Timeless and Fearless: Enduring Lessons in Engineering Leadership

National Board General Meeting

James R. Chiles

May 6, 2019
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
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
Inflection Points in techno-history
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“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
Steamboat Inspections: 1838-1871
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• 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 good ideas: test to find out!

Progress comes in painful lurches

Practices vs. Hardware
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”
INVITING DISASTER

FIDDLER ON THE ROOF CHIMNEY SWEEP
LEN CONSTANTINEAU
(818) 747-0135

Customer:
Address:
City:
Phone:
E-mail:
Date:
Directions to Home:

CONDITION REPORT

CHIMNEY
1. Height
2. Chimney Cap / Spark Arrester
3. Crowns / Wash
4. Brickwork / Mortar
5. Flashing
6. Flue Liner
7. Moisture Resistance

FIREPLACE
8. Smoke Chamber
9. Damper
10. Firebox / Grate
11. Ash Container
12. Spark Screen / Doors
13. Tools / Gloves
14. Hearth Protection
15. Misc.

WOODSTOVE OR FIREPLACE INSERT
16. Stovepipe Condition (woodstove)
17. NFPA Approved Flue Connection
18. Installation / Throttle / Clearances

OTHER SAFETY CONSIDERATIONS
19. Fire Ext. / Smoke Detectors / CO Alarms
20. Gas / Oil Furnace Flue Liner
21. Fire Escape Plan

Type of Fireplace:  □ Prefab  □ Masonry
No. of Stories:  □ 1  □ 2  □ 3  □ 4
No. of Fireplaces:  □ 1  □ 2  □ 3  □ 4
Woodstove:  □ Insert  □ Freestanding  □ Pellet/Com
Type of Wood Used:  □ Soft  □ Hard  □ Wet  □ Dry
Last Cleared:  □ Year(s) Ago  □ Never
Number of cords burned per season:
Flue Size:  □ 8" x 8"  □ 8" x 13"  □ 13" x 13"  □ 13" x 17"  □ 17" Round  □ 8" Round
Outside Chimney Dimensions:  □ x □
Fireplace Opening Size:
How did you hear about us?:  □ TV  □ Radio  □ Website
□ Newspaper  □ Yellow Pages  □ Direct Mail
□ Referral  □ Repeat Customer  □ Other

COMMENTS:

CUSTOMER VERIFICATION
I have read this form and now understand which areas of my chimney system appear to be satisfactory and which areas are not satisfactory.
Signed:  Date:

NEXT SERVICING SCHEDULED
on  at

The National Fire Protection Association Standard states the fireplace and chimney should be inspected yearly for any structural faults.
Chimney Professional’s Signature:

RECEIPT / INVOICE

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
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<tbody>
<tr>
<td>SUBTOTAL</td>
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</tr>
<tr>
<td>TOTAL</td>
<td></td>
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</tbody>
</table>

Date Completed:  

Notes: This shows the result of a visual inspection done at the time of checking. It is not involved as a commitment to our opinions, not as certification of the workmanship or safety. Some conditions of use and hidden construction defects are beyond our control. We make no warranty of the safety or function of any appliance and warn to be implied.
CUSTOMER VERIFICATION

I have read this form and now understand which areas of my chimney system appear to be satisfactory and which areas are not satisfactory.

Signed: ___________________________ Date: ___________________________

NEXT SERVICING SCHEDULED

The National Fire Protection Association Standard states the fireplace and chimney should be inspected yearly for any structural faults.

Chimney Professional’s Signature: ___________________________
CUSTOMER VERIFICATION
I have read this form and now understand which areas of my chimney appear to be satisfactory and which areas are not satisfactory.

Signed: ____________________________ Date: ____________

NEXT SERVICING SCHEDULED
on: ________________________________ at: ____________

The National Fire Protection Association Standard states the fireplace and chimney should be inspected yearly for any structural faults.

Chimney Professional's Signature: ____________________________
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
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LESIONS 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