

The innovation process in Air Liquide advanced Technologies

sharing my personal experience

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Innovation: more a mindset than a process

There are 3 prerequisites for innovation :

1 EMULATION : Make the pot of ideas boiling: mix competencies of the communication, cross-fertilization, agility

2PASSION:

Innovation works once in ten

Meaning it fails nine times out of ten!

You then must be highly focused and have te to the long term

3VISION: to give sense, to have perspective

You always must know ere go, knowing you will never go where you wanted to go!

Which we because anyway, the initial direction was wrong!

Innovation is not a goal, it is me the goal is to get a good product, service

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By the way, what is Innovation?

As many definitions as people!

I am working in a technology-driven company, so what I know is :

If the technician fails, the innovation will fail But if the technician succeeds, the innovation may still fail

Indeed, the innovation is a good match between a need and a solution

Good solution but no need = not innovation, just an invention

So, first we need NEEDS: explore, open your eyes, detect trends and chase for unsatisfied needs (market pull)

But do the reverse at the same time : what a hell could my bright idea serve? (techno push)

Am I an inventor or an innovator?

Do I care if it is not my idea? If thanks to my efforts, the idea became a success, then I am the innovator, not necessarily the inventor Do I care if it is not that innovative, technologically speaking? as long as it is an added value for my organization, it's fine

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2020 : 1 turbomachine per day!!!!

A long term story written by few techno-intrapreneurs working in the innovation department :1 or 2 key persons behind each line below

1 1990: first Oxygen generator aboard the Rafale combat aircraft;

Business unit created in 1996; 150 persons and 40 m \in in 2019 21991: 1st contract on a turbo-Brayton for the International Space Station

Flown in 2006, still running, creation of a dedicated orbital cryogenics BU (50 pers. today) **3**1996 : 1st H2 refueling station; creation of the New Energy BU in 2012

41999: 1st idea on pulse tube coolers for space; 1st contract 2010; 1st flight 2019

 5_{2001} : Creation of Axane, our subsidiary in FC; went up to 50 pers in 2012

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62002: 1st idea on the turbo-Brayton; transferred to the BU in 2014; serial product today

 7_{2006} : beginning of work on biogas purification : transferred to New energy in 2013

ALAT size has doubled since 5 years; 30% of the business is done on technologies which were in

the Innovation Direction less than 10 years ago

From idea to series : 10-15 years average!





The techno-intrapreneur is like a music conductor

A mindset adapted to each phase



Conclusions: key features for a succesful innovation

1 Passion for technology, intrapreneurship, agility

2We cannot oblige people to have ideas

The innovator has to inspire in order to get empowerment -THE key words -

3Technology is only half of the stake : matching with needs is key



prospection (pull/push)

4 The ideation/prospection phase, whilst fundamental, is a minor part in terms of manpower effort :

• Making the idea a reality is much harder and longer : an adapted mindset is needed for a rigorous realization

5 Selling the idea outside is mandatory but not enough ...

... early selling inside can be more complex!