



# Creativity and innovation in business – Implications to HFE

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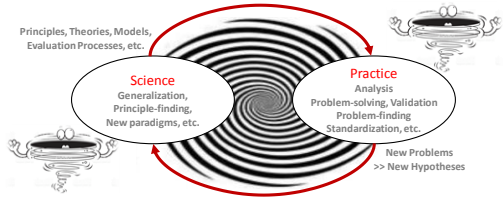
## Revisit HFE

### IEA Who Are We?

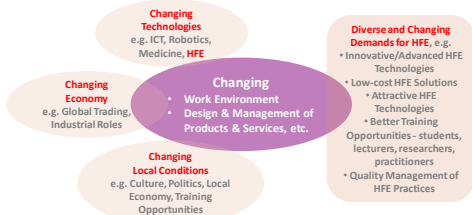


### IEA Advance Spirally

"Creativity in Practice" is the challenge of transforming the experimental and field research and evaluation processes into the daily practices of the ever-changing working and living organizations - IEA2018



### IEA Everything is Changing



## Some Attributes of Creativity

**IEA** Creativity

- Create : To produce along new or unconventional lines
- : To make or bring into existence something new
- Creative : Having the quality of something created rather than imitated or assembled
- Creativity : The quality of being creative

*(Webster w's Third New International Dictionary of The English Language Unabridged, Meriam-Webster, 1971.)*

In the context of business, it implies a **"successful."**

**IEA** Creative Works Stand on Tradition



Japanese traditional lacquered box by Saki Mizuguchi (Not for reproduction)

Traditional, yet modern and "creative."  
 The key is the artistic sense of artist.  
 But, the sense is a consequence of everlasting skill development.  
 More than one hundred processes and two hundreds specialized craftsmen involved normal productions.  
 The artistic sense and the underlying skill are not separable.

**IEA** Creative Works Rely on Collaboration



- Master painters, especially those of Renaissance, run studios where a lot of apprentices were working.
- Modern and contemporary artists tend to work more independently, but need assistants and collaborators – Kusama (left) and Murakami.

**IEA** S&T is Interactive Group Work



Super-Kamiolande, a huge underground neutrino detector (above).

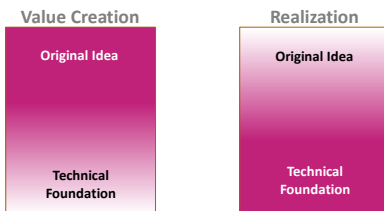


Hayabusa (falcon), an Asteroid explorer.

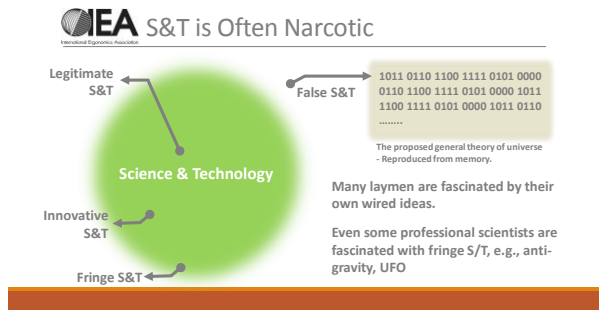
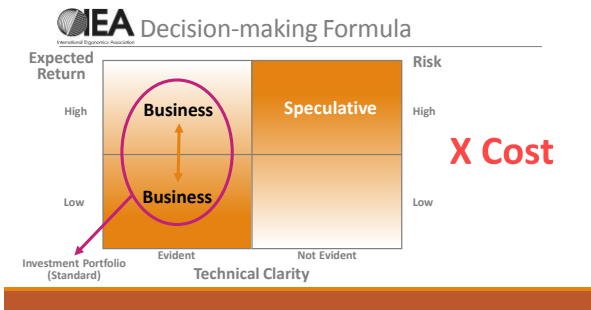
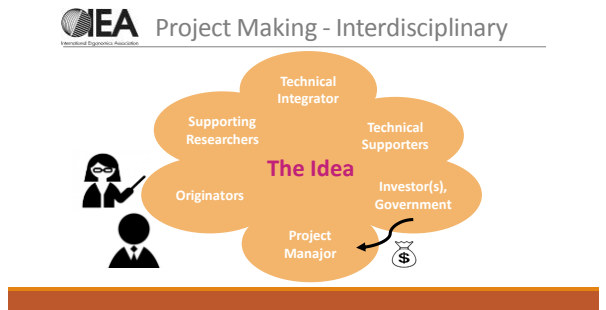
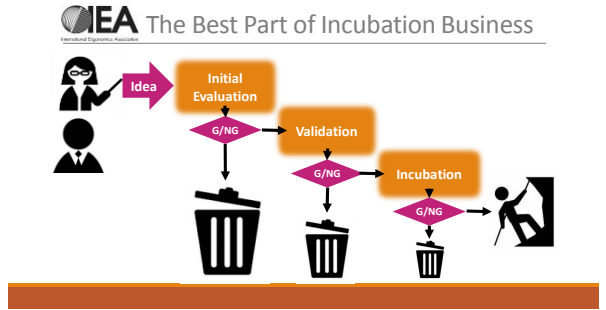
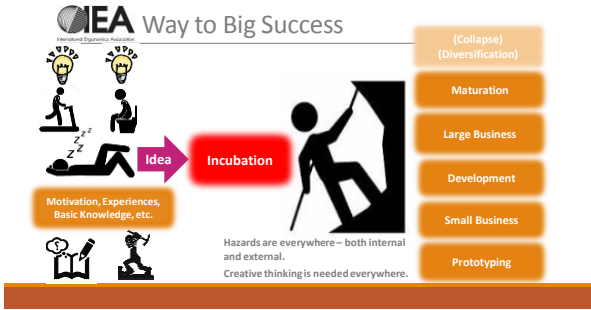


Shyuji Nakamura, a Nobel Prize Winner was one of few lonely scientists. He invented an efficient blue light-emitting diode (LED).

**IEA** Value Creation Vs. Realization



18 Years in Project Management Bussines



**IEA** Cold Fusion – From Pseudo to Real

“Cold Fusion” is a typical fringe science.

More scientists begin to believe that the phenomenon is real - **Condensed Matter Nuclear Science**

Hindsight: Legitimate scientists can easily crashes anything that is not understandable.

It is not easy to evaluate S&T falling into the fringe area.

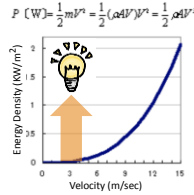


Pons and Fleischmann



Yasuhiro Iwamura, one of the brave pioneers

**IEA** Micro Windmills – Groundless Expectation



**IEA** ROI Vs. Energy ROI

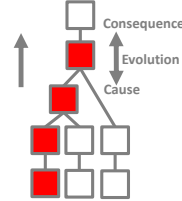


Vs.

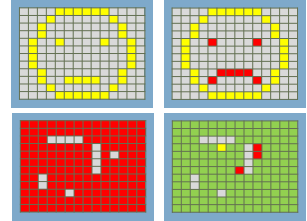


**IEA** Alarms - Assumptions Not Questioned

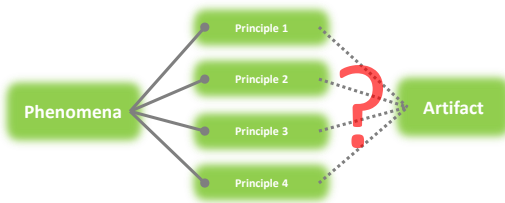
Assumption 1: Cause-Consequence



Assumption 2: Pattern Recognition



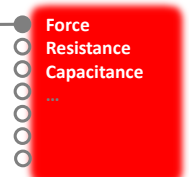
**IEA** Design Theory 2 – Irreversibility



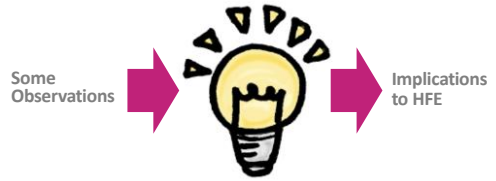
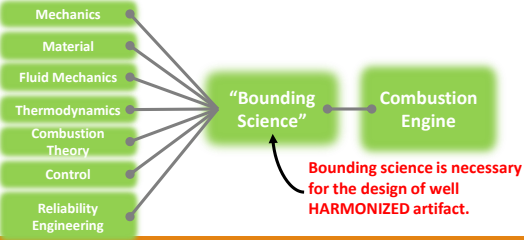
**IEA** Design Theory 2 – Incommensurability

Mechanical Engineering

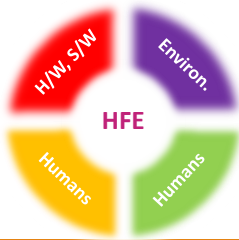
Electrical Engineering



**IEA** Design Theory 3 – “Bounding Science”



**IEA** HFE as a “Bounding Science”



The design of joint human system needs a bounding science.

The bounding science provides harmonized integration.

Practice of HFE should play the bounding role.

The power of harmonizing the whole bring about reactivity.

**IEA** Seven Hints

If HFE serves its bounding role well, it makes the resultant artifact creative.

**Seven hints for HEF to be recognized a magical spice:**

1. HFE as science and HFE as practice can be coupled more tightly.
2. HFE must continue improving its scientific foundations.
3. HFE must show a multi-linguistic ability for harmonizing the whole.
4. HFE specialists should step across the conventional boundary of HFE.
5. HFE corrects people’s biases including that of HFE specialists.
6. HFE must be a cost reducing factor.
7. HFE must become powerful enough to change traditional design approaches and regulatory framework – a long-term strategy.