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How Resilient Is Your Organisation?

An Introduction to the Resilience Analysis Grid (RAG)

Erik Hollnagel

DRAFT, April 2010

The Difference Between Safety and Resilience

Although there are several different definitions of safety, they all tend to emphasize the importance of avoiding unwanted outcomes (losses, harm, incidents, accidents). The common understanding is furthermore that a higher level of safety corresponds to fewer adverse outcomes – and *vice versa*. Two illustrations follow:

The International Civil Aviation Organisation (ICAO) defines safety as ‘the state in which the risk of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management.’

The Patient Safety Indicator guide published by the US AHQR (Agency for Healthcare Research and Quality) defines safety as ‘freedom from accidental injury,’ or ‘avoiding injuries or harm to patients from care that is intended to help them.’

There is, however, more to safety than avoiding that things go wrong or reducing the number of adverse events. Resilience Engineering argues that it is necessary to focus on what can go right (successes) as well as on what can go wrong (failures). A resilient organisation can recognise when day-to-day operations are at the margins of expected performance and safety, and is able to adjust practice to return the organisation to a less precarious level of functioning. As a practical discipline, Resilience Engineering looks for ways to *enhance* the ability of an organisation to continue to function in as many different situations as possible. Safety is consequently defined as the ability to *succeed* under varying conditions, rather than as the ability to *avoid* unwanted outcomes. The more formal definition is that:

Resilience is the intrinsic ability of a system or an organisation to adjust its functioning prior to, during, or following changes and disturbances, so that it can sustain required operations under both expected and unexpected conditions.

If an organisation is resilient, then it is also safe. This follows from the simple fact that it is impossible for something to go right and wrong – to succeed and to fail – at the same time. If

the number of things that go right increase, then the number of things that go wrong will consequently decrease. The opposite is, however, not true, i.e., an organisation that is safe is not necessarily resilient.

The Four Essential Abilities of Resilience

So what does an organisation need to be resilient? Resilience Engineering emphasizes that resilience, and therefore also safety, is something an organisation *does*, rather than something an organisation *has*. Resilience Engineering thus emphasizes function over structure and ability over capacity. In order to be resilient, an organisation must be able to *do* certain things, which can be expressed practically by four basic abilities.

The Ability to Respond

A resilient organisation must be able to *respond* to regular and irregular variability, disturbances, and opportunities. A resilient organisation must know what to do and when to do it. This is the ability to address the *actual*.

- No system, organisation, or organism can exist unless it is able to respond to what happens – whether that is a threat or an opportunity. Responses must furthermore be both timely and effective so that they can bring about the desired outcomes or changes before it is too late. In order to respond, the organisation must be able to *detect* that something has happened and to *recognise* it and *rate* it as being so important that a response is necessary; it must know *how* and *when* to *respond*, and finally have the *resources* necessary to implement the response.

The Ability to Monitor

A resilient organisation must be able to monitor that which happens, and recognise if something changes so much that it may affect the organisation's ability to carry out current or intended operations. A resilient organisation must know what to focus on – at least for the duration of the current activity or operation. This is the ability to address the *critical*.

- In order to survive in the long run, an organisation must be able *flexibly* to monitor both its own performance and developments in the environment, and address potential near-term threats and opportunities before they become real. Monitoring must be based on valid *leading* indicators, i.e., reliable precursors for events that are about to happen. (Monitoring cannot be based on lagging indicators, since these by definition are known only after the fact.) Their effectiveness depends on how easy it is to *interpret* them, which in turn requires a good understanding of how the organisation functions. In the absence of that, 'leading' indicators are often defined by association or spurious correlations.

The Ability to Anticipate

A resilient organisation must be able to anticipate developments that lie further into the future, beyond the range of current operations. It must be able to consider the possible future events, conditions, or state changes that may affect the organisation's ability to function – either

positively or negatively – such as technological innovation, changes in customer needs, new legislation, etc. This is the ability to address the *potential*.

- Dealing with the potential goes beyond conventional risk assessment. It is not just a question of what could go wrong in an organisation (hazards, wrong decisions, technological failures, etc.) or in the immediate environment (raw materials, energy, suppliers, communication, etc.). Dealing with the potential must also consider the organisation's environment in a wider sense such as changes to demands and resources or changes to constraints and opportunities. In order to envisage or imagine these, it is necessary to have an articulated understanding (or model) of the organisation and of the environment in which it must function and survive. To deal with the potential it is necessary to acknowledge that the future is uncertain and be willing to bet on new ways of thinking.

The Ability to Learn

A resilient organisation must finally be able to learn from experience. It is necessary to understand what has happened, and be able to learn the right lessons from the right experience. This is the ability to address the *factual*.

- Future performance can only be improved if there is a change in behaviour as a result of experience. In order to learn, it is necessary that there are frequent opportunities to learn, that events have some degree of similarity, and that it is possible to confirm that something has been learned. (That is why it is difficult to learn from rare events.) The effect of learning is that behaviours change so that some outcomes become more likely and others less likely. If there is no change in behaviour, then probably nothing has been learned. And if the changes go in the wrong direction, then the wrong lessons have been learned.

In learning from experience it is important to separate what is *easy* to learn from what is *meaningful* to learn. Compiling extensive accident statistics or populating data bases is not the same as learning. In fact, since the number of things that go right, including near misses, is many orders of magnitudes larger than the number of things that go wrong, it makes sense to try to learn from the former as well as the latter.

How Resilient Is Your Organisation?

Since resilience is defined by the organisation's ability to adjust its functioning to expected and unexpected conditions, a resilience 'measure' will be different from traditional measures of safety. And because resilience refers to something that the organisation *does* rather than to something that it *has*, it is not possible to represent resilience by a single or simple measurement. The solution is to assess each of the four abilities that together define resilience. This can be done by means of a *Resilience Analysis Grid*, i.e., four sets of questions where the answers can be used to construct a *resilience profile*.

The detailed assessment of the four abilities requires some competence in resilience engineering and safety management, but mostly a good knowledge of how the organisation

operates. The starting point for the assessment is four sets of generic questions, which, of course, must be tailored to address the specifics of the target organisation. Since a detailed assessment does require some effort, it may be useful to begin by considering the four abilities ‘wholesale,’ and to rate them using the categories of <excellent | satisfactory | acceptable | unacceptable | deficient | missing>, for example.

When giving the answers, it is essential to keep in mind that the purpose is to rate the typical way in which the organisation works rather than to ‘score’ recent accidents and incidents. The rating should describe how well the organisation normally is able to *do* something, rather than how badly things can turn out.

Overall Assessment of the Organisation’s Degree of Resilience

By way of illustration, the four main abilities can be evaluated using the following brief questionnaire.

The ability to respond: How ready is the organisation to respond and how able (quickly and efficiently) is it to respond when something unexpected happens?

Excellent	Satisfactory	Acceptable	Unacceptable	Deficient	Missing

The rating of this ability can be helped by asking some more detailed questions, for instance:

- How complete is the set of events for which the organisation is ready to respond?
- How fast can a response be given and how long can it be sustained?
- How is the readiness to respond ensured and maintained?

The ability to monitor: How well is the organisation able to detect smaller or larger changes to work conditions (internal and/or external) that may affect the organisation’s ability to carry out current or intended operations?

Excellent	Satisfactory	Acceptable	Unacceptable	Deficient	Missing

The rating of this ability can be helped by asking some more detailed questions, for instance:

- How does the organisation monitor the situation and how are the indicators defined?
- How is the validity of the indicators established?
- How are the ‘readings’ used and communicated?

The ability to anticipate: How large an effort does the organisation put into what may happen in the near future? Is anticipation a strategic concern?					
Excellent	Satisfactory	Acceptable	Unacceptable	Deficient	Missing

The rating of this ability can be helped by asking some more detailed questions, for instance:

- How does the organisation (or people in charge) think about the future? What is the ‘model of the future’ that the organisation uses?
- How long is the organisation’s time horizon (for instance, number of years)?
- How is the cost-benefit of investments in the future established?

The ability to learn: How well does the organisation make use of formal and informal opportunities to learn from what happened in the past?					
Excellent	Satisfactory	Acceptable	Unacceptable	Deficient	Missing

The rating of this ability can be helped by asking some more detailed questions, for instance:

- How selective is the basis for learning? Does the organisation consider both failures and successes?
- How often does the organisation try to learn? Continuously or when something has happened?
- How is learning expressed? (rules, procedures, attitudes, skills, etc.)?

Balancing the Four Abilities

The four basic abilities are represented symbolically in Figure 1.

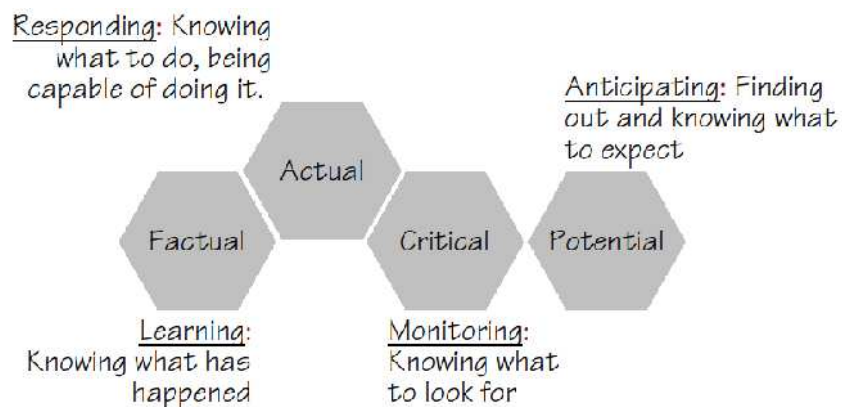


Figure 1: The four abilities of a resilient organisation

Resilience Engineering cannot prescribe a certain balance or proportion among the four qualities. For a fire brigade, for instance, it is more important to be able to respond to the actual than to consider the potential, while for a sales organisation the ability to anticipate may be just as important as the ability to respond. But it is clearly necessary for any organisation to address each of these qualities to some extent in order to be resilient. All organisations traditionally put some effort into the ability to respond to the actual. Many also put some effort into the ability to learn from the factual, although often in a very stereotypical manner. Fewer organisations make a sustained effort to monitor the critical, particularly if there has been a long period of stability. And very few organisations put any serious effort into the ability to anticipate the potential.