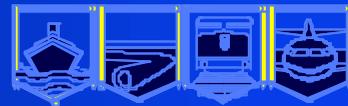


Tools for Safety Management: Considerations for the Design of Occurrence Data

**Maury Hill
Manager, Macro Analysis
Transportation Safety Board of Canada**



ACCIDENT INVESTIGATION

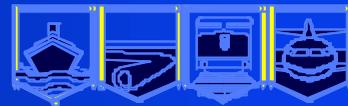
Traditional Approach



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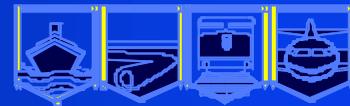
WHAT?

WHEN?

WHO?

WHY?

HOW?



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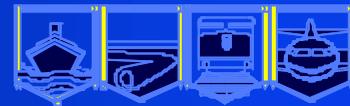
WHEN?

WHO?

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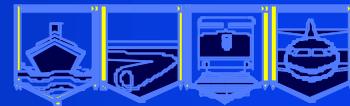
HOW?

Applied to data collection as well





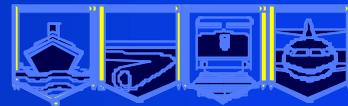
TSB APPROACH





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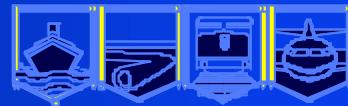
- ◆ Advance Safety through the identification and validation of *Safety Deficiencies* that are found through the investigation process





TSB APPROACH

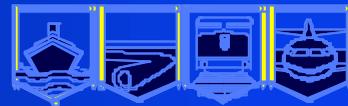
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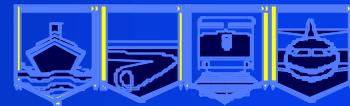


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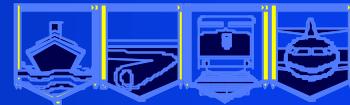
Changes to database



Why Collect?

**Macro
Analysis**

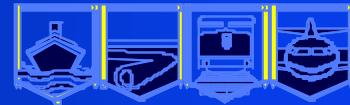
**Occurrence
Assessment**



Why Collect?

**Macro
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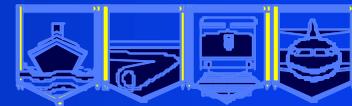
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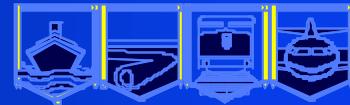


Source of Data

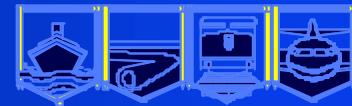
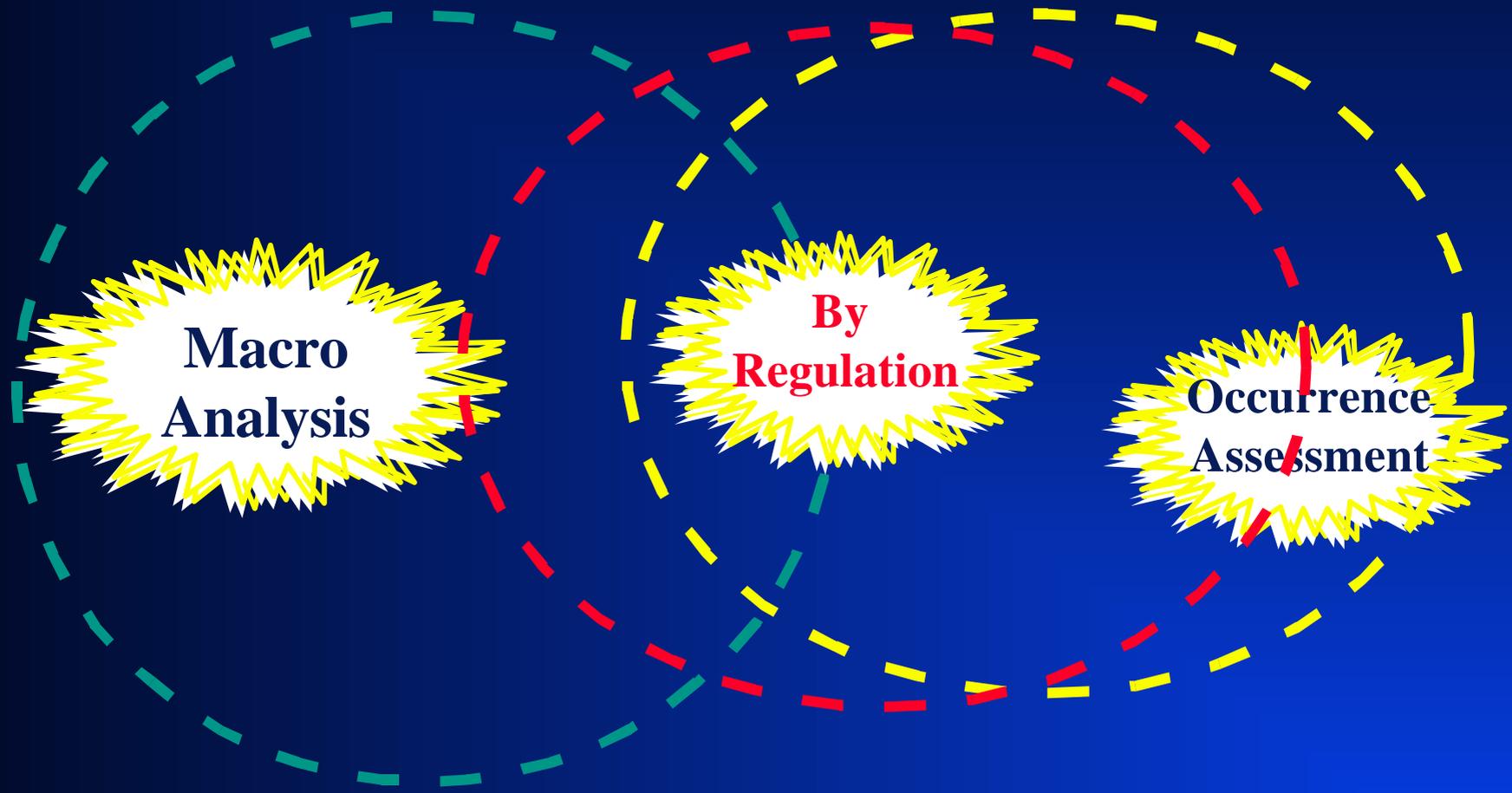
**Macro
Analysis**

**By
Regulation**

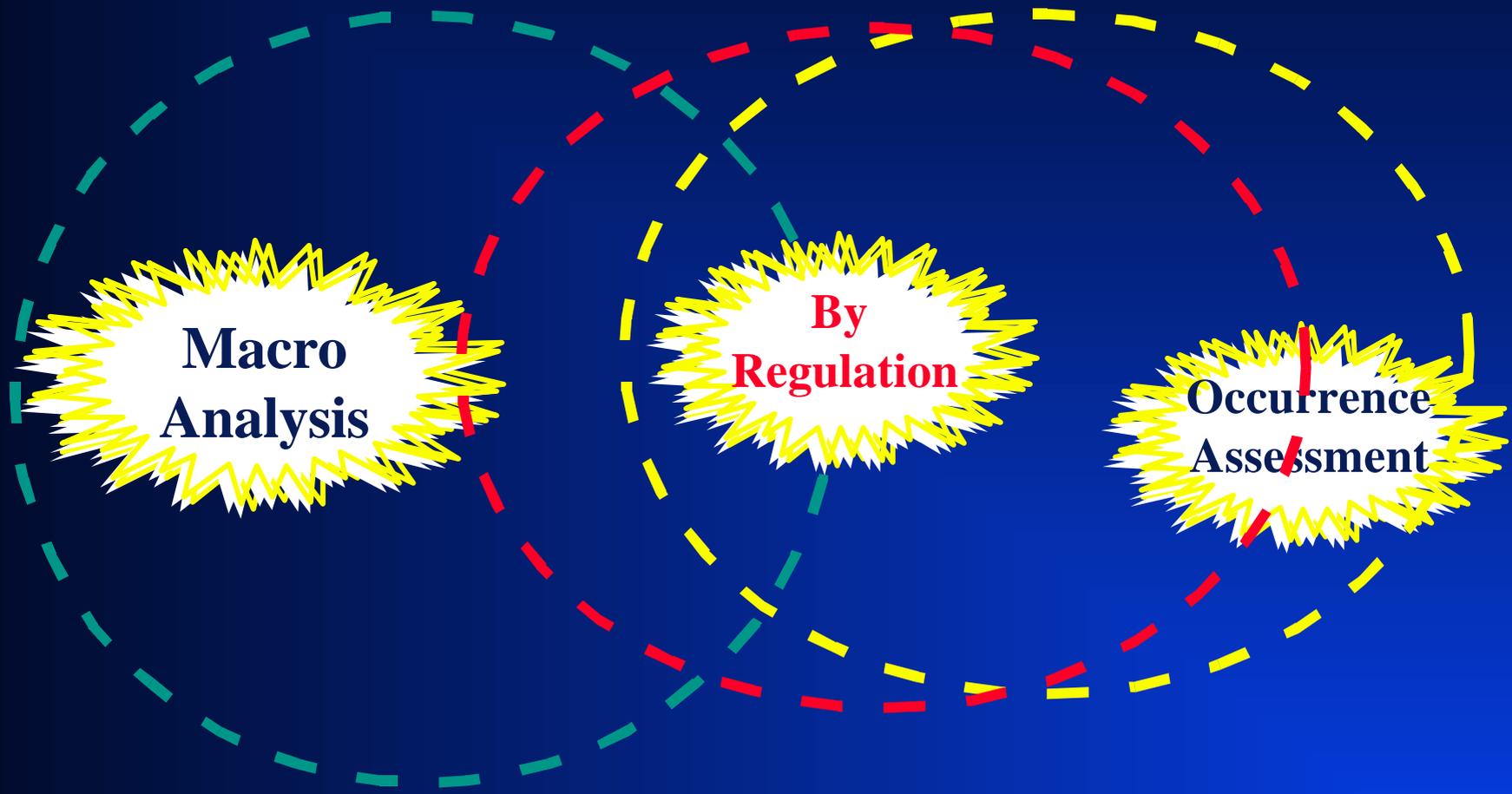
**Occurrence
Assessment**



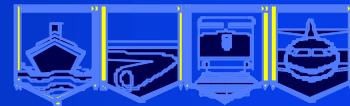
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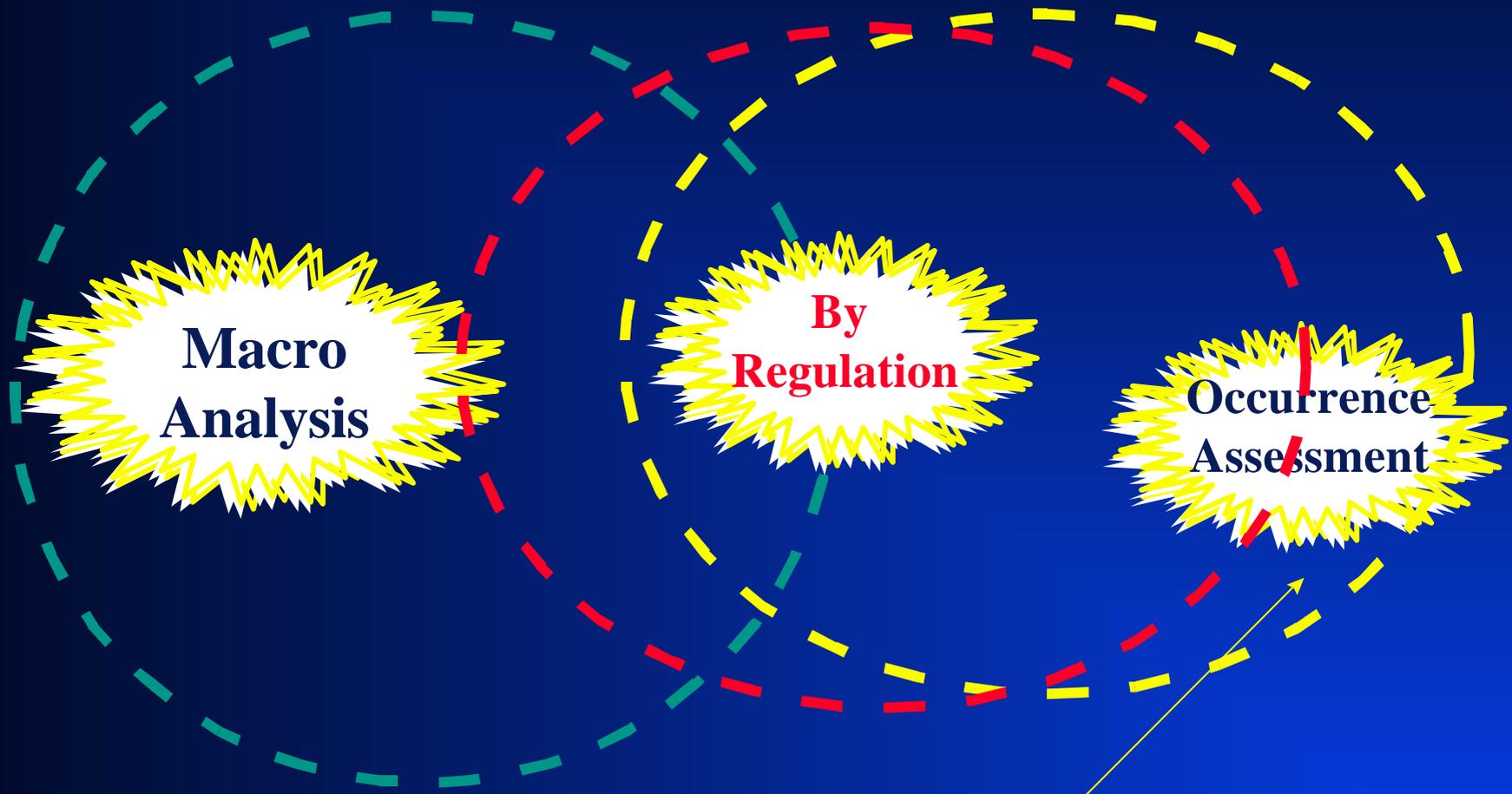
Source of Data



Investigation



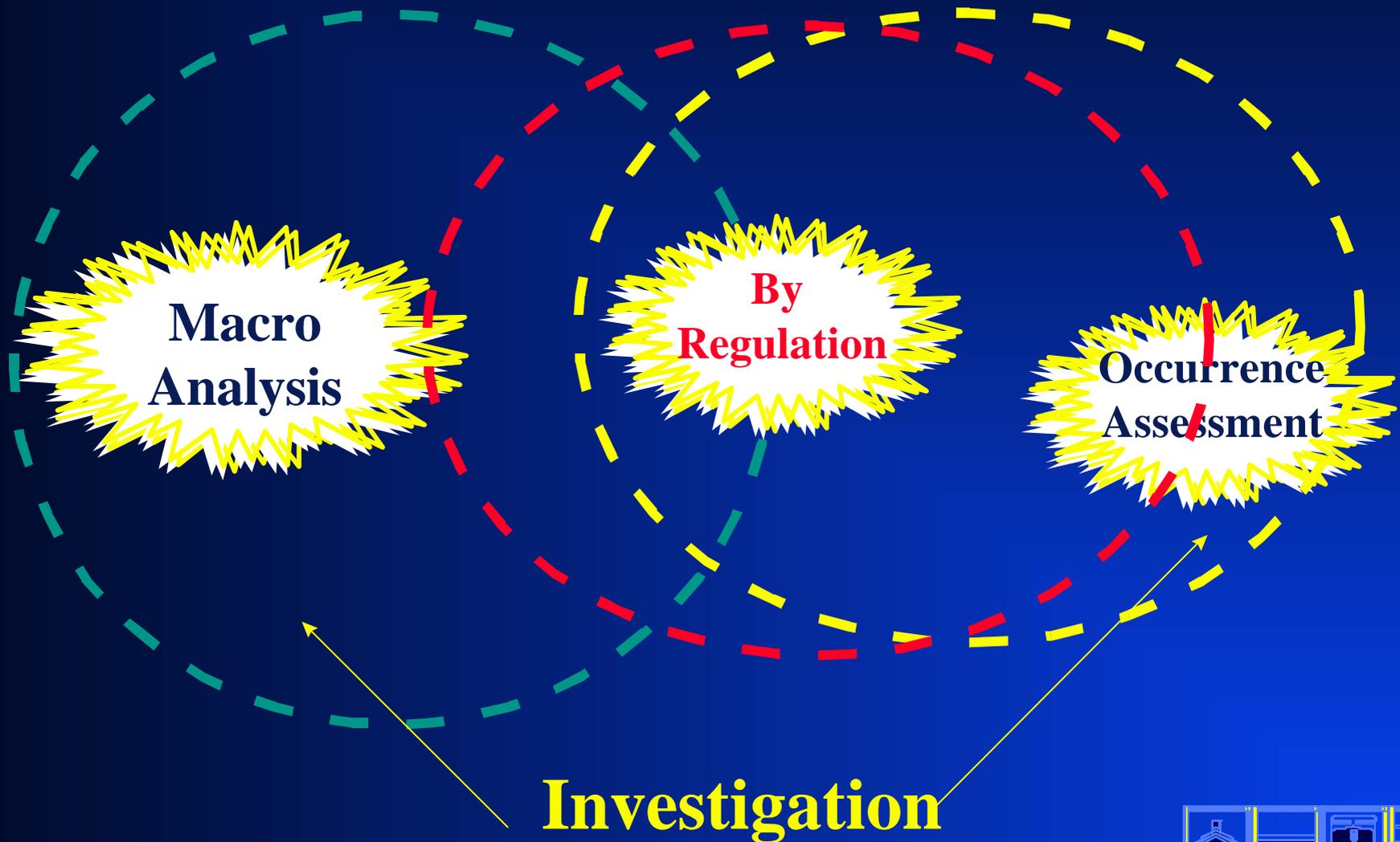
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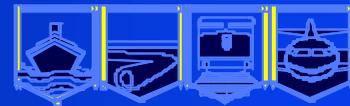
Investigation



Source of Data

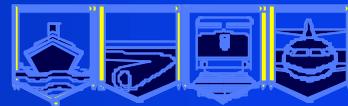


Why Collect?



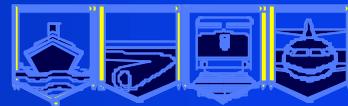
Why Collect?

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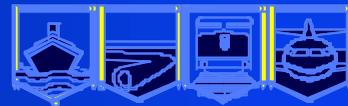


Why Collect?

- ◆ **data are required to assess problem size and characteristics, to establish trends, and to decide between and evaluate risk control options.**
- ◆ **a reporting system can provide a bank of data sufficient to establish broad accident categories and provide detailed information on accident causation.**



Why Collect?



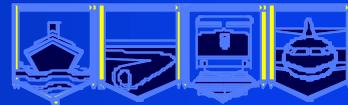
Why Collect?

- ◆ Occurrence most often have happened before



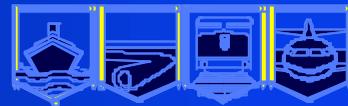
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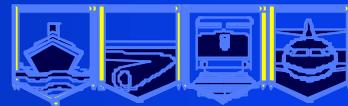
Why Collect?

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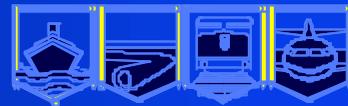
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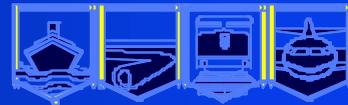


Why Collect?

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 - **L1011 O-Rings - 11 in past 2 years**
 - **Three Mile Island**



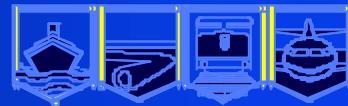
What to Collect



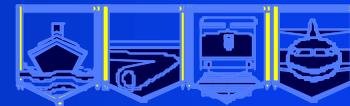
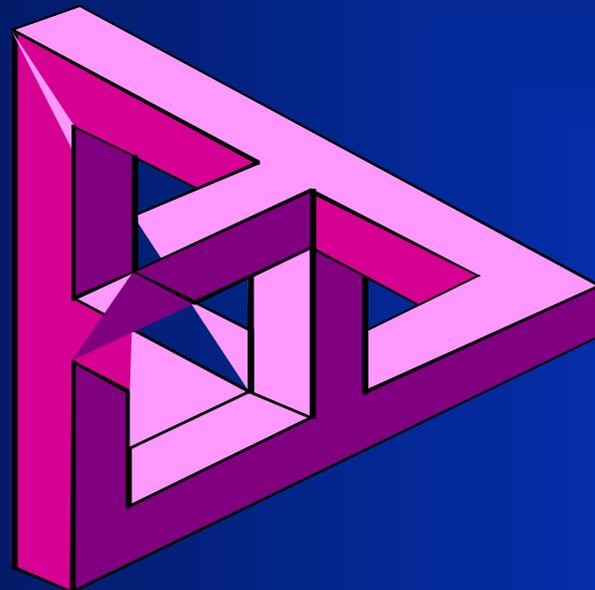
What to Collect

- ◆ *“... Data held for any purpose or purposes shall be adequate, relevant and not excessive in relation to that purpose or those purposes.”*

Data Protection Act, United Kingdom

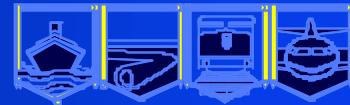
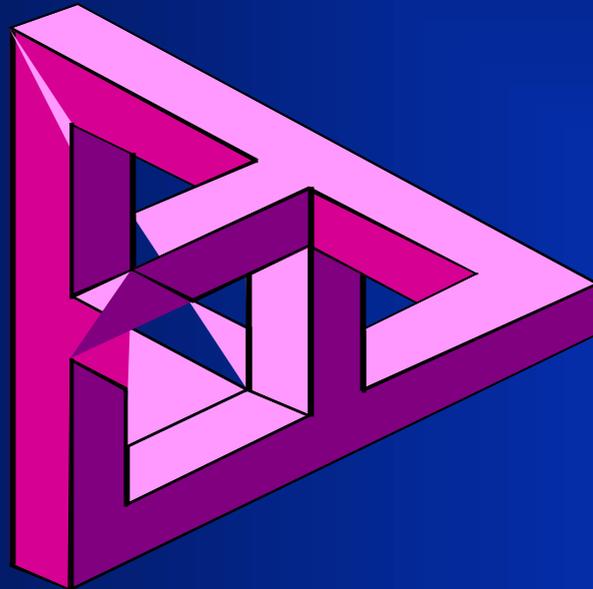


VOLTAIRE



VOLTAIRE

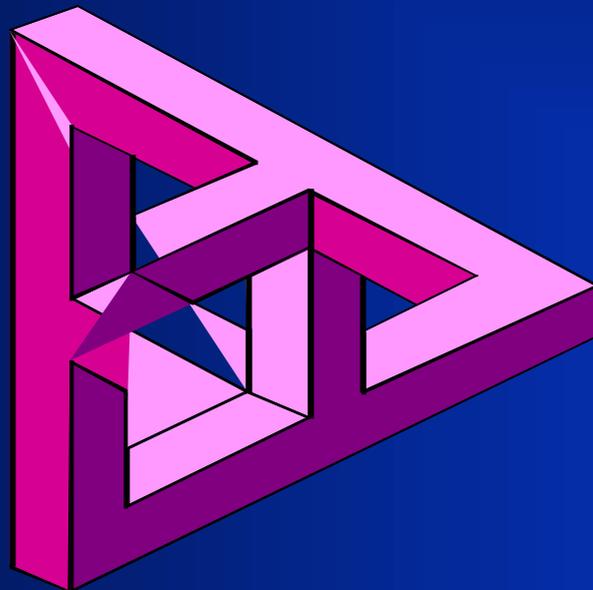
“There are no such things as accidents.”



VOLTAIRE

“There are no such things as accidents.

*What we call by that name is the effect
of some cause which we do not see.”*

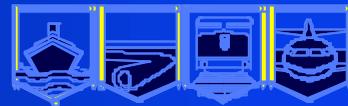


Definitions



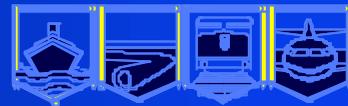
Definitions

- ◆ **Restrictive definitions of reportable occurrences have a profound impact on our work.**



Definitions

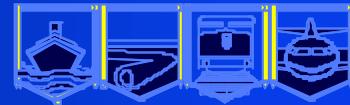
- ◆ **Restrictive definitions of reportable occurrences have a profound impact on our work.**
- ◆ **All definitions are of necessity restrictive:**
 - **simple expediency**
 - **expressions of limited professional interest**



Accident causation is layered like an onion.....



- *Individual performance*
- *Crew performance*
- *Design & Operating Standards*
- *Supervision and training*
- *Company safety management*
- *Regulatory compliance*

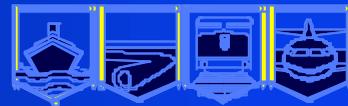


*Accident causation is layered
like an onion.....*

*Each layer represents
a set of safety conditions.*



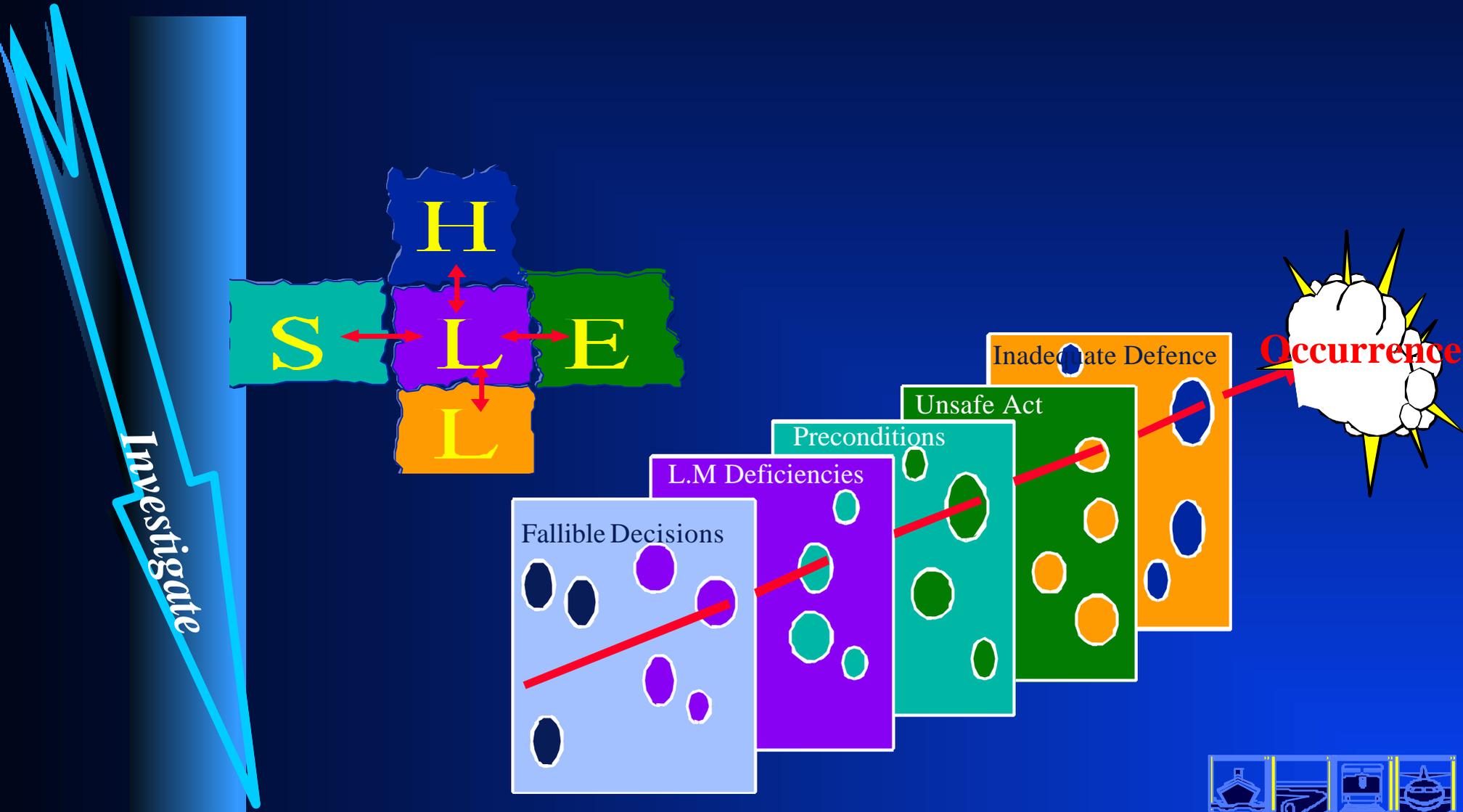
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Occurrence

Investigation Methodology

Initial Assessment



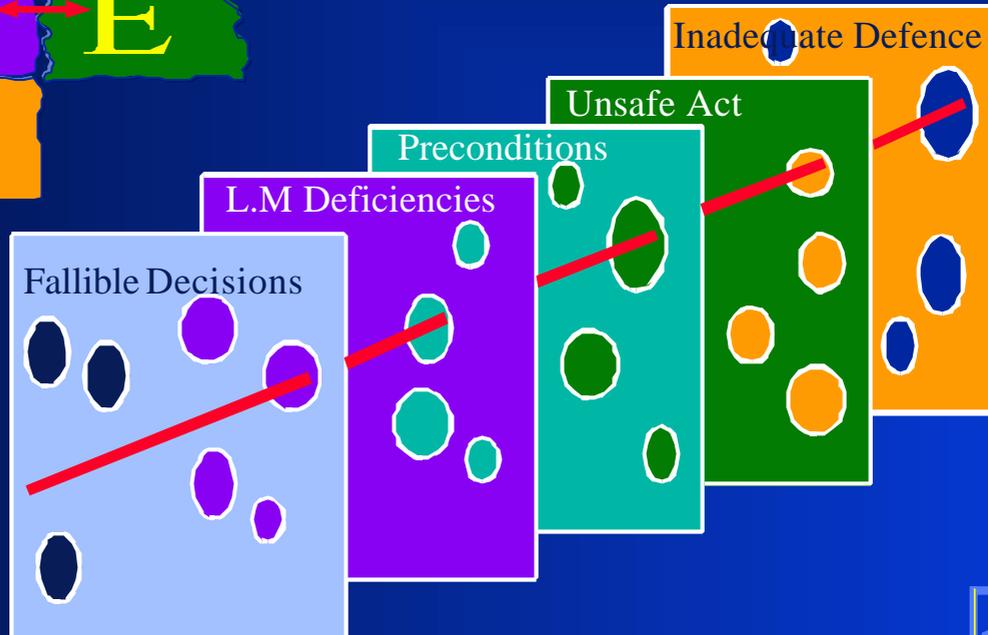
Occurrence

Investigation Methodology

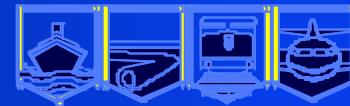
Initial Assessment

Data Collection

Investigate



Occurrence



Occurrence

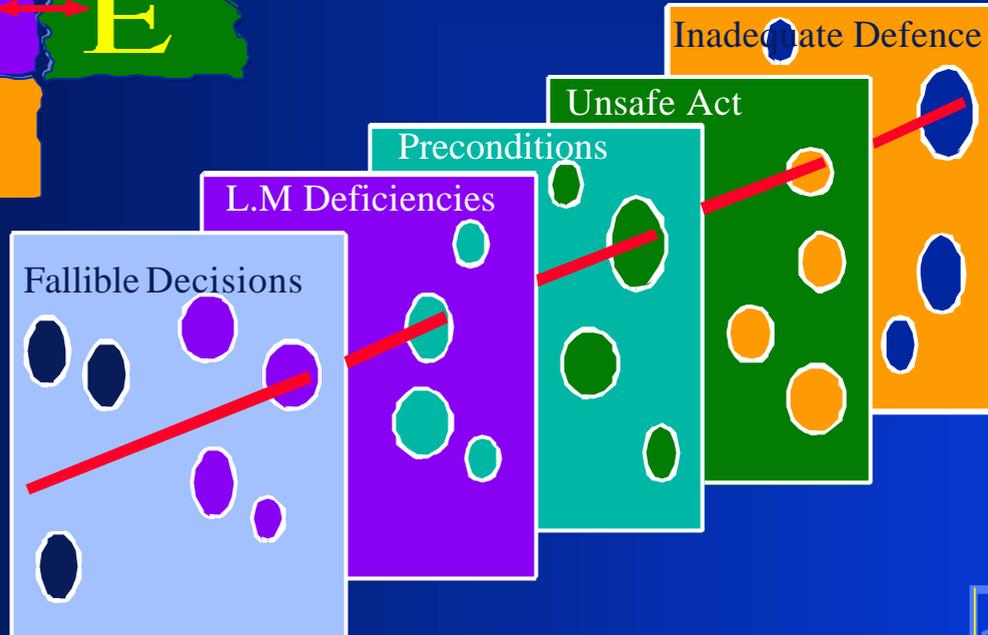
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Initial Assessment

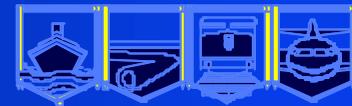
Data Collection



Investigate



Occurrence



Investigation Methodology

Occurrence

Initial Assessment

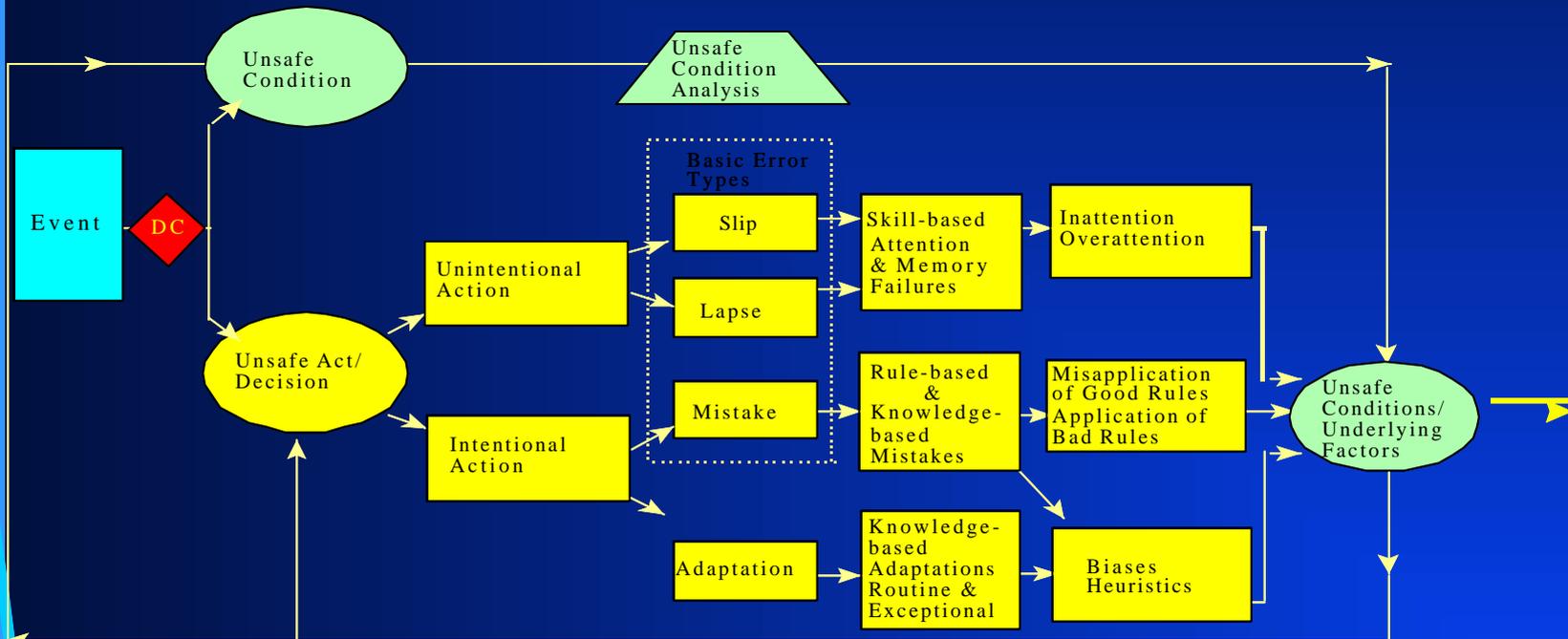
Data Collection

Reference Events

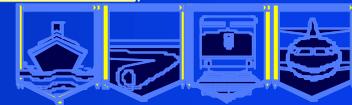
Events & Factors Analysis

Integrated Investigation Process

Investigate



DC = Decision Criteria



Investigation Methodology

Occurrence

Initial Assessment

Data Collection

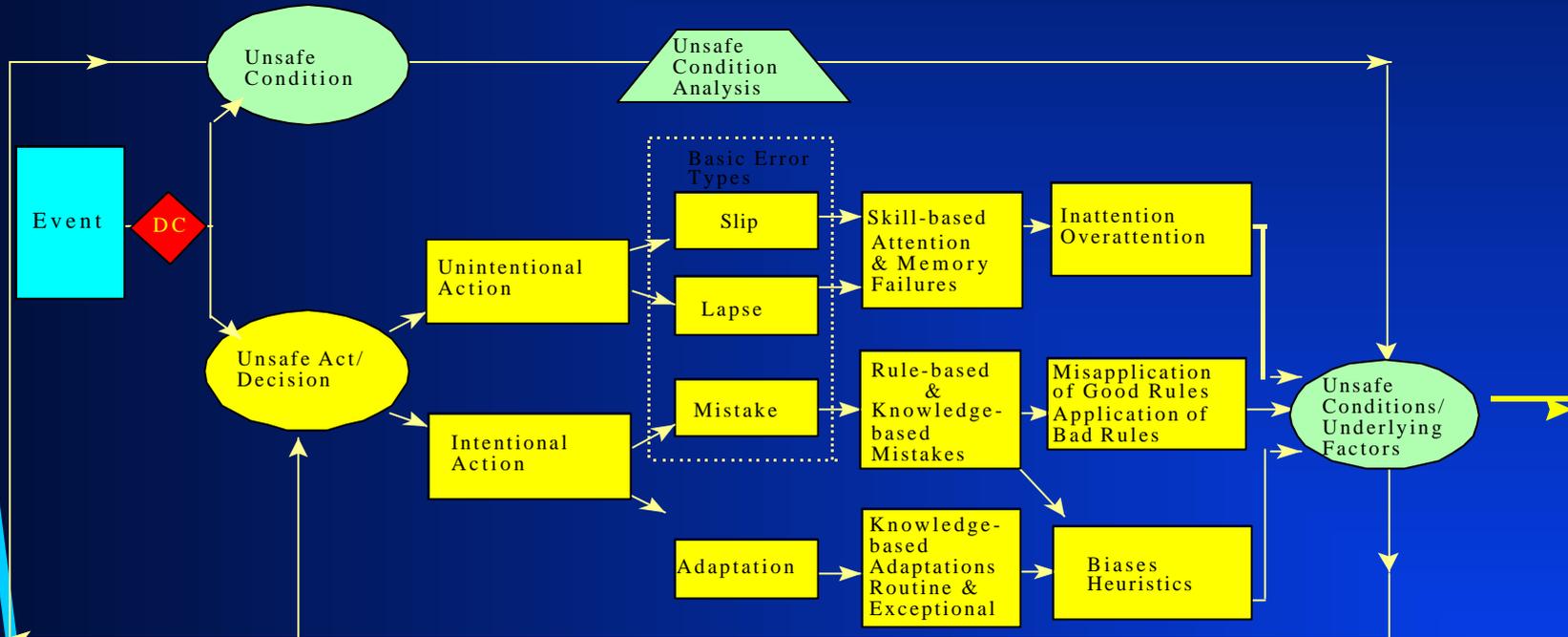
Occurrence Events

Unsafe Acts/Conditions

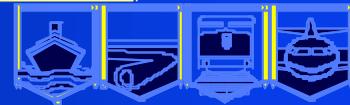
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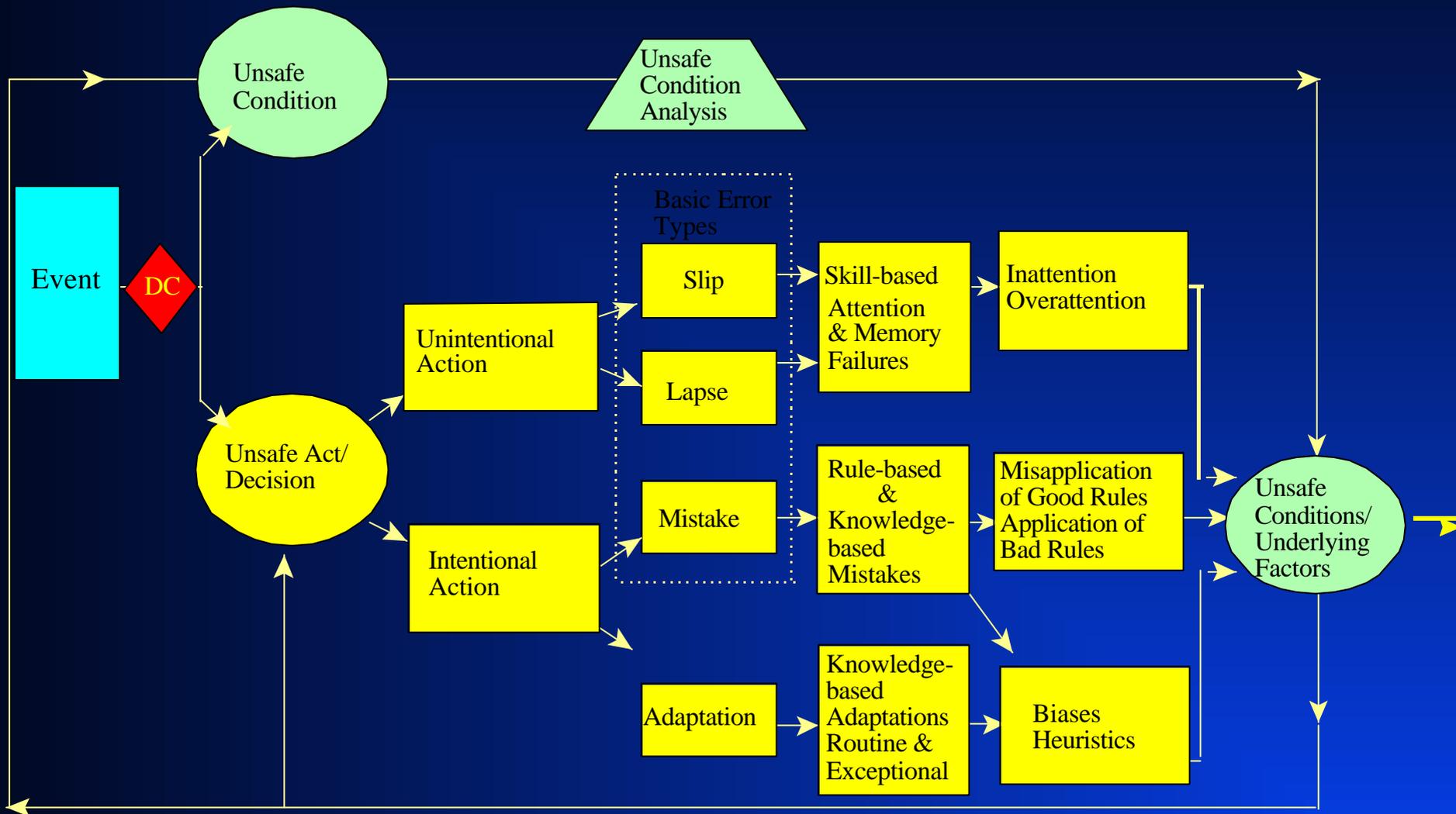
Investigate



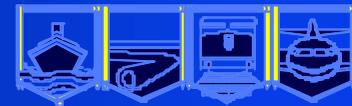
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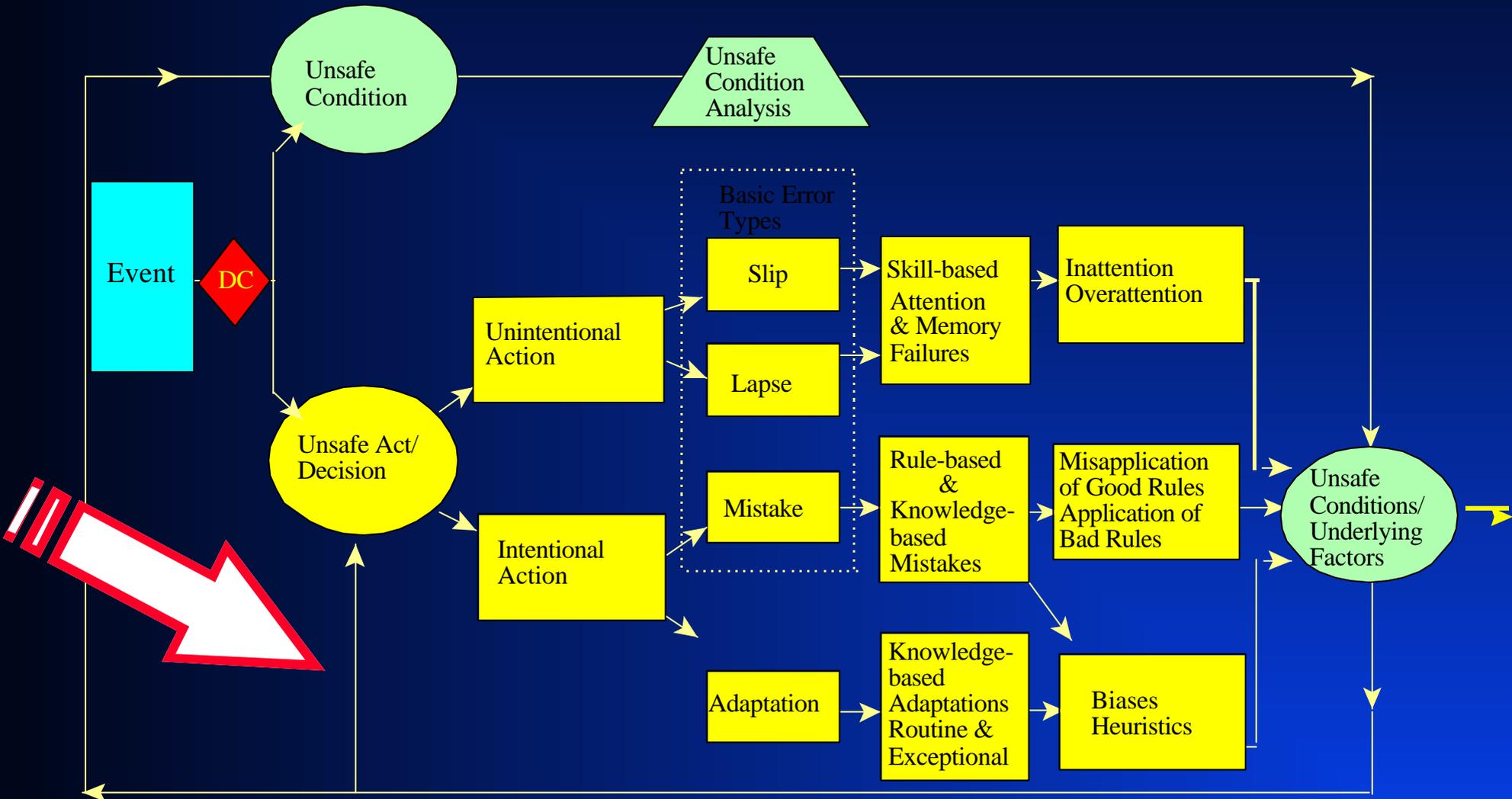
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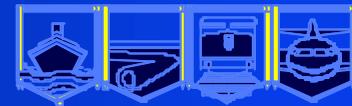
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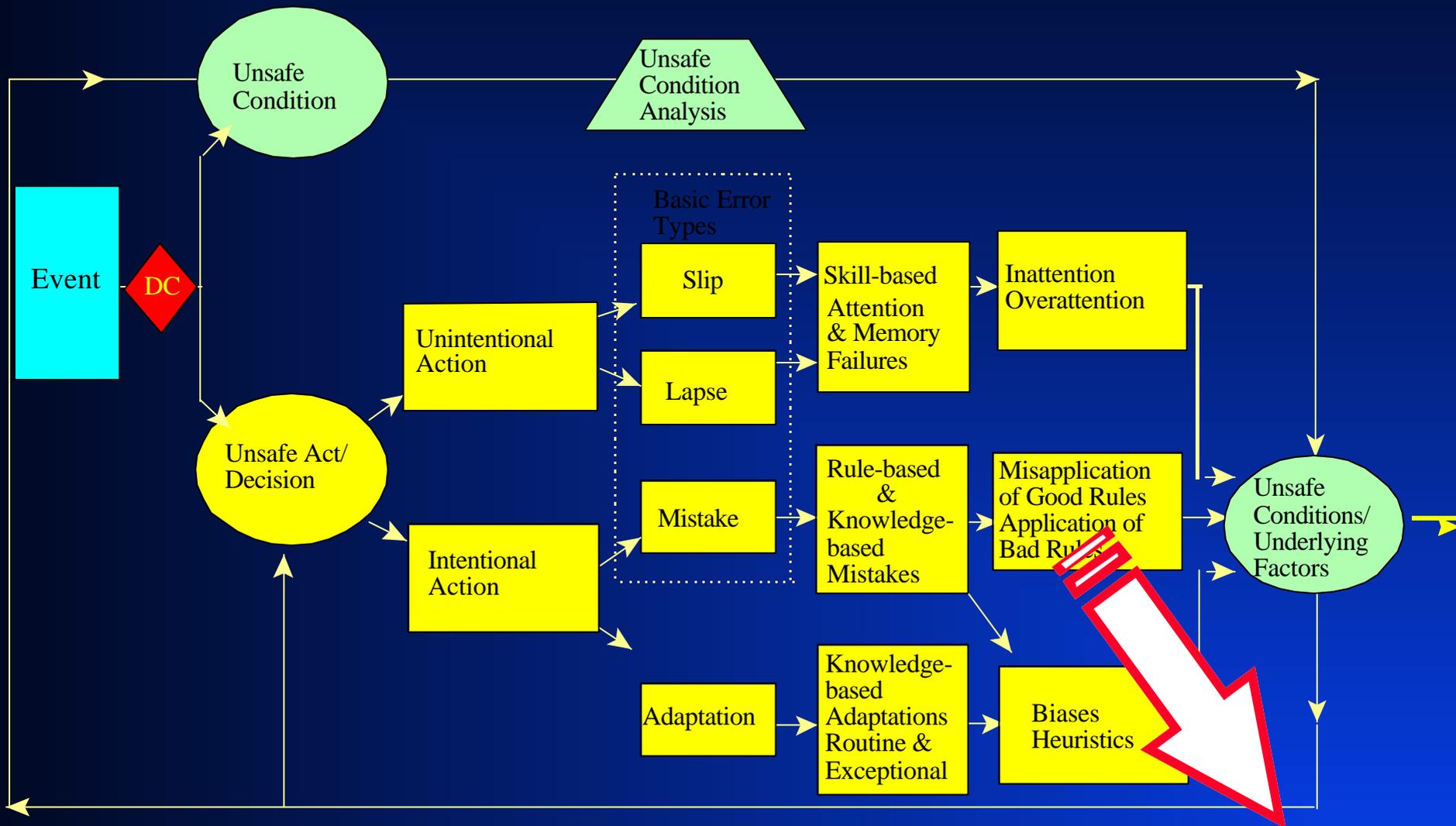
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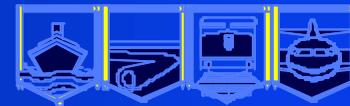
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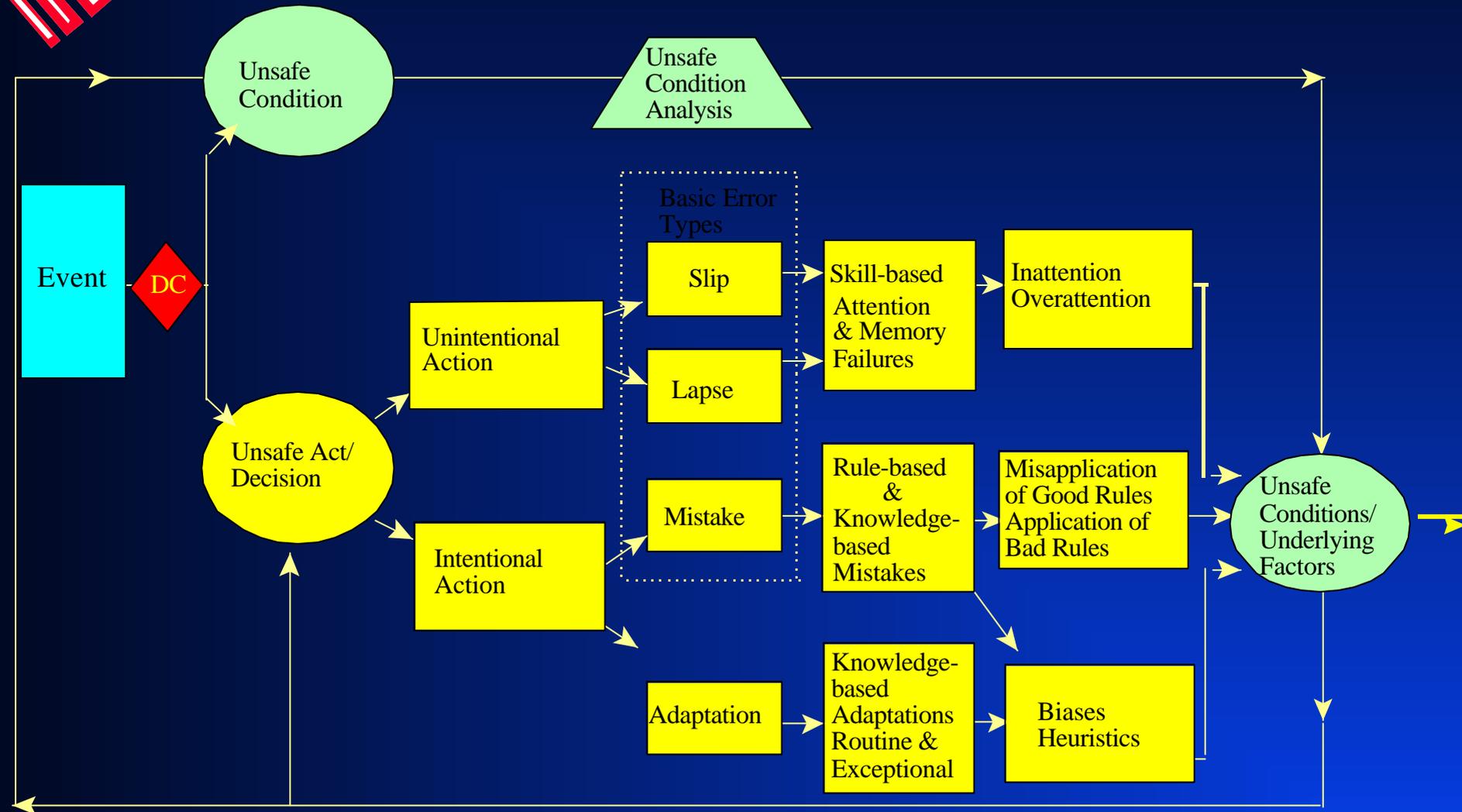
Integrated Investigation Process



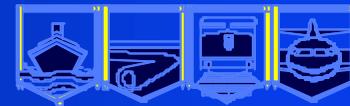
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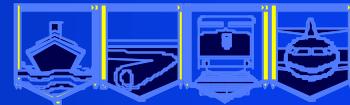
Integrated Investigation Process



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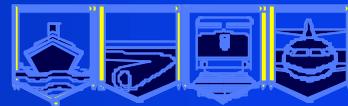


Need for Taxonomy



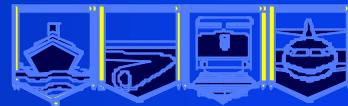
Need for Taxonomy

- ◆ **Should be founded in science - have construct validity, not just face validity**



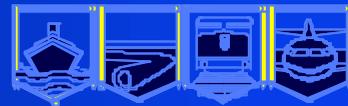
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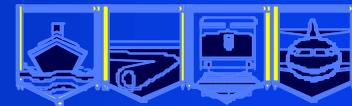
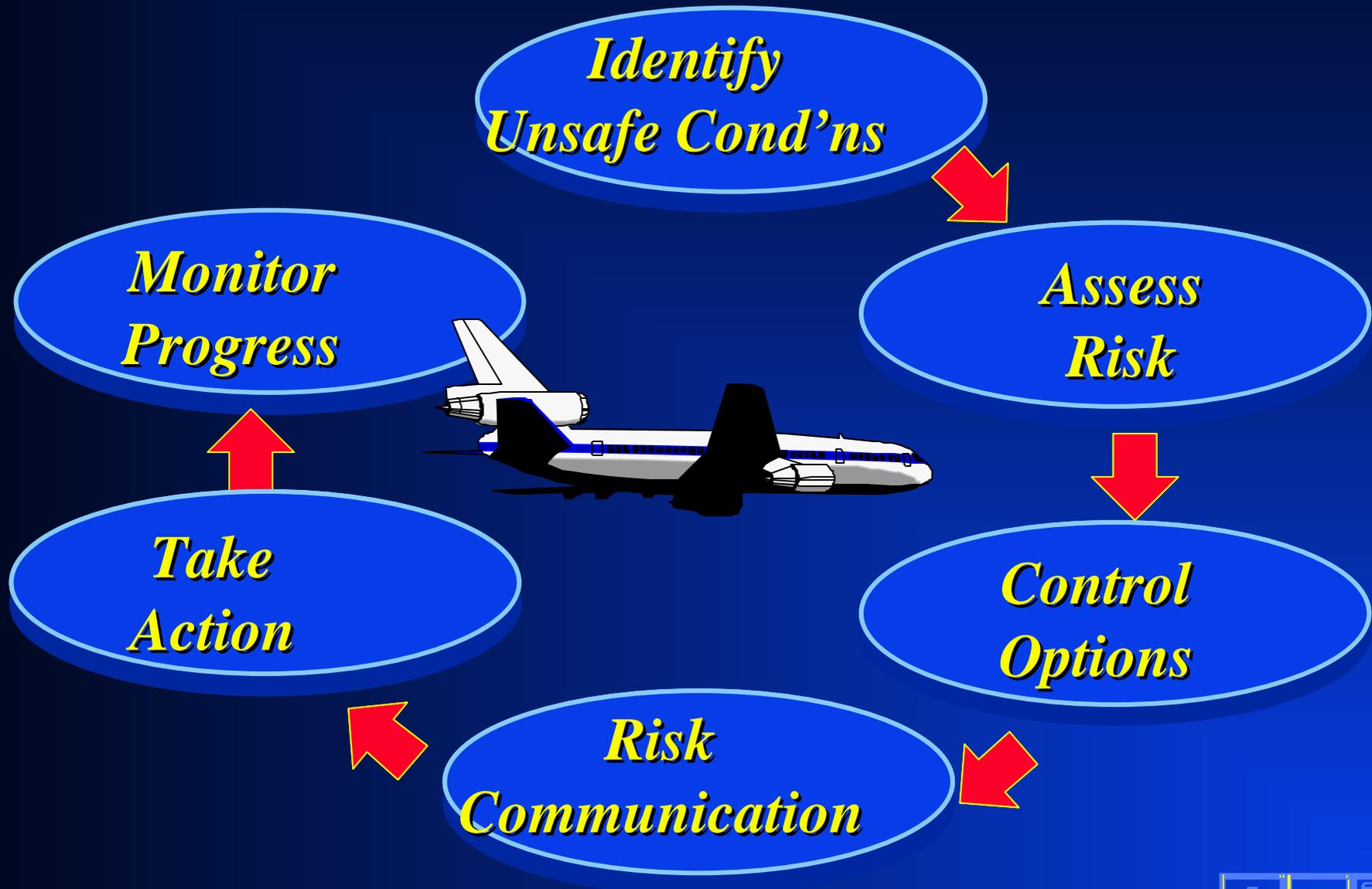


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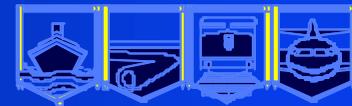
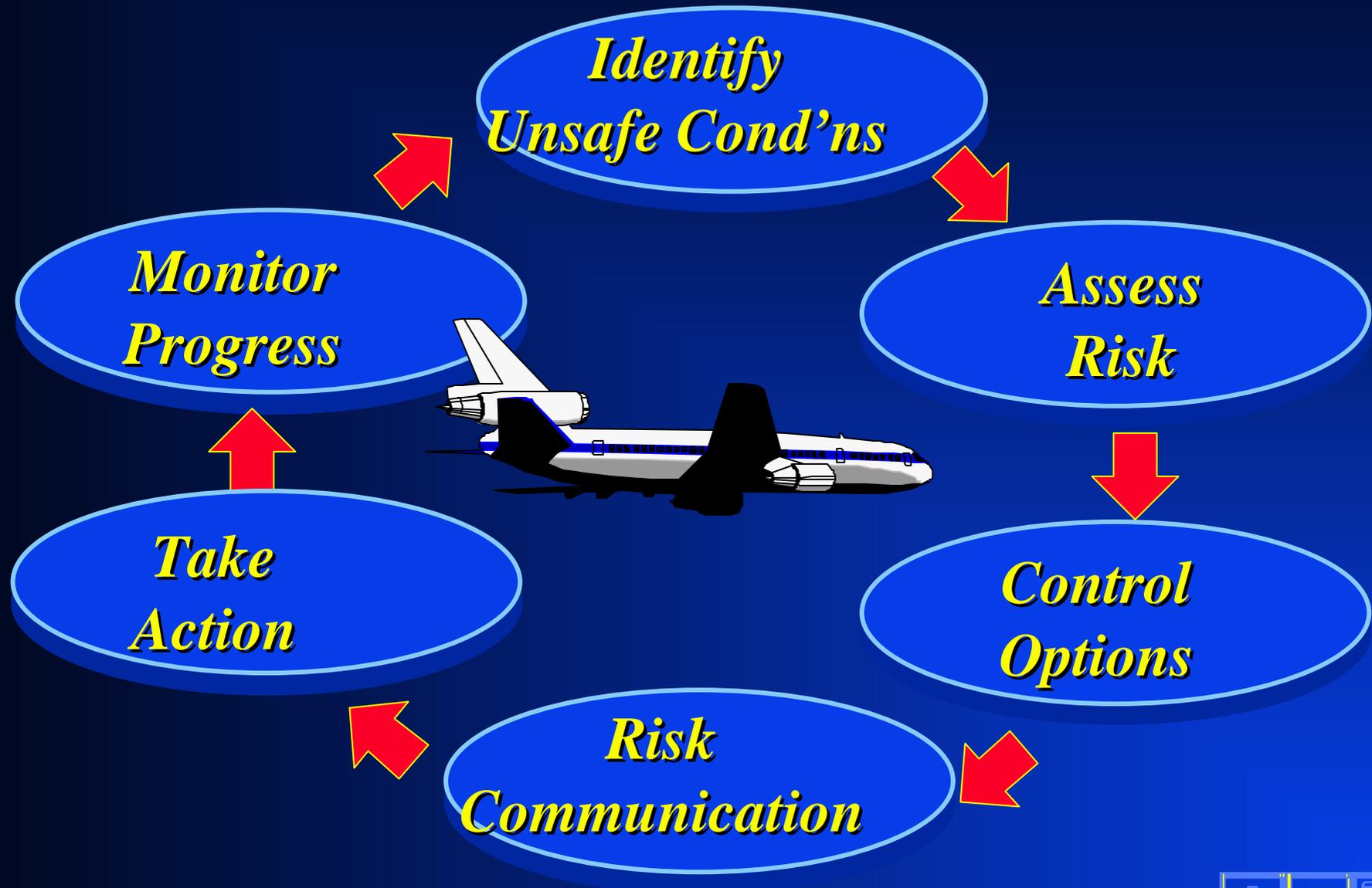
- ◆ **Should be founded in science - have construct validity, not just face validity**
- ◆ **Should be able to give insight into accident causation**
- ◆ **Need for taxonomies for error *and* underlying factors**



Accident Prevention Process



Accident Prevention Process

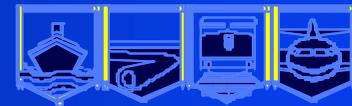


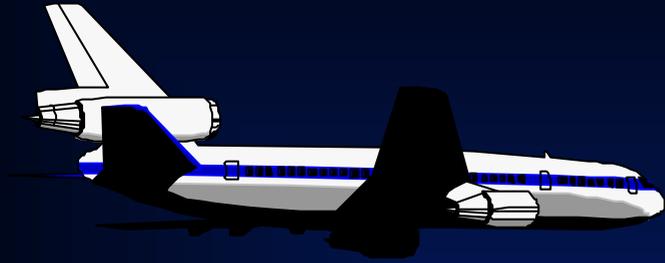
Results?



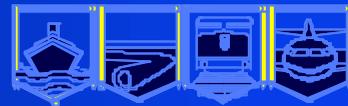
Results?

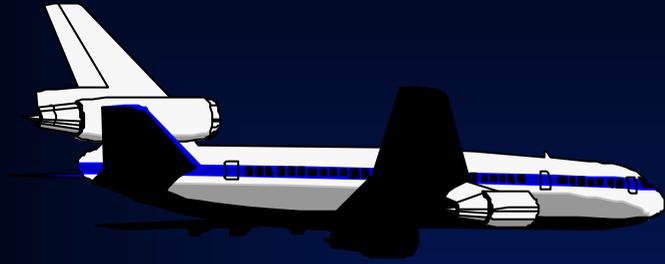
*Our commitment
to improving aviation safety data
through human factors initiatives
will pay a safety dividend?*



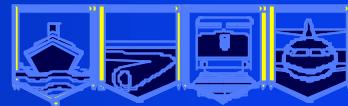


- ◆ **“... it is impossible, while designing a database, to anticipate every type of data analysis that might be required in the future, (therefore) it is to be anticipated that any database will be lacking with respect to its ability to support macro analysis projects. The implication of this is that for most macro analysis projects, it should be anticipated that some data collection will be required.”**

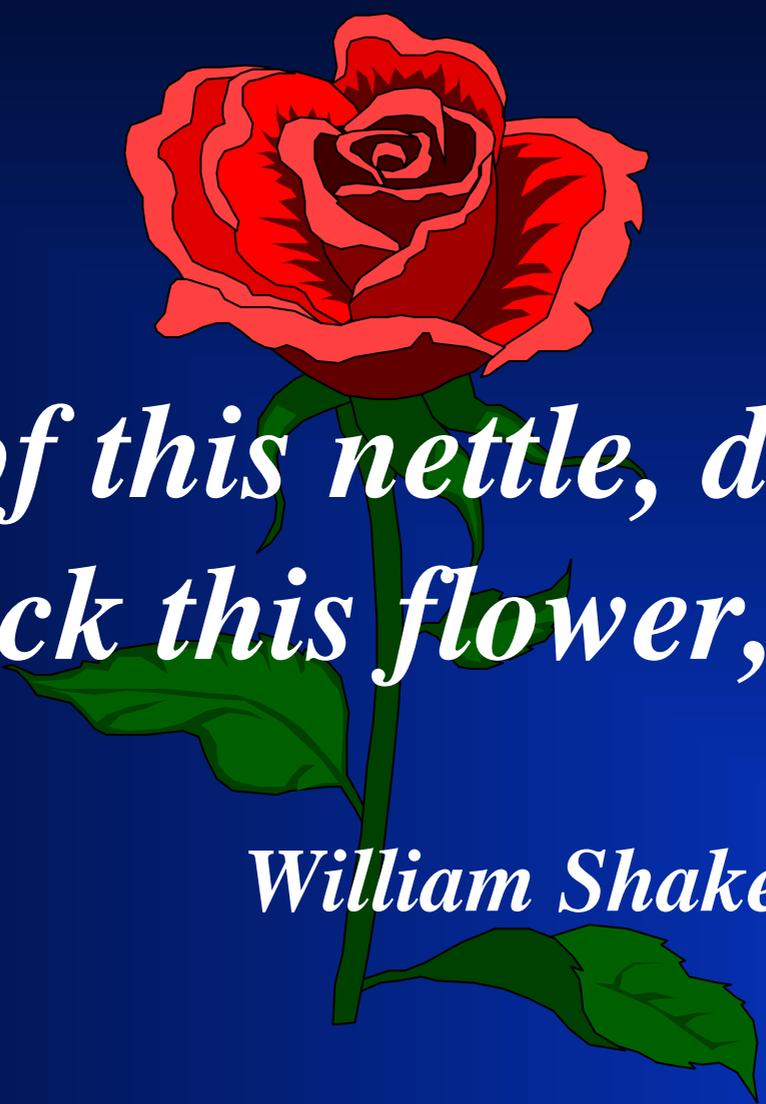




- ◆ **data quality issues**
- ◆ **currency of data**
- ◆ **etc., etc.,**







*“Out of this nettle, danger,
we pluck this flower, safety.”*

William Shakespeare



