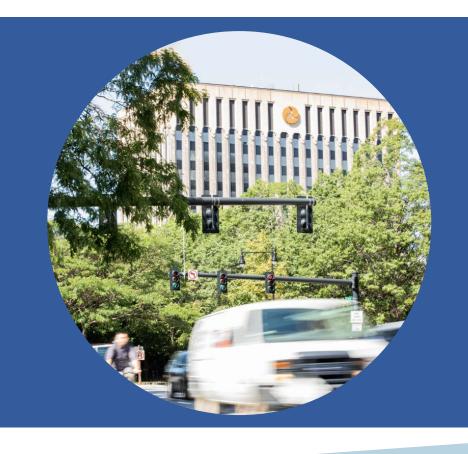
Disclaimer

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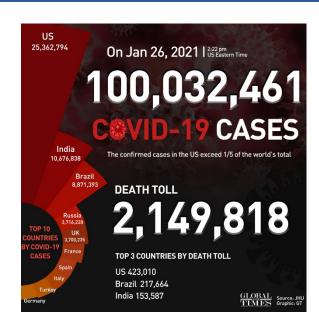
Local and global perspective on how to move the needle on worker fatigue

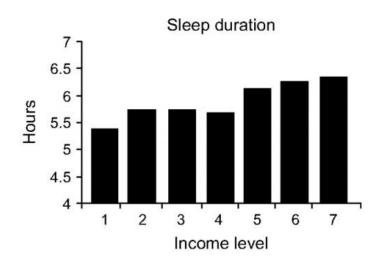
Stephen Popkin, PhD Donald Fisher, PhD May 19, 2021





The current environment: Radically complex









Problems are worldwide





"Fatigue is a biological drive for recuperative rest" Safe Factors contributing to fatigue **Operator rests** Task-Time Awake Time of Day related **Factors Impaired** Performance **Operator reaches Operator continues** work point of FATIGUE

Primary Skills and Abilities

	Skill or Ability		Air Traffic Control	Pilot	Truck Driver	Train Dispatcher	Pipeline Controller
	Skills	Operation & Control					
		Operation Monitoring					TITES
		Critical Thinking				W ABIT	
		Judgment & Decision Making Complex Problem Solving Problem Separation			SKILLS		
		Complex Problem Solving		EKERS			
	A	Problem Separate	18		0		
	Abilitie	COLLEGE OF THE PARTY OF THE PAR					
	T.A	adctive Reasoning					

Still not getting it right



So what to do?

- Belief
 - Incredible breakthroughs in our understanding of fatigue and fatigue management.
 - All too often our systems fail to deliver those breakthroughs to operators.
- Hope for international reach
 - Promote simple, scalable solutions.
 - <u>Pioneer an innovation and research pathway</u> that produces transformative, globally scalable solutions both tactically in the short run and strategically in the long run.



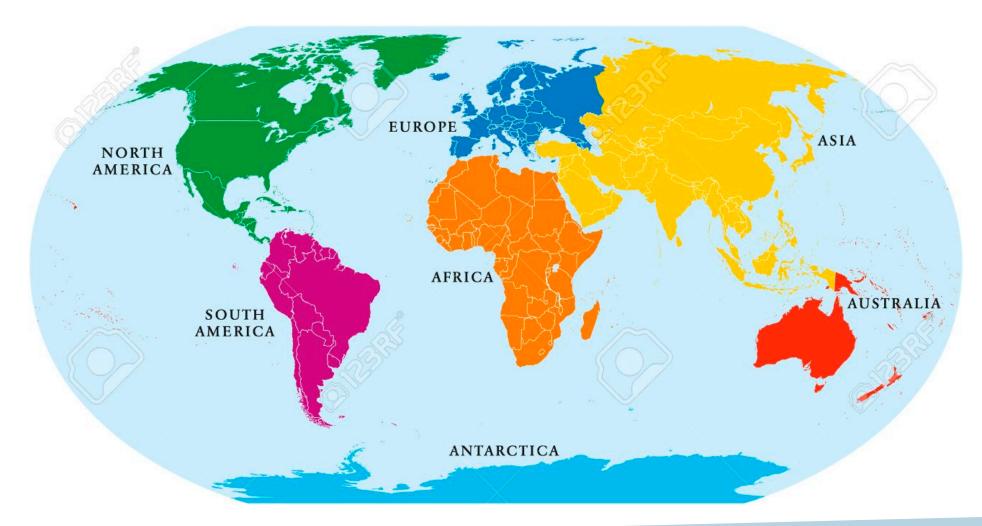
The devil in disguise

"Developing an optimal work schedule to provide adequate opportunities for sleep requires consideration of many factors such as hours of work, rest breaks between and within-shifts, shift sequences, work demands, workforce demographics and culture. As such, scheduling is unique to each industry, occupation and workplace.

Wong, Popkin and Folkard (2019)



Europe, North America, Australia, Asia



Variations in regulatory environment: Types of rules

Types of rules

Prescriptive rules regarding FEATURES

(e.g., maximum number of hours per day is 10)

RESULT related rules

(e.g., the obligatory fatigue management systems helps to asses the consequences of long shifts)

Rules regarding the PROCESS

(e.g., 12 hours are only allowed if a consensus between the company and the workers representatives could be reached

proper planning of hours to be controlled by an authority)

Focus of regulation

SAFETY

(e.g., accident risks)

WELL BEING & SOCIAL ISSUES

(e.g., Sunday work, labour market related aims)

HEALTH

(e.g., avoiding long term problems)

INCOME / COSTS

(e.g., overtime payment)

(Gartner, Rosa, Roach, Kubo, & Takahashi, 2019)

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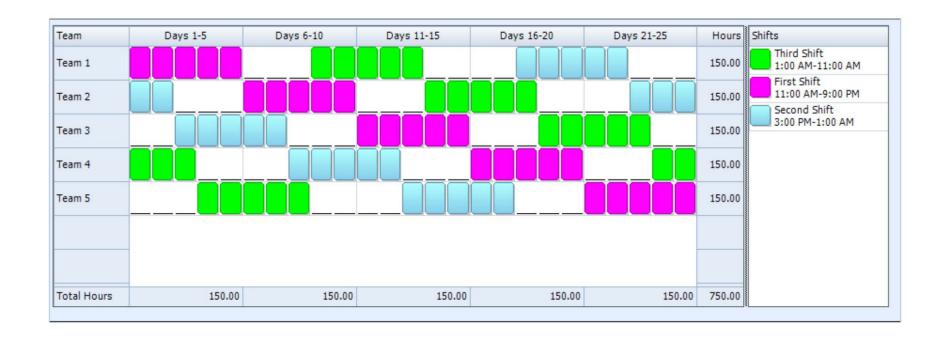
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5-3 5-4 5-3 Ten Hour Rotating Shift Schedule



Focus: Income and costs

	Day	
Day	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	Total Hours
Hours/Day	10 10 10 10 10 10 X X X 10 10 10 10 X X X 10 10 10 10 10 10 X X X X	170
Hours/Day	50 50 40 30)
Overtime/Week	10 10 0	

Focus: Health

		current staffing				new staffing			
		# employees	Annual income	insurance	total cost	# new hires	Annual income	insurance	total cost
Company	Insurance Cost								
А	constant percentage of income	5	\$ 50,000	0.15	\$ 287,500	5	\$ 25,000	0.15	\$ 143,750
В	constant per employee	5	\$ 50,000	\$ 7,500	\$ 287,500	5	\$ 25,000	\$ 7,500	\$ 162,500

Players in the regulatory chain

EU – council, commission, parliament, supreme courts ... Influences positions & Sets EU-frames, fines ... personnel decisions ... supports National Level: parties, government, supervisory structures, courts, ... scientific discourse Support in elections, support Sets national/sectoral frames. or opposition regarding fines ... Supports/reacts upon specific topics specific wishes National & sector level: unions, employers organisations, ... Support in elections, support Sets sectoral frames, ... ಹ or opposition regarding Supports/reacts upon specific Public specific topics wishes Company/organisational level, employee representatives, managers Sets frames, ... Elects / works for or Supports/reacts upon specific against somebody wishes **Individual** & organisational unit

Career opportunities and threats

Further organisations, regional levels

Markets & technologies

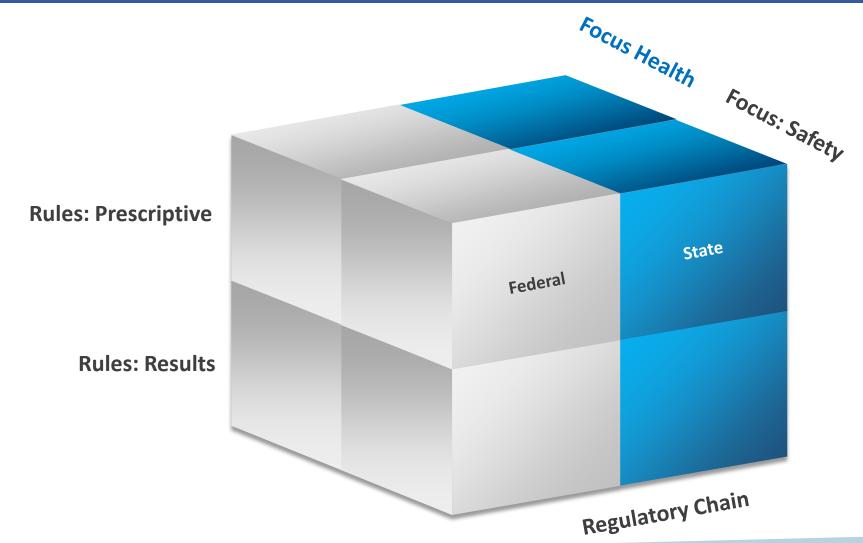


Regulatory chain as a funnel

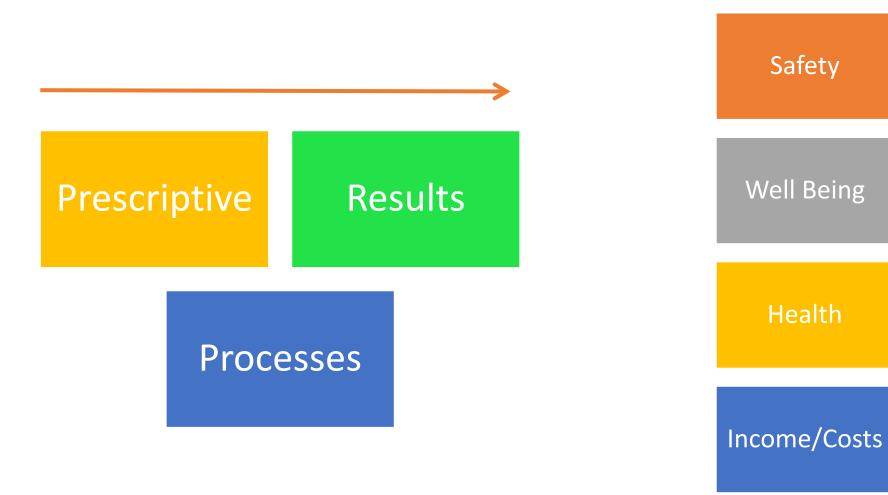
National State Industry



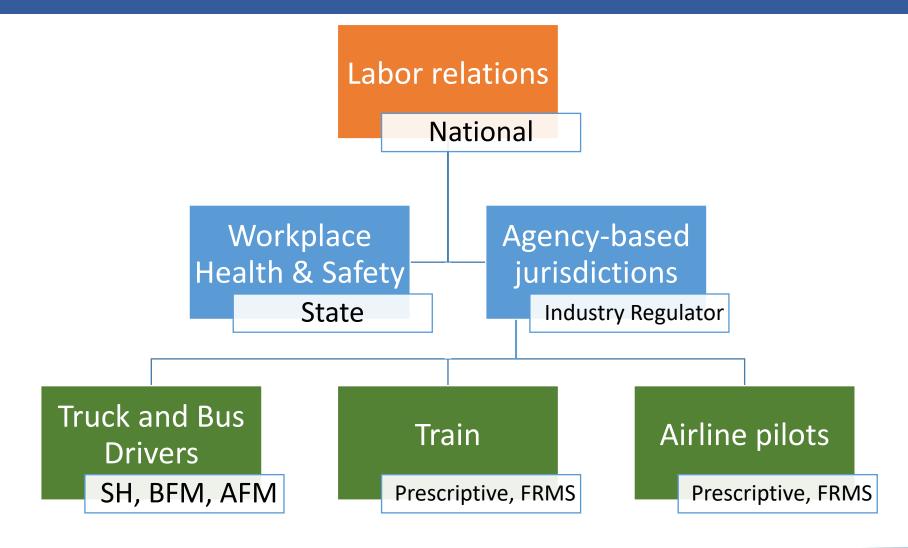
Three dimensional matrix



Australia



Australian Regulatory Environment

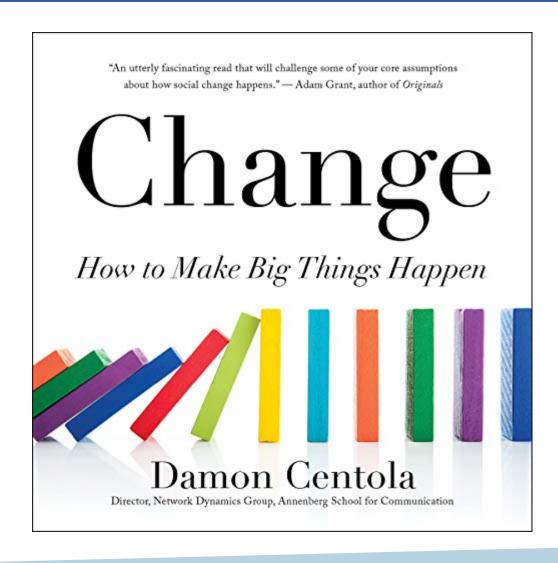


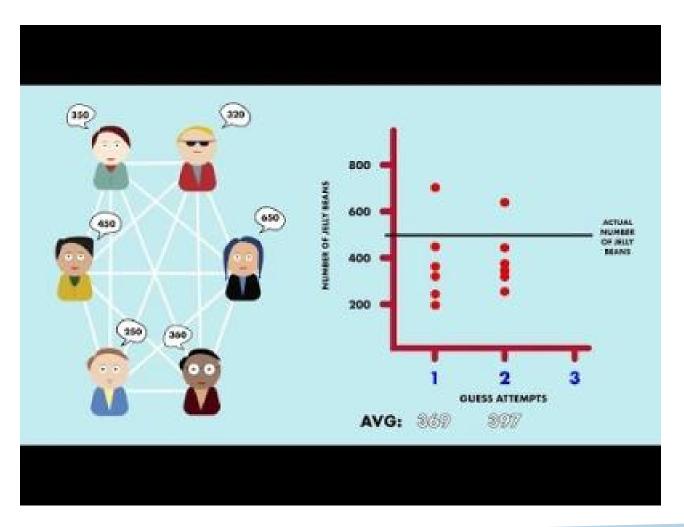


Australia: Truck Drivers (SH)

- Maximum work limits.
 - All drivers can work for a maximum of 5.25 h in any 5.5-h period, 7.5 h in any 8-h period, 10 h in any 11-h period, and 12 h in any 24-h period.
- Cumulative work limits.
 - Solo truck drivers can work for a maximum of 72 h in any 7-d period and 144 h in any 14-d period.
 - Two-up drivers can work for a maximum of 60 h in any 7-d period and 120 h in any 14-d period.
- Minimum rest limits.
 - All drivers must have a minimum of 15 continuous minutes of rest in any 5.5-h period, 30 continuous minutes of rest in any 8-h period, and 60 min of rest in blocks of 15 continuous minutes in any 11-h period. In any 24-h period,
 - Ssolo drivers must have a minimum of 7 continuous hours of stationary rest, and two-up drivers must have a minimum of 5 continuous hours of rest either stationary or in an approved sleeper berth in a moving vehicle.
- Cumulative rest limits.
 - Solo truck drivers must have a minimum of 24 continuous hours of stationary rest in any 7-d period, and a minimum of 2 night rest breaks and 2 night rest breaks on consecutive days in any 14-d period.
 - Two-up drivers must have a minimum of 10 continuous hours of stationary rest in any 52-h period, 24 continuous hours of stationary rest and 24 h of stationary rest in blocks of 7 continuous hours in any 7-d period, and a minimum of 2 night rest breaks and 2 night rest breaks on consecutive days in any 14-d period.

NIOSH: Strategies – behavior change







Behavior change: Sleep

Workers

Workers and management





Behavior change: Sleep - workers

- Social networks on the periphery
 - Facebook users in a given locale

Boston

Atlanta



Los Angeles



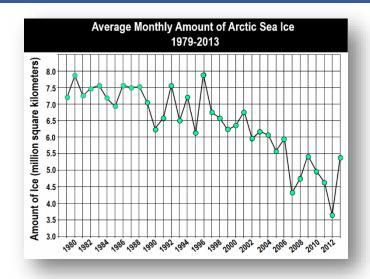
- Influencers in the networks
 - "Mom, Dad, I am worried when you drive while distracted" vs "Mom, Dad, texting while driving is dangerous"



Behavior change: Sleep – labor and management

• Egalitarian networks

Tipping point







NIOSH, social networks and fatigue management



Dreams: Simple, scalable solutions



