METANOIA
US Standard Railroad Gauge
(distance between rails) is 4 feet, 8.5 inches
Why?

Because that’s the way they built them in England, and the U.S. railroads were built by English expatriates.
Why did the English build them like that?

Because the first rail lines were built by the same people who built the pre-railroad tramways, and that’s the gauge they used.
Why did they use that gauge?

Because the people who built the tramways used the same jigs and tools that they used to build wagons, which used that wheel spacing.
Why did wagons use that spacing?

Because any other spacing would break the wagons on some of the old, long distance roads. Those roads had spacing from old wheel ruts.
Who built these old rutted roads?

Imperial Rome for the benefit of their legions.
And the ruts?

They were first made by Roman war chariots.
SO WHAT?
World’s Most Advanced Transportation System
Why the Need for a Shift in Thinking?

- Guns/Ammo have greater demands……
  - Robustness Trades
  - More Sensitive “Systems” Influences
  - Real Acquisition Costs
  - Industrial Base Readiness
IT ALL STARTS WITH ENGINEERING!
But Watch Out For Engineering Plagues!
THE THREE BEARS
• Industry should challenge the appropriateness and effects of the specifications

• Government should demand consistent adherence to these requirements
A Definition

technical excellence (te’ni-kəl ek’sə-ləns) n.
Develop a robust design and effectively manufacture the same every time.
Bursting Ammunition Fuze
We Need To Put A Greater Emphasis On Margins of Safety...

i.e. Robustness
Good Engineering Prioritizes Boundary Conditions
Guns & Ammos Are **NOT** Commodities……..

They Are **Systems**
The Integrated Program Team (IPT) Approach is an Ideal “Systems” Solution
Bullets & Bucks

Lemma . . . . . .

A weak financial company will cause extra technical grief.
A Suggestion . . . . . .

The Technical community should take an excursion to the “dark side”

Simply ________

• See if the economics are affecting the technical effectiveness of the product

• Assess the healthiness of the supply chain (industrial base)

▪ Sam Walton would be hyper-ventilating!
Technology As An Enabler

• Look at the World
  - This Ain’t Easy

• Government/Industry Synchronized Plans

• Recruit the Best
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