

What does 'resilience' mean?

A system is resilient if it can adjust its functioning prior to, during, or following events (**changes, disturbances, and opportunities**), and thereby sustain required operations under both expected and unexpected conditions.

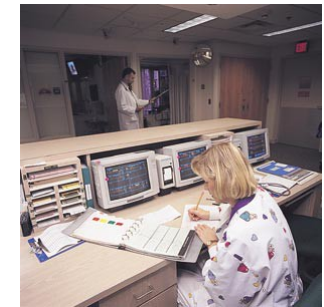
Resilience is something a system does, and not something a system has.
Resilience is a characteristic of a system's performance or behaviour.
This characteristic cannot be reduced to, substituted by, or explained by a single 'internal mechanism' or ability.

WHY WORK-AS-IMAGINED IS DIFFERENT FROM WORK- AS-DONE

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Work-as-done



... understand what happens here?



How well do these people ...



Work-as-imagined

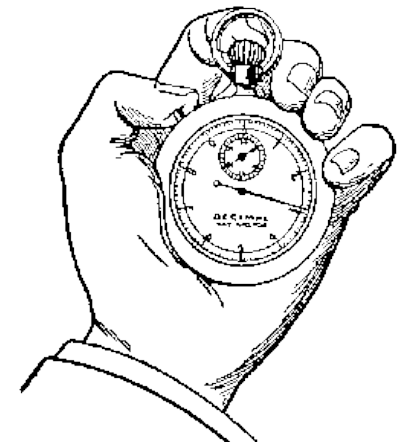
Looking at work-as-done



Scientific management was formulated in the late 19th and early 20th in order to increase efficiency of work and decrease waste. It introduced empirical methods to study work as it actually took place (WAD) – with the intention of prescribing the “**one best way**” of doing it (WAI).

Principles of scientific management (1911)

- ➔ **Analyse** tasks to determine most efficient performance
- ➔ **Select** people to achieve best match between task requirements and capabilities
- ➔ **Train** people to ensure specified performance
- ➔ Insure **compliance** by economic incentives



WAI-WAD in behavioural science

Calculus
Ratiocinator



Homo
Economicus

- Completely informed
- Infinite sensitivity
- Rational

Decision theory assumes all options, outcomes and preferences are known and amenable to evaluation.

Naturalistic
decisions



“Muddling through”

Satisficing

Naturalistic decision making

Decision theory recognises that most situations have incomplete, dynamically changing conditions and competing goal structures.

Work as imagined – work as done

Work-as-imagined (formal work) is what designers, managers, regulators, and authorities believe happens or should happen.

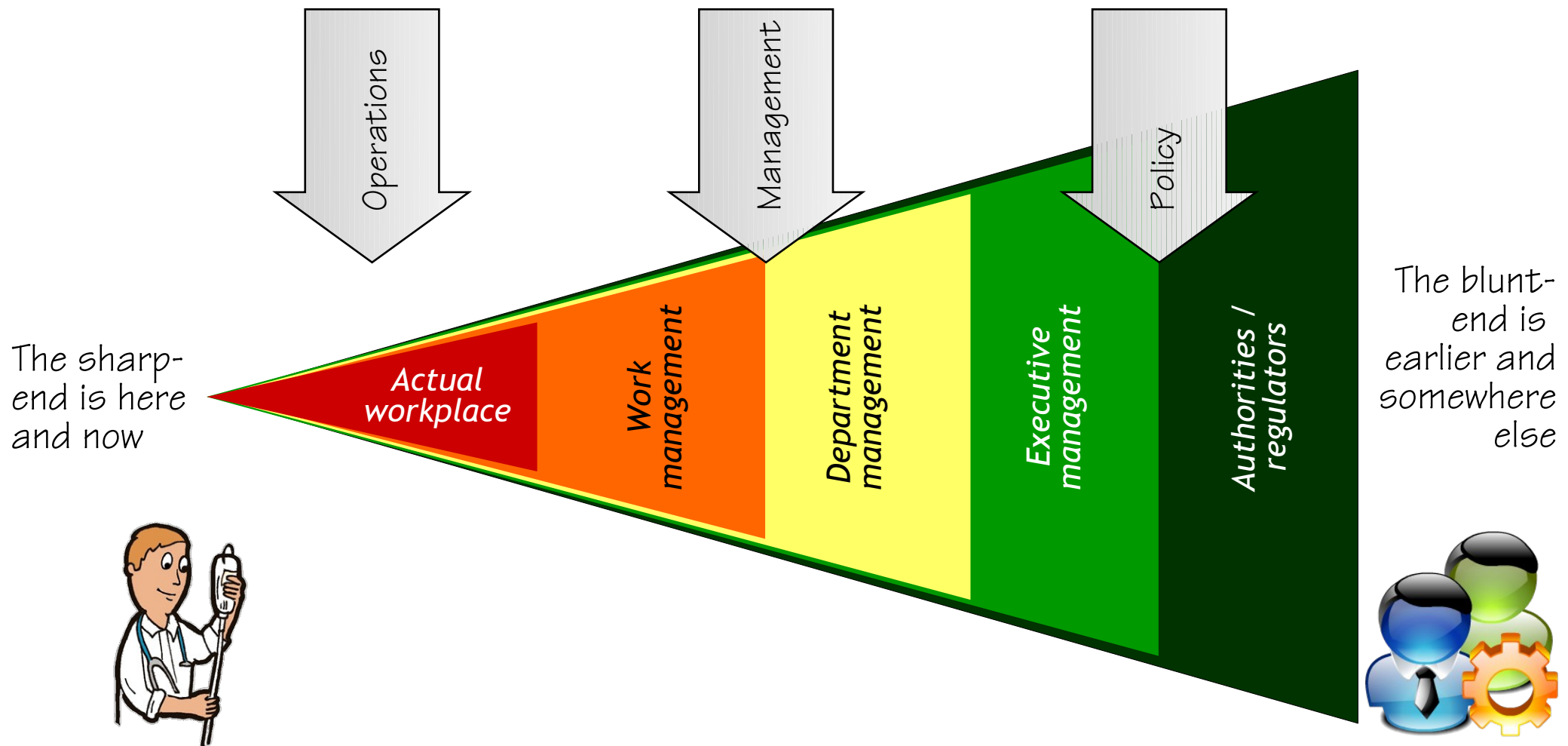
Work-as-imagined is the basis for design, training, and control.

Work-as-done (informal work) is what people have to do to get the job done in the actual situation.

Work-as-done is what actually happens.



The sharp end and the blunt end



Performance adjustments are necessary



Availability of resources (time, manpower, materials, information, etc.) may be limited and uncertain.



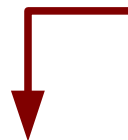
People adjust what they do to match the situation.



Performance variability is inevitable, ubiquitous, and necessary.



Because of resource limitations, performance adjustments will always be *approximate*.



Performance variability is the reason why everyday work is safe and effective.



Performance variability is the reason why things sometimes go wrong.

Different roles of the blunt end



Work management
(schedules - norms)

Describing and preparing work for others; managing how others do their work (quality, productivity)



Production planning
("lean" - optimisation)

Monitoring and managing actions (sampling rate, level of detail, ETTO organisational)



Investigations & auditing
(errors - compliance)

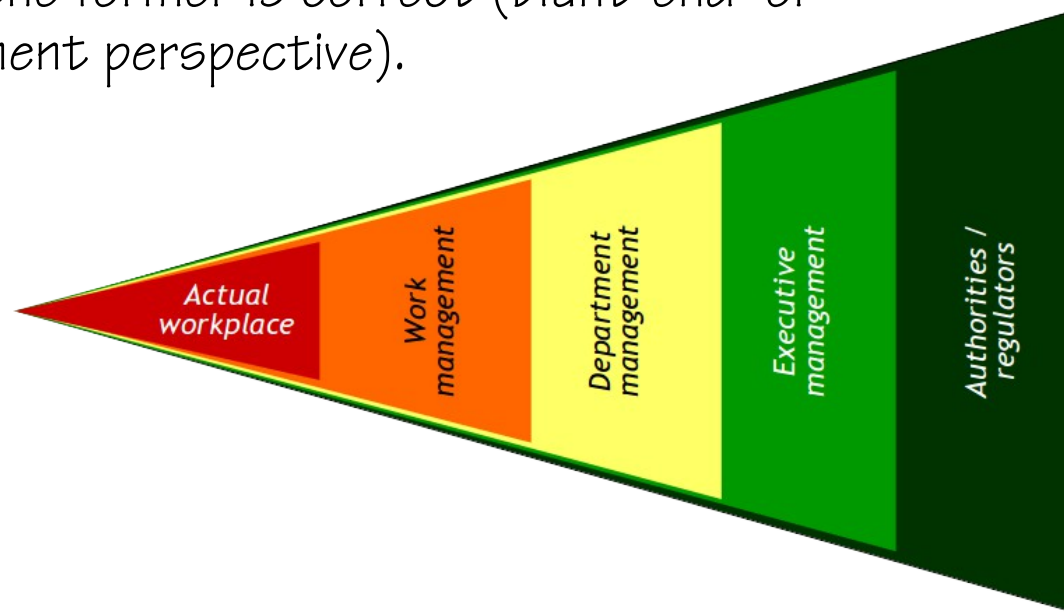


As regulator and arbiter of right or wrong. Limited time to do their work

Problems with safety as risk reduction

The causality credo favours simple cause-effect explanations.
Favourite causes are humans in wilful disregard of critical cues or factors.

The focus on failures juxtaposes WAI and WAD – and assume the former is correct (blunt-end or management perspective).



Most incidents are in hindsight easy to prevent by relatively simple measures, such as higher compliance, increased vigilance, or better instructions and policies.

Explanations are incomplete and misleading, hence an ineffective basis for changes.
Looking for – and finding – a “culprit” limits learning.

Focused and scattered work

Work at the sharp end is usually focused:

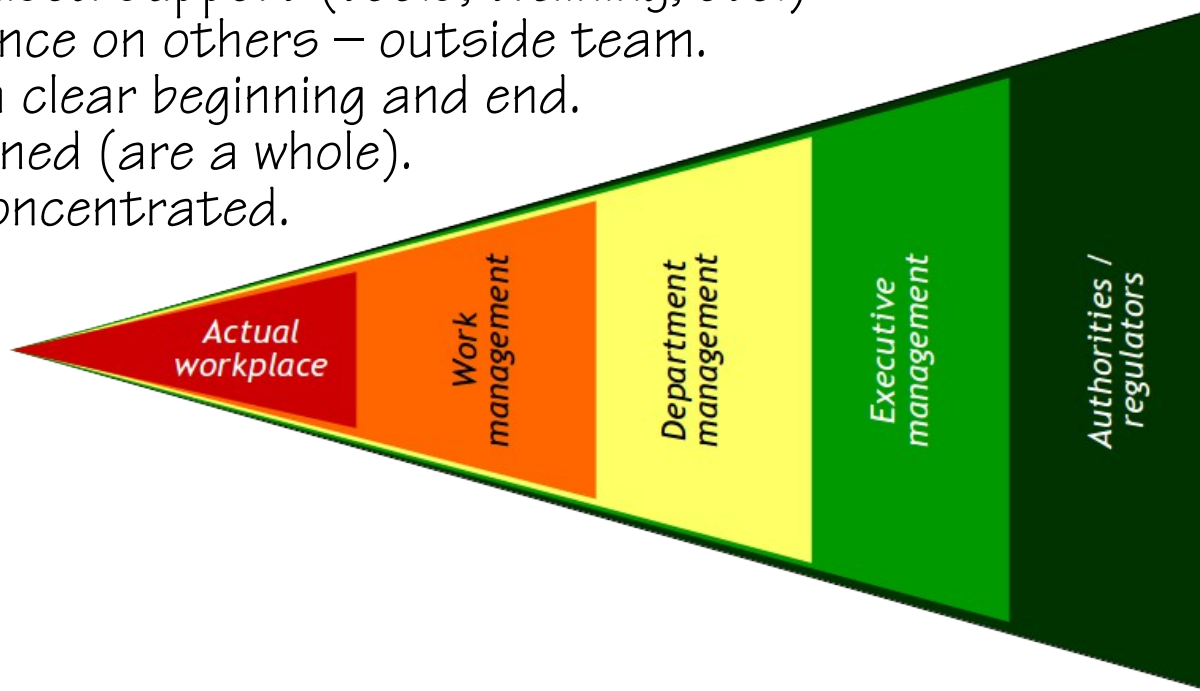
Work has specialised support (tools, training, etc.)

Limited dependence on others – outside team.

Activities have a clear beginning and end.

Activities are joined (are a whole).

Information is concentrated.



Work at the blunt end is often scattered:

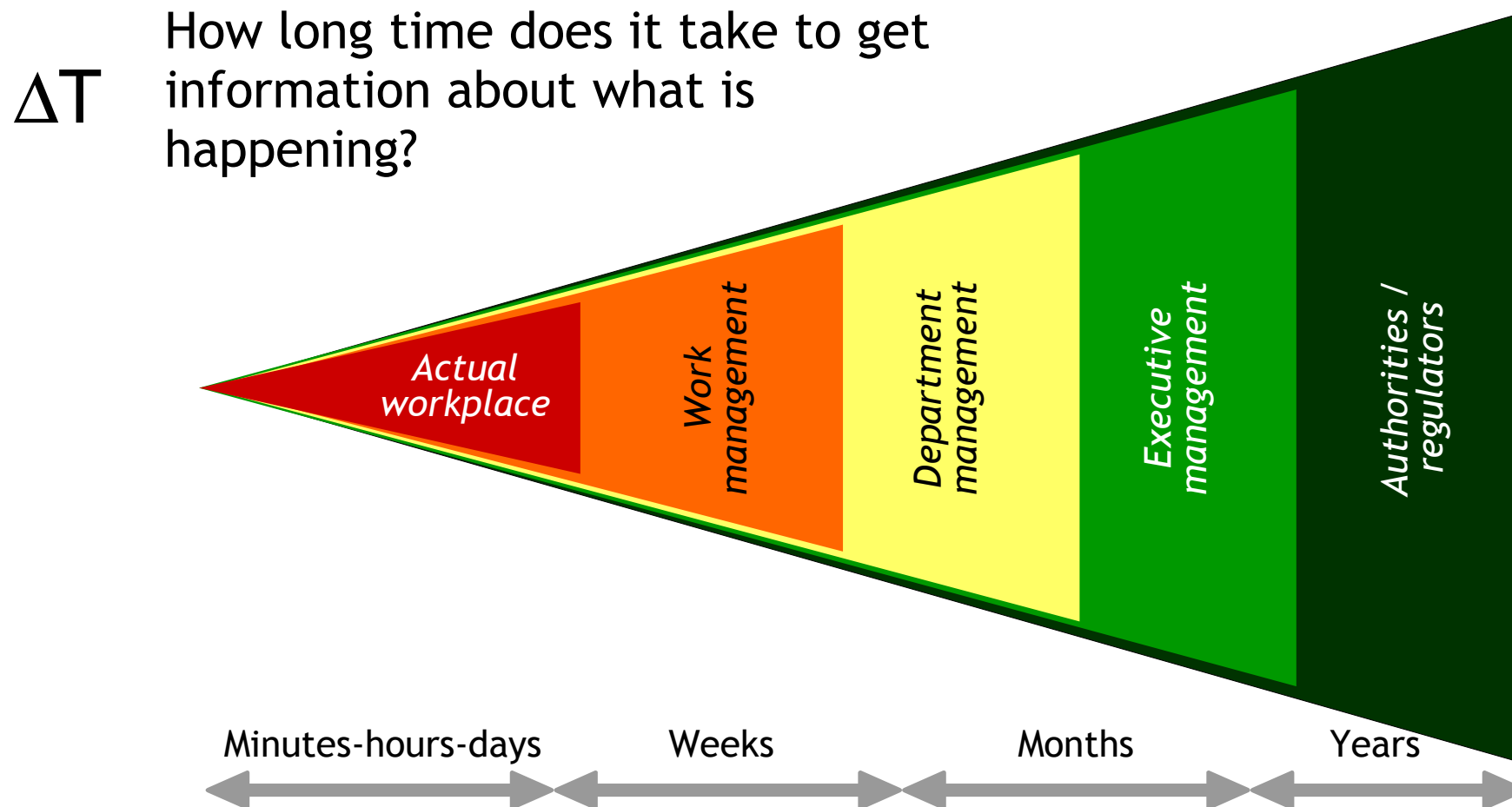
Activities are isolated, or loosely connected (temporally).

Considerable dependence on others.

Work environment is generic.

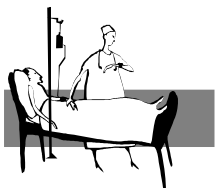
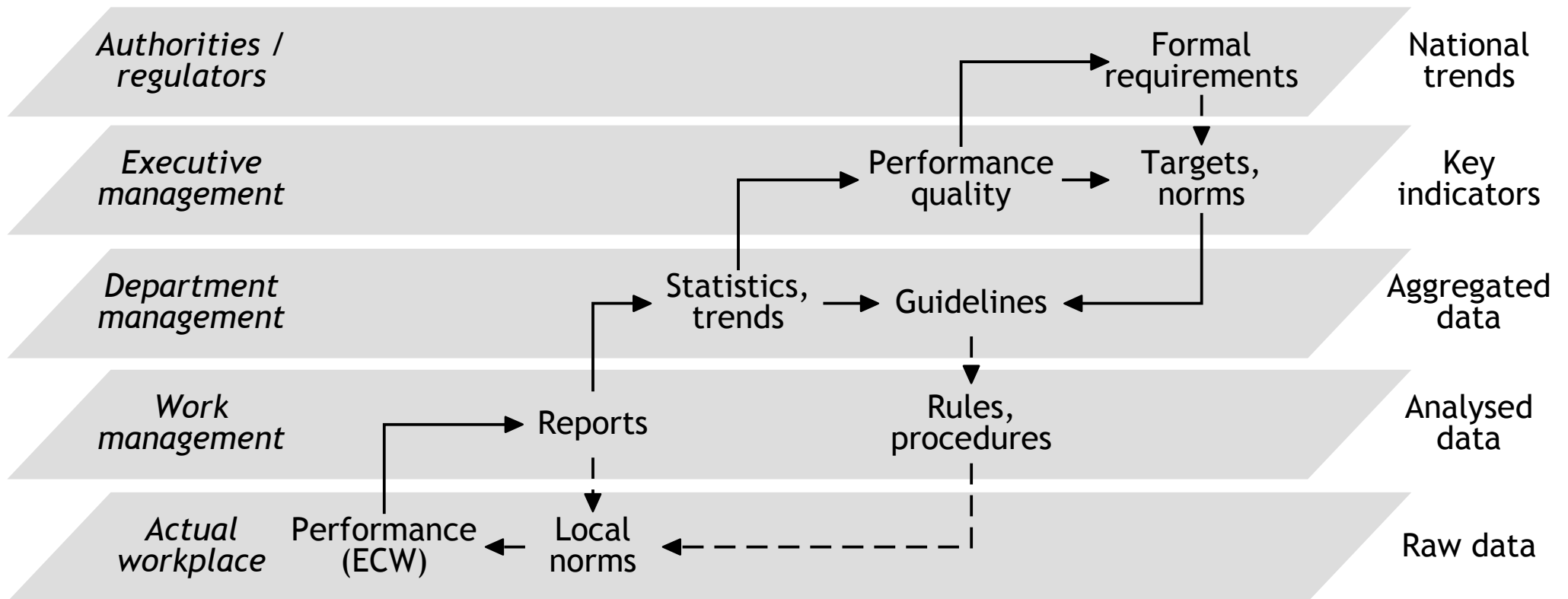
Information is dispersed.

Delay and decay

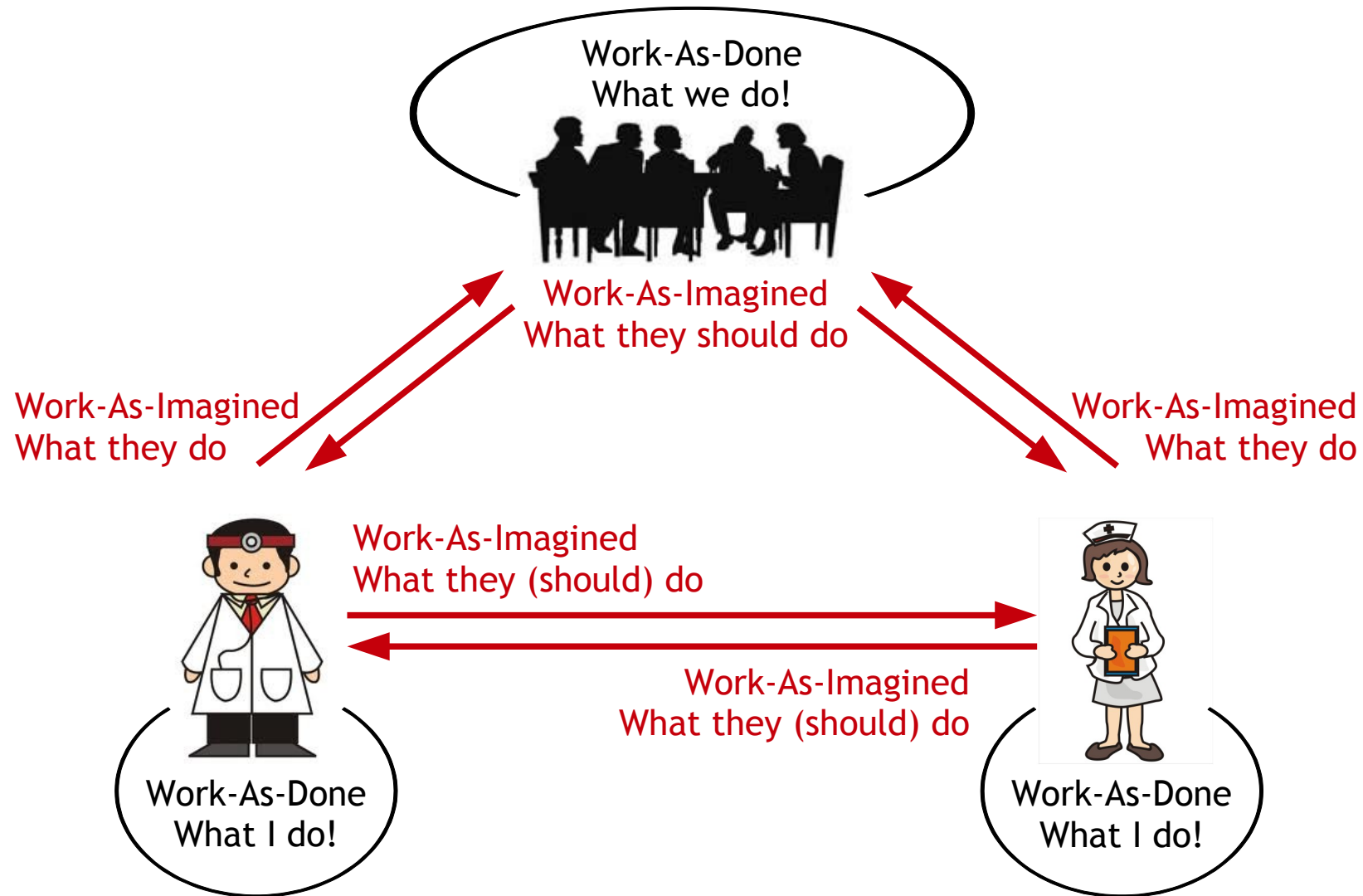


$T_{1/2}$ How long does it take before half the information is obsolete?

How long does it take to find out?



Reciprocal (mis)understanding



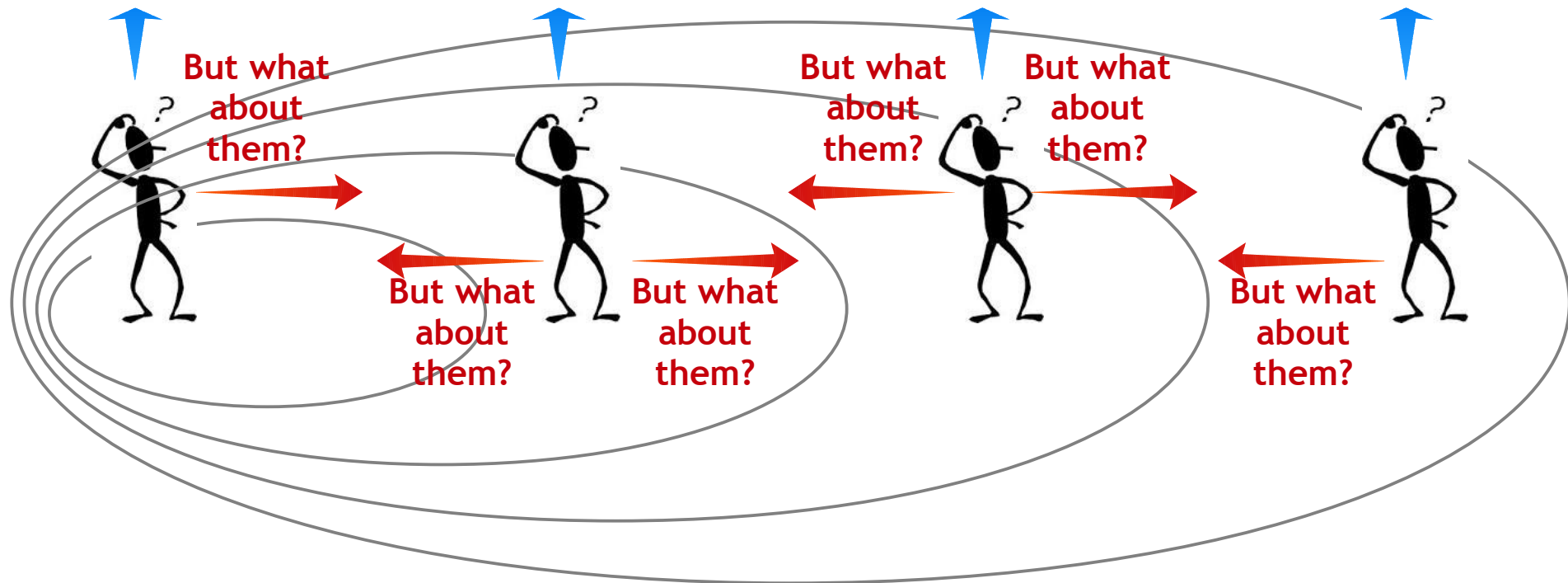
“Us” and “Them”

I know what
I am doing.

I know what
I am doing.

I know what
I am doing.

I know what
I am doing.



When worlds collide ...

WAI \neq WAD

WAI \neq WAD

Solution: Make sure that WAD is more like WAI.

Tempting because WAI seems to be clear and well-defined, and it is easier to prescribe that WAD should be changed than to change WAI.

WAI \neq WAD

Solution: Adjust WAI to be more like WAD.

Difficult because WAD appears to be unclear and difficult to grasp, because WAD is forever changing, and because it will threaten those in charge.

WAI \neq WAD

Solution: Realign WAI and WAD.

To change WAI:
Get information about WAD faster.
Improve quality of information about WAD (Safety-II).

To change WAD:
Encourage mindfulness.
Make informal communication easier.