



Timeless and Fearless:
Enduring Lessons
In Engineering Leadership

National Board General Meeting

James R. Chiles

May 6, 2019



INVITING DISASTER

Fearless – not the same
as *Reckless*

Book highlights

Journeys on the Machine Frontier, where little things add up in surprising ways

Steam engines were the first devices on that Frontier

System fractures give warnings in advance

The “Unreasonable Man” standard

The importance of sensemaking in crisis

INVITING DISASTER



Iroquois Theater Fire
(1903)

Outline

1. New Things & Old Things
2. Uniform Standards: Where and Why
3. Inspections and the Dotted Line
4. Critical Thinking, Critical Questions
5. Winding Up

1. Things New and Old

***"... what has been done
will be done again; there
is nothing new under the
sun." Ecclesiastes 1:9***

Human nature doesn't
change

But *technology* does,
and we struggle to
keep pace

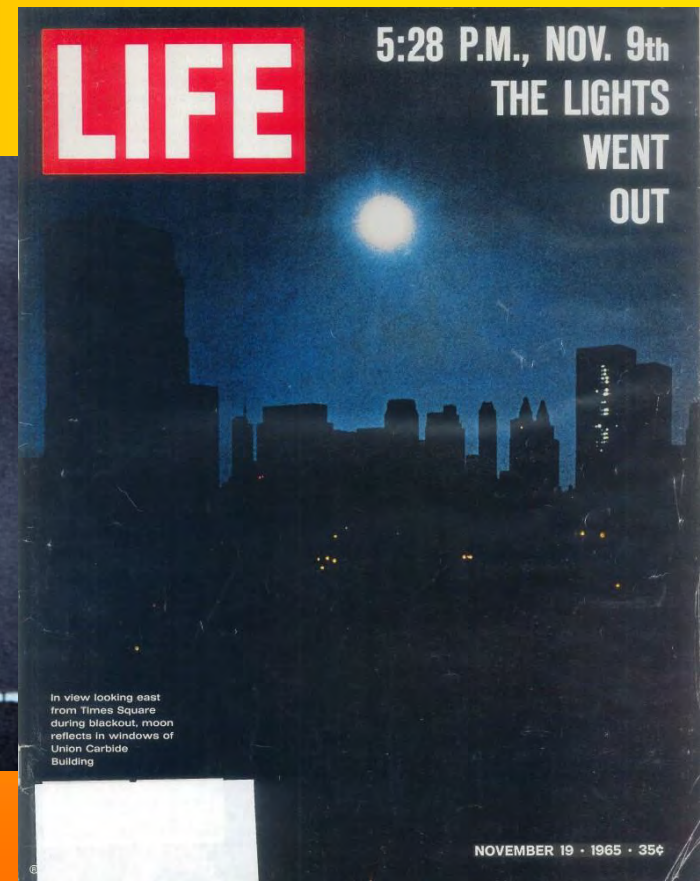
INVITING DISASTER

Inflection Points in techno-history



INVITING DISASTER

Inflection Points in techno-history





**“I had no idea
something like this
could happen”**

*- Dan Ingram, WABC-NY
Disk Jockey*



INVITING DISASTER

Welcome to
Present Shock

Predictions through 2120

- Dept of Defense: We'll be *relocating*, not just replacing, major infrastructure
- Populations shifting on a new scale
- **New levels of automation: “emergent behavior”**
- Media whiplash and loss of trust
- Projects getting bigger and bigger still

INVITING DISASTER



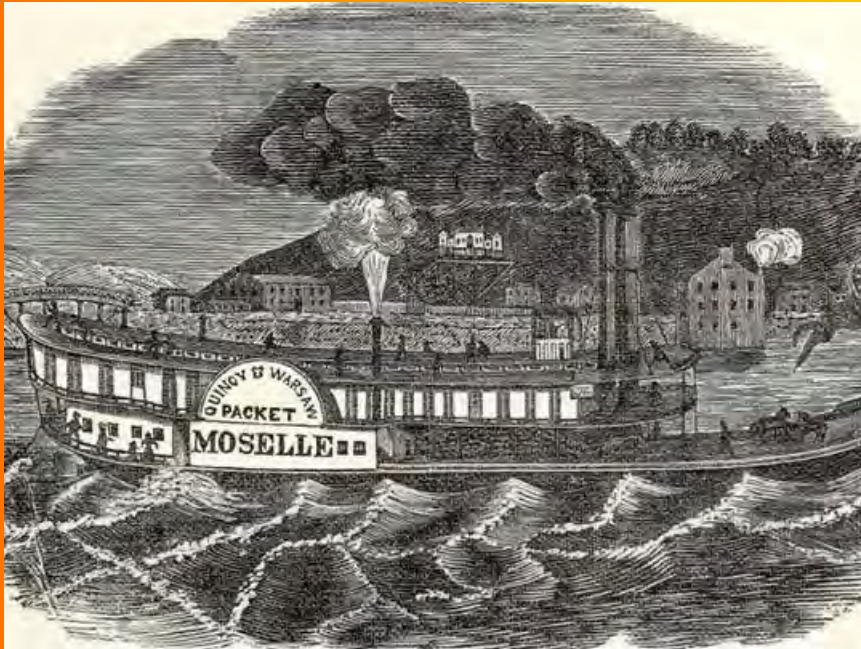
Bingham Canyon Mine, April 2013



2. Uniform Standards: When and Why

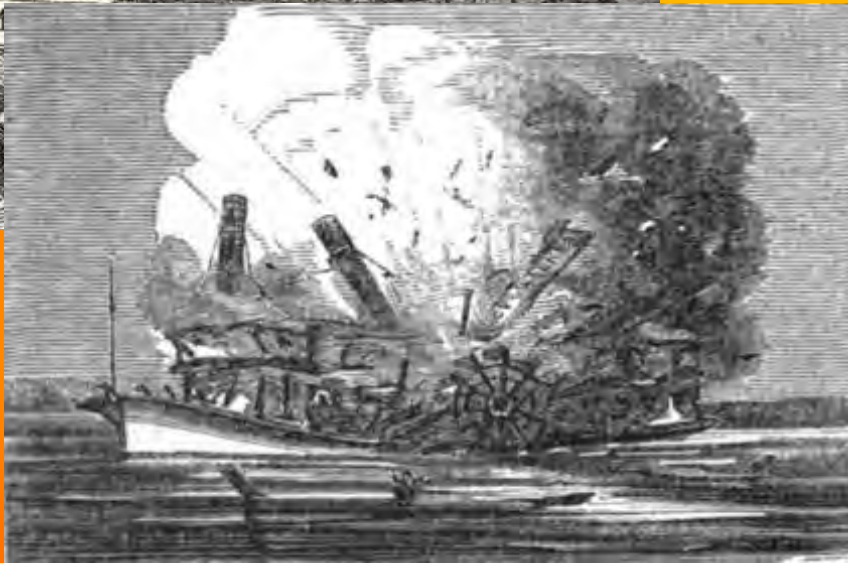
INVITING DISASTER

Steamboat Inspections: 1838-1871



INVITING DISASTER

Steamboat Inspections: 1838-1871



INVITING DISASTER

Steamboat Inspections: 1838-1871



me closed to them the bitter malice of the treason era
to which they had gained the victory. They did not
to forget the anxiety with which they followed the





INVITING DISASTER

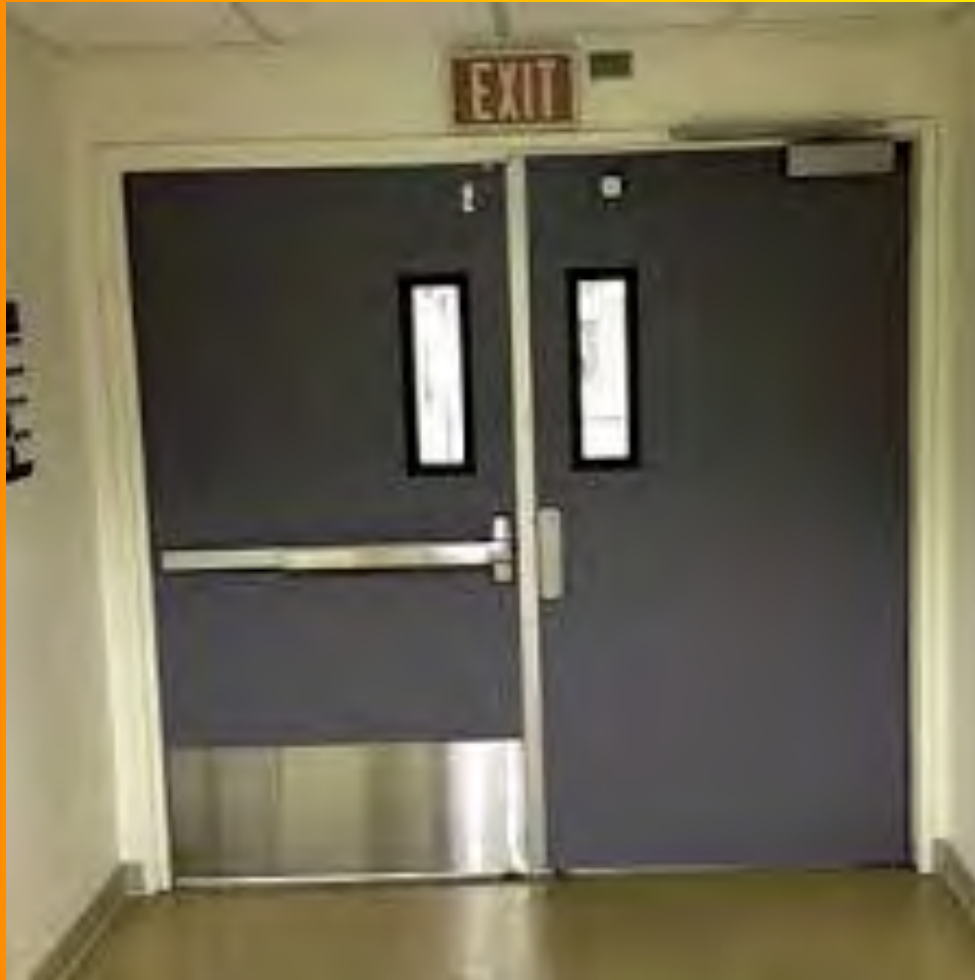
- Rising complexity, efficiency drives, and the “gray wave” all argue for uniformity
- Uneven rules reduce safety between jurisdictions and *inside* them
- But good ideas have to start *somewhere*, and be tested



INVITING DISASTER

**States and Cities are
Little Laboratories**

INVITING DISASTER



The "Panic Bar"



INVITING DISASTER

- These little labs have their place, because there are many more ideas than good ideas: test to find out!
- Progress comes in painful lurches
- Practices vs. Hardware

INVITING DISASTER

Seat belts: 1949-1961-1984



INVITING DISASTER

March 12, 1990:

Route 640, West of Culpeper VA





3. Inspections and the Dotted Line

Rickover's Advice to the Ages

- It's all about accountability
- Can reveal trends and red flags
- Inspectors benefit from mentors, regular gatherings and stories
- Helps with “management of change”



4. Critical Thinking, Critical Questions



INVITING DISASTER

- Getting requests for waivers, or trials?
New approach to manufacturing or contracting?
- Ask questions! Get answers in writing
- What are the objective, measurable benchmarks of success or failure? Get these before approval
- Can learn from safety cases and Technology Readiness Levels (TRL)



5. Winding Up

INVITING DISASTER



"Vivid and dramatic stories."

—*Harvard Business Review*

INVITING **DISASTER**

LESSONS FROM THE EDGE OF TECHNOLOGY



AN INSIDE LOOK AT CATASTROPHES

AND WHY THEY HAPPEN

WITH A NEW INTRODUCTION ON THE COLLAPSE

OF THE WORLD TRADE CENTER TOWERS

JAMES R. CHILES



INVITING DISASTER