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Wisdom to make a difference.

Applying Information Literacy Skills in a Technical Crisis

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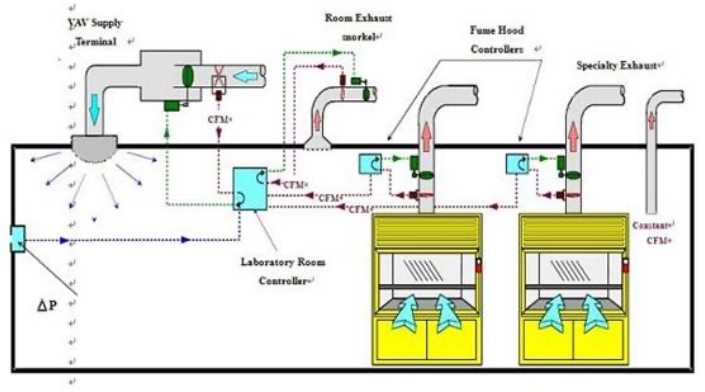
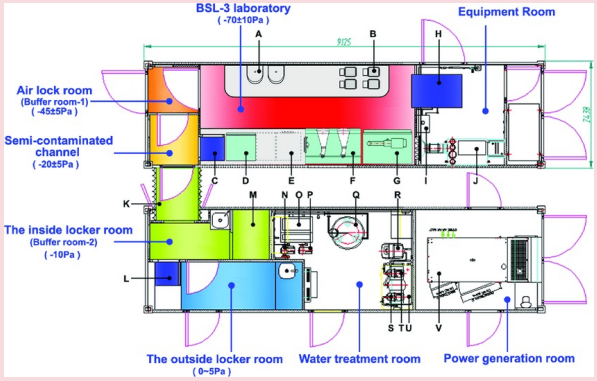
Virtual presentation in CINF seminar on
Information Literacy in the Disinformation Era

Where I'm Coming from

- I worked in environmental chemistry labs at **Cornell** and **UVM** for 5 years, then started the lab safety program at **UVM** in 1985
- In 2011, I went back to **Cornell** to work on lab ventilation for 3 years, lincluding work in both chemistry and BSL-3 labs
- In 2014, I moved to **Keene State** to be Chemical Hygiene Officer at a PUI



Chemical Lab Schematic

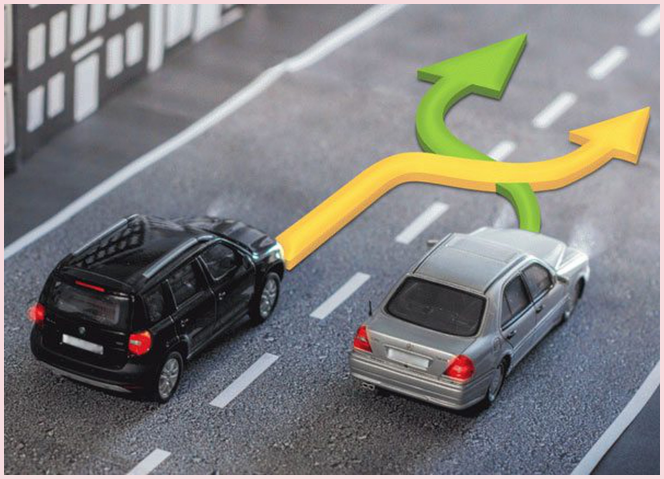


BSL-3 Lab Schematic

The ideas I talk about in this paper are connected to ideas in other papers I am giving at this meeting. The common theme is *safety is a property of an evolving, complex system, not a condition which can be established and then left to run on its own.*

What do I mean by "Technical Crisis"?

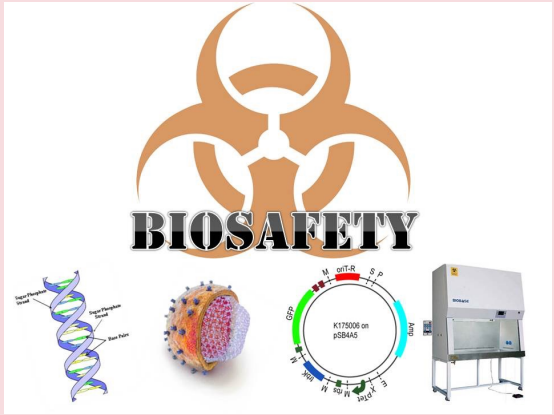
- Crises occur when unrecognized assumptions in standard practices are no longer being met. This creates new risks with low quality (poor fit) information about them.
- In response, many people change technical lanes, often without checking outside the other lane.
- For example, in 2020, Covid broke the assumption that infectious aerosols are rare and can be confined to BSL-3 facilities. This led to applying traditional practices in a new risk situation, so that:
  - PPE production was suddenly inadequate
  - 6 foot of physical distance was no longer found to be adequately protective
  - There was a sudden interest in optimizing ventilation systems, that were not designed to control biological hazards



The Impact of Changing Lanes

- Technical Crises have both scientific and cultural aspects
- These aspects are historically based and can not be changed quickly, but they will evolve as the technical and social environment changes.
- Technical silos are one of these aspects; for example, chemical safety and biosafety have fundamentally different assumptions and cultures. These contrasts became prominent during Covid.
- Understanding these contrasts is part of *risk literacy.*

Industry based tradition



Clinic based tradition

Confusion in the Media about Covid and Ventilation

In the Mainstream Media

- The press has published many stories about the role of ventilation in managing Covid. These stories are often based on numerical models, calibrated with superspreader events, but are not peer reviewed
- *A few* studies include Covid lab data, *none* include field data.

In Professional Discussions

- Professional organizations start with different definitions and make different assumptions; e.g. medical vs engineering approaches to ventilation practices
- Many vendors are proposing novel solutions based on a mixture of technical justification and speculation (UVC, ionizers, air cleaners)

CNBC Story, April 23

HEALTH AND SCIENCE

MIT researchers say time spent indoors increases risk of Covid at 6 feet or 60 feet in new study challenging social distancing policies

PUBLISHED FRI, APR 23 2021·12:15 PM EDT | UPDATED TUE, APR 27 2021·3:34 PM EDT

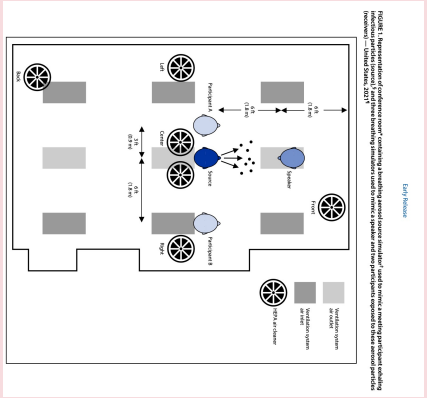
Rich Mendez
@RICHMENDEZCNBC

SHARE

KEY POINTS

- The risk of being exposed to Covid-19 indoors can be as great at 60 feet as it is at 6 feet in a room where the air is mixed.
- Existing safety guidelines have omitted too many factors to accurately quantify the risk of airborne transmission, such as time, mask use and ventilation rates.
- Bazant and Bush question long-held Covid-19 guidelines that recommend 6 feet of distance between people.

MMWR Report, July 2021



Technical Professionals in the Twittersphere

These suggestions don't explain what *"Just do it"* means in an actionable way.

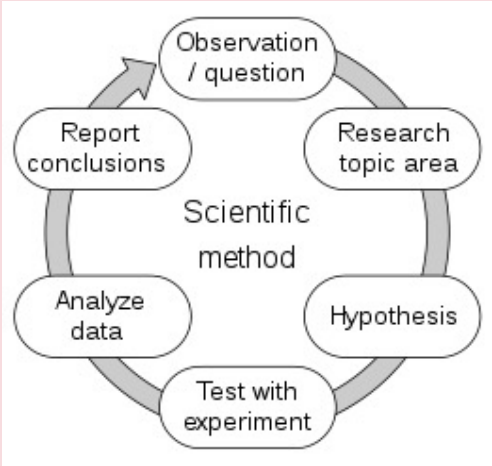
However, these voices help to shape perceptions in the media and on campus

An article Dr. Marr co-authored notes that:

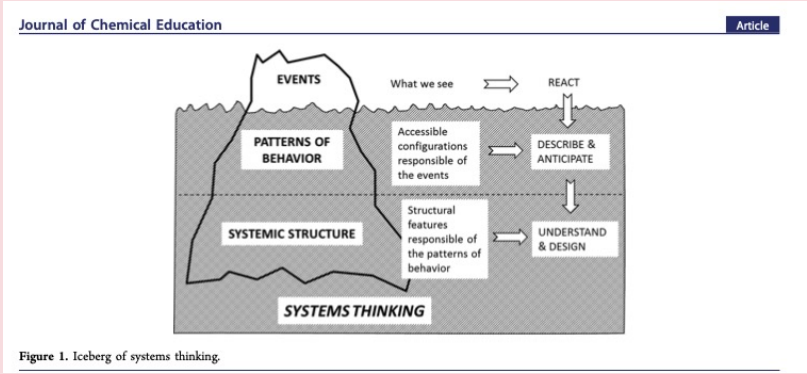
"As of early 2021, no in situ research has evaluated the independent impact of ventilation and air cleaning for reducing the risk of COVID-19 transmission in schools."

“Risk Literacy” exists at the intersection of Internal and Systemic Information Literacy

Internal Information Literacy (peer reviewer questions)	Systemic Information Literacy (citizen reviewer questions)
Does the logic follow the "scientific method"?	Does this information address questions I am interested in?
Does it include references to appropriate literature?	Do the technical observations address the management questions at hand?
Does the data presented support the results?	Do the authors respect our knowledge and their own ignorance?



https://en.wikipedia.org/wiki/Scientific_method



Systems Thinking: Adopting an Energy Perspective as a Tool for Teaching Green Chemistry
Alvise Perosa,*,† Francesco Gonella,*,† and Sofia Spagnolo‡
J. Chem. Educ. 2019, 96, 2784−2793

Information Literacy Advice from the National Academy of Medicine

Models for Evaluation of Source Credibility

- *Clinical Practice Guidelines We Can Trust.*
- The CRAP and/or SIFT Test.
- Health on the Net Foundation Certification.
- MEDLINE and MedlinePlus (National Library of Medicine).
- URAC Certification for Health Content Providers and Health Websites.

** A discussion paper, not a report*

DISCUSSION PAPER

Identifying Credible Sources of Health Information in Social Media: Principles and Attributes

Raynard S. Kington, MD, PhD, MBA, Phillips Academy in Andover; **Stacey Arnesen, MS,** National Library of Medicine; **Wen-Ying Sylvia Chou, PhD, MPH,** National Cancer Institute; **Susan J. Curry, PhD,** The University of Iowa; **David Lazer, PhD,** Northeastern University; and **Antonia M. Villarruel, PhD, RN, FAAN,** University of Pennsylvania

July 16, 2021

ABSTRACT | *Social media is widely used as a source of health information for the general public. The potential for information shared through social media to influence health outcomes necessitates action by social media platforms to enhance access and exposure to high-quality, science-based information. This paper summarizes the work of an independent advisory group convened by the National Academy of Medicine that deliberated and gathered information to develop a set of initial principles and attributes that could inform platforms' identification and possible elevation of credible sources of health information. Using these principles and attributes as a framework, the authors discuss the likelihood of credibility among major categories and types of nonprofit and government organizations that share health information through social media. The authors also emphasize the need for parallel strategies in addition to source evaluation, including assessment of content, as well as important ethical considerations such as the protection of free speech and individual autonomy. The paper also stresses that, in order to be considered credible themselves, social media platforms should share data with behavioral and public health researchers to understand the effects of such policies on both online and offline behaviors.*

Introduction

People seek, share, and receive health information from a wide variety of sources, such as health care professionals, insurance and pharmaceutical companies, family and friends, media, educational materials, advertisements, and the internet—including social media. Increasing numbers of Americans have turned to internet sources for health and medical information in recent years, with approximately three out of four searching for health information online today, and similar rates among Europeans [1,2]. However, both high- and low-quality health information can be found online, and few social media platforms (SMPs) [a] differentiate between credible and non-credible sources of information. Consequentially, consumers must make their own judgments about how much trust to place in a source and the quality of the information it shares. These judgments are influenced by their level of health and digital literacy, prior knowledge, personal situations, and personal beliefs [3].

"Misinformation" is that which conflicts with the best scientific evidence available at the time. "Disinforma-

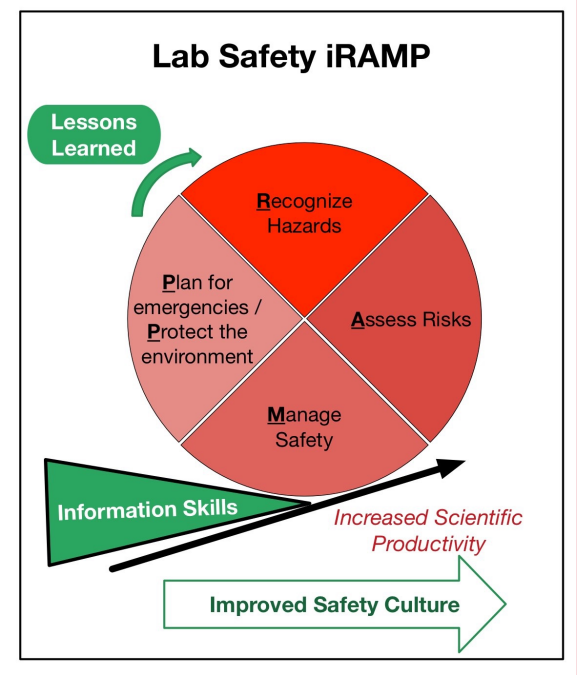
The CRAP Test in a Crisis

CRAP Element	NAM description	Unspoken issues
Currency/ Credibility	How recent is the information? How recently has the website been updated? Is it current enough?	News is speculative; older information has had time for peer discussion and review
Reliability	What kind of information is included in the resource? Is this resource opinion? Is it balanced? Does it provide references?	Do the citations actually say what the article suggests they do?
Authority	What are the author's credentials? Who is the publisher or sponsor?	Are those credentials relevant to the topic at hand?
Purpose/Point of View	Is this fact or opinion? Is the creator/author trying to sell you something?	Does this answer the question I am asking?

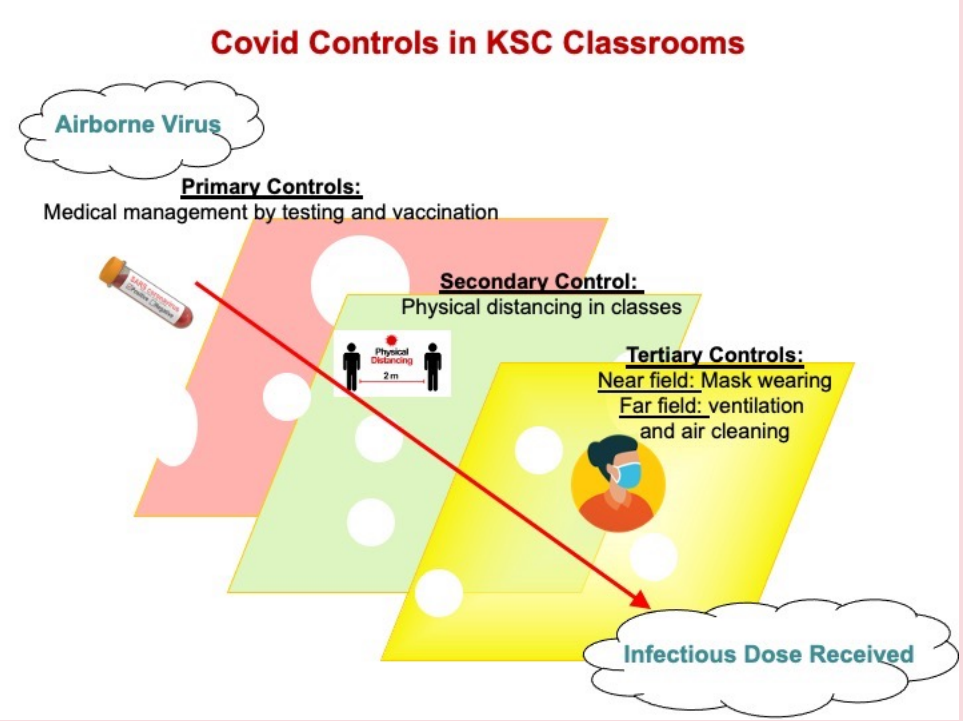
A Risk Literacy Model: An Information RAMP

Recognize the model	What is the physical model that the numbers are based on? What are its strengths and limits?
Assess the data	What is the type of data being used in the discussion? • Speculative physical models • Lab based data • Field trial data • Population data Is this data FAIR?
Management implications	Is the information presented: • transferable • sustainable • scalable • transparent
Prepare for new information	Are the uncertainties described and/or quantified?

This risk literacy model borrows from work in the chemical health and safety community over the last ten years.



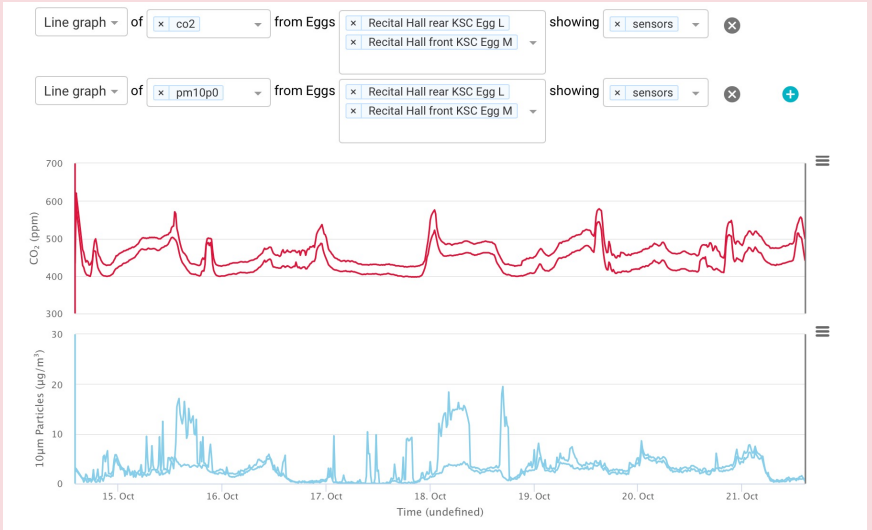
Improving Risk Literacy:
1. Be Aware of the Risk Model You Are Using



- **Primary control**: Testing to screen infected individuals
- **Secondary control:** Physical distancing in classrooms
- **Tertiary controls:** Mask wearing (near field) and ventilation and air cleaning (far field)

Improving Risk Literacy:
2. Use FAIR Data from the Field

Findable
Accessible
Interoperable
Reusable



Improving Risk Literacy: 3. Include Uncertainty

Layer	Estimated impact
1) Medical Interventions: Testing and Vaccinations	• Testing reached 95% of the KSC population and isolation of positives and their contacts was rapid. • Vaccinations are more than 90% effective, but uptake in the population is currently 60%
2) Physical distancing	Hallway observations and CO_2 readings at KSC indicate that physical distancing was appropriate in most classrooms. There are CO_2 concerns in some classes in low ventilated, crowded rooms.
3a) Controlling Near-field exposures: Mask wearing	• Lab research finds that masks are about 65% effective in controlling particles. • KSC mask wearing was about 94%, but some people don't cover noses (7% in April; much higher now).
3b) Controlling far-field exposures: Ventilation and air cleaners	We deployed HEPA air cleaners to poorly ventilated classroom spaces. Initial results indicate that cleaners reduce the time required to return to background particle levels from 1 hour to 30 minutes. Covid transmissions have been reported in less than 15 minutes

4. Acknowledge Outstanding Questions

- Scientific Questions
  - How are these management measures impacted by the emerging variants?
  - What size particles carry infectious materials?
    What does the 2020-21 flu season tell us about our infection control practices last year?
- Practical Questions
  - Do classroom policies transfer to offices, meeting rooms, dorms?
  - How do we value air cleaners, both physically and perception-wise?
  - What are appropriate ongoing monitoring protocols?

Advantages of RAMP

Acknowledging the physical model used as the basis for discussion.

- *All models are wrong (incomplete) but some models are useful (close enough for decision-making)*

Separating the model from the data

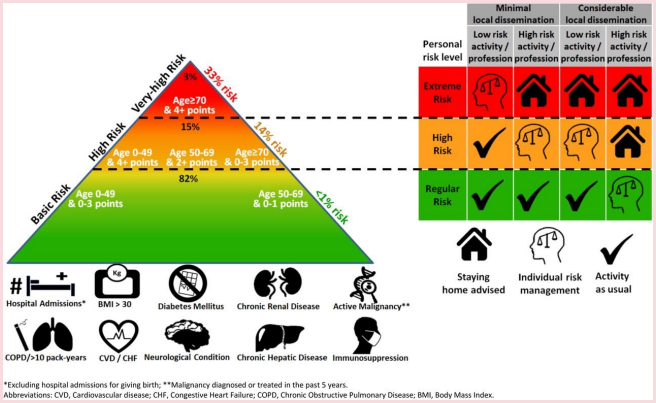
- The model prejudices the data

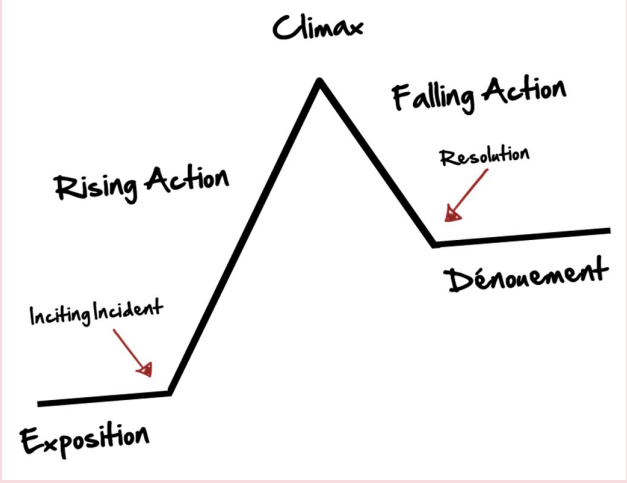
Disconnecting decisions from data

- The NAM paper notes: *even the most credible sources have conflicts, and no organization should be exempt from disclosing them.*

Including uncertainty in the process

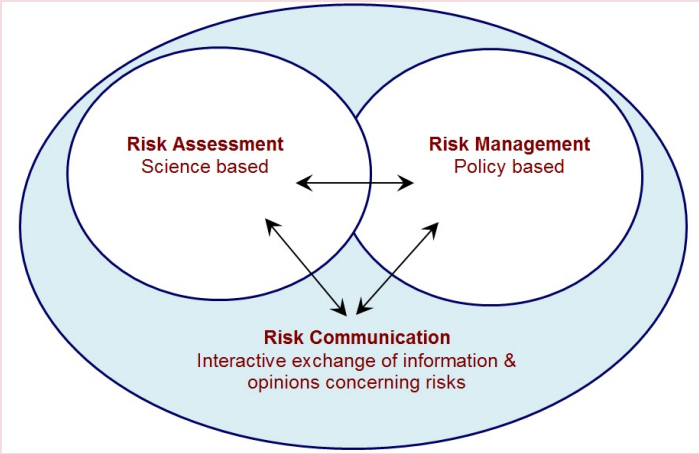
- Uncertainties increase the cognitive load associated with the information.
- The drive for memorable narratives drives information away from uncertainties.





Closing Thoughts

- Risk Literacy involves both technical and cultural considerations
  - Risk education is not well established in general education
  - There is a significant body of research into risk communication; this information is often ignored in crises
- Disciplinary silos can confuse discussions and audiences
- Science takes time; decisions have deadlines



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https://www.youtube.com/watch?v=b1h_yj3zf20