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

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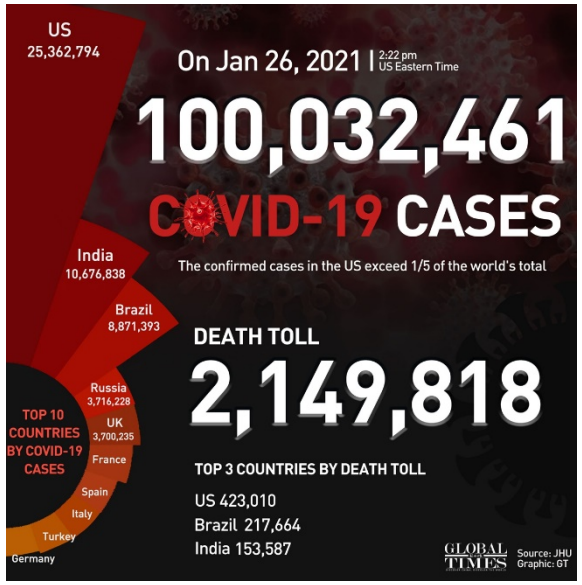
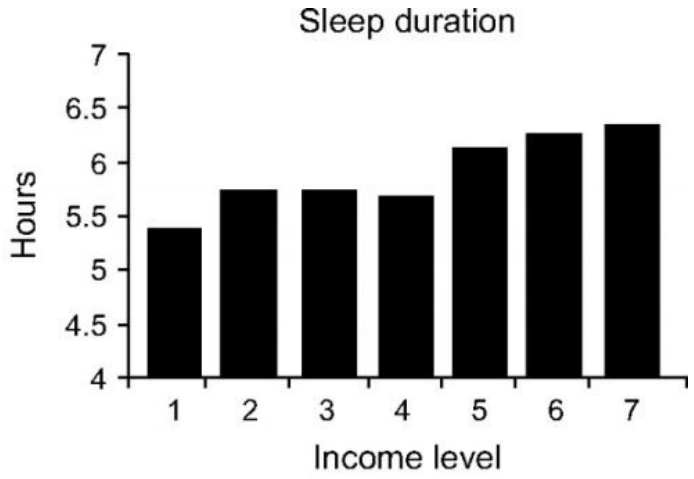
50 YEARS 1970 – 2020

U.S. Department of Transportation
Volpe Center

TRANSPORTATION INNOVATION FOR THE PUBLIC GOOD

The current environment: Radically complex





Problems are worldwide

"Fatigue is a biological drive for recuperative rest"

Factors contributing to fatigue

Time of Day

Time Awake

Task-related Factors

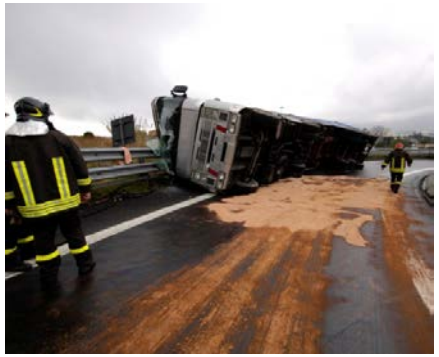
Operator reaches point of FATIGUE

Safe

Operator rests

Impaired Performance

Operator continues work

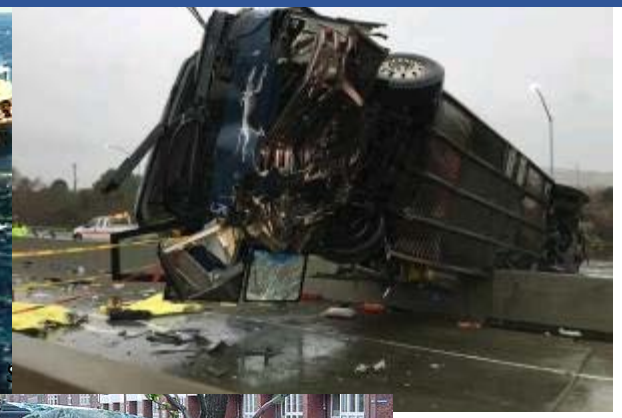


Primary Skills and Abilities

*Reference: Occupational Information Network (O*NET)*

Still not getting it right

Source: Wikipedia.com




Source: I


Source: NTSB

So what to do?

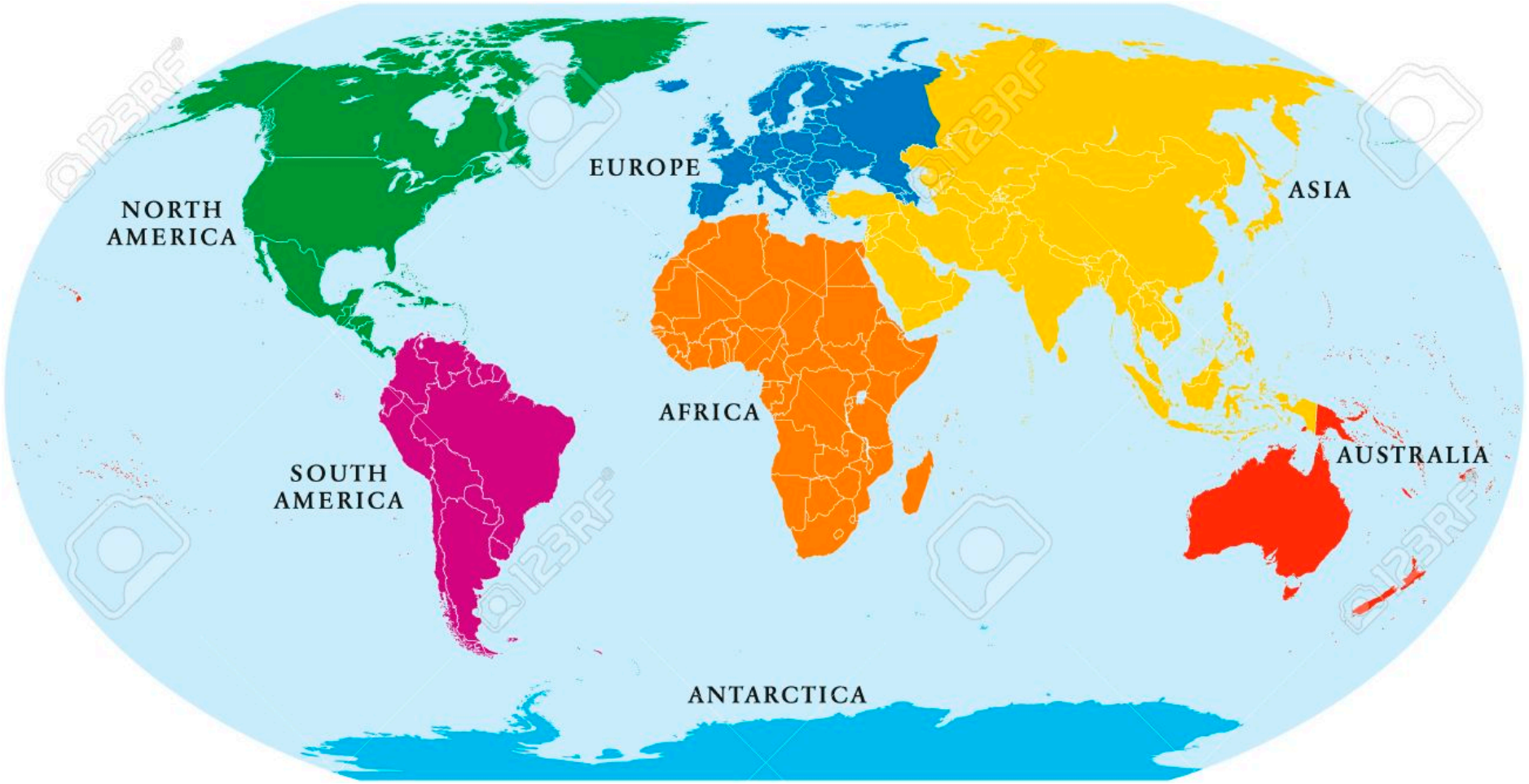
- Belief
  - Incredible breakthroughs in our understanding of fatigue and fatigue management.
  - All too often our systems fail to deliver those breakthroughs to operators.
- Hope for international reach
  - Promote simple, scalable solutions.
  - Pioneer an innovation and research pathway that produces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

The devil in disguise

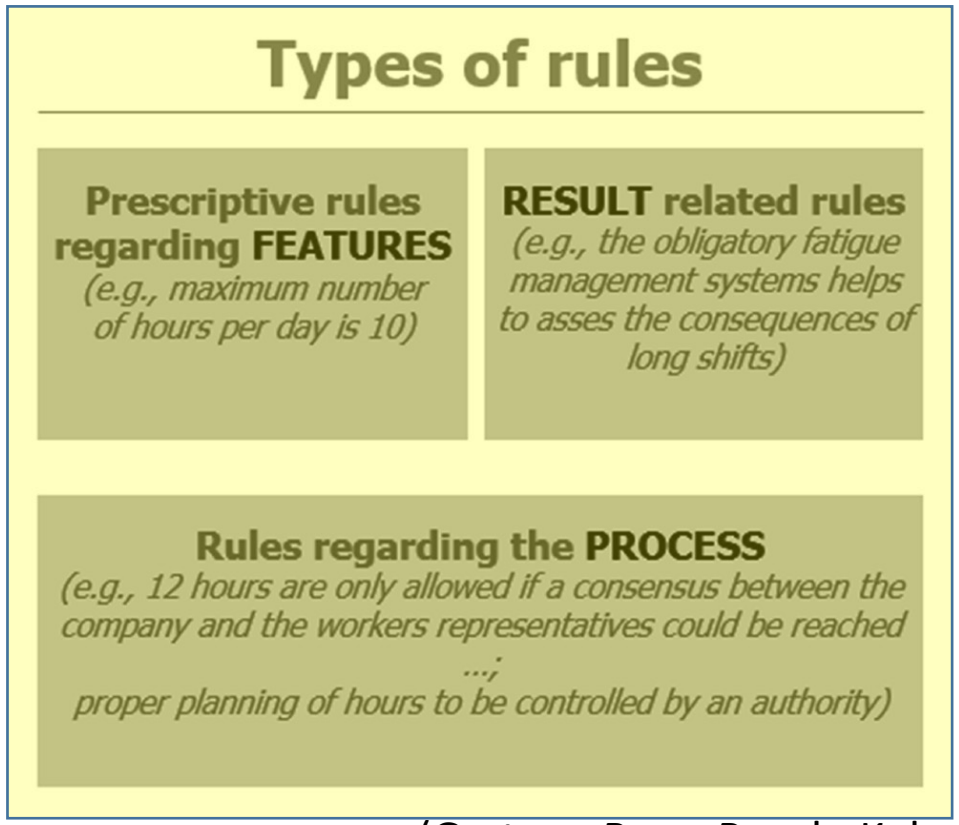
"Developing an 'optimal' work schedule to provide adequate opportunities for sleep requires consideration of many factors such as hours of work, rest breaks between and within-shifts, shift sequences, work demands, workforce demographics and culture. As such, scheduling is unique to each industry, occupation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

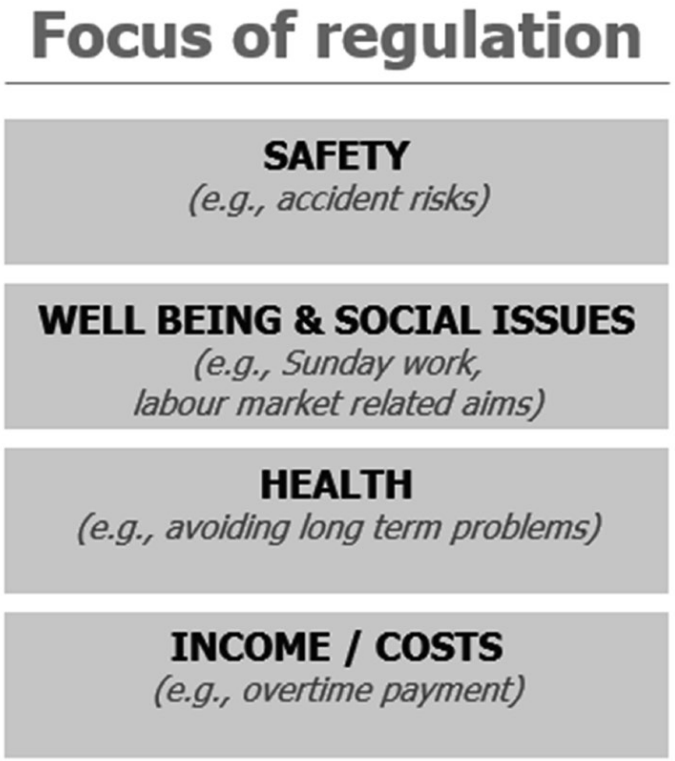
Wong, Popkin and Folkard (2019)

Europe, North America, Australia, Asia



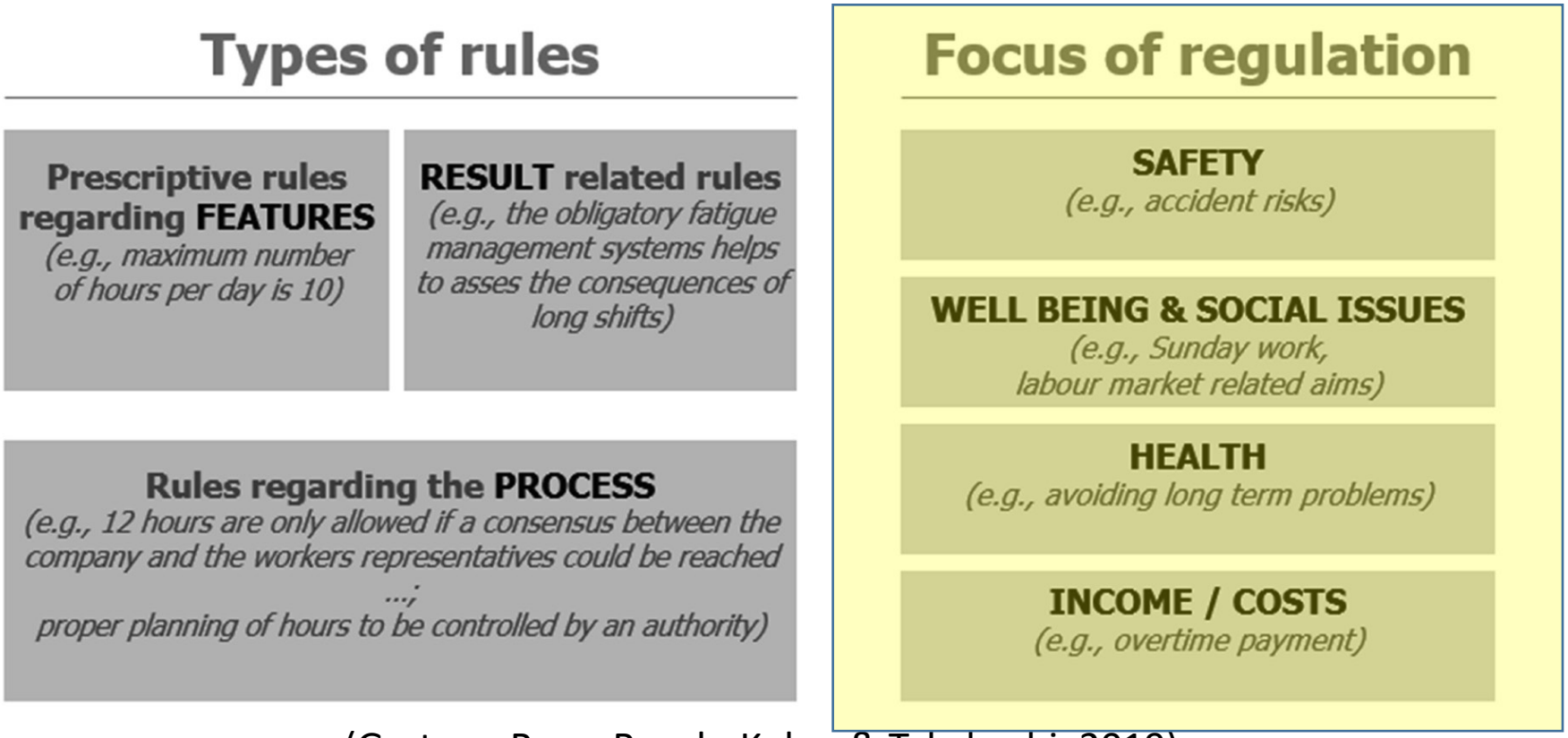
Variations in regulatory environment: Types of rules





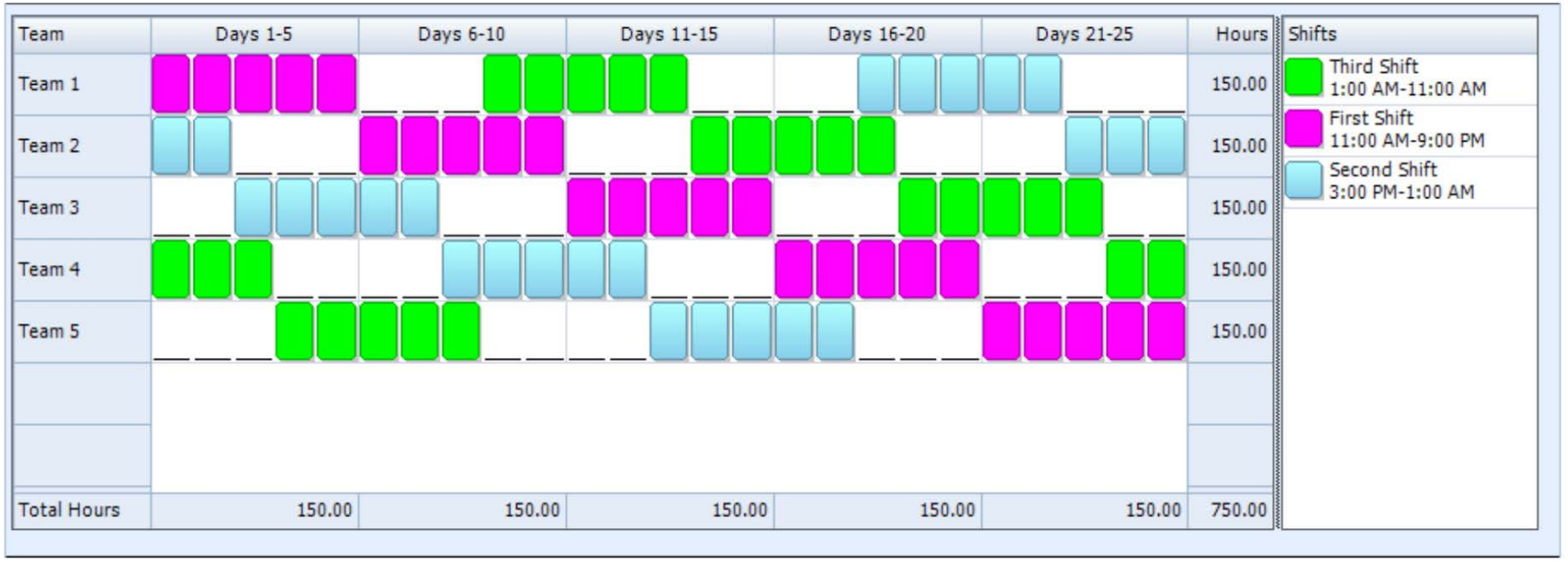
(Gartner, Rosa, Roach, Kubo, & Takahashi, 2019)

Variations in regulatory environment: Focus of regulation



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

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



Team	Days 1-5	Days 6-10	Days 11-15	Days 16-20	Days 21-25	Hours
Team 1						150.00
Team 2						150.00
Team 3						150.00
Team 4						150.00
Team 5						150.00
Total Hours	150.00	150.00	150.00	150.00	150.00	750.00

Shifts
- Third Shift 1:00 AM-11:00 AM
- First Shift 11:00 AM-9:00 PM
- Second Shift 3:00 PM-1:00 AM

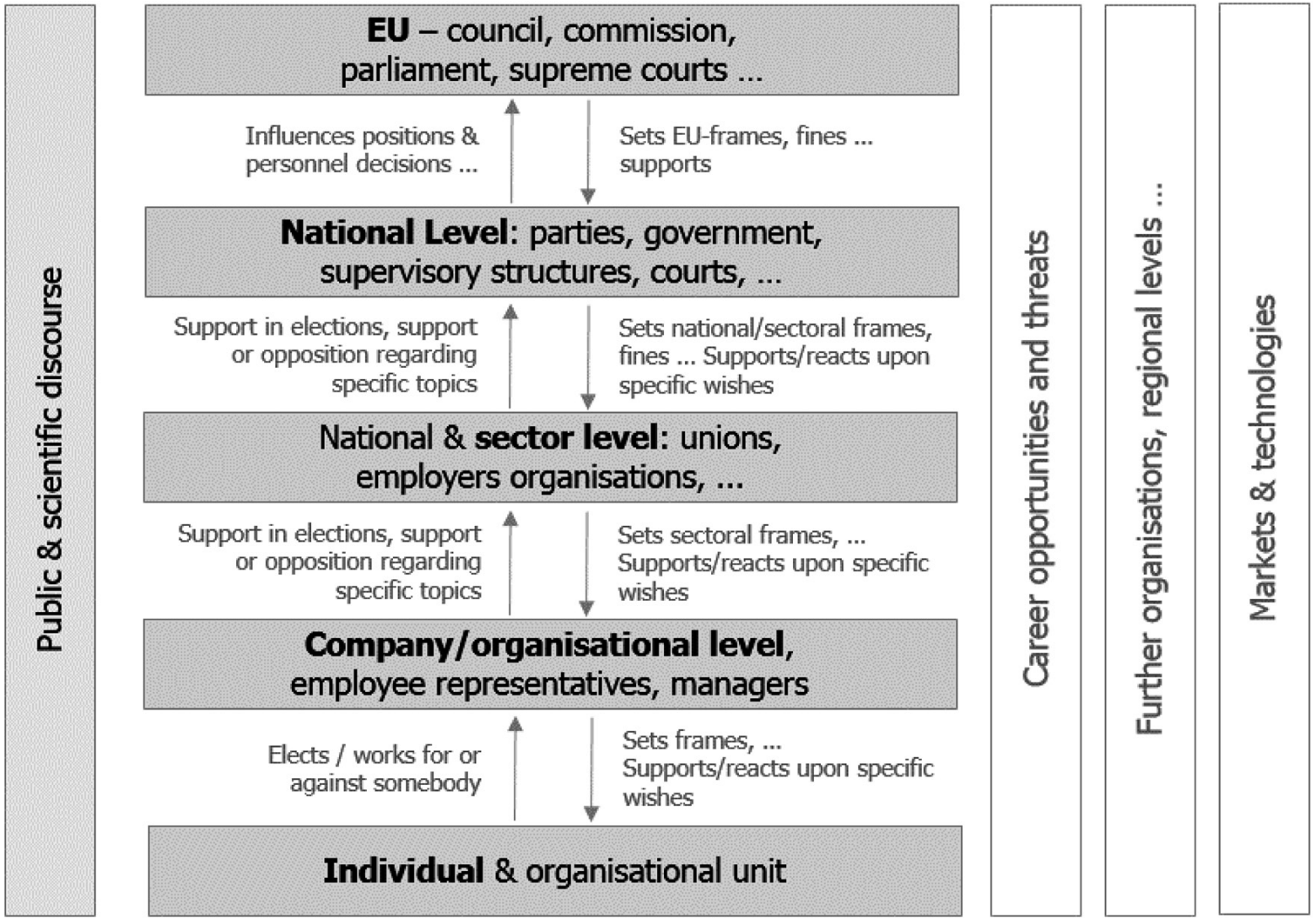
Focus: Income and costs

	Day																										Total Hours
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	
Hours/Day	10	10	10	10	10	X	X	X	10	10	10	10	10	X	X	X	X	10	10	10	10	10	X	X	X	X	10	10	170
Hours/Day							50							50							40							30	
Overtime/Week							10							10							0							0	

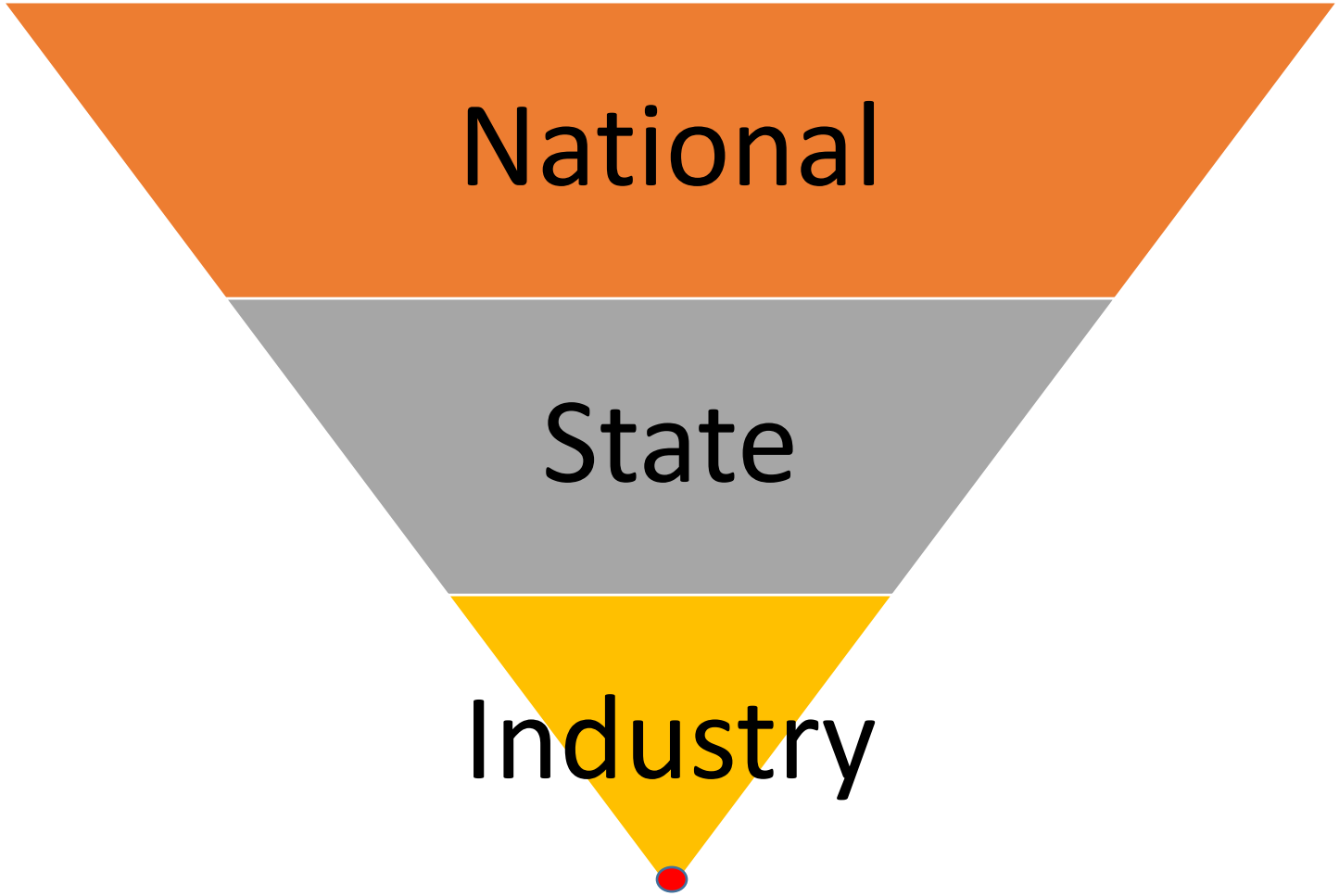
Focus: Health

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

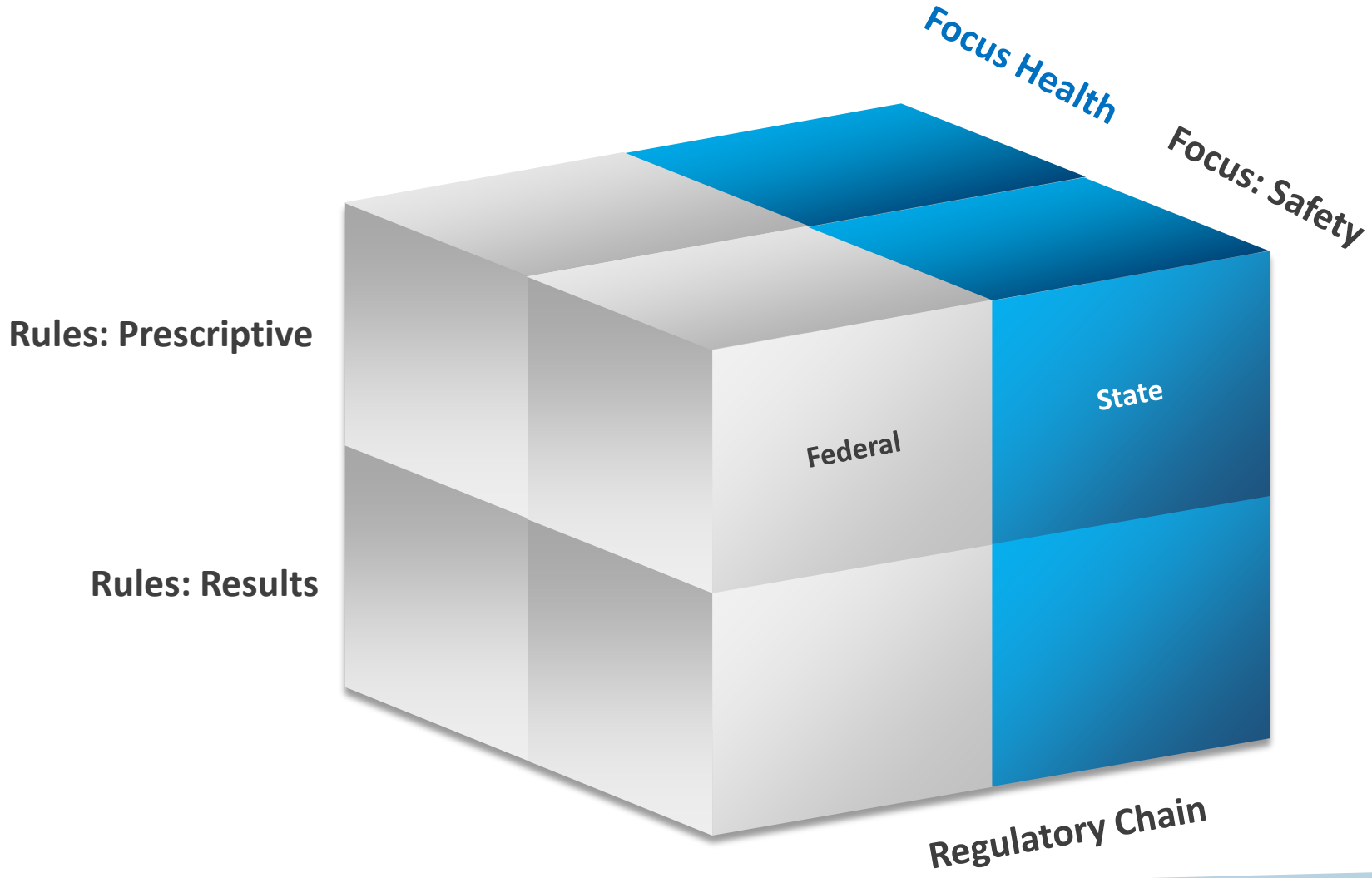
Players in the regulatory chain



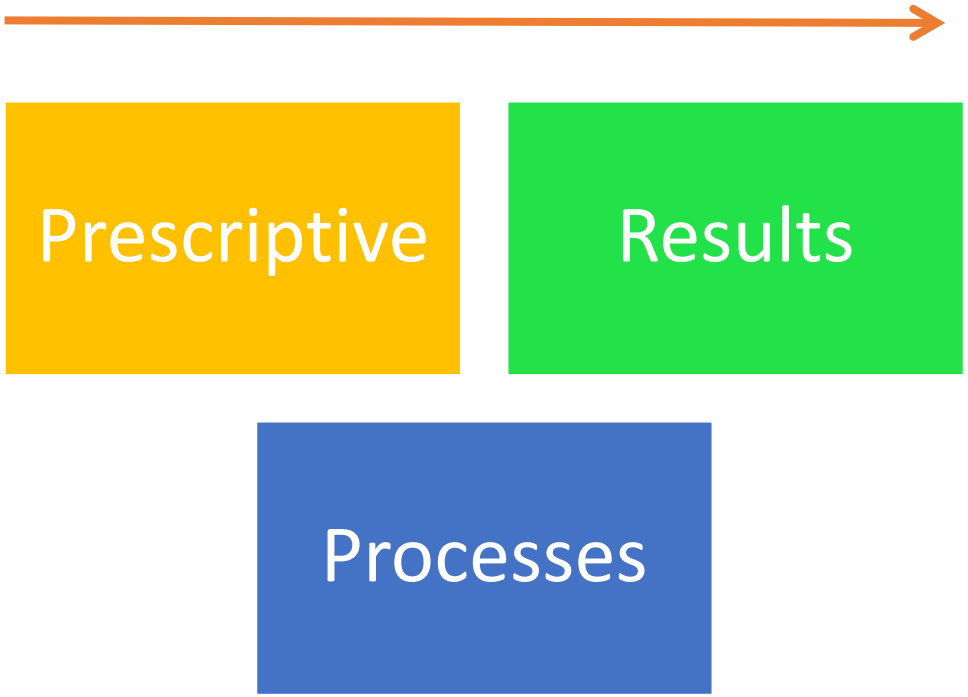
Regulatory chain as a funnel



Three dimensional matrix

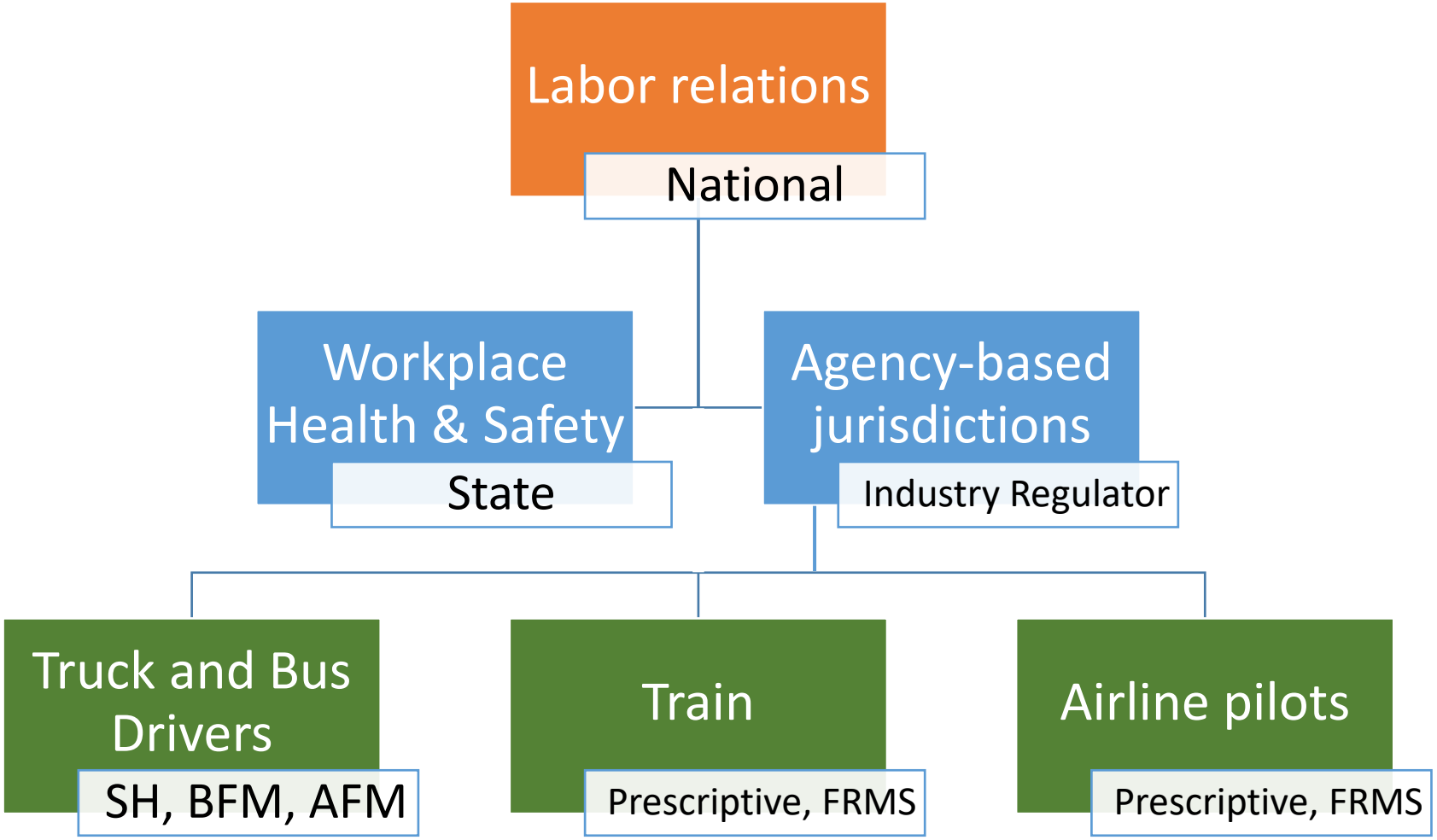


Australia



- Safety
- Well Being
- Health
- Income/Costs

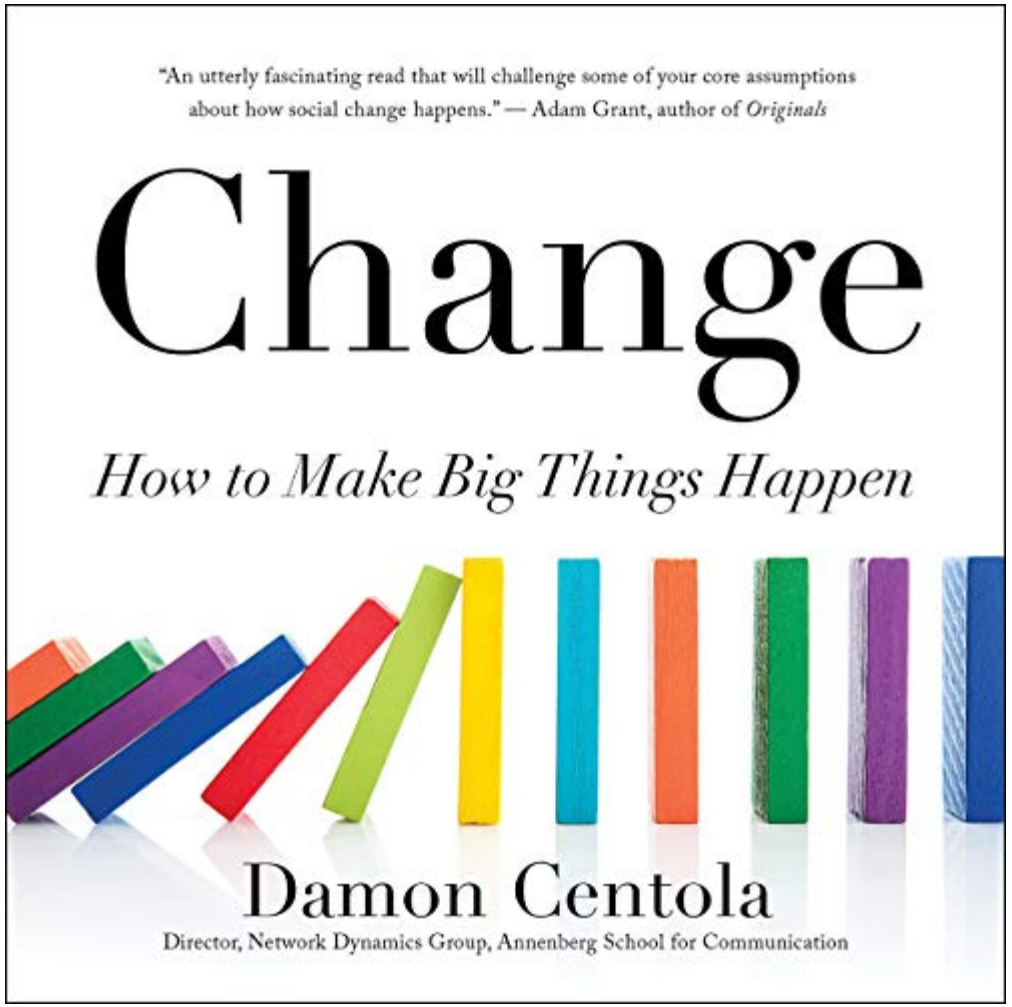
Australian Regulatory Environment

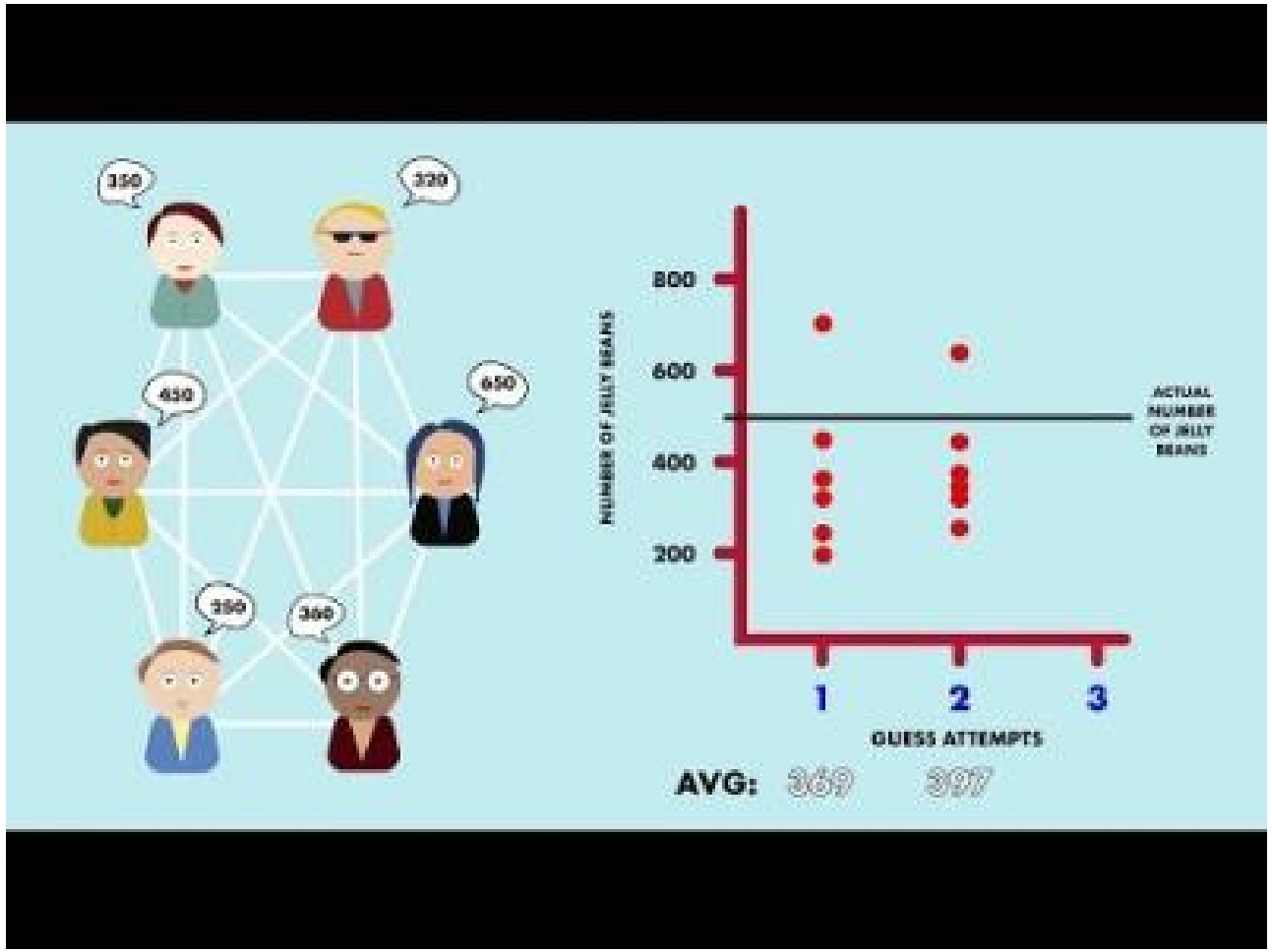


Australia: Truck Drivers (SH)

- 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

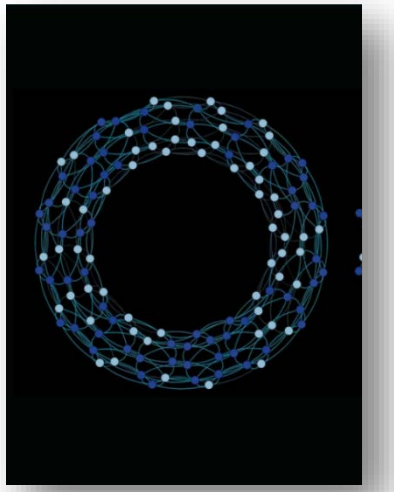
- Workers and management

Behavior change: Sleep - workers

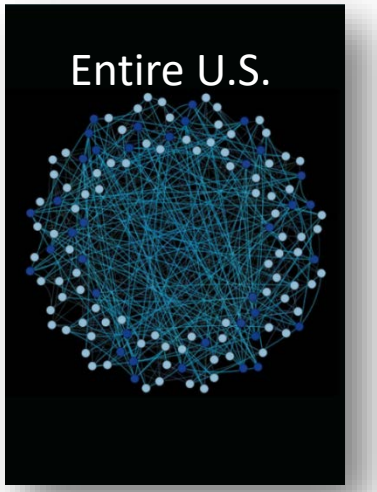
- Social networks on the periphery
  - Facebook users in a given locale

Boston

Atlanta



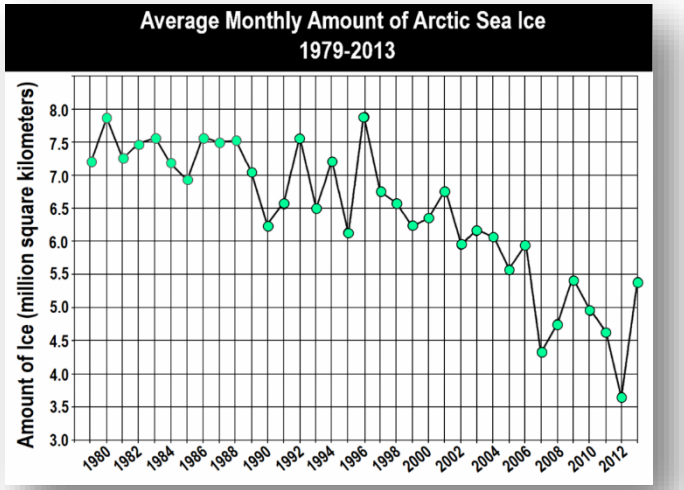
Los Angeles



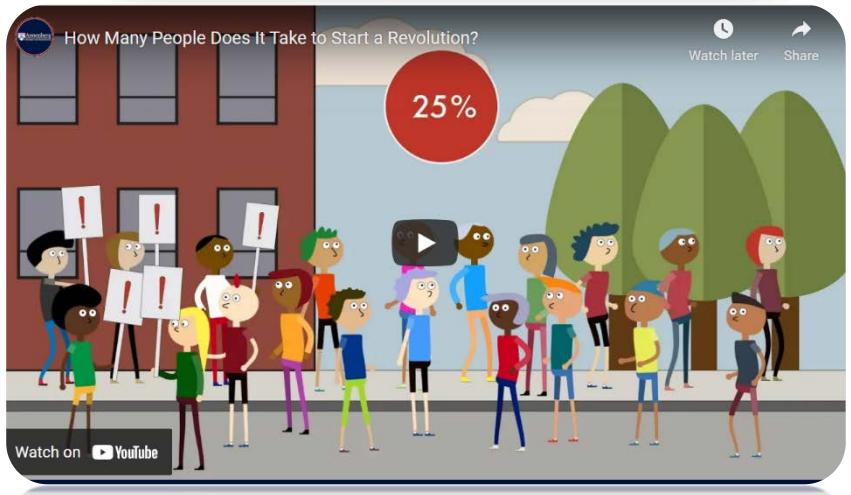
- Influencers in the networks
  - “Mom, Dad, I am worried when you drive while distracted” vs “Mom, Dad, texting while driving is dangerous”

Behavior change: Sleep – labor and management

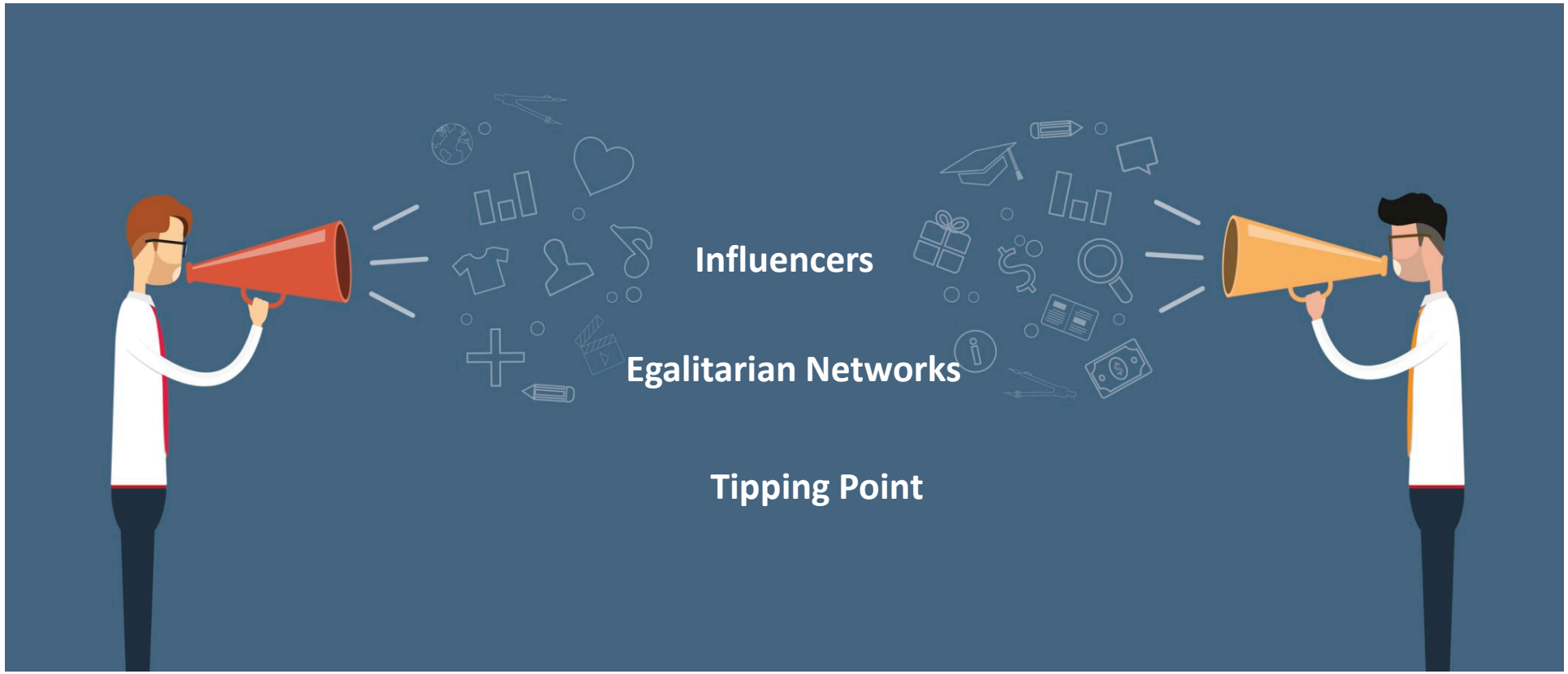
- Egalitarian networks



- Tipping point



NIOSH, social networks and fatigue management



Dreams: Simple, scalable solutions