

TECHNOLOGY EXPLOITATION IN THE RAILROAD INDUSTRY

A **Rail**roadmap for Introducing New
Technologies

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A definition of technology according to Webster: “Technical methods for achieving a practical purpose.”

Technology can come in many flavors.....

1. Can be strategic or tactical
2. Can be evolutionary or revolutionary
3. Can be procedural changes as well as innovations that result in new products, equipment, or tools

BARRIERS TO NEW TECHNOLOGY IMPLEMENTATION (WHY NOT MAINTAIN THE STATUS QUO?)

1. Comfortable with present way of conducting operations
2. Work force is trained in using existing technologies
3. We're producing decent shareholder returns
4. New technologies may be risky, disruptive, and costly
5. Reluctance to compromise relations with agreement personnel

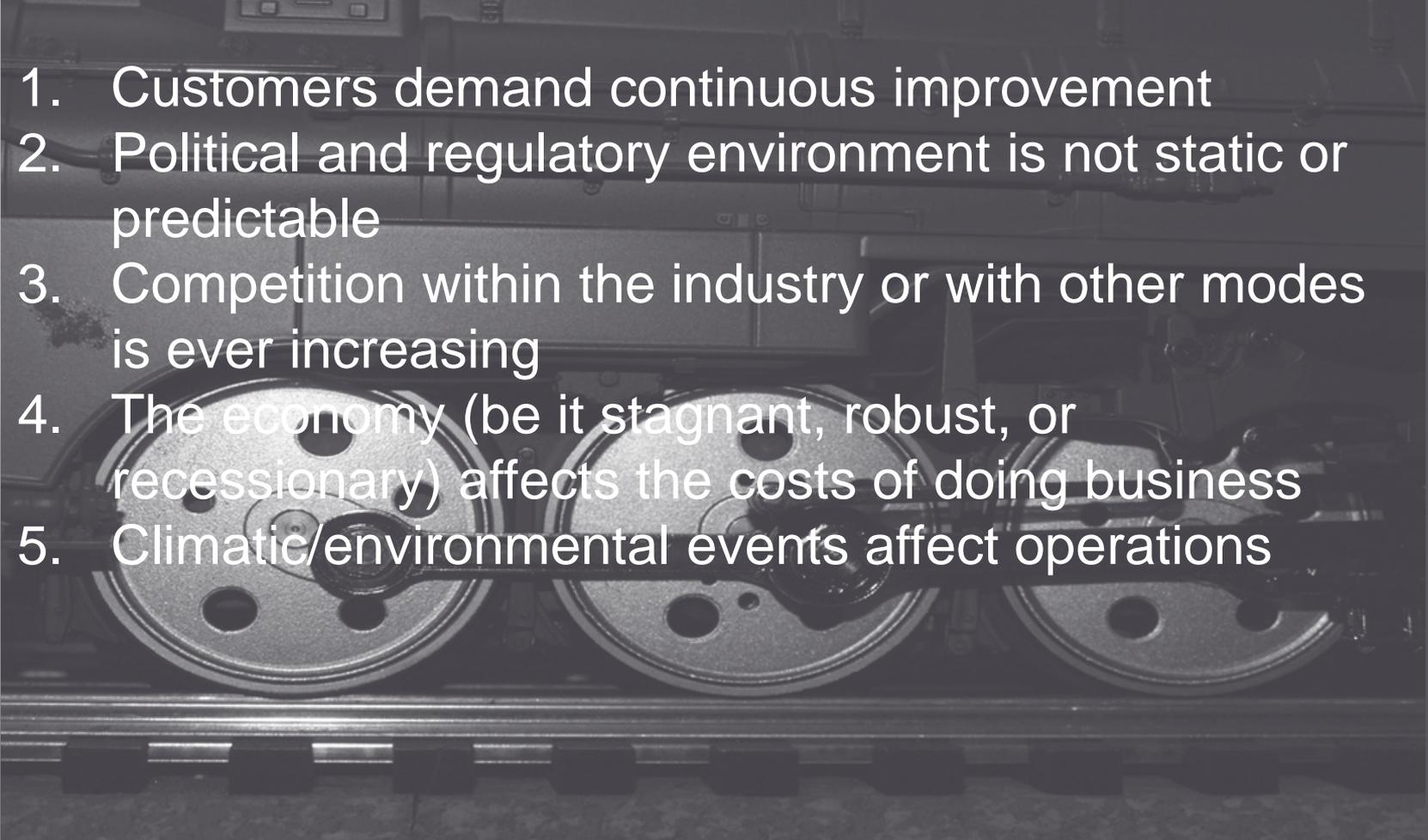
BARRIERS TO NEW TECHNOLOGY IMPLEMENTATION (WHY NOT MAINTAIN THE STATUS QUO?)

6. Our customers and the general public are generally satisfied with our product, rates, or relations
7. We compare favorably with our competitors
8. Regulators are generally tolerant of our safety and environmental performance
9. Private car owners and/or interchange partners may have to be persuaded to accept a change
10. Our conservative culture has served us well

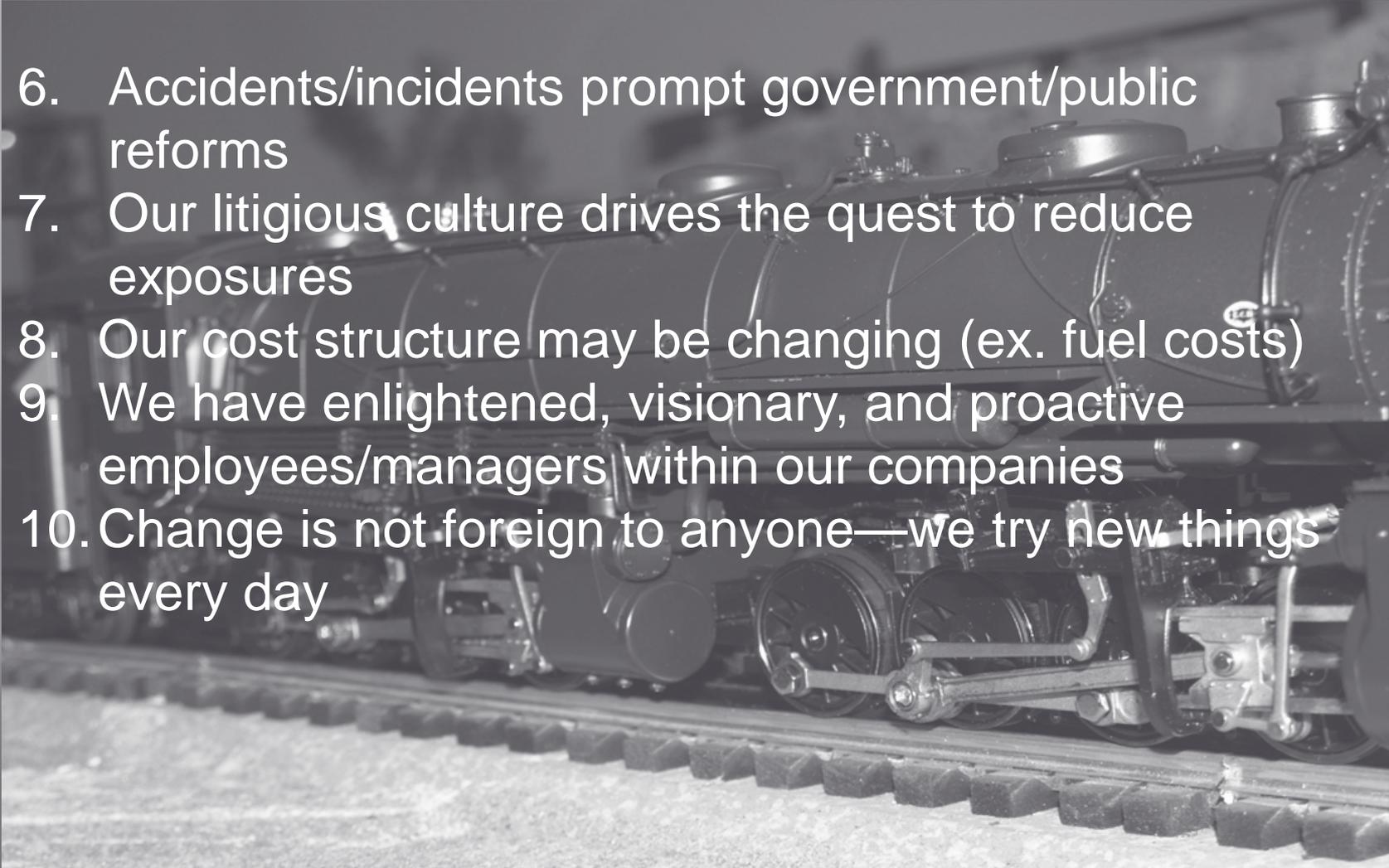
We have most likely heard these and similar thoughts frequently expressed throughout all levels of our companies, and we in this room have likely uttered similar concerns.

However, we don't need to look hard for examples where complacency has resulted in the eventual and inevitable train wreck.

Conversely, there are many DRIVERS FOR CHANGE

1. Customers demand continuous improvement
 2. Political and regulatory environment is not static or predictable
 3. Competition within the industry or with other modes is ever increasing
 4. The economy (be it stagnant, robust, or recessionary) affects the costs of doing business
 5. Climatic/environmental events affect operations
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MORE DRIVERS FOR CHANGE

6. Accidents/incidents prompt government/public reforms
 7. Our litigious culture drives the quest to reduce exposures
 8. Our cost structure may be changing (ex. fuel costs)
 9. We have enlightened, visionary, and proactive employees/managers within our companies
 10. Change is not foreign to anyone—we try new things every day
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These factors and many others should prompt companies to constantly question what they need to do to remain relevant to their many constituencies.

But what are the strategies for doing this?

SOME FUNDAMENTALS FOR DRIVING CHANGE

1. Develop and sustain a proactive culture that encourages and embraces change
2. Incent the workforce to become and remain energetic and enthusiastic
3. Acquire relevant metrics and track performance for self-assessment
4. Diagnose performance via data analyses
5. Develop the means for harvesting ideas from both management and labor, and ensure that these are seriously vetted

SOME FUNDAMENTALS FOR DRIVING CHANGE

6. Establish links to other incubators of technologies/methods that can be exploited to address identified performance issues
 - Attend/participate in forums such as this one, IHHA, TTCI Research Review, International Wheelset Congress, AREMA, ASME-RIG, etc.
 - Review technical journals and materials such as NASA Tech Briefs and many others
7. Consider how seemingly unrelated technologies can be leveraged to address a performance issue
8. Consider proposed concepts from past years

SOME FUNDAMENTALS FOR DRIVING CHANGE

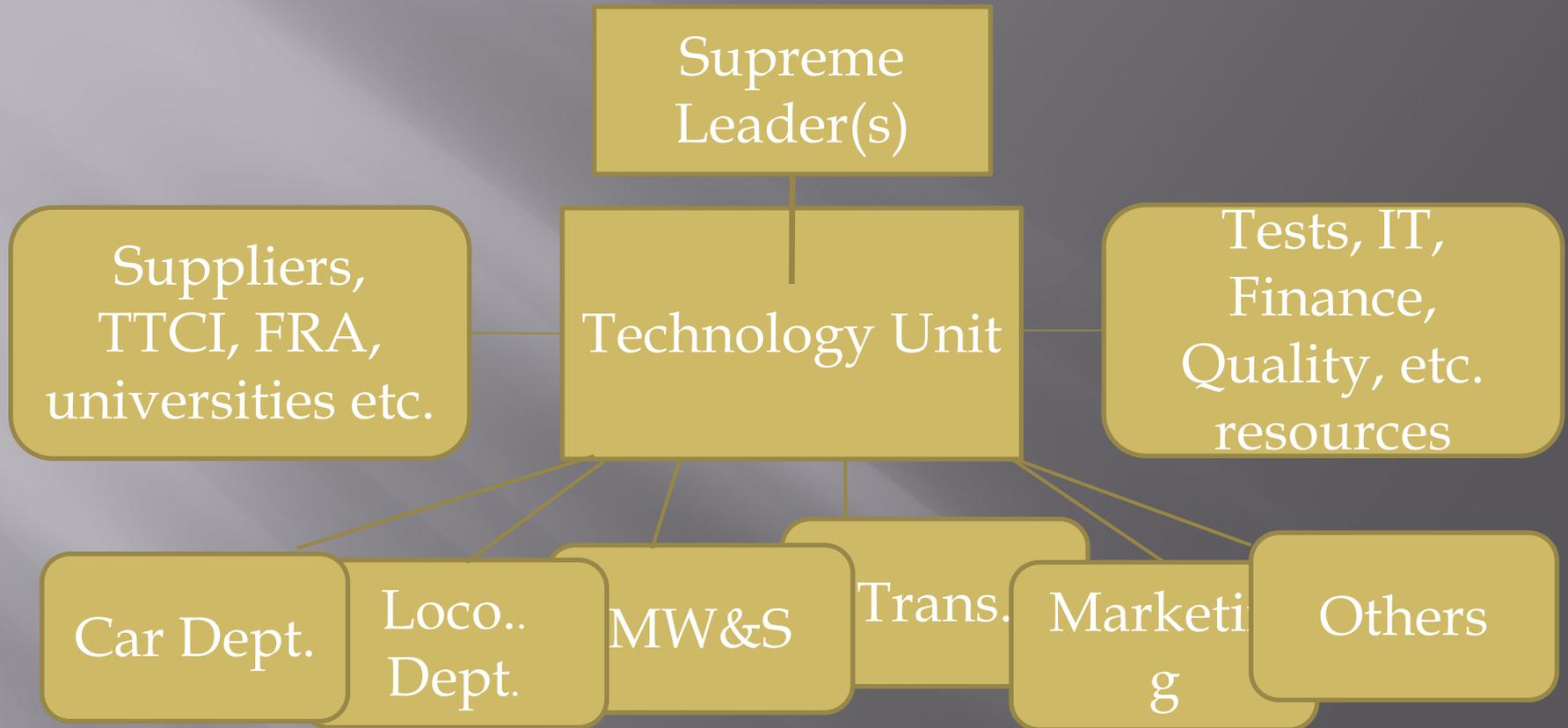
9. Ensure that IT, Finance, Law, and other relevant resources are available on an as-needed basis to minimize excessive delays
10. Ensure that funding is available to expedite technology evaluation and implementation
 - Don't overlook FRA, DOE, etc. grant opportunities
11. Seek partnerships as required
 - Suppliers, universities, inventors, TTCI, FRA Office of R&D
12. Protect IP as necessary to ensure that the company may capitalize on a potential competitive advantage

A PROPOSED TECHNOLOGY MANAGEMENT ORGANIZATION STRUCTURE

Companies have developed many strategies for managing technologies—all are fine if frequent and relevant improvements are being realized

- Some have adopted a “splintered” or decentralized approach wherein the various departments are responsible for their technological improvements
 - This is likely ideal for tactical changes within a department
- Others have adopted a more integrated or centralized approach
 - This is probably best for progressing strategic projects

AN ALTERNATE APPROACH IS PROPOSED...



SENIOR MANAGEMENT FUNCTION

- ❑ Develop and sustain a culture for change
- ❑ Set relevant goals
- ❑ Ensure that adequate funding and other resources are available for evaluating and implementing technologies
- ❑ Address internal and external barriers to technology implementation
- ❑ Defuse internal arguments over who pays and who benefits—everyone works for the good of the company rather than just a department
- ❑ Ensure that department heads are on board

SENIOR MANAGEMENT FUNCTION

- ❑ Ensure that projects do not lag and are completed in accordance with established schedules
- ❑ Schedule meetings with the Technology Unit and other stakeholders to review progress and results, identify barriers
- ❑ Decide whether to proceed with implementation based on credible results and analyses
- ❑ Ensure that the pipeline is filled with opportunities
- ❑ Incent employees for presenting opportunities and implementing technologies

SENIOR MANAGEMENT FUNCTION

- ❑ Accept risk and possibility of failure
- ❑ Establish priorities
- ❑ Recognize accomplishments, but always demand more

DEPARTMENT FUNCTIONS

- ❑ Designate technology associate(s) to spearhead departmental technology implementation efforts
- ❑ Acquire relevant performance metrics to assess opportunities
- ❑ Solicit ideas from supervisors and labor
- ❑ Have scheduled meetings to review ideas, metrics, and trial results from which recommendations are developed
- ❑ Present potential opportunities to the Technology Unit for further consideration
- ❑ Perform relevant testing or trials as necessary

TECHNOLOGY UNIT FUNCTION

- ❑ Spearheads technology evaluation and implementation and is not distracted with activities that compete for time and resources
- ❑ Is comprised of engineers/scientists of varied disciplines
- ❑ Reports to senior level management or CEO
- ❑ Has hooks to other departments (especially in Operations and Marketing divisions)
- ❑ Coordinates with technology associate(s) in other departments for vetting of submitted ideas
- ❑ Reviews results of tests/trials, and evaluates economic viability with assistance of Finance, Quality, etc.

TECHNOLOGY UNIT FUNCTION

- ❑ Seeks out new technologies that may be implemented or leveraged (technology scanning)
- ❑ Establishes the feasibility of technology implementation
- ❑ Presents the case to senior management
 - Economic review
 - Required resources
 - Expected overall impact
 - Risks (pros and cons)
 - Recommendations

BENEFITS

- ❑ Structure can nurture both tactical and strategic initiatives
- ❑ Everyone is involved
- ❑ Technology Unit has a “global” perspective and can communicate technology applications in one department to another to address similar issues
- ❑ A department’s concerns about budgeting for technologies that result in benefits that it does not directly benefit from should be minimized
- ❑ Complex strategic technology implementation should be facilitated

TECHNOLOGY IMPLEMENTATION EXAMPLES

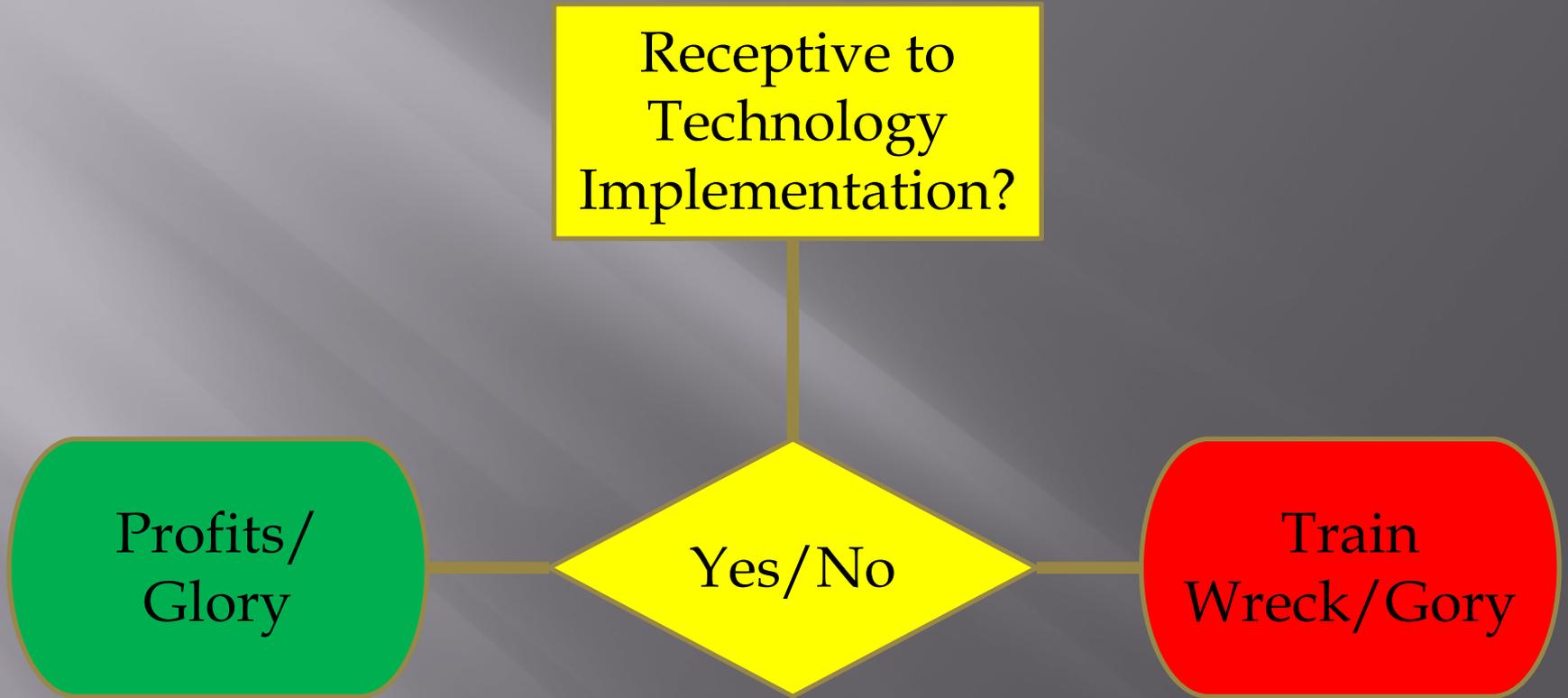
- ❑ Cameras on locomotives
- ❑ LEADER®
- ❑ Top of Rail Friction Modification
- ❑ Electronically controlled pneumatic brakes

Receptive to
Technology
Implementation?

Profits/
Glory

Yes/No

Train
Wreck/Gory



THANK YOU!