Safety-II as a management principle

implications for managing and developing an organization

Erik Hollnagel, Ph.D.
Professor, Jönköping Academy (Sweden)
Visiting Professorial Fellow, Macquarie University (Australia).
E-mail: hollnagel.erik@gmail.com

Managing Safety-I

Safety-I is a condition where the number of adverse outcomes (accidents / incidents / near misses) is as low as possible.

The belief in causality (Causality Credo)

(1) Adverse outcomes happen because something has gone wrong (cause-effect thinking + value congruence between cause and effect).

(2) Causes can be <u>found</u> and <u>treated</u> (rational deduction).

(3) All accidents are therefore preventable (zero harm principle).

Prevent, eliminate, constrain. Safety, quality, etc. are different and require different measures and methods.

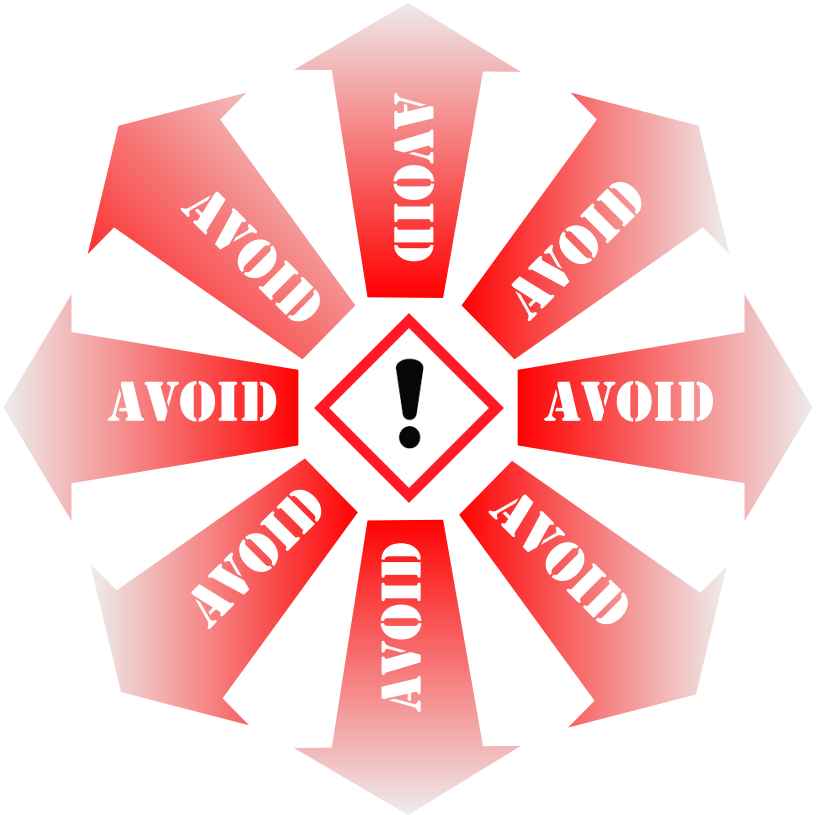
Safety-I: Avoid unwanted outcomes

Safety is the condition of being without harm or other non-desirable outcomes.

Negative outcomes are caused by failures and malfunctions.

↓

Find and eliminate causes of accidents and incidents



If you want to avoid or get away from something, then any direction you take will work!

Managing Safety-II

Safety-II is a condition where as much as possible goes well.

Support, augment, facilitate. Safety, quality, etc. are inseparable and need matching measures and methods.

1. Care about what happens all the time rather than what happens rarely. We always count the number of times something fails, but rarely the number of times it just works.
2. Look for 'work-as-done' - the habitual adjustments and why they are made. When something is done, as a part of work, it has usually been done before and gone well before.
3. Learning should be based on the frequency of events rather than their severity. Small improvements of everyday performance may be more important than large improvements of rare performance.

Safety-II: With wanted outcomes

Safety is the condition of being with intended and wanted outcomes.

All outcomes involve some performance variability.

Study everyday performance in order to support what goes well.

If you want to approach or get close to something, you need to move in the right direction!

What is management?

Management is a process of planning, decision making, organising, leading, and controlling the resources (human, financial, physical, and information) of an organisation to ensure that it can reach its goals efficiently and safely

The purpose of management is either to maintain the current state, to approach a new and desirable state, or to avoid or evade an unwanted state.

To maintain …	requires the ability to change in order to compensate for external (and internal) influences, degradation, and variability.
To approach …	requires the ability to change, in order to move from the current to a new position or state in an orderly manner.
To avoid …	requires the ability to change, in order to steer clear of a temporary or permanent hazard or risk.

Management is the purposeful control of change.

Management requires knowledge

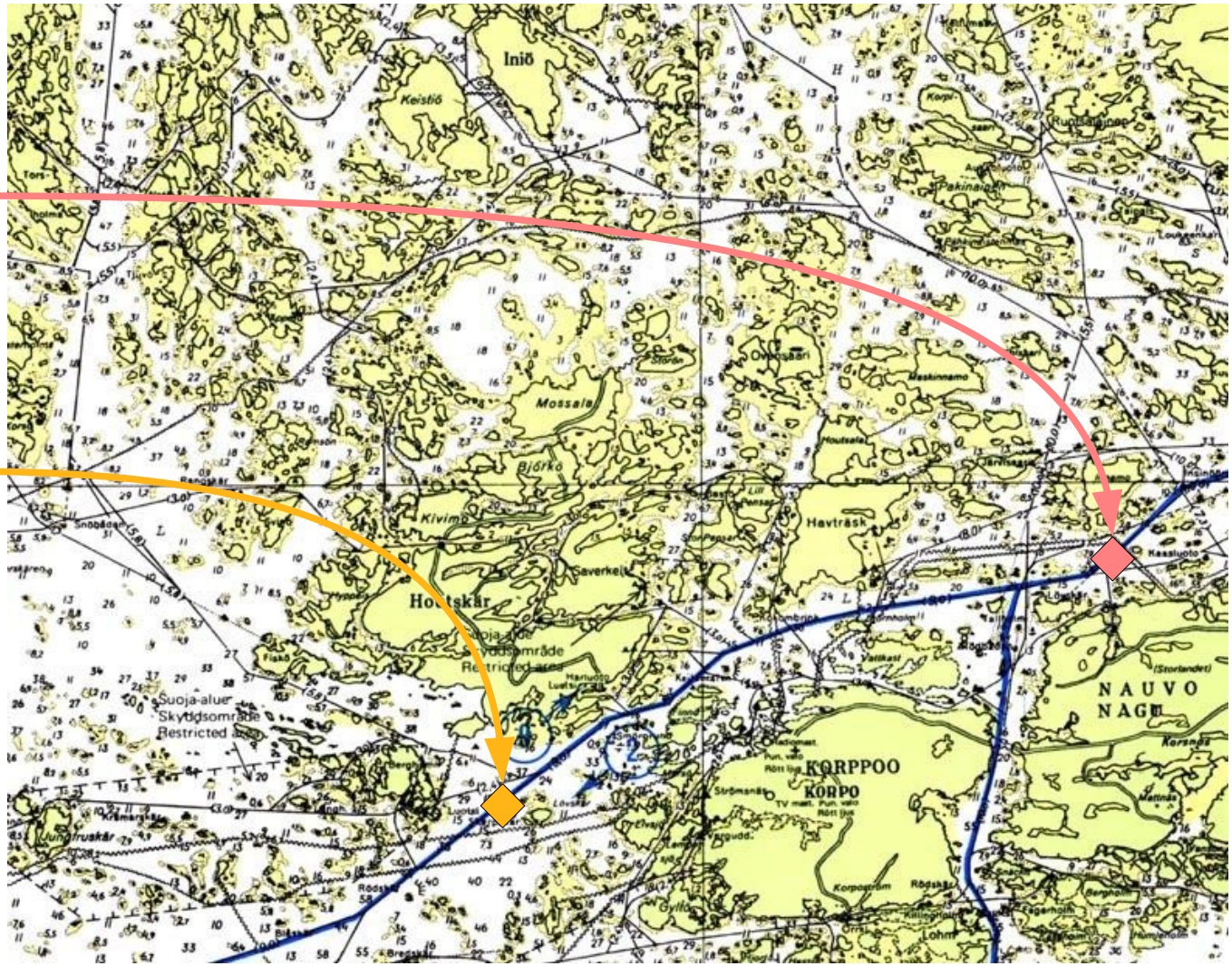
Position:	A need to know where you are: the current position / condition(s) / state. Indicators (KPI)? Measurements? Dashboards? Benchmarks? *Predictions about how the current situation will develop in the short term.*
Goal:	A need to know where you want to be: the new or future position / condition / state. *Criteria for success – approach or avoidance? Stakeholders, consensus or conflict? Costs and benefits?*
Means:	A need to know how to get there where you want to be: how to move the system from the current position to the resulting position. *What are the effective means for change? How long will it take? Are there any side-effects? Will outcomes be temporary or permanent?*

Management is like travelling

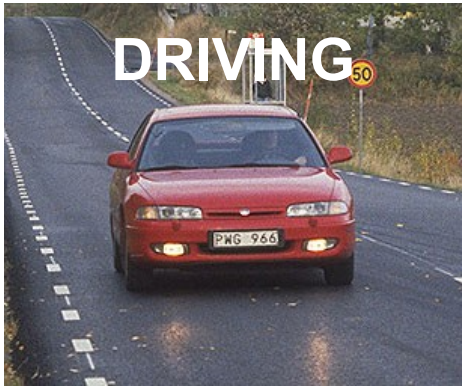
GOALS or TARGETS:
Where do we want to be?
When should we arrive?

POSITION:
Where are we now?
How well are we doing?

MEANS or PROCESS:
How can we change position ("speed" and "direction")?



Managing different processes



Goal: Well defined
Position: Known
Means / Process:
Well known, transparent

Goal: Well defined
Position: Known
Means / Process:
Well known, transparent

Goal: well defined
Position: Known
Means / Process:
Well known, transparent

Managing safety

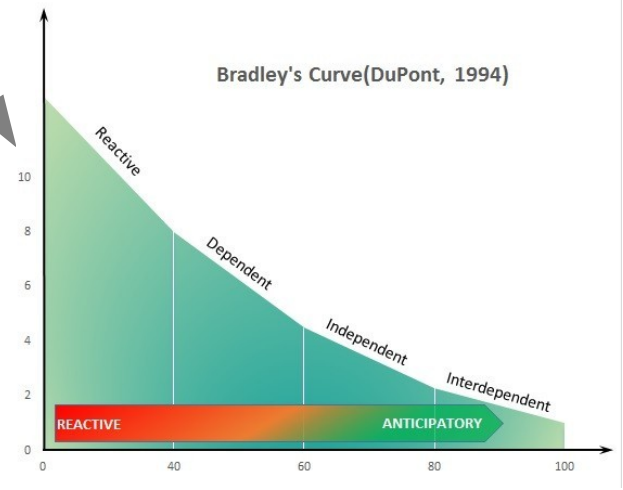
Goal: Defined by negation (no accidents)

Position: Vaguely known or unknown

Means / Process: Partly unknown, based on tradition rather than knowledge.

Safety: What is the goal?

Safety goals are rarely described explicitly



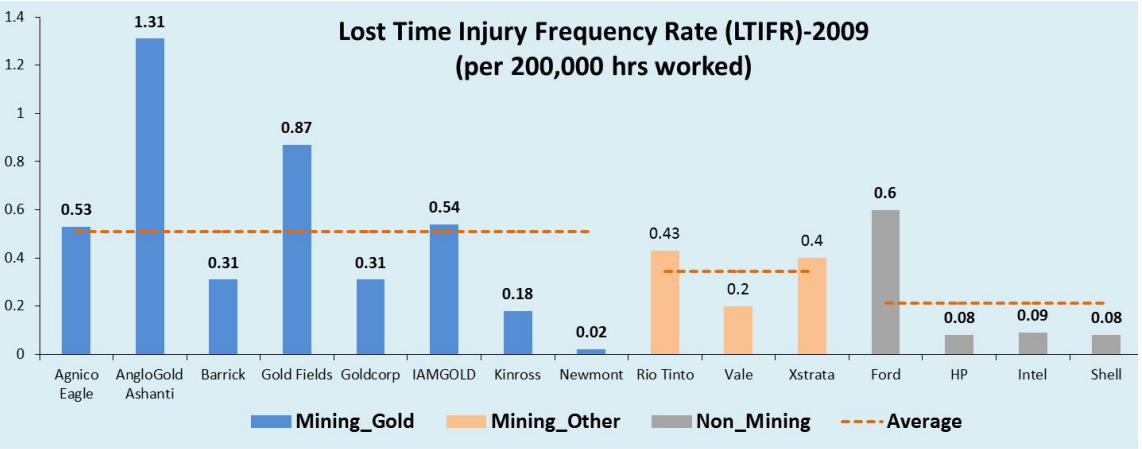
Goal: The "zero accident" approach

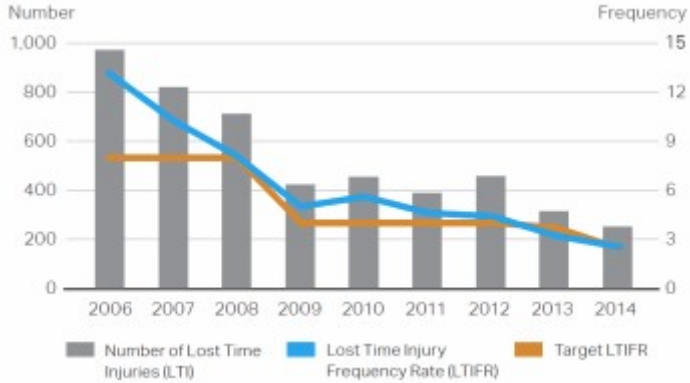
<u>OUR PURPOSE</u>
To produce [X] safely, securely and profitably – without harm to people or the environment.

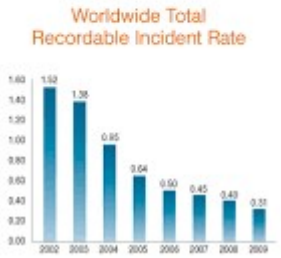
OUR BELIEFS and GUIDING PRINCIPLES

1. Safe production is our most important goal.
2. All injuries and environmental incidents are preventable.
3. Any task that can't be done safely without harm to the environment will not be done.
4. Each person is accountable for his or her own safety, the safety of their coworkers and protecting the environment.
5. Each person is expected to identify hazards and manage risks to people and the environment.
6. Each person must have the necessary skills to work safely and protect the environment.
7. Working safely with respect for people and the environment is a condition of employment.

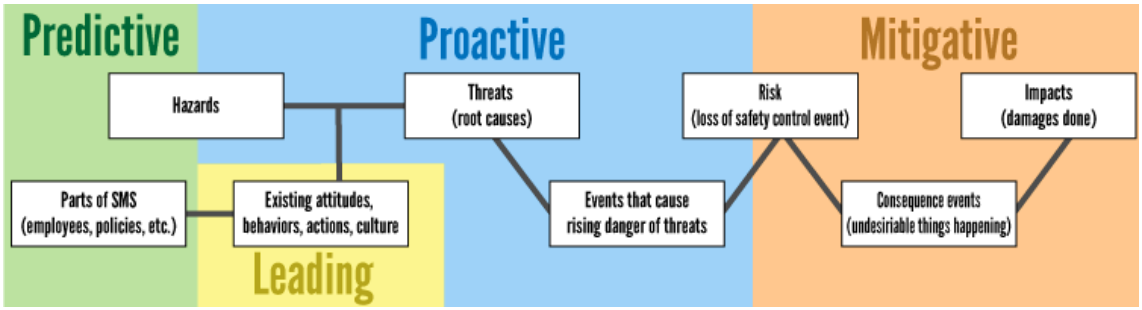
Safety: What is the position?



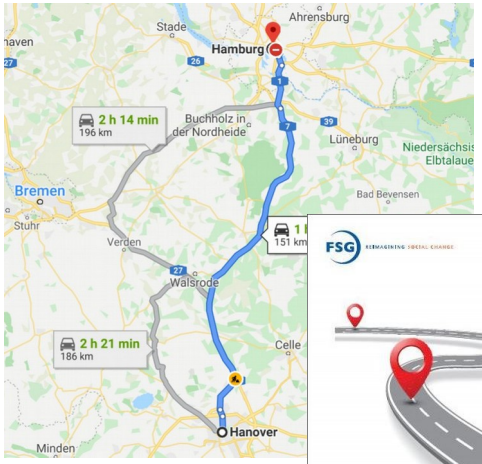


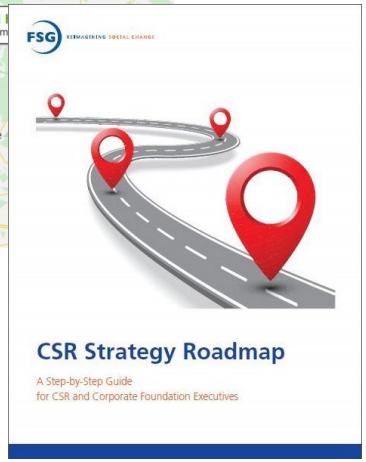


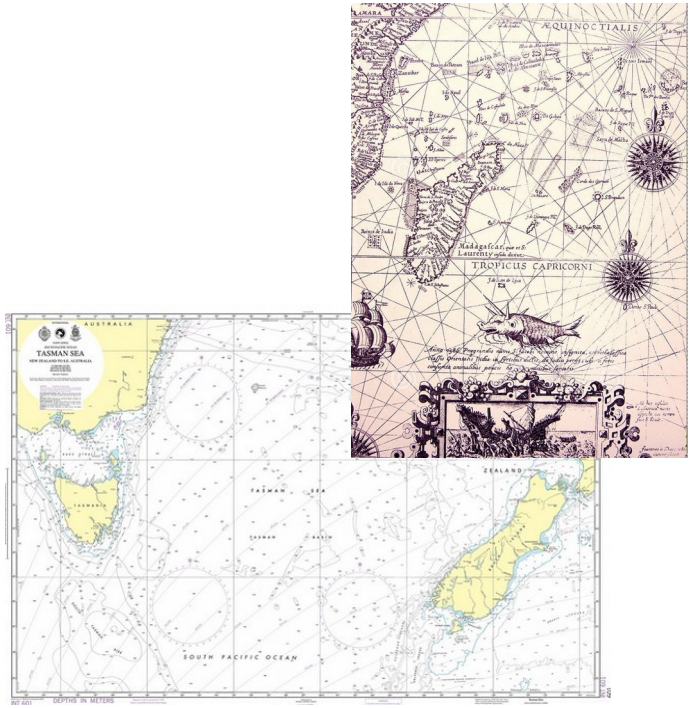
Most, if not all, safety measures refer to negative outcomes (accidents, etc.)



Roadmap versus sea-chart





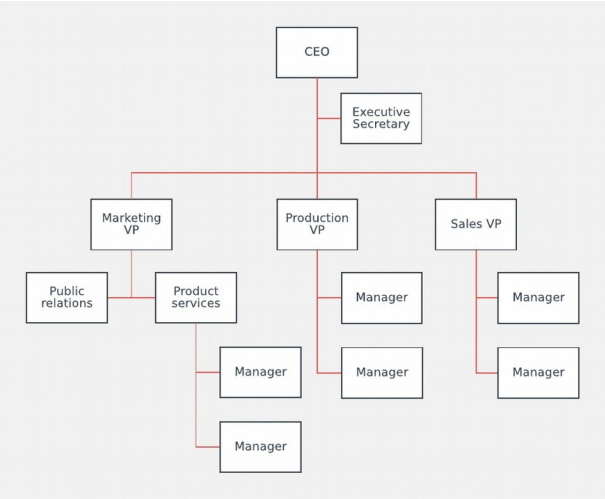


Position: Easy to establish
Direction: Clearly indicated
Routes: Well marked
Conditions: Stable

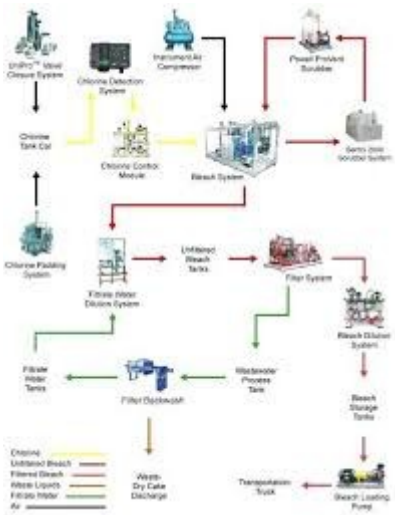
Position: ?
Direction: ?
Routes: ?
Conditions: ?

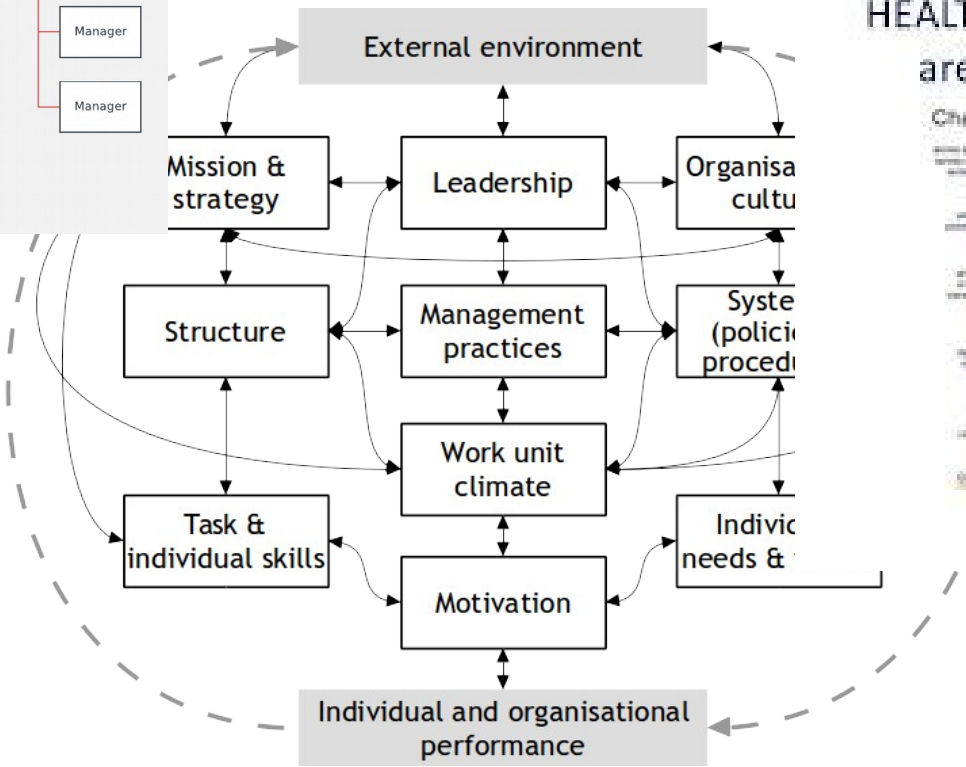
Position: Can be uncertain
Direction: Must be worked out
Routes: Course must be set
Conditions: Unpredictable

How does an organisation function?



In order to manage something it is necessary to know how it functions!

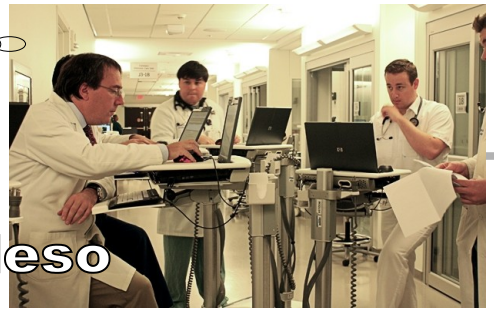




Different ideas about solutions

This will solve your problems

Will this solve our problems?



This doesn't solve our problems

Why are there different ideas about what actually goes on?

And how can they be reconciled?

How do we understand what happens?

Design (tools, roles, environment)

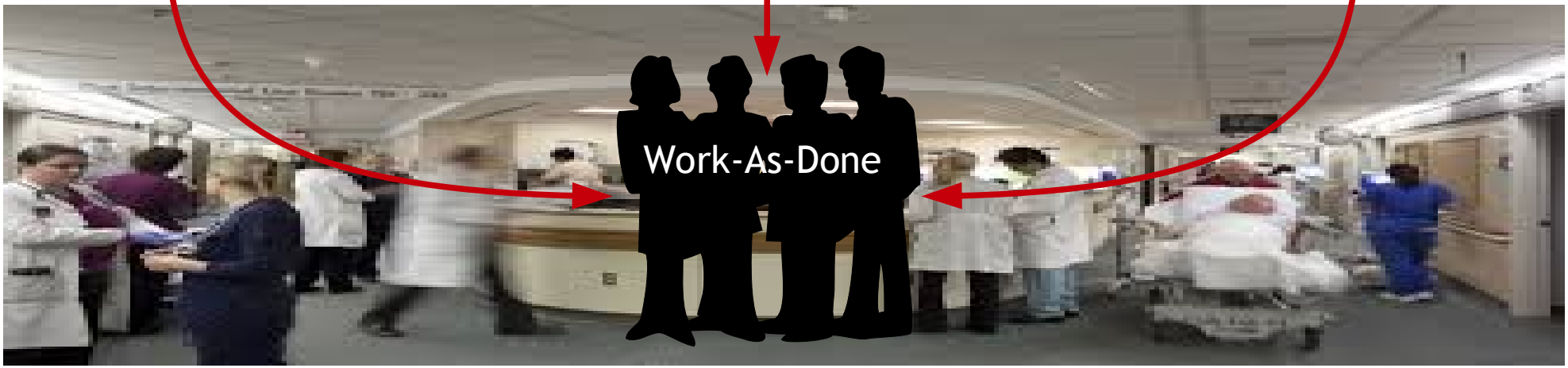
Work-As-Imagined

Work & production planning ("lean" - optimisation)

Work-As-Imagined

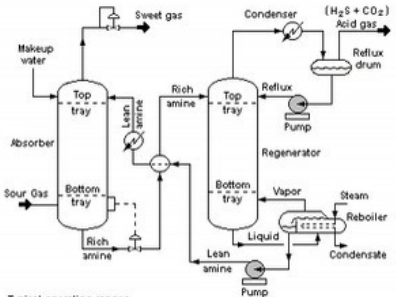
Safety management, investigations & auditing

Work-As-Imagined

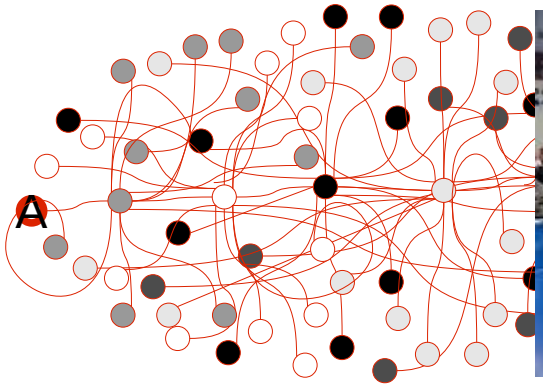


Means: Understanding systems

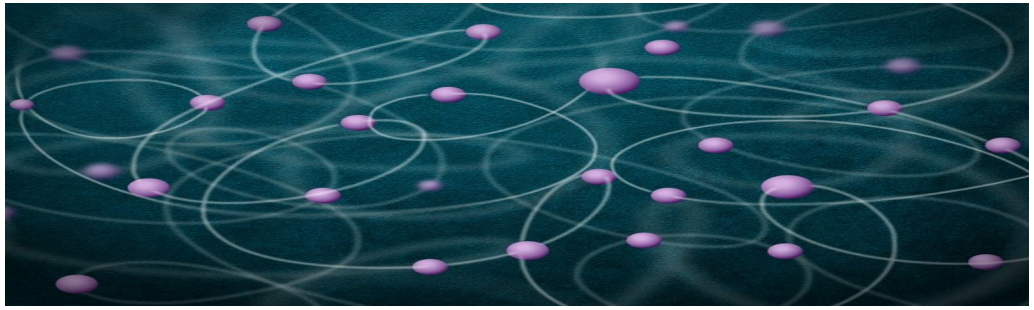
Tractable system
(technical)



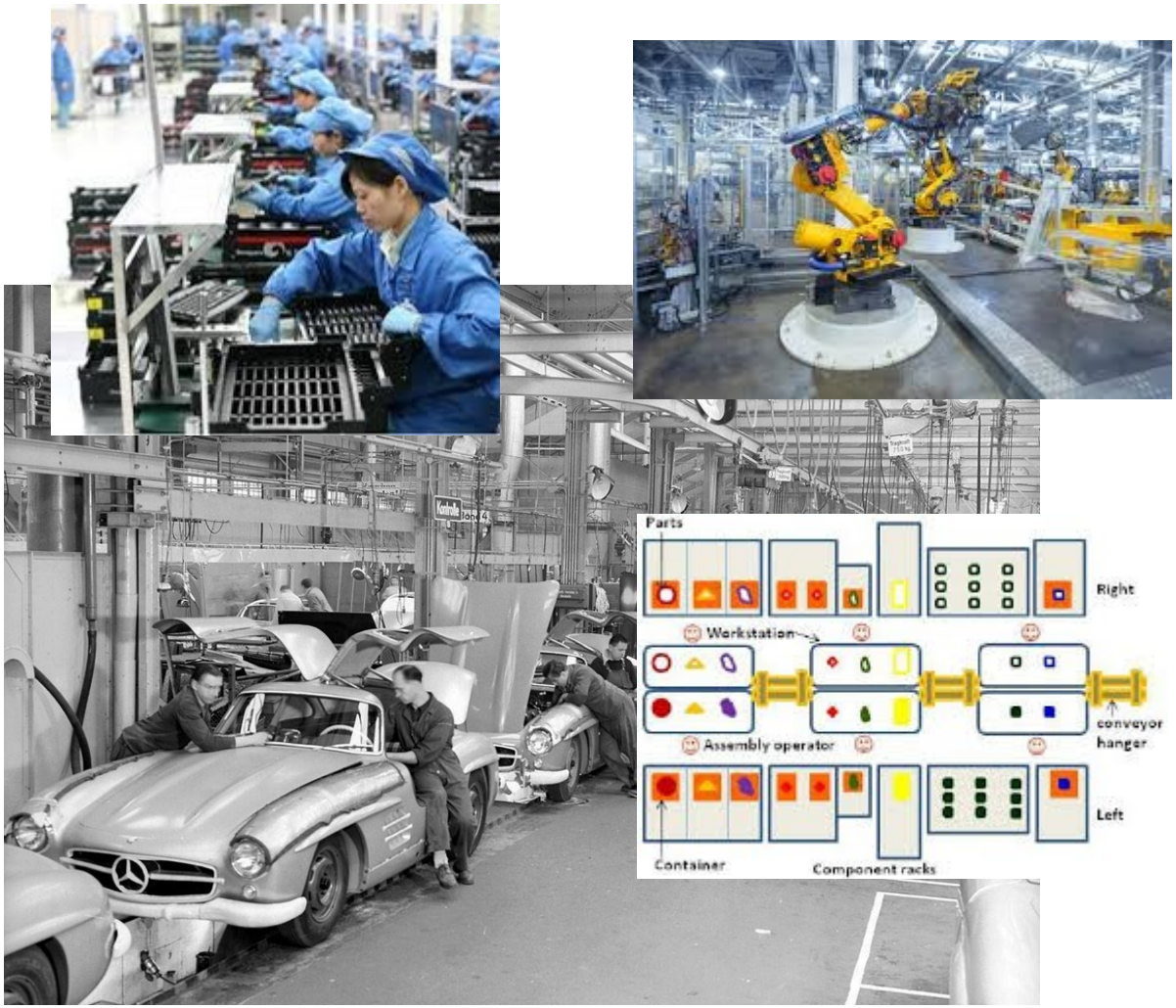
Intractable system
(socio-technical)



Entangled system
(synergistic and self-regulating)



Tractable systems

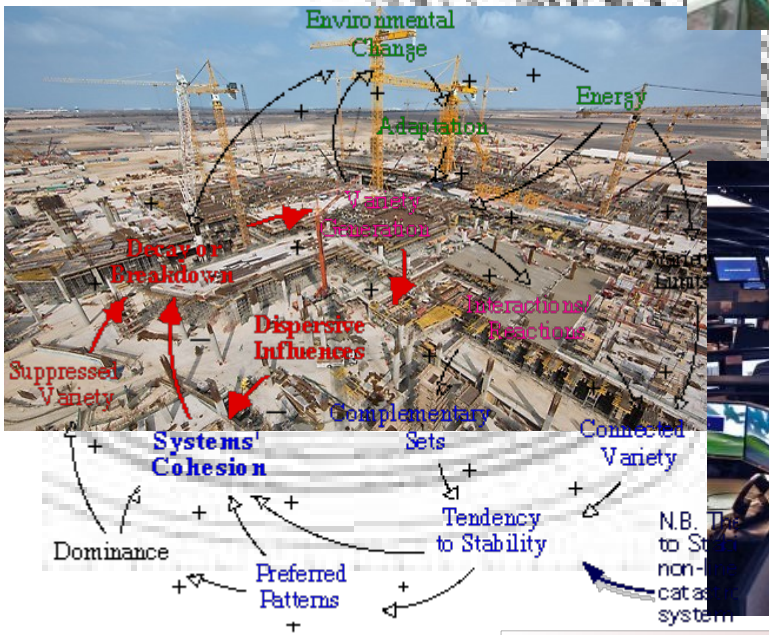


Simple descriptions with few details (technology, people)

Principles of functioning are known

System does not change while being described

Intractable systems

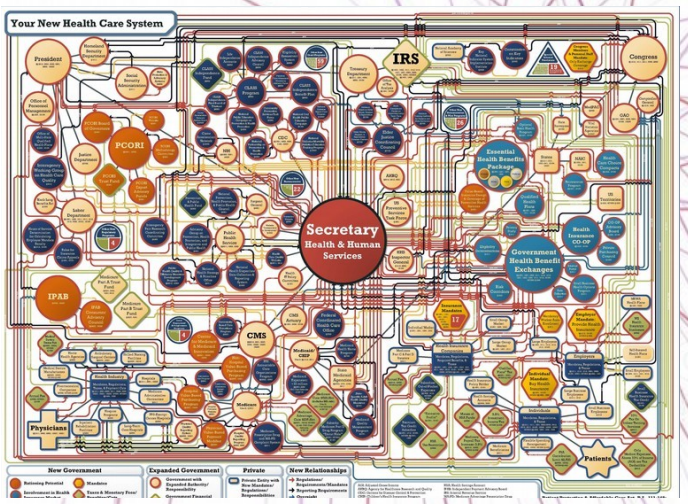


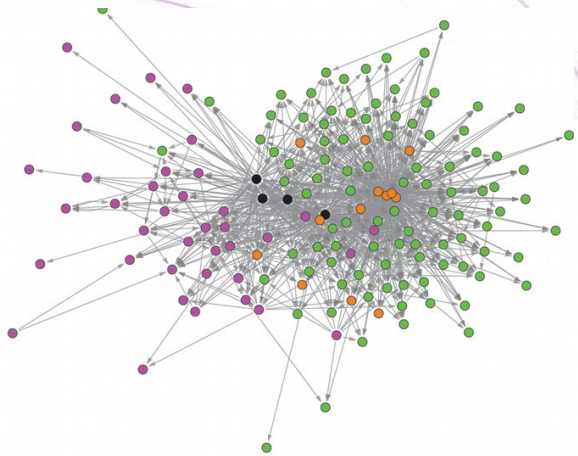
Elaborate descriptions with many details

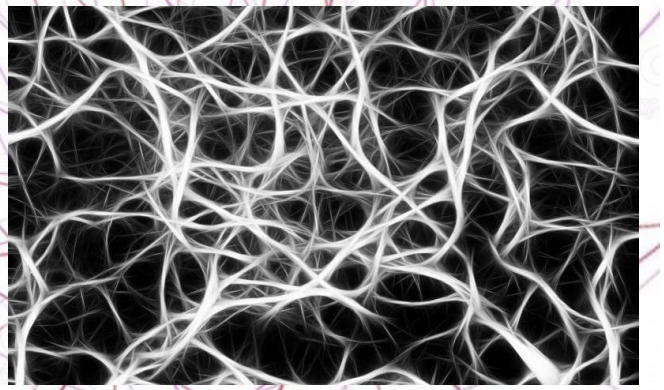
Principles of functioning are partly unknown

System changes before description can be completed

Entangled systems







Systems have exceedingly many parts requiring elaborate descriptions.

Parts and functions are intrinsically linked.

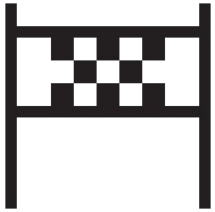
Multiple interconnections means that more things happen at the same time.

No function can be described independently of other functions.

Goals, position and means

Legacy
Industry practice
Current trends

Indirect, lagging
“measures”



Tradition
Standards
Requirements

Control inputs
(management
interventions)

Outcomes
(products)

Change management
Safety culture
QA / QM - Lean

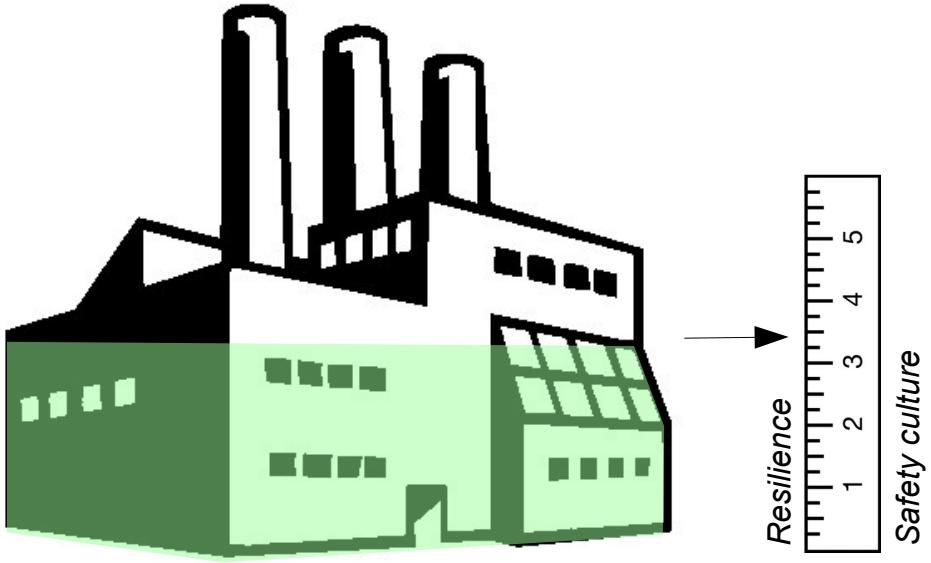
Work-as-Done,
everyday practices.
(mostly unknown)

Accidents, losses
Performance indicators
Balanced Scorecards

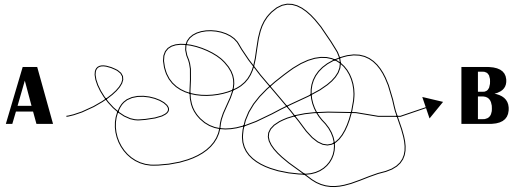
No single or simple measures

Organisations today are complex socio-technical systems.

There are no simple ways of characterising complex systems, hence no simple ways of measuring them.

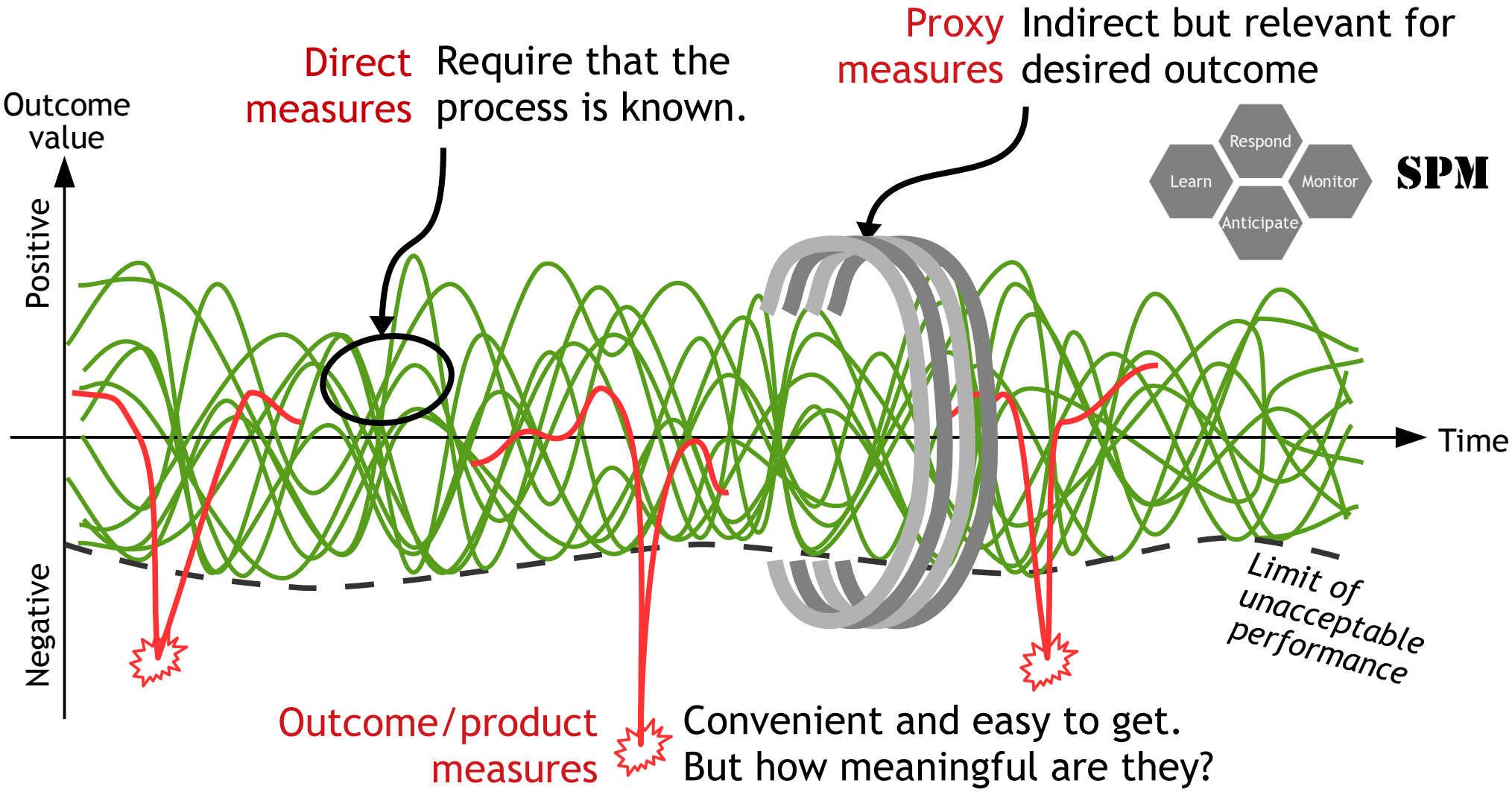


The path from A to B is never straight.



It is important how an organisation or a system, and the people in it, performs in general – not just with regard to safety.
This requires an understanding of how an organisation functions.

Management requires measurements



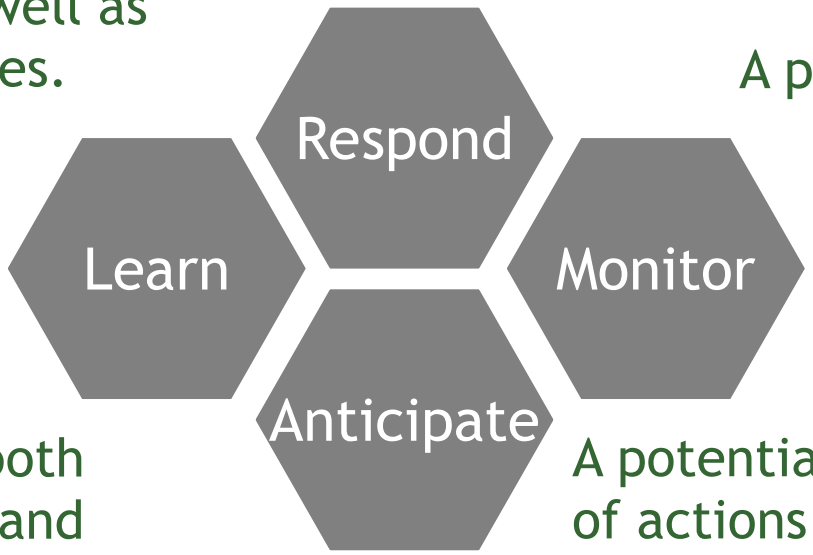
Systemic potentials

An organisation should be able to function as required under expected and unexpected conditions alike (changes / disturbances / opportunities).

People, individually and collectively, quickly learn how to adjust what they do to the conditions and rely on this to cope successfully with everyday situations.

A potential to respond to threats as well as opportunities.

A potential to monitor what happens - externally and internally.



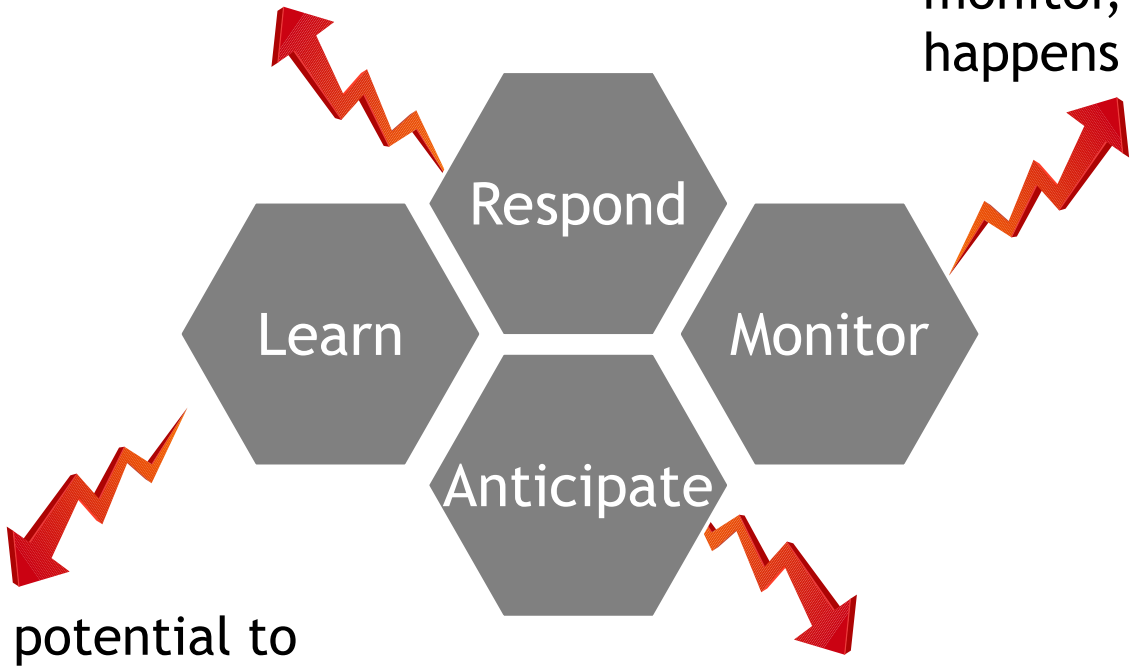
A potential to learn - both from what goes well and what goes wrong.

A potential to anticipate the effects of actions as well as long-term changes to demands and resources.

Why the four potentials are needed

Without the potential to respond, threats and opportunities will go unanswered.

Without the potential to monitor, everything that happens will be a surprise



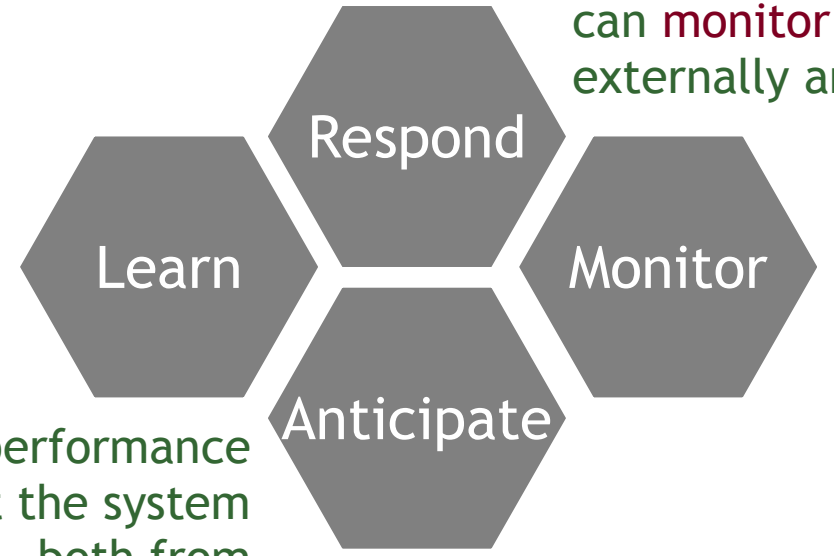
Without the potential to Learn, the system will always respond in the same way and rely on the same indicators.

Without the potential to anticipate the future is assumed to be a repetition of the past.

Potentials are scale-invariant.

Acceptable performance requires that the system can respond to threats and opportunities alike

Acceptable performance requires that the system can monitor what happens - externally and internally.



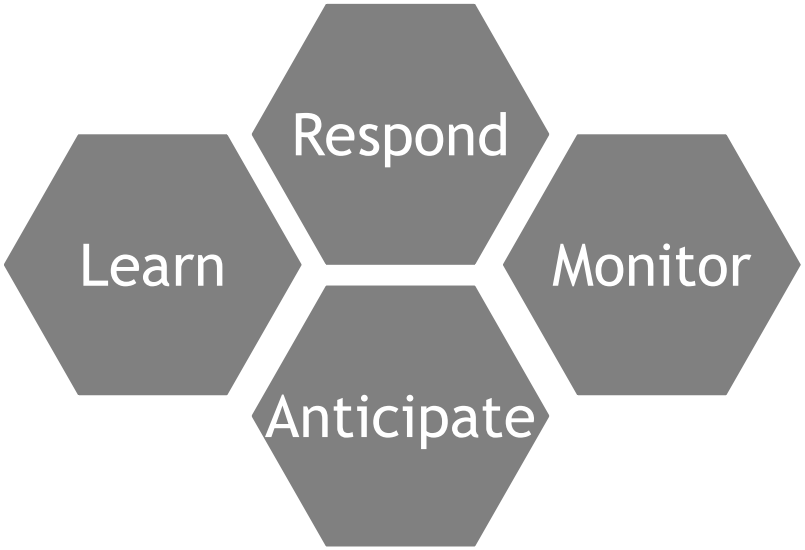
Acceptable performance requires that the system can learn - both from what went well and what went wrong.

Acceptable performance requires that the system can anticipate long-term changes to demands and resources.

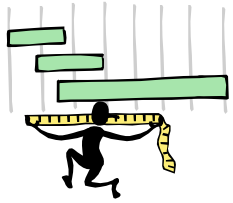
Assessing the performance potentials

For which events have responses been prepared?
What is the threshold of response?
Have enough resources been allocated?
…

What is learning based on (successes – failures)?
Is learning continuous or event-driven?
How is learning verified and maintained?
…



How have indicators been defined?
How many are leading and how many are lagging?
What is the delay between measurement and interpretation?
….

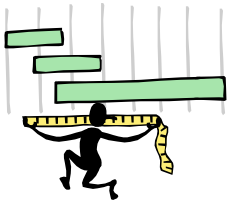


What is the implicit/explicit "model" of the future?
How far does the organisation look ahead ("horizon")?
Which risks are the organisation willing to take?
…

As high as reasonably practicable

Respond

For which events is there a response ready?
What is the threshold of response?
How many resources are allocated to response readiness?
…



Monitor

How have the indicators been defined?
How many indicators are leading and how many are lagging?
What is the delay between measurement and interpretation?
….

Learn

What is the learning based on (successes – failures)?
Is learning continuous or event-driven?
How are the effects of learning verified and maintained?
…

Anticipate

What is the implicit/explicit "model" of the future?
How far does the organisation look ahead ("horizon")?
What risks are the organisation willing to take?
…

The Systemic Potentials

Systemic Potentials Management

		Target*	Status
Event list	Is there a prepared list of possible and potential events or conditions for which the system should be ready to respond?		
Relevance of event list	Has the list been verified and/or is it revised on a regular basis?		
Response set	Have responses been planned and prepared for every event in the list? Do people know what to do when one of these events occur?		
Relevance of response set	Does the system check that the responses are adequate? How, and how often, is this done?		
Response start and stop	Are the triggering criteria or threshold well defined? Are there clear criteria for when to return to a "normal" state?		
Activation & duration	Can an effective response be activated fast enough? Can it be sustained as long as needed?		
Response capability	Are there sufficient support and resources to ensure response readiness (people, equipment, materials)?		
Verification	Is the readiness to respond (response capability) adequately maintained? Is the readiness to respond verified regularly?		

		Target	Status
Indicator list	Does the organisation have a list of regularly used performance indicators?		
Relevance	Is the list verified and/or revised on a regular basis?		
Validity	Has the validity of indicators been established?		
Delay	Is the delay in sampling indicators acceptable?		
Sensitivity	Are the indicators sufficiently sensitive? Can they detect changes and developments early enough?		
Frequency	Are the indicators measured or sampled with sufficient frequency? (Continuously, regularly, every now and then?)		
Interpretability	Are the indicators / measurements directly meaningful or do they require some kind of analysis?		
Organisational support	Is there a regular inspection scheme or schedule? Is it properly resourced? Are the results communicated and put to use?		

		Target	Status
Selection criteria	Does the organisation have a clear plan for which events to learn from (frequency, severity, value, etc.)?		
Learning basis	Does the organisation try to learn from things that go well or does it only learn from failures?		
Learning style	Is learning event driven (reactive) or continuous (scheduled)?		
Categorisation	Are there any formal procedures for data collection, classification, and analysis?		
Responsibility	Is it clear who is responsible for learning? (Is it a common responsibility or assigned to specialists?)		
Delay	Does learning function smoothly or are there significant delays in the learning process?		
Resources	Does the organisation provide adequate support for effective learning?		
Implementation	How are 'lessons learned' implemented? (Regulations, procedures, training, instructions, redesign, reorganisation, etc.)		

		Target	Status
Corporate culture	Does the corporate culture encourage thinking about the future?		
Acceptability of uncertainty	Is there a policy for when risks / opportunities are considered acceptable or unacceptable?		
Time horizon	Is the time horizon of the organisation appropriate for the kind of activity it does?		
Frequency	How often are future threat and opportunities assessed?		
Model	Does the organisation have a recognisable and articulated model of the future?		
Strategy	Does the organisation have a clear strategic vision? Is it shared'?		
Expertise	What kind of expertise is used to look into the future? (In-house, outsourced?)		
Communication	Are the expectations about the future known throughout the organisation?		

Comprises four sets of questions, one for each potential. The questions are:

SPECIFIC – address issues that are important for a concrete organisation.

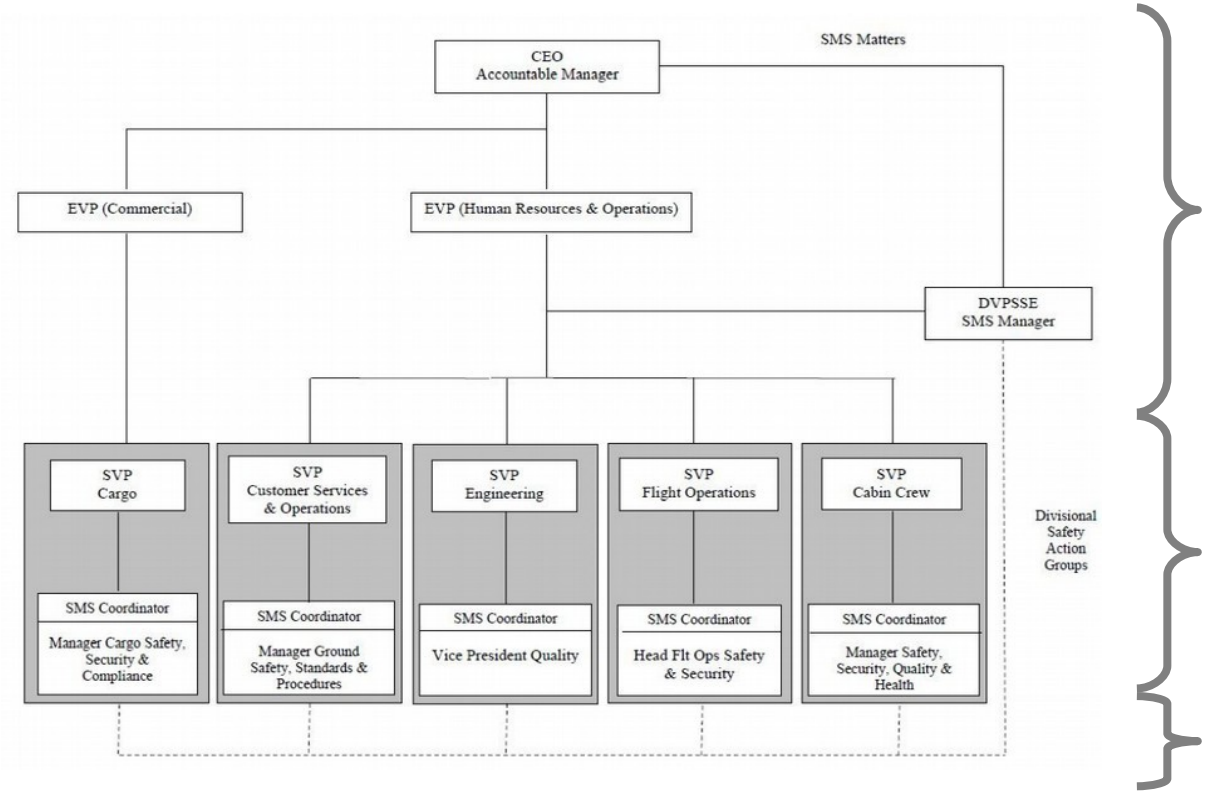
DIAGNOSTIC – point to details of a potential that are meaningful to assess.

FORMATIVE – answers can be used to make decisions about how to improve potentials.

The SPM can be used to show position

Systemic Potentials Profile for the ability to respond (constructed example)

The role of the SPM in an organisation



Macro level (blunt end)

How well are we doing?
How can we do better?

(sharp end) Meso level (blunt end)

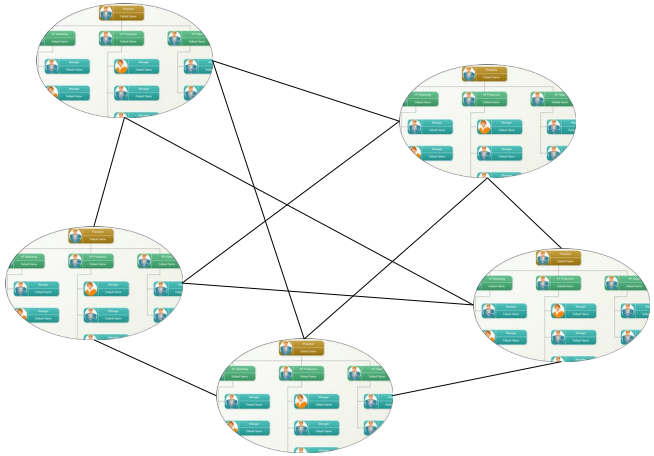
How well are we doing?
How can we do better?

(sharp end) Micro level

How well are we doing?
How can we do better?

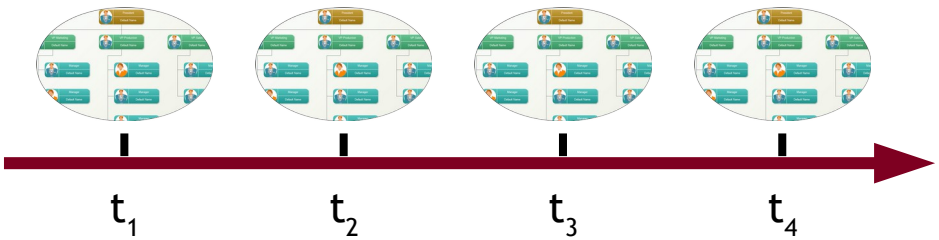
The SPM can be used to assess how resilient performance is at all levels of an organisation. It can help people to look at what they do themselves, and also to look at what others do.

To compare or not to compare?



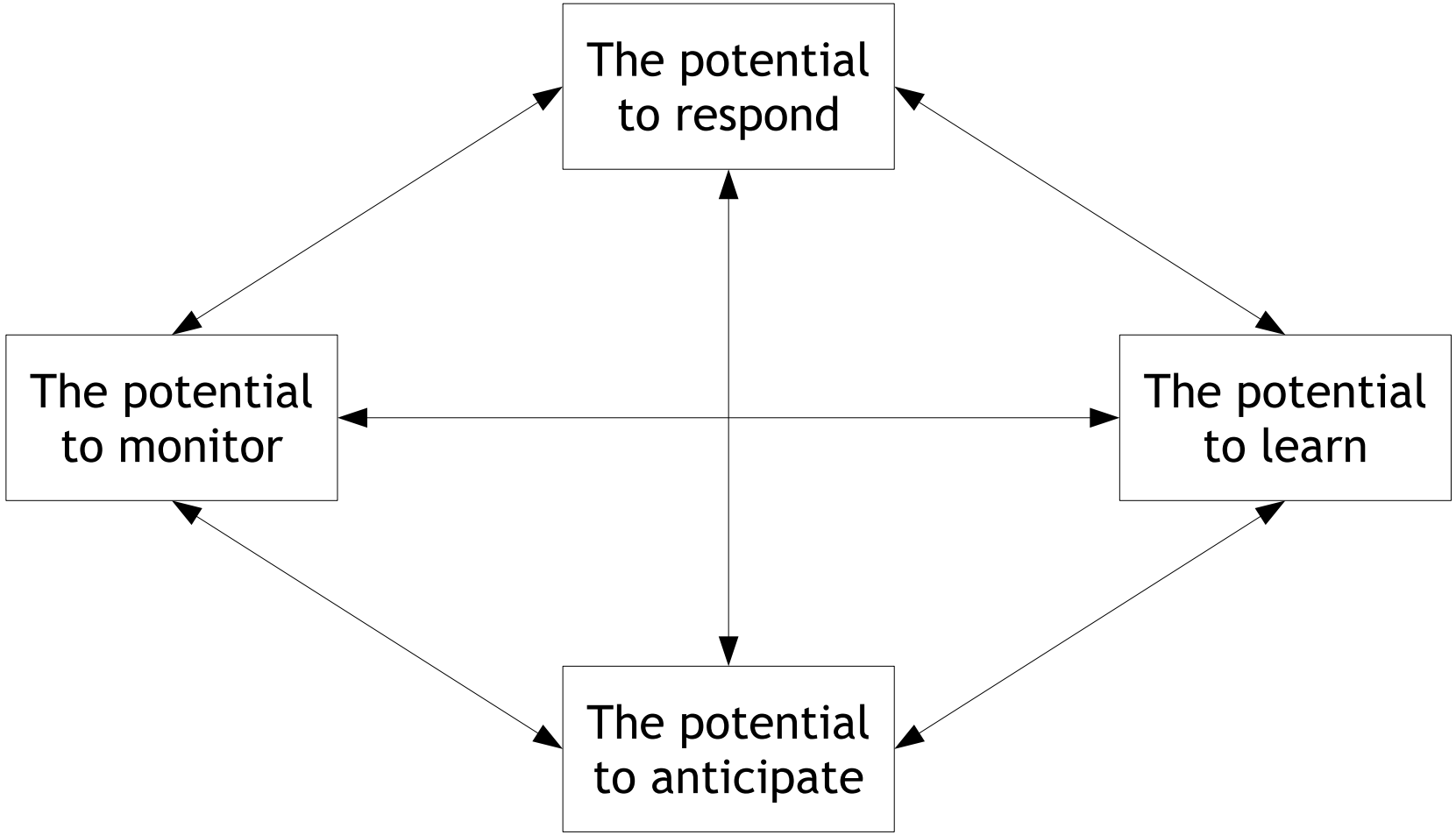
The SPM should not be used to compare different organisations ...

The only fair comparison for an organisation is the organisation itself – over time. Organisations can possible be compared in terms of distinct outcomes, but not in terms of the “internal” processes.



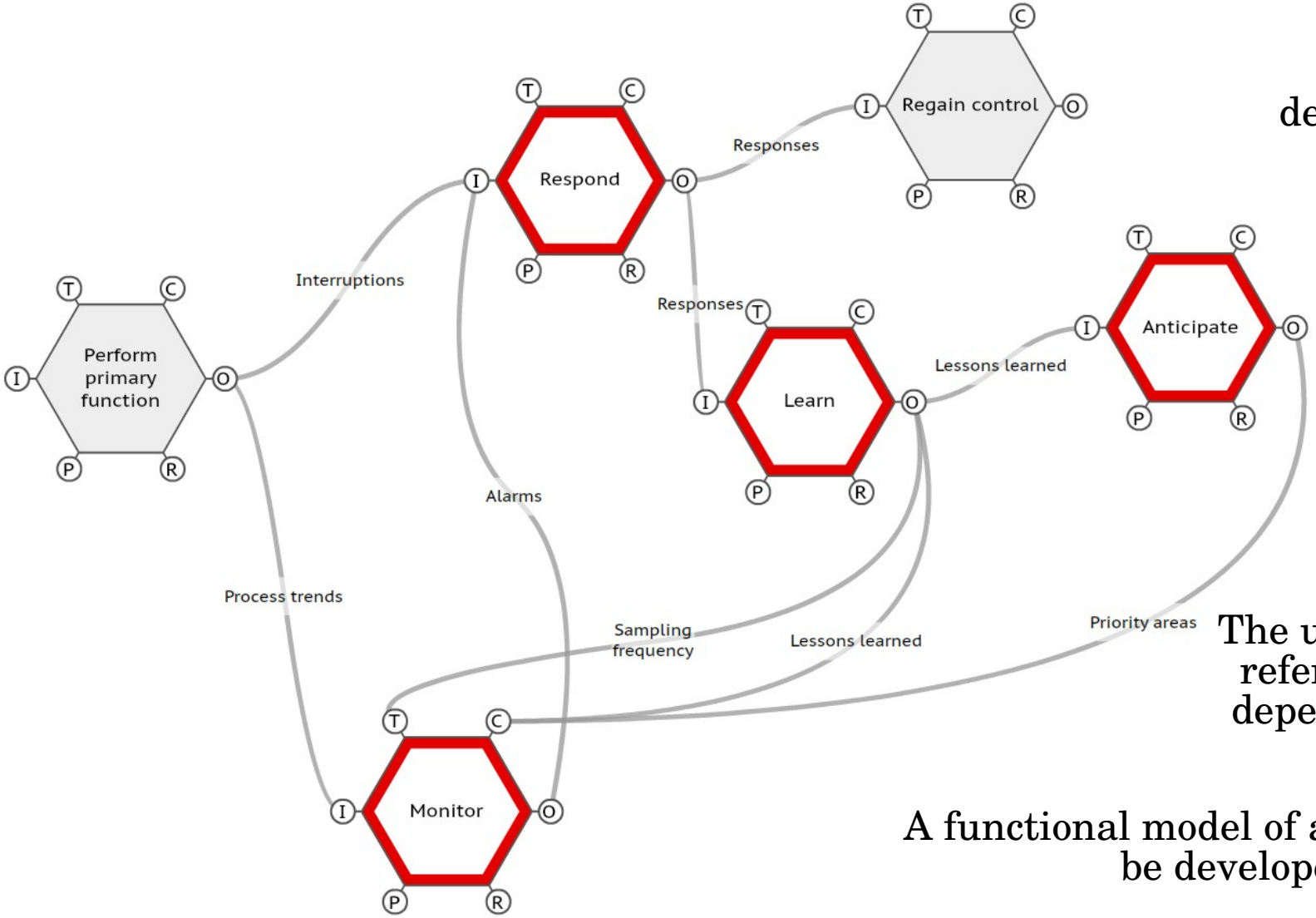
… but only to “compare” an organisation to itself over time.

The potentials are not independent



… but the relations between then are not linear!

Systemic potentials are coupled



The potentials are coupled, i.e., they depend on each other.

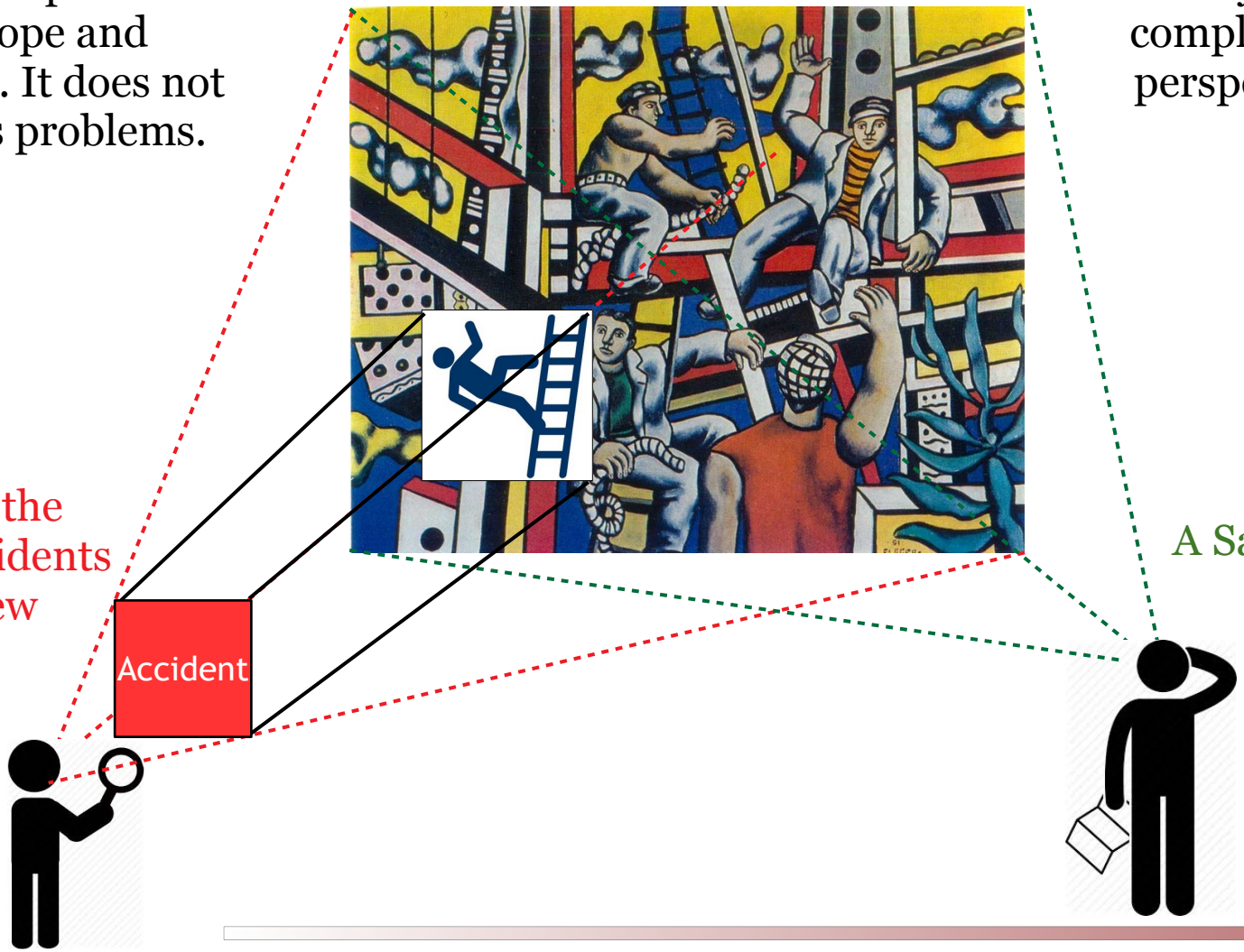
The use of the SPM must refer to a model of these dependencies for a given context.

A functional model of an organisation can be developed using the FRAM.

A different perspective

A Safety-I perspective is limited in scope and applicability. It does not solve today's problems.

A Safety-II perspective is a complement to a Safety-I perspective rather than a replacement.



In a Safety-I perspective, the focus on accidents hinders a view of work that goes well.

A Safety-II perspective considers all outcomes and provides a better understanding of how things happen.

Safety is not enough

It is not enough to look at safety. It is just one criterion for a system's performance. We need to look at other criteria as well.
Each criterion represents a special concern for the system's performance, with its own tradition, methods, models, and vocabulary.

Productivity	Safety	Quality	Reliability	Sustainability	Cust

But we must look at them together. It is the system's performance as a whole that we should be concerned with and manage.