



CONTROLLING

The principle of Controlling

A broader picture and some thoughts



Controlling the function which controls.

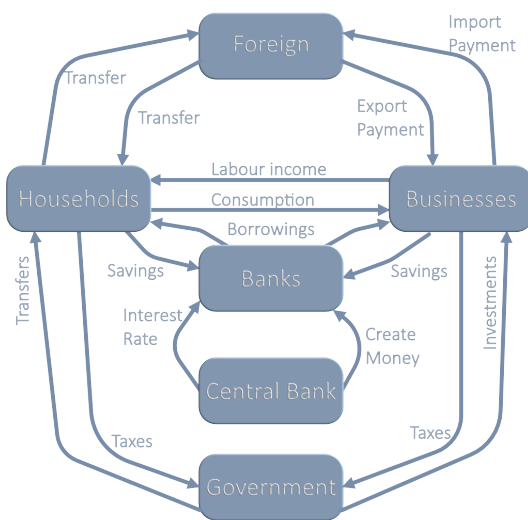
As an engineer and economist I shall be entitled to broaden the field a bit.

In order to control something you need to make measurements first. Secondly you need to compare the measurement against a target. Depending on the variance from measurement to target an intervention is issued to bring the something towards the target.

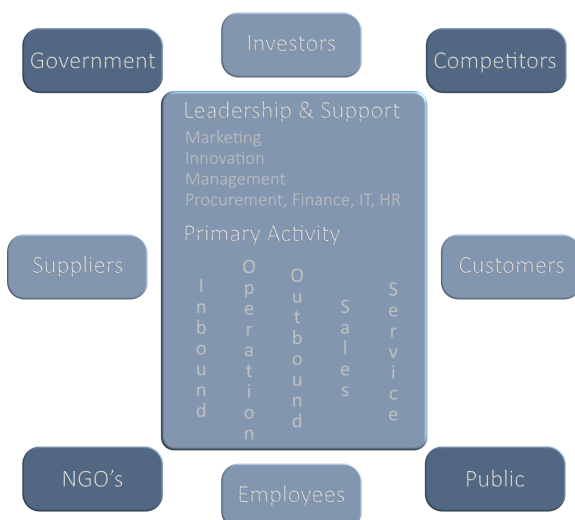
THE WIDER VIEW

Economy Control

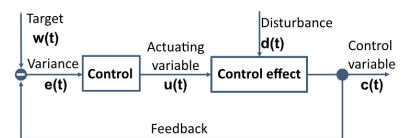
Macro



Micro



Eng. Control Nano



No.: $2 \cdot 10^2$
 Cycle time: Year
 Consolid.: Not yet done
 Measure: Inflation > Inflation Target
 Reaction: e.g. increase Interest

No.: $7 \cdot 10^6$
 Cycle time: months
 Consolid.: Done
 Measure: Revenue >> Budget
 Reaction: Outsource / Increase Capacity

No.: $> 1 \cdot 10^{12}$
 Cycle time: msec. + inertia
 Consolid.: n.a.
 Measure: Speed < Target
 Reaction: increase Throttle



There are around 200 national Macro Control loops (evtl. not all are up and running). On average within them 40 Million Humans are interacting. Economic Micro Controlling with a separate Controlling function takes place in the large and medium size organizations of which many are international or global. A rough estimate leads to around 7 Million L&M organizations with on average 500 employees. The engineering controllers amount to more than 10^{12} in the world and they keep on growing. There are ubiquitous and some of them interact with Humans over an User Interface other operate except of maintenance rather independent.

Even though there are many differences between them there are all following the same principle! I find the conceptual representation of a “Controlling Instance” by electrical engineering quite universal and applicable for many fields. It is a feedback loop which is dynamic over time and it starts with having a target. Then you

compare the measured actual value against the target and determine the variance which acts as input to the control. The control is the “brain” which now finds out, according to a logic, how much the actuating variable has to be changed in order to bring the actual closer to the target. This actuating variable is now the input to the control effect which as output changes the control variable. The control effect is also the entry point of any disturbance into the process.

A typical example is the cruise control which controls the speed of a vehicle [e.g. Target = 100 km/h, Actual = 90 km/h, control response is increase actuating variable Throttle by 15%, the control effect (Motor) translates that input in higher rotational speed and over the gearing into higher speed of the vehicle].

The same holds true for Business Controlling in principle. However much more

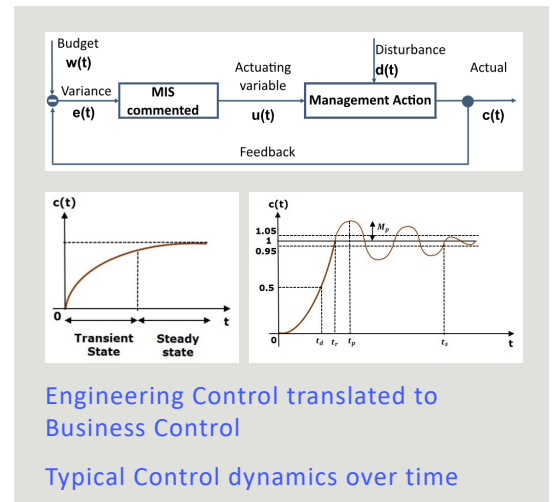
human “unlogics” are involved and the feedback loop is not “hardwired” as a nano controller. The management action response is dependent on facts and on forecasts but also on style, culture and knowledge.

Also for the Macro economy the cycle is valid and even closer to engineering as seen in Neis Insight “Forecasting” (Oct. 2020) as they work with equation systems and transient and steady states like engineers and use Kalman-filters like engineers. But take in consideration that even more humans are involved than in Micro!

In comparison to Macro and Nano, Micro controlling is

Whereas Micro controllers know since long that consolidation is mandatory if you need to control a group of companies. Thus they do it. National accounts are not consolidated!

This represents a grave lack of control and leads e.g. to “Tax optimization” from the perspective of international groups or to “Tax evasion” from a governmental standpoint. If the global world knocks this problem of the to do list, which will take several decades, we will harvest fairer competition and more entrepreneurship as an unfair competitive advantage of large groups is heavily diminished.



mathematically less advanced and sophisticated. However in principle it is a multi-variable control problem, which requires even more math than the typical single variable control¹.

The same control loop cycle is also true in the field of biology where in each creature there enormous amounts of control cycles up and running (e.g. temperature control, blood sugar level, etc.).

The control cycle time varies strongly. For Macro controllers it is a year and more for Micro controllers its months and for Nano controllers it is milliseconds + inertia of the control effect.

¹ I will elaborate on that topic in a future Issue.

(P)RETHINK MAR

The standard manager / controller is very good in translating figures into standard management action responses (MAR). One of the most standard ones being “cost cutting”. There is more work to do.

Whereas Macro economic controlling deliberate, forecast and model their policy responses a lot, whereas some humans programmed the Nano controller responses stringently. I am of the opinion Micro controllers could and should do more in the field of management action response and control variables.

Think about it and have a Nice Day!