

Timeless and Fearless: Enduring Lessons In Engineering Leadership

National Board General Meeting James R. Chiles May 6, 2019



<u>Fearless</u> – not the same as <u>Reckless</u>



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



ITING DISASTER

SEFUL HOLIDAY GIF

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

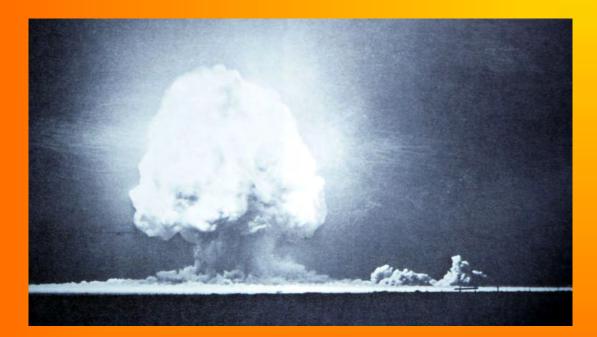


Human nature doesn't change

But <u>technology</u> does, and we struggle to keep pace



Inflection Points in techno-history





Inflection Points in techno-history





"I had no idea something like this could happen"

– Dan Ingram, WABC-NY Disk Jockey



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



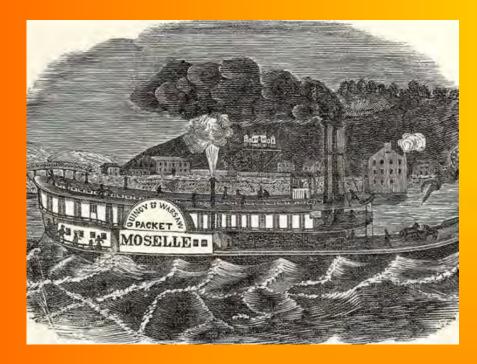


Bingham Canyon Mine, April 2013



2. Uniform Standards: When and Why





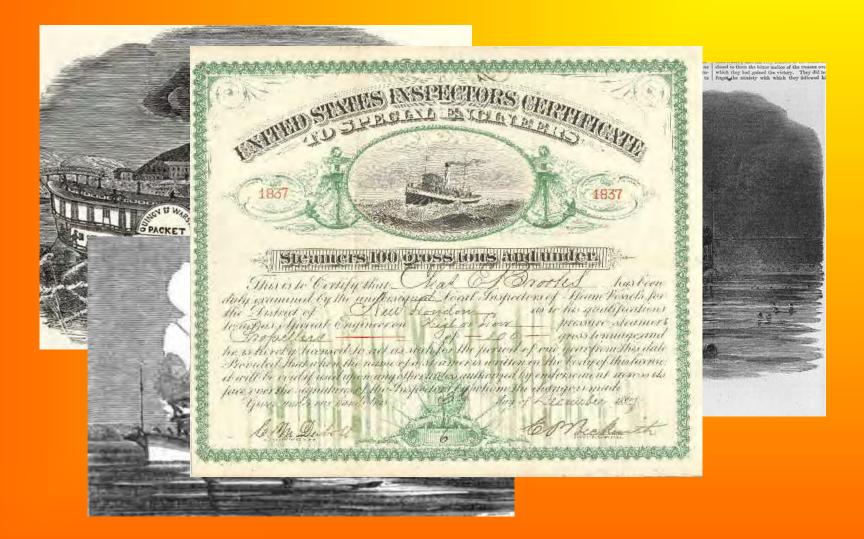




INVITING DISASTER



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



States and Cities are Little Laboratories





The "Panic Bar"



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



Seat belts: 1949-1961-1984





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"

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|---|-------|--------------|----------------|----------------|---|
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| FIDDLER ON THE ROOF CH LEN CONSTANTIN (518) 747-013 | NEAU | 1 31 | WE | EP | 1474204 • Type of Fireplace: Prefab Masonry • No. of Stories: 1 2 3 4 • No. of Fireplaces: 1 • Woodstove: Insert Freestanding Pellet/ • Type of Wood Used: Soft Hard Wet • Insert News News |
| Customer | | | | | Last Cleaned:Year(s) Ago [] Never Number of cords burned per season: |
| Address | | | | | Flue Size: 8"×8" 8"×13" 13"×13" 1 |
| | Zip | - | - | _ | □ 13"×17" □ 6" Round □ 8" Round □ |
| Phone () E-mail | | _ | _ | _ | Outside Chimney Dimensions: " ×" |
| DateTime | | | | | Fireplace Opening Size:" ×" |
| Directions to Home | - | - | _ | - | • How did you hear about us? TV Radio V |
| | - | _ | | | Newspaper Yellow Pages Direct Mail Referral Repeat Customer Other |
| CONDITION REPORT | | Satisfactory | Unsatisfactory | Not Applicable | COMMENTS: |
| | | Sal | 5 | ž | |
| CHIMNEY | | _ | | | |
| 1. Height | 123 | - | - | - | |
| 2. Chimney Cap / Spark Arrestor P au 3. Crown / Wash | | - | - | | |
| 3. Crown / Wash | 胃 | - | - | | |
| 4. Brickwork / Mortar | 昌 | - | - | | and the second second second |
| 5. Flashing 6. Flue Liner | EB | - | - | | CUSTOMER VERIFICATION |
| 7. Moisture Resistance | | - | - | | I have read this form and now understand which areas chimney system appear to be satisfactory and which are |
| | . 88 | - | - | | not satisfactory. |
| A Sample Chamber DOO SHE | | - | - | | Signed Date |
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| 10. Firebox / Grate | 588 | - | | | NEXT SERVICING SCHEDOLED |
| 11. Ash Container | | | | | onattim |
| 12. Spark Screen / Doors | -68 | | | | The National Fire Protection Association Standard states t place and chimney should be inspected yearly for any str |
| 13. Tools / Gloves | - 68 | | | | faults. |
| 14. Hearth Protection | | | | | Chimney Professional's Signature |
| 15. Misc.; | | | | | RECEIPT / INVOICE |
| WOODSTOVE OR FIREPLACE INSERT | | | | | DESCRIPTION PR |
| 16. Stovepipe Condition (woodstove) | | | | | |
| 17. NFPA Approved Flue Connection | | | | | |
| 18. Installation / Thimble / Clearances | | | | | |
| OTHER SAFETY CONSIDERATIONS | | | | | |
| 19. Fire Ext. / Smoke Detectors / CO Alar | ms | | | | |
| 13.THE EAL / SHIOKE DETECTORS / CO Har | | | | | |
| 20. Gas / Oil Furnace Flue Liner | | | 1 | | SUBTOTAL |

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| (518) 747-0135 | | | | Woodstove: I Insert Freestanding Pellet/Co |
| | | | | • Type of Wood Used: Soft Hard Wet D |
| | | | | • Last Cleaned:Year(s) Ago 🔲 Never |
| Customer Address | | - | - | Number of cords burned per season: |
| CityStateZip | | | | Flue Size: 8"×8" 8"×13" 13"×13" 8"> [13"×17" 6"Round 8"Round |
| Phone () | | | _ | Outside Chimney Dimensions:" × |
| E-mail Date Time | | | - | Fireplace Opening Size: * ×* |
| Directions to Home | | - | | How did you hear about us? TV Radio Wel |
| | | | | Newspaper Vellow Pages Direct Mail |
| | 14 | 1 A | ble | Referral Repeat Customer Other |
| CONDITION | tory | Jnsatisfactory | Not Applicable | COMMENTS: |
| REPORT | Satisfactory | satis | t Ap | |
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| 2. Chimney Cap / Spark Arrestor | 3 | | | |
| 3. Crown / Wash | 3_ | _ | | |
| 4. Brickwork / Mortar | | | | |
| 66 6 | 8 | | | |
| 5. Flashing | | | | CUSTOMER VERIFICATION |
| 5. Flashing 6. Flue Liner | | | | |
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| 5. Flashing 6. Flue Liner 7. Moisture Resistance FIREPLACE | | | | I have read this form and now understand which areas of chimney system appear to be satisfactory and which area not satisfactory. |
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| (516) 747-0155 | | | | Voodstove: reestanding Peneoto Type of Wood Used: Soft Hard WetD | | | |
| | | | - | Last Cleaned:Year(s) Ago Never | | | |
| Customer | | | _ | Number of cords burned per season: | | | |
| Address | _ | _ | _ | • Flue Size: 8"×8" 8"×13" 13"×13" 8"× | | | |
| CityStateZip | | _ | _ | Outside Chimney Dimensions: " ×" | | | |
| Phone () E-mail | | | | | | | |
| DateTime | | | | Fireplace Opening Size:" ×" | | | |
| Directions to Home | _ | _ | - | • How did you hear about us? 📋 TV 📋 Radio 🗋 Web | | | |
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| CHIMNEY | > " | ñ D | Z | | | | |
| 1. Height | R | + | | | | | |
| 66 | <u>-</u> | + | - | | | | |
| 2. Chimney Cap / Spark Arrestor 3. Crown / Wash | 83- | + | | | | | |
| 4. Brickwork / Mortar | | + | - | | | | |
| 5. Flashing | 63- | - | | | | | |
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4. Critical Thinking, Critical Questions



- 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





"Vivid and dramatic stories." —Harvard Business Review

INVITING DISASTER LESSONS FROM THE EDGE OF TECHNOLOGY



AN INSIDE LOOK AT CATASTROPHES

AND WHY THEY HAPPEN

JAMES R. CHILE

