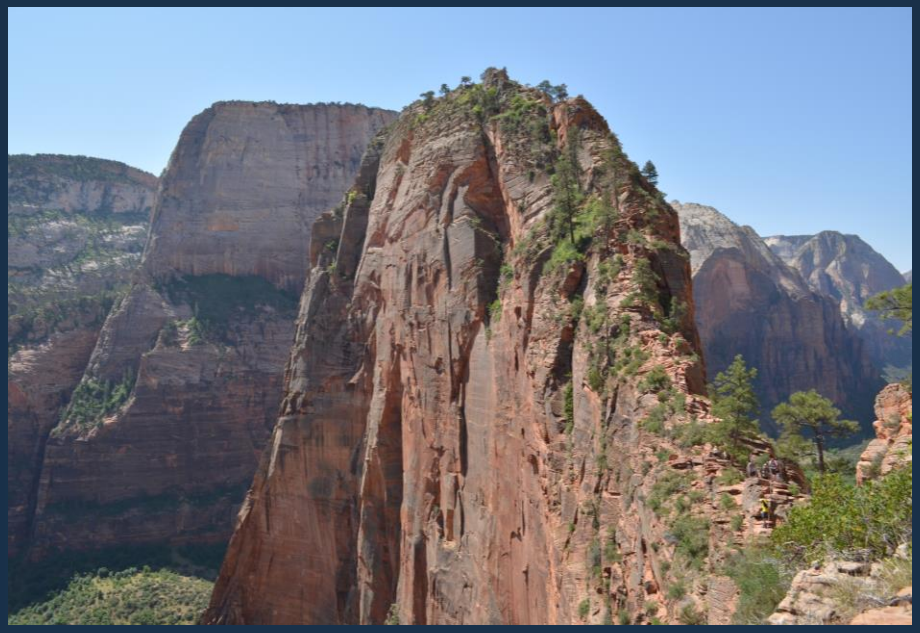
Hu Conference
17-18 March 2015
Atlanta, GA

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Risk-Based Thinking:
An Operating Philosophy for Long-Term Success



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The Certified Performance Technologist (CPT) designation is awarded by the International Society for Performance Improvement (ISPI) to experienced practitioners in the field of organizational performance improvement whose work meets both the performance-based Standards of Performance Technology and application requirements.

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JOE BRAUN PHOTOGRAPHY

Problem: Events / Incidents*

Harm – to one or more assets (people, product, or property) due to an uncontrolled:

- *transfer* of energy
- *transport* of mass (solid | liquid | gas)
- *transmission* of information

Safety: An asset's freedom from unacceptable risk of harm[#]
Reliability: Ability to succeed under varying conditions[β]

* Adapted from Perrow, C. (1999), *Normal Accidents*, p.66.
[#] Reason, J. (1997), *Managing the Risks of Organizational Accidents*, p.107.
β Hollnagel, E., et al. (Eds.) (2013), *Resilience Engineering In Practice*, p.277,.

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Workplace Realities

- Market Place – competition, faster-better-cheaper, various demands, many implicit, pressures, and resource constraints, goal conflicts: faster, better, cheaper, & safer
- Human fallibility: 50 errors per day (3-4 errors per hour)
- Error traps – local factors that provoke error, uncertainty, complexity, surprises, etc.
- Land mines – hidden sources of energy, mass, and information that could cause harm to assets; configuration
- Risks – inherent, dynamic, emergent
- Defenses – missing, faulty, and sometimes bypassed
- Overconfidence in the System

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Conundrum*

Productivity: Efficiency

- Keeping the investment of time, energy, and resources used to accomplish an outcome as low as possible

Safety: Thoroughness

- Conducting an activity only when confident that the necessary conditions exist so that an activity can be accomplished with no unwanted side-effects

What do you do when you can't do everything you want?

* Adapted from Hollnagel, E. (2009), *The ETTO Principle*, pp.15-19.

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Risk-Based Thinking*

Fundamental First Principle

- **Anticipate** – know what to expect
- **Monitor** – know what to pay attention to
- **Respond** – know what to **do**
- **Learn** – know:
  - what has happened (past)
  - what is happening (present)
  - what to change (future)

Operating Philosophy:
a way of doing business and work

* Source: Hollnagel, et al., *Resilience Engineering*, (2006), p.350, and *Resilience Engineering Perspectives, Vol. 2*, (2009), pp.117-133.

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Safety Misunderstood*

- Safety is *NOT* the absence of accidents.
- Safety is the *presence* of defenses in your processes, procedures, facilities, methods, and practices.
- Safety is what you ***DO*** to ensure the integrity of *assets* using a variety of controls, barriers, and safeguards

*Woods, D. et al. (2010), *Behind Human Error* (2nd ed.), Ashgate, pp.38-39, 244-246.

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Chronic Uneasiness*

A deep-rooted respect for the technology

Mindfulness
to protect assets against *uncontrolled*:

1) Transfers of energy
2) Movements of mass
3) Transmissions of information

how you perceive, feel, and think about **assets** and their hazards

A Preoccupation with Failure: Value Addition vs. Value Extraction

* Reason, J. (2008), *The Human Contribution*, p.274.

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Risk-Based Thinking*

AMRL

- **Anticipate** – know what to expect
- **Monitor** – know what to pay attention to
- **Respond** – know what to do
- **Learn** – know:
  - what has happened (past)
  - what is happening (present)
  - what to change (future)

Touching = Risk

* Source: Hollnagel, et al., *Resilience Engineering*, (2006), p.350, and *Resilience Engineering Perspectives, Vol. 2*, (2009), pp.117-133.

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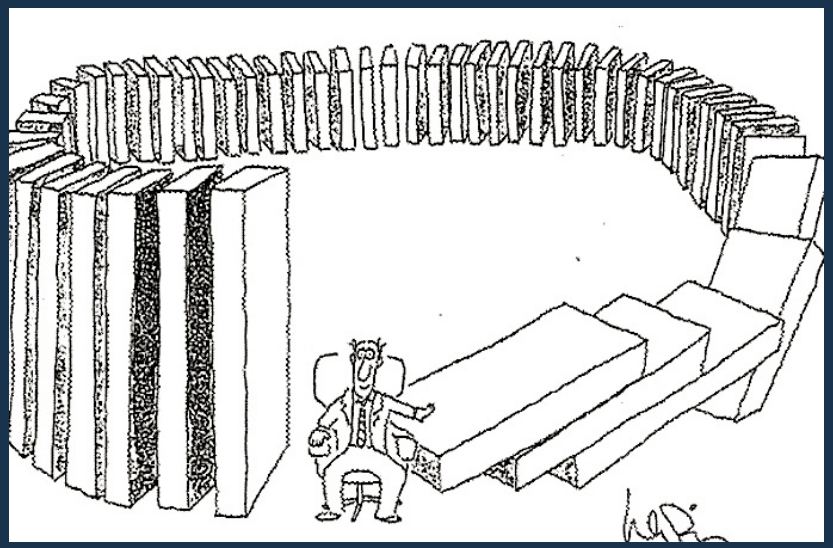
Anticipate

AMRL

- ***Know*** *what to expect*: assets / hazards
- Accomplishments: value additions (planned)
- Inherent risks:
  - Transfers of energy
  - Movements of mass
  - Transmissions of information
- What if…?



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Monitor

AMRL

- ***Know*** *what to pay attention to*: TouchPoints
- TouchPoints: human actions that change the state of an asset through work (W=fxd)
- Critical steps and Risk-Important Actions
- Critical parameters: safety and quality
- Situation awareness

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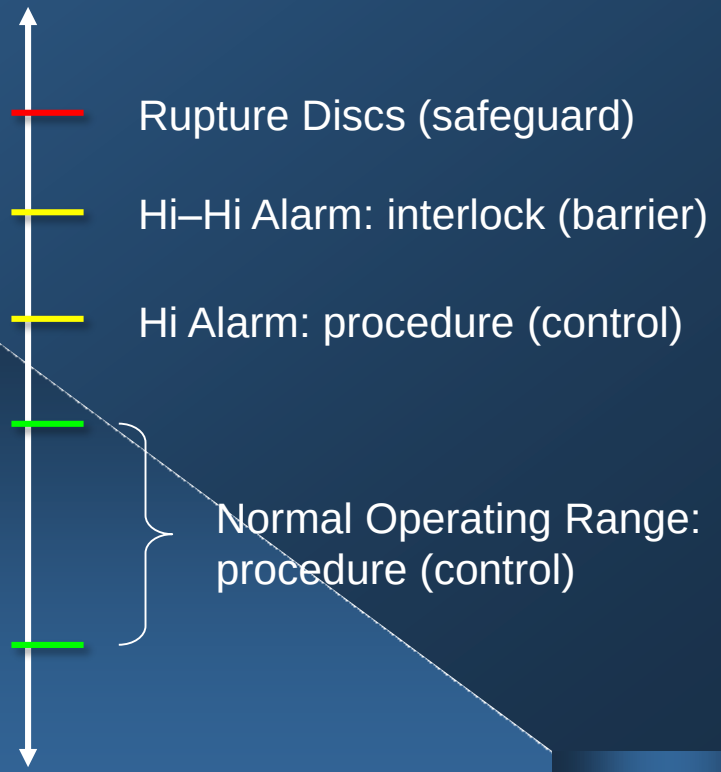
Respond

AMRL

- ***Know*** what to **Do**: Positive Control
- Eliminate, Prevent, Catch, Detect, Mitigate
- Hu Tools
- Stop when unsure
- Conservative decision-making
- Pre-positioned resources, reserves
- Engineered safeguards



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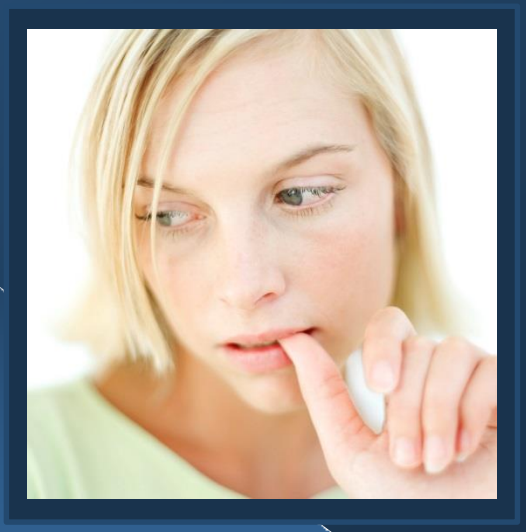
Learn

AMRL

- ***Know*** *what has happened* (past): operating experience and personal experience
- ***Know*** *what is happening* (present): situation awareness; relentless pursuit of truth; facts; thinking ahead
- ***Know*** *what to change* (future): system-level improvements, personal development, protection of assets for future tasks



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Risk-Based Thinking

AMRL

Anticipate	Monitor	Respond	Learn
Know what to expect	**Know** what to pay attention to	**Know** what to do	**Know** what: • Has happened • Is happening • To change

* Source: Hollnagel, et al., *Resilience Engineering*, (2006), p.350, and *Resilience Engineering Perspectives, Vol. 2*, (2009), pp.117-133.

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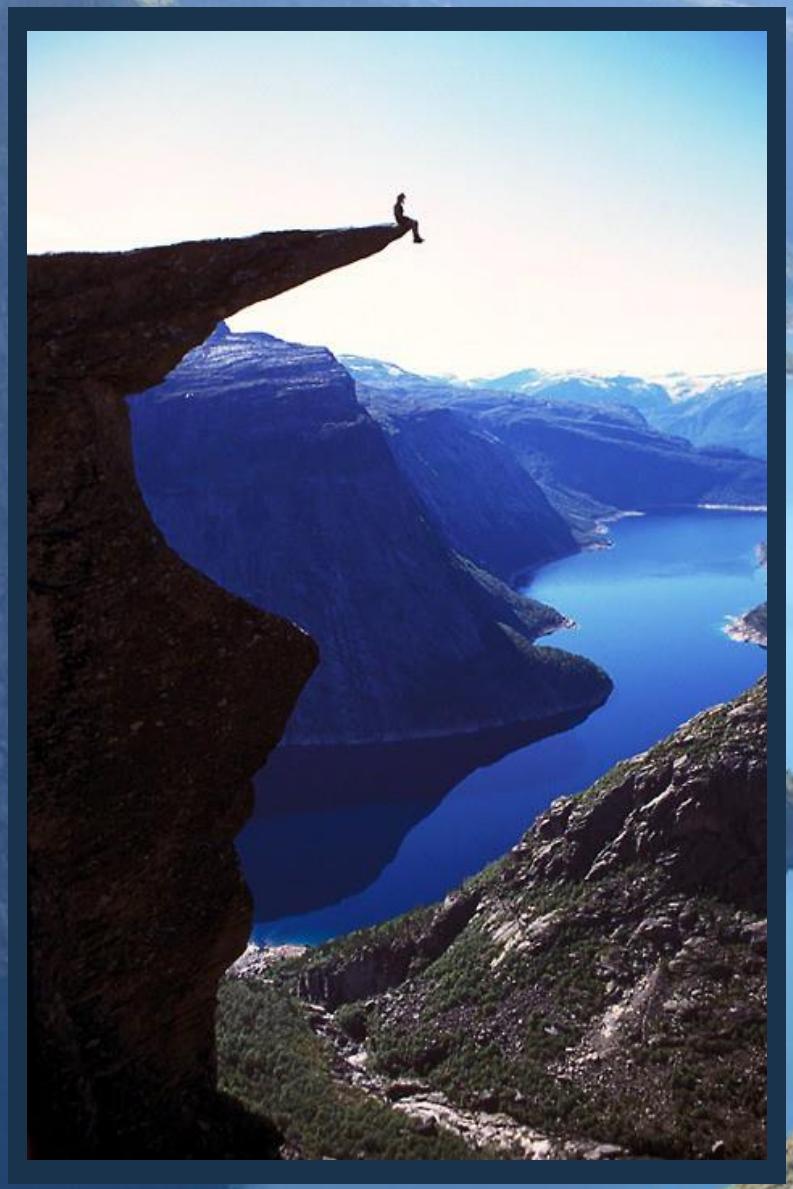
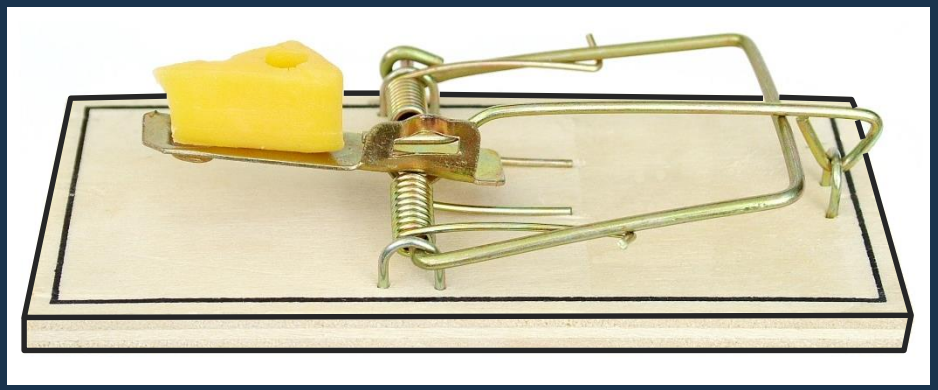
Trolltunga
Odda, Norway



Critical Step[SM]

– Point of No Return | What **MUST** Go Right

A human action that ***will*** trigger ***immediate, irreversible, intolerable harm*** to an asset (if that action or a preceding action is performed improperly)



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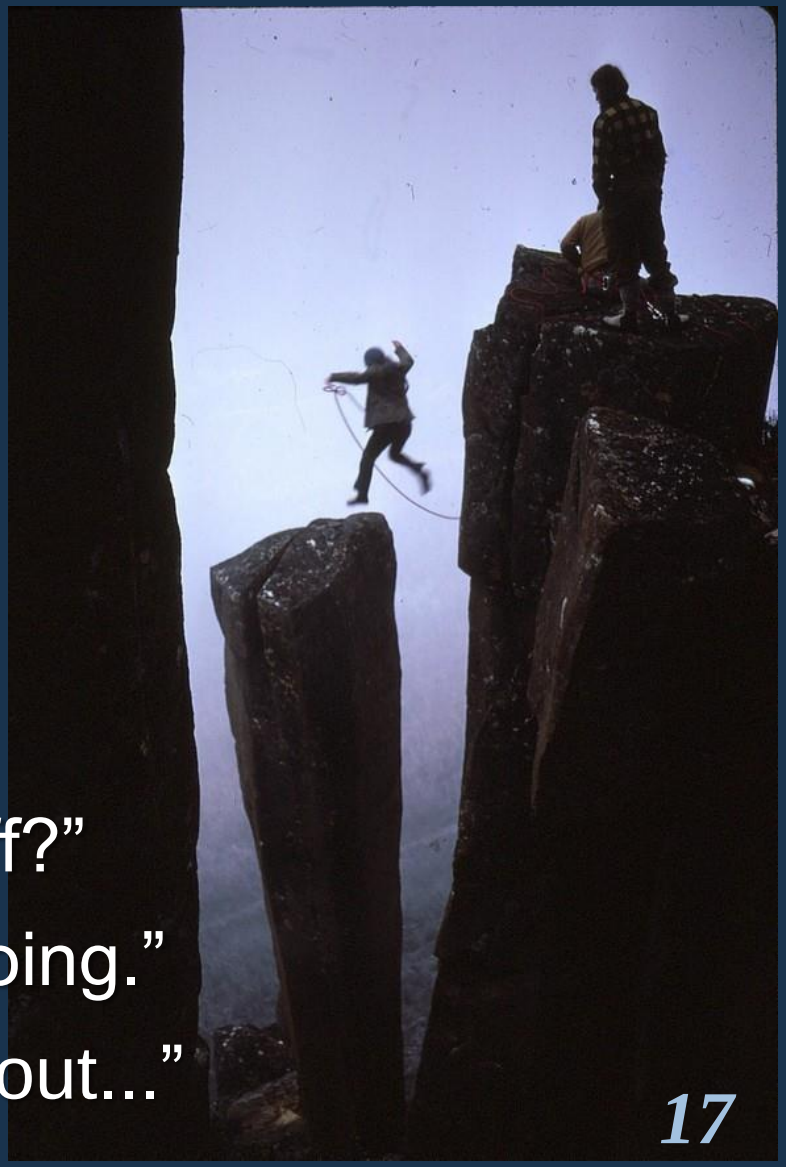
Famous Last Words at Critical Steps

- “Oops.”
- “Watch this.”
- “Nice doggy.”
- “Look Ma, no hands.”
- “What does this button do?”
- “Don’t worry. I’ve done this a hundred times.”
- “Are you sure the power is off?”
- “Trust me, I know what I'm doing.”
- There's only one way to find out…”



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Strength of Hu Tools	Self-checking			
Cornerstones of Risk-Based Thinking	Stop	Think	Act	Review
Anticipate (know what to expect)		✓		
Monitor (know what to pay attention to)	✓	✓	✓	✓
Respond (know what to do)	✓	✓	✓	✓
Learn (know what happened, what is happening, what to change)		✓		✓

Using AMRL, Workers Create Safety*

- Expertise: in-depth technical know-how tempered with experience; knowledge of limitations
- Humility: willingness to learn
- Chronic uneasiness: mindfulness of uncertainty in the workplace
- Adjustments: responses to underspecified plans, procedures, policies, design, etc. in order to protect key assets during work

* Reason, J. (2008), *The Human Contribution*, p.274.

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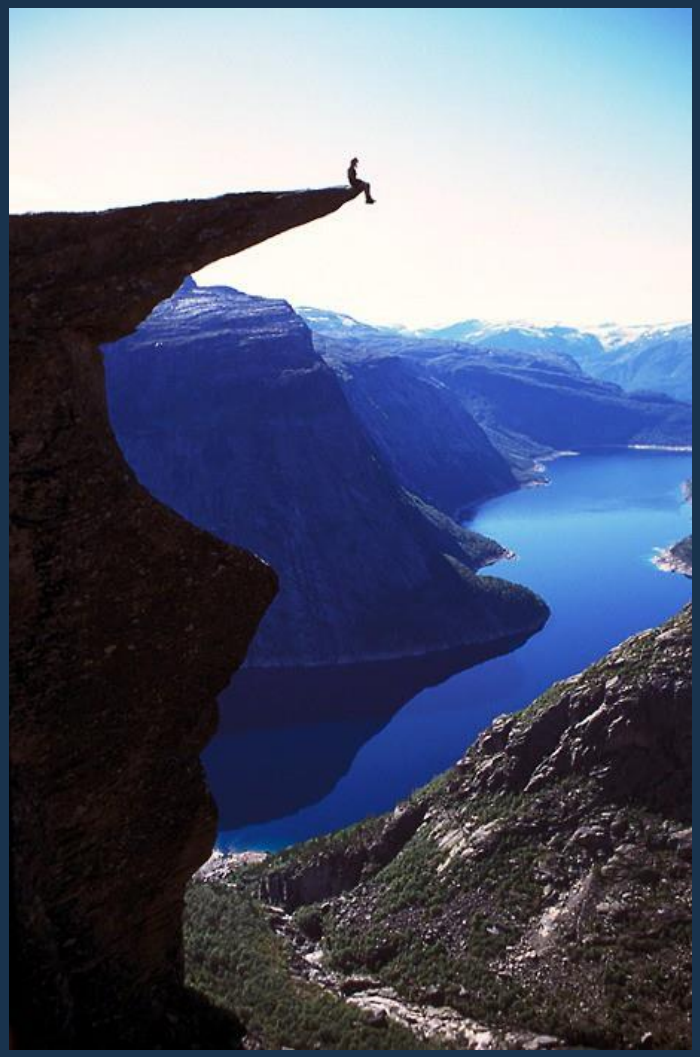
Integration

Work Execution Process

Enabling Risk-Based Thinking	Preparation	Execution	Learning
Anticipate **(know what to expect)**	**Review** the task to identify what is to be Accomplished (outputs) and what to Avoid (harm)	**Look ahead** to all: • Transfers of energy • Movements of mass • Transmissions of info	**Foresee** impact on safety and reliability of future work (assets) if nothing changes
Monitor **(know what to pay attention to)**	**Review** work procedures that describe the accomplishments and expectations **Identify** critical steps and related risk-important actions (RIA)	**Concentrate** on: • TouchPoints—changes in state of assets • Critical steps / RIAs • Critical parameters	**Identify**: • Differences between Work as Done and Work as Planned • Surprises, errors, and recurring adjustments
Respond **(know what to do)**	**Decide** on how to retain positive control of accomplishments and avoid loss of control	As needed, **apply**: • Hu Tools • Contingencies • Stop Work Criteria • Conservative decisions (adjustments)	**Conduct** a post-job Review **Report** serious differences between WaD & WaP
Learn **(know what happened, what is happening, what to change)**	**Recall** relevant Operating and personal experiences. **Ask** "What if …?"	**Be mindful**: • Chronic uneasiness • Situation awareness • Observation and Feedback	**Identify** changes: • System level • Personal leel

Live Long and Prosper*



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* Popularized by actor Leonard Nimoy as the character Mr. Spock in the television show, *Star Trek*, but is actually an variation of a blessing by Jewish rabbis in worship services.

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