How to Achieve Research Excellence

or

How I learnt to shape my numbers

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William Thomson, Lord Kelvin (1894)

- When you cannot measure it,
- when you cannot express it in numbers,
- your knowledge is of a meager and unsatisfactory kind;
- it may be the beginning of knowledge,
- but you have scarcely, in your thoughts, advanced to the stage of science.
Do you belong to the Elite?

• No matter if you use these words – elite, excellence, outstanding

• it requires that you can measure it, and this is essentially the problem!

• → use indicators instead and measure them
Performance Indicators
What are they good for?

• They all like it: controlling, management, government
  – If you can count something, build statistics and compare results.
  – It helps them to make decisions
    In particular if they are not experts in the field.
  – If they have a strategy, the numbers help them to argue for it. (Justification: cmp. SWOT)
What can be measured?

- Number of publications (conferences, journals, patents, books, white papers, reports...)
- Volume of third party income
- Number of graduates
- Not good enough? → weight them
  - E.g., SCI journals, peer reviewed publications, income from Gacr(reviewed) master/PhD
What happens if you make indicators, a prerequisite?

- Researchers will find ways to satisfy minimum requirements and by this trivialize the intention.
- E.g. high impact journal (SCI) as qualification:
  - find journal that accepts you, often the centre of the journal is not in your research direction and they try to extend their reach,
  - or you simply create your own journal and „control“ the quality.
Are indicators capturing excellence?

• There is good examples that the answer is: no


• Shows some 20 examples of world changing ideas but discovered some 20—100 years after their publication.

• All classical indicators failed here!
Why do Indicators Fail?

• What excellence is, is only visible for very few people at an early stage.
• For this, you need to be talented and trained in predicting the world!
• Many technical sound ideas simply do not make it, if they are presented at the wrong time. (Frequency hopping, CDMA)
• They are nevertheless clever ideas although they have no impact (in a short time frame).
What do these Indicators Describe?

• They are a relative good performance measure for the large mass of predictable research, that is of those nice and honest scientists that follow already existing paths and keep improving them.

ε-research

• They definitely do not describe breakthroughs that require a radical change in thinking!
Characterisation of Breakthroughs

• Frequency Hopping, OFDM, digital wave filters, MIMO Technology, Interference Alignment...
• ...were radically new ideas but required their time to be employed
• Typically, authors experienced difficulties to get their first paper accepted.
• Once accepted, the community may need a long time to really appreciate it.
• Reward comes late...(many Nobel price winners are rather old when receiving the price).
What don’t these Indicators Describe?

• Your **research quality** has only little impact in such indicators:
  
  – Do you keep your original data for 10 years?
  – Do you annotate your software clearly?
  – Do you compare your theory/simulation with a real-time, real-world prototype?
  – Do you answer all requests with respect to your previous work?
  – Do you make your work fully accessible to others?
To Measure you Personally

• In a hierarchical system the upper management may be happy to know numbers of underlying units;

• but if you go down the chain of management, you end up with the last management layer that wants to know performance on an individual level.

• Who is the best/poorest performer?

• It is characteristic for micromanagement that upper managers want to have lowest level information to make decisions over several management layers.
The H Index
Put everything into a single number

• Jorge Hirsch, UCSD, 2005:
• Measure number of publications weighted by their references
• Number of publications that has at least the same number of references
• Example: Bible, H=1
What do You Want?

• You want to
  – become famous and successful
  – become well respected for your original ideas
  – become well paid
  – get a bigger office
  – get easy access to high quality PhD students
  – obtain easily finances for expensive experiments
  – ...

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Your Path to the TOP

All of these is related to one thing:

• **International Visibility**

• If your institution, your group, your group members, yourself, are internationally visible, the rest follows...
International Visibility

• You become international visible by

• 1) be present on international platforms (conferences, journals, universities)

• 2) bring in internationally visible people to your place. (invitations, conferences)
What needs to be done:

• Conferences:
  – Identify flagship conferences of your society.
  – Submit your best papers there in order to get in.
  – Don’t give up. With the feedback you obtain, you increase your chances. There is related workshops later where you can resubmit.
  – Submit special sessions: requires preparation!
  – Become involved in conference organization (TPC and more)
What needs to be done:

• Apply for workshops (and conferences) in Brno
  – While it may be impossible to get a flagship conference to Brno due to poor international connections, small to moderate size workshops (<100 people) can be attractive
  – Prepare portfolio presentation of how wonderful Brno is, when the sun shines...

• Organize at least one international workshop per year. (best location is city centre!)
What needs to be done:

• Journals:
  – Identify most important journals for your research field (where do the famous people publish)
  – Submit your best papers there.
  – Don’t give up. With the obtained feedback, improve your paper and try again.
  – Become reviewer of as many good journals as possible, learn from those papers.
  – Try to get into Associate Editor positions.
What needs to be done:

• Invite selected people on a regular basis
  – They should work in your field
  – Check for tutorials and plenaries at conferences
  – Use their appearance to elevate your seminars...
  – Have them staying a day longer to discuss collaborative ideas

  – You need money for this...
What needs to be done:

• International Research collaboration
  – Typically via EU programmes (Erasmus, COST, ...) but not only
  – Lots of people travelling can also make an impact
  – Become a missionary: always present something
  – Accept EU collaboration even so others abuse you: offer excellent labs: prototyping offer admin work (no one wants to do it)
  – Once you are in a collaboration scheme, aggressively take advantage of it to force joint publication.
  – Offer your labs to theoretical working people to prove their recent ideas and force them to joint paper.
What needs to be done:

• Improve research quality by easy access to your work:
  – Publication data base up-to-date and easy to use if you can read English → quality by evidence
  – Functional home page with links to your work
  – **Reproducibility:**
    Offer free download of your code (make sure it is well annotated), in particular in connection with an accepted paper.
What needs to be done: Reproducible Research

All of these papers are simply overview papers of our simulators but offer downloads for all examples
Become a Missionary for your own Work

• Present overview of past research whenever possible: seminars, plenaries, invitations, trips.
• Write overview papers on hot topics including your own work.
• Reference your own work.
• Write/edit books to include your work and provide easy access to your previous work.
• Become member of Research Gate, Academia, ...
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