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Decisional Information System for Safety (D.I.S.S.) dedicated to the Human Space Exploration Mission

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Objectives and presumption

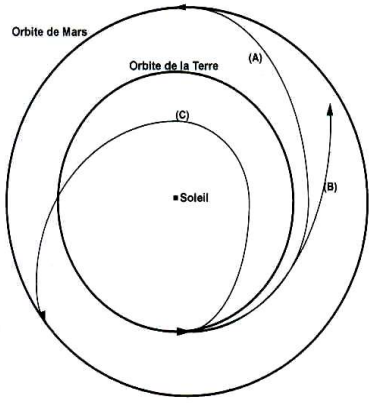
- *The objective is to conceive a decisional information system for human long duration space flight (> 1000 days) which is realised in entire autonomy in the solar system*

- *The strong presumption is that the centralised models of security could not be sufficient today to respond and challenge the security of a technical system, which will support human exploration missions.*

Objectives

- For Human space flight in the solar system, the need for an autonomous system and the distance scales push us to think that the demonstration of security in a classic empirical-analytical paradigm is quite problematic.

FIGURE 4.2



Différentes trajectoires pour aller sur Mars. (A) Trajectoire de Hohmann ; (B) Trajectoire de conjonction rapide ; (C) Trajectoire d'opposition.

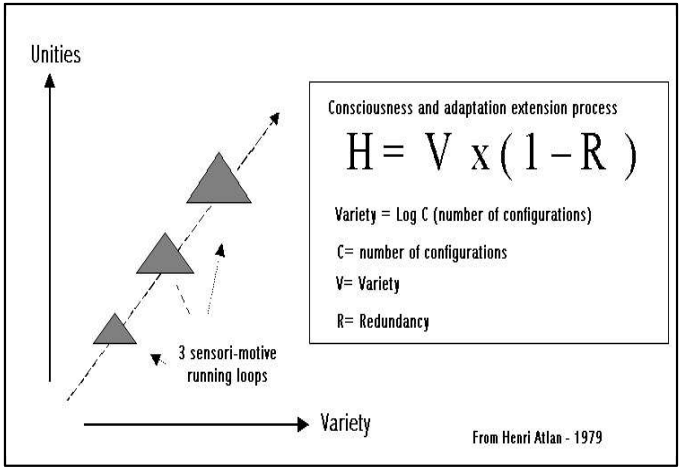
Reasons in favour for transformation of security

- Our analysis is that the key requirement for conceiving security of a Human autonomous system is the opening to a continuous learning process. This process made possible the fast adaptation of the system to a numerous various configurations, not “ a priori ” identified and modelised

Reasons in favour for transformation of security

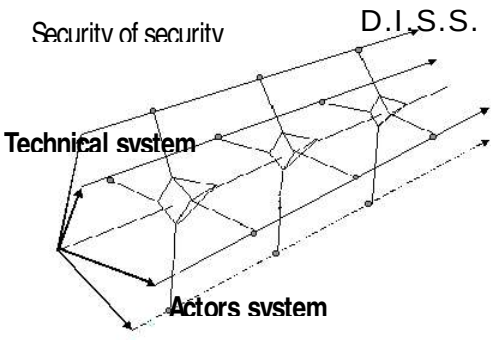
- The life principles and particularly the immune system could guide us to ameliorate the epistemological design of the security system.

Our point is to place in first position interaction at the centre of the dynamics of conception, as it is at the centre of the life principles. The interactions deployed between variety and unity in a co-dependable inseparable relation favourable for the hopeful increase of consciousness.

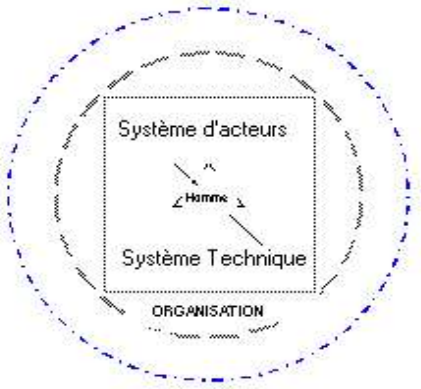


The limits of the existing paradigm for security

- we need an ontological and epistemological reflection in order to design a security system (near of life principles) able to face and react with success in an unknown environment (adaptation and co-evolution actors systems / technical systems / environment).



Technical security

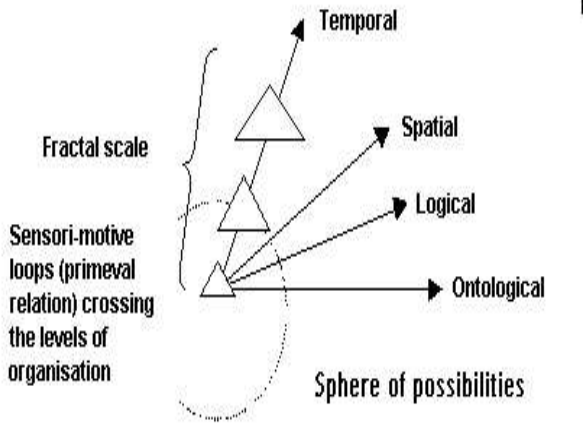


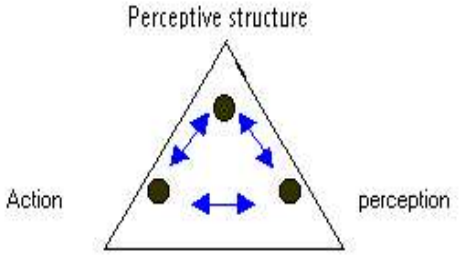
Environnement connu, mi-connu, inconnu

Guidlines principles for design

The basic element is operating a unity of consciousness and producing the phenomenal world that forms a primitive relation crossing all the life levels of organisation.

This minimal experience perceptive process is running from the mono cellular form of life to human being. It is founded on a conscious and/or unconscious capacity to distinguish self and non self





The sensori-motive loop form a primitive relation in the sens that it cross the different levels of organisation

Decisional Information System for Safety

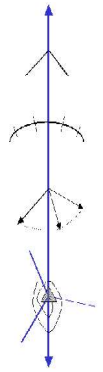
- The D.I.S.S. must be capable of :

- distinguish from a “shaded way”, a “never view”, and a “non-conceivable” accident in the scope of the system. Nevertheless it should be viewed ideally and preventively, but in an imperfect manner,

- to establish and built ideal security. A “never view” accident should not be identically repeated for the same system, so we are proposing that “a never view” accident can be produced outside of all angles of probabilities or possibilities.

Decisional Information System for Safety

- We can see for the logic process of the D.I.S.S. three different domains of strategies which support various types of memorisation and resolution to be correctly articulated and flexible from a known environment

Level	Temporal domains	Datas	Calculation computation mode	Types of logic	Memories
1	Past	Sharp	Statistic		Duplication
2	Present		Probabilities and possibilities		Computation and extrapolation
3	Futur		System dynamics and fuzzy control		Pattern of regulation
4 ?		Fuzzy	Random generator and pattern matching		Dynamical memory ?

Life form strategies as a metaphorical guide for supporting the design of the D.I.S.S.

- First level strategy – “The known”
- Second level strategy – “The relatively known”
- Third level strategy – “The half known”
- Fourth level strategy – “The half known”

Futur Past	Cooperation	Competition
Cooperation		
Competition		

Life form strategies as a metaphorical guide for supporting the design of the D.I.S.S.

- The articulation of different memories is a function of the co-operative necessity linked with the situation and time delay, which can foresee the required aptitudes of the D.I.S.S.

- The memorisation process is based on the system changes and its historical interaction with the environment.

Conclusion

- Necessity of transforming the way we think about security and our “security of thinking” due to the increasing complexity of Human and technological knowledges

- The utilisation of new high risks technologies needs to be managed and balanced in proportion with a human corresponding extended consciousness