Measuring is Knowing

Or is it?

Jan Velterop – APE – 20 January MMX
NSF Workshop on Scholarly Evaluation Metrics
Washington DC, December 2009
About Citations and Usage

(More about Citations than Usage)
Mixed feelings
Mixed feelings

* useless
Mixed feelings

* useless

* meaningless
Mixed feelings

* useless
* meaningless
* interesting
Mixed feelings

- useless
- meaningless
- interesting
- just play the game
Every 'usage' has its metric
Every metric has its 'usage'
How science is linked
And metrics less so
growth of informal science communication

metrics for data sets

re-use of data as impact measure

metrics suitable to take decisions?

local metrics vs global ones

Eigenfactor vs Impact Factor

web metrics poorly understood

focus on networks

h-bar index refinement of h-index

multiple author, junior author, senior author

article level metrics

relative funding decisions

increasing inputs not always leading to increased output

science is non-linear

how to quantify exposure in lay news media?

attributed nano-publications
Current knowledge transfer
Current knowledge transfer

Signal to noise ratio?
Current knowledge transfer – an analogy – needle transport
Current knowledge transfer – an analogy – needle transport

Nano-publications are the “needles”
Ascoviruses (AVs) induce a unique pathology in their insect host cells causing cleavage of the cells into virion-containing vesicles. The mechanism by which AVs induce vesicle formation is poorly understood. It is postulated that the virus initially induces apoptosis leading to cell fragmentation. The apoptotic bodies are however, rescued by the virus to form the vesicles. Here we show that *Heliothis virescens* AV (HvAV-3e) is able to inhibit chemically induced apoptosis from around 16 h after infection. Analysis of the genome of the virus indicated the presence of a putative inhibitor of apoptosis (orf28) gene that encodes a protein with an imperfect baculovirus inhibitor of apoptosis repeat (BIR) and a RING domain. Transiently expressed orf28 did not inhibit chemically induced apoptosis suggesting that the protein may not serve as an inhibitor of apoptosis. Nevertheless, RNA interference studies revealed that the gene is probably essential for virus pathology and replication.
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They are “nano-publications” because they can be cited.
In essence the NSF workshop was all about Impact

(Though “Impact” was not defined)
Let me help define “Impact”
But first...

Why do scientists publish?
The record

“keeping the minutes of science”
The record

“keeping the minutes of science”
Transfer of information and knowledge
Credit in the ego-system: the acknowledge economy
Credit in the ego-system: the acknowledge economy

Often seen as impact
“Scientific impact is the sound you hear if you drop a feather down the Grand Canyon and wait for the echo.”

Paraphrasing Don Marquis, 1878-1937
“The notion of *impact* is incoherent, likely to reward the sensationalist and second-rate ... and risks turning academics into door-to-door salesmen for vulgarised versions of their increasingly market-oriented *products*.”

Stefan Collini, professor of intellectual history and English literature at the University of Cambridge
Impact Factor

g-index

h-index

h-b-index

Eigenfactor
<table>
<thead>
<tr>
<th>Journal</th>
<th>Impact Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
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Lazy Man's Credit League Tables?

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Journal

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g-index

Individual

h-index

Topic

h-b-index

Journal

Eigenfactor

In Defiance of Science?
Defiance of Science?
Defiance of Science?

Higher precision than needed for a space rendez-vous
Apart from journal level, also article level metrics:
Apart from journal level, also article level metrics:

- usage
- citations
- blog posts
- bookmarks
- comments/ratings
- trackbacks
The less I understand it, the more quality it is bound to have

\[
\begin{pmatrix}
8 & 1 & 6 \\
3 & 5 & 7 \\
4 & 9 & 2
\end{pmatrix}
\]

\[
\begin{bmatrix}
\cos(\phi) & -\sin(\phi) \\
\sin(\phi) & \cos(\phi)
\end{bmatrix}
\begin{bmatrix}
x \\
y
\end{bmatrix}
\]

\[L\{f(t)\} \equiv F(s) = \int_0^\infty e^{-st} f(t) \, dt\]

\[e = \sum_{k=0}^{\infty} \frac{1}{k!}\]

\[m\ddot{y} = -mg + C_D \cdot \frac{1}{2} \rho \dot{y}^2 \cdot A\]

\[\int_0^\infty x^2 e^{-x^2} \, dx = \frac{\sqrt{\pi}}{4}\]
I'm not sure what you're trying to say.
Anyway, what does it mean, all these metrics and the resulting ranking of McJournals* and McArticles*?
Anyway, what does it mean, all these metrics and the resulting ranking of McJournals* and McArticles*?

* obviously, in this context "Mc" just means: falling within a narrow band of variability
not just self-referencing ivory tower influence?
not just self-referencing ivory tower influence?
Number of career decisions based purely on citation counts of one sort or another
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Just in case this graph makes it to the web – it's totally fictional!
Number of career decisions based purely on citation counts of one sort or another

Just in case this graph makes it to the web – it’s totally fictional!

But believable, too!
Akin to phrenology?
Akin to phrenology?
Akin to phrenology?
Akin to phrenology?
Societal Impact
Capturing Research Impacts

A review of international practice

JONATHAN GRANT, PHILIPP-BASTIAN BRUTSCHER, SUSAN KIRK, LINDA BUTLER, STEVEN WOODING

DB-578-HEFCE
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Prepared for the Higher Education Funding Council for England

79-page document
'Citation' mentioned exactly twice.
'Impact Factor' not mentioned at all.
'Quality' mentioned 50 times.
The Scientific Ecosystem is an Acknowledge Economy where ROI means Return on Influence.
The Scientific Ecosystem is an Acknowledge Economy
where ROI means Return on Influence
Shouldn't that be Societal Influence?
“Not everything that can be counted counts; not everything that counts can be counted.”

Albert Einstein
Are the most cited articles also the ones worth citing most?
Are the most used articles also the ones worth using most?
Are the most cited and used articles also the ones worth most to current and future society?

**Preliminary note**

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**Electrochemically induced nuclear fusion of deuterium**

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(Received 13 March 1989; in revised form 22 March 1989)

**INTRODUCTION**

The strange behaviour of electrogernated hydrogen dissolved in palladium has been studied for well over 100 years, and latterly these studies have been extended to deuterium and tritium [1]. For discharge of deuterium from alkaline solutions of heavy water we have to consider the reaction steps

\[
\begin{align*}
D_2O + e^- & \rightarrow D_{\text{ads}} + OD \\ 
D_{\text{ads}} + D_2O + e^- & \rightarrow D_2 + OD \\ 
D_{\text{ads}} & \rightarrow D_{\text{lattice}} \\ 
D_{\text{ads}} + D_{\text{ads}} & \rightarrow D_2
\end{align*}
\] (i) (ii) (iii) (iv)
One thing that bugs me is that people answer the question ‘what impact has your funding had’ with things like ‘I hired 3 postdocs and 2 support staff.’

Societal impact?

How has your research – done with our money – made the world a better place?
Can we truly know?
Ivory tower

Foundation
Thank you!

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