
LEADERS for INNOVATION, INTEGRATION, DIRECTION

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WHAT IS AN « ENGINEER » ?

« A person versed in the design, construction, and use of engines or machines »

(WEBSTER'S DICTIONARY of ENGLISH LANGUAGE)

« Personne qui a reçu une formation scientifique et technique le rendant apte à diriger certains travaux, à participer aux applications de la science »

(ROBERT)

...So a kind of Janus

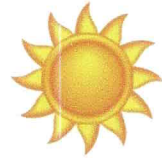


a two faced god



- ❖ The smiling one inspired by « **the sun** » whereby Janus would be enlightened for his contribution to the progress of Humanity.
- ❖ A severe one inspired by « **the moon** » whereby Janus would be influenced by his tiring work in the forge of Vulcan.

Sun – Sciences



❖ contribution to development of Humanity

❖ Malthus

❖ 8 planets – 80 planets ?

$\Delta = ?$

❖ Capability to integrate messages from the future

❖ Changes in technology (ΔT)

❖ Changes in requirement and profile of products (ΔP)

❖ Changes in trend for costs (energy, raw materials) (ΔC)

❖ Changes in market structures (ΔMS)

❖ Changes in regulations (ΔR)

So the contribution to the future
..... will be.....

$$CF = \int_t^{t+\Delta t} \frac{\Delta P}{\Delta T} + \frac{\Delta MS}{\Delta T} + \dots$$

- ❖ where the different terms receive a ponderation characteristic for the type of activity
- ❖ ΔT is significant for the expected timeframe for change

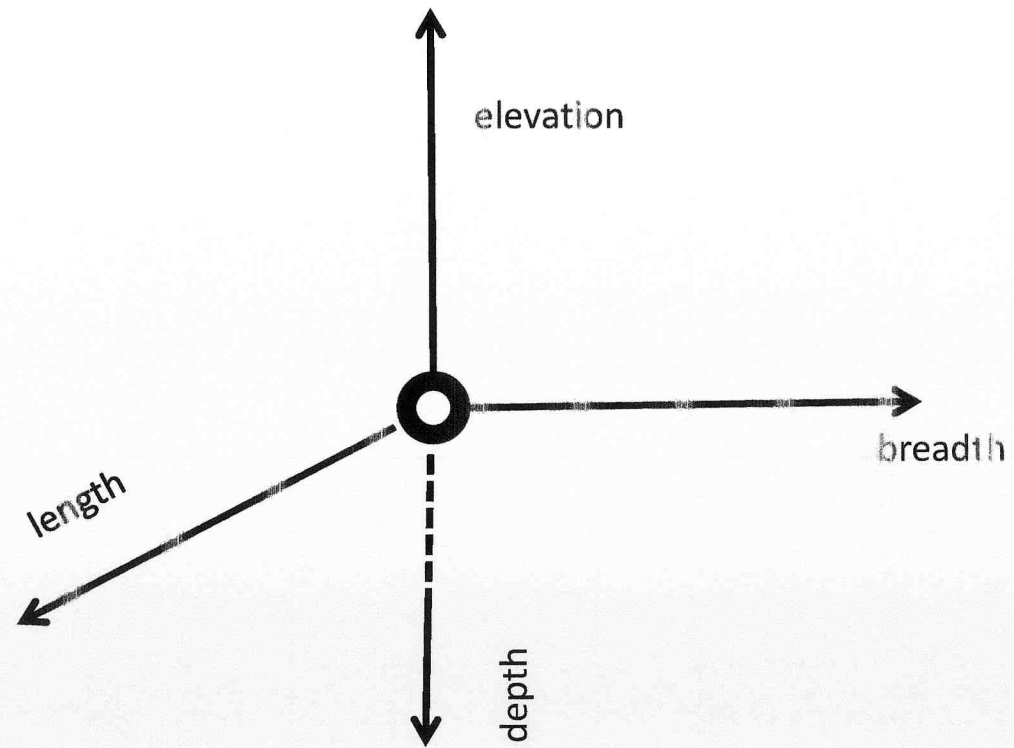
❖ This innovation capability is essential for the development of new products/services to secure the perennality of corporations.

Moon – Technology



- ❖ Rational and practical translation of theory into Reality
- ❖ Ability to translate
 - ❖ concepts into projects
 - ❖ projects into working solutions
- ❖ Trend is to go more and more to integration product/solution
- ❖ The technological capability is essential to build and run industrial facilities and... to secure the perennality of corporations.

So... How to position this « Janus » god ?
How to breed this kind of engineer ?
How to position his required capabilities ?



« 0 » = zero point – the origin

How to decide to become an engineer ?

- ❖ Importance of elementary school (10 – 12 y)
- ❖ Importance of close contact with industry
- ❖ Teaching the teachers
- ❖ « Dreaming » the science
- ❖ « Meditation of content »

The Breadth

- ❖ Growing complexity of problems involving numerous partners
- ❖ Lowering barriers between branches of instruction
- ❖ Complementariness of competences/knowledge
- ❖ Integration of « shared » or « distributed » intelligence
- ❖ Development of « lateral thinking »
- ❖ Development of critical mind
 - skilled generalists
 - revisit the profile and the role of the teacher
 - Develop learning by project
 - Multidisciplinary approach of complex problems

The Depth

- ❖ Enhancement of professional skills as competitive advantage
- ❖ « Vertical » transmission of knowledge through the different graduation systems
- ❖ Inclusion of professional education down to apprenticeship in cascading knowledge
- ❖ Recognition of competences

The Length

✧ In Time

- ❖ Fast evolution in technologies
- ❖ Fast depreciation of acquired knowledge
 - Long life learning
 - Enhance the processes of long life learning

✧ In Geography

- ❖ Some emerging countries (Corea, India, China) are taking leadership in some technologies (ICT, electronic...)
- ❖ Importance of meeting geographical challenge
 - continuous benchmark with the « Best in class »
 - business and technology watch
 - Ensure international training
 - university level
 - corporation level

The Elevation

- ❖ How to consider situation from a « higher level » ?
 - ❖ Going from knowledge and experience to « Philosophy » (PhD)
 - ➔ Introduction of some branches of instruction fostering thought and reflection

- ❖ How to better understand complex problems ?
 - ❖ Problem solving integrates more and more various inputs from different disciplines
 - ❖ efficient action requires team work integrating specialists from different horizons
 - ➔ develop project management of complex problems including students from different faculties
 - ➔ extend education to basis in Law, HR, finance

❖ Need for strong leadership

- ❖ Identification of goals
- ❖ Formulation of strategy(ies) to reach a goal
- ❖ Focusing interdisciplinary teams on action(s) (teambuilding)
- ❖ communication skills
 - ➔ strategy management and communication management
 - ➔ leadership development

❖ Openness to external world

- ❖ Understanding criticism from public opinion
- ❖ Image of industry(ies)/technologies
 - ➔ engagement in defense of scientific approach of issues felt as problem by public opinion
 - ➔ communicate on engagement

Conclusion

- ❖ To motivate the young generation to go to science, we need a strong industry
- ❖ To develop an industry we dramatically need young, skilled engineers.

- Innovative personalities
- Generalists able to integrate the future and solutions coming from other horizons of science and knowledge
- With strong leadership
- Able to direct projects with multidisciplinary teams