

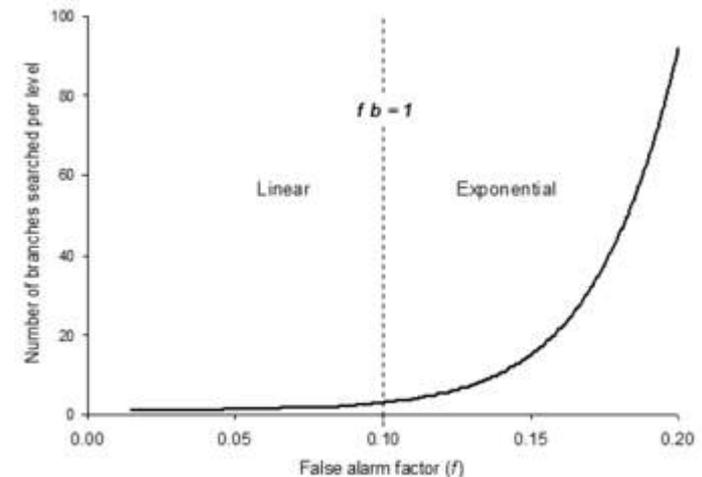
How to Achieve Research Excellence

or

How I learnt to shape my numbers

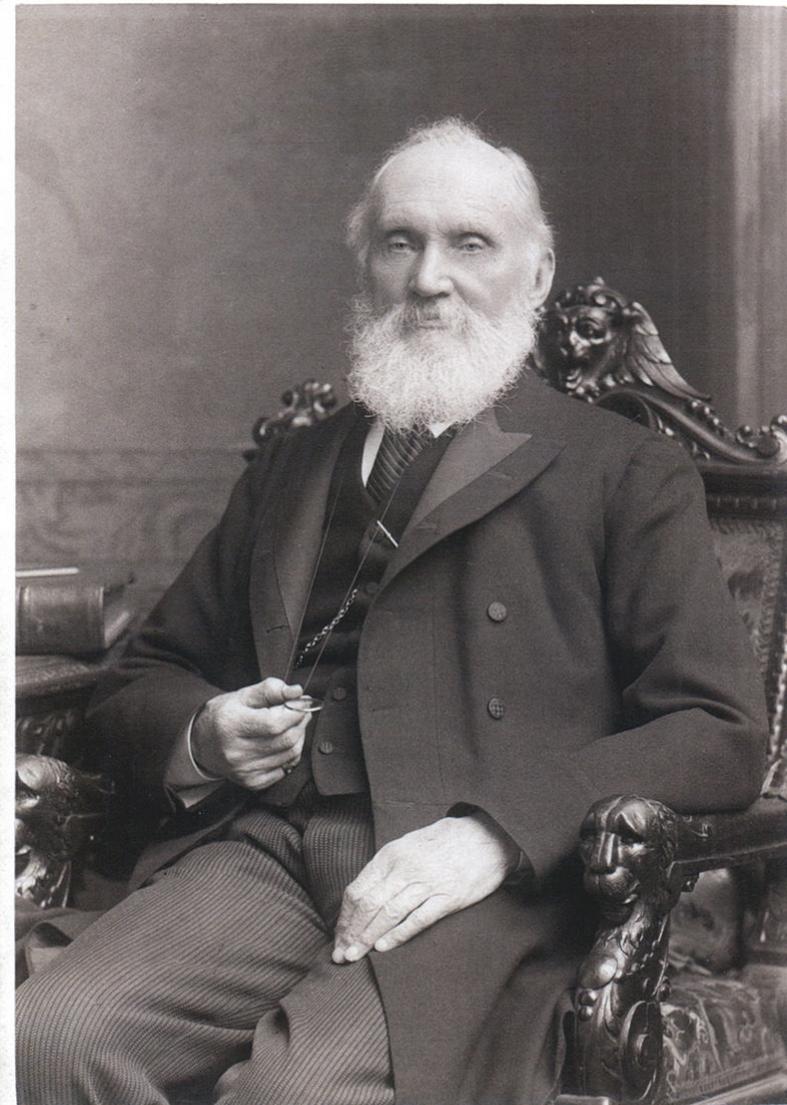
Markus Rupp

February 12, 2016



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



Markus Rupp

Russell & Sons
Kelvin
July 4 1894
7, BAKER STREET
LONDON, W.

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

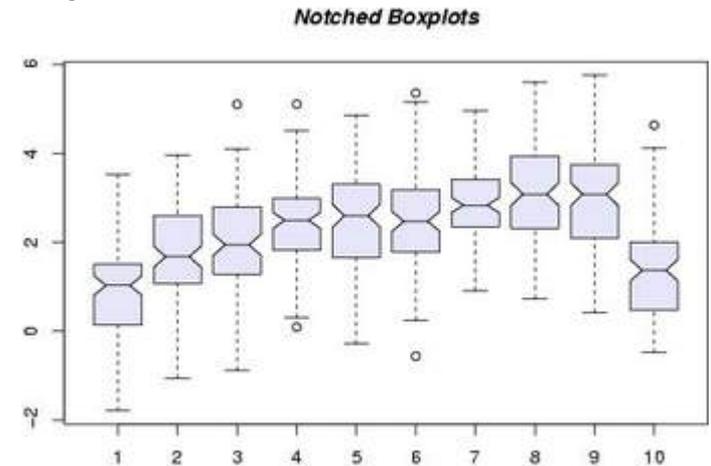
What are they good for?

- 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

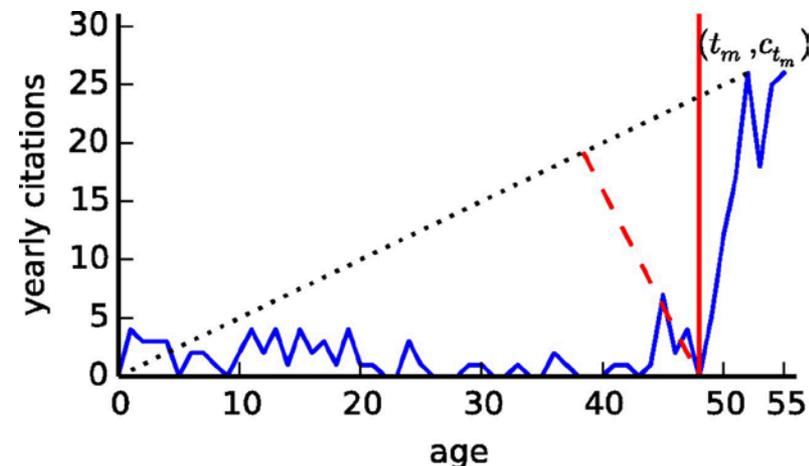


What happens if you make indicators, a prerequisite?

- 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
- Qing Ke, Emilio Ferrara, Filippo Radicchi, and Alessandro Flammini
Defining and identifying Sleeping Beauties in science
PNAS 2015 112: 7426-7431.
- 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?

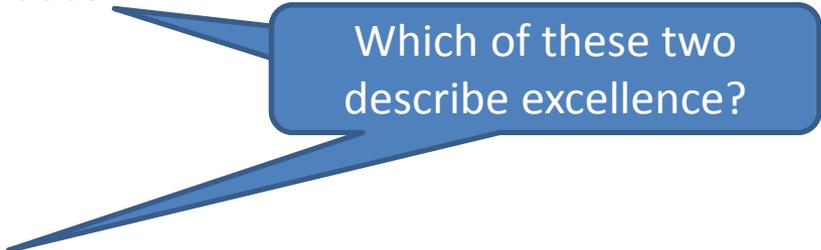


- What excellence is, is only visible for very few people at an early stage.
- For this, you need to be talented and trained in predicting the world!
- Many technical sound ideas simply do not make it, if they are presented at the wrong time. (Frequency hopping, CDMA)
- They are nevertheless clever ideas 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



Which of these two describe excellence?

- 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

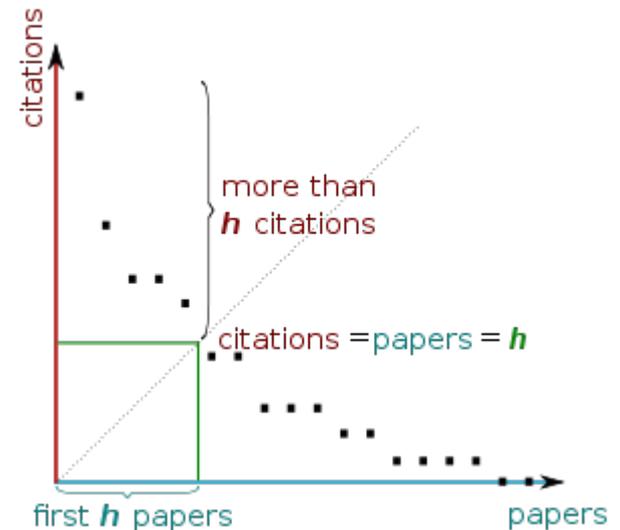


- In a hierarchical system the upper management may be happy to know numbers of underlying units;
- but if you go down the chain of management, you end up with the last management layer that wants to know performance on an individual level
- Who is the best/poorest performer?
- It is characteristic for **micromanagement** that upper managers want to have lowest level information to make decisions over several management layers.

The H Index

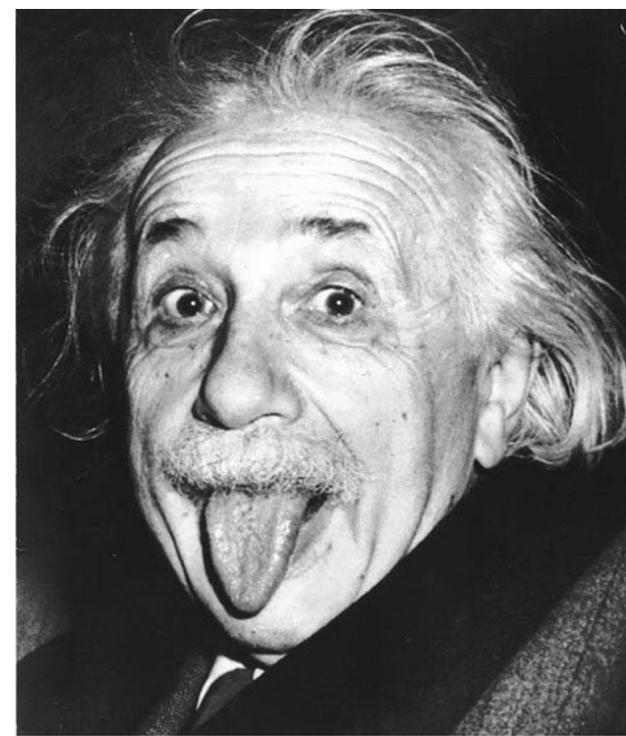
Put everything into a single number

- 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
 - ...





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

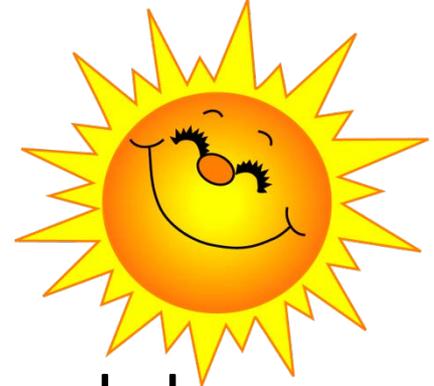
- You become international visible by
- 1) be present on international platforms (conferences, journals, universities)
- 2) bring in internationally visible people to your place. (invitations, conferences)

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

| | | | | | |
|---|-------|----|---|---|----------|
|  354 | 50.57 | 1 | C Mehlh rger, M Wrulich, JC Ikuno... | Simulating the long term evolution physical layer | 2009 |
|  350 | 58.33 | 2 | JC Ikuno, M Wrulich, M Rupp | System level simulation of LTE networks | 2010 |
|  132 | 26.40 | 8 | C Mehlh rger, JC Ikuno, M Simko... | The Vienna LTE simulators-Enabling reproducibil... | 2011 |
| 36 | 12.00 | 90 | S Schwarz, JC Ikuno, M Simko, M Taranetz... | Pushing the limits of LTE: A survey on research ... | 2013 Acc |

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, ...
- Become a self-fulfilling prophecy.



Thanks for your Interest

- You can read more (and possibly enjoy) under
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