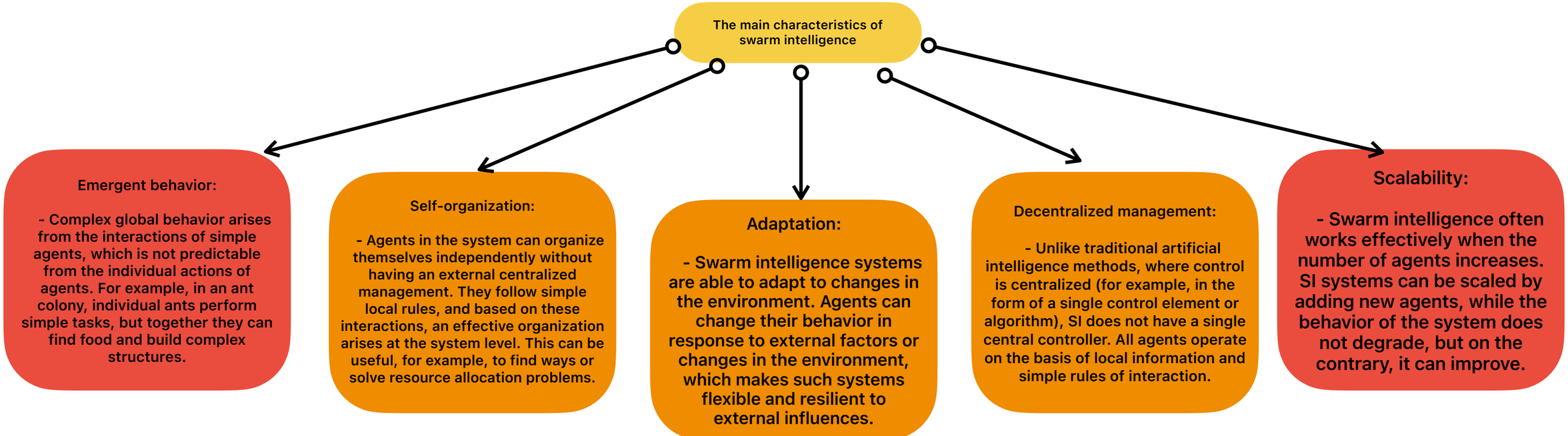
The main characteristics of swarm intelligence
Emergent behavior:
- Complex global behavior arises from the interactions of simple agents, which is not predictable from the individual actions of agents. For example, in an ant colony, individual ants perform simple tasks, but together they can find food and build complex structures.
Self-organization:
- Agents in the system can organize themselves independently without having an external centralized management. They follow simple local rules, and based on these interactions, an effective organization arises at the system level. This can be useful, for example, to find ways or solve resource allocation problems.
Adaptation:
- Swarm intelligence systems are able to adapt to changes in the environment. Agents can change their behavior in response to external factors or changes in the environment, which makes such systems flexible and resilient to external influences.
Decentralized management:
- Unlike traditional artificial intelligence methods, where control is centralized (for example, in the form of a single control element or algorithm), SI does not have a single central controller. All agents operate on the basis of local information and simple rules of interaction.
Scalability:
- Swarm intelligence often works effectively when the number of agents increases. SI systems can be scaled by adding new agents, while the behavior of the system does not degrade, but on the contrary, it can improve.