



# **Enterprise Thinking & InThinking:** ***Better Thinking for a Better Future***

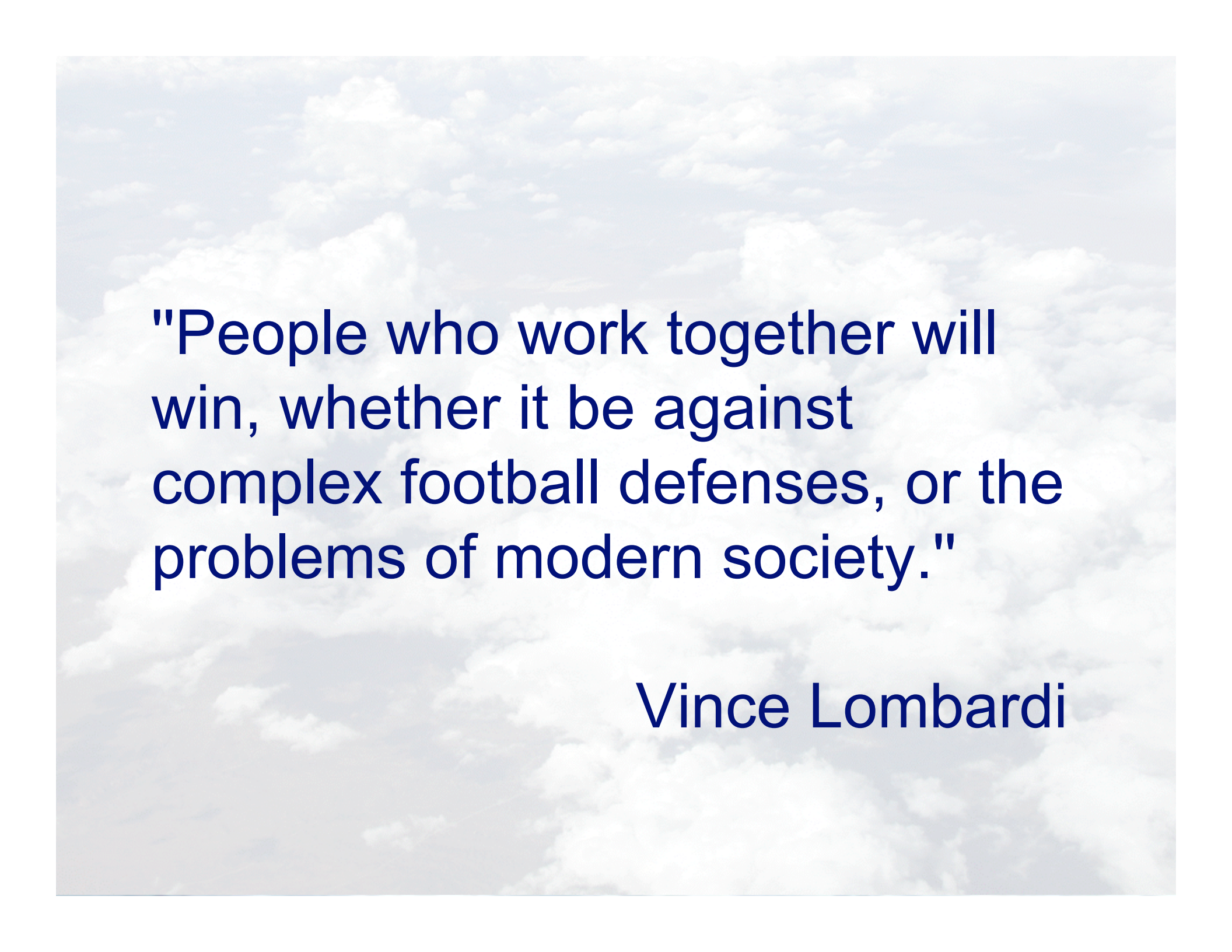
*Presented by*  
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"People who work together will win, whether it be against complex football defenses, or the problems of modern society."

Vince Lombardi



“The significant problems we face cannot be solved at the same level of thinking we were at when we created them.”

Albert Einstein



# Counting Straws





# New Cuyama, California





# New Cuyama, California





# Perception & Thinking

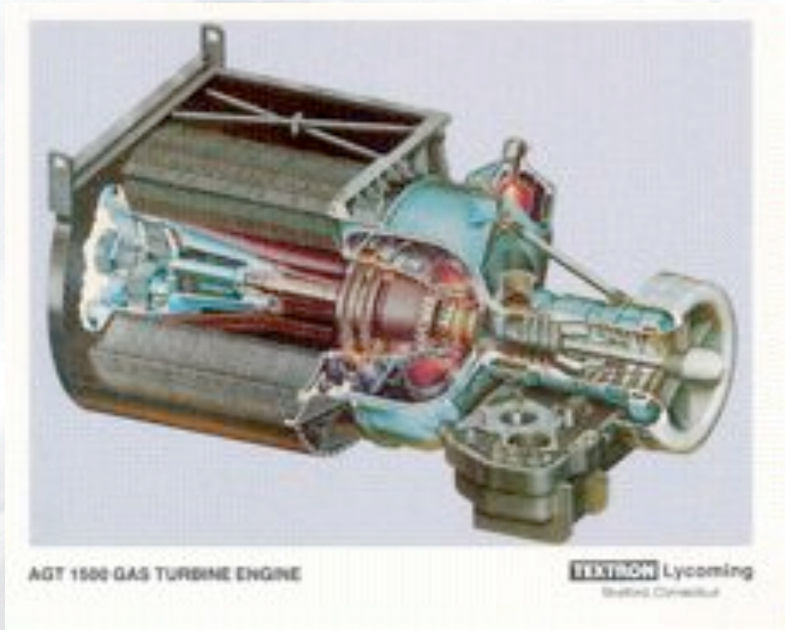
“How the world we perceive works depends on how we think.

The world we perceive is a world we bring forth through our thinking.”

H. Thomas Johnson



# Tank Engines and Rocket Engines



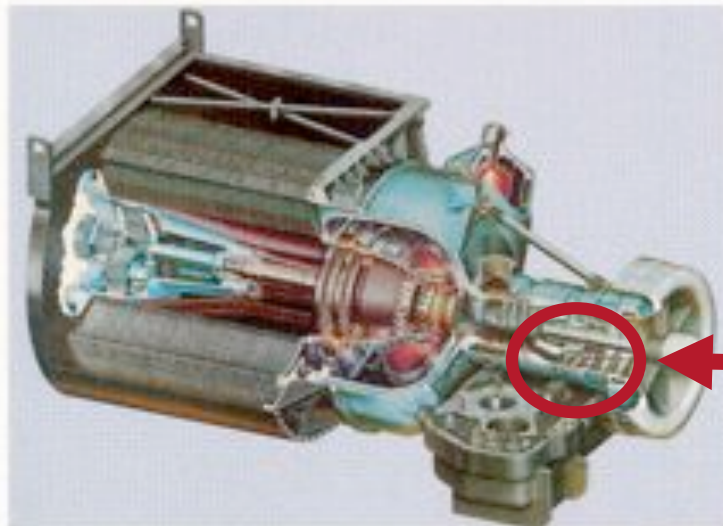
**AGT1500**



**RS68**



# AGT1500 Gearbox Problems



AGT 1500 GAS TURBINE ENGINE

**TEXTRON** Lycoming  
Bristol, Connecticut

**TEXTRON** Lycoming

## PERFORMANCE REPORT: AGT1500 Gearbox Status

In the fall of 1987, a series of Accessory Gearbox Drive failures was experienced in tanks with engines built during the preceding 12 months. Since these tanks were newly issued M1A1s comprised an important first line of defense, a high level task force at Textron Lycoming was created and an around-the-clock, seven-days-a-week test program was initiated.

While the task force was organizing the test activities, a team of field service specialists was dispatched to Germany to repair on-site these drive systems that failed. This effort was concentrated in minimizing operations and vehicles have been returned to depots for repair.

As part of the Engineering investigation, and at the suggestion of the Army Program Manager's Office, Textron Lycoming employed the Taguchi method of anti-variable testing. Previously, we had been using the classic one-variable method where an attempt is made to hold all factors constant except one. The Taguchi method provided the breakthrough we were looking for in identifying the most important factors related to the rapid wear of Accessory Gearbox Drive components.

The primary cause of the increased wear rate was traced back to a change introduced to improve bearing package oil flow characteristics. The change introduced a chamfer where previously there had been a 90 degree platform edge. The chamfer reduced the amount of oil that splashed onto the ACR Drive, effectively reducing lubrication to the spline.

In addition to the chamfer in the accessory gearbox, there were two other components which played a role in the failure. These components were the splined coupling and the "twine cog" which together form the linkage between the accessory gearbox and the forward module. The base material for both components had previously been treated in a phosphate bath as a preparation for a dry film lubricant. This base treatment was removed because

population have been identified as of the middle of May. Retrolite completion will occur about mid-June. The specialist repair team remains on duty to fix those engines in units that were already fielded before the retrofit program could begin.

### AGT1500 Operations

*Deliveries as of 1 May 1988:*

- 6,015 engines
- 260 module equivalent engines
- 6,575 engine equivalents
- 8,970 M1/M1A1 vehicles

*As of 1 May 1988:*

- Estimated Total Fleet Hours — 3,119,640 hours
- Estimated Total Fleet Miles — 9,471,211 miles
- Highest Time Engine S/N B5323 — 2,250 hours without overhaul
- Highest Mileage Engine S/N B5026 — 10,002 miles without overhaul

### Have Questions? Comments?

*Feel free to contact:*

- your local Field Service Representative
- Vice Pres., Military Program Office, Steve White, Textron Lycoming, 520 Main St., Bristol, CT 06047, tel. 203/582-2105
- Vice Pres., Washington Operations, Art Barrows, Textron Lycoming, 1000 Vermont Ave. N.W., Washington, D.C. 20005, tel. 202/249-2200

### Anti-Chamfer Ring

investigations had indicated that a roughened the base material.

With the effects of the chamfer and phosphate treatment better understood, Textron Lycoming took the initiative and carried out a large-scale field retrofit campaign to install new hardware in engines that were already in vehicles in Germany but had not been issued to active units. The retrofitted hardware was also our new production on February 1, 1988. Over half the vehicles in the suspect



# Present State

- Reducing Cost, Waste, Inventory, Variation, etc
- Talk about “Working Together”
- Striving for “Zero Defects”
- Striving for “Zero Waste”
- Striving for “Satisfaction”
- Continuous Improvement
- Using Metrics for Alignment\*

\*without a thinking transformation



# What is needed?



Thinking that  
promotes  
***better***  
discovery

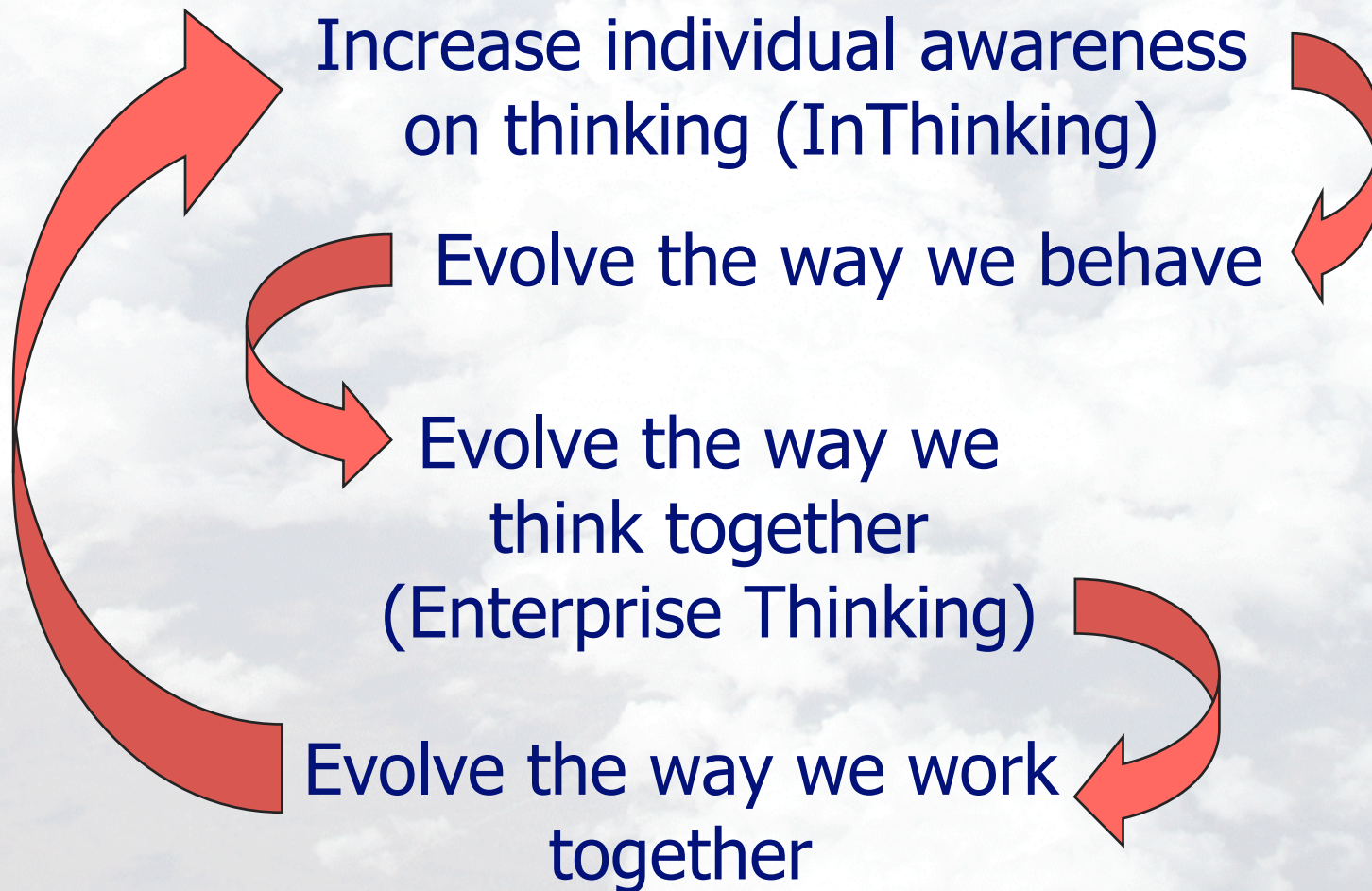


# InThinking

InThinking is about a transformation of the ways people think into effective predetermined patterns and sequences of thinking. The organization of thinking itself and the awareness that there is a choice of alternative ways of thinking when creating better solutions, presents a significant and exciting departure from traditional approaches.



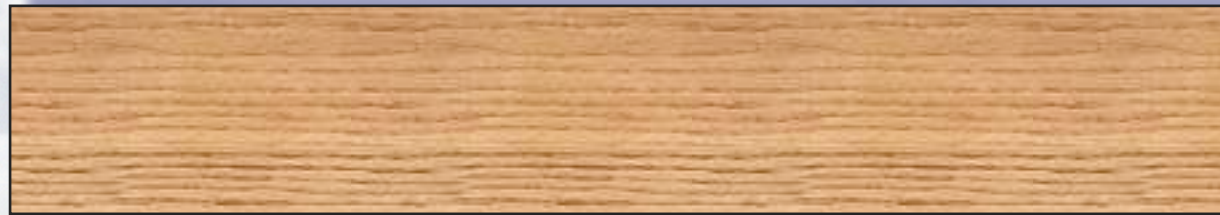
# InThinking & Enterprise Thinking





# Cutting Wood

Given a piece of wood that will be cut into 2 pieces....

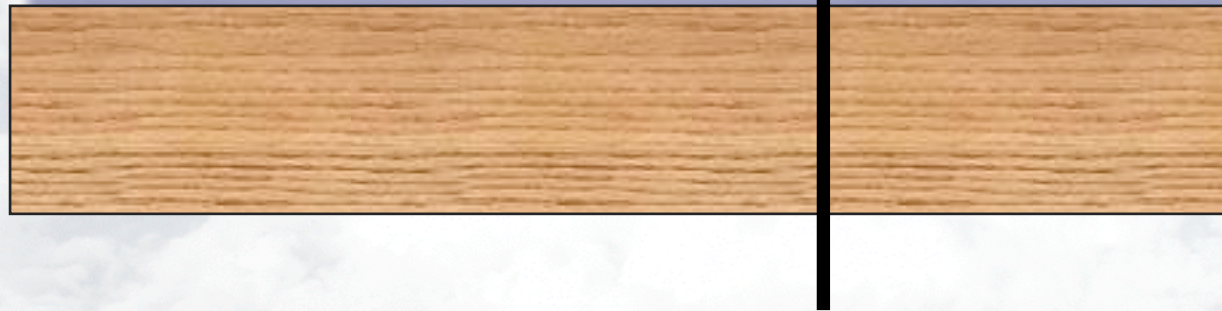


how many lines will be drawn across the top face before the cut is made?



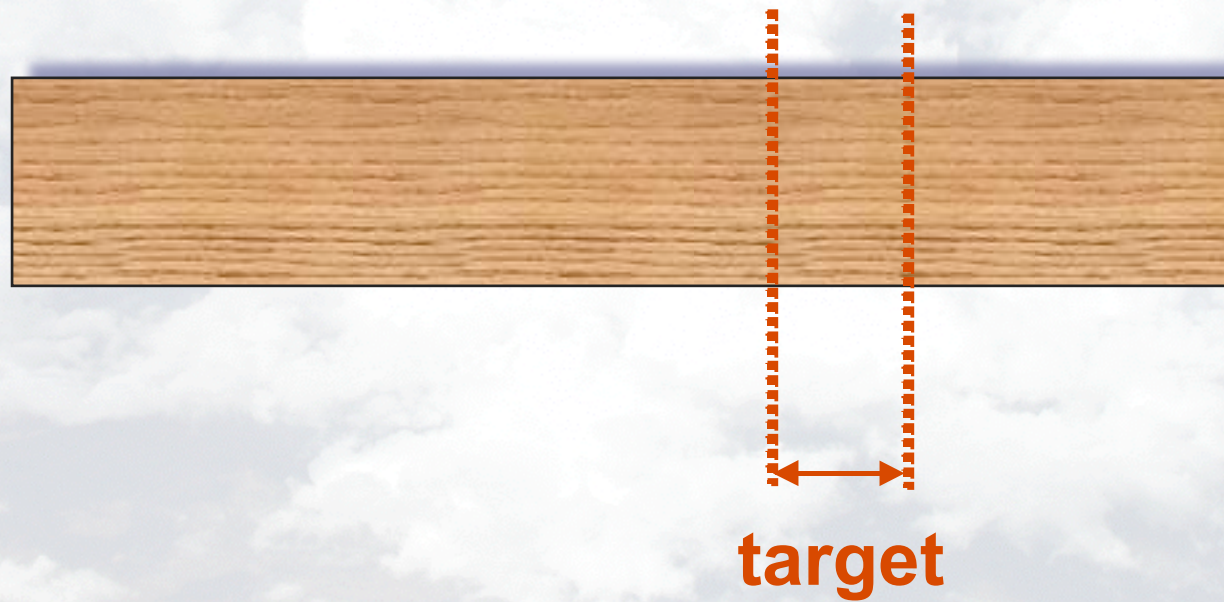
# Cutting Wood

target



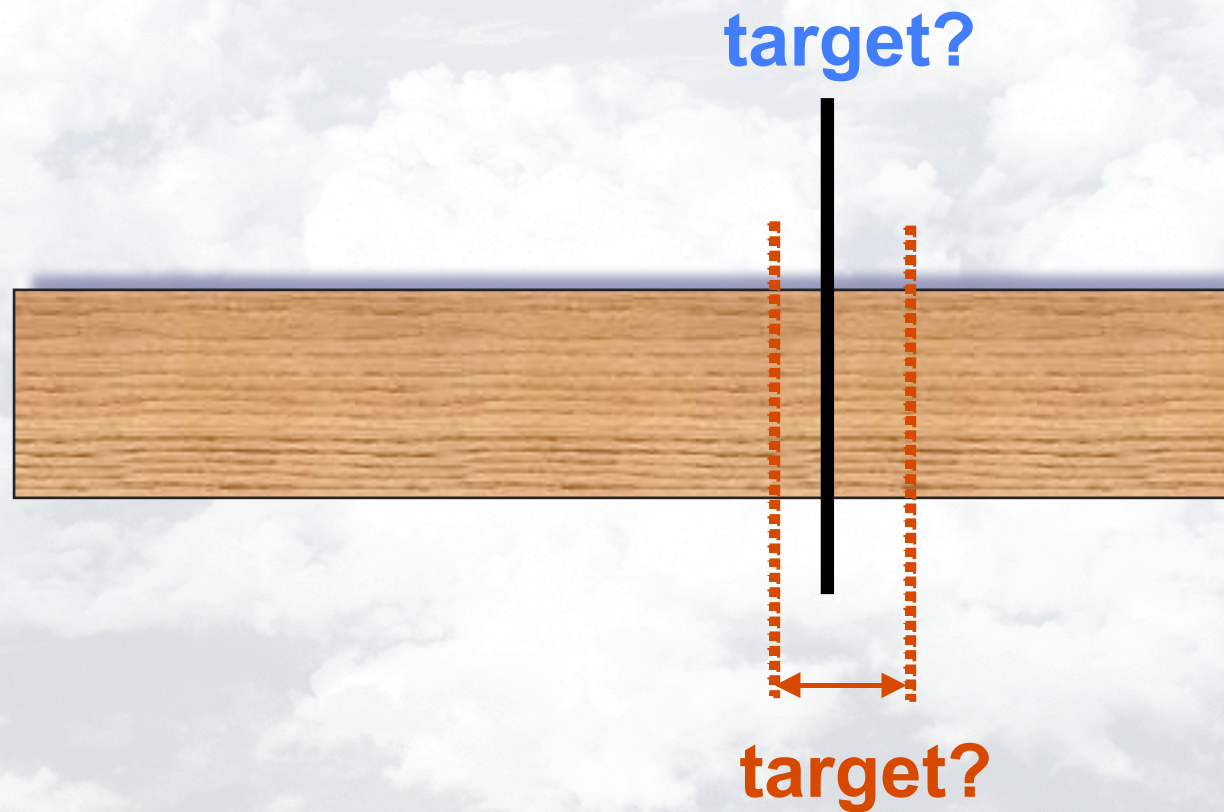


# Cutting Wood





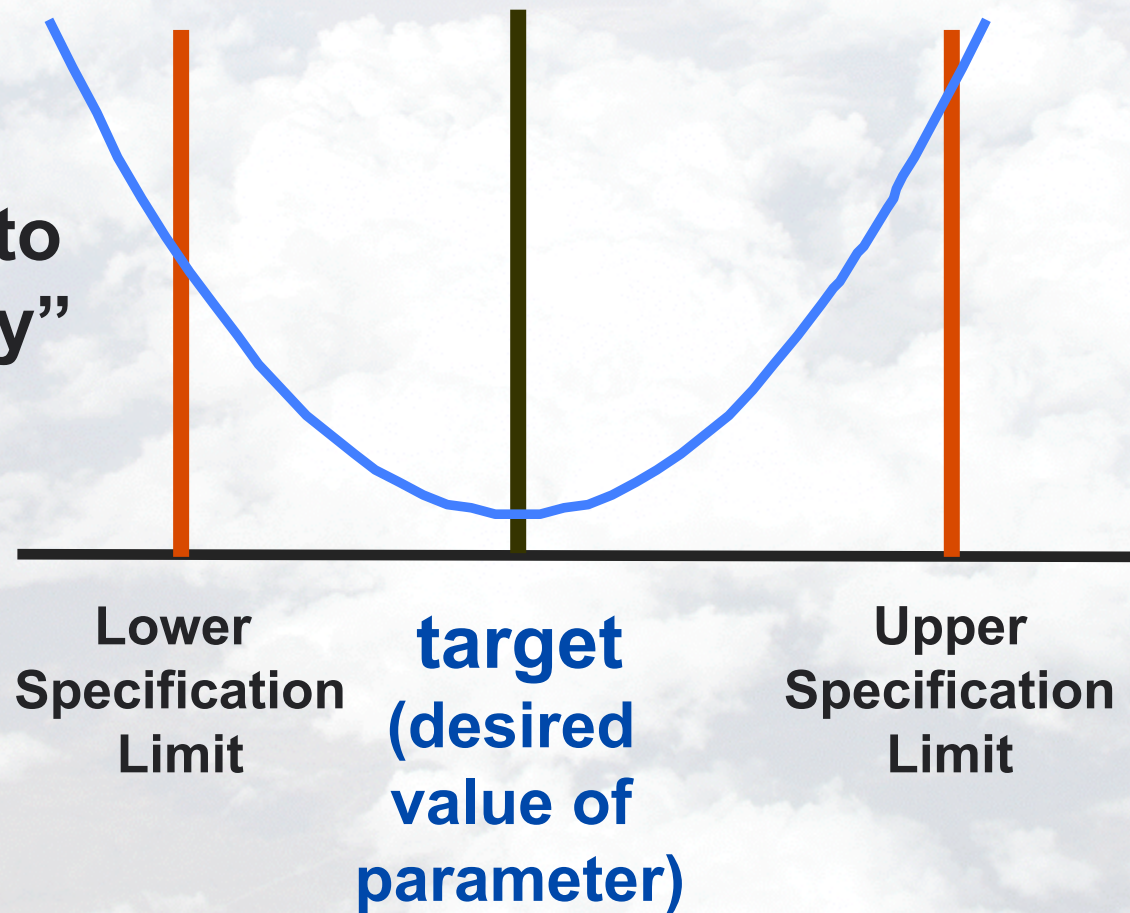
# Cutting Wood





# Taguchi's Quality Loss Function

“Loss to Society”





# **Picking Up Nails**

**Spending time (yours)  
to  
Save time (others)**

***Minimizing Loss to  
Society***

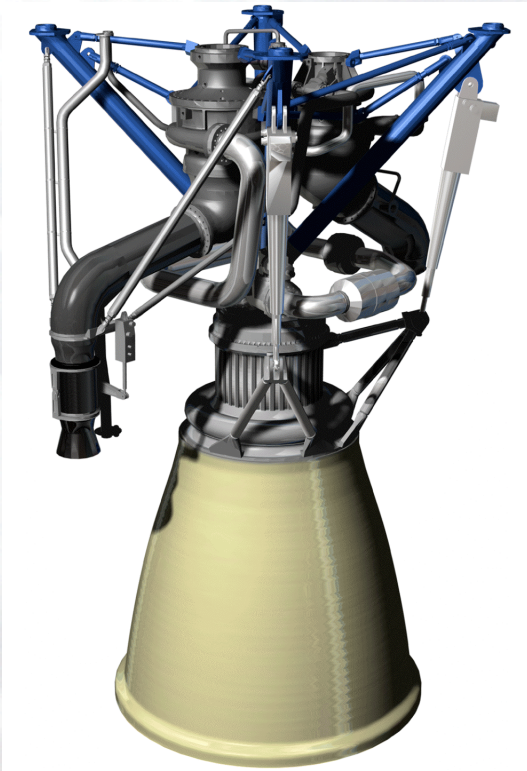


# Investment Thinking

- Seeing connections
- Spending \$ to save \$
- Spending **time** to save **time**
- Spending **resources** to save **resources**
- Examples
  - a stitch in time, an ounce of prevention, college education, home maintenance, time with kids, “take a knee”



# RS68 – Investment Thinking



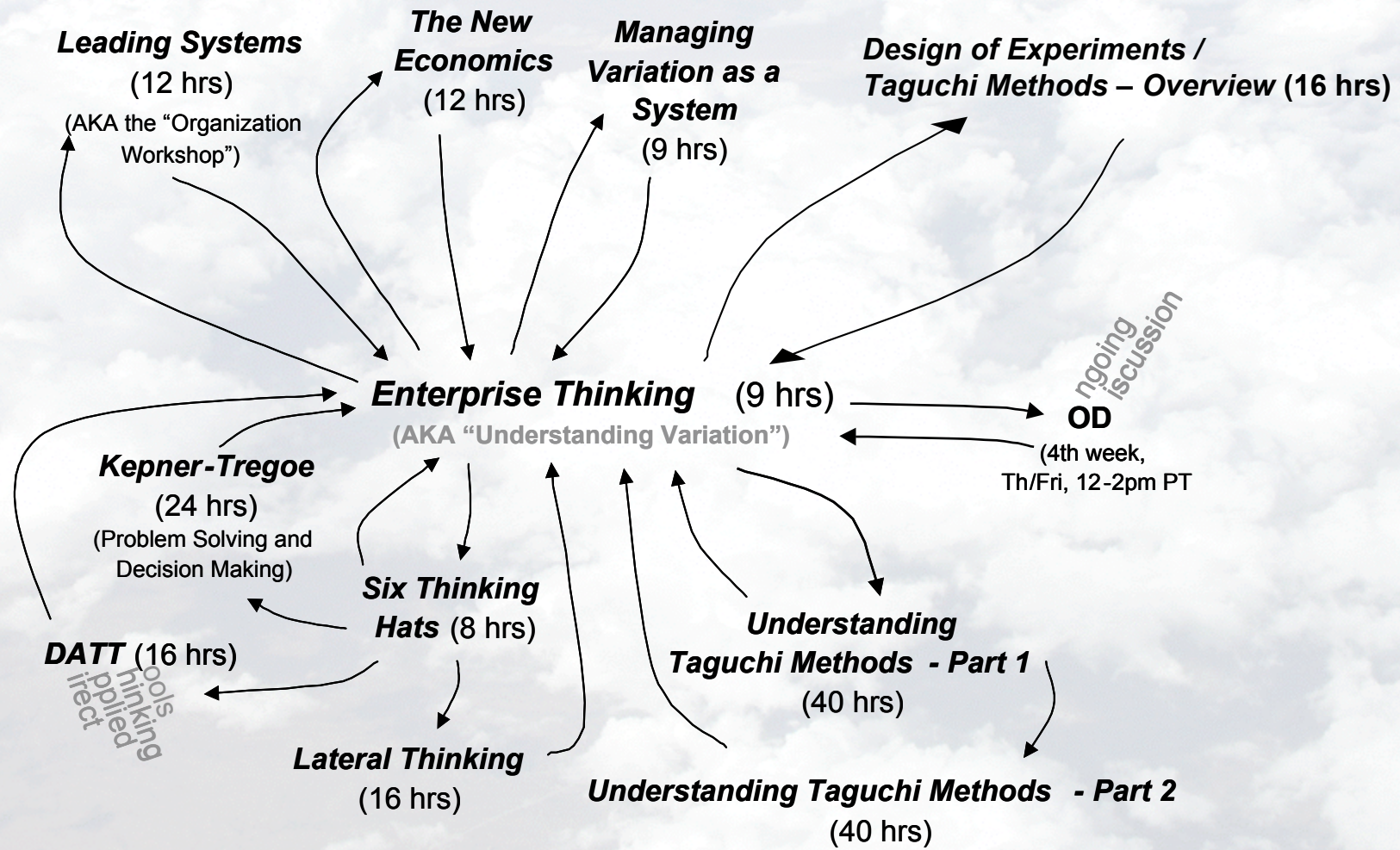


# Future State

- Resource & Relationship Management (Striving for Balance)
- Thinking & Learning Together - Then Working Together
- Managing Customers' Expectations
- Continuous Investment
- Using Thinking for Alignment
  - InThinking and Enterprise Thinking



# PWR's Thinking Roadmap









# Visioning

“it’s not what the *vision* is that is important...

it’s what the *vision* does...”

Robert Fritz



# Imagine the Possibilities...

- When operating in an “Enterprise Thinking” environment
- If we could develop a broader appreciation of “continuous and connected learning”
- If we could develop a deeper appreciation of “*working together*”, “*learning together*” and “*thinking together*”



# Imagine the Possibilities...

➤ and the enterprise we could create...

Working Together

Investing Together

Designing Together

Building Together

Learning Together

Thinking Together

Leading Together



Questions/Comments/Feedback:

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Additional Information

In2:InThinking Network

[www.in2in.org](http://www.in2in.org)