A New Paradigm for Communicating Astronomy

"It is increasingly likely that big astronomical discoveries will be made by big-science infrastructures in big multi-institutional collaborations, and possibly increasingly in new areas like Multi-Messenger and Time-Domain Astronomy."

"Who knows what kind of new physics will come out of these two up-and-coming areas of astronomy, and this involves tremendous opportunities, but also challenges, for science communicators. At the same time, it is also clear that the **communication needs of our society and its citizens have changed."**

- NSF 2019 Multi-Messenger/Time-Domain Astronomy Summit at STScI

Fig. 1: Participants in the Multi-Messenger/Time-Domain Astronomy Summit. Credit: NOIRLab/NSF/AURA

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Meeting the Informational Needs of the Public

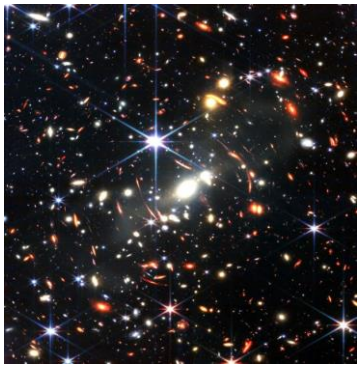
“IT’S THE STORY . . .”

Presidential adviser James Carville

Discoveries are not just about facts and figures, precision, or benchmarks, or who saw what first.

A science writer has to weave a narrative that engages the reader by enticing their **imagination and curiosity.**

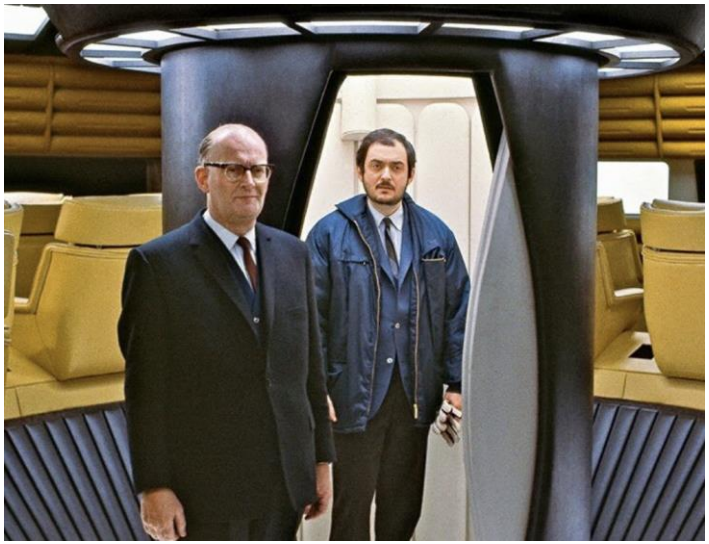
This involves the art of storytelling. The story has to have an element of **challenge, surprise, achievement** – and **emotion.** (Hubble’s popularity comes from a story arc – straight out of a Hollywood sci-fi movie script.)



THE ART OF STORYTELLING

"Arthur C. Clarke could take an inanimate object – like a star, or a world, or even a galaxy – and somehow make it into a very poignant thing, which almost seems alive… He has a way of writing about, you know, mountains and planets and worlds, with the same poignancy that people write about children, or love affairs . . ."

- Filmmaker Stanley Kubrick



How will your story feed people's **curiosity?**

How will the story expand and refine their understanding and appreciation of your research?

What information is the audience **seeking**?

How will the audience **use** the information?

How is the information **salient** to their interests?

Can it be folded into a broad cultural context?

(i.e. reiterating pride in American scientific and technological prowess)

"We are the center of absolutely nothing, a tiny species in a majestic and indifferent universe (Writer/artist Barry Vacker)

Science Communication Strategies

Abandon any preconception of how **you think** your audience should ***think.***

Assume the audience knows very few science concepts.
Science literacy in the U.S. is little under 30 percent of the population.

Consider: How do we tell people things they are not necessarily interested in?
"Why should I care?"
"What have we learned about the universe that we didn't know before?"

How can we best communicate big science ideas without readers feeling that it takes too much effort to understand.

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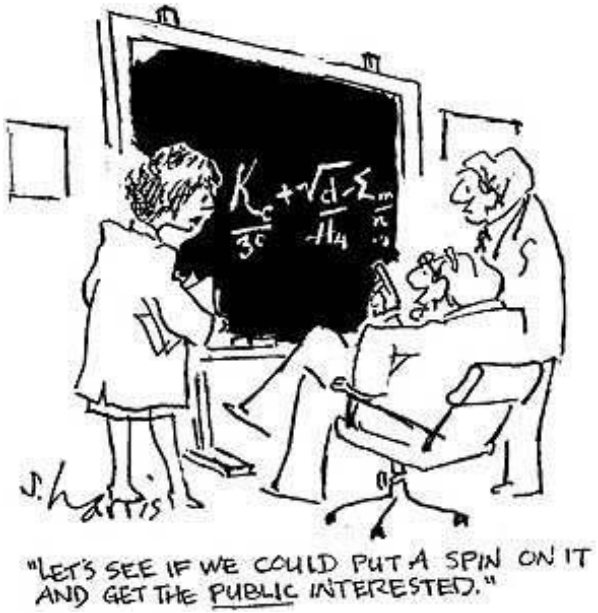
A common desire for precision, nitty-gritty details must be traded off for understandability. Jargon, difficult concepts, esoteric ideas will scare away the lay reader.

Naturally, this seems antithetical to how scientists communicate with their peers in journals.

*"Science has a way of **making heads turn away.** The more complex it gets, the more abstract it becomes. And if you're not constantly putting effort into working out the fine intricacies of it all, you might just get too overwhelmed to commit any interest to it."*

– Science communicator Leonardo Ramos.



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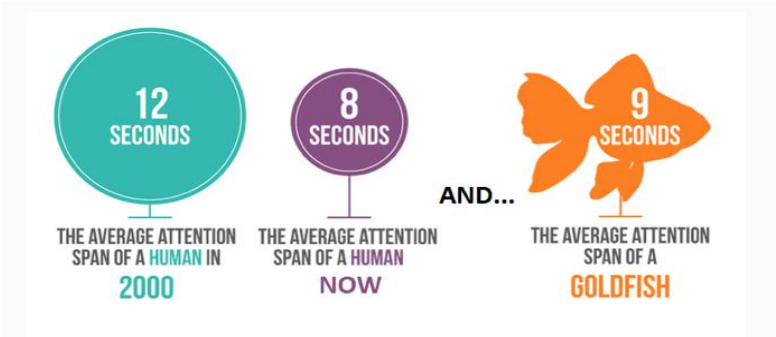
Science information is no longer tightly controlled by a couple dozen seasoned science journalists. Social media presents a smorgasbord of informational sources – from good to terrible.

And, public attention span has shortened. There is tremendous competition for attention on the Internet. Info must be **simple, visual,** invite **curiosity** to be re-tweeted, etc.



-Microsoft

"Americans have access to a wider array of information at lower cost than at any time in human history."

Dr. Jon D. Miller, Director, International Center for the Advancement of Scientific Literacy

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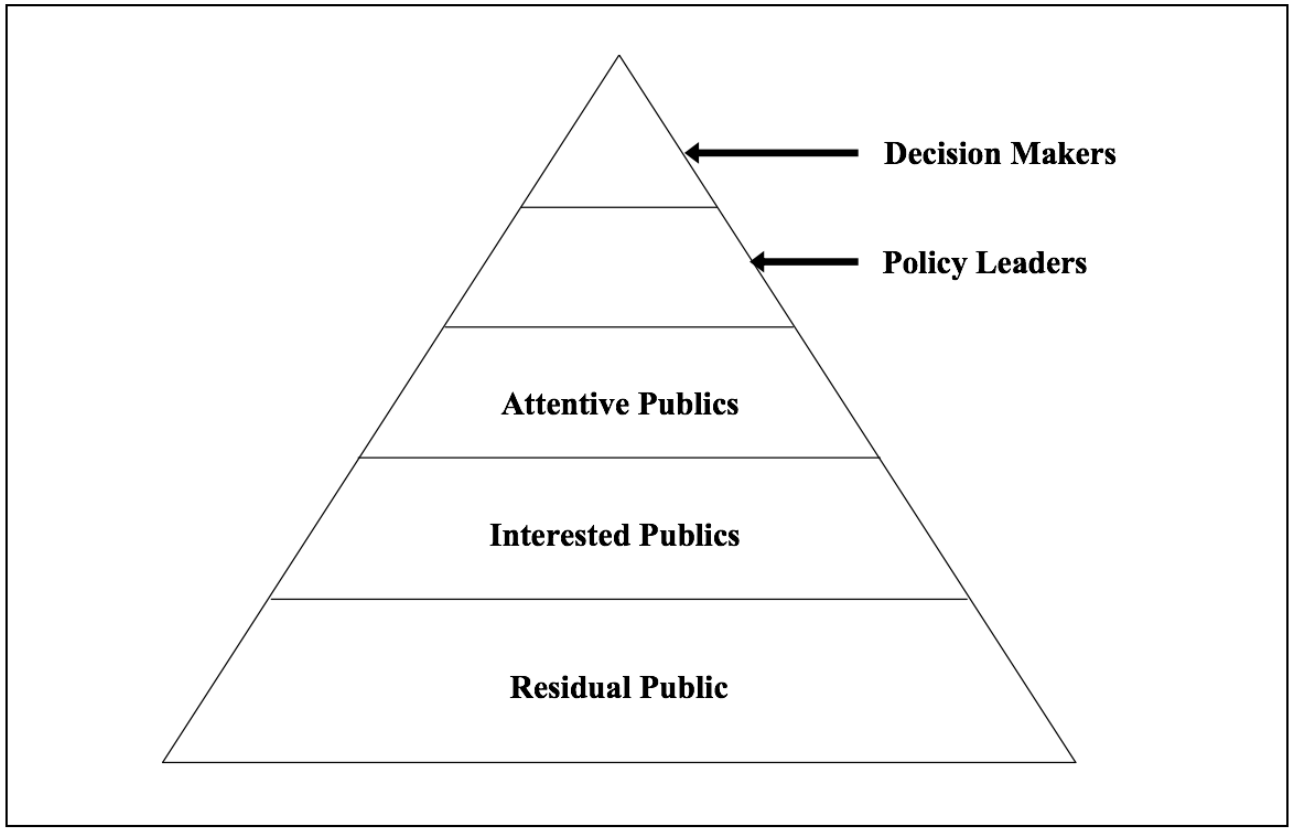


In 2016, **52%** of American adults reported that they were very interested in science and technology issues and **19%** said that they felt very well informed about those issues. Issue attentiveness is defined as the **combination of being very interested in an issue area and feeling very well informed about it**. (*Miller*)

A NEW PARADIGM FOR THE 21ST CENTURY

The Internet has brought about a new system of information acquisition, where individuals seek information when they **need it** or **want it**, in other words, issues that are **salient** to them.

Salience is an individual's determination that an event or object is important to his or **her personal interests and needs**, and they therefore seek a source will provide useful information.

Just one word … "~~Plastics~~" salience

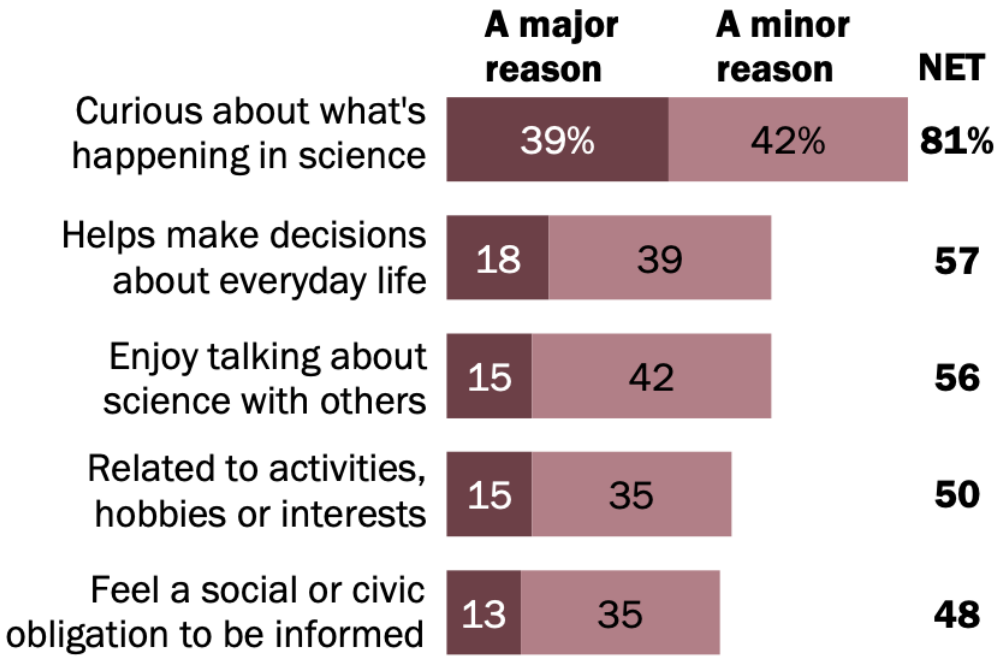
(The Graduate, 1968)

The higher the level of salience, the greater the likelihood that an individual will seek information about a subject. People most likely follow four top issues, not ten.

Salience is also related to the retention, recall, and utilization of information.

Curiosity is most common reason for following science news

% of U.S. adults who say that each is a major or minor reason for why they follow news about science



(*Pew Research Study*)

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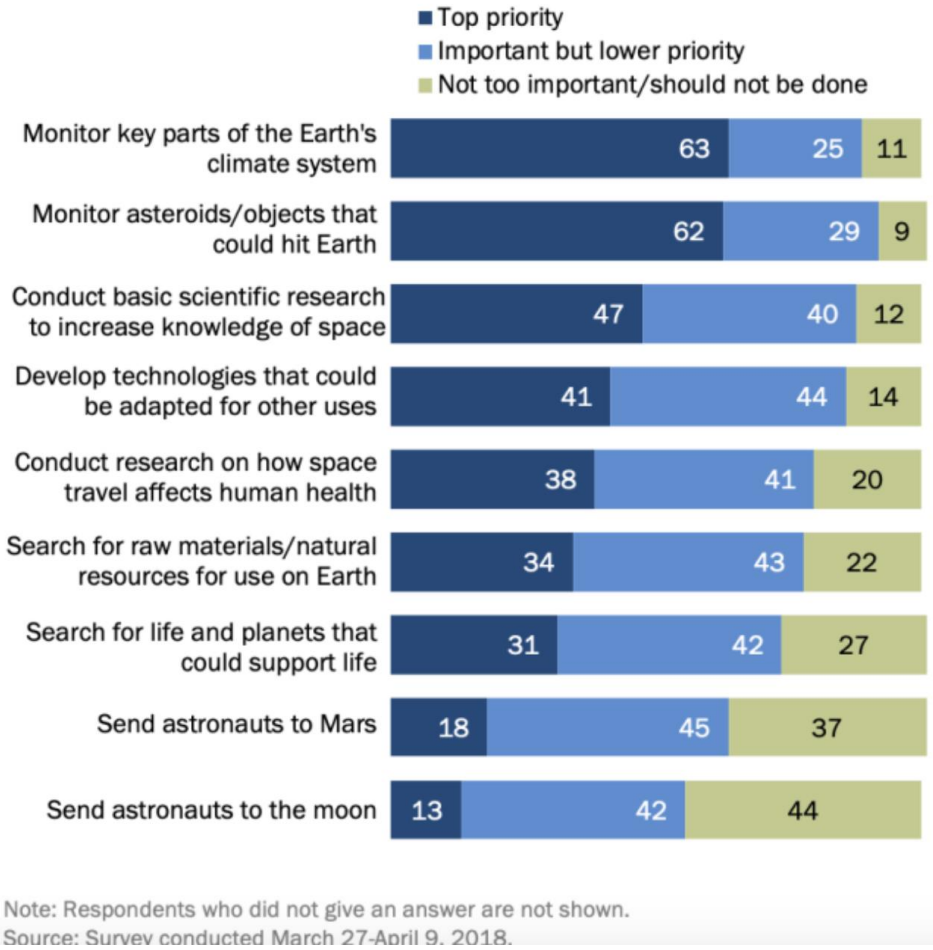
More Americans view monitoring climate or asteroids as top NASA priorities than do so for sending astronauts to the moon or Mars

% of U.S. adults who say each should be a _____ for NASA



Note: Respondents who did not give an answer are not shown.
Source: Survey conducted March 27-April 9, 2018.

For most of human history, the basic model of information acquisition could be characterized with the metaphor of a warehouse.

Through early formal schooling and adult learning experiences, individuals acquired an assortment of basic information which they stored in their mental warehouse, or better yet "the attic." (Only works for Trivial Pursuit game winners)

In contrast, the **just-in-time model** is built on a marketplace metaphor. Individuals have a fixed amount of time (the 24-hour day) and numerous demands competing for that time. And only follow about four issues at any given time.

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Meeting the Informational Needs of the Public

It is much easier for astronomy than any of the other natural sciences to capture the public's imagination.

P**eople can't see quarks, electrons or hadrons**– but everyone at some point in their lives was fascinated by looking up into starry nighttime sky.

Astronomy is a preeminently visual science. And therefore the power of astronomical images **cannot be overestimated,** they open the door to curiosity.

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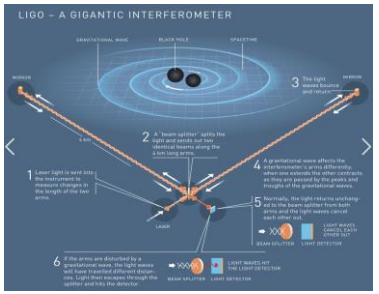
Big Newsworthy Discoveries Without Imaging

Possible Astrobiology on Venus

"This is, needless to say, invigorating news the potential of life on (or around) Venus is the kind of feel-good scientific discovery this year has desperately needed."

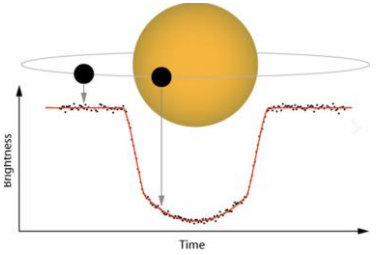
Gravitational wave detection

Wide message, "hear" the collision of neutron stars, etc. a new way to see the universe. Very little understanding of general relativity or the extraordinary precision required, need for multiple observatories etc.,



Kepler Exoplanet Inventory

Received more news coverage than most of the Great Observatories discoveries (*except* Hubble). Small fraction of public understands exoplanet transit photometry)



<u>Public salience *followed* these discoveries</u>

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It is important for leaders of the space community to recognize the wide array of sources from which interested citizens seek space information and to **think creatively** about ways to make those sources more **attractive** and more **functional** for interested citizens

In the Internet Era, interested citizens seek information when they want it or think that it is necessary or important – **Salience**

The rapidly fading broadcast model of communication with centralized editing and production, and structured messaging is largely inoperative today. Individuals and groups with modest resources can create their own video channels on YouTube and **fewer than one in five American adults** watch any network news show

From: *The Public Acquisition of Space Science Information in the 21st Century*
Jon D. Miller, 2022

21st Century Science Communication
Meeting the Informational Needs of the Public

The creation of a sustained increase in the salience of space exploration and science in the American public will take **focused programming and significant resources**.

Discussion about agenda setting must switch to a focus on the creation of interest in space exploration that recognizes the **importance of space activities and research for the lives of citizens today** and for the future of human civilization.

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