R. 21-10-001:
Order Instituting Rulemaking to Develop Safety Culture Assessments for Electric and Natural Gas Utilities

Safety Policy Division Workshop

Friday March 11, 2022, 9:00am-12:00pm

California Public
Utilities Commission

WELCOME AND OPENING COMMENTS

9:00am-9:20am

California Public
Utilities Commission

R. 21-10-001 Background

October 13, 2021:
Commission opens Rulemaking (R.) 21-10-001

November 29, 2022:
Opening Comments filed to the OIR

December 29, 2021:
Reply Comments filed to the OIR

March 11, 2022:
Initial kickoff workshop for the proceeding (today)

Spring/ Summer 2022:
Additional technical working group meetings and workshops

Goal of proceeding: To develop and adopt a safety culture assessment framework and process for regulated investor-owned electric and natural gas utilities and gas storage operators

Overview of the Workshop

9:00am-9:20am

- Welcome, background, and Commissioner Comments

9:20am-11:00am

- Presentations from five safety culture experts

11:00am-12:00pm

- Questions from Commissioners, Panel Discussion, and Questions from Audience

Detailed Agenda

Time	Presenter	Topic
OPENING, 9:00-9:20AM		
9:00am-9:10am	CPUC Safety Policy Division	Welcome; brief overview of OIR scope and why we're here
9:10am-9:20am	Commissioners	Opening Comments
SPEAKER PRESENTATIONS, 9:20-11:00AM		
9:20-9:40am	Dr. Mark Fleming, *Department of Psychology, Saint Mary's University*	Why safety culture?; measuring, and improving safety culture
9:40-10:00am	Dr. Paul Schulman, *Center for Catastrophic Risk Management University of California, Berkeley*	Safety culture context and regulatory challenge
10:00-10:20am	Dr. Dom Cooper, *B-Safe Management Solutions (BSMS)*	Safety culture, safety climate, and safety culture frameworks
10:20-10:40am	Dr. Claudine Bradley, *Canada Energy Regulator*	Regulator's safety culture journey
10:40-11:00am	Christopher Hart, *Former Chairman of the National Transportation Safety Board (NTSB)*	Improving safety in the airline industry through the Commercial Aviation Safety Team (CAST)
QUESTIONS & PANEL DISCUSSION, 11:00AM-12:00PM		
11:00am-11:15am	Commissioners	Questions from Commissioners
11:15am-11:45am	CPUC Safety Policy Division	Panel Discussion: How do we know that focusing on safety culture leads to improvement?
11:45am-12:00pm	All	Questions from Audience

Virtual Housekeeping

- **Questions**
  - Please type questions into chat or use Q&A feature
  - Staff will try to resolve questions as they are received or will send to the appropriate speaker
  - Q&A session for audience at the end of the workshop
  - Will follow up on any unanswered questions after the workshop

- **Timing**
  - To be respectful of everyone's time, we will maintain scheduled starting times for each presentation outlined in the agenda
  - Additional topics will also be covered in subsequent technical working group meetings or workshops

- **Recording; Slides**
  - Workshop recording and slides will be sent to the service list and posted on the CPUC website after the meeting

- **IT Support**
  - Brevin Fong and Jorge De Ocampo

Audience Questions?

Please use chat or Q&A feature

Commissioner Opening Comments

11:00-11:15am

SPEAKER PRESENTATIONS

9:20am-11:00am

California Public
Utilities Commission

Speaker Presentations, 9:20am-11:00am

9:20-9:40am	**Dr. Mark Fleming** Department of Psychology, Saint Mary's University	Why safety culture?; measuring, and improving safety culture
9:40-10:00am	**Dr. Paul Schulman** Center for Catastrophic Risk Management, University of California, Berkeley	Safety culture context and regulatory challenge
10:00-10:20am	**Dr. Dom Cooper** B-Safe Management Solutions (BSMS)	Safety culture, safety climate, and safety culture frameworks
10:20-10:40am	**Dr. Claudine Bradley** Canada Energy Regulator	Regulator's safety culture journey
10:40-11:00am	**Christopher Hart** Former Chairman of the National Transportation Safety Board (NTSB)	Improving safety in the airline industry through the Commercial Aviation Safety Team (CAST)

Mark Fleming

Department of Psychology, Saint Mary's University

Overview

- Origins of Safety Culture
  - Organizational culture model
- Safety culture and disasters
  - Relevance to regulators
- Safety culture measurement
- Conclusions

In the beginning…

Safety culture began as an undefined term, coined for political expediency.

It is now a globally recognized poorly defined term, that is a major area of practice.

DEPARTMENT OF ENERGY

The Public Inquiry into the Piper Alpha Disaster

The Hon Lord Cullen

SAINT MARY'S UNIVERSITY SINCE 1802

One University. One World. Yours.

Organizational failure

- Despite the adoption of a full range of safety arrangements, complex systems broke down disastrously, because the people running them failed to do what they were supposed to do

- These were not simply individual errors, but malpractices that corrupted the social system and organizational functioning.

Lee (1997)

Safety culture

- Abstract concept that was created to describe a collective failure to implement know controls to prevent catastrophic events.

- These are cultural failures as organizational members believed that they were safe prior to the disaster

- Concerned with major hazard risk, rather than occupational safety

SAINT MARY'S UNIVERSITY SINCE 1802

One University. One World. Yours.

Safety culture definitions

Author(s)	Definition of safety culture
INSAG (1991)	Safety culture is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance
Pidgeon (1991)	The set of beliefs, norms, attitudes, roles, and social and technical practices that are concerned with minimising the exposure of employees, managers, customers and members of the public to conditions considered dangerous or injurious
ACSNI (1993)	The safety culture of an organisation is the product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organisation's health and safety management. Organisations with a positive safety culture are characterised by communications founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficacy of preventive measures
Guldenmund (2000)	Those aspects of the organisational culture which will impact on attitudes and behaviour related to increasing or decreasing risk
Hale (2000)	The attitudes, beliefs and perceptions shared by natural groups as defining norms and values, which determine how they act and react in relation to risks and risk control systems

Key elements of safety culture definitions

- It is something that people share
- Organizational rather than individual level construct
- It is multi faceted and complex
- Includes values, attitudes, beliefs, norms practices related to risk and safety
- It influences safety practices and behavior

Safety culture threats
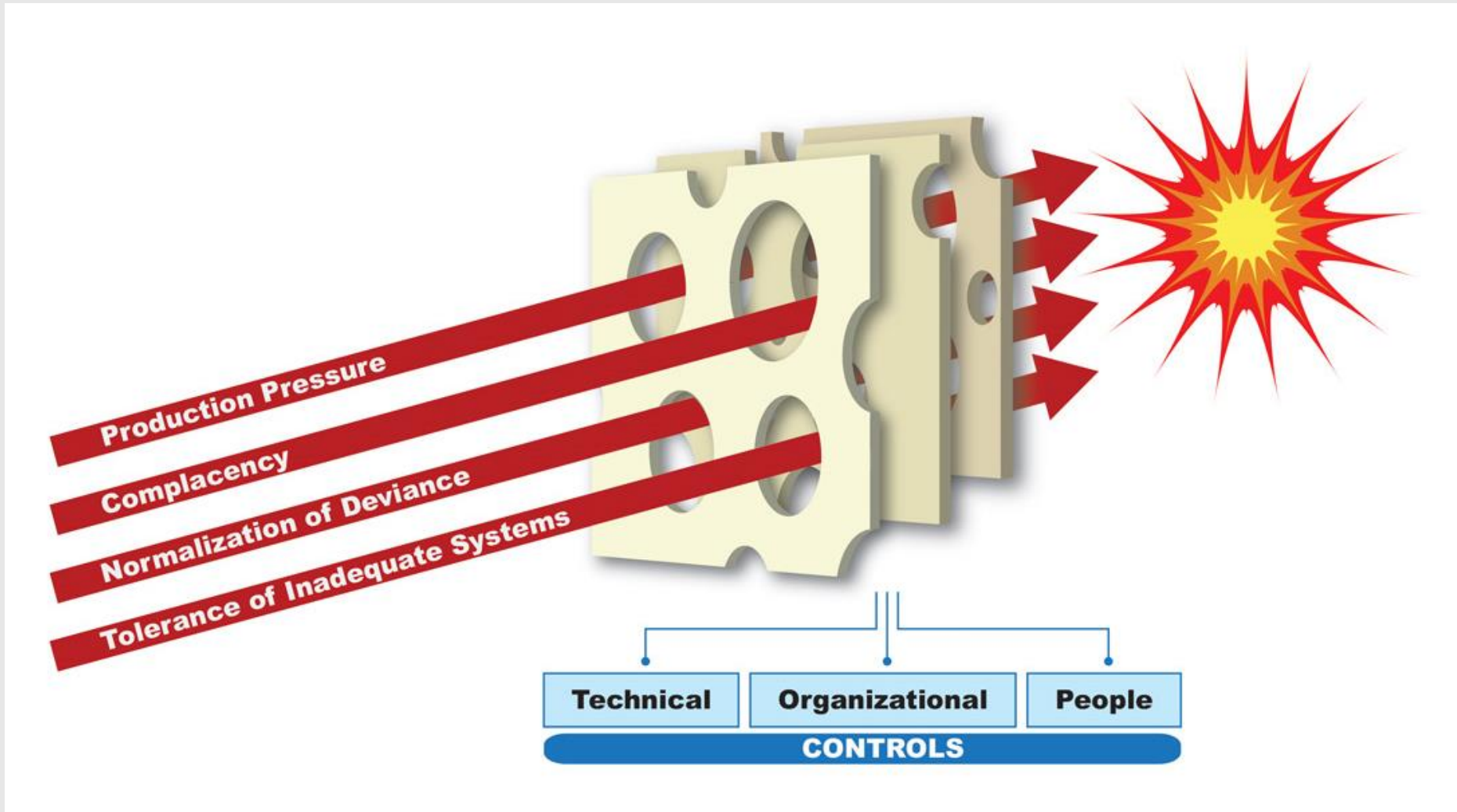
Graphic courtesy of the NEB

Safety culture and disasters

- Reviewed 17 offshore disasters to identify cultural causal factors
- 14 disasters contained cultural causes
  - Tolerance of inadequate systems and resources (identified 10 times)
  - Normalization of deviance, (identified 9 times)
  - Complacency, (identified 8 times)
  - Work pressure/ cost (identified 4 times)

Regulatory challenge

- Need to be able to identify duty holders with cultures that increase the risk of disaster by:
  - Understanding the complex nature of culture and how it influences risk
  - Be able to identify cultural warning signs
 - Influence duty holders to address safety culture

Measurement issues

- Abstract construct, cannot measure
- Overuse of the term
- Diverse range of approaches
- Similar to other constructs (e.g., safety climate)
- Incentives for stakeholders to claim to be measuring safety culture

Good safety culture indicators

- Accurate
  - Direct relationship with system risk
  - Difficult to manipulate
- Predictive
  - Related to future system states and performance
- Current
  - Real time information

Iceberg model
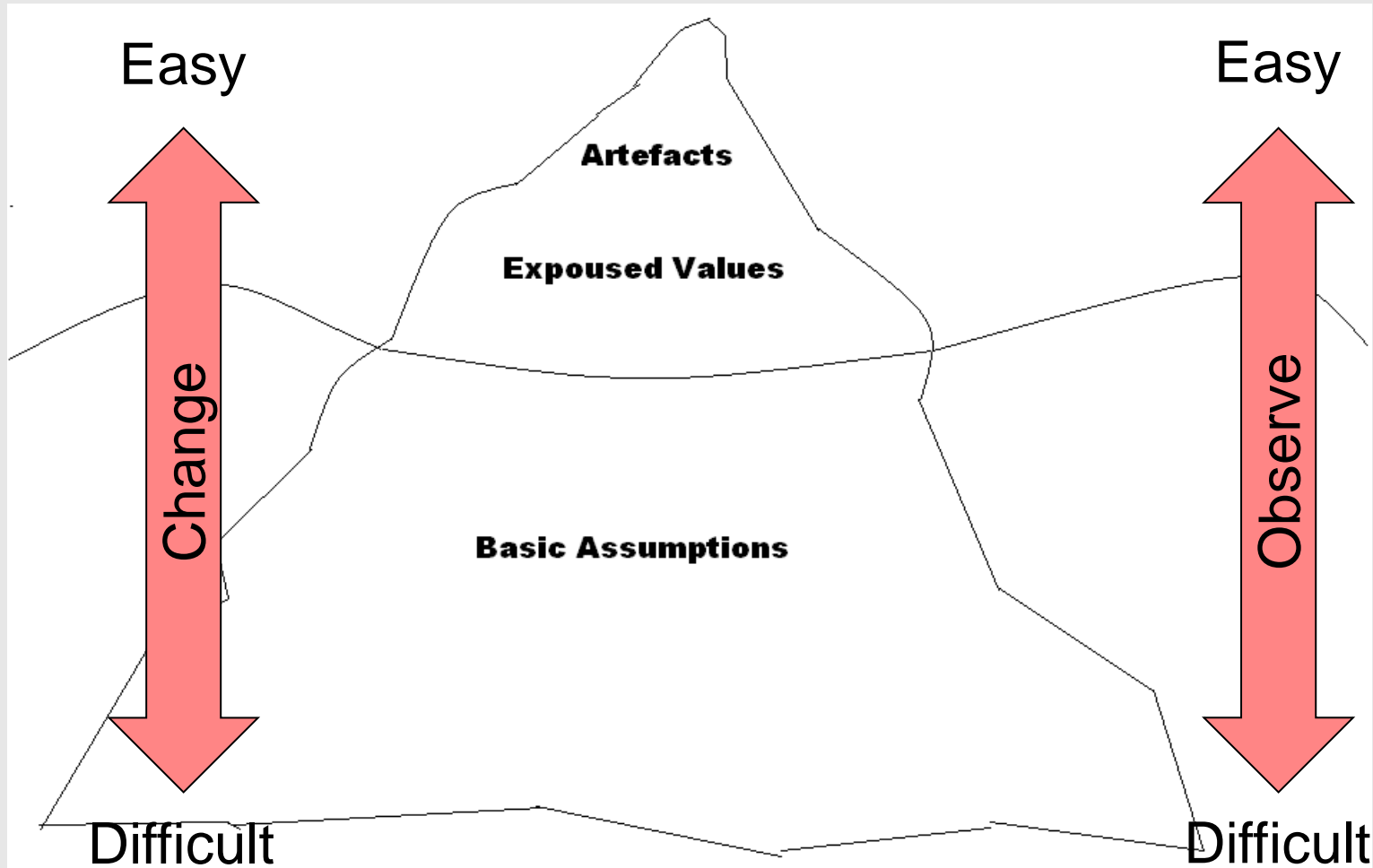
Illusion of objectivity

- Numbers are not objective
- Artefacts can deceive
- Indicators become distorted
  - Goodhart's Law:

When a measure becomes a target, it ceases to be a good measure

Summary

- Safety culture is not real, yet important
- Avoid simplistic approaches
  - Beware of delusion of objectivity
- Develop a sophisticated understanding of safety culture
- Seek ways to identify the presence of safety culture threats

Thank you

SAINT MARY'S UNIVERSITY SINCE 1802

One University. One World. Yours.

References

- Alvensson, M. & Sveningsson, S. (2008) *Changing Organizational Culture: Cultural change work in progress.* Routledge, New York

- Avruch, K. (1998). *Culture & conflict resolution.* Washington, DC: United States Institute of Peace Press.

- Guldenmund, F. W., Ellenbroek, M., & van den Hende, R. (2006). Organizational culture

- Gudbjörg Erlingsdottir, Anders Ersson, Jonas Borell, Christofer Rydenfält, (2018) "Driving for successful change processes in healthcare by putting staff at the wheel", Journal of Health Organization and Management, Vol. 32 Issue: 1, pp.69-84, https://doi.org/10.1108/JHOM-02-2017-0027

- Martin, J. (2002). *Organizational culture: mapping the terrain.* Thousand Oaks, CA: Sage Publications.

- Schein, E.H. (1985). *Organizational Culture and Leadership.* CA: Jossey-Bass.

- Westrum, R. (2004). A typology of organisational cultures. *Quality and Safety in Health Care,* 13(2), ii22-27.

SAINT MARY'S
UNIVERSITY SINCE 1802
One University. One World. Yours.

Paul Schulman

Center for Catastrophic Risk Management
University of California, Berkeley

Assessing Organizational Safety Culture: A Regulatory Challenge

Paul Schulman

Center for Catastrophic Risk Management
University of California, Berkeley

CPUC R.21-10-001 Safety Culture Assessment OIR Kickoff Workshop

March 11, 2022

What is safety culture?

- "The safety culture of an organisation is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organisation's health and safety management." (U.K. Health and Safety Executive, 1993)

- Safety Culture "is ... a collection of beliefs, perceptions, and values that all employees share in relation to the risks that exist while conducting operations within an organization. It is what each person believes about the importance of safety and how he or she contributes in light of that belief. It is about understanding what risks are associated with the job, and what your responsibility is regarding that risk." (FAA Safety Briefing, 2019)

A Foundation of a Safety Culture

- A shared conception that "safety" is more than an absence of harmful events and the failure of things to go wrong.

- A conception of safety as a set of design and practice-based processes that produces successful outcomes.
  "Safety is the continuous production of dynamic non-events"
  (Karl Weick)

- A stress on the importance of continual attention to precursor conditions and leading indicators of the integrity of these dynamic processes, not simply assuming that an interval without accidents and failures is a confirmation of safety. ("It's the accident out ahead we always have to worry about.")

A Foundation of a Safety Culture (2)

Further, "Safety" is perceived as more than the mitigation of risk:

- "Safety is more than the absence of risk; it requires specific systemic enablers of safety to be maintained at all times to cope with the known risks, [and] to be well prepared to cope with those risks that are not yet known and to address the natural 'erosion' of risk controls over time ."

  (Aviation Safety Management International Collaboration Group, 2013)

Elements of a safety culture*

1. Leadership commitment to Safety Values and Actions
2. Prompt Problem Identification and Resolution
3. Personal Responsibility for Safety
4. Safety is Embedded in Work Processes
5. Continuous Learning
6. An Environment for Raising Concerns
7. Effective Safety Communication Across Tasks and Levels
8. Respectful Work Environment
9. A Questioning Attitude
10. Decision making is Systematic, Rigorous and Thorough

* From the Institute of Nuclear Power Operators (INPO) and the Nuclear Regulatory Commission (NRC)

Role of safety culture in organizational behavior and safety outputs?

- Safety "culture" as less a noun than an adverb: it refers, as a modifier, to how things are done ("safely") in the process of producing outputs while preventing accidents.

- Safety culture is a background condition that:

  - provides motivation for specific safety promoting behaviors and the reliability of those behaviors (social norms over market norms)

  - sets constraints on individual and collective decisions and actions

  - stabilizes expectations about the behavior of others (e.g. trust)

Safety Culture is at the same time a concept that poses difficulties for managers and regulators

- It is an abstract and intangible process that can be hard to measure, assess and control

- It has become a fad for the marketing of management prescriptions:
  - (The "three"; "five"; "eight" or "nine" basic and easy steps to a safety culture)

- The ambiguity of the concept can allow for quick explanation of a failure and accident, and the blanket condemnation of the organization in which it occurred

- Then, safety culture assessments conducted after accidents are likely to be subject to distortion through "hindsight bias"

- The concept might also generate external prosecution of organizations or their executives in the aftermath of accidents, as legally accountable for the failure to develop a stronger safety culture

What safety outcomes or metrics should be used by a regulator to evaluate the efficacy of its safety culture assessment process?

- the efficacy of a safety culture assessment process must ultimately be *in the successful development and maintenance of a mature safety culture* within a regulated utility, not its role as a foundation for detecting its failures and imposing punishments.

But there are Real Challenges in Safety Culture Development

- All organizations will have a culture and likely sub-cultures in specialized units and departments.

- The major challenge in promoting a safety culture in an organization may lie in the prior existence of a culture or sub-cultures that have elements antagonistic to those of a safety culture.

- It may take an uncertain time (even a new generation of managers) for a safety culture to displace or successfully modify prior cultures.

- There is also a cost to organizations in adopting a safety culture:
  - it may cost them speed or efficiency or undermine "decisive" leadership
  - it may undermine other goals in production output or capacity
  - it may undermine their effectiveness against competitors who don't have one

Uncertainties in Safety Culture Development

- A safety culture can be a long, unpredictable and "uncertain journey" (National Academy of Sciences, *Strengthening the Safety Culture of the Offshore Oil and Gas Industry* (2016).

- We do not know a standard recipe for how to grow a safety culture within an organization

- An effective, mature safety culture is not achieved once and for all. It is a constant work in progress. Elements in safety culture are perishable.

- There may be different requirements for developing a safety culture and detecting and preventing the degradation of one already in place (Boeing case example)

- An effective safety culture cannot be imposed by top-level executive orders in an organization. Nor can that implementation be off-loaded to a "safety officer". Development must evolve and adjust, correct and improve down through levels and across departments and units.

Typical components in a safety culture assessment process:

1. Survey questionnaires
   - Given to organizational employees across levels, departments and units
     - Description of current values, attitudes, state of practice
     - Generally Likert type scale "Agree/Disagree" with specific descriptive statements

2. Individual or small group employee interviews across levels, departments and units

3. Trained observations of work processes (across units), meetings (general, work planning sessions, shift hand-offs, etc.) and supervisor/employee communications and interactions

4. Document review of procedures, minutes, corrective action reports, etc.

Two Approaches to Safety Culture Assessment

1. An accountability, responsibility and compliance-based approach, features:

   - an adversarial relationship between regulator and utility

   - a focus on measured deficiencies in specific safety culture elements, and timetables for their remedy as part of prescriptive regulation

   - formal legal proceedings surround acceptance of assessment results with possible implications for fines and punishments

   - a standardized assessment process is sought, with the same metrics applied for numerical comparisons across utilities

Two Approaches (Cont'd)

2. A learning-based approach, features:

- a safety culture assessment method is a cooperative research and development process between a utility and its regulator

- the assessment process is conducted in teams that include representatives from the regulator as well as company employees and safety experts

- strategies and methods employed for assessment are themselves assessed as part of a learning and improvement process

- safety culture indicators and measurements are tested and revised for reliability and validity, including their long-term correlation with observable behaviors and safety outcomes

Safety culture assessment will be a challenge for the CPUC

- an important factor in assessing and promoting safety cultures in an organization has been the effectiveness, persistence and skill of its regulator in safety regulation

- the effectiveness of the regulator's own safety culture and safety management system also effects its regulatory impact

  (Nuclear Energy Agency, OECD, "The Safety Culture of an Effective Nuclear Regulatory Body" (OECD, 2016).

  https://www.oecd-nea.org/upload/docs/application/pdf/2019-12/7247-scrb2016.pdf)

- adding safety culture assessment is an exercise in "regulating the intangible" – a challenge for adversarial and prescriptive regulation

Safety Culture Assessment Challenges (2)

- Effective safety culture regulators in this country (NRC, FAA) and in Europe (Norwegian Petroleum Safety Authority; Swedish Radiation Safety Authority; U.K. Health and Safety Executive) have several elements in common:

  - Safety is their primary, if not exclusive, mission: they do not have to regulate prices, employment law, or environmental and social justice

  - The regulatory safety purview for each is most often confined to a limited set of technologies and their associated industries, e.g. aviation, nuclear power, offshore drilling, or marine, rail or road transport

  - These regulatory agencies have their own in-house expertise on safety management and culture. Many of them do their own safety culture assessments or issue guidelines for outside culture assessment teams

Safety Culture Assessment Regulatory Challenges (3)

- Effective safety culture regulators have a significant inspection workforce – with training in safety culture and safety management – whose personnel make frequent visits to sites.

- These inspectors can add careful, trained observational information to safety culture assessments

- The CPUC might want to consider these challenges in addition to the potential overlap of its own safety culture assessments to those of the Office of Energy Infrastructure Safety. How about a public independent, expert safety culture and SMS assessment unit tasked by both agencies to do their assessments? In the California Council on Science and Technology?

Useful Guidance Documents on Safety Culture Assessment

1. Nuclear Regulatory Commission, "Guidance for Conducting An Independent NRC Safety Culture Assessment" (https://www.nrc.gov/docs/ML1409/ML14090A072.pdf)
    - Contains elaborate description of roles for safety culture assessors (SCAs) and Inspectors;
    - Checklists on what to look for in support of each of the safety culture elements, and documents to inspect for each. Also guidance for conducting employee interviews.

2. [Aviation] Safety Management Independent Collaboration Group, "Industry Safety Culture Evaluation Tool and Guidance" (https://skybrary.aero/sites/default/files/bookshelf/4630.pdf)
    - Contains elaborate interview questions for both managers and workers on culture elements.
    - Guide from a large international group of regulators, including the FAA

3. Contra Costa County Safety Program, "Guidance Document Section F: Safety Culture Assessments"
       (https://cchealth.org/hazmat/pdf/iso/section_f.pdf)
    - Offers guidance of the psychology of good interview questions and potential sources of bias
    - Section E offers an example of some safety culture survey questionnaire items taken from the panel report on the 2005 BP Texas refinery explosion. (http://cchealth.org/hazmat/pdf/iso/attachment_e.pdf)

4. An alternate example of safety culture survey design can be found in a New South Wales government document:
       (https://safetyrisk.net/wp-content/uploads/2013/10/safety_culture_survey_questionnaire_2291.pdf)

Dom Cooper

BSMS Inc.

SAFETY CULTURE, SAFETY CLIMATE, AND SAFETY CULTURE FRAMEWORKS

Safety Culture and Safety Climate
How do they relate?

Dominic Cooper PhD.
BSMS Inc.
Greencastle, IN, 46135, USA

www.behavioural-safety.com

Safety Culture and Safety Climate Comparison

	Safety Culture	Safety Climate
Construct Level	Macro – Organizations	Micro – Individuals
Stability	Steady, durable, takes longer to change	Transitory, temporary, more amenable to change
Number of Definitions	50 plus	30 plus
Primarily concerned with	Group norms (*the way we do safety around here*)	People's perceptions (*what we think of safety right now*)
Measured By	Variety of methods (e.g. audits, observations, focus groups, document analysis, interviews).	Psychometric surveys that target and aggregate task-level perceptions
Other		Used as a proxy measure of safety culture
Purpose	**To ensure an entities entire operations are conducted as safely as possible**	**To understand employees shared perceptions about the importance of safety in their organization**

Models of Organizational [Safety] Culture

Pyramid:
- Visible Artefacts
- Espoused Values (conscious attitudes)
- Invisible / Unknown Core Basic Assumptions
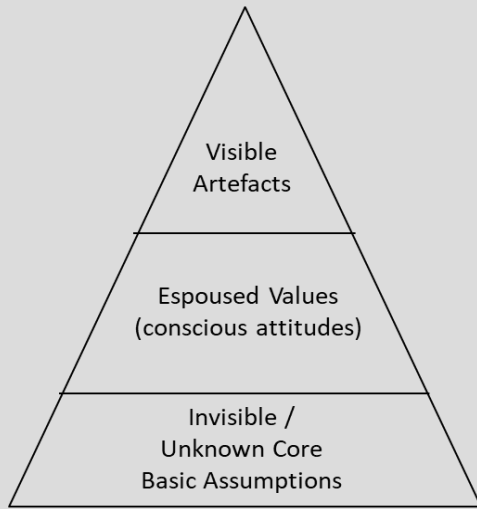
Interpretive Approach (Guldenmund, 2000) Anthropological – seeks to understand

X   Not Empirically linked to actual safety incidents. Used by Euro Control Air Traffic Management + IAEA

- Safety Culture
- Informed Culture
- Learning Culture
- Reporting Culture
- Sub-Culture
- Flexible Culture
- Just Culture
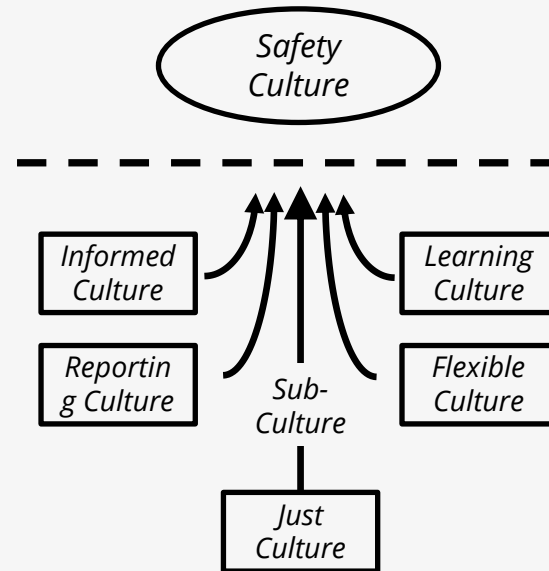
Functionalist Approach (Reason 1998) Managerial – seeks to control

✓   Empirically linked to safety incidents. e.g. Used in Oil & Gas

- Routines
- Stories
- Monitor, Measure & Reinforce
- Underlying Assumptions
- Safety Management Structures
- Symbols
- Values
- Influence
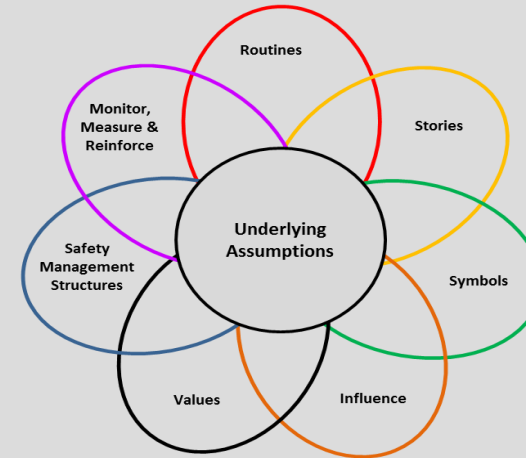
Interpretive + Functionalist Approach (Johnson & Scholes, 1999)

✓ Quantitative adaptation empirically linked to safety incidents in Agriculture, Metal Refining, Mining & Road Transport

- Social Norms HEARTS & MINDS Psychological
- Invisible
- Visible
- Injunctive Norms SAFETY GUIDELINES Situation
- Descriptive Norms DAILY ACTIONS Behavior
- *This link is 80% of safety performance*
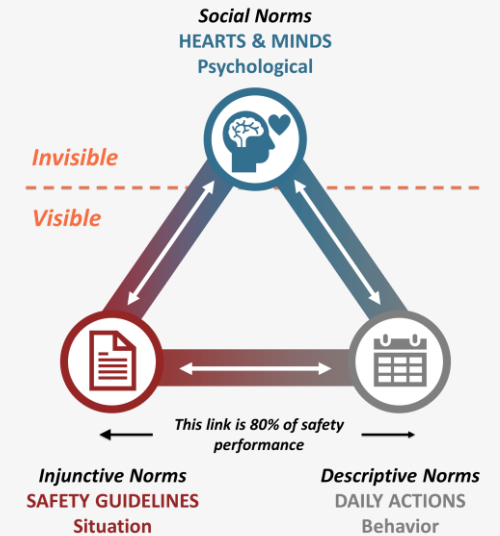
Functionalist Approach (Cooper, 2000)

✓   Empirically linked to safety incidents. e.g. Used by Intl. Air Transport Assoc.

Typical Model of Safety Climate

Primarily concerned with how an individual's perceptions, attitudes, and personality, affect their safety knowledge and motivations, which are thought to influence their safety compliance and safety participation behaviors, which influence safety outcomes.

Internal Psychological Factors

Distal Situation Related Factors

Safety Climate
- Mgt. Commitment
- HRM Practices
- Safety Systems
- Supervisor Support
- Internal Group Processes
- Job Risk
- Work Pressure

- Leadership

Distal Person Related Factors

Personality Characteristics
- Conscientiousness
- Neuroticism
- Extroversion
- Locus of Control
- Propensity for Risk-Taking

Attitudes
- Safety Attitudes
- Job Attitudes

Proximal Person Related Factors
- Safety Motivation
- Safety Knowledge

e.g. Christian, M. S., Bradley, J. C., Wallace, J. C., & Burke, M. J. (2009). Workplace safety: a meta-analysis of the roles of person and situation factors. Journal of applied psychology, 94(5), 1103.

Safety Performance
(Overt Behaviors)

Safety Compliance
- Following Procedures
- Using Protective Equipment
- Practicing Risk Reduction

Safety Participation
- Communication / Voice
- Helping
- Stewardship
- Exercising Rights / Whistleblowing
- Civic Virtue
- Initiating Safety Related Change

Safety Outcomes
- Accidents
- Injuries

Relationships between Safety Culture Models

Cooper
(2000)

| **Social Norms**
(Values, Beliefs, Perceptions) | **Descriptive Norms**
(Behaviors) | **Injunctive Norms**
(Situational) |

Guldenmund
(2000)

Underlying Assumptions

The Paradigm

Org. Structures

Power Structures

Control Structures

Espoused Values

Just Culture

Safety Climate

Stories

Reporting Culture

Informed Culture

Learning Culture

Flexible Culture

Visible Artefacts

Rituals & Routines

Symbols

After Porkka, P. (2016). Functional model for organizational and safety culture. Chemical Engineering Transactions, 48, 907-912.

Johnson & Scholes (1992) Cultural Web

Reason's (1998) safety culture,

Safety Culture Assessment Methods

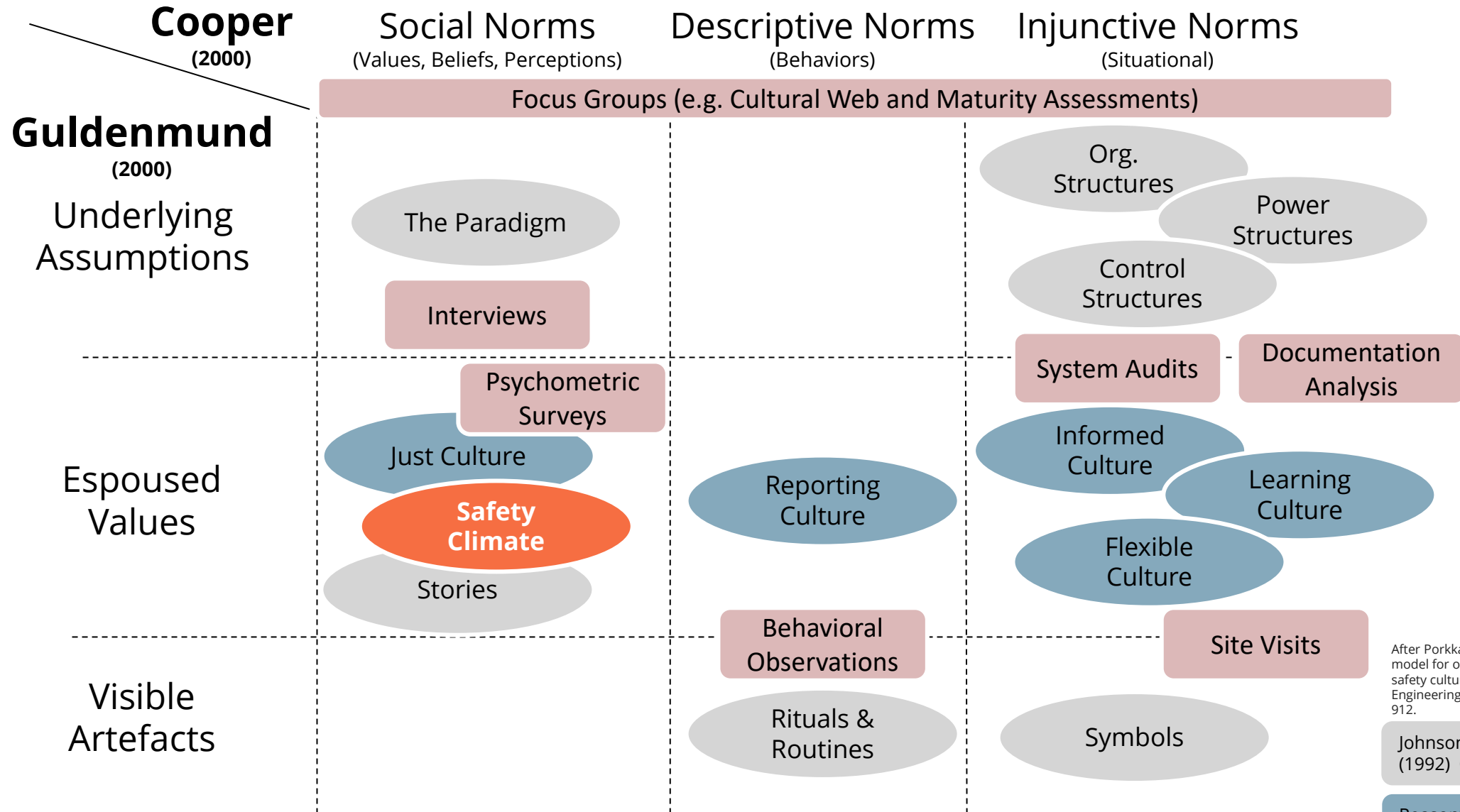| **Cooper** (2000) → **Guldenmund** (2000)	**Social Norms** (Values, Beliefs, Perceptions)	**Descriptive Norms** (Behaviors)	**Injunctive Norms** (Situational)
	Focus Groups (e.g. Cultural Web and Maturity Assessments)		
Underlying Assumptions	The Paradigm; Interviews		Org. Structures; Power Structures; Control Structures
Espoused Values	Psychometric Surveys; Just Culture; **Safety Climate**; Stories	Reporting Culture	System Audits — Documentation Analysis; Informed Culture; Learning Culture; Flexible Culture
Visible Artefacts		Behavioral Observations; Rituals & Routines	Site Visits; Symbols

After Porkka, P. (2016). Functional model for organizational and safety culture. Chemical Engineering Transactions, 48, 907-912.

Johnson & Scholes (1992) Cultural Web

Reason's (1998) safety culture,

Common Safety Culture & Safety Climate Targets

Academic Safety Climate Inquiries e.g.
- Clarke, 2000
- Flin et al., (2000)
- Mearns et al, 2003

Public Inquiries into Catastrophes e.g.
- Macondo (2010),
- Texas City (2005)
- Three-mile Island (1979)

Significant Safety Issues

- Profit Before Safety
- Just Culture

Social Norms

- Safety Leadership
- Managerial Non-compliance

Descriptive Norms

- Safety Communications
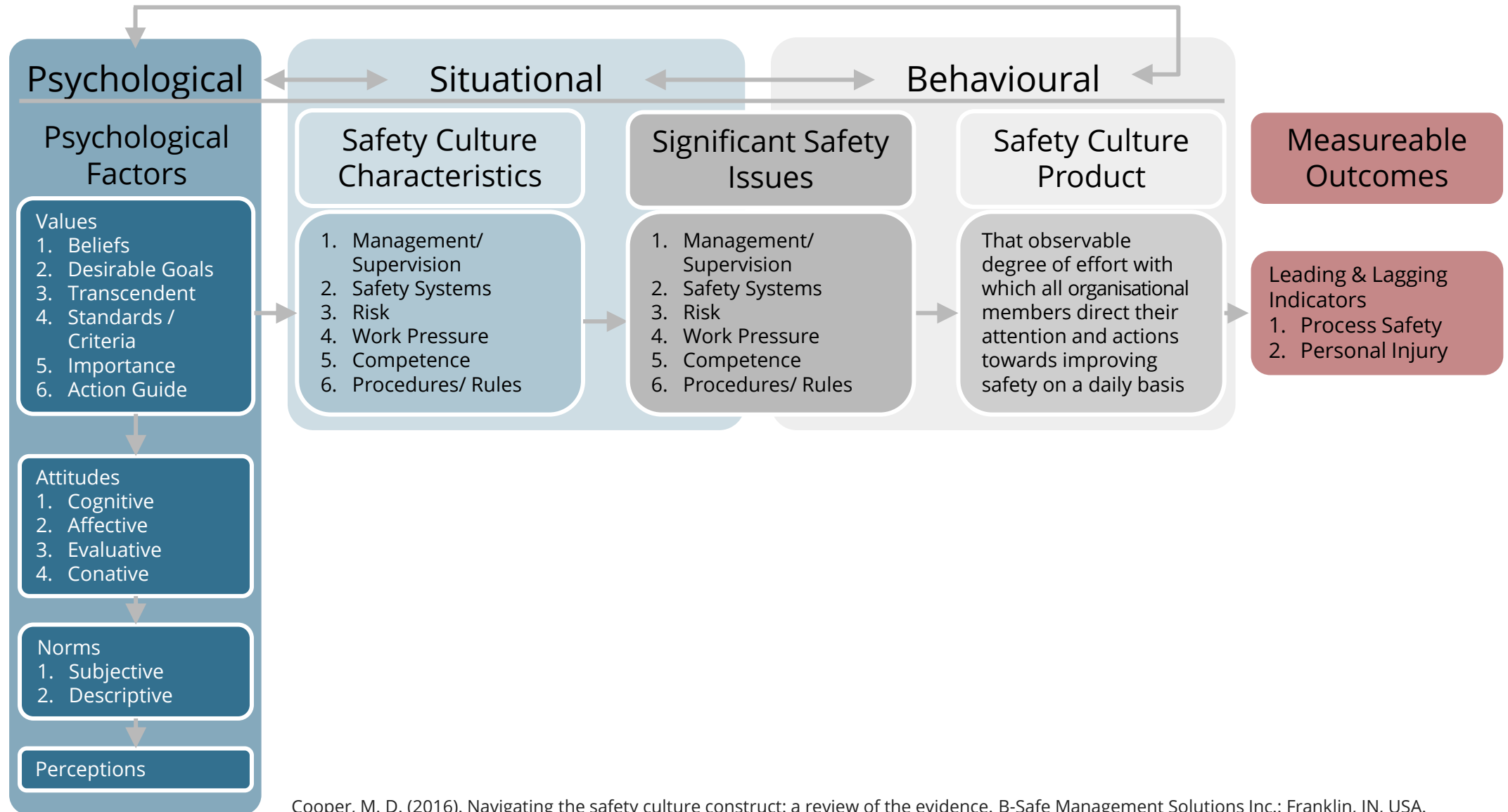- Safety Competence
- Lessons Learned

Injunctive Norms

Regulator Loss of Primary Containment (LOPC) Studies e.g.
- HSE (2003)
- European Commission (2012)
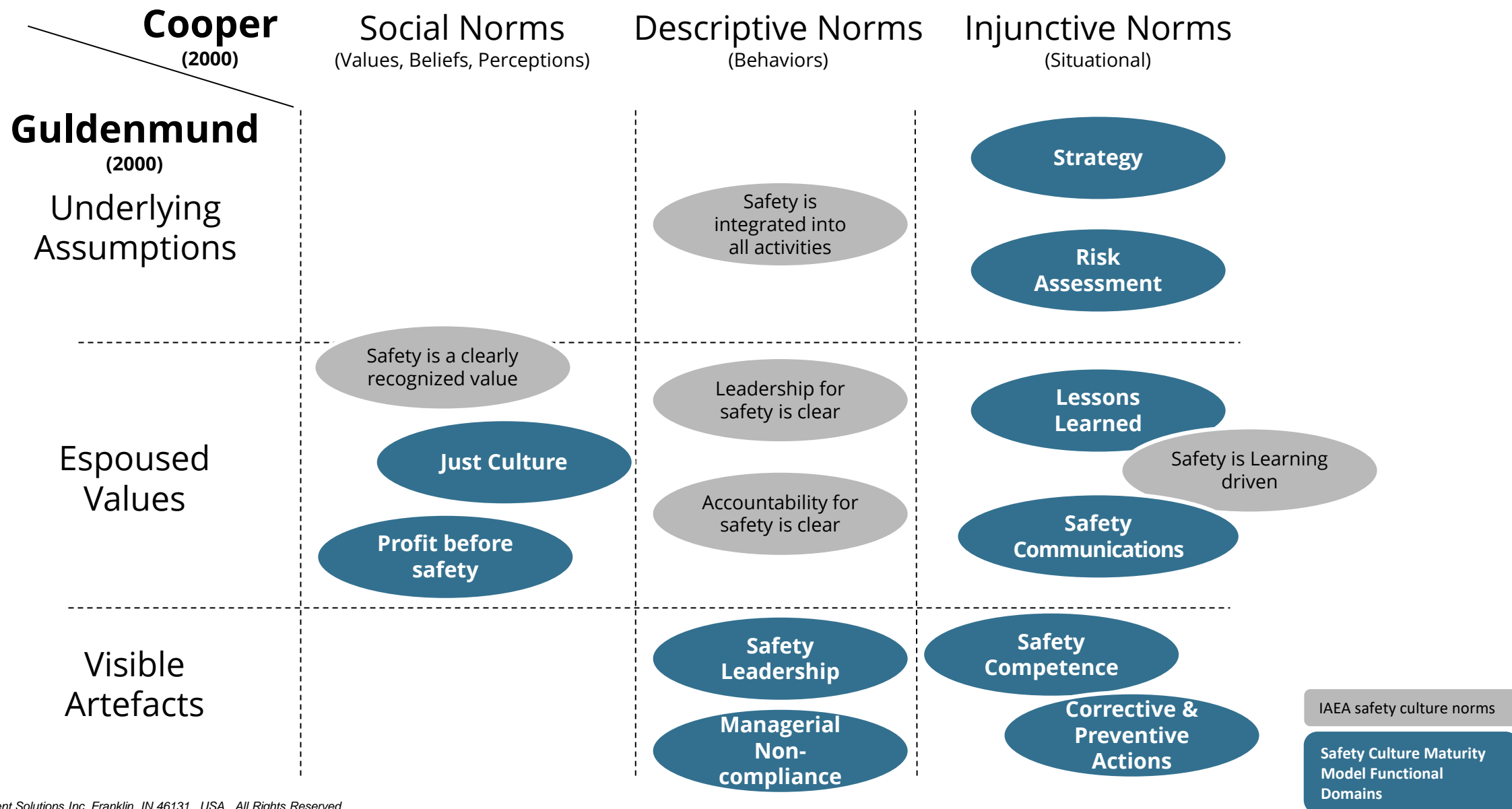- Dutch Labour Inspectorate's Directorate for Major Hazard Control (2013)

Revised Safety Culture Model
(Cooper, 2016)

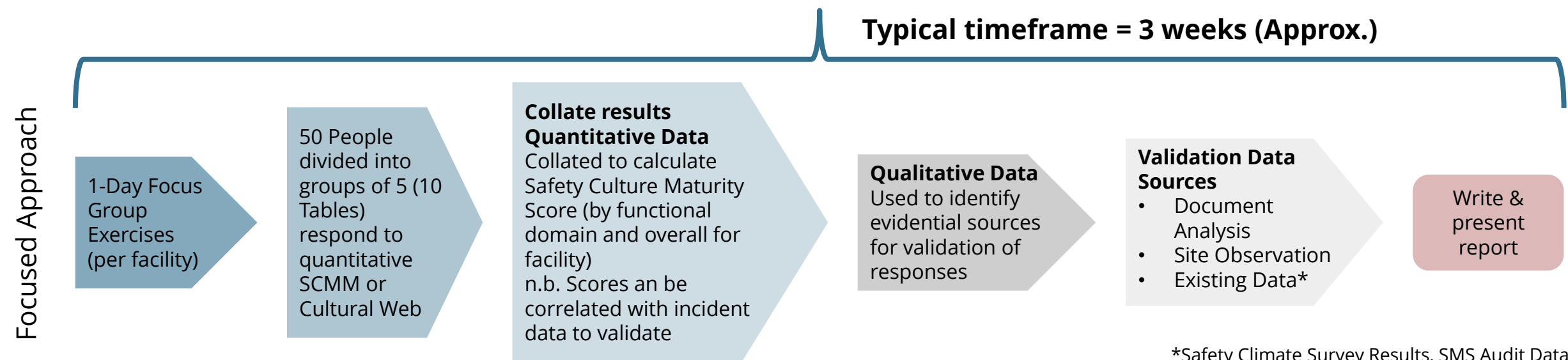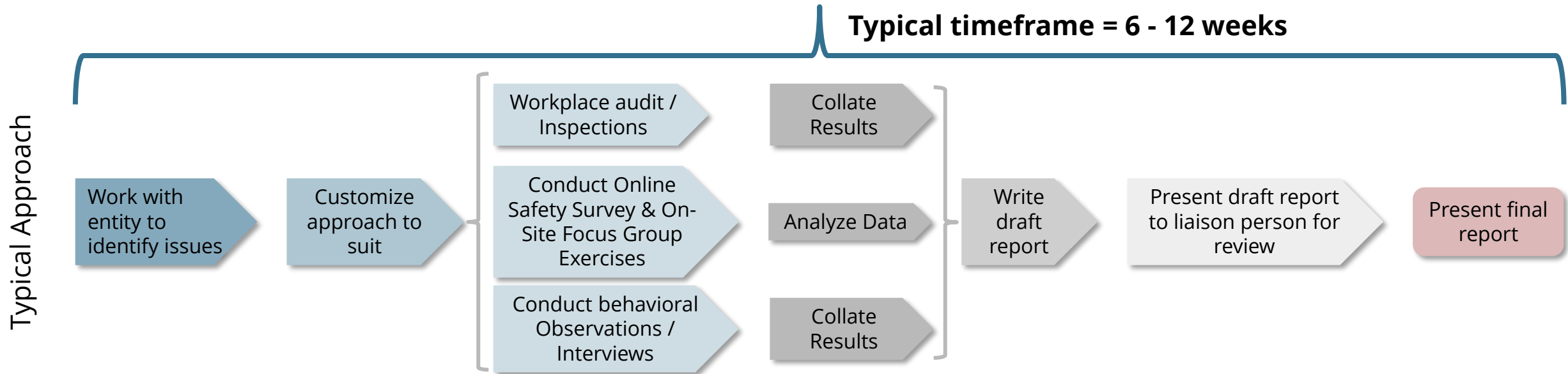| Psychological	Situational		Behavioural	
Psychological Factors	**Safety Culture Characteristics**	**Significant Safety Issues**	**Safety Culture Product**	**Measureable Outcomes**
Values 1. Beliefs 2. Desirable Goals 3. Transcendent 4. Standards / Criteria 5. Importance 6. Action Guide	1. Management/ Supervision 2. Safety Systems 3. Risk 4. Work Pressure 5. Competence 6. Procedures/ Rules	1. Management/ Supervision 2. Safety Systems 3. Risk 4. Work Pressure 5. Competence 6. Procedures/ Rules	That observable degree of effort with which all organisational members direct their attention and actions towards improving safety on a daily basis	**Leading & Lagging Indicators** 1. Process Safety 2. Personal Injury
Attitudes 1. Cognitive 2. Affective 3. Evaluative 4. Conative				
Norms 1. Subjective 2. Descriptive				
Perceptions				

Cooper, M. D. (2016). Navigating the safety culture construct: a review of the evidence. B-Safe Management Solutions Inc.: Franklin, IN, USA.

IAEA Safety Culture Assessment & BSMS SCMM

Cooper (2000)

	Social Norms (Values, Beliefs, Perceptions)	**Descriptive Norms** (Behaviors)	**Injunctive Norms** (Situational)
Guldenmund (2000) **Underlying Assumptions**		Safety is integrated into all activities	Strategy; Risk Assessment
Espoused Values	Safety is a clearly recognized value; Just Culture; Profit before safety	Leadership for safety is clear; Accountability for safety is clear	Lessons Learned; Safety is Learning driven; Safety Communications
Visible Artefacts		Safety Leadership; Managerial Non-compliance	Safety Competence; Corrective & Preventive Actions

IAEA safety culture norms

Safety Culture Maturity Model Functional Domains

Safety Culture Assessment Processes

Typical timeframe = 6 - 12 weeks

Typical Approach

Work with entity to identify issues

Customize approach to suit

Workplace audit / Inspections

Conduct Online Safety Survey & On-Site Focus Group Exercises

Conduct behavioral Observations / Interviews

Collate Results

Analyze Data

Collate Results

Write draft report

Present draft report to liaison person for review

Present final report

Typical timeframe = 3 weeks (Approx.)

Focused Approach

1-Day Focus Group Exercises (per facility)

50 People divided into groups of 5 (10 Tables) respond to quantitative SCMM or Cultural Web

Collate results Quantitative Data
Collated to calculate Safety Culture Maturity Score (by functional domain and overall for facility)
n.b. Scores an be correlated with incident data to validate

Qualitative Data
Used to identify evidential sources for validation of responses

Validation Data Sources
• Document Analysis
• Site Observation
• Existing Data*

Write & present report

*Safety Climate Survey Results, SMS Audit Data Results & Behavioral Safety Scores / Data

5 MINUTE BREAK – RETURN AT 10:20AM

Claudine Bradley
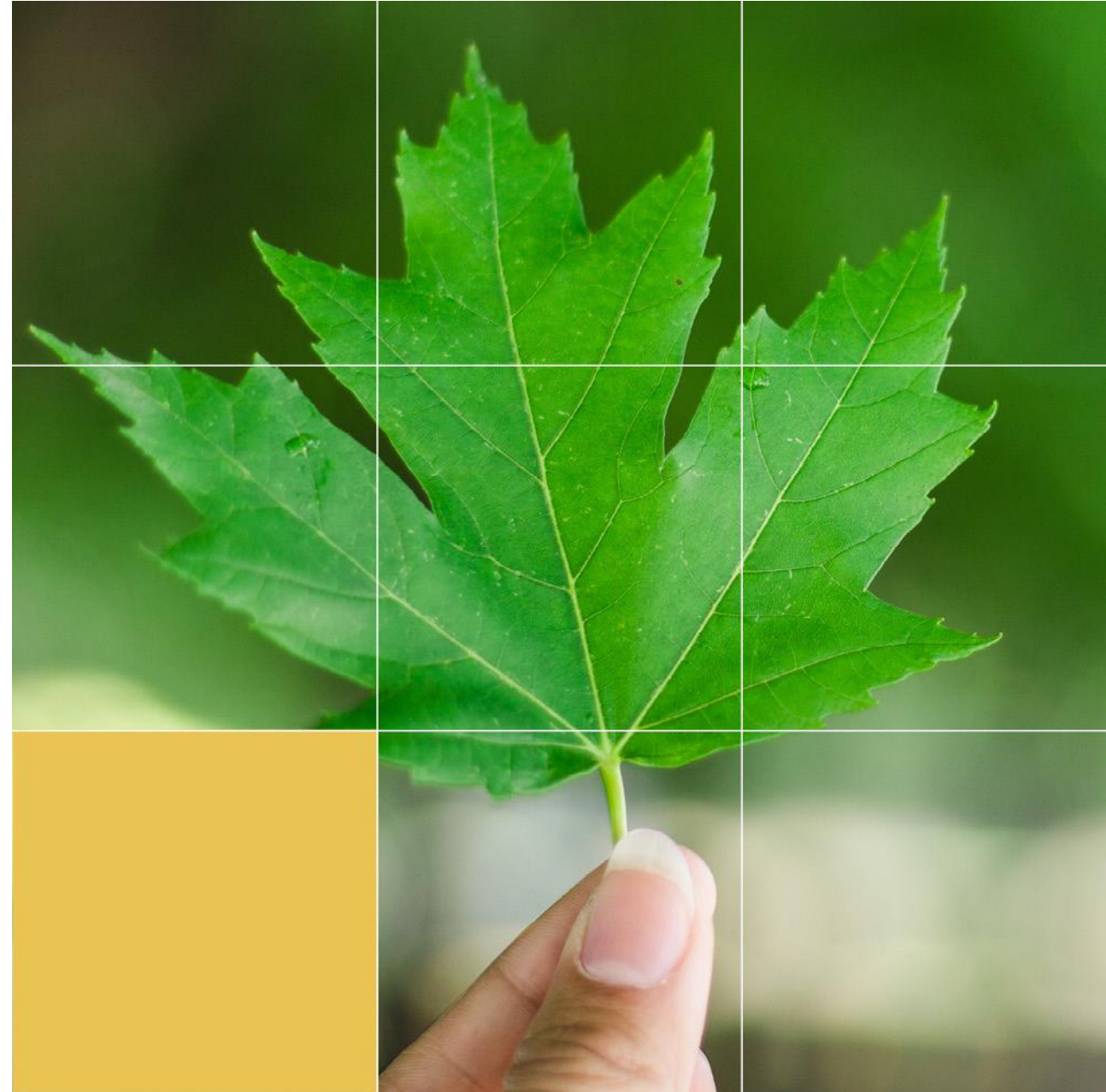
Canada Energy Regulator

Who is the Canada Energy Regulator?

- We are the Canada Energy Regulator (CER) formerly known as the National Energy Board.

- Head office is situated in Calgary, with regional offices in Montréal, Vancouver and Yellowknife

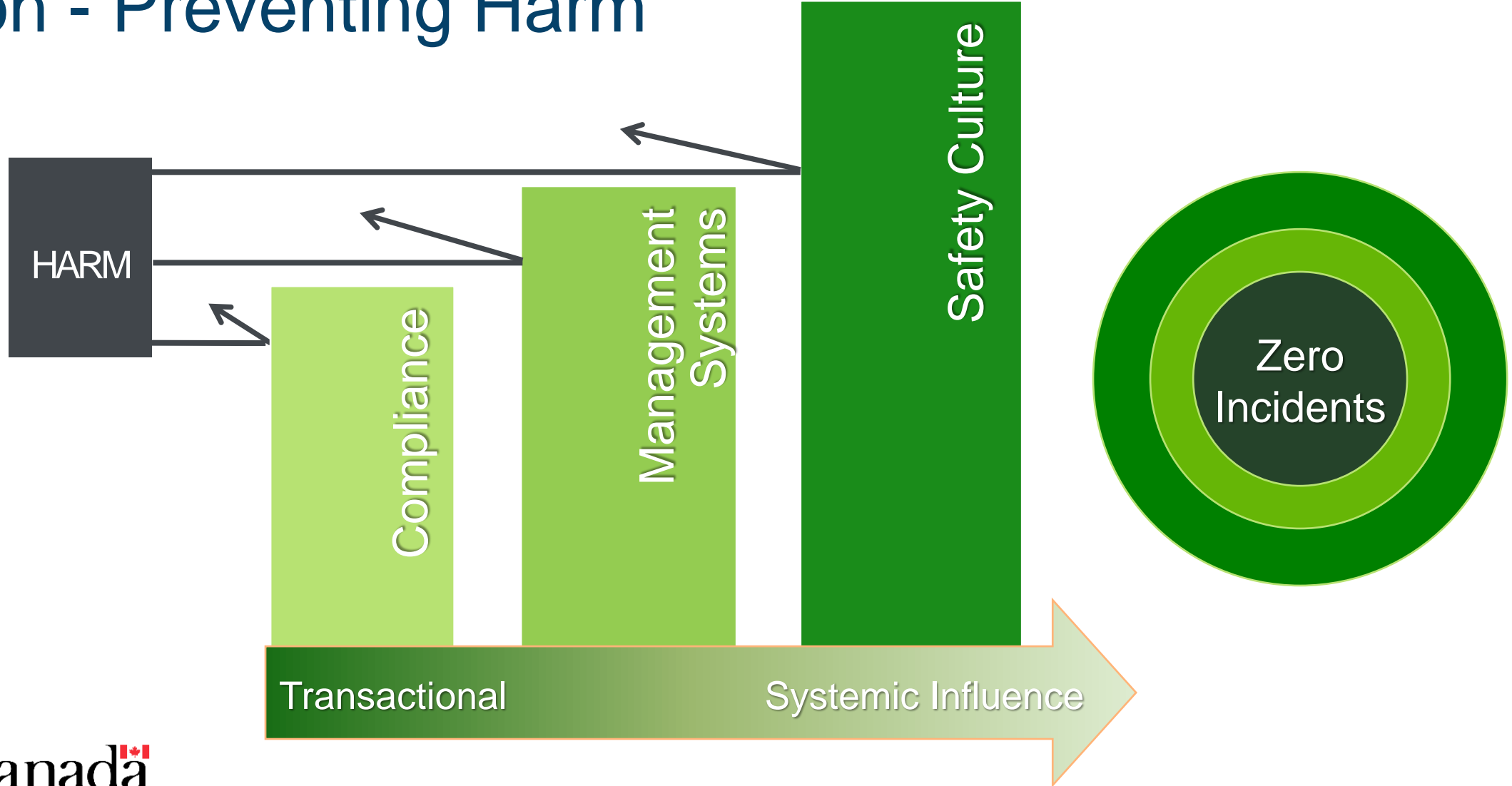- We have six decades of experience overseeing energy companies and projects in Canada.

We regulate…

- 73,000 km of inter-provincial and international oil and gas pipelines;

- 1400 km of international power lines;

- offshore exploration and production in Canada's arctic;

- Recently granted oversight for future offshore renewables

Safety Culture Advancement Philosophy

- Not explicitly codified in regulation by design

- Focus on system (industry-wide) influence and holistic company performance

- CER positively influences these outcomes through outreach, education and collaboration efforts

- Based on relationship building and trust focused on collective SC learning journey (e.g., regulatory (safety) oversight culture is also an area of concern and feedback)

Expectations of Regulated Companies

- Companies are aware of and understand the role that culture plays in preventing organizational accidents

- Leaders establish and foster a healthy safety culture through their actions and decisions

- Companies build and sustain a positive safety culture while continually scrutinizing their organizations for potential cultural threats

Historical Efforts (2014-2019)

CER Safety Culture Efforts (2014-2019)

- Established North American Regulators Working Group on Safety Culture;

- Released first CER Statement on Safety Culture;

- Developed suite of safety culture indicators following regulatory research project with validation by international experts for industry use;

- Conducted outreach including facilitated workshops with Group 1 companies to promote learning, sharing, and networking;

- Formal and informal collaboration with others (including industry associations, other regulators, NAS)

CER's Safety Culture Framework
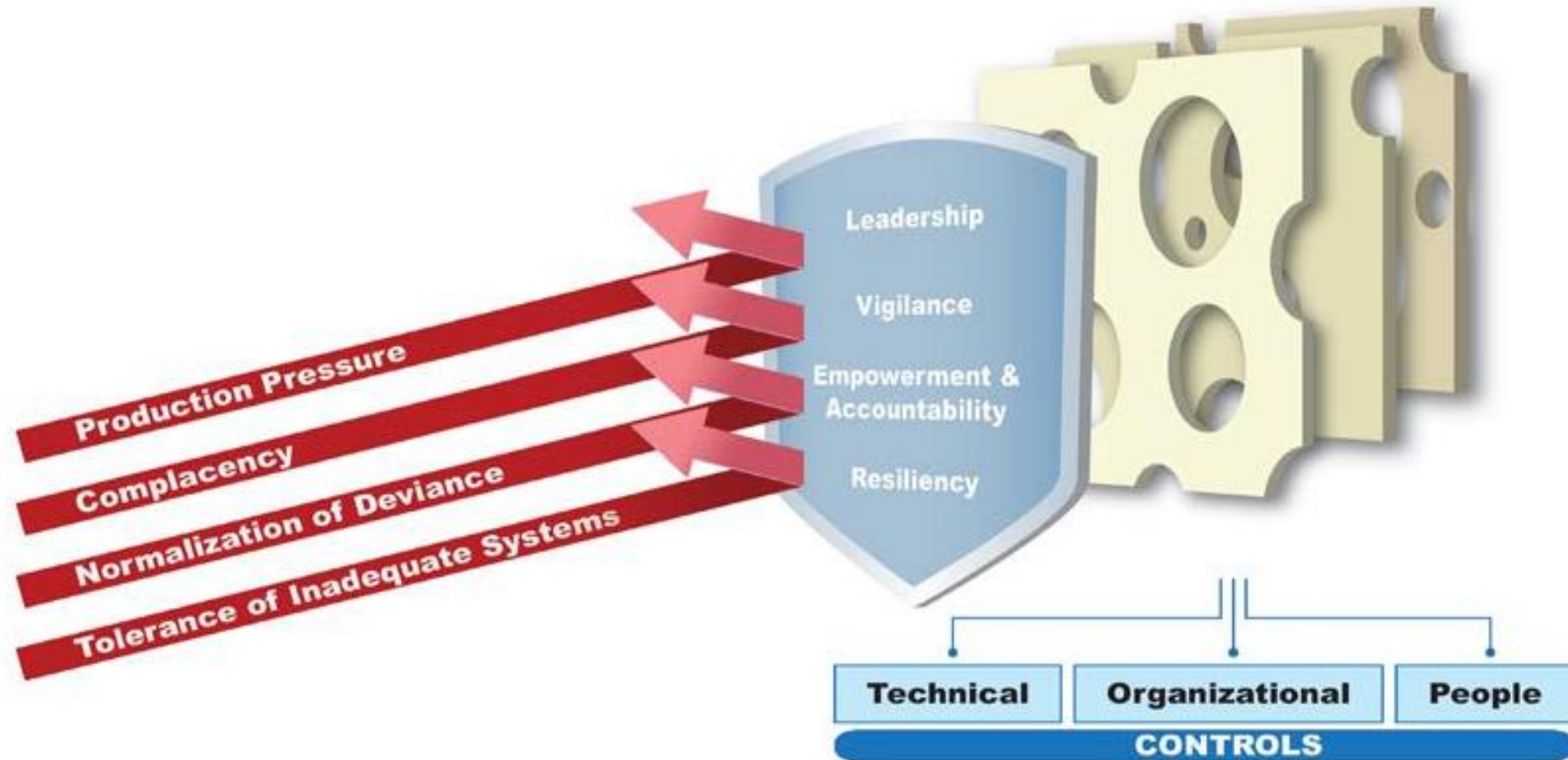
Current Three-Year Strategy (2020-2023)

Current Safety Culture Strategy

SYSTEM INFLUENCE

- Facilitate sharing and learning through collaboration

- Develop and share safety culture improvement guidance and tools

- Evaluate effectiveness of collaboration and guidance/tools

COMPANY PERFORMANCE

- Development of analytics for identifying HOF threats and process for incorporating results into CVA planning

- Annual risk-informed company outreach activities to promote safety culture maturity

Updated Statement on Safety Culture

Advancing Safety in the Oil and Gas Industry:
Statement on Safety Culture (2021)

"The CER articulating expectations of safety culture considerations helps support organizational efforts in this regard."

-Accountable Officer, 2021

Learning Portal Launch

"Additional materials supporting the assessment of safety culture, advances in the science of safety culture, organizational behaviour and psychology… could support the advancement of our program..."

- Accountable Officer, 2021

Other Collaboration Activities

- Group 1 and Group 2 Pipeline Company Safety Culture Workshops

- Canadian Standards Association (CSA) Express Document on Human and Organizational Factors

- National Academy of Sciences *Modernization of the US Offshore Oil and Gas Inspection Program for Increased Agility and Safety Vigilance report*

CER Safety Culture Influence Data (2021)

CER Departmental Results Framework (DRF)

Type of advancement effort described by companies:

- ➢ 37 companies noted program development and implementation
- ➢ 27 companies identified safety culture training
- ➢ 19 companies noted safety culture assessments
- ➢ 12 companies stated safety culture expert consultation

Three Year Trend and Results

Percentage of companies that have allocated resources to promote safety culture advancement	Target	2018	2019	2020	✓ **Upward Trend**
	100%	61%	64%	72%	

➢**65%** indicated CER has contributed to or influenced their organization's safety culture advancement efforts

Links of Interest

CER Safety Culture Homepage: https://www.cer-rec.gc.ca/en/safety-environment/safety-culture/

Safety Culture Statement on Safety Culture: https://www.cer-rec.gc.ca/en/safety-environment/safety-culture/statement-safety-culture/index.html

Safety Culture Indicators Research Project: https://www.cer-rec.gc.ca/en/safety-environment/safety-culture/statement-safety-culture/index.html

Safety Culture Learning Portal: https://www.cer-rec.gc.ca/en/safety-environment/safety-culture/safety-culture-learning-portal/index.html

www.cer-rec.gc.ca

1-800-899-1265

Twitter: @CER_RCE | @RCE-CER
LinkedIn: @Canadian-Energy-Regulator | @la-Régie-canadienne-de-l'énergie
Facebook: @CanadianEnergyRegulator | @RégieCanadienneDeLEnergie

Canada

Christopher A. Hart

Hart Solutions LLC

Former Chairman of National Transportation Safety Board

The Challenge

–   Declining fatal accident rate stopped declining, early 1990's

–   Volume predicted to double in 15-20 years

–   Industry concerned that twice as many fatal accidents would scare the flying public

–   Implemented CAST, Commercial Aviation Safety Team, a voluntary industry-wide collaborative program that has not been fully replicated in any other industry before or since

–   Collaboration includes airlines, manufacturers, airports, pilots, air traffic controllers, and the regulator (FAA)

–   Note: Effectively implemented SMS without mentioning SMS

Complex System of Subsystems

– More System *interdependencies*
- Large, complex, interactive system
- Often tightly coupled
- Hi-tech components
- Continuous innovation
- Ongoing evolution

– Safety issues are more likely to involve *interactions between parts of the system*

AIRLINES

PILOTS

CONTROLLERS

The System

MECHANICS

MANUFACTURERS

INVESTIGATOR

REGULATOR
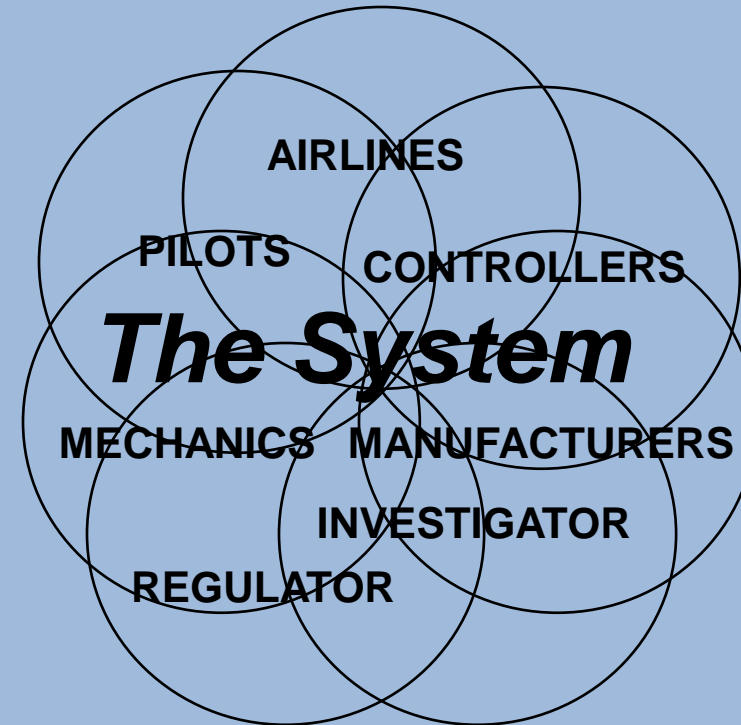
The Solution: System Think

Understanding how an

improvement in one subsystem

of a complex system may

affect other subsystems

within that system

"System Think" via Collaboration

Bringing all parts of a complex system together to collaboratively

- Identify potential issues

- *PRIORITIZE* the issues

- Develop solutions for the prioritized issues

- Evaluate whether the solutions are
  - Accomplishing the desired result, and
  - Not creating unintended consequences

Objectives:

Make the System

(a) Less
error prone
and

(b) More
error tolerant

New Paragidm

How It Is Now . . .

You are highly trained

and

If you did as trained, you would not make mistakes

so

You weren't careful enough

so

You should be PUNISHED!

How It Should Be . . .

You are human

and

Humans make mistakes

so

Let's *also* explore why the system allowed, or failed to accommodate, your mistake

and

Let's IMPROVE THE SYSTEM!

Aviation Collaboration: Commercial Aviation Safety Team

CAST engaged *all* participants in identifying problems and developing and evaluating remedies

– Airlines

– Manufacturers
  • *With the systemwide effort*
  • *With their own end users*

– Air Traffic Organizations

– Labor
  • *Pilots*
  • *Mechanics*
  • *Air traffic controllers*

– Regulator(s)

AIRLINES

PILOTS **CONTROLLERS**

The System

MECHANICS **MANUFACTURERS**

INVESTIGATOR
REGULATOR
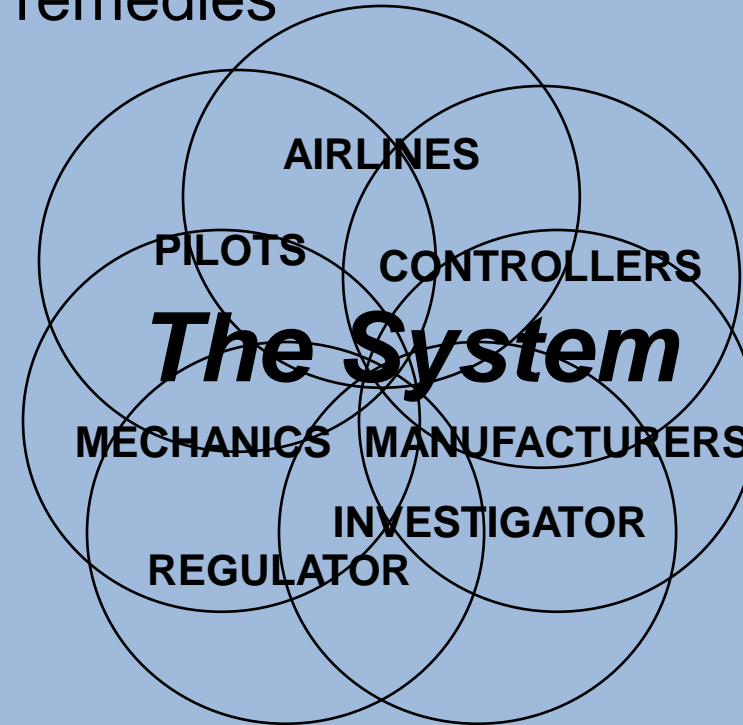
CAST Outcome

83% decrease in fatal accident rate

in *less than ten years*

largely because of

System Think

fueled by

proactive safety information programs

Success Beyond Expectations

– When CAST began, many safety experts believed that aviation was already *very safe and unlikely to improve*

– Collaboration also
  - Improved productivity (which made it sustainable)
  - Reduced the likelihood of *unintended consequences*
  - *Enabled significant improvement without generating any new regulations*

Moral of the Story

Anyone who is involved in

or affected by the *problem*

should be involved in

developing the *solution*

Challenges of Collaboration

– Human nature: "I'm doing great . . . the problem is *everyone else*"

– Participants may have competing interests, e.g.,
- Labor/management issues
- May be potential co-defendants

– Regulator probably not welcome

– Not a democracy
- Regulator must regulate

– Requires all to be willing, *in their enlightened self-interest,* to leave their "me first zone" and think of the System

Major Paradigm Shift

- Old: The regulator identifies a problem, develops solutions
  - Industry skeptical of regulator's understanding of the problem
  - Industry fights regulator's proposed solution and/or implements it begrudgingly

- New: Collaborative "System Think"
  - Industry involved in identifying problem
  - Industry "buy-in" re solutions because everyone had input, everyone's interests considered
  - Prompt and willing implementation
  - Interventions evaluated . . . *and tweaked as needed*
  - Solutions probably more effective and efficient, improved productivity enhances sustainability
  - Unintended consequences much less likely
  - Safety level well above "floor of regulatory compliance," hence no new regulations generated
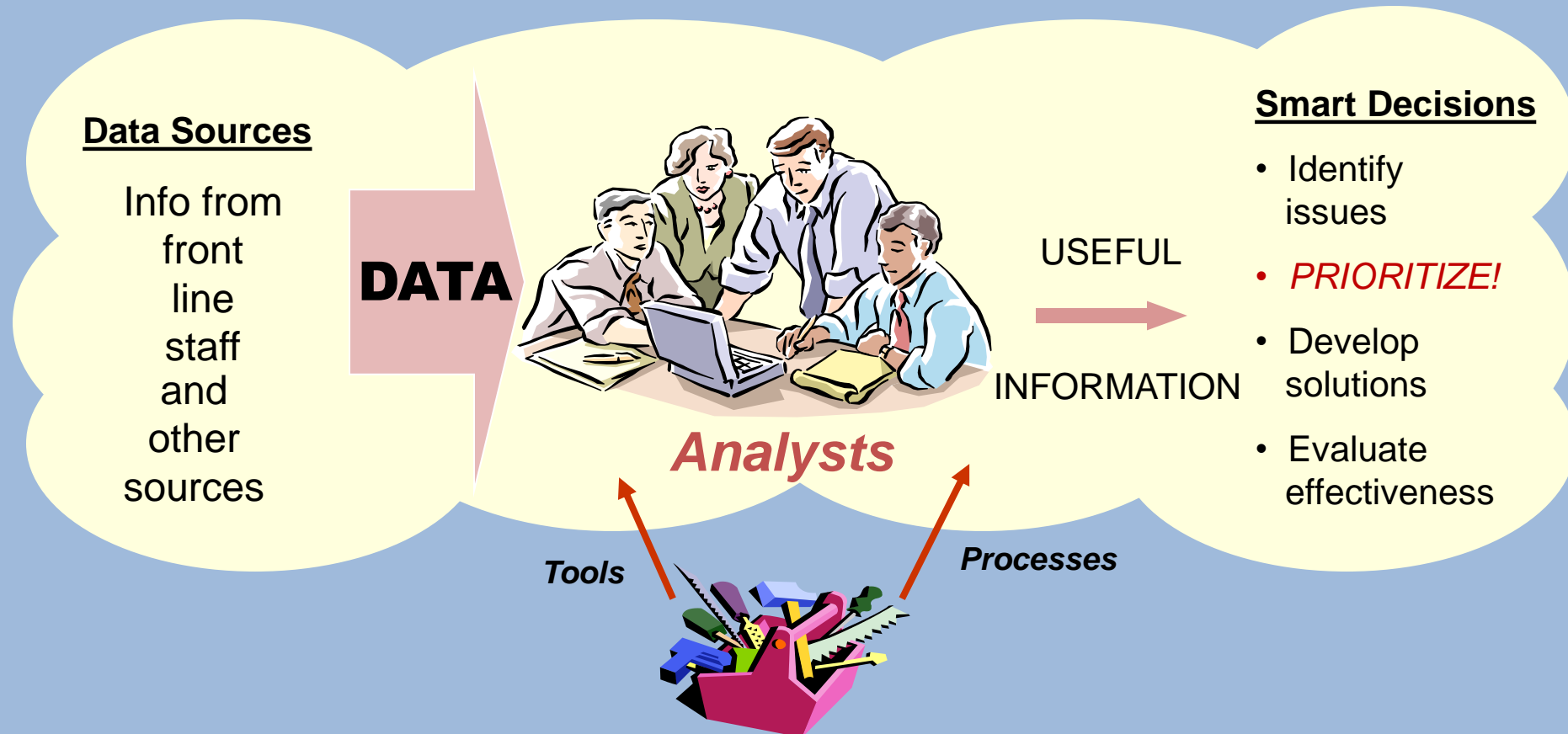
Fuel for the Collaboration

- Collecting,

- Analyzing, and

- Sharing

Information

From Data to Useful Information

Developing tools and processes to convert large quantities of data into useful information

Data Sources

Info from front line staff and other sources

DATA

Analysts

USEFUL

INFORMATION

Tools

Processes

Smart Decisions

- Identify issues
- *PRIORITIZE!*
- Develop solutions
- Evaluate effectiveness

Applicability of Collaborative Approach

- Other Industries in Potentially Hazardous Endeavors
  - Other Modes of Transportation
  - Nuclear Power
  - Petroleum Exploration, Refining
  - Chemical Manufacturing
  - Healthcare
  - Financial Industries
  - Other

- Workplace Safety, All Industries

Conclusions

–   *With a healthy safety culture, safety is not a box to be checked, but a way of doing business every day*

–   *A healthy safety culture can be challenging to implement and sustain*

–   *The airline industry has shown that collaboration can be a way to implement a healthy safety culture*

–   *Collaboration can also help ensure that safety improvement programs also improve productivity, which makes the safety improvements more sustainable*

Thank You!!!

Questions?

Christopher A. Hart
Hart Solutions LLC
chris@hartsolutionsllc.com
202-680-4122

QUESTIONS & PANEL DISCUSSION

11:00am-12:00pm

California Public
Utilities Commission

Commissioner Questions

11:00am-11:15am

Panel Discussion

11:15am-11:45am

Panel Discussion

How do we know that focusing on safety culture leads to improvement?

We understand that there are multiple approaches and models for assessing and understanding safety culture, some of which we heard about today. There are functionalist approaches that strive to engineer and quantify safety culture improvement and interpretive approaches that seek to understand underlying assumptions, beliefs, attitudes, and norms.

- **Considering that the CPUC is exploring this topic for assessment of regulated gas and electric utilities, what do we need to know and measure about an organization's safety culture to identify issues and implement interventions that provide for long term sustainable cultural improvement?**

Audience Questions?

11:45am-12:00pm

Please use chat, Q&A feature, or "raise hand" ✋

California Public Utilities Commission

https://www.cpuc.ca.gov/about-cpuc/divisions/Safety-Policy-Division/Safety-Culture-and-Governance