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Cognition for a Purpose, Cognitics for Control

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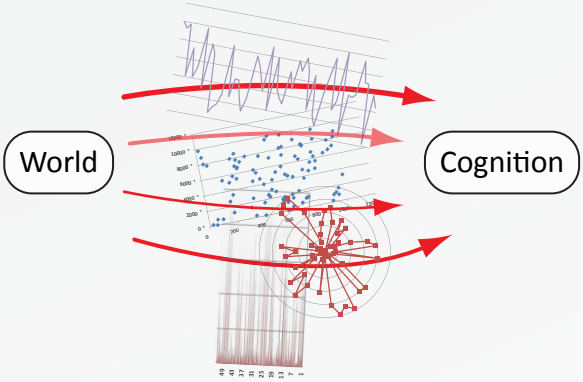
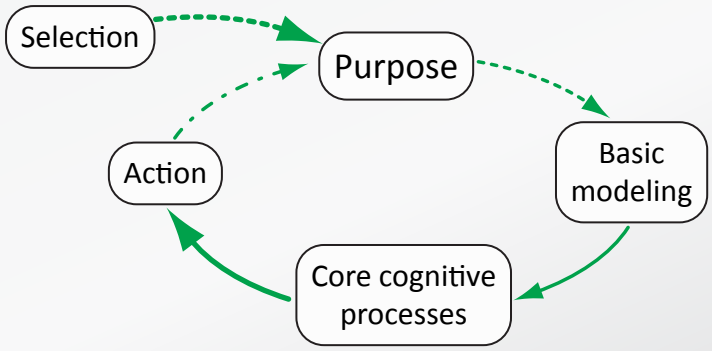
Cognition for a Purpose

Cognition without purpose is impossible and useless



Common errors: *belief in the possibility of absolute truth, in finite, apprehendable size of real world complexity, and in the value of understanding per se.*

Cognition prerequires modeling, i.e. purpose-oriented, simplified representation of reality

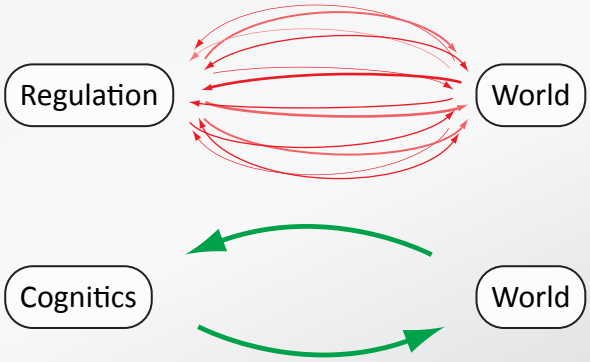


«Focus»: *precisely selecting purposes implies multiple constraints to be considered as chances rather than drawbacks.*

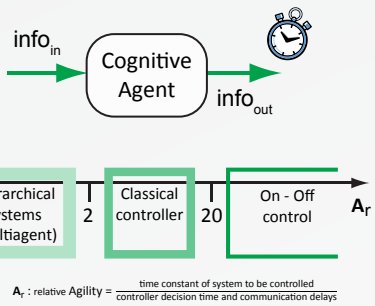
Cognitics help Controlling

Cognitics extend the possibilities of classical regulation and often lead to drastic improvements in system dynamics and stability:

- identifying relevant factors and processes
- determining critical values
- sparing measurements
- reducing or sometimes even eliminating critical delays
- anticipating effects and compensating for disturbance



Quantitative Cognitics



Example: Cooperating robot RH4-Y in Robocup@Home competition 2010, Graz

Evaluate metrically complexity, information flows, knowledge, expertise and other cognitive and dynamic properties

Information:	$n = \sum p_i \log_2(1/p_i)$ [bit]
Knowledge:	$K = \log_2(n_{out}\, 2^{n_{in}}+1)$ [lin]
Expertise:	$E = K/\Delta t$ [lin/s]
Learning:	$\Delta E = E(t_1)-E(t_0)$; >0 [lin/s]
Experience:	$R = r(n_{in}+n_{out})$ [bit]
Intelligence:	$I = \Delta E/\Delta R$ [lin/s/bit]

References:

- Jean-Daniel Dessimoz, *"Cognition Dynamics; Time and Change Aspects in Quantitative Cognitics"*, Second International Conference on Intelligent Robotics and Applications. Singapore, 16 - 18 December, 2009
- Jean-Daniel Dessimoz, Pierre-François Gauthey, *"RH4-Y – Toward A Cooperating Robot for Home Applications"*, Robocup-at-Home League, Proceedings Robocup09 Symposium and World Competition, Graz, Austria, June- July 2009