A Look at Assessing Culture in the Chemical & Nuclear Sectors

Purdue Process Safety and Assurance Center

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CCPS Center for Chemical Process Safety

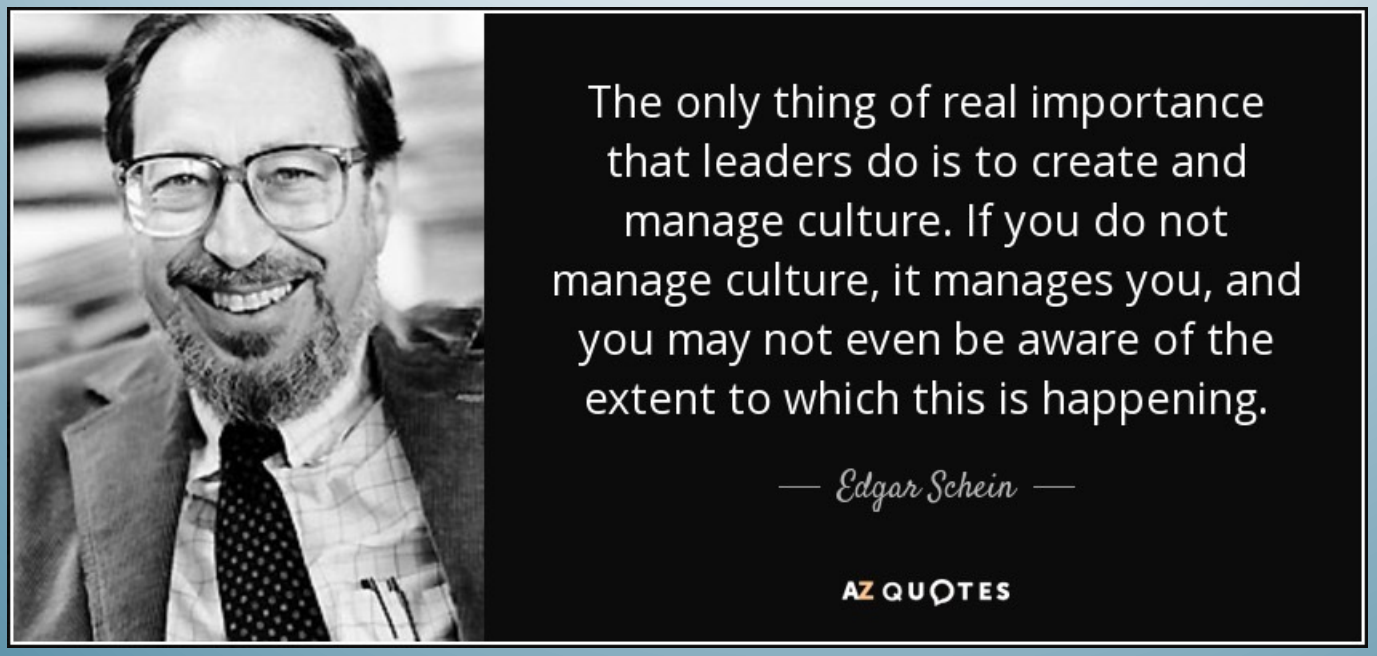
Outline

- Definitions of Culture
- Overview of the CCPS Process Safety Culture Self-Assessment
- Overview of the Nuclear Regulatory Commission Safety Culture Common Language
- The Similarities
- The Differences
- Conclusions
- Recommendations

Edgar Schien Model of Organizational Culture

Three-level model:

- Artifacts & Behaviors
- Espoused Values
- Underlying Assumptions



If your doctor were to perform surgery before tests, diagnosis, proper pre-operative examination, and patient evaluation….

Malpractice

AIChE Definition: Process Safety Culture

The combination of group values and behaviors that determine the manner in which process safety is managed.

- **"How we do things around here."**
- **"What we expect here."**
- **"How we behave when no one is watching."**

Nuclear Regulatory Commission Definition: Nuclear Safety Culture

The core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment.

Premise

- Self-assessments
  - ***CCPS Excellence in Process Safety Self-Assessment Tool (147)***
  - ***NUREG -2165, Safety Culture Common Language (217)***
  - ***Other tools***
- Review the CCPS Industry Tenets & Societal Themes
- Review NUREG-2165 Traits, Attributes, and Examples
- Assess whether the NUREG survey questions could be added to a self-assessment tool to provide new culture insights in the CPI.

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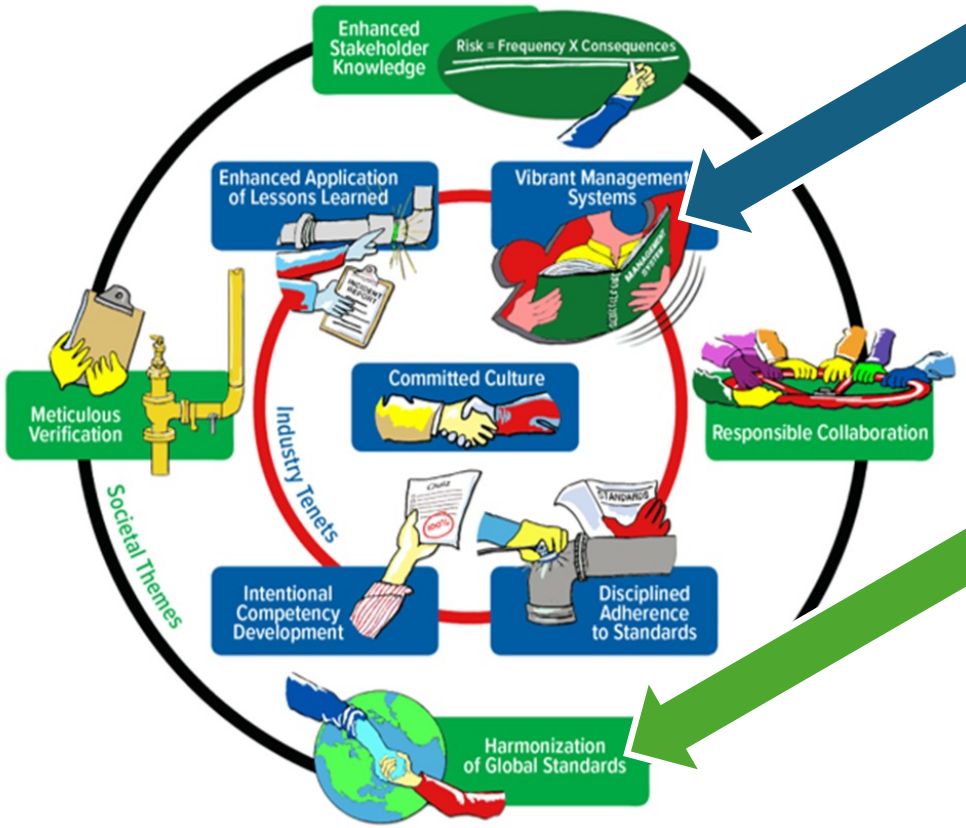
EXCELLENCE IN PROCESS SAFETY



5 Industry Tenets

- Committed Culture
- Vibrant Management Systems
- Disciplined Adherence to Standards
- Intentional Competency Development
- Enhanced Application and Sharing of Lessons Learned

4 Societal Themes

- Responsible Collaboration
- Enhanced Stakeholder Knowledge
- Harmonization of Global Standards
- Meticulous Verification

The 5 Industry Tenets

1. **Committed Culture**
2. Vibrant Management Systems
3. Disciplined Adherence to Standards
4. Intentional Competency Development
5. Enhanced Application and Sharing of Lessons Learned

The 4 Societal Themes

1. Responsible Collaboration
2. Enhanced Stakeholder Knowledge
3. Harmonization of Standards
4. Meticulous Verification

Example from *Committed Culture*

Includes the following characteristics:

- **Executives** personally and visibly lead process safety.
- **Operators and mechanics** follow procedures and speak up when problems or improvement opportunities arise.
- **Supervisors and managers** verify that proper work is done, intervene to correct issues, and openly tell their management negative news.

Criteria for a *Committed Culture*

Q No.	***Executives personally and visibly lead process safety*** **Question**	Always	Most of the Time	Some of the Time	Infrequent or Never
1.	Executives review industry and company incidents and review their own operations for similar hazards.				√
2.	Process Safety topics are regular agenda items at board/executive meetings.			√	
3.	Executives have personal Process Safety performance goals and objectives (beyond stating metric goals).			√	
4.	Process safety lagging metrics are tracked at the site and company level.		√		
5.	Process safety leading metrics are tracked at the site and company level.		√		

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5.	Process safety leading metrics are tracked at the site and company level.		√		

Strength to Weakness

Example of Quantitative Scoring

Summary for Committed Culture	Always	Most of the Time	Some of the Time	Infrequent or Never
Count of Question Responses	15	10	3	2
Multiplier *(Answer's ranking from 4 to 1)*	4	3	2	1
Resulting Points	60	30	6	2
Sum of the Points				98
Number of Characteristic Questions				30
Average for *Committed Culture*				3.3

Then What?

- ✓ Identified within the company's *Committed Culture*:
  - ➢ Strengths
  - ➢ Weaknesses ("Areas for improvement")
- ✓ Quantitative data used to analyze trends over time
  - ➢ Strengths decreasing?
  - ➢ Weaknesses increasing?
- ✓ Analyze incidents to determine weak cultural factors

Then What?

- ✓ Identified within the company
  - ➢ Strengths
  - ➢ Weaknesses (“Areas for imp
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  - ➢ Strengths decreasing?
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Oops. This is not good

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NRC Safety Culture Common Language

- Nuclear Regulatory Commission (NRC) published as NUREG-2165 (March 2014)
- Developed solely for informational purposes not statement of policy.
- Nuclear power plant events have had cultural aspects:
  - Peach Bottom (1987)
  - Millstone Nuclear Power Station (1996)
  - Davis-Besse Nuclear Power Station (2002)
- INPO (Institute of Nuclear Power Operations), NRC, and stakeholders developed NRC Safety Culture Policy Statement (SCPS) (2011)
- SCPS applies to all licenses, certificate holders, permit holders, and others whose QA program is subject to NRC authority.

NRC Safety Culture Policy Statement

Nuclear safety culture as the core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment.

Ten Traits

Leadership Safety Values and Actions (LA)	**Environment for Raising Concerns (RC)**
Problem Identification and Resolution (PI)	**Effective Safety Communication (CO)**
Personal Accountability (PA)	**Respectful Work Environment (WE)**
Work Processes (WP)	**Questioning Attitude (QA)**
Continuous Learning (CL)	**Decision Making (DM)**

Examining One of the 10 Traits & Attributes

Leadership Safety Values and Actions (LA)
Leaders demonstrate a commitment to safety in their decisions and behaviors.

LA.1 Resources: Leaders ensure that personnel, equipment, procedures, and other resources are available and adequate to support **nuclear safety**.

LA.2 Field Presence: Leaders are commonly seen in working areas of the plant observing, coaching, and reinforcing standards and expectations. Deviations from standards and expectations are corrected promptly.

Leadership Safety Values and Actions (LA) continued

LA.3 Incentives, Sanctions and Rewards: Leaders ensure incentives, sanctions, and rewards are aligned with **nuclear safety** policies and reinforce behaviors and outcomes that reflect safety as the overriding priority.

LA.4 Strategic Commitment to Safety: Leaders ensure plant priorities are aligned to reflect **nuclear safety** as the overriding priority.

LA.5 Change Management: Leaders use a systematic process for evaluating and implementing change so that **nuclear safety** remains the overriding priority.

Leadership Safety Values and Actions (LA) continued

LA.6 Roles, Responsibilities, and Authorities: Leaders clearly define roles, responsibilities, and authorities to ensure **nuclear safety.**

LA.7 Constant Examination: Leaders ensure that nuclear safety is constantly scrutinized through a variety of monitoring techniques, including assessments of **nuclear safety culture**.

LA.8 Leader Behaviors: Leaders exhibit behaviors that set the standard for safety.

Traits, Attributes and Examples

Leadership Safety Values and Actions (LA)

Leaders demonstrate a commitment to safety in their decisions and behaviors.

LA.1 Resources: Leaders ensure that personnel, equipment, procedures, and other resources are available and adequate to support nuclear safety.

1) Managers ensure staffing levels are consistent with the demands related to maintaining safety and reliability.

2) Managers ensure there are sufficient qualified personnel to maintain work hours within working hour guidelines during all modes of operation.

3) Managers ensure facilities are available and regularly maintained, including physical improvements, simulator fidelity, and emergency facilities.

Traits, Attributes and Examples (continued)

Leadership Safety Values and Actions (LA)

Leaders demonstrate a commitment to safety in their decisions and behaviors.

LA.1 Resources: Leaders ensure that personnel, equipment, procedures, and other resources are available and adequate to support nuclear safety.

4) Leaders ensure tools, equipment, procedures, and other resource materials are available to support successful work performance, including risk management tools and emergency equipment.

5) Executives and senior managers ensure sufficient corporate resources are allocated to the **nuclear** organization for short- and long-term safe and reliable operation.

6) Executives and senior managers ensure a rigorous evaluation of the **nuclear safety** implications of deferred work.

Elements of a Nuclear Safety Culture Assessment

- Confidential Survey
- Focus Groups
- Interviews
- Behavioral Observations of Personnel Performing a Work Package (Work Permit)
- Meeting Observations
- Comparison with Previous Safety Culture Assessments

A few examples from *Leadership Safety Values & Actions (LA)*

No.	Example	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1.	Managers ensure staffing levels are consistent with the demands related to maintaining safety and reliability.					√
2.	Managers ensure there are sufficient qualified personnel to maintain work hours within working hour guidelines during all modes of operation.				√	
3.	Managers ensure facilities are available and regularly maintained, including physical improvements, simulator fidelity, and emergency facilities.			√		
4.	Leaders ensure tools, equipment, procedures, and other resource materials are available to support successful work performance, including risk management tools and emergency equipment.			√		

A few examples from *Leadership Safety Values & Actions (LA)*

No.	Example	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1.	Managers ensure staffing levels are consistent with the demands related to maintaining safety and reliability.	Weakness to Strength				√
2.	Managers ensure there are sufficient qualified personnel to maintain work hours within working hour guidelines during all modes of operation.				√	
3.	Managers ensure facilities are available and regularly maintained, including physical improvements, simulator fidelity, and emergency facilities.			√		
4.	Leaders ensure tools, equipment, procedures, and other resource materials are available to support successful work performance, including risk management tools and emergency equipment.			√		

Example of Quantitative Scoring

SUMMARY	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Count	1	2	8	12	19
Multiplier (Ranking 1 to 5)	1	2	3	4	5
Result	1	4	24	48	95
Sum		172			
Number of Questions (divisor)		42			
Average of LA.1 **Leadership Safety Values & Actions**		4.1			

Then What?

Based on the data and perception of the respondents:

- ✓ Identified within the company's *Nuclear Safety Culture*:
  - ➢ Strengths
  - ➢ Weaknesses ("Areas for improvement")
- ✓ Quantitative data used to analyze trends over time
  - ➢ Strengths decreasing?
  - ➢ Weaknesses increasing?
- ✓ Analyze incidents to determine weak cultural factors

Similarities & Differences

CCPS Excellence in Process Safety	NRC Safety Culture Common Language
Verification of process safety performance, trends, near misses, incidents, third party evaluations, no culture assessments	Continuous learning through operating experience, self-assessment, INPO, culture assessments (Leadership Actions)
Emphasis on procedures, management system, no mention of human error reduction tools	Emphasis on procedures, management system, explicit reference to expectation using human error reduction tools (Work Processes)

Similarities & Differences

CCPS Excellence in Process Safety	NRC Safety Culture Common Language
Intended Use: • Self-assessment by multi-level team (executives, process safety leaders, employees) • Voluntary/Industry Driven to guide companies toward higher process safety performance and culture.	**Intended Use:** • Shared vocabulary for NRC staff and licensees • Implementation of Safety Culture Policy • Integration into Reactor Oversight Process

Similarities & Differences

CCPS Excellence in Process Safety	NRC Safety Culture Common Language
• References the CCPS Risk Based Process Safety elements: The management system includes all 20 elements of CCPS's Guidelines for Risk Based Process Safety.	Input from • Nuclear Regulatory Commission (NRC) • Institute for Nuclear Power Operations (INPO) • International Atomic Energy Agency (IAEA) • Nuclear Energy Institute (NEI) • workshops included the public.

Similarities & Differences

CCPS Excellence in Process Safety	NRC Safety Culture Common Language
• Online assessment tool: 147 questions using a 4-point Likert scale.	• Publication has been used to create 217 questions using a 5-point Likert scale.
• 5 Industry Tenets & 4 Societal Themes & 147 Questions	• 10 Traits & 40 Attributes & 217 Examples

Similarities & Differences

CCPS Excellence in Process Safety	NRC Safety Culture Common Language
Operators & mechanics freely raise process safety concerns to supervisors & management	Safety Conscious Work Environment: free to raise safety concerns without fear of retaliation (Raise Concerns)
Process safety is managing integrity of hazardous operating systems and processes	Nuclear is recognized as special and unique (Questioning Attitude)

Mapping Terms in the NUREG to CPI

- **Nuclear Safety**
  - **Personal Accountability (PA)**
    - **PA.2 Job Ownership:** Individuals understand and demonstrate personal responsibility for the behaviors and work practices that support **nuclear safety**.
    - **PA.3 Teamwork:** Individuals and workgroups communicate and coordinate their activities within and across organizational boundaries to ensure **nuclear safety** is maintained.
  - **Work Processes (WP)**
    - **WP.1 Work Management:** The organization implements a process of planning, controlling, and executing work activities such that **nuclear safety** is the overriding priority. The work process includes the identification and management of risk commensurate to the work.

Mapping Terms in the NUREG to CPI

- **Nuclear Safety/Reactor**
  - **Continuous Learning (CL)**
    - **CL.4 Training:** The organization provides training and ensures knowledge transfer to maintain a knowledgeable, technically competent workforce and instill **nuclear safety** values.
      - Individuals master **reactor** and power plant fundamentals to establish a solid foundation for sound decisions and behaviors.
  - **Effective Communication (CO)**
    - **CO.4 Expectations:** Leaders frequently communicate and reinforce the expectation that **nuclear safety** is the organization's overriding priority.

Mapping Terms in the NUREG to CPI

- **Nuclear Safety/Reactor**
  - **Decision Making (DM)**
    - **DM.2 Conservative Bias:** Individuals use decision making practices that emphasize prudent choices over those that are simply allowable. A proposed action is determined to be safe to proceed, rather than unsafe in order to stop.
      - Executives and senior managers reinforce the expectation that the **reactor** will be shut down when procedurally required, when the margin for safe operation has degraded unacceptably, or when the condition of the **reactor** is uncertain. Managers implement this expectation.
    - **DM.3 Accountability for Decisions:** Single-point accountability is maintained for **nuclear safety** decisions.
      - A designated, on-shift licensed **senior reactor operator** has the authority and responsibility to determine equipment operability.

Conclusions

- The ***CCPS Excellence in Process Safety Self-Assessment Tool*** is a good survey form for assessing process safety culture.

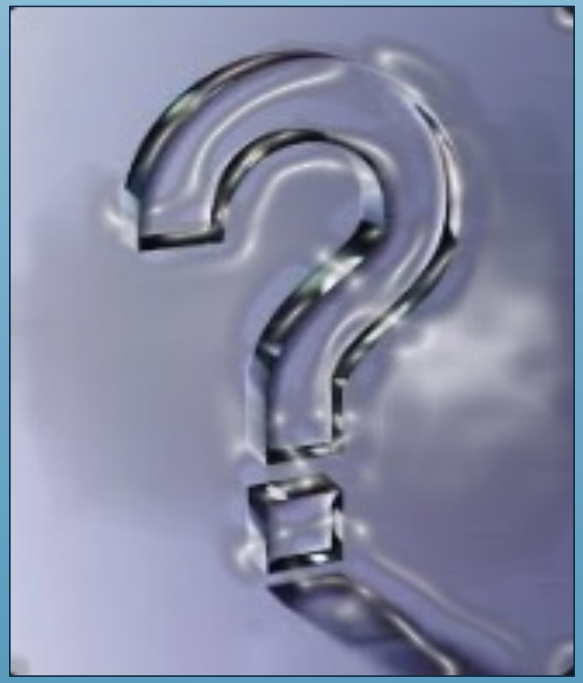
- The ***NRC Safety Culture Common Language*** publication was designed for licensees, permit holders, vendors and suppliers of safety-related equipment whose quality assurance program approval is subject to NRC approval.

  The Safety Culture Policy Statement provides NRC's expectation for a healthy safety culture.

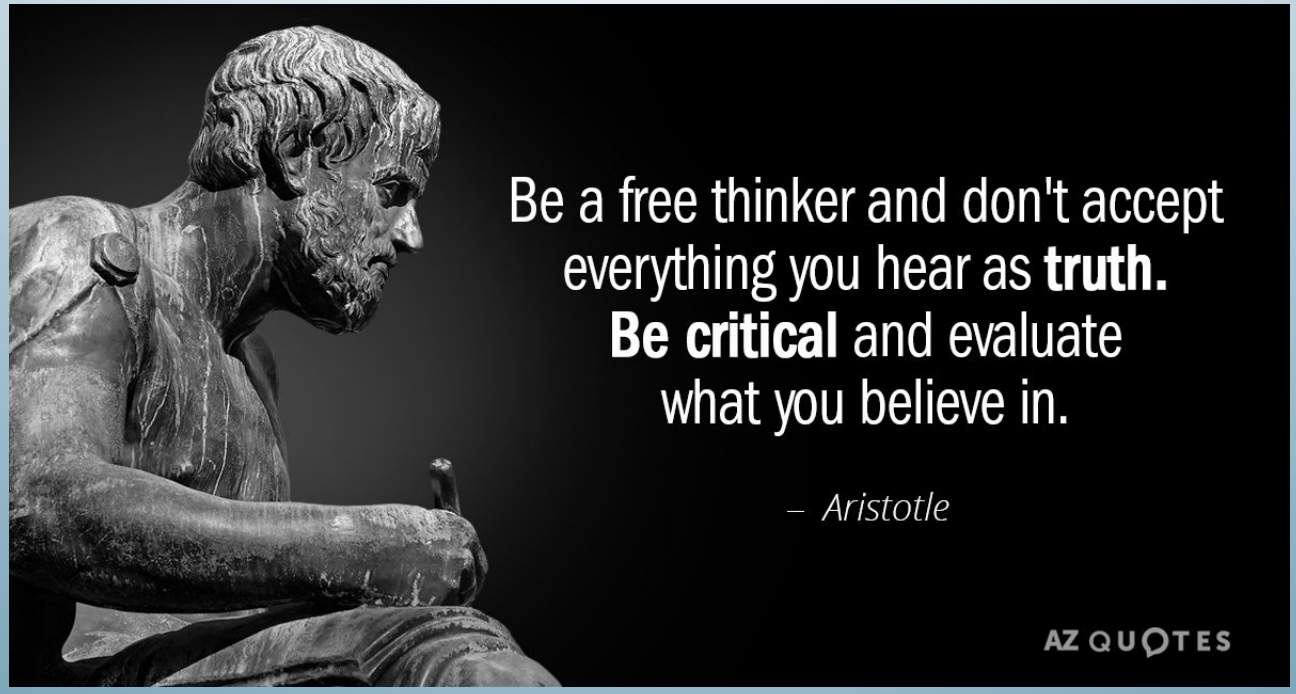
Recommendations

- Perform a self-assessment using the ***CCPS Excellence in Process Safety Self-Assessment Tool***
- Download ***NUREG -2165, Safety Culture Common Language***
- Review the **Traits/Attributes/Examples** editing the "***nuclear-related***" words to apply to your facility.
- Assess whether these **Traits/Attributes/Examples** provide new insights into your organization's culture.

Questions?



Thank You


Be a free thinker and don't accept everything you hear as **truth.** **Be critical** and evaluate what you believe in.
– *Aristotle*
AZ QUOTES