

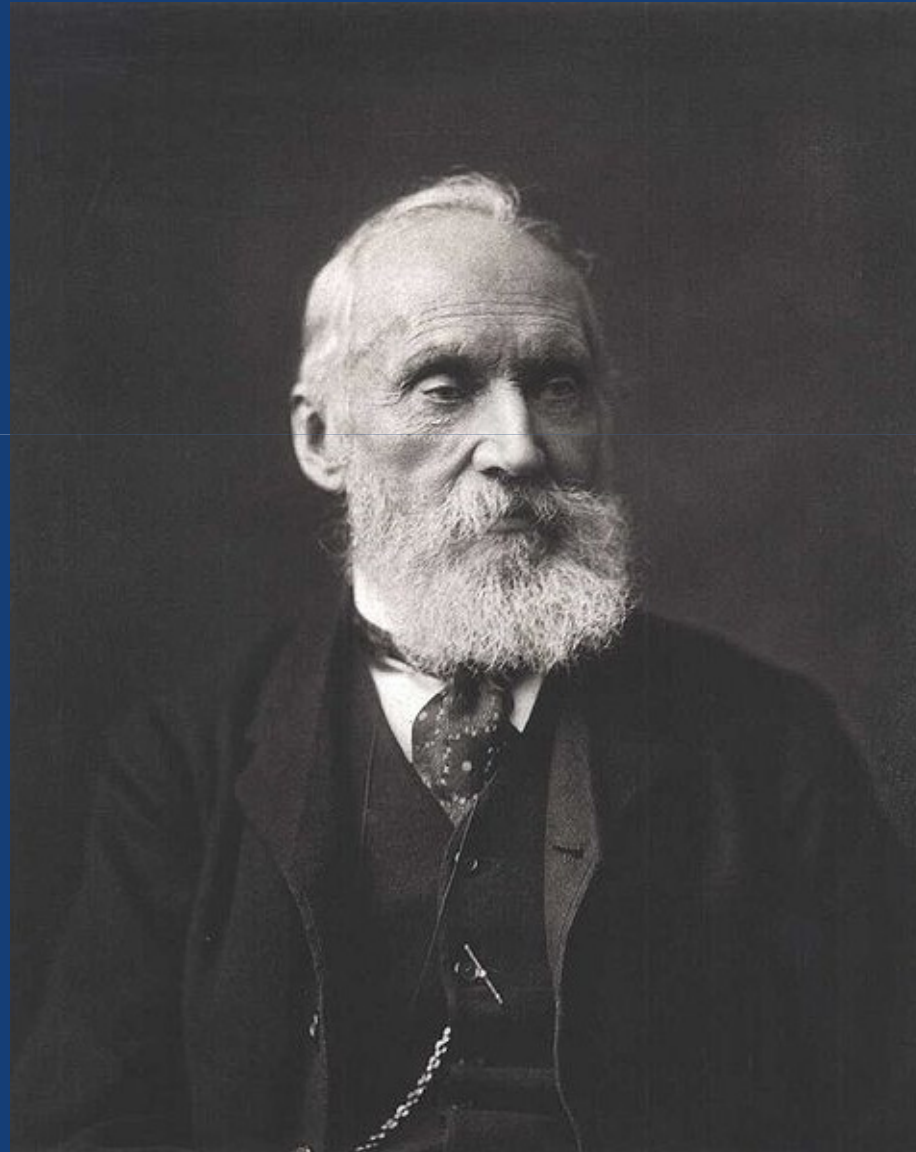
The future of scientific communication

Richard Smith
Former editor, BMJ; editor, Cases Journal

Outline of talk

- Problems with looking to the future
- Why the present methods of sharing medical and scientific information are not fit for purpose
- Drivers of change
- Four futures for scientific publishing
- My sketch of the future

Lord Kelvin, president of the Royal Society, 1890-95



Lord Kelvin's predictions

- "Radio has no future"
- "Heavier than air flying machines are impossible"
- "X rays will prove to be a hoax"

What was predicted

- Paperless office
- Leisure society
- Death of the book

What wasn't predicted

- Explosion of the internet (future of medical journals, 1990)
- Berlin wall coming down
- September 11
- Credit crunch

Looking to the future: common mistakes

- Making predictions rather than attaching probabilities to possibilities
- Simply extrapolating current trends
- Thinking of only one future

Looking to the future: common mistakes

- People consistently overestimate the effect of short term change and underestimate the effect of long term change.
- Ian Morrison, former president of the Institute for the Future

Why bother with the future?

- "If you think that you can run an organisation in the next 10 years as you've run it in the past 10 years you're out of your mind."
- CEO, Coca Cola

Why bother with the future?

- “The future belongs to the unreasonable ones, the ones who look forward not backward, who are certain only of uncertainty, and who have the ability and the confidence to think completely differently.”
- Charles Handy quoting Bernard Shaw

Why bother with the future?

- The point is not to predict the future but to prepare for it and to shape it

1980: two choices for a global network

- Choice one:
 - Everybody has access
 - Everybody can forward material
 - Only trusted sources can put on information
- Choice two:
 - Anybody can put up anything

1990: two choices to build the world's best encyclopaedia

- Choice one
 - A global corporation with state of the art governance
 - First class contributors and editors
 - Elaborate fact checking
 - Scrupulous copy editing
- Choice two
 - A website where anybody can contribute and correct anything that's there

How doctors feel about information



One man's view



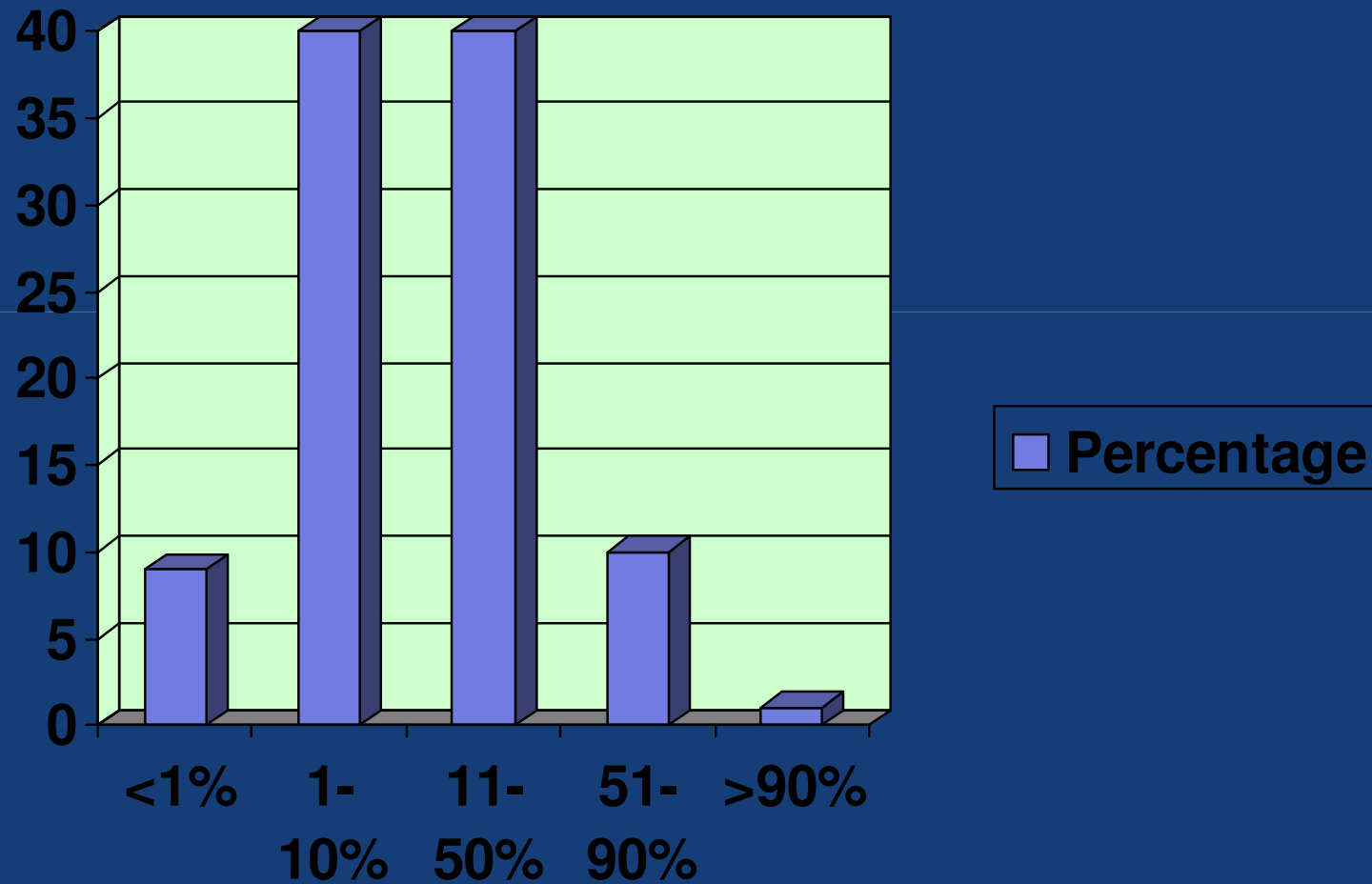
Current information problems

- Our current information policy resembles the worst aspects of our old agricultural policy, which left grain rotting in thousands of storage files while people were starving. We have warehouses of unused information rotting while critical questions are left unanswered and critical problems are left unresolved. **Al Gore**

Current problems

- Think of all the information that you might read to help you do your job better.
- How much of it do you read?

Answers from a sample of doctors

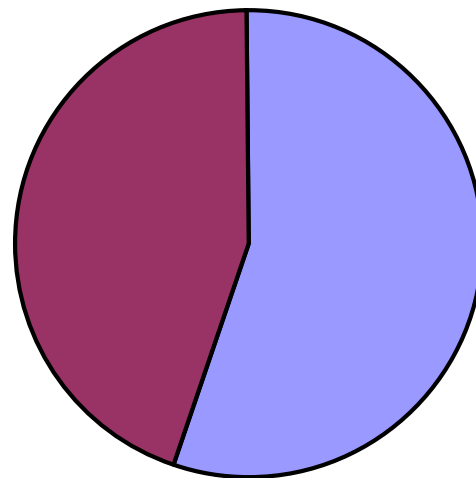


Current problems

- Do you feel guilty about how much or how little you read?

Answers from a sample of doctors

Do you feel guilty about how much or little you read?

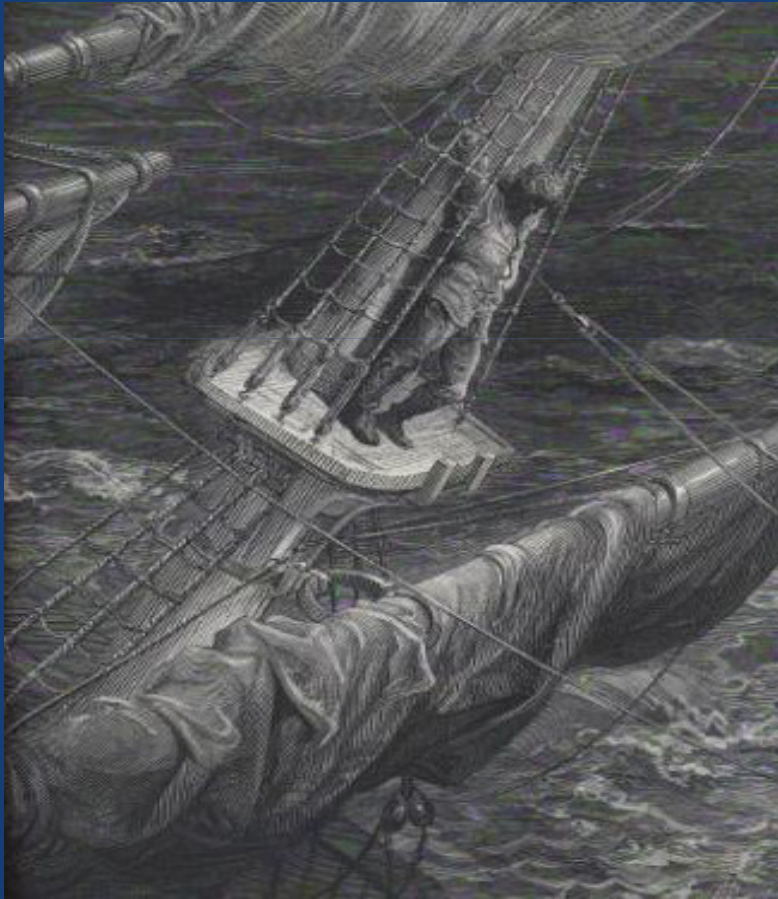


■ Yes
■ No

Words used by 41 doctors to describe their information supply

- Impossible Impossible Impossible
Impossible Impossible Impossible
- Overwhelming Overwhelming
Overwhelming Overwhelming
Overwhelming Overwhelming
- Difficult Difficult Difficult Difficult
- Daunting Daunting Daunting
- Pissed off
- Choked
- Depressed
- Despairing
- Worrisome
- Saturation
- Vast
- Help
- Exhausted
- Frustrated
- Time consuming
- Dreadful
- Awesome
- Struggle
- Mindboggling
- Unrealistic
- Stress
- Challenging Challenging
- Excited
- Vital importance

Information paradox



- “Water, water everywhere,
Nor any drop to drink.”
- Rime of the Ancient Mariner

What's wrong with medical journals

- Don't meet information needs
- Too many of them
- Too much rubbish
- Too hard work
- Not relevant
- Too boring
- Too expensive

What's wrong with medical journals

- Don't add value
- Slow every thing down
- Too biased
- Anti-innovatory
- Too awful to look at
- Too pompous
- Too establishment

What's wrong with medical journals

- Don't reach the developing world
- Can't cope with fraud
- Nobody reads them
- Too much duplication
- Too concerned with authors rather than readers

The three essential requirements for change

- To overcome inertia, resistance to change, and vested interests
- Burning platform
- X
- Vision of something better
- X
- What do we do this afternoon

What are the drivers of a new form of publishing?

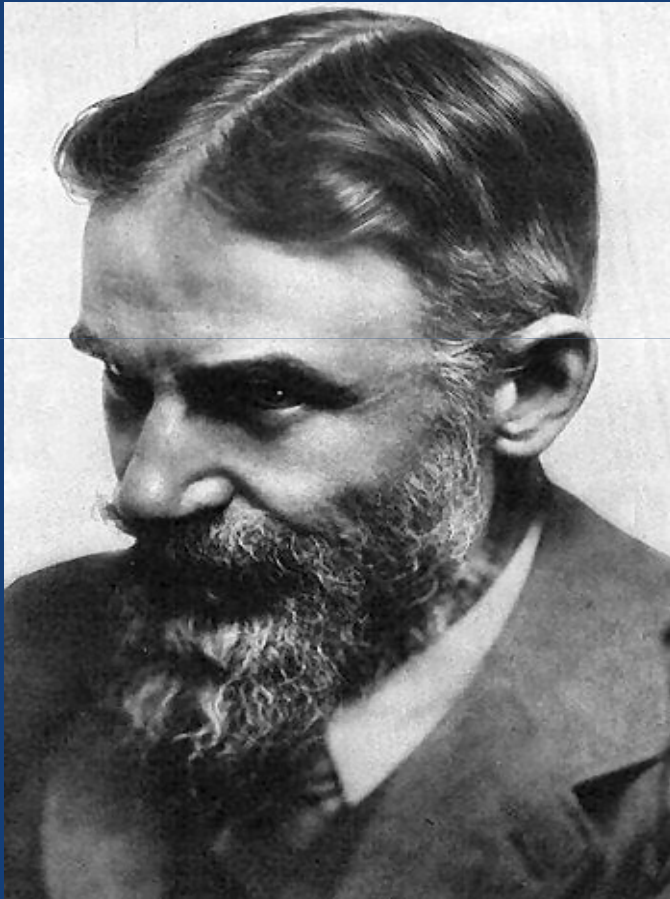
- Failures of the present system
- A vision of something better
- Money
- Balkanisation of the literature
- Slowness

A vision of something better



- "It's easy to say what would be the ideal online resource for scholars and scientists: all papers in all fields, systematically interconnected, effortlessly accessible and rationally navigable, from any researcher's desk, worldwide for free."
Stevan Harnad

A vision of something better



- If you have an apple and I have an apple and if we exchange these apples then you and I will still each have one apple. But if you have an idea and I have an idea and we exchange these ideas, then each of us will have two ideas.

George Bernard Shaw

Money: What does the research community do?

- Do the research, often funded by public money, often costing millions
- Hand over the copyright to the journals
- Do the editing, often unpaid
- Do the peer review, almost always unpaid
- Often do the technical editing, often unpaid
- Buy the journals, often at inflated prices, some cost \$20 000
- Read the journals
- Store the journals

Money: What do the publishers do?

- May own the journals, although often they don't
- Manage the process
- Lend the money to keep the process going
- Design - usually minimal
- Typeset, print, and distribute the journal
- Market the journal - but often to libraries that have to have them
- Sell reprints - sometimes for \$1m a time (nothing to authors or funders of the research); can almost sell themselves
- Sell advertising - often none

Balkanisation

- If you are a gastroenterologist the research that might matter to you may be in 30 different journals
- The difficulty of doing systematic reviews
- Important research articles are all over the place, some in Pubmed, many not
- Even if you can find the stuff, it costs a fortune to gather it all together (systematic review on research misconduct -£2000 to get photocopies)

Slowness

- For many journals the time between submission and publication is still over a year--unacceptable

Barriers to change

- Natural conservatism
- “I’ve done well in the old game I might not do so well in the new game.”
- Academic credit coupled to where people publish
- Impact factors
- Vested interest—“scientific publishing is highly profitable”

Four possible futures: Simpson scenarios

Homer: fat, lazy, rather gormless

- “Medical publishing ain’t broke so need to fix it.”
- Traditional journals remain
- Peer review closed
- Publishers invest in summarising material and point of care information.

Marge: the wise mother

- Almost all material is open access and published on databases rather than in journals
- Open peer review
- A few journals remain but have become magazines
- Point of care information
- Researchers linked electronically in clubs
- Academic credit comes from hits, citations in magazines, and evidence of making a difference in the real world

Lisa: smart, sassy, well informed daughter

- Published material replaced by electronic conversations: blogs, social networking sites
- Everybody, including researchers, are in clubs where data are shared
- Powerful search engines
- Information a side product of work and leisure activities
- Wikis for everything: “the wisdom of the many.”
- Traditional publishers largely gone

Bart: the streetwise son

- A world where information comes mainly from large organisations— governments, pharma companies, Google, WHO
- Editors work for these organisations which also sponsor research
- Money and idea markets intertwined

My sketch of the future

- Scientific papers published not on paper but posted on the web in databases—using the full possibilities of the web:
 - all raw data
 - software used to manipulate the software
 - links to all relevant material
 - multimedia
- Peer review—not a black box but an open scientific discourse and is “post publication”
 - World is moving from “filter then publish” to “publish then filter”—as with Wikipedia
- Everything open access
- A few paper journals remain, finding research that matters to their readers and presenting it to them in a readable, actionable way

Clinical trials in the future

- Not conducted by drug companies: “Having vendors research products is crazy.”
- Overwhelming evidence of bias in trials conducted by drug companies
- Many more non-drug trials
- All trials registered from the very beginning
- Protocols publicly available
- All outcomes and data made available
- Results published on databases not in journals
- Results instantly incorporated into systematic reviews

A glimpse of the future

The screenshot shows a web browser window displaying the PLoS Medicine article page for "Why Most Published Research Findings Are False". The browser tabs include BBC Weather, Twitter, Yahoo! Mail, Facebook, and Linda Smith's welcome page. The address bar shows the URL: <http://www.plosmedicine.org/article/metrics/info:doi/10.1371/journal.pmed.0020124;jsessionid=EE3FE97B1FE80CA0DA6FA48070A75D1B>. The page header features the PLoS logo, navigation links (Home, Browse Articles, About, For Readers, For Authors and Reviewers, Journals, Hubs, PLoS.org), and a search bar. The article title is "Why Most Published Research Findings Are False", categorized as an "ESSAY" and "OPEN ACCESS". It is published in the August 2005 issue of PLoS Medicine. The article usage statistics show a total of 250,801 views from August 30, 2005, to January 18, 2010. A breakdown by view type shows 198,828 HTML page views, 5,061 PDF downloads, and 1,362 XML downloads. A cumulative views graph shows a steady increase over 54 months. The metrics sidebar indicates 250,801 total article views, cited in 103 CrossRef, 67 PubMed Central, and 321 Scopus articles, with an average rating of 2 stars. Related content includes "Minimizing Mistakes and Embracing Uncertainty" and "When Should Potentially False Research Findings Be Considered Acceptable?". The footer of the browser window shows several open files: "IRIS Steering Group A...doc" and "IMG00002.jpg".

ESSAY **OPEN ACCESS**

Why Most Published Research Findings Are False

Article | Metrics | Related Content | Comments: 23

Article Usage

Total Article Views: **250801** from Aug 30, 2005 (publication date) - Jan 18, 2010*

Breakdown by View Type
HTML Page Views: **198828**
PDF Downloads: **50611**
XML Downloads: **1362**

Cumulative Views from Aug 30, 2005 (publication date) - Jan 18, 2010*

The graph plots cumulative views over 54 months. The y-axis represents views from 0 to 200,000. The x-axis represents months from 0 to 54. The data points show a consistent upward trend, reaching approximately 250,801 views by month 54.

*Data refers to views from the PLoS Medicine web site only.
*Although we update our data on a daily basis (not in real time), there may be a 48-hour delay before the most recent numbers are available.

Metrics Information and Summary Data for PLoS Medicine

Metrics

Total Article Views: **250801**

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Instant, real time metrics

- Number of hits
- Downloads
- Graph of hits over time
- Citations in four databases
- Bookmarks
- Mentions in blogs
- Reader scoring
- Reader comments
- Trackbacks
- And more to come—mentions in the media, Hansard

Conclusion

- Current methods of communicating science are not fit for purpose
- Scientists, who invented the web, have not used it fully yet
- There are powerful drivers of change
- There is powerful resistance to change
- Dramatic change is likely in the next 20 years

“When the future comes through you’ll either be part of the roller or part of the road.”

