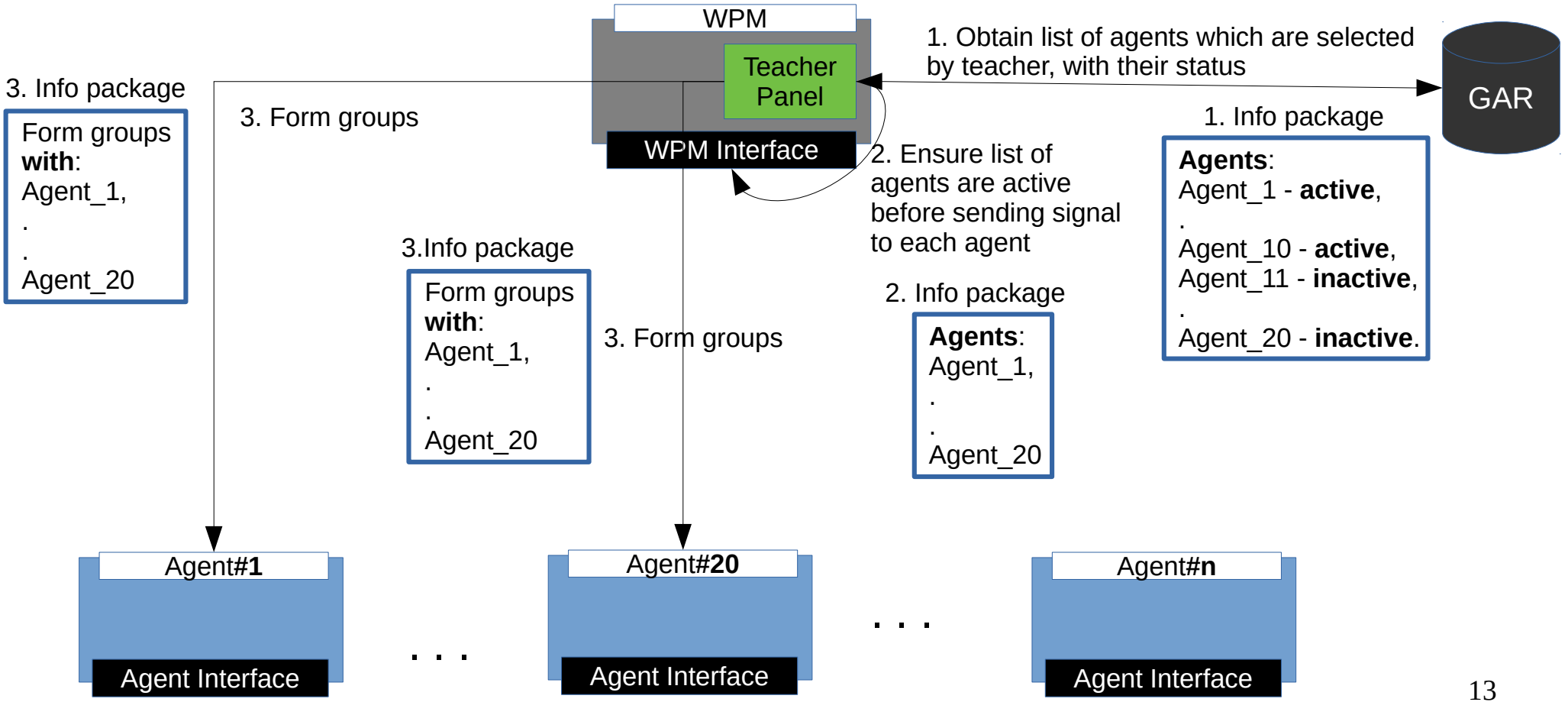
* Once a TCN finishes solving evaluation exercises, app-logic calculates grades (reading, grammar, writing, vocabulary and lesson progress level) and sends it to the respective agent.

App-Agent communication:
Saving evaluation exercise results



* Once agent receives the grading info from app-logic, it calculates course progress level based on the previous lesson progress levels (if exists) which are stored in its LAKR. Then agent saves all the grading info (which came from app-logic) to LAKR.

LCC Process:
Teacher requests grouping proposal



LCC Process:
Teacher requests grouping proposal - **Explanation**

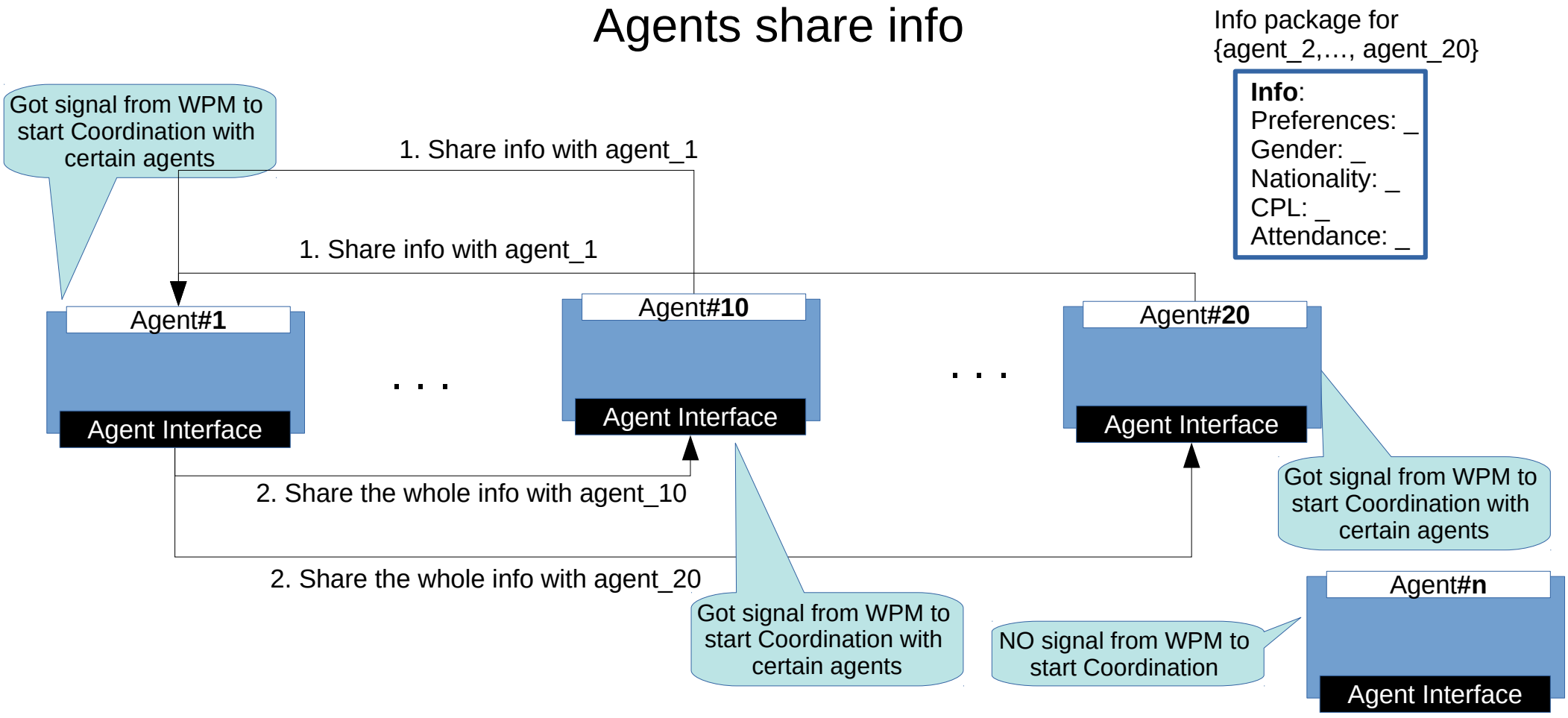
* Slide 13 doesn't have to happen right after slide 12. Teacher can request "*form groups*" anytime she wants (e.g. Saturday midnight, during a lesson, etc.). If teacher selects a classroom which contains, for example, TCN_1 to TCN_20, then WPM needs to ensure that agent_1 to agent_20 are active such that they can start coordination process.

Here it's assumed that teacher selects only a classroom (a set of students) and she doesn't select a lesson number. Therefore, agents form groups with the information they have. In other words, if agent_1 to agent_19 have received the grades for lesson_1 to lesson_4, but agent_20 has received grades for lesson_1 to lesson_3, then agent_20 will proceed with the information for 3 lessons.

Some suggestions to overcome the issue of not receiving the grades for all lessons from TCNs:

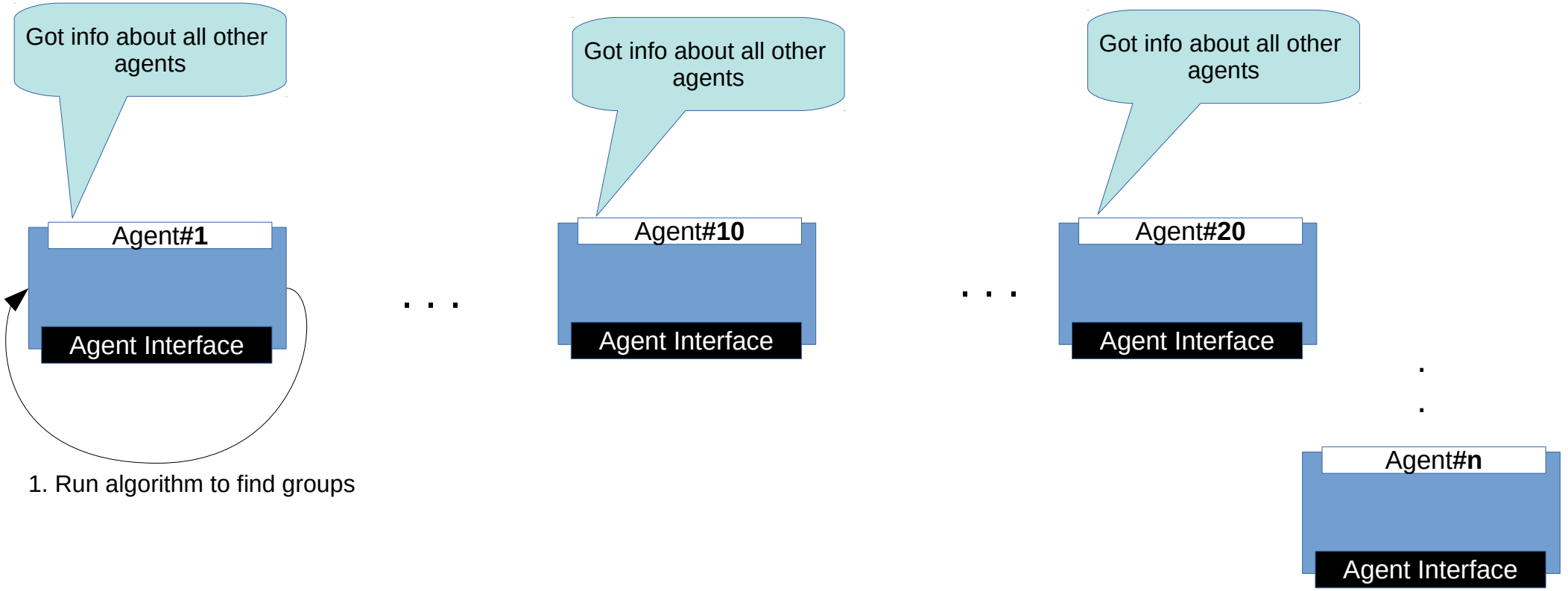
1) Teacher selects a classroom (set of students) and a lesson number (e.g. 4). WPM sends signal to all agents in the classroom whether they are ready to form groups for lesson_4. They respond back to WPM about their status. If all of them are ready, then WPM sends another signal to start coordination. If some agents haven't received the grades for lesson_3, then agents might send a push notification to MyWelcome app. Since it is not guaranteed that the TCN will solve exercises, teacher could be given two options if every agent is not ready: 1) don't start to form groups and 2) start to form groups with what you have.
2) Teacher selects a classroom (set of students) and a lesson number (e.g. 4). WPM sends signal to 20 agents to start to form groups for lesson_4. Let's assume that agents select agent_1 as leader agent based on a protocol without voting. Then each agent sends a signal to agent_1 whether they have received all grades or not. If all agents are ready, then agent_1 sends other agents to start the coordination. If some agents are not ready then agent_1 informs WPM about it. And then teacher is given the last word to say whether it is ok to start or not as in (1).
3) More suggestions?

LCC Process:
Agents share info



* When an agent receives the signal from WPM, it selects a leader agent (agent_1 in this example) based on a protocol.Then all agents ({agent_2, . . agent_20}) send their info to agent_1. Once agent_1 has the info from all agents, it shares the whole info with {agent_2, . . agent_20}, such that they all have the same info.

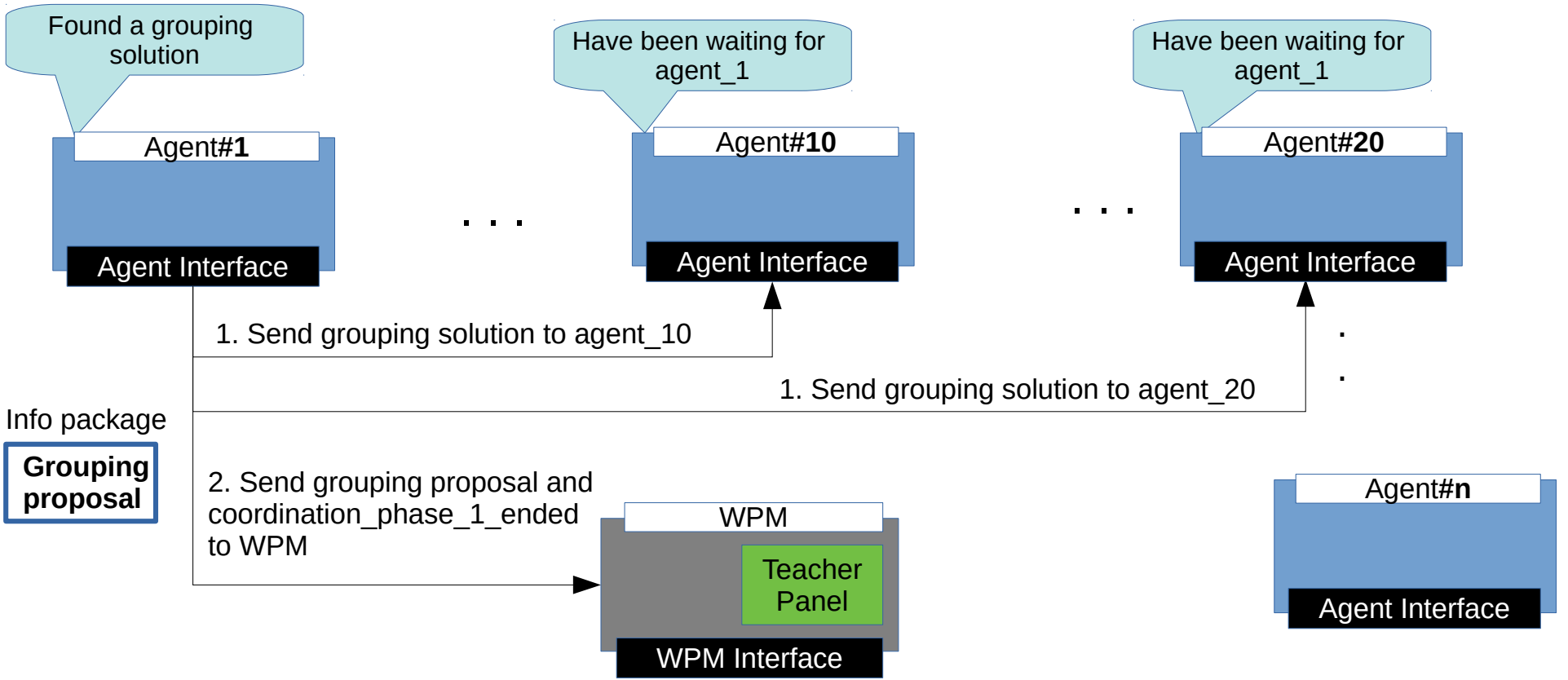
LCC Process:
Agents find grouping



1. Run algorithm to find groups

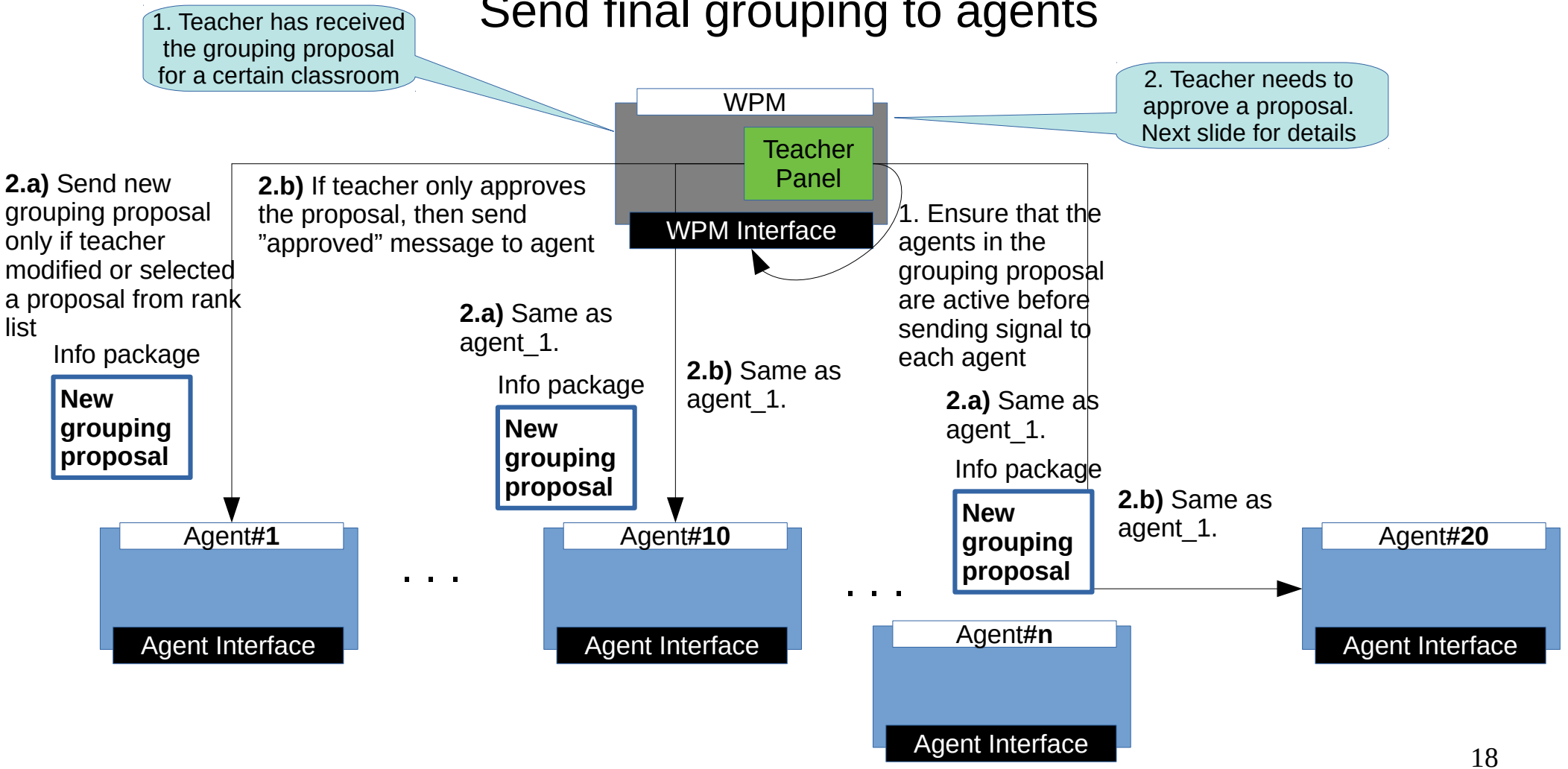
* Since agent_1 is chosen as leader based on the protocol, {agent_2, . . , agent_20} will wait to receive the grouping proposal from agent_1.

LCC Process:
Agents share grouping result with Teacher



* Once agent_1 finds a grouping solution, it lets all other agents to know about the grouping. Then agent_1 sends the grouping solution to WPM and lets WPM know that coordination_phase_1 has ended for the agents in grouping solution.

LCC Process:
Send final grouping to agents



* Teacher is free to submit final grouping or approve the proposal whenever she wants.

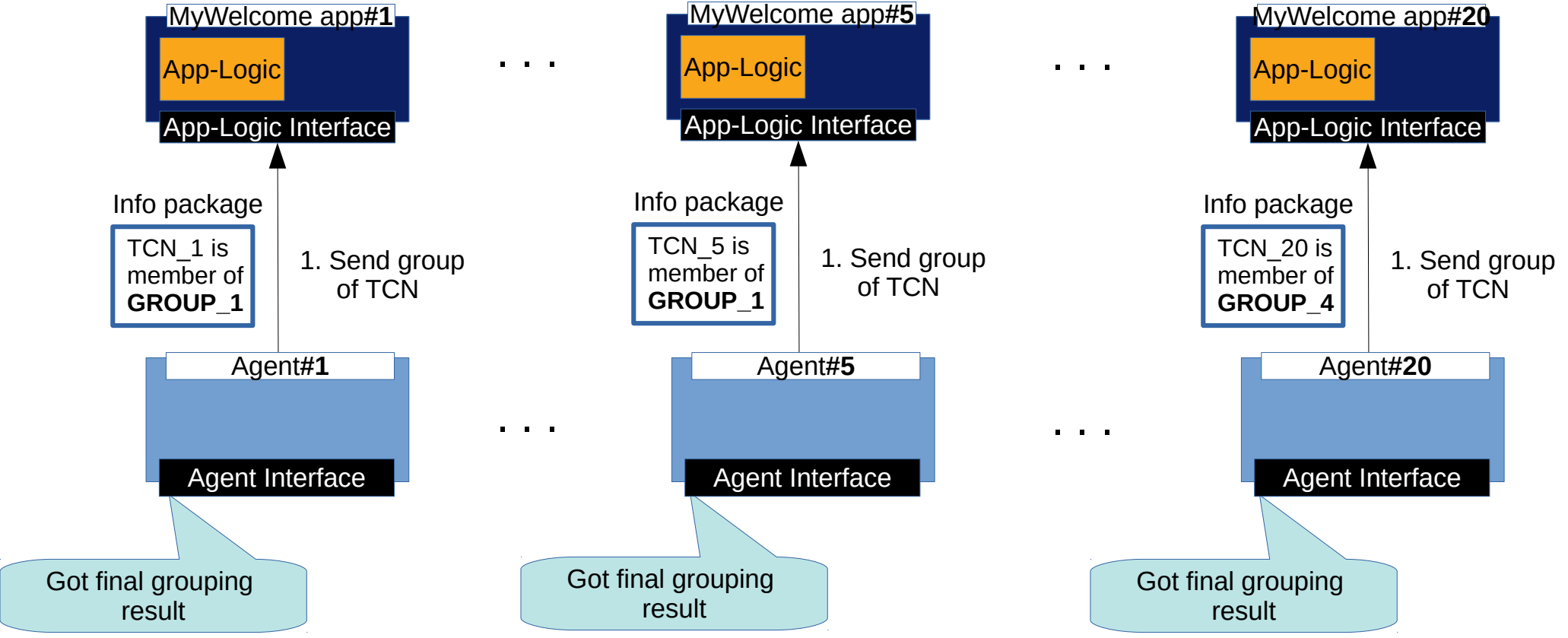
LCC Process:
Send final grouping to agents **- Explanation**

Agents might send only one or a rank list of groupings to teacher. Therefore, there will be 3 possibilities on teacher side:

1) If teacher received a rank list, she needs to select one grouping and submit. She can modify the grouping she selected.
2) If teacher received only 1 grouping proposal, she can modify and submit.
3) If teacher received only 1 grouping proposal, she can approve it.

What do agents expect under each condition?
For (1) and (2), agents expect the new grouping. For (3), agents don't expect any grouping because they already know it.

LCC Process:
Send final grouping to TCNs



LCC Process:
Send final grouping to TCNs - **Explanation**

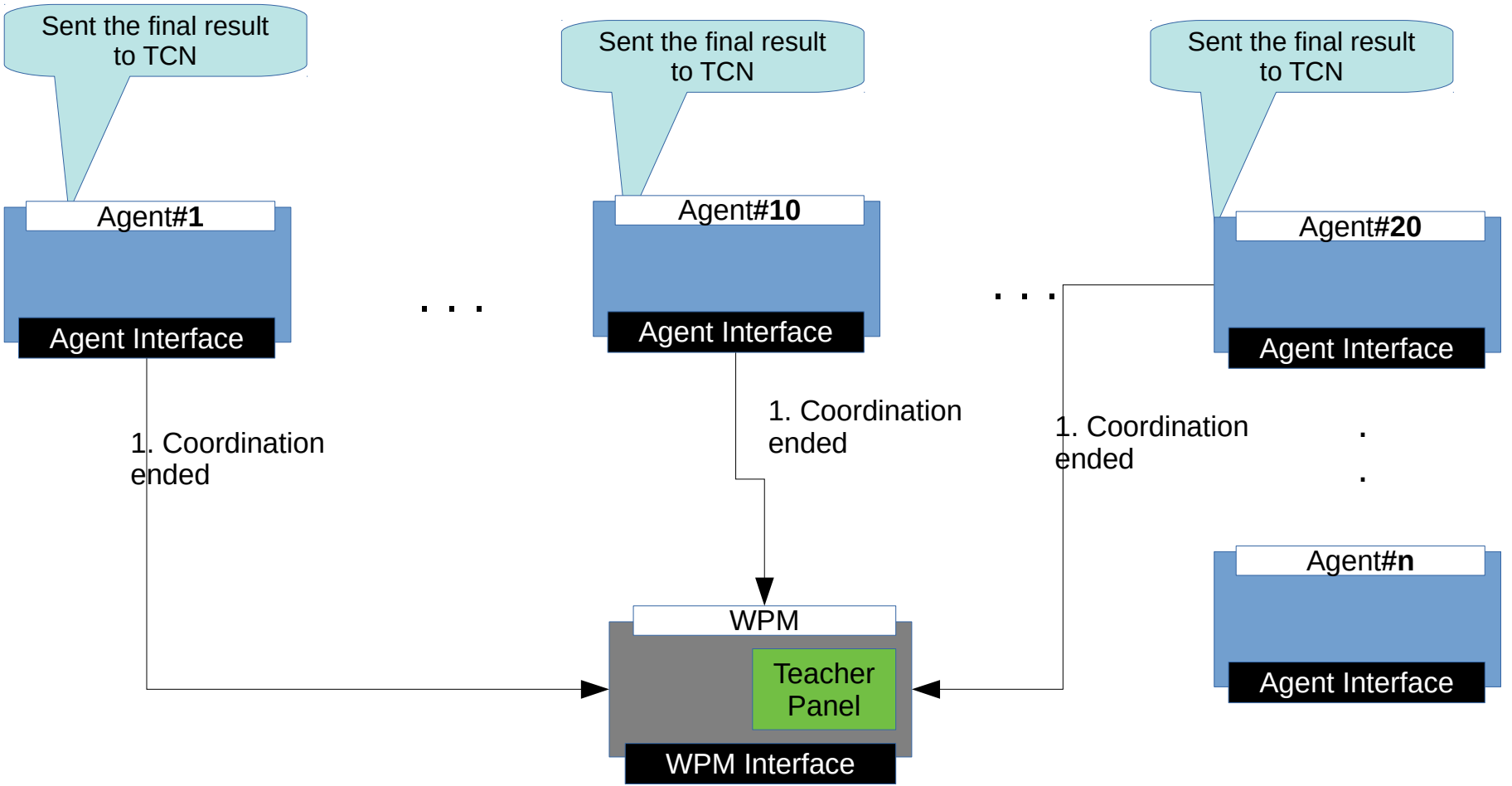
Once an agent receives the final grouping or an approve from the WPM, it needs to inform its TCN. An agent cannot inform a TCN about the identities of his/her group members because the agent doesn't have this information. Therefore, each agent will send the name of the group (e.g. GROUP_1) to its TCN such that TCNs who are members of the same group can find each others. There are 3 possibilities to happen while informing the TCN:

1) agent sends the group, app-logic receives the group but TCN doesn't approve
2) agent sends the group, app logic doesn't receive the group because TCN is logged out
3) agent sends the group, app-logic receives the group, TCN approves the group right away

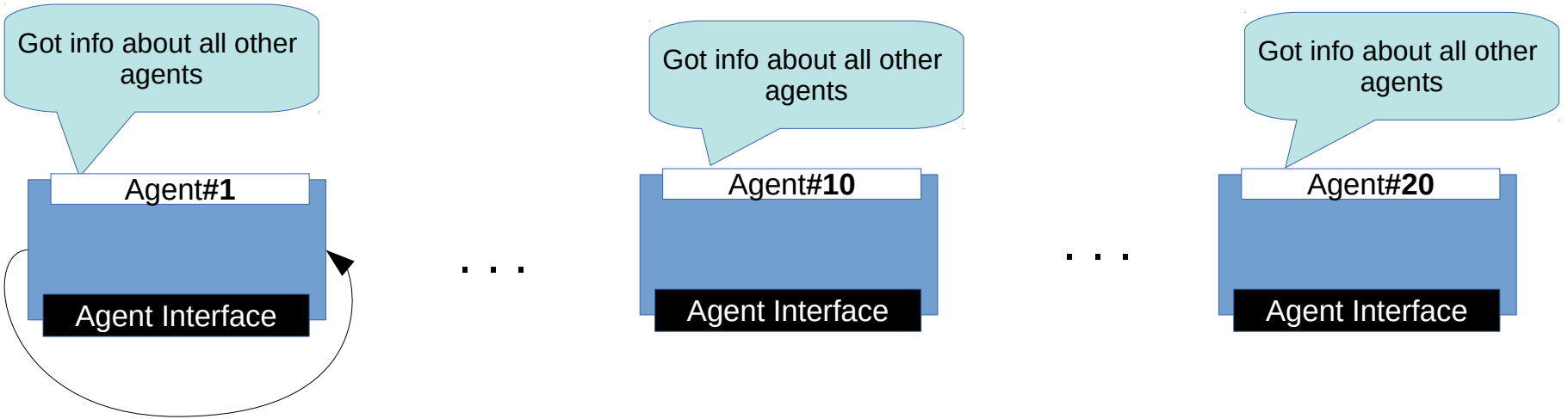
The approval from TCN can take hours if he/she is busy to open the app. Therefore, it would make sense to consider the coordination process as complete if app-logic receives the group information/notification.

Obviously, (3) is the ideal case but agent will send the "*coordination ended*" message (slide 22) to WPM if (1) or (3) happens. If (2) happens, then agent will save a flag to LAKR. This flag would represent that app-logic hasn't received the group info of TCN. So when TCN logs in again, agent will send a notification to app-logic about group info. But to do so, agent needs to be informed by WPM when TCN logs in.
Agent is (re)created if it is dead when TCN logs in. But if agent is not dead when TCN is logging in (e.g. in_coordination or a BT is running), then agent needs to be informed.

LCC Process:
End of coordination signal



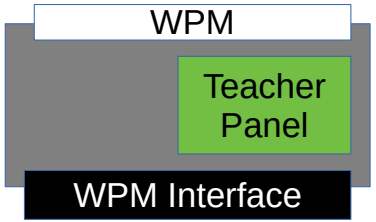
LCC Process:
Agents find grouping – **Why would agents wait**?



1. Run algorithm to find groups

One might ask **why would {agent_2, . . , agent_20} wait** while agent_1 is forming the groups (Slide 16). A suggestion to overcome this is below:
In slide 15, when {agent_2, . . , agent_20} receive the whole info from agent_1 (leader agent), they can send a signal to WPM that coordination_phase_1 has ended for them. WPM can even kill them if they don't run any other BT. Then in slide 17, when agent_1 finds a grouping solution, it would send the grouping and coordination_phase_1 ended message to WPM and WPM can kill agent_1 as well if it doesn't run any other BT. Other agents wouldn't know about the proposal yet. Then in slide 18, when teacher accepts a proposal, WPM can wake up all necessary agents and inform them about the final grouping decision. The rest would be same as in slide 20 and 22.

Involved Components



- 1 endpoint to receive the agent's answer whether it can be killed or not - Slide 4
- 1 endpoint to receive grouping result – Slide 17
- 1 endpoint to receive end of coordination signal – Slide 17, 22

- 1 new BT to receive evaluation exercise results only if it doesn't already exist as part of main language (catalan) scenario – Slide 11
- 1 new BT to receive teacher request (form groups) from WPM – Slide 13
- 1 new BT for a leader agent to receive info (e.g. preferences, etc.) from other agents, share the complete info with others and find a grouping – Slide 15, 16
- 1 new BT to receive the complete info from leader agent – Slide 15
- 1 new BT to receive grouping approval signal from WPM, to share it with respective TCN and to send "Coordination ended" signal to WPM – Slide 18, 20, 22

- 1 endpoint to receive TCN's group – Slide 20