A note on changing from a decremental safety culture to an incremental safety culture

by Erik Hollnagel (March 2025)

Making the change from a decremental safety culture to an incremental safety culture, is like all safety culture changes much easier to talk about than actually to do. The idea of safety culture seems to have emerged in the wake of the chemical accident at Bhopal in 1984. (Bloch & Vaughen, 2024). It was revived in the wake of the accident with the space shuttle Challenger in 1986 (Vaughan, 2016) and the accident at the nuclear Power Plant at Chernobyl in Ukraine also in 1986 (INSAG-4, 1992), Although much has been said and even more written about safety culture during the last 40 years or so it is not known with any kind of certainty (1) how actually best to change a safety culture or (2) how long it takes. But most educated guesses assumes that it takes years rather than months, possibly as much as a decade. It is critically important that this is fully acknowledged before any efforts in this direction are begun. Changing a culture of any kind requires steadfast management motivation and a willingness to invest for the long term.

It is fortunately much easier to describe what decremental and incremental safety cultures are, respectively. Although eaxh has itsown name a decremental safety culture and an incremental safety culture do not differ with regard to their definition of what safety is. Both define safety as a state where there are as few unacceptable outcomes (commonly called accidents and incidents) as possible. Decremental and incremental safety cultures differ in their recommended approach on how to achieve and maintain a state of safety just as Safety-I and Safety-II do. Safety-I, and a decremental safety culture are aligned with the general safety legacy in the belief that a state of safety best can be achieved by reducing acts that may lead to unacceptable outcomes, to as low a number as possible, ideally, but quite unrealistically to zero. (This is commonly referred to as the **Zero Accident Vision or ZAV**) this applies not only to the acts themselves but also to the associated risks and hazards. Yet since an outcome objectively speaking cannot be acceptable and unacceptable at the same time, there is logically another way to achieve the same objective, namely to ensure that as much as possible, and equally unrealistically everything goes well. (In analogy with Vision Zero, this can be called ***visio centum(100)***. Assuming that the total number of acts or events is constant, any increment or increase in the number of activities that go well and lead to acceptable outcomes will therefore mean a reduction or decrease of the number of acts that do not go well and lead to unacceptable outcomes. This duality of outcomes can be likened to flipping a coin. Unless the person who flips the coin is incredibly skilled, or cheats, a physical coin will land randomly land either heads up or tails up (only a quantum coin could remain in a so-called quantum superposition where it is heads and tails at the same time. But it would be terrible for safety, and for daily life, if it was not possible to determine whether the outcomes of an act were acceptable or unacceptable. The intention with this analogy is not that the outcome of work activities are random. On the contrary, in a detremental safety culture everything is done to bias the coin so it does not land tails up, corresponding to an unacceptable outcome. The intention of the analogy is rather that we might equally well bias the coin in the opposite way so that it is more likely to land heads up corresponding to acceptable outcomes and an incremental safety culture, because that is after all what we want and need in everyday work.

A change in safety culture cannot be brought about by simple meansor by a single factor, such as leadership. According to the widely accepted theory of Edgar Schein (1992) an organisational culture comprises artefacts, assumptions, and espoused values (as shown in Figure 1). Artefacts are any overt, visible, describable aspects (icon, emblems, symbols or signs) of an organisation. Artefacts can be changed rapidly and easily. Espoused values are the socially agreed ideals that guide our behaviour, these are deeply rooted and generally long lasting, and therefore more difficult to change, although no one knows precisely how long. Assumptions represent the immediate dispositions toward a concept or a problem, Assumptions are more like attitudes that can be changed by effective communication (or propaganda). The biggest problem is that there are no proven ways that effectively bring about a change in espoused values, single factor solurions such as leadership have never been proven to work.To illustrate the difficulties, just think of the massive efforts made and the money invested to change the opinion of voters before an election, be it local or national. In the recent US presidential campaign the Harris side had a campaing war chest of over $1.27 billion, while the Trump campaign is estimated to have had around $940 million. This may change the attitudes but not the values, which is why there can be a serious backlash in the aftermath of an election. Any cost of changing the culture of a workforce or a company surely pales in comparison to these numbers and all three parts, artefacts assumptions and espoused values must furrthermore change in a coherent manner. Consistency and effective communication are important. A

change of working culture fortunately does not have to be accomplished as quickly as a change in voter preferences. There are, for instance, no hard deadlines. it will also beconsiderably cheaper

In summary a decremental safety culture and Safety-I propose that the best way to achieve a state of safety is to reduce or prevent the number of cases (events, activities) that can, but not necessarily lead to unacceptable outcomes. This is basically a **protective** approach (it is protective because preventing that some acts go wrong does not as such contribute to other acts going well, any effort spent is therefore a **cost** that at best may avoid a loss), while an incremental safety culture and Safety-II propose that the best way is to increase and support the number of cases (events, acts) that can, but not necessarily do lead to acceptable outcomes, hence basically a **productive** approach (It is productive because the purpose is to ensure that more work goes well, any effort spent is therefore an **investment** in productivity -- that as a positive side-effect also may avoid a loss.) The differences are described by Table 1.

Table 1: Different approaches to achieve a state of safety.

	philosophy or view of safety	
Specific consequences for:	*Safety-I or a decremental safety culture*	*Safety-II or an incremental safety culture*
The definition of safety	as few unacceptable outcomes as possible, and therefore as many acceptable outcomes as possible	as many acceptable outcomes as possible, and therefore as few unacceptable outcomes as possible
The recommended approach	block or hinder acts that lead to unacceptable outcomes	facilitate acts that lead to acceptable outcomes
The recommended basis for learning	Accidents and incidents, exceptional operations and activities	work that goes well, everyday operations and activities
simplified version	Zero Accident Vision (ZAV)	Visio centum (one hundred)

1.: Consequences of the two different safety cultures

1.1: Learning in a decremental safety culture.

Learning in a decremental safety culture is based on acts that have not gone well and resulted in unacceptable outcomes. This has *one minor advantage and three major disadvantages*. The minor advantage is a clear motivation to learn, and this is possibly the only justification for the conventional claim that learning should be based on accidents.

The first disadvantage is the negative nature of learning. Learning in a decremental safety culture means that the lessons learned are about what **not to do**, and what should be prevented, eliminated or avoided (hence, avoidance learning).

The second disadvantage is the negative consequences for the opportunities to learn since learning in a decremental safety culture can only take place when something has filed or not gone well, and because this intentionally is an *exceptional* event, Learning in a decremental safety culture itself becomes *exceptional*, contrary to the best interests of any system or organisation.

The third disadvantage is the negative effects for the possibilities to confirm learning since learning in a decremental safety culture is about what should **not be done**, and aims to prevent the recurrence of an unaccceptable outcome or accident. Yet it is impossible to know whether the lessons learned actually were correct until the next time the same or a very similar accident happens. And since it is impossible to know **if,** and **when** that will be the case,and also **whether** it has been the case -- since similar outcomes may occur for very different reasons, the delay in feedback is n principle infinite – which in practice means there is no feedback at all, obviously not a good condition for managing safely. For learning in a decremental safety culture it is therefore difficult in principle as well as in practice to confirm whether the right lessons have been learned and to know whether the planned responses or interventions would have worked as intended. The practices are in all essentially based on the principle of linear causality (simple chains of causes and effects) and rely on a combination of prevention and protection. A decremental safety culture can be summarised as follows:

- **A zero mindset** -- which means having a ZAV mindset, rather than not having a mindset
- **No repeats** – the learning is about what should be **avoided or not be done**
- **Smple and non-negotiable standards**, which assumes a perfect match between how work was imagined to take place and how it is actually done.
- **Full compliance,** no variability and no attempts to adjust performance to conditions whatsoever

1.2: Learning in an incremental safety culture.

Learning in an incremental safety culture is based on activities that have gone well and resulted in acceptable outcomes. This has *one minor disadvantage and three major advantages*.

The minor disadvantage is a somewhat reduced motivation to learn, because people tend to take acceptable outcomes for granted, no one gets upset when the outcomes are acceptable,or demand an investigation, and in most cases no one pays any attention to it. There is no tradition for reporting, no requirements to do so, not even any effective words to describe it. The acceptable outcomes are after all why work was done in the first place, and events **which is not surprising are often neglected or go completely unnoticed**. **Paying attention to work that has gone well also runs counter to the conventional claim of the safety legacy that learning to become safe must be based on accidents**.

The first advantage is the positive effects on the nature of learning. Learning in an incremental safety culture means that the lessons learned are about what **to do**, and what should be supported facilitated, and strengthened (hence, reinforcement or approach learning). And becoming better at whatever you do is surely something to strive for.

The second advantage is the positive consequences for the frequency of learning since learning in an incremental safety culture can be based on everyday actions, eliminating the need to wait for something to fail or go wrong. This makes learning in an incremental safety culture practically continuous which clearly is beneficial.

The third advantage is the positive effects for the possibilities to confirm learning since the lessons learned in an incremental safety culture are about what you should **do**, to reinforce and facilitate work that goes well. This can be confirmed the next time the same or a similar activity is carried out, and since learning in an incremental safety culture is based on everyday work it is bound to happen sooner rather than later. The delay in feedback is therefore very short or perhaps even negligible which definitely is a good condition for managing safely. For incremental safety it is therefore easy in principle as well as in practice to confirm whether the right lessons were learned and whether the planned responses or interventions were effective. Another advantage is that the changes required by an incremental safety culture will be smaller(adjusting existing procedures and routines rather than replacing them completely) and therefore cheaper and easier to integrate into existing attitudes and practices than the changes required by a decremental safety culture.

The differences of the two safety cultures with regards to learning characteristics have been summarised in Table 2.

Table 2: Learning characteristics of the two safety cultures.

	decremental safety culture	incremental safety culture
Motivation to learn	High (due to the need to avoid failures)	Low, because work that goes well tens to be taken for granted
Possibilities to learn	Few: only when something has gone wrong	Many: whenever something goes well
Possibilities to confirm learning	Few: only when "the same" accident happens again	Many: because everyday work has many similar situations and conditions.

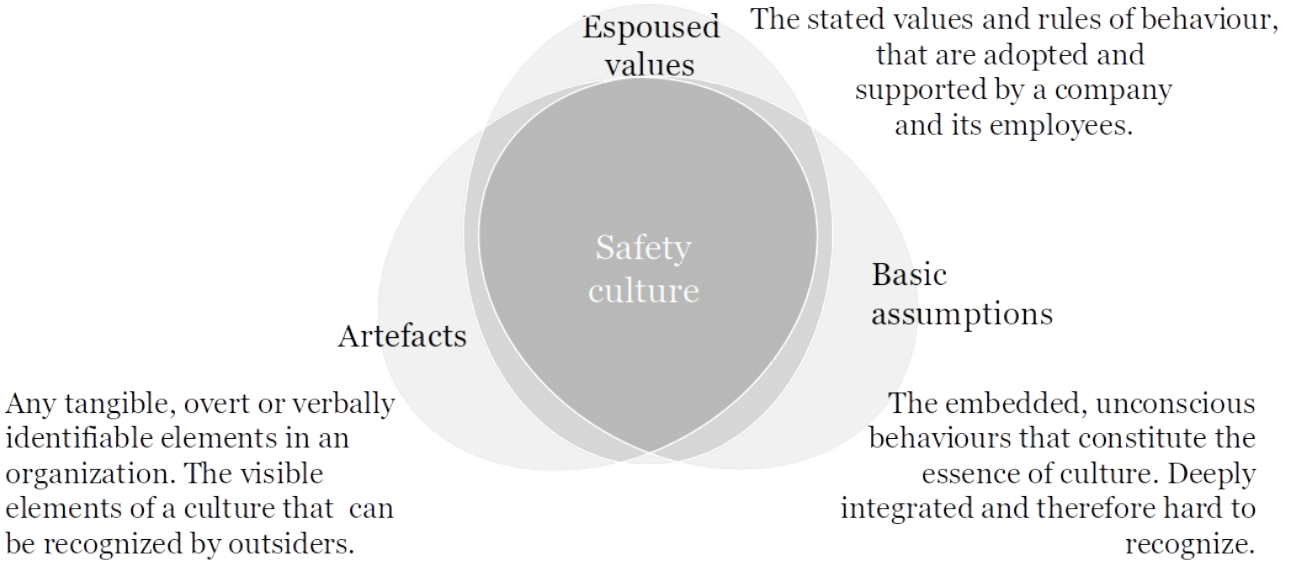


Figure 1: Schein's (1992) model of organisational culture

The essence of an incremental safety culture can also be summarised by a few bullet points:

- An incremental safety culture **requires a centum (or 100%) mindset** -- meaning the attitude that in principle every actcan and should lead to acceptable outcomes
- **when work goes well, it should be rememberred and repeated:** People should try to remember what was done, and confirm it by sharing it with colleagues. learning is about what **should be done,** rather than about what should **not** be done
- **clear messages and a common can-do spirit**.
- **do not be afraid of trying new solutions,** but remember to tell others about them so they know what to expect. Be thorough and always act according to the conditions, and try to make the best use of resources and opportunities.

and further

- D**o not worry unnecessarily** about future accidents, instead think about future opportunities.
- **Make working conditions, and demands as transparent as possible** and think about how daily work best can be **facilitated**.
- **Encourage interpersonal discussions and feedback**, for instance by using the Resilient Performance Enhancement (RPET) tool.

2.0: How to develop an Incremental Safety Culture

When the question arises of how best to improve the safety culture, and how best to caharcterise any such improvement, there are two popular approasches. one is to invoke the concept of levels of safety culture and imagine safety culture voyage that gradually rises through multiple the levels (usually the five levels seen in Figure 2, known as the Health, Safety, and Environment (HSE) Culture Ladder (Hudson, 2007, p. 703).

2.0.1: The HSE Culture Ladder

The five levels of the HSE Culture Ladder is shown in Figure 2: and the five levels are characterised in Table 2.

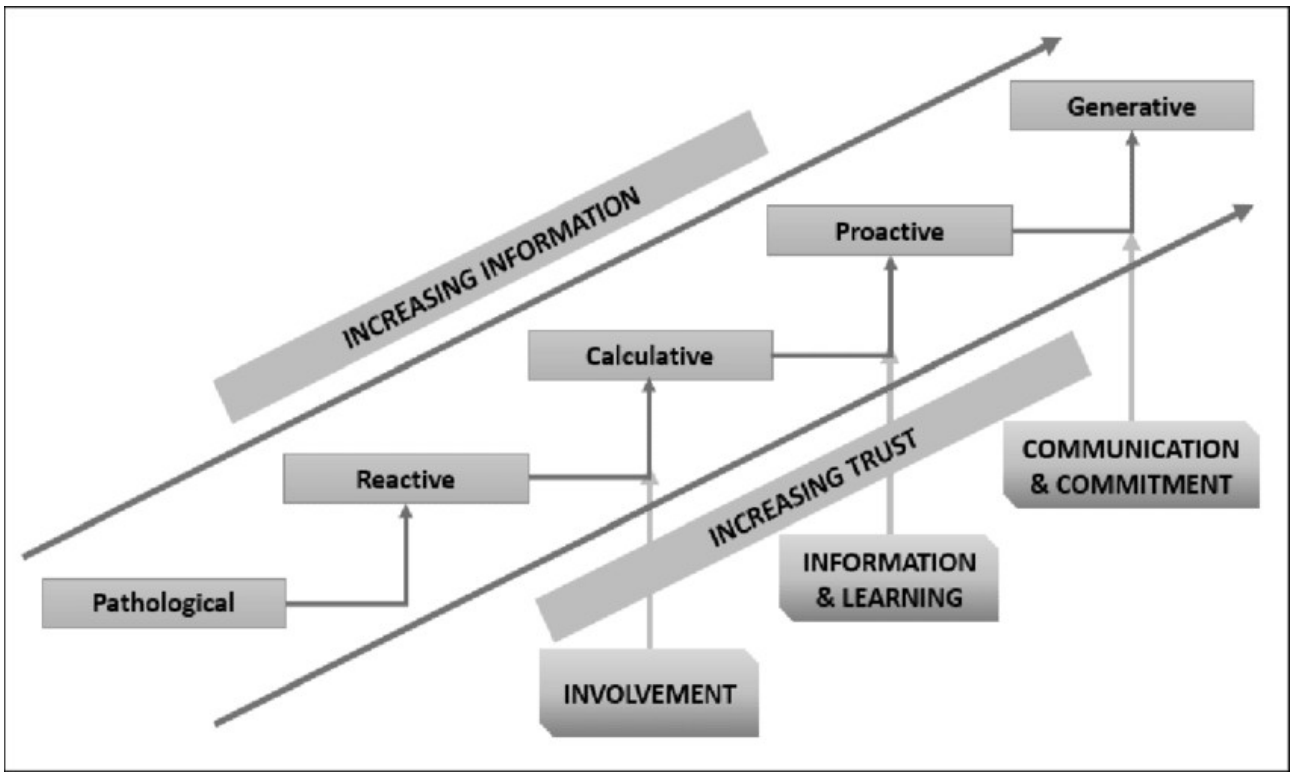


Figure 2: The HSE culture ladder (Hudson, 2007).

Table 3: The five levels of safety culture (Lawrie, Parker & Hudson, 2006).

Level of safety culture	Characteristic	Typical response to incidents/accidents
Generative	Safe behaviour is fully integrated in everything the organisations does.	Thorough reappraisal of safety management policies and practices.
Proactive	We work on the problems that we still find.	Joint incident investigation.
Calculative	All necessary steps are followed blindly.	Regular incident follow-up.
Reactive	Safety is important, we do much every time we have an accident.	Perfunctory investigation.
Pathological	The organisation cares more about not being caught than about safety.	No investigation.

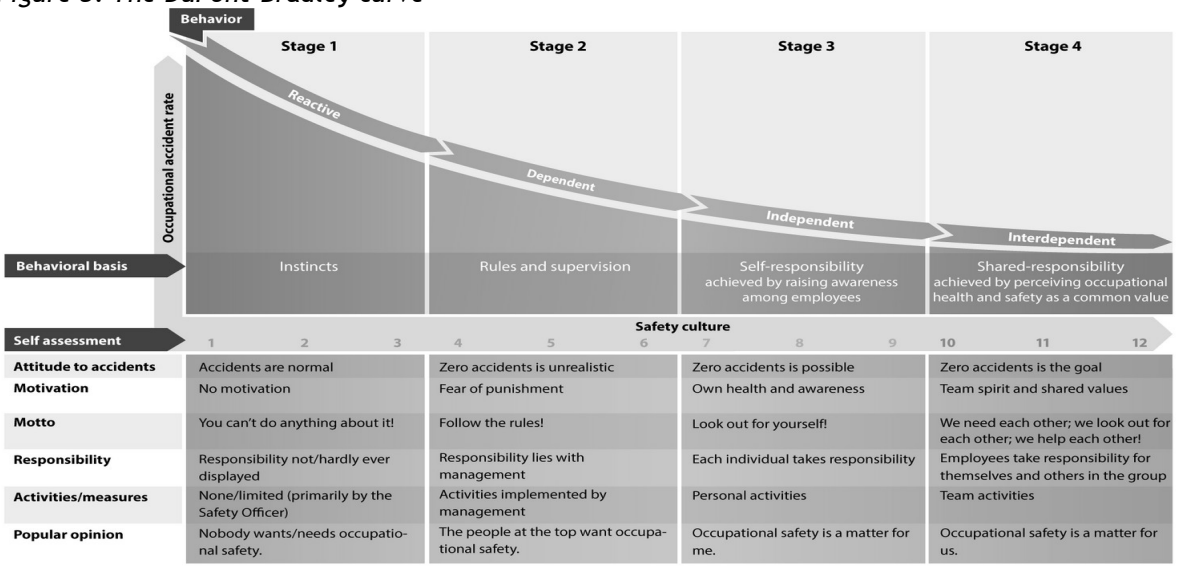
2.0.2: The Bradley curve

Another commonly used graphical representation is the so-called DuPont Bradley curve (named after Berlin Bradley, a DuPont employee who alleged created the diagram in 1995, but who otherwise is completely unknown) (see Figure 3). The development represented in Figure 3 has four stages, but the names are completely different from the five names used by Figure 2 and the HSE culture ladder. Another difference is that the Bradley curve, directly shows the consequences in terms of the occupational accident rate. (It must, however, be added, that there are no known sets of continuous performance data that support this curve).

The Bradley Curve illustrates the relationship between accidents and corporate culture. Almost nothing is known about the Bradley curve, except that it is supposed to have been developed in 1995 by a Mr. Berlin Bradley an employee somewhere in the DuPont company. There are no publications that describe it, except promotional materials by the several companies that claim to rely on it in their practice, and no kind of scientific evidence whatsoever. In contrast to the HSE culture ladder there is not even an explicit characterisation of the four stages, or reason why they have been given the names they have. Part of its appeal is the continuous curve that shows the much desired gradual reduction in accident rates. But no industry or company makes such continuous measurements. They are usually published at intervals, weekly, monthly, quarterly, or -- most often -- annually. Though appealing, the curve is totally fictitious and utterly useless. The Bradley curve is even less capable of providing or supporting the three

types of knowledge described above, than the HSE ladder was. (There is not even an upper or lower limit for the accident rate that matches the four stages. And apart from the obvious desirability of reducing the accident rate, in agreement with the irrational and unattainable ideal of the Zero Accident Vision, there is no suggestion of how a transition from one stage to the next can be brought about.

Figure 3: The DuPont-Bradley curve



2.0.3: The four potentials for resilient performance

At present the only viable alternative to the concept of safety maturity is resilience, and accepting that, the obvious next questions are: (1) how can the resilience of a system or an organisation be improved and (2) how can the level of resilience reliably be assessed. Both questions fortunately have concrete and practical answers.

The answer to the first question, oddly, begins by pointing out that resilience is not a material quality. Already in 2004, when resilience engineering first entered the safety debate it was emphasised that resilience was not something an organisation **had**, but something an organisation **did**. *Resilient performance simply means that a system is able to function and perform as required, as it should, under expected and unexpected conditions alike*.

The overall ability to function resiliently can be specified in even further detail by reference to the four systemic potentials, at one time called the four cornerstones of resilience engineering. The four potentials are: (1) the potential to respond, (2) the potential to monitor, (3) the potential to learn, and (4) the potential to anticipate. Taken together this means that a resilient organisation must be able to respond, to monitor, to learn, and to anticipate. Each potential is described in further detail below:

It is, however not enough to know what the four potentials are, it is also necessary to know how establish and maintain them in an organisation. It is fortunately again possible to be more concrete with how the our potentials can be developed and maintained, and in general what is required to ensure that a system or an organisation develops in a desired direction.

2.3.0.1: First systemic potential: Respond

In order to manage anything it is necessary to be able to respond to whatever happens it is necessary to know boyh **what** to do and **when** to do it. This either requires that a response already exists (and that the necessary resources are available) – or that a response can be developed before it is too late. The inability to respond, whether it concerns two moving vehicles or two business initiatives on a potential collision course, or a rapidly spreading bushfire (a recent example being the evacuations due to Greek forest fires in on the Island of Rhodes in the summer of 2023), to say nothing of the wildfires in Los Angeles at thestart of 2025 or a new pandemic (such as Covid-19), will eventually lead to a loss of control. Quite apart from that, no person or company one likes to be in a situation where they cannot respond to what happens.

It is obviously an advantage for the potential to respond if the number of unexpected events is as small as possible which is the case if as much as possible goes well. If something is expected to happen – even though the exact timing may be uncertain – then it is possible to prepare in advance or even to act preemptively, although that (as a form of prediction based control) may be a risk in itself. In order to be prepared for what may happen – at the next moment or in the immediate future – it is necessary to keep an eye on what happens in the system as well as around it, hence to be able to monitor and to anticipate.

2.3.0.2: Second systemic potential: Monitor

In order to be able to keep an eye on what happens and be ready to respond quickly and effectively it is necessary what to look for (signals, indicators and trends), where to look, and how frequentlytto look – which means knowing how to monitor. Although it sometimes may be possible to respond to unexpected events just as they happen, "fire-fighting" is not a strategy that is viable in the long run.

> "In business organisations, there are invariably more problems than people have the time to deal with. At best, this leads to situations where minor problems are ignored. At worst, chronic fire-fighting consumes an operation's resources. Managers and engineers rush from task to task, not completing one before another interrupts them. Serious problem-solving efforts degenerate into quick-and-dirty patching. Productivity suffers." Bohn (2000, p. 1.). Under such conditions the number of unanticipated consequences (Merton, 1936) is likely to increase.

2.3.0.3: Third systemic potential: Learn

Neither responding, nor monitoring can always be carried out in the same way. Since neither internal nor externaL conditions are perfectly stable, it is a risk always to respond in the same way, and also always to rely on the same signs, signals, and indicators. The only practical way to avoid this is by means of learning. It is learning that enables a system (or a company) to change how it responds to something, by strengthening effective responses, by learning new responses, and by suppressing or eliminating ineffective responses. The essence of learning is not the acquisition or accumulation of knowledge (or data or information, but the effect this has on performance, on the ability to respond – as well as the ability to monitor, and eventually also on the ability to learn. Without the ability to learn, responses would be limited to a fixed and pre-defined set as in a standard procedure or set of instructions. Yet, always responding in the same way is only feasible if conditions never change, i.e., if the world is fixed and perfectly stable. But that is, as everyone knows not possible to accomplish. The same argument, of course, goes for monitoring. It is unwise to always rely on the same signs, indicators and measurements. Learning can furthermore not be limited to what **not** to do (avoidance learning). It is equally important, if not more so, to learn from what works well, in order to reinforce effective responses. Learning is necessary to make performance more efficient, as in the progression from knowledge via rules to skills (Vicente & Rasmussen, 1988). The gradual automation of responses, the development of patterns, habits, and routines, and the recognition of weak signals are essential parts of how performance becomes attuned to the prevailing conditions – with all the risks that such reduced thoroughness and increased effectiveness involve.

2.3.0.4: Fourth systemic potential: Anticipate

Since the environments and surroundings in which work takes place and in which companies exist never are perfectly stable, it is necessary acknowledge that they can change and necessary also also to imagine or think about **how** they may change, which means being able to anticipate. Where monitoring focuses on the current situation and the near term developments, anticipation looks beyond the near term to the more distant future. It is, of course difficult to predict what may happen in the future ("It is difficult to make predictions -— especially about the future", both because it is nearly impossible to know how other people think, and what they may do and also because the dynamics of changes, even of physical phenomena may be too rapid to follow, and sometimes also so slow that it is difficult for us to notice them, climate change beings an excellent example of that. It is also necessary to think about which resources, skills, and competences a compay will need in the future? This information is required in order to ensure that responses remain possible also in the future. A simple example is that fires in Electrical Vehicles (EV), for instance, not can be extinguished in the same ways as fires in fossil fuel vehicles, since both water and foam conduct electricity, that may possibly hurt the fire fighters.

2.3.0.4: AA LIT

Another example is the AA LIT (American Airlines, 2020). The LIT acronym means Learning and Improvement Team. The AA LIT project nominally used the idea of the four potentials in the Resilient Analysis Grid (RAG) (now called the four systemic potentials), but changed the names for two of them (so the quadruple (respond, monitor, learn, anticipate) became the quadruple (Adapt, Coordinate, Learn, and Plan) possibly representing the dominant interests of aviation.The four potentials were shown by the AA LIT model seen below.

Figure 2: The AA LIT model (2020).

This model is supposed to show how the four potentials together provide the basis for resilience -- or rather resilient performance.Unlike the HSE Culture Ladder and the Bradley curve, the AA LIT does not depict a path of progress. But this can fortunately easily be remedied as shown by Figure 5. the definition of the four potentials provided above actually designates the logical order in which they should be developed as seen in Figure 3. the four components of the AA LIT model were cursorily defined as follows:

- **Adapt**: Act given current conditions.
- **Coordinate**: Get the team on the same page
- **Learn:** What will I do /change next time? and
- **Plan**: thinking in future.

It is therefoe not difficult to see how these four categories mirror the four systemic potentials.

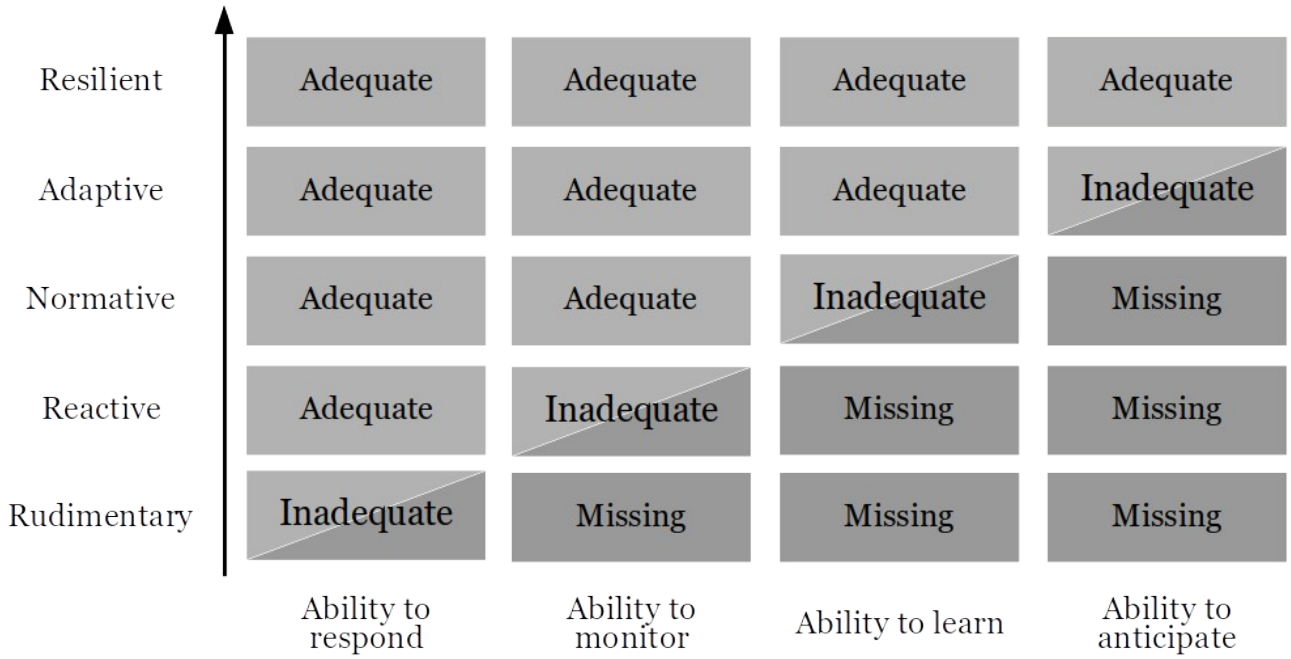


Figure 3: Logical progression toward resilience.

2.4: Three types of knowledge

In order to manage an incremental safety culture, once it has been established, three types of knowledge are required (this requirement actually applies to any form of management, cf. Hollnagel

(2025) (the requirements are based on the analogy between making a journey through physical space, such as the safety journeytravelling or making a journey, such as changing or managing a culture, which often is described as making a journey through an abstract, space. **The first type of knowledge is about the position: The second type of knowledge is about the target or goal. The third type of knowledge is about the means.**

The first and the second types of knowledge unfortunately, but necessarily requires some kind of measurement, which raises the tricky question of whether and how safety can be measured?

The word manage is, as in so many other cases derived from a Latin word (*manus)*, meaning hand, and in everyday language having something in hand means being in charge of it and being able to control it, managing an incremental safety culture, therefore comprises what needs to be done to reach the defined goal state and to ensure it remains so, once achieved so that the system is able to function as intended under expected and unexpected conditions alike so that it can fulfill its intended purpose, managing an incremental safety culture also means ensuring there are as many acceptable outcomes as possible, and hopefully an increasing number as time goes by.

2.4.1: First type of knowledge: about the current position

The first type of knowledge is about the goal: What is it you want to achieve,where do you want to be different from where you are now? Is the primary purpose to get away from somrthing, as in a decremental safety culture, or to approach or get closer to something, as in an incremental safety culture What more specifically are the criteria for the acceptable final state that you strive for. This type of knowledge is first of all necessary to determine whether and when you have reached your goal.

2.4.2: Second type of knowledge about.goal

The second type of knowledge is about the present position or current status. This is necessary for two reasons. First in order to know whether you have reached your goal, or whether there still is a discrepancy, how large that discrepancy is, and therefore how long it will take before you reach the goal. It is additionally necessary to compare the current position to the previous position in order to determine whetherthere has been any progress has been made.

2.4.3: third type of knowledge: about the means

The third type of knowledge is about the means: how do you effectively reduce the discrepancy between the current position and the defined goal, how do you move or make a change of position in whatever space you are in? For physical systems, such as driving a car, riding a bicycle, sailing a boat or overseeing an assembly line in a factory, the means by which a change in speed or direction can be made are usually well known and readily available

2.5: Assessing the systemic potentials

Safety, like risk, is a social construct. This means that it represents a set of ideas shared by a number of people: safety and truth are good examples of social constructs, since they have no obvious physical reality (accidents as the absence of safety may have), unlike the zJjeddah tower, which is there for all to see, touch, and visit. A social construct cannot be measured and counted. ***There is simply no unit for mesuring safety, and no meaningful scale conceivable***. For that reason alone is safety measure a non-sense concept, it is not nonsense, but it does not make much or any sense. But there is also another reason. Namely the paradox that safety is defined by its absence rather than its presence by what happens when it is absent as pointed out by professor James Reason (Reason, 2000, p. 3). And it is obviously impossible to measure something that is not there.

Since safety cannot be measured directly most safety measures are counts of how many acts go wrong, as the accident rate in the Bradley curve (Figure 3). In most cases where a direct measure is midding the alternative is to use a proxy measure, an indirect measure that is strongly correlated to thetrue, but unavailable measure. This problem exists for the measure of safety as such, and even more so for the measure of safety culture. It is especially a problem for the concept of a safety culture journey, such as moving up the HSE safety culture ladder (it is obviously of limited value to use a journey as an analogy, if it is not possible to determine the position).

2.6: Assssing the potentials

Although the status of the four potentials cannot be measured directly. It is possible to propose good proxy measures,and systematically to assess them. The four potentials can be assessed by means of four sets of questions that are given to people who actually carry out the work, and therefore have first hand experience with regard to how well a company is able to respond, monitor, learn and anticipate.

2.6.1: Developing relevant questioning

Although it is not possible to have completely ready-made sets of questions (it is impossible because all organisations are and must be unique it is,however, possible to have four sets of generic questions that then can be tailored to be applicable to a specific organisation.

The questions must meet the following criteria:

- They must be **specific** in the sense that they address issues that are important for a concrete organisation.
- They must also be **diagnostic** and point to details of a potential that are meaningful to assess.
- And they must finally be **formative** – in the sense that the answers can be used (directly or indirectly) to make decisions about how to improve a potential.

It is an essential and important group exercise for a company to develop the tailored sets of questions from the generic sets provided. This work will give rise to many discussions that by themselves are valuable in an incremental safety culture. It is also important that the questions keep a neutral tone, and that they do not tempt or bias people to give specific types of answers. The sociological literature, has much valuable advise to offer in this respect.

2.6.2: Administering the questions

Once the questions have been developed, they should be taken into use. Here it is recommended to have a relatively small group of respondents to anser the questions. In today's work environments it is easy and convenient that the respondents reply to the questions by means of a web based version. This will also make it easier to collate and analyse the answers and to display a profile for each potential. Since the purpose is to follow the development of the potentials on the voyage from a decremental safety culture to an incremental safety culture rather than to obtain a benchmark, the questions must be administered many times, with suitable intervals.

2.6.3: analysing and interpreting the data

In terms of analysing and interpreting the data, it is easy and tempting to calculate a numerical score, for instance a weighted average. it is, however far more useful to plot the answers and show them by means of a simple graphical form called a web or radar chart, an example of that is shown in Figure 4, which shows the outcomes of assessments made four months apart. The data on which Figure 4 is based, are, of course, not real but constructed. 3ut the graphical rendering makes it easy to see which changes have taken place. The same graphical format can obviously also be used to show what the ideal profile or goal should be.

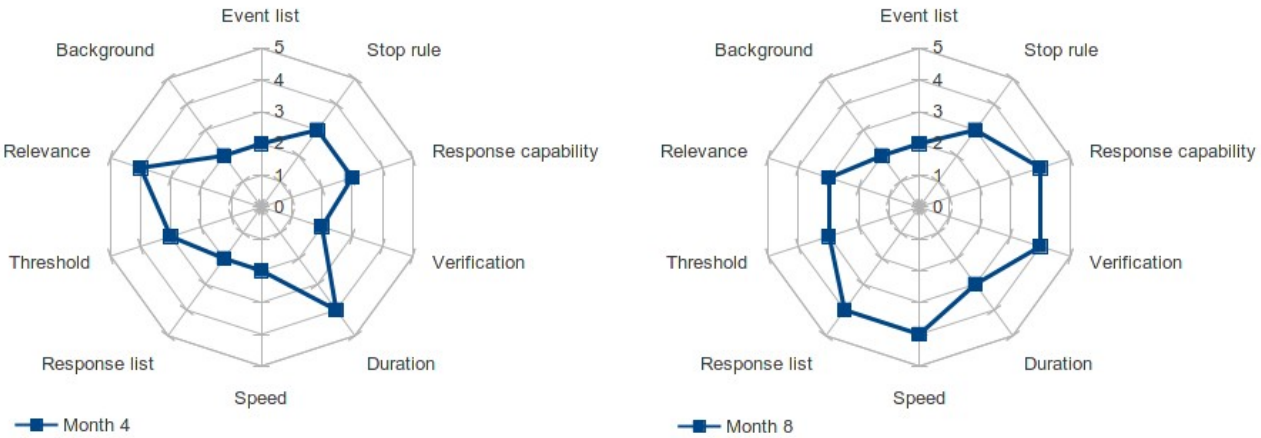


Figure 4 Performance Potential Profile for the potential to respond (constructed example)

2.7: changing from a decremental to an incremental safety culture.

The common recommended approaches, such as the EHS Ladder or the Bradley curve depicts a change in safety culture as a smooth continuous progress, either up the levels from a pathological to a generative culture as in Figure 1, or a through the stages in a left to right movement from a reactive to an interdependent culture as in Figure 2.In contrast to that the principle of the systemic potentials only provides one way to make progress, as shown in Figure 5.

2.7.1: Problems with the safety culture journey

The idea of a safety culture journey appeals to many, and with good reason. For who can object to the concept of improving how a company functions, be it in terms of safety, productivity profitability or quality?. The journey idea is also appealing because it is rendered as an attempt to get to or approach something, a generative culture, rather than to get away from or avoid something, a pathological culture. But this relative strength is also a weakness. The main problems with the concept of a safety culture journey have to do with the first type of knowledge about the goal: (1) the problem is more precisely that none of the five levels (in Figure 2) have an operational definition. it is therefore difficult to determine where a company is at any point in time, this is the problem of determining the position, but it is also the problem of defining the goal. Being generative or resilient or being interdependent, as in the Bradley curve, sounds attractive but neither of these designations is very concrete. Knowing your position, where you are should not be a matter of opinion. the safety culture voyage should not rely on dead reckoning. (Dead reackoning would not even work, because it requires you know a position and your speed , and you cannot calculate your speed unless you either have a speed gauge or can measure your position at two different points in time. Few of us are as fortunate as Columbus who discovered the American continent, when he thought he had reached the Indies. A second problem has to do with the second type of knowledge: knowing your current position.The five levels of the HSE ladder or the four stages of the Bradley curve sound reasonable, but the hard question is, how to determine precisely where you are? in the case of the five HSE levels a further problem is that the five levels are based on a misintrepretation or overinterpretation of professor Ron Westrum's proposal of two organisational climates, or leadership styles. (Westrum ref.)

Ron Westrum →actually proposed a description of characteristic leadership styles. The critical issue was the nature of the information flow in the organisation, from the personal power-oriented *pathological*, through the departmentally motivated *bureaucratic*, to the mission-oriented *generative*, and how this was shaped by the motivations and emphases shown by leaders. “One useful indicator of the overall climate is the way that information is handled in the organization. It might be useful to suggest a range of climates, using information flow as the indicator. One such range is the pathological, bureaucratic and generative scheme.” (Westrum, 1996, p. 7 reproduced in Table 3).

Table 4: How organisations process information (from Westrum, 2004.)

Pathological	Bureaucratic	Generative (later called resilient)
Power oriented	Rule oriented	Performance oriented
Low cooperation Messengers shot Responsibilities shirked Bridging discouraged Failure → scapegoating Novelty crushed	Modest cooperation Messengers neglected Narrow responsibilities Bridging tolerated Failure → justice Novelty → problems	High cooperation Messengers trained Risks are shared Bridging encouraged Failure → inquiry Novelty implemented

The initial proposal was for the two extreme conditions, where style of leadership is most influential. The bureaucratic organisational culture in fact signified the lack of strong leadership rather than a specific kind of leadership. In the absence of strong leadership people look for other types of predictability, and the easiest way of getting that is to stick to the rules and not take any chances. Only strong leadership may overrule this default way of functioning.

"The model was extended from three to five stages in a sequence, replacing the label bureaucratic with calculative and introducing just two extra stages, the reactive and the proactive. With the cooperation of Westrum a possible internal structure was first fleshed out past the original communication model to a number of dimensions covering both *Talk* (what people say) and *Walk* (what they actually do) factors" (Hudson, 2007), p. 702-703).The HSE Ladder does, in fact propose a way to progress from one level to the next, yo so-called hearts and minds tool. ((see www.energyinst.org.uk/heartsandminds). The "hearts and minds" tool was in turn derived from a transtheoretical model originally developed for use by an anti-smoking campaign (Prochaska & DiClemente, 1983).

It might be argued that the problem of knowing the position is smaller for the Bradley curve because the stage you are in corresponds to a rate of accidents. The x-axis called safety assessment, actually show

12 positions that are not evenly distributed along the x-axis. But the Bradley curve is unfortunately not a solution, because there are no known empirical data to support the curve. Not even the most diligent company makes continuous measures like that, at best they are made weekly, monthly or quarterly, which will result in a jagged rather than a continuous curve.

none of these problems exist for an approach based onthe principles od systemic potentials. The first problem is solved, because each potential can be assessed as described above. The second problem can be solved becsuae it is possible to propose an ideal set of answers to the qusations, which then by implication defines the desired goal. And the third problem, the means, is solved because there is an optimal path of progression of the four potentials as shown in figure 5, and because the ***formative*** nature of the questions in the assessment indicate the way improvements can be made.

2.7.2: First step ISC, level 1 or DSC

The starting point is a system or an organisation that only has the potential to respond. In that case responses will by definition be reactive only, so this corresponds to a system or an organisation with a decremental safety culture. The only objective is to reduce or avoid unacceptable outcomes. This is on the other hand the absolute minimum, since without te ability to rspond, even in a rigid mechanical way no system or organisation would be able to survive for long, or even for short.

2.7.3: Second step ISC, level 2

The next step must be the a quisition or development of an additional potential. Since there altogether are four potentials, the choice must be between the potential to monitor, the potential to learn or the potential to anticipate. Of the three the potential to monitor is the obvious choice, because the potential to monitor will directly enhance the potential to respond, both making it more efficient an gradually allowing it to become proactive instead of only reactive. So the second step on the way from a decremental safety culture to an incremental safety culture is to combine the potentials to respond and to learn. This will considerably improve the ability of a system or an organisation to thrive and survive.

There would be little advantage in having the potential to learn as the second step, because learning requires an understanding of what goes on, which must be based on a confirmation of predictions, hence not possible without having the potential to monitor in place first.

There would also be little advantage in the potential to anticipate as the second step, because anticipation requires a good model or an understanding or model of what determines how the surroundings develop and change, and that cannot be done without having the potential to learn in place first.

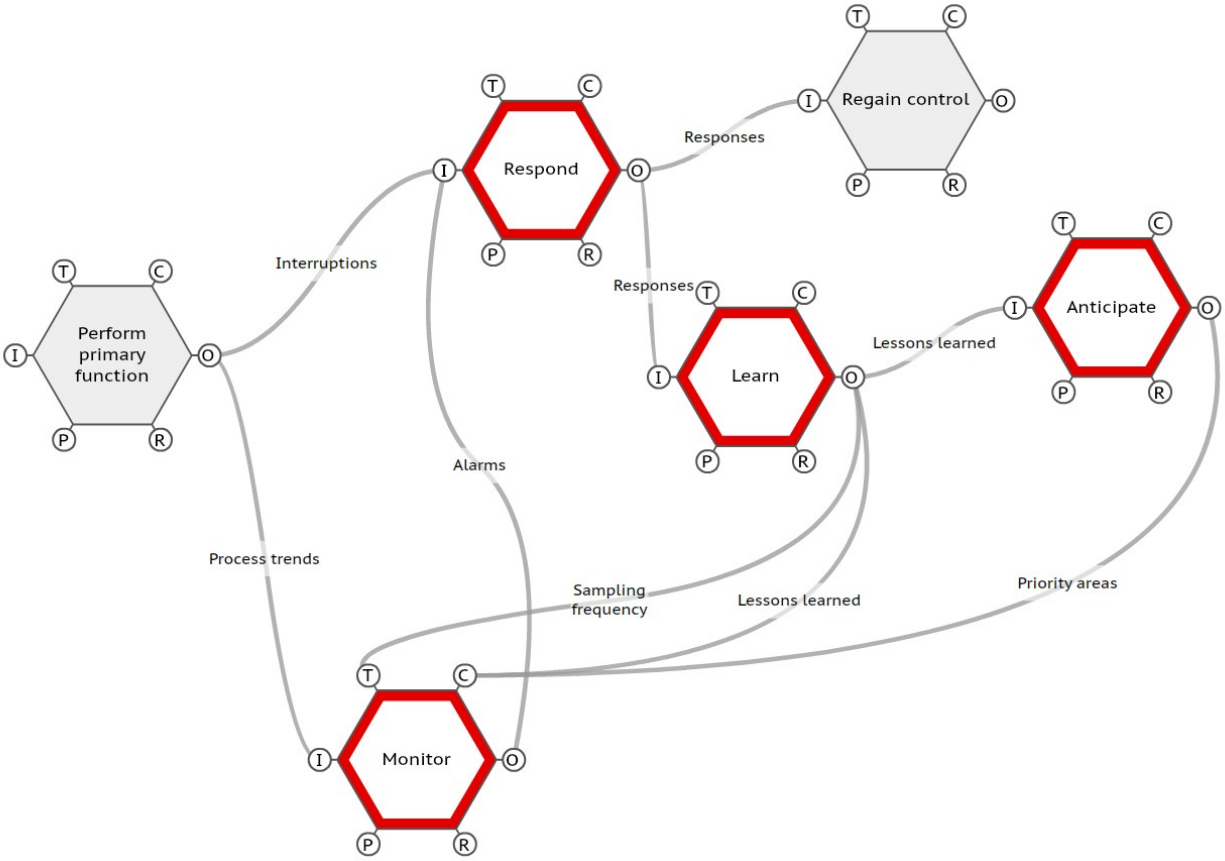
2.7.4: third step ISC, level 3

The next step is equally obvious. For a system or an organisation to function well in the long run, it must be able to respond and monitor in a flexible manner and to adjust the routines to ever-changing conditions. It must in other words be able to learn.

2.7.5: Fourth step ISC, level 4

Deciding what the fourth trandition should be is easy because, because there is only one possibility left to choose from. So even an AI should be able to do that.

Figure 4: Dependencies among the four potentials (as a FRAM-built model).



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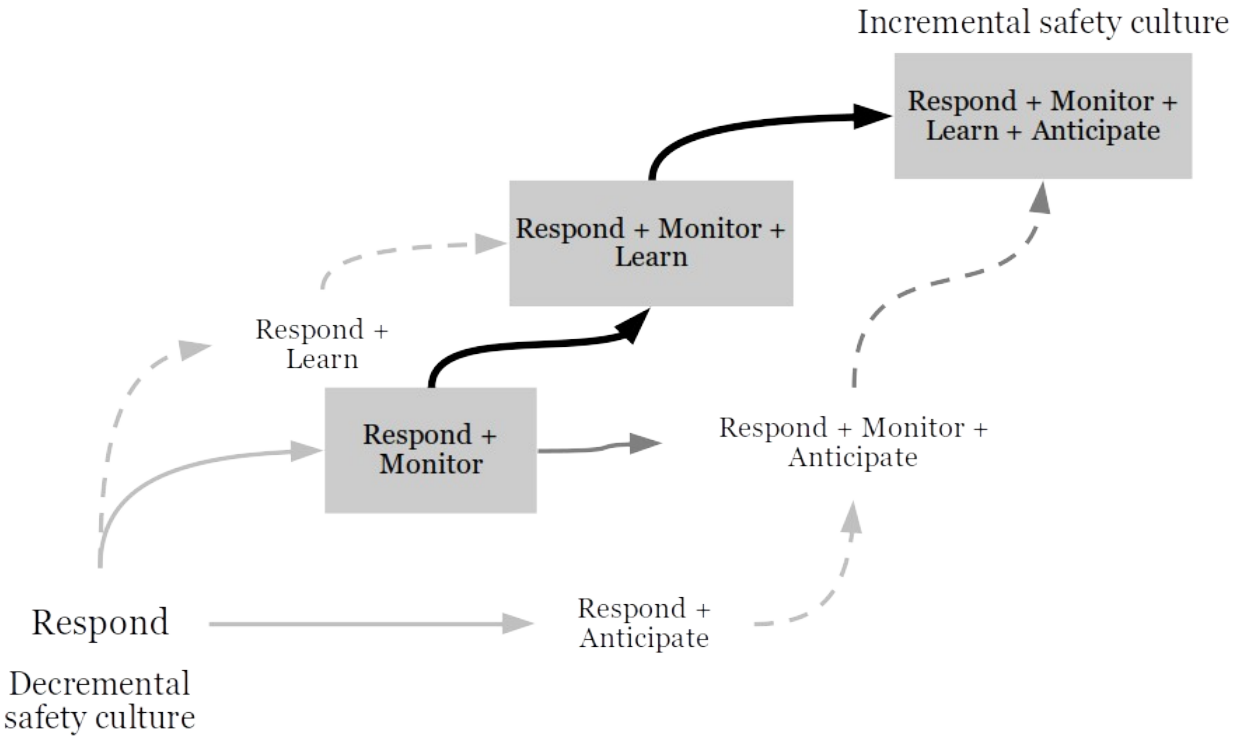

Figure 5 The logical path from a decremental to an incremental safety culture.