



Where do new ideas come from?

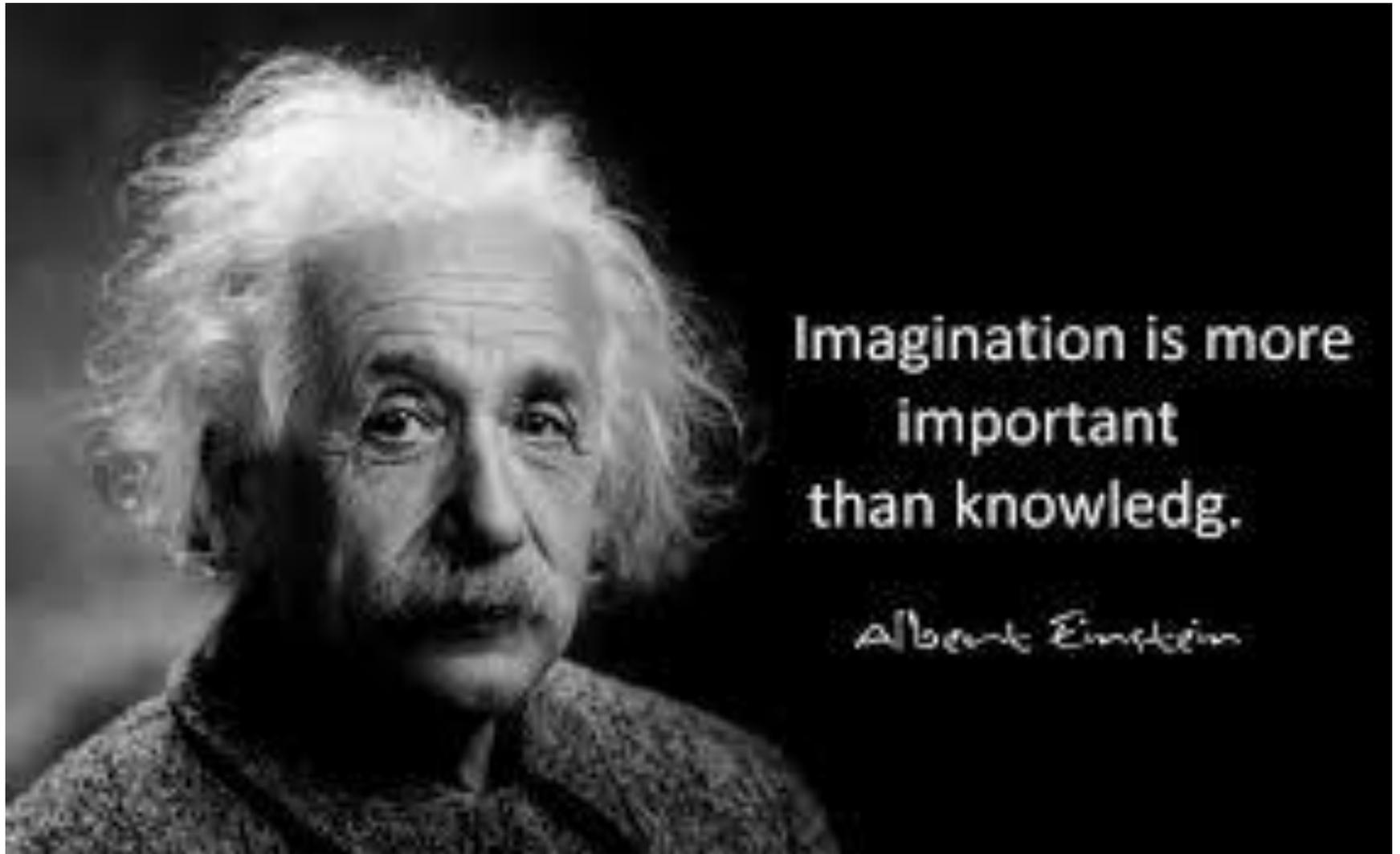
Who knows?



John Wood

« Systems and Serendipidity »

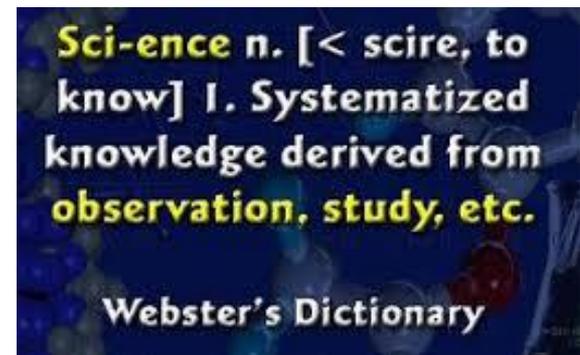




All change but back to the past

Open Science/Science 2.0

- A systemic change in the modus operandi of scholarship and research
- Affecting the whole research and innovation cycle and its stakeholders





European
Research Area
Board (ERAB)

Developing a renaissance mind



ERA 2030: ERAB's STRATEGIC VIEW

October 2009



European Research Area



... holistic thinking and approach epitomized the first 'Renaissance', where scholars and artists moved relatively freely around Europe among the centres of learning and culture. While this privilege was the domain of a few at that time, it should be our ambition, in the new 'Renaissance', that this should be the expectation of all citizens, especially in the field of research and innovation.





Some quotes to help focus



“STRANGE TIMES ARE THESE IN WHICH WE LIVE WHEN OLD AND YOUNG ARE TAUGHT FALSEHOODS IN SCHOOL. AND THE PERSON THAT DARES TO TELL THE TRUTH IS CALLED AT ONCE A LUNATIC AND FOOL.”

~ PLATO (427 BC)



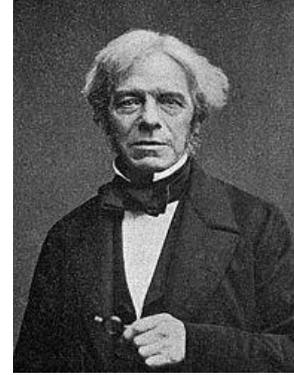


“All things change. Yet nothing is extinguished . . . there is nothing in the whole world that is permanent. Everything flows onwards and all things are brought into being with a changing nature. The ages themselves glide by in constant movement, for still waters will never reach the sea.”

Ovid



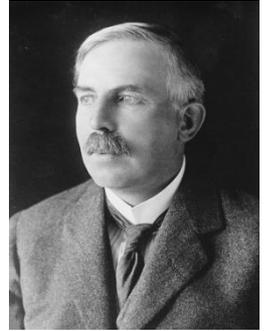
Michael Faraday



- Nothing is too wonderful to be true if it be consistent with the laws of nature
- It is the great beauty of our science, chemistry, that advancement in it, whether in a degree great or small, instead of exhausting the subjects of research, opens the doors to further and more abundant knowledge, overflowing with beauty and utility.
- I have far more confidence in the one man who works mentally and bodily at a matter than in the six who merely talk about it
- I am no poet, but if you think for yourselves, as I proceed, the facts will form a poem in your minds
- Why, sir, there is every probability that you will soon be able to tax it!”

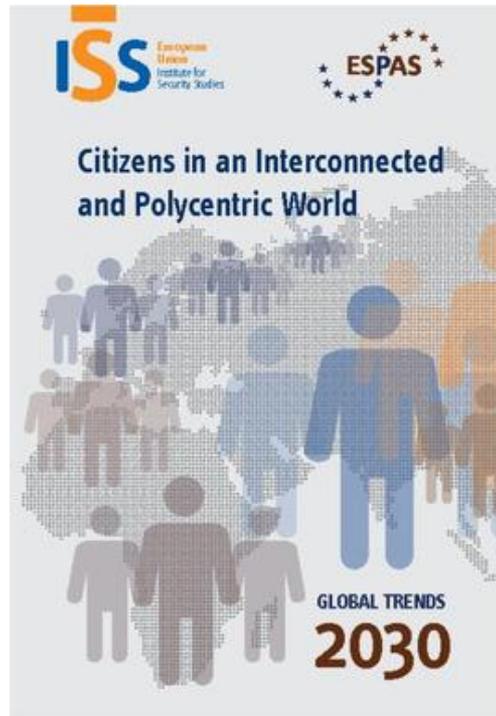


Ernst Rutherford



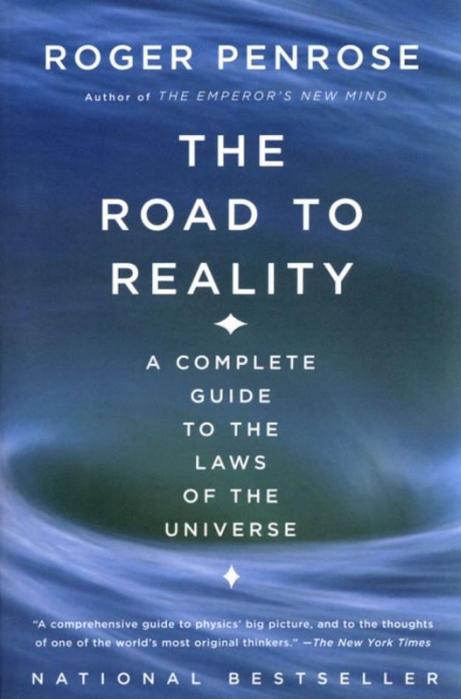
- We've got no **money** so we've got to think.
- All science is either physics or stamp collecting.
- An alleged scientific discovery has no merit unless it can be explained to a barmaid.
- Don't let me catch anyone talking about the Universe in my department.



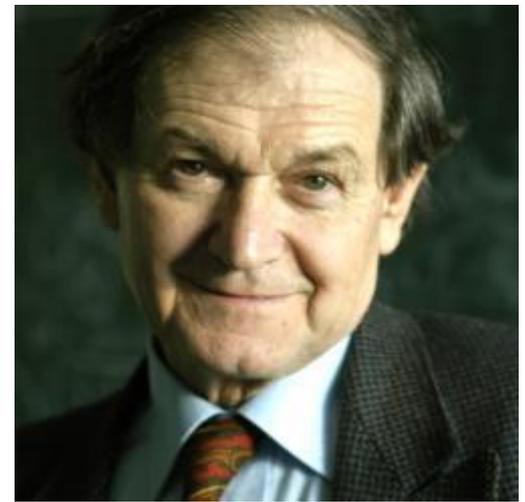


“Knowledge is no longer concentrated in the hands of a few; it can be created and shared by ordinary citizens everywhere, challenging the very legitimacy of traditional sites of knowledge and information production such as universities and the media.”





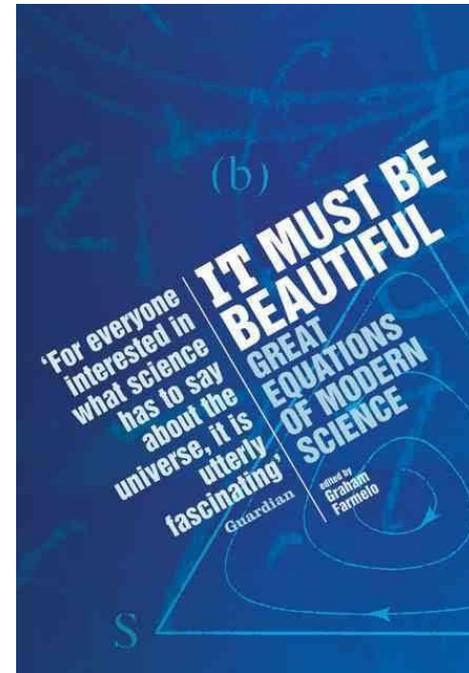
Roger Penrose



“I shall put forward powerful positive reasons,...to believe that the present-day quantum mechanics are in need of a fundamental (though presumably subtle) change....Yet I find it remarkable how few of today’s quantum physicists are prepared to entertain seriously the idea of an actual change in the ground rules of their subject.”



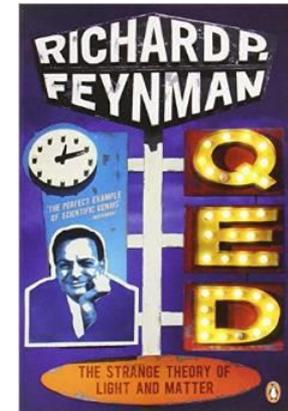
- “A solution that allows our models to be believed and understood is that our very best model of the universe should of necessity be, um, **crappy.**” letter from Steve Cohen



Richard Feynman Quotes

- “I think it's much more interesting to live not knowing than to have answers which might be wrong.”
- **“If you thought that science was certain - well, that is just an error on your part.”**

From the **“Strange theory of light and matter lectures:”**

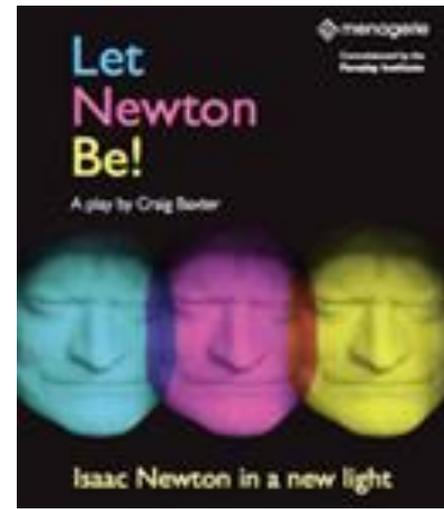
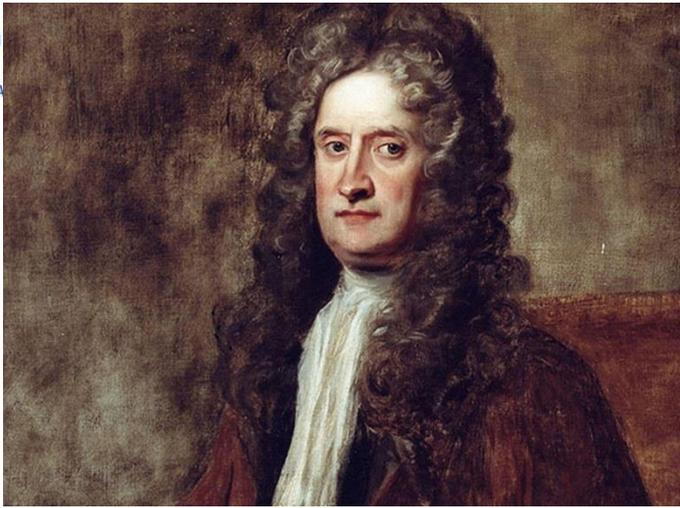


“...if you think I am going to explain it to you so you can understand it. **No**, you’re not going to be able to understand it. Why, then, am I going to bother you with all this? Why are you going to sit here all this time, when you won’t be able to understand what I am going to say? It is my task to convince you not to turn away because you don’t understand it. You see my physics students don’t understand it either. That is because I don’t understand it. Nobody does.





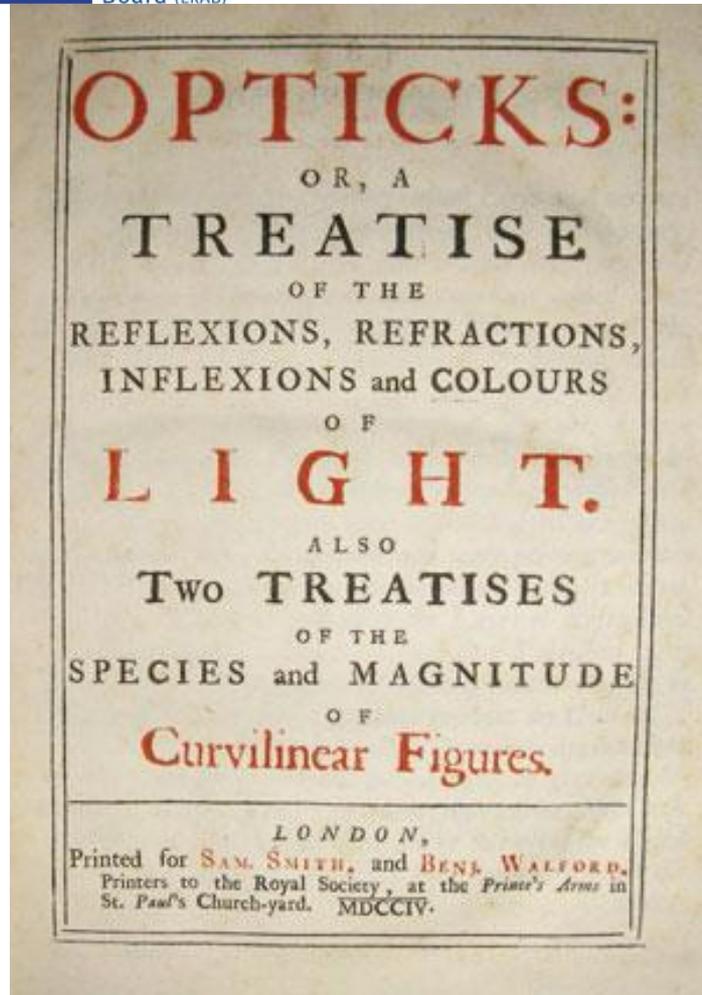
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Nature and nature's laws lay hid in the night. God
said, Let Newton be! and all was light!

(Alexander Pope)

izquotes.com





TRAITE DE LA LUMIERE.

Où font expliquées

Les causes, de ce qui luy arrive

Dans la REFLEXION, & dans la REFRACTION.

Et particulièrement

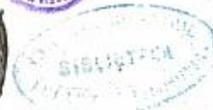
Dans l'étrange REFRACTION

DV CRISTAL D'ISLANDE,

Par C. H. D. Z.

Avec un Discours de la Cause

DE LA PESANTEUR.



A L E I D E,

Chez PIERRE VANDER AA, Marchand Libraire,
M D C X C.

TREATISE ON LIGHT.

In which are explained
The causes of that which occurs

In REFLEXION, & in REFRACTION.

And particularly

In the strange REFRACTION

OF ICELAND CRYSTAL.

By CHRISTIAAN HUYGENS.

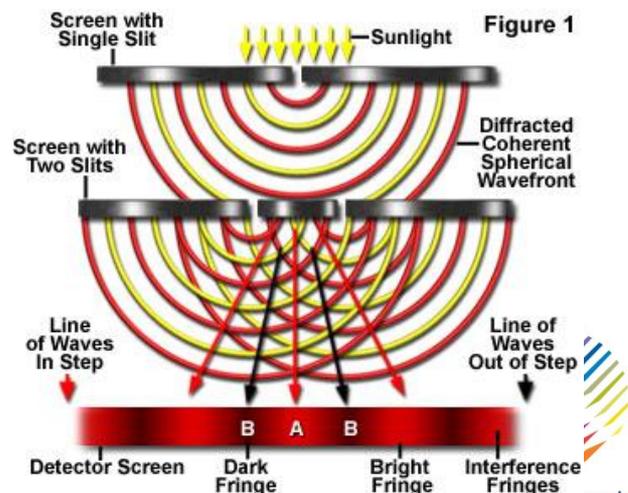
Rendered into English

By SILVANUS P. THOMPSON.

DOVER PUBLICATIONS, INC.
NEW YORK NEW YORK

“All points on a wavefront can be considered as *point sources* for the production of *spherical secondary wavelets*. At a later time, the new position of the wavefront will be the *surface of tangency* to these secondary wavelets.”

Thomas Young's Double Slit Experiment

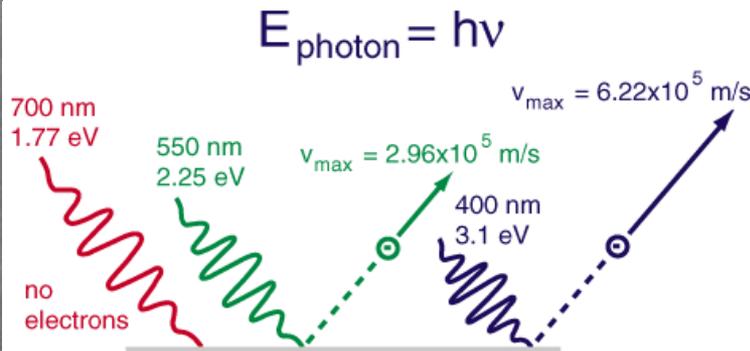
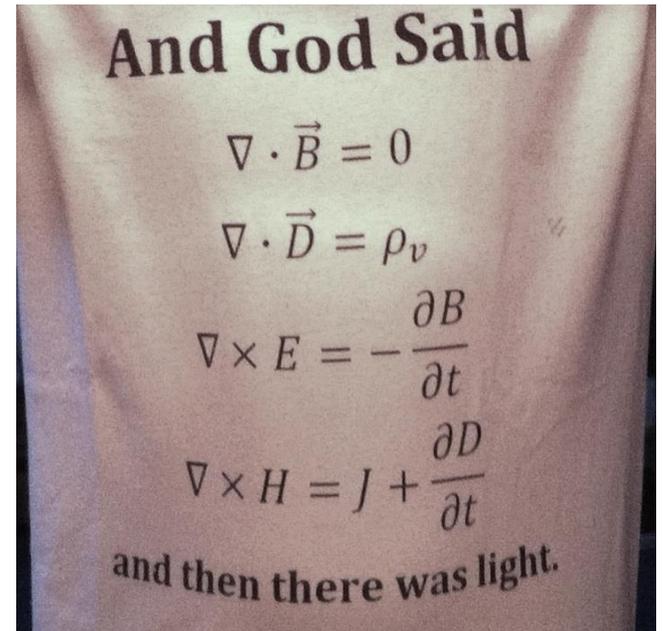


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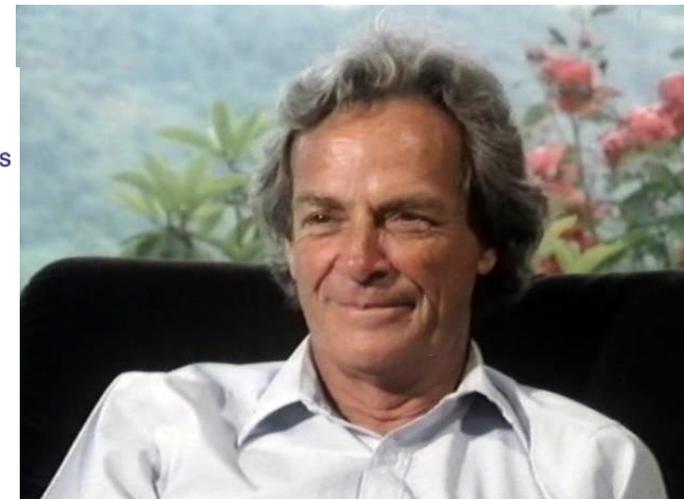
"But I should be very sorry if an interpretation founded on a most conjectural scientific hypothesis were to get fastened to the text in Genesis... The rate of change of scientific hypothesis is naturally much more rapid than that of Biblical interpretations, so that if an interpretation is founded on such an hypothesis, it may help to keep the hypothesis above ground long after it ought to be buried and forgotten."

James Clerk Maxwell



Potassium - 2.0 eV needed to eject electron

Photoelectric effect



Lewis Carol on seeing

He thought he saw an elephant
That practised on a fife:
He looked again, and found it was
A letter from his wife;
“At length I realise” he said,
“The bitterness of life.”





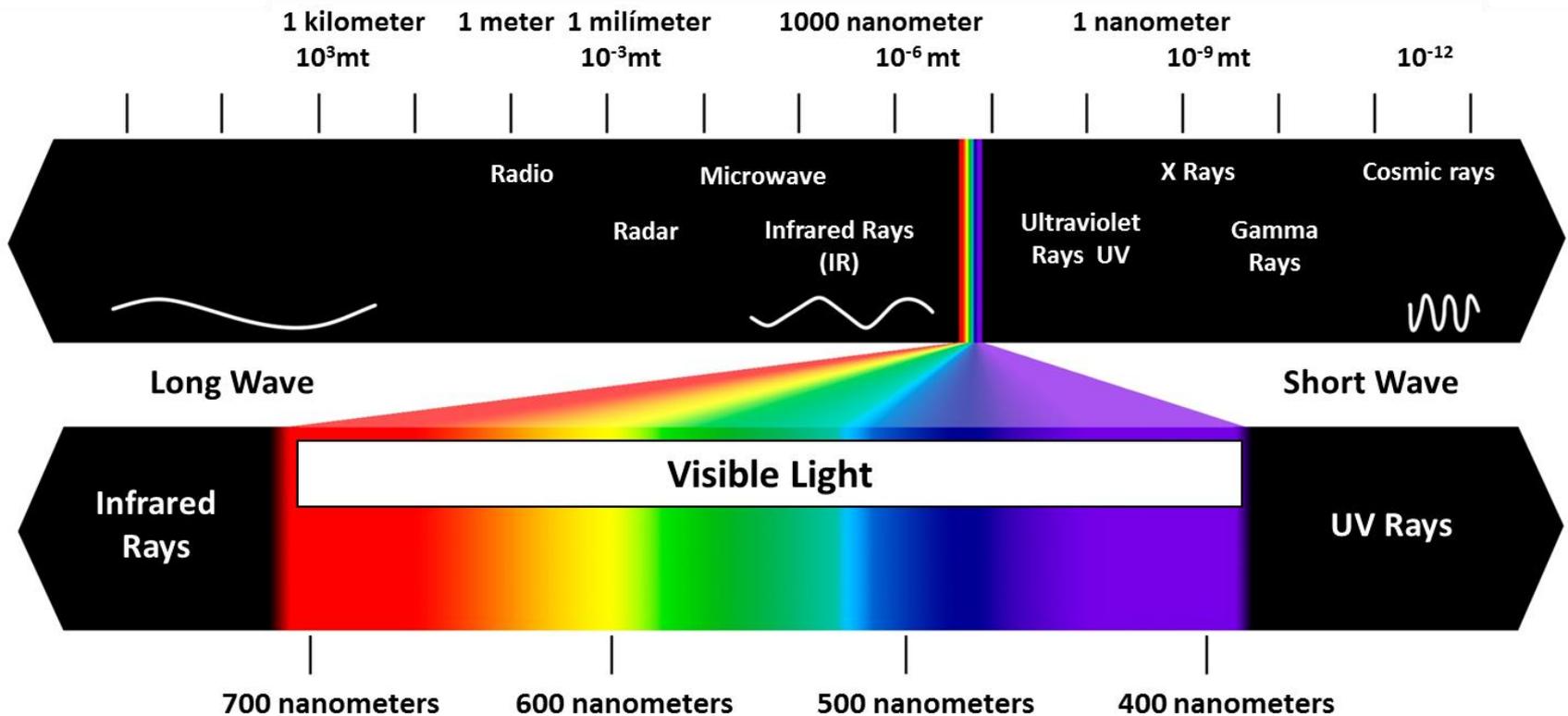
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All is not what it seems!





What do we really see?





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Seeing is believing!

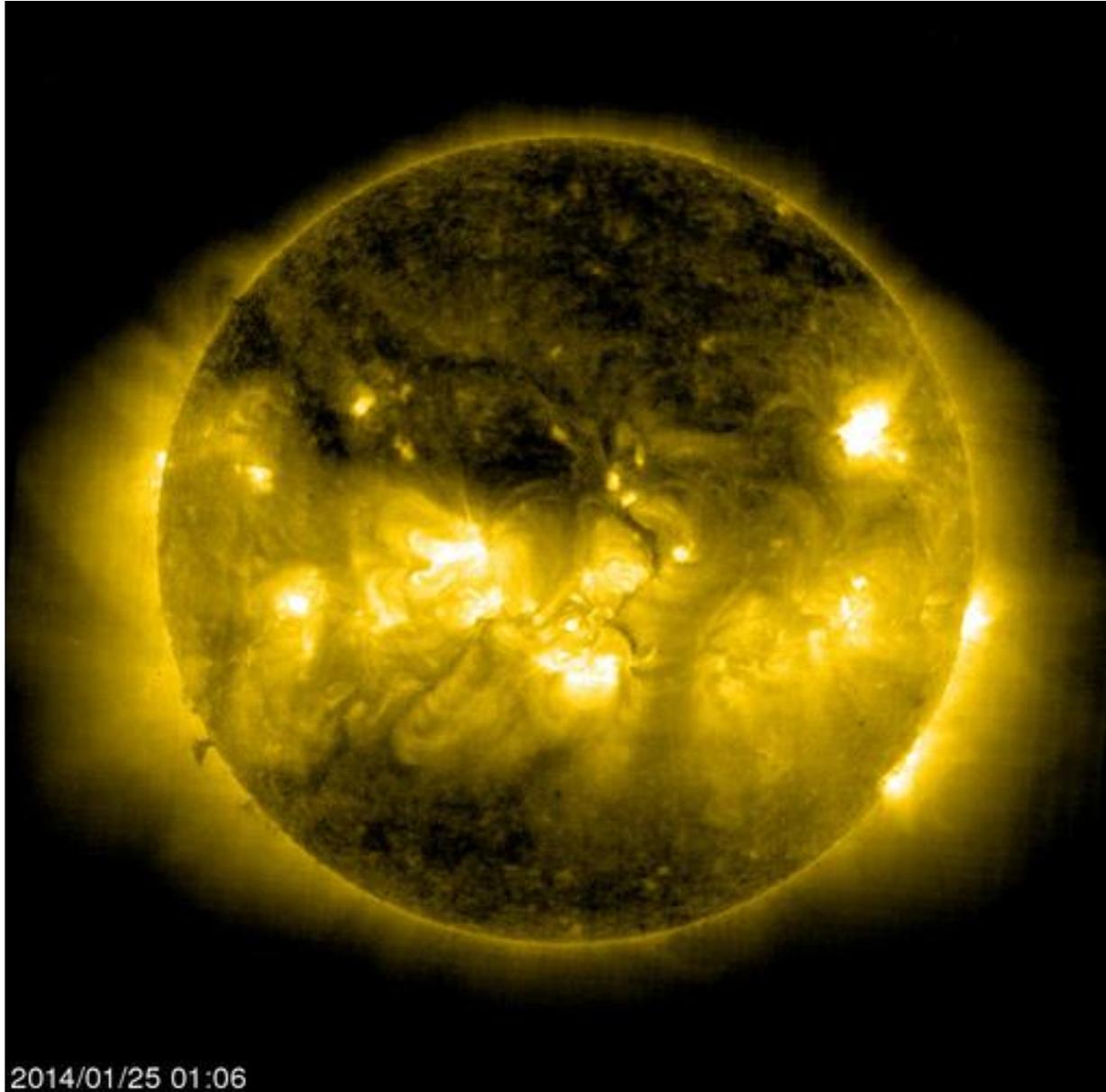


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Soho



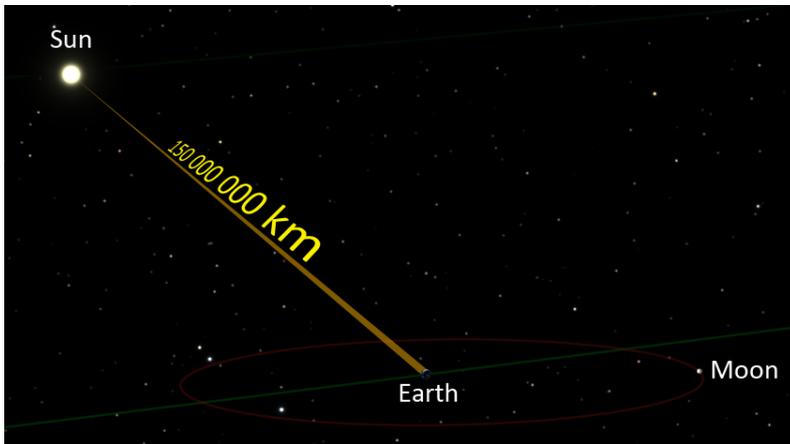
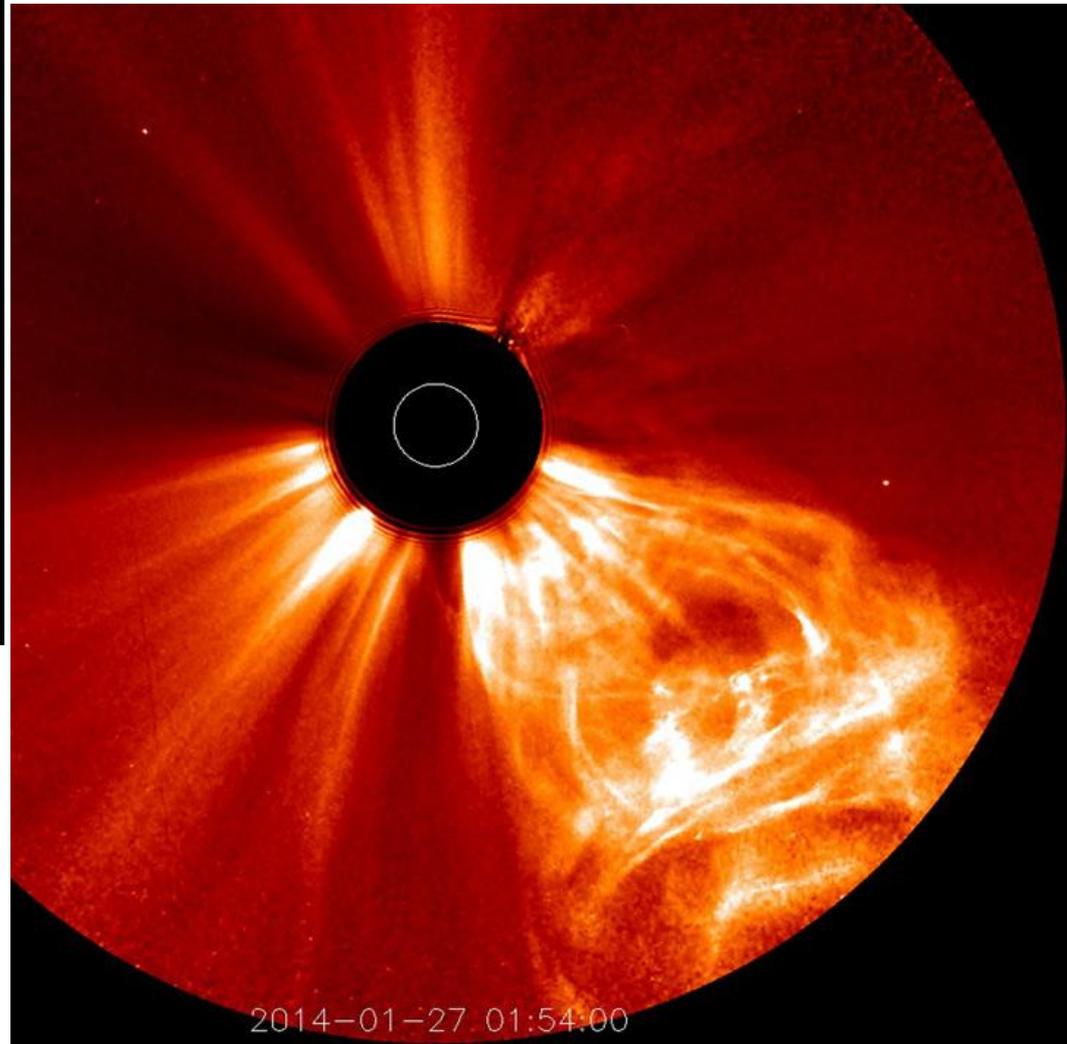
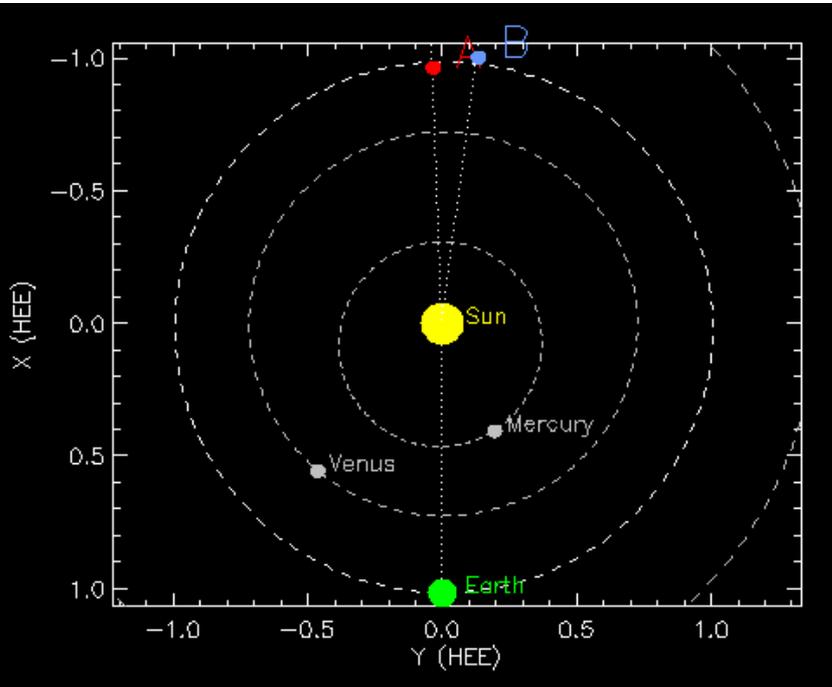
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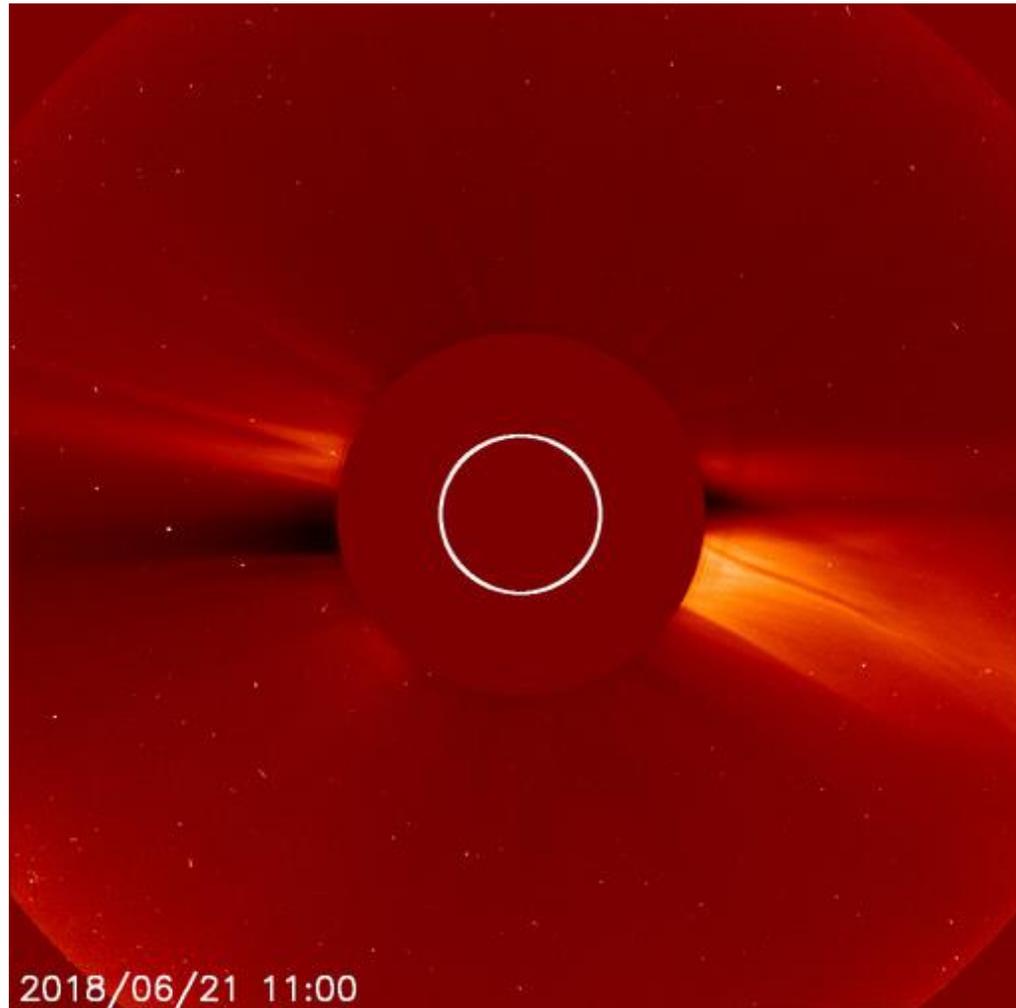
STEREO





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Yesterday at 11.00



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Fertile Ground

- Wisdom and Silence
- Tension
- Remembrance
- Poverty and Passion
- Observe
- Abandonment and dissension
- Time
- Risk
- Creative Space
- Beauty
- Analysis
- Planning



Wisdom - silence

- "Go and tell this people: "Be ever hearing, but never understanding; be ever seeing, but never perceiving.' (Isaiah)
- “Where shall the word be found, where will the word Resound? Not here, there is not enough silence
Not on the sea or on the islands, not
On the mainland, in the desert or the rain land,
For those who walk in darkness
Both in the day time and in the night time
The right time and the right place are not here
No place of grace for those who avoid the face
No time to rejoice for those who walk among noise and deny the voice” (T.S.Eliot, Ash Wednesday)





Tension and dissonance

- "It seems likely that there is another way of dealing with incompatibles and opposites within the mind, provided one is sufficiently robust to stand the tension.; and this is the way adopted by creative people. One characteristic of creative people is just this ability to tolerate dissonance. They see problems that others do not see;; and do not attempt to deny their existence. Ultimately the problem may be solved, and a new whole made out of what was previously incompatible, **but it is the creative person's tolerance of discomfort of dissonance that makes new solutions possible.**" (From "White Msrs" by Brian Aldiss and Roger Penrose).



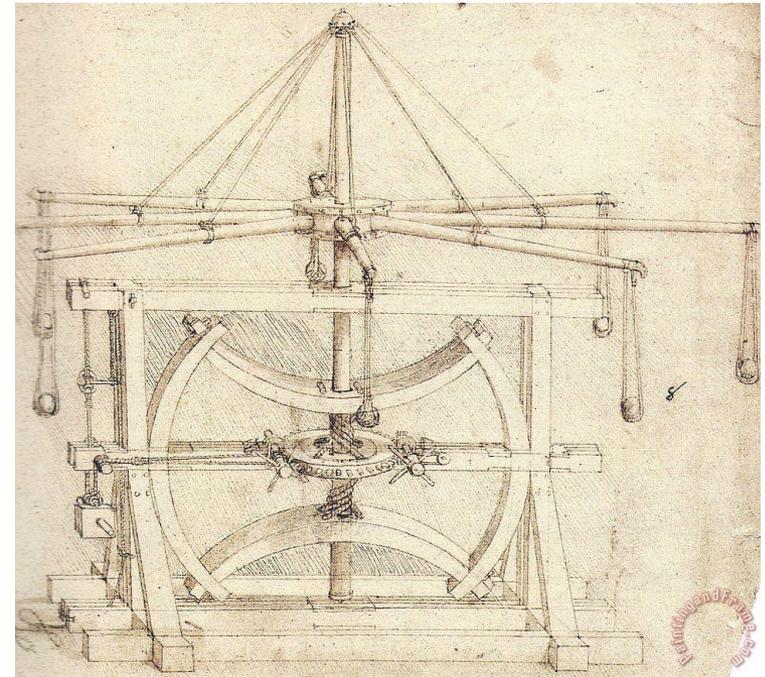


Remembrance and the role of history



If I have seen further than others, it is by standing upon the shoulders of giants.

(Isaac Newton)



Those that fail to learn from history are doomed to repeat it.

- Winston Churchill

Old Weather

Help scientists recover Arctic and worldwide weather observations recorded in ship's logs since the mid-19th century.

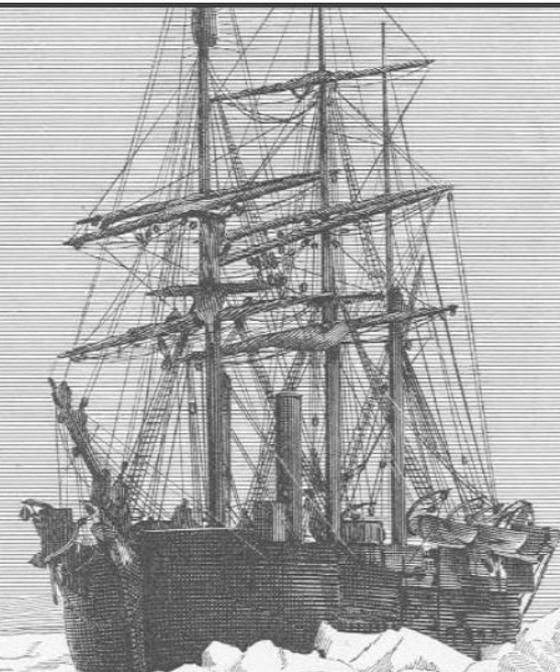
Choose a project and get started:

Old Weather: Whaling

Explore the Arctic of the past from the deck of a whaling ship

Old Weather: Arctic

Rediscover the historic Arctic voyages of the U.S. Navy and Coast Guard



Why Scientists Need You

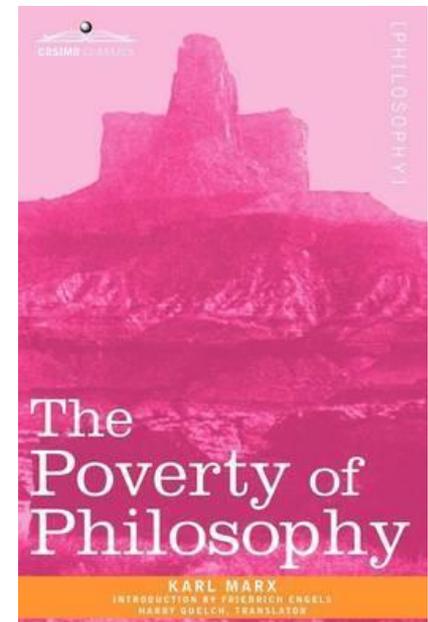
In this video scientists explain why your contributions are vital, and what they're doing with your results behind the scenes.



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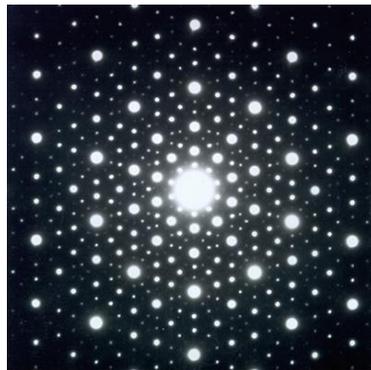
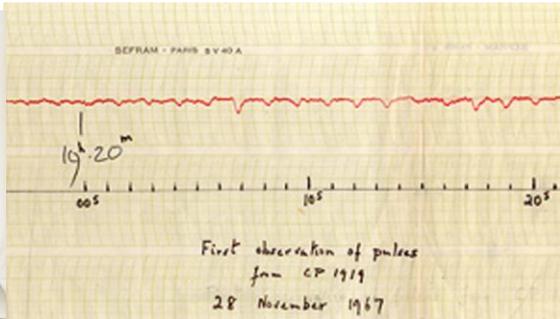
Poverty and Passion

- We've got no **money** so we've got to think
- “Do you believe in what you are doing?”



Observe

- What do you see?
- Radio has the best pictures and blind people are good seers!
- The use of senses and sensors





Abandonment and Dissension



- Holding to views with a tenacity of belief
- Room for honest dissension among colleagues – can be violent
- Intellectual hate
- Avoid herd instinct despite funding priorities
- When to admit defeat (oxide on ss)



Time

- Westerners have watches, Africans have time
- “There is a time for everything and a season fo every activity under the sun.”
(Eccleisates)
- I know what it is if no one asks; but if anyone does, then I cannot explain it.”
(St.Augustine)
- “Time’s handiworks by time are haunted.” (Edwin Muir)





- Chronos: Relentless monotony of the ticking clock
- ” Kaironic time introduces novelty into the banality of linear, chronic time. It is time as “creative advance,” (Whitehead)
- Aionic:unbounded, sacred or eternal time.





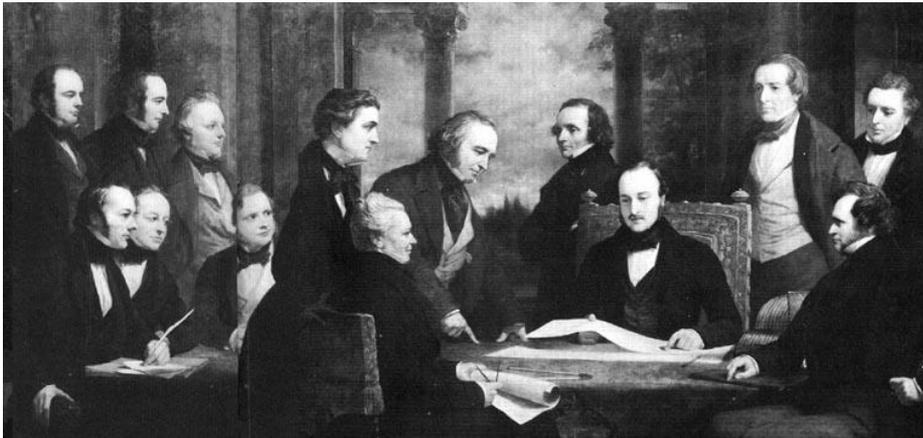
The need for disruptive time

“ A beat poised, a cross grained rhythm,
Interplays, imbrications of voice over voice,
mutinies of living are rocking the steady
state of a theme; these riffs and overlappings
a love of deviance, our genesis in noise.”
(O’Siadhail).



Risk

- Most public funders and universities are risk adverse
- Foundations can take risks – The Royal Commission for the Exhibition of 1851
 - “The fellowship has allowed me to engage in risky research that I probably would not have dared go into if I hadn’t had the position that this grant enabled me to get.”
- **ATTRACT!**



Fiction

- “It is precisely the daring work of fiction to probe beyond settled truth and to walk on the edge of alternatives not yet available to us. It is this probe behind our settlements that makes newness possible.” (Brueggemann)





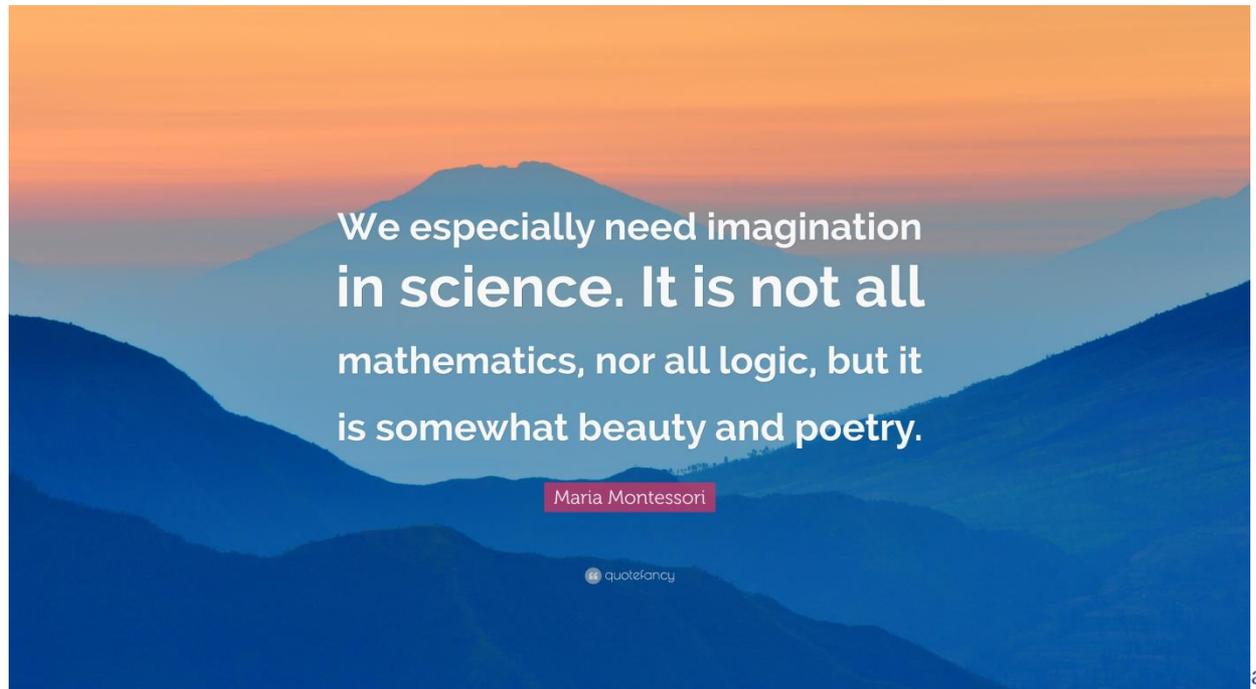
Creative Space

- Look around you!
- Common rooms
- Coffee bars
- Hackathons
- Sandpits
- No straight corridors
- Challenges beyond the individual



Beauty

- *“The laws that we find describe nature somehow have a sense of inevitability about them. There are very few principles and there’s no possible other way they could work once you understand them deeply enough. So that’s what we mean when we say ideas are beautiful.”*
(Nima Arkani-Hamed)





Analysis and Planning

- This is what governments, research funders and industry do
- Supply chain analysis looking for “white spaces”
- Challenge and market need (clean up micro-plastics etc, clean energy for all, water).
- Impact of new standards and regulations (exhaust emissions)
- Financial and tax impacts



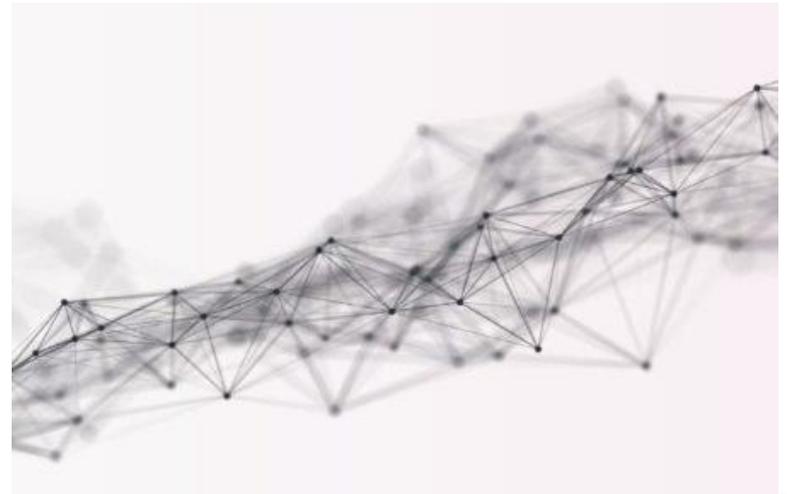


Foresighting and Scenario Planning

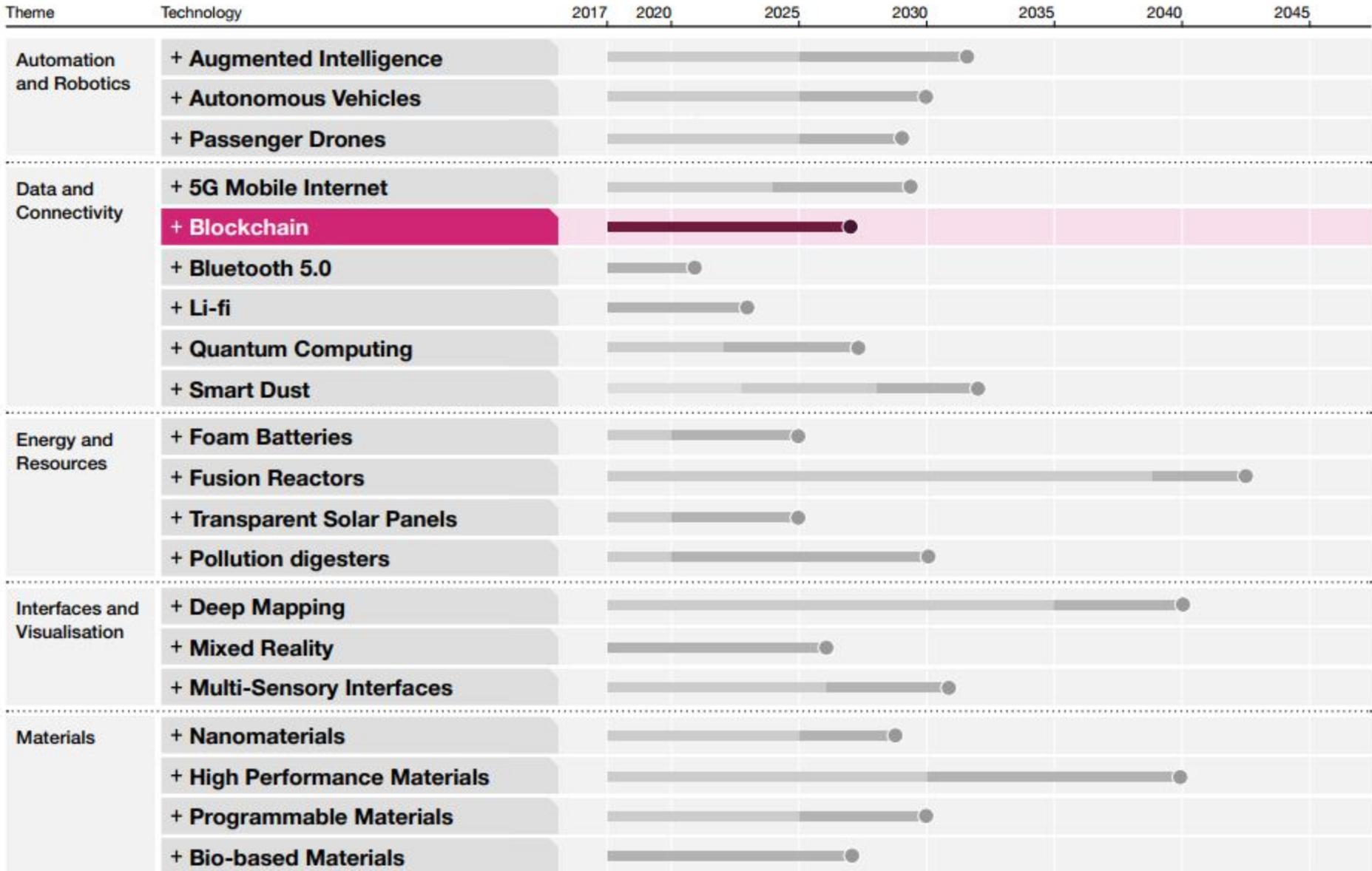
- Impact of AI, remote surgery, data mining, gene engineering, climate change etc.

Arup Technology Timeline 2017

- Interactive pdf which showcases 20 emerging and future technologies with a high disruption potential for the AEC industry.



Technology Readiness Level





Final thought – is anything really new?

Time present and time past

Are both perhaps present in time future,

And time future contained in time past.

If all time is eternally present

All time is unredeemable.

What might have been is an abstraction

Remaining a perpetual possibility

Only in a world of speculation.

What might have been and what has been

Point to one end, which is always present.

(Burnt Norton – T.S.Eliot)

