

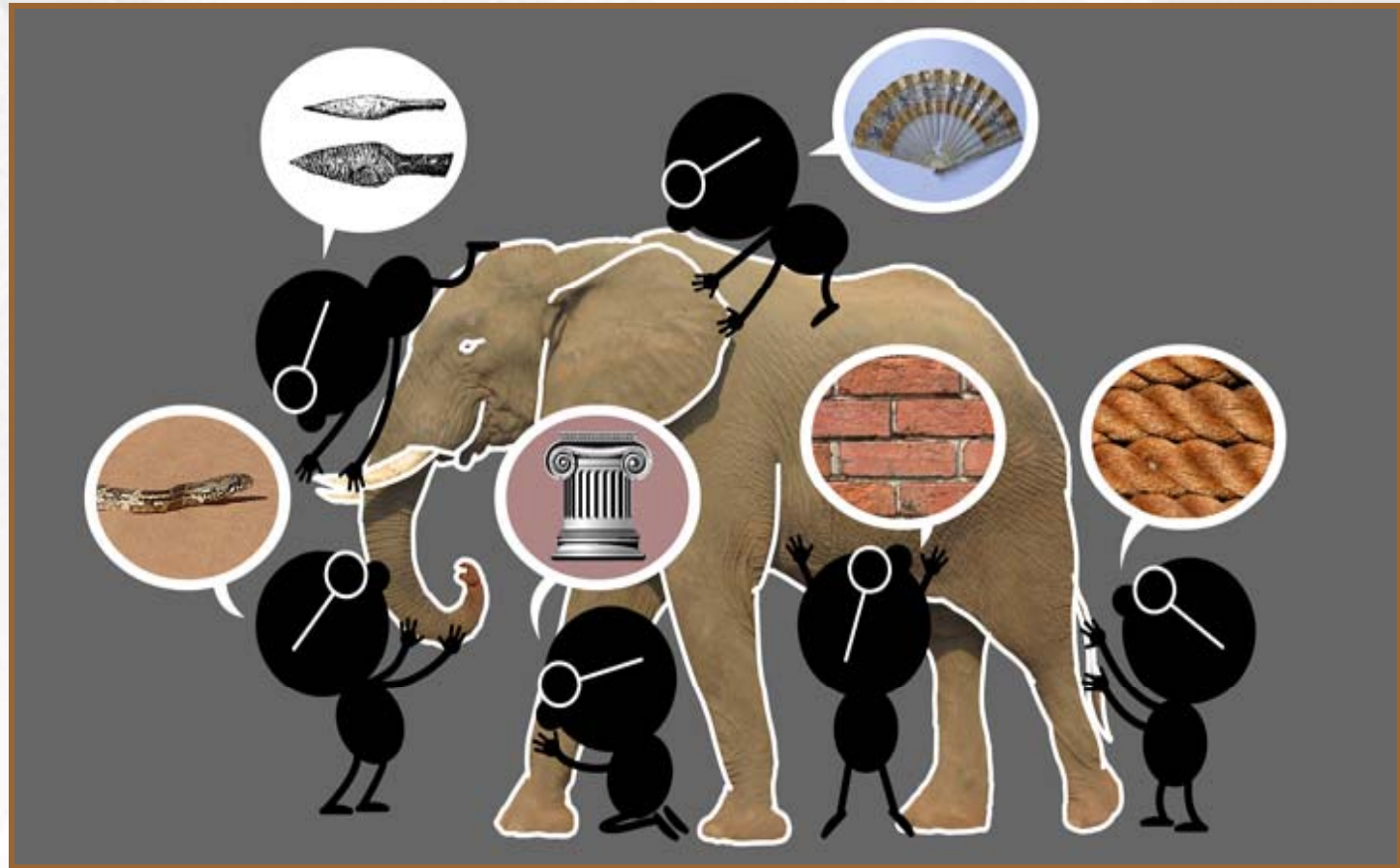


There's an Elephant in the Control Room

API Control Room Forum



The Elephant and the Blind Men





Specifics about Fatigue Mitigation

Implement these methods to reduce the risks

Provide opportunity for eight hours sleep between shifts

TIME OFF

Educate controllers and supervisors in fatigue mitigation strategies and how off-duty activities contribute to fatigue

TRAINING

Train controllers and supervisors to recognize the effects of fatigue

TRAINING

Establish a maximum limit on controller hours-of-service

TIME OFF

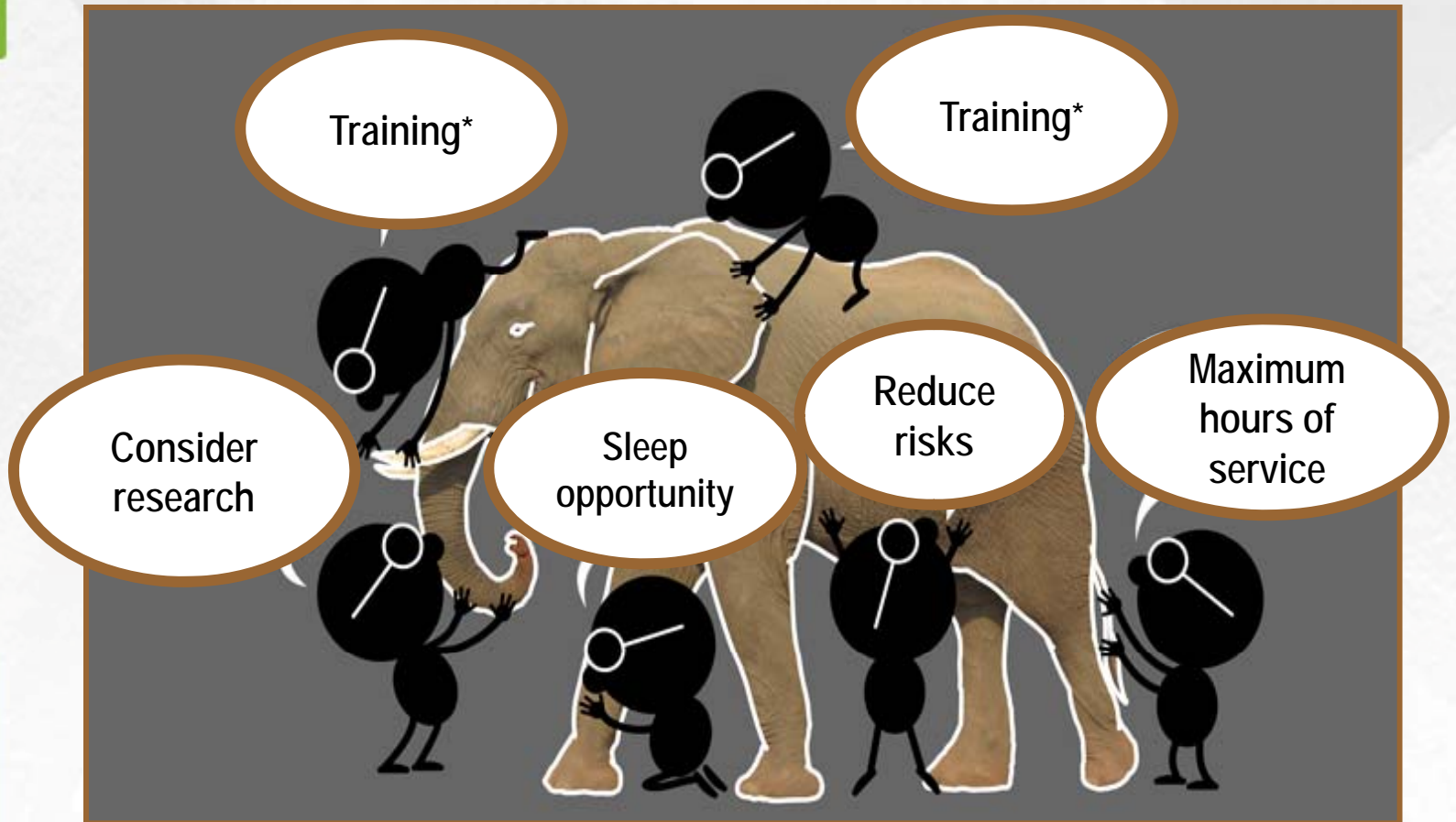


Other Statements in Summary

- PHMSA requires that operators implement methods to reduce the **risks** associated with fatigue.
- PHMSA expects that operators will consider circadian effects, need for rest, and other factors highlighted by **relevant research**.



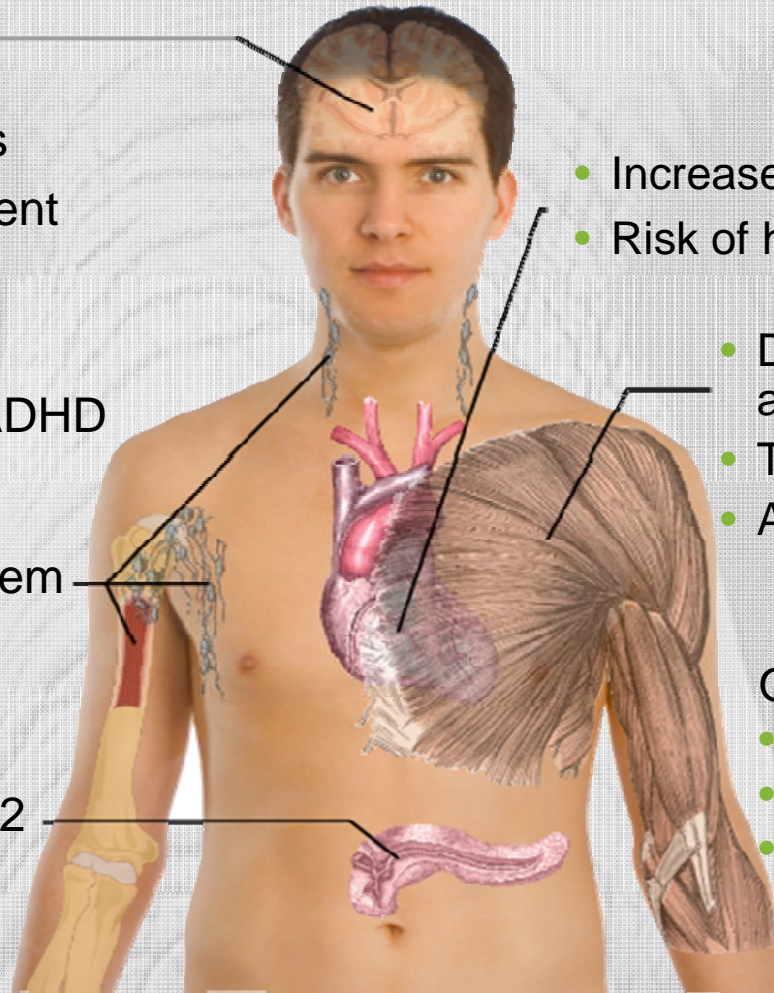
Fatigue in Rule: What Do We See?



*SGA Online Courses

Elephant in the Room is **PEOPLE**

- Irritability
- Cognitive impairment
- Memory lapses or loss
- Impaired moral judgment
- Severe yawning
- Hallucinations
- Symptoms similar to ADHD
- Impaired immune system
- Risk of diabetes Type 2



- Increased heart rate variability
- Risk of heart disease

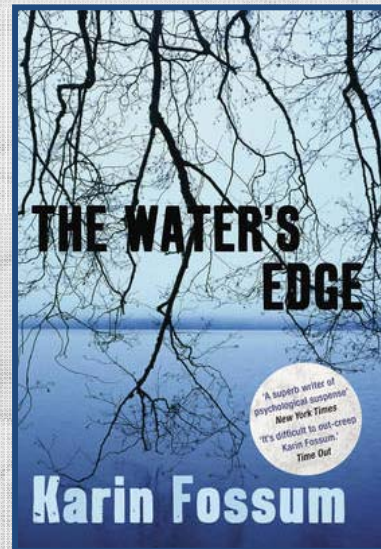
- Decreased reaction time and accuracy
- Tremors
- Aches

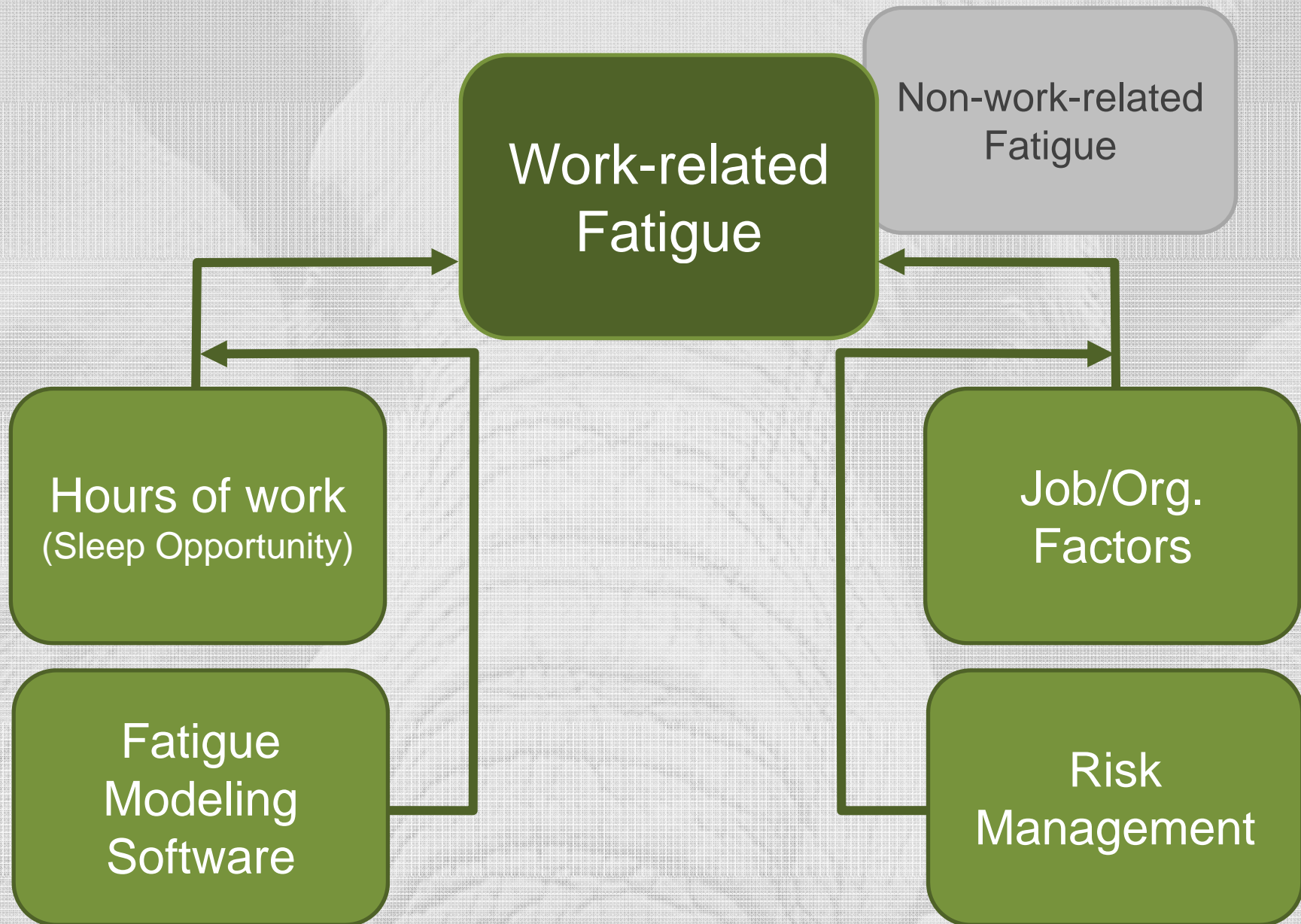
Other:

- Growth suppression
- Risk of obesity
- Decreased temperature

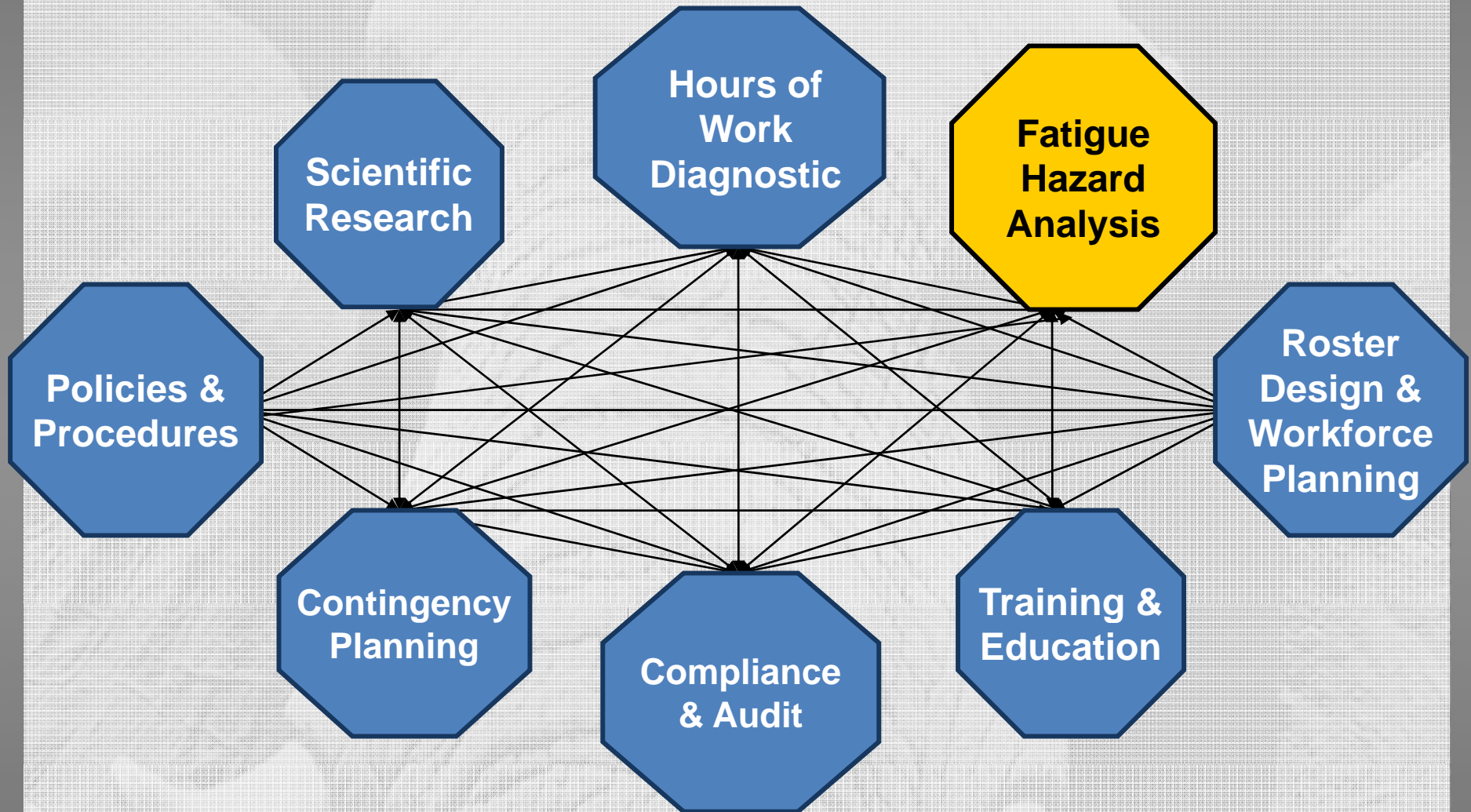
People are Unpredictable!

“People are unpredictable creatures, they invent rules which they break incessantly and they follow impulses which they later cannot explain.”





Fatigue Risk Management System



Risk Exposures & Safeguards

			Importance	As Is	To Be
Exposures	Hazards	Fatigue hazards associated with the operational environment	XH	C	C
		Driving to / from work	H	C	C
		Sleeping conditions	M	B	A
	Hours of Work	Hours of operations (i.e. day / afternoon / night operations)	XH	C	C
		Nature of work schedules (i.e. rotating / fixed / on-demand / stan...	L	B	B
	Capacity	Seasonality impacts on workload vs workforce balance	H	A	A
		Seasonality impacts on workforce profile	M	A	A
	Culture	Pay incentives which encourage personal fatigue	H	C	B
		Prevalence of second jobs	M	A	A
		Cultural expectations which encourage longer than planned hou...	M	C	B
		Cultural issues that lead to less than normal sleep hours	M	C	A
		Workforce turnover	L	C	B
		Sleeping Disorders	L	C	B
	Safeguards	Primary	Work schedule design	H	C
Hours of work risk assessment			H	D	A
Fatigue hazard analysis methodology			H	C	A
Fatigue Tolerance Level (FTL)			M	C	A
Workforce capacity planning			M	C	A
Fatigue safe policies and procedures			L	C	A
Communication and consultation frameworks			L	C	A
Secondary		Competency and awareness	H	C	A
		Compliance with corporate legislative fatigue safety standard	M	C	A
Tertiary		Contingency and emergency procedures	H	D	B
		Incident and accident reporting	M	C	A
		Audit - periodic assessment of fatigue risk controls	M	D	A



Potential Rating **Excellent**
 Current Rating **Poor**

Fatigue Scenario Hazard Analysis



Identify Hazards

Strategic Context Map

FATIGUE

Identify Hazards

Risk Tolerance

Risk Profile

Outcomes

Report

Control Room Operatio

NEW

LOAD

SAVE

Definitions

Guidelines

Fatigue Impairment

Consequence

Probability

Risk Assessment

Settings

Identify

Fatigue Impairment

Hazard Catalog

Risk Tolerance

Fatigue Impairment

Boundary

Risk Profile

Fatigue Risk

Task Risk

Quality Check

Outcomes

Fatigue Tolerance Level

Improvement Action

Automatic Improvement

Compare

Report

Documentation



Hazard Catalog

No.	Hazard	Trigger	C	S	M	M	P	B	T	W	T	E	O	Effect	Con...	Prob...	Existing Controls
			M	A	M	R	I	S	R	T	F	N	T				
1	Fatigue related occurrence while commuting to work on day shift.	Heavy traffic Driving in the dark Deer hitting vehicle	Y	Y	Y	Y	Y			Y	Y	Y		Personal injury Injury to others Property damage	III	C	Safe Driving Course Strategic use of caffeine Nap before dr...
2	Fatigue related occurrence that contributes to a pipeline leak or explosion	Abnormal operating condition at low point of circadian rhythm.		Y	Y		Y							Threat to public safety Environmental damage	I	D	Safety devices Fatigue training Opportunity for 8 hours of sleep Limit ...
3	Fatigue related occurrence that contributes to a reportable pipeline accident or abnormal o...	Abnormal operating condition Inadequate response to alarm	Y	Y	Y	Y	Y						Y	Threat to public safety Potential damage to equipment	III	B	Safety devices Procedures

NEW ENTRY

COPY

PASTE

New Hazard

Load

Save

Clear

Hazard

Trigger

Fatigue Trigger

<input type="checkbox"/>	Communication	CM
<input type="checkbox"/>	Situation Assessment	SA
<input type="checkbox"/>	Mental Model	MM
<input type="checkbox"/>	Memory	MR
<input type="checkbox"/>	Performance Insight	PI

Trigger - Other

<input type="checkbox"/>	Base	BS
<input type="checkbox"/>	Terrain	TR
<input type="checkbox"/>	Weather	WT
<input type="checkbox"/>	Traffic	TF
<input type="checkbox"/>	Engineering	EN
<input type="checkbox"/>	Other	OT

Effect

Existing Controls

Consequence

Probability

SUBMIT

Modeling Fatigue Risk Exposure

FTL Compliance %							
Work Schedule	Total Hours	Total Hr > Tolerance	Compliance (%)	FAID® Condition Green %	FAID® Condition Yellow %	FAID® Condition Red %	Peak FAID® Score
1	887.4	12.8	98.6	94.9	3.6	1.4	95

ID #	Total Hours	Total Hr > Tolerance	Compliance (%)	FAID® Condition Green %	FAID® Condition Yellow %	FAID® Condition Red %	Peak FAID® Score	
1:	1	165	1.0	99.4	96.3	3.1	0.6	79
2:	2	147	1.7	98.8	93.9	4.9	1.2	80
3:	3	157	0.0	100.0	97.4	2.6	0.0	74
4:	4	131	5.1	96.1	91.1	5.1	3.9	95
5:	5	131	2.0	98.5	95.6	2.8	1.5	91
6:	6	157	3.0	98.1	94.5	3.6	1.9	95

Based on the task an individual is performing, and following a rigorous risk management process, a tolerance is set at an acceptable indicative fatigue exposure level



Don't Ignore the Elephant in the Control Room

- People are unpredictable, aren't we?
- Fatigue affects people in different ways.
- Use a risk based approach with the group, the role of a controller, and the specific individuals.
- Consider a Fatigue Risk Management System.



There's an Elephant in the Control Room

API Control Room Forum