"Evolution of constraint satisfaction and human autonomy" (working document)

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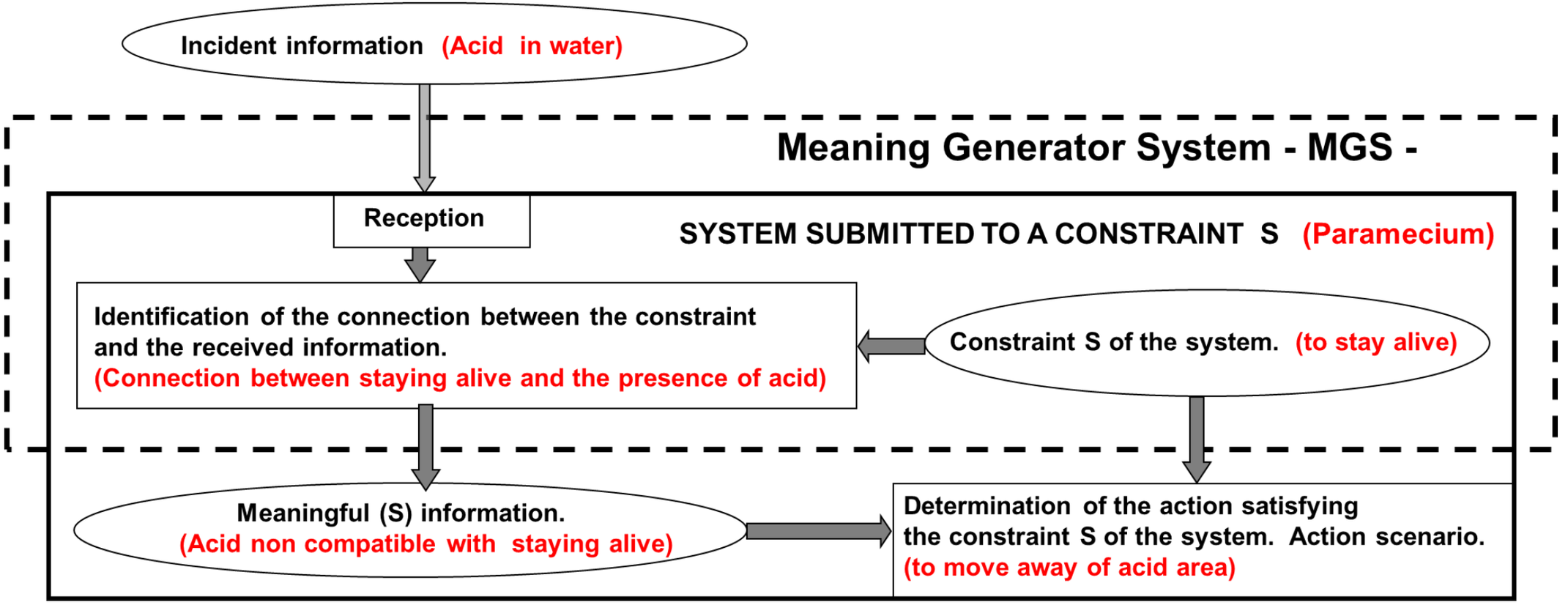
A) Frame of analysis :

- Autonomy as management of meaningful information for constraint satisfaction -

	MATTER	LIFE	HUMANS	ROBOTS
Autonomous Agency	No	Yes	Yes	Yes
Laws and constraints	Physico-Chemical laws. Ubiquist laws . Efficient causes.	Stay alive constraints (individual & species). Local constraints. Final causes (?).	Specific local constraints . (look for happiness, anxiety limitation,…). Free will. Conscious and unconscious constraints. Final causes (?).	Local internal constraints as designed or programmed.
Meaningful relations with environment	NA.	Via constraints satisfaction processes (embed agent in environment)	Via constraints satisfaction processes (embed agent in environment)	Via constraints satisfaction processes (embed agent in environment)
Related concerns	Far from equilibrium stability of open system.	Unknown nature of life.	Unknown nature of human mind (consciousness). Conscious vs unconscious constraints.	Derived nature of constraints and autonomy.

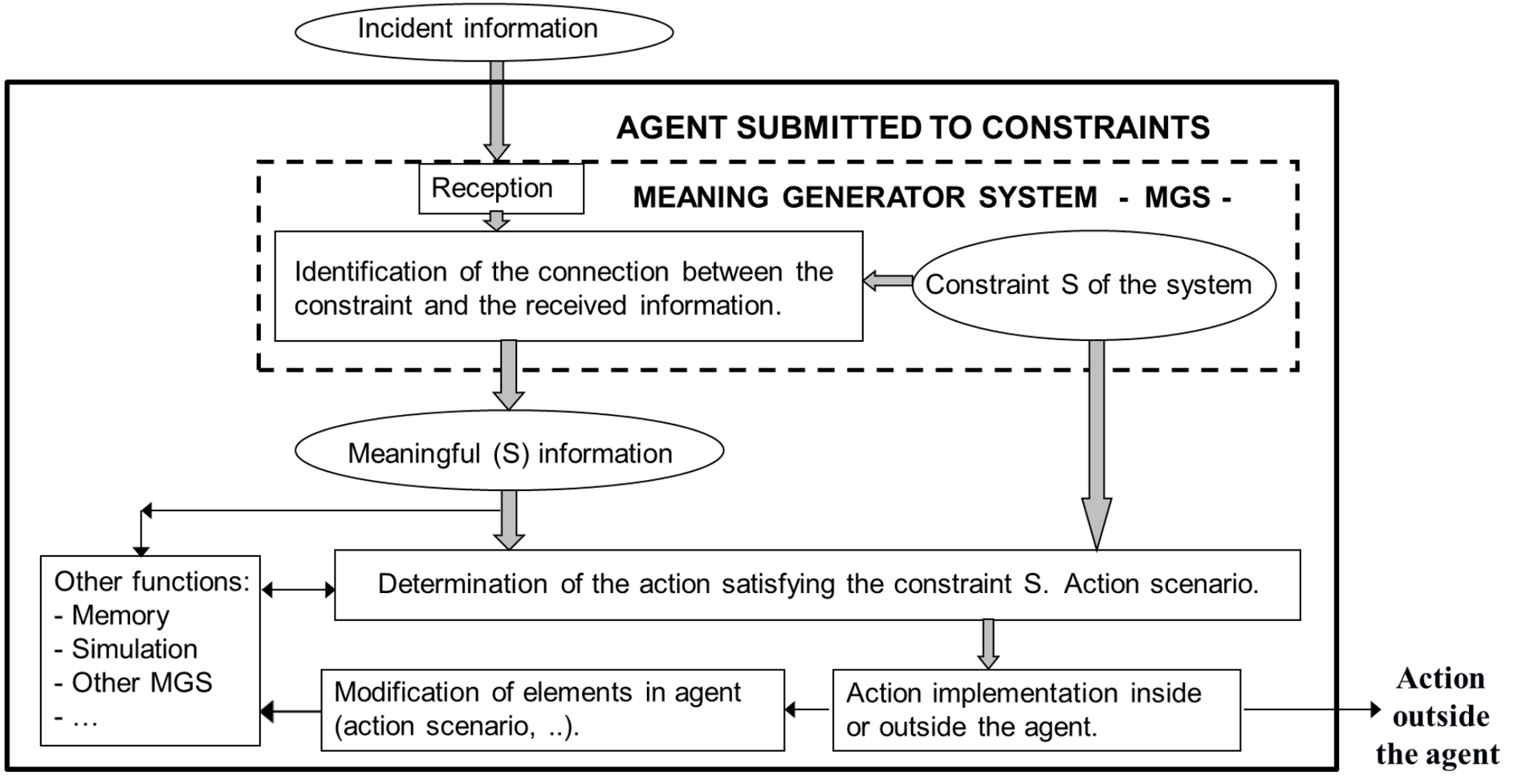
B) Constraint Satisfaction and Meaning Generation. MGS level [1]



* Meaning generation => Action implementation => Constraint satisfaction.
* Constraint satisfaction as related to the nature of the system.

[1] http://cogprints.org/3694/

C) Constraint satisfaction . Agent level



* Meaning generation: internal/external relations to agent. Embeds agent in its environment.
* Meaning generation and constraint satisfaction as supporting cognition [2].
* Meaningful representation as network of meanings.

[2] http://cogprints.org/7584/

D) Animal autonomy as starting point

*** Animal autonomy** as management of meaningful information for constraint satisfaction.

*** Constraint:** stay alive (individual/species), group life constraints (hierarchy, group survival, …)

*** Management of meanings for constraints satisfaction:**
- Determine action (physical, mental, ..) that will lead to constraints satisfaction.
. Use innate action programs. Improvement by individual/group experiences.
. Simulate outcomes of available action programs and chose the best (anticipation).
. Build up new action programs (random inputs on existing programs).
- Adapt action programs as performances increase.
- Usage of meaningful representations (network of meanings).

*** Open questions**
- Nature of life unknown (more than the characteristics of life).
- "Management" of constraint satisfaction by organisms may use unknown processes.
- Need for an animal/organic self as a tool (=> "identity" of agent ?).

E) Human autonomy as evolution of animal autonomy

*** Human autonomy** as management of meaningful information for constraint satisfaction.

*** Constraints** (in addition to animal ones):
- Unknown nature of self-consciousness and free will => human constraints difficult to address.
- Maslow pyramid of needs.
- Look for happiness, limit anxiety, be smart & successful, …. (evolutionary approach) [3].

*** Management of meanings for constraints satisfaction:**
- Conscious /unconscious constraints and emotions (decide by emotion, rationalize to justify).
- Human constraint satisfaction can conflict with animal ones.
- Free will as key player.

*** Open questions**
- Unknown nature of human mind may contain specific human constraints and management tools. (WIP: Evolution of auto-representation toward conscious self-representation) [3].
- Need for a self-conscious self (as animal self + self-consciousness).
- Free will considered as animal autonomy with self-consciousness => animal autonomy= free will without self-consciousness ?

[3] http://cogprints.org/4957/

F) Robot autonomy

*** Robot autonomy** as management of meaningful information for constraint satisfaction.

*** Robot constraints:** as built in or programmed.
- Artificial/derived constraints (=> artificial/derived autonomy).

*** Management of meanings for constraints satisfaction:**
- Data processing (including non anticipable outcomes).
- Determine action that will lead to constraints satisfaction.

. Use action programs. Simulation, optimization, anticipation.
- Programs improvement by experiences and performances increase.
- Usage of meaningful representations (network of meanings).

*** Open questions:**
- Nature of derived/artificial constraints versus natural ones.
- Possible robotic self => robotic/artificial identity based on constraint satisfaction ?
- Are (today) computing performances enough ?
- Possibility of organisms in robots to benefit of life specificities (hybrid bio-robots)?