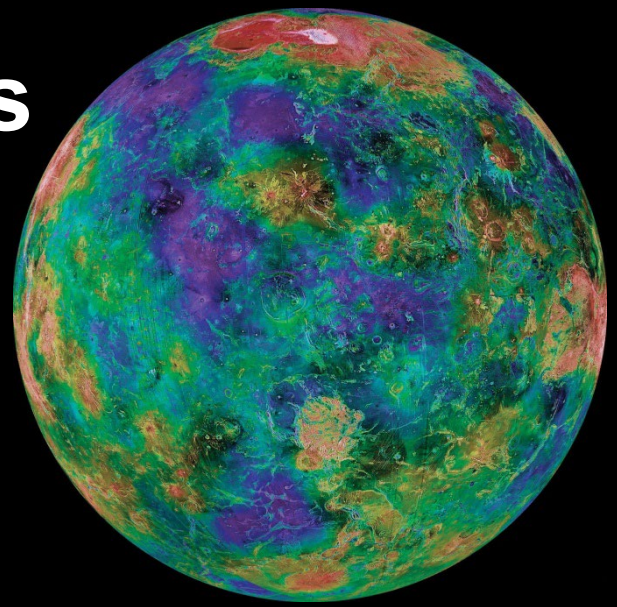
Industries are from Mars, Universities are from Venus



Understand the Differences between Academe and Industry

Kamran Khodaparasti

July 2024


If you have just graduated from university and are looking for a job, or if you have just started working in an engineering company, I recommend you to read the following items.

The overwhelming consensus is that there are real differences between university and industry cultures and that these two cultures have drifted apart over the years.

The university culture in which you are training or have recently left is quite different from the engineering, business or government culture you will likely enter.

Understanding this difference is important because you will need to make an adjustment in mindset as you enter your engineering job.

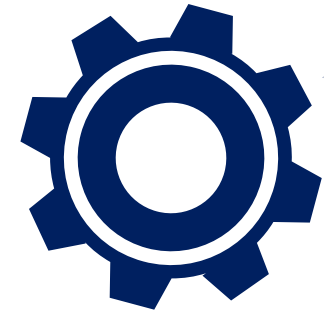
It is particularly relevant for Ph.D. graduates and some master degree graduates who have been trained to do research in an academic, scientific environment rather than an engineering environment.

KEY POINTS

Both Academe and Industry are dedicated, but focus and metrics are different

- Academe promotion metrics
  - Number of archival publications (freedom to publish)
  - Amount of research money brought in

- Industry promotion metrics
  - Contribution to the business
  - Engineering or managerial excellence
    (design, fix problem, beat competition, etc.)
  - Archival publications often mean little
    (restrictions on publishing)



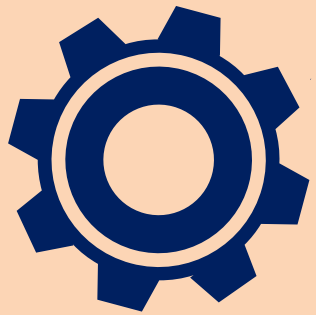
A number of **key differences** between academe and industry are given.

It must be strongly emphasized that one column is not right and the other column wrong. They are different for valid reasons.

They are also generalization, which means that there are exceptions.

Be informed of these general differences and be prepared to acclimate to them.

More INDIVIDUAL oriented

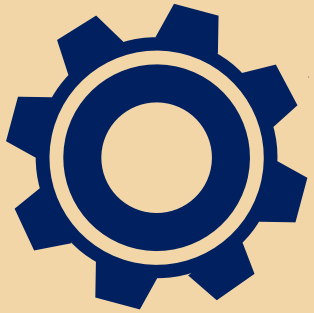


More TEAM oriented

1

Is it ORIGINAL work?

2



Can we “leverage” existing work?

Does it contribute to SCIENCE?

3

Does it contribute to the BUSINESS?

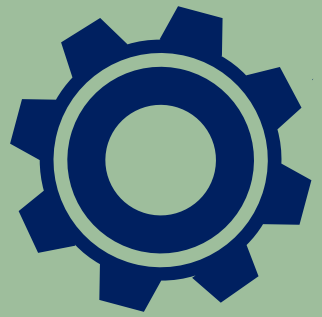
Is it interesting to do?

4

Is it worthwhile financially?

Who conceived of the idea?

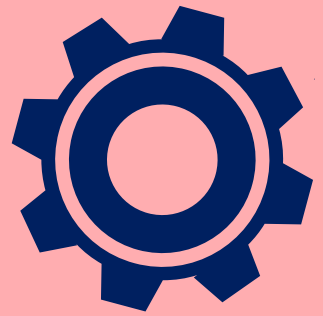
5



Where are the results?

Will it make archival PUBLICATION?

6

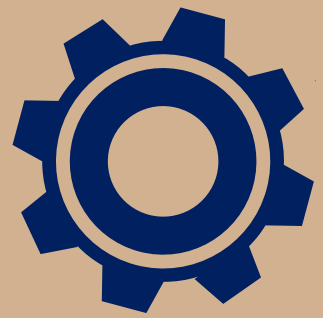


Will it make it into PRODUCTION?

Develop the equations, analysis, etc. from first principles.

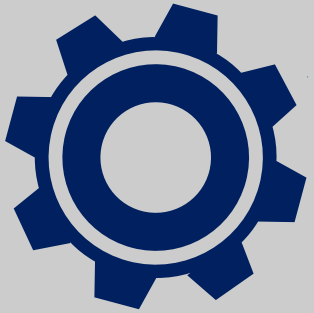
7

Fit a curve through the data and/or anchor the existing analysis



Don’t limit my scientific inquiry

8



Does it make physical sense to do?

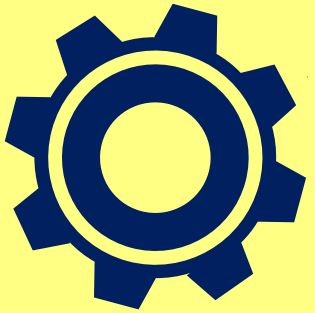
Is it original and complete from scientific (physics) perspective?

9

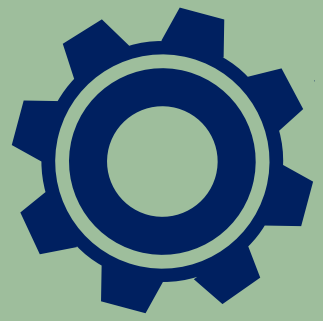
Is it institutionalized into the system from an engineering perspective?

Graduate when thesis finished

Meet schedule and budget



Publish, publish, publish

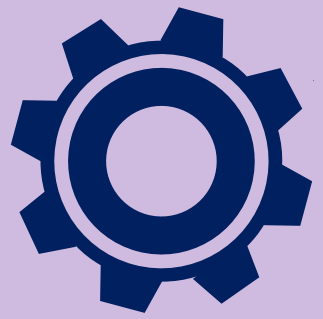


11

Customer, customer, customer

Sound scientific process

Design practices, templates



12

Non-profit institution

Profit institution

13

Solve roadblock issues as they occur

14

Identify and manage risks carefully up front with risk abatement plan and critical path scheduling

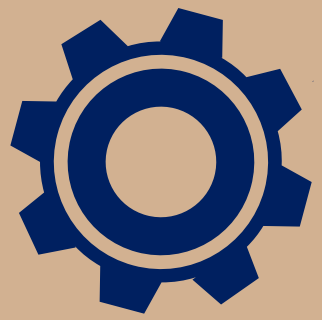
Professors (especially tenured) are independent

15

Formal management process up to shareholders

Graduate students, publish papers 

16

Sell the product 

SUMMARY

Engineering professors tend to conduct research in an individualistic (independent might be a better word) style. This does not mean that they don't consult with others or don't have group meetings with other faculty or students, etc. It does mean that they are generally free to work independently on those areas of technology that are of interest to them (and for which they can also get funding).

Likewise, while consulting with others and all that goes with it, graduate students must, in the end, conduct independent research. And they must defend their thesis alone. In addition, professors operate under a set of metrics for their promotion and peer evaluation that rewards research quality (e.g., number of archival publications in the prestigious journals of their field) and the amount of research money they bring in. They tend to train their graduate students to develop the equations and analyses from first principles. They are usually employed by a non-profit institution.

Achieving tenure provides the degree of independence they seek for unfettered research that contributes to science. At this level they have no manager.

This is the educational environment in which you probably trained.

On the other hand, engineers and engineering managers tend to form teams and do their work in a team environment that will likely be very different from any academic team you may have encountered. They are not free to work on whatever problems interest them or advance science. They operate under a set of metrics for their promotion and managerial evaluation that rewards contributions to the business and engineering excellence which in turn enables the company to beat the competition, fix a field problem or gain increased market share.

They concentrate on creative engineering design and analysis work that leverages design templates and existing work or anchors findings in existing analyses. Archival publications often mean very little.

They are usually employed by a for-profit company and tend to be customer-focused. There is a well-established chain of management command up to the shareholders.

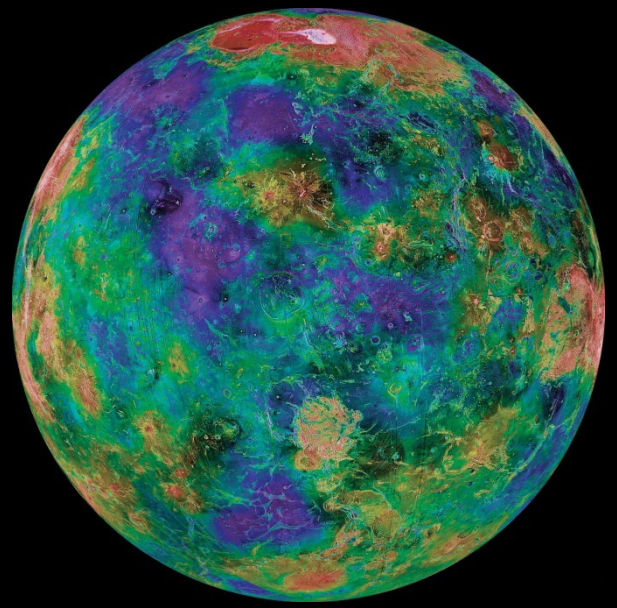
This is the environment in which you will likely be working.

Of course engineering is high tech, is based on the principles of physics, chemistry and uses the complex math that you learned in school. But it is much more than that and you must absolutely grasp this "more-ness".

As you progress through your career, you will need to learn what some call the “art of engineering”; that is, the art or science of making practical application of the knowledge of pure science, physics, chemistry and math to construct useful things like engines, airplanes, bridges, buildings, etc.

Generally, you learn the science and math of engineering in school, but you do not learn the "art" of engineering. This takes years of experience. Yet, as you transition from academe to the workplace, it is vital that you do learn it.

Universities
are from Venus



Venus

Or so it seems

Earth

Industries
are from Mars

Mars

Kamran Khodaparasti

Materials Engineer

Info.

This presentation was developed by Kamran Khodaparasti.

Publication date: July 2024

kkhodaparasti@yahoo.com

kamrankhodaparasti.ir

Kamran Khodaparasti

Ref.

Engineering, What You Don't Necessarily Learn in School, David C. Wisler

Personal experience