Australian Government
Australian Radiation Protection and Nuclear Safety Agency

arpansa

Supplementary Material: Adapted Resilience Assessment Grid Question Set

Resilience refers to a set of abilities that enable a system to maintain or regain a safe and stable state. Systems achieve this by adjusting themselves before, during or after an event, and continuing to operate safely in both expected and unexpected conditions. A resilient system is one which has the ability to respond, monitor, learn and anticipate (Hollnagel, 2010). Further detail on resilience, including ARPANSA's expectations for licence holders, can be found in the *Regulatory Guide: Holistic Safety* (ARPANSA-GDE-1753).

The Resilience Assessment Grid (RAG; sometimes also referred to as the Resilience Analysis Grid) is a tool for assessing the extent to which each of the four abilities of resilience are supported by organisational systems. The RAG includes four sets of questions (one set per ability) to be used to determine the organisation's resilience profile. Using a Likert scale to capture responses and a radar chart to display responses is encouraged. The RAG is one of the many THOF tools recommended for use within the *THOF Methods Library* (ARPANSA-SUP-2566).

While a generic set of questions is proposed in the literature (Hollnagel, 2011) it is recommended that practitioners adapt the questions to suit their operating context. ARPANSA has done this in adapting the original questions to better suit the Australian nuclear industry, and to align with existing guidance. The questions below are designed as a starting point. Licence holders should appraise the appropriateness of these questions for their individual contexts before applying them.

Respond

Topic	Question
Event List	What events (emergency or otherwise) have systems been prepared to respond to?
Background	What are the selection criteria (e.g. operating conditions, risk assessments, industry standards) used to determine the events for which a response should be prepared?
Relevance	How regularly are the selection criteria reviewed? What considerations are made in these reviews? How is this process documented?
Threshold	What criteria are used to trigger a response? What mechanisms are in place to ensure a graded approach is taken?
Response List	How are the final set of responses determined? What criteria are used to evaluate that the set of responses is appropriate and adequate?
Speed	What provisions are there for early predictions of significant safety events? How rapidly can a full response be activated?
Duration	For how long can a full response be sustained? What is the minimum acceptable response level? How long can the minimum acceptable response be maintained?
Stop Rule	What criteria are used to determine when to terminate a protective response?
Response Capability	What resources are exclusively allocated for maintaining response readiness across technical, human, and organisational domains (e.g. finances, personnel, training, organisational structure, equipment)? Who is responsible for managing these resources?
Verification	How is the organisation's readiness to respond evaluated? How regularly are such evaluations made?

Monitor

Topic	Question
Indicator List	What indicators of safety and security performance are present in the organisation? How were indicators defined (e.g. by analysis, operating experience, regulator, IBP)? What performance aspects are not included within indicators and why not?
Relevance	When were the indicators created? How often are they revised? Who is involved in the review (e.g. frontline workers, managers, senior leaders)? Who is accountable for maintaining the list of indicators?
Indicator Type	Which indicators are 'leading' and which are 'lagging'? What processes exist to enable early recognition of deviations?
Measurement Type	What is the nature of the 'measurements'? Qualitative or quantitative? (If quantitative, what kind of scaling is used?) Why was this type of measurement considered appropriate?
Delay	How long is the typical lag in responding to indicators? How long is the typical lag in responding to known issues?
Validity	How is the validity of indicators (both quantitative and qualitative) established and assessed? How do these assessments impact practice?
Measurement Frequency	How often are measurements (e.g. audits, reviews, assessments) for indicators made? (Continuously, regularly, every now and then?) Does the system allow for individuals to report measurements/findings themselves?
Analysis & Interpretation	How many of the measurements taken are directly meaningful, and how many require further analysis? Who performs this analysis and when is it performed? How are these results communicated, and to whom? How is this information used?
Stability	Are the measured effects transient or permanent? For example, finding something to be out of date is a permanent effect until corrected, while a measured trend over time is transient.
Organisational Support	Are there regular self-inspections, including by an internal but independent group? Are these tasks sufficiently resourced?

Learn

Topic	Question
Selection Criteria	Which events are investigated, and which are not (frequency, severity, value, etc.)? What approach is taken to near miss incidents? How is the selection made (e.g. set of criteria), and who makes the selection?
Learning Basis	Does the organisation try to learn from successes (things that go right), from failures (things that go wrong) and near misses? How is this done?
Classification	How are events classified (e.g. by risk, severity, potential consequence)? How does this impact upon what data is collected and shared?
Formalisation	How are event investigations formalised (e.g. with procedures on data collection, analysis, reporting, sharing, and learning)? Who should conduct the investigation? What is the formalised end point for the investigation?
Training	What formal training or organisational support is there for data collection, analysis and learning? How is the appropriateness of training as a suitable intervention (e.g. in response to an event) determined?
Learning Style	Is learning continuous and proactive, or discrete and reactive (i.e. event-driven)?
Resources	How are resources for safety allocated? How are resources allocated for improvement? How is the adequacy of resourcing assessed? How are detrimental resource constraints identified and rectified?
Delay	What is the delay in conducting investigations, reporting their outcomes, and acting on their findings? Is there a delay between actions applied at the site of an event compared to the rest of the organisation, and if so what is its impact?
Learning Target	At what level of the organisation is learning targeted (e.g. the work design, frontline worker, management, or organisation level)? Who is the learning audience (e.g. only one, some, or all people/groups)? How is this decided?
Implementation	How are 'lessons learned' implemented (e.g. processes, procedures, norms, training, instructions, redesign, reorganisation)? How are these lessons communicated and applied across the entire organisation?

Anticipate

Topic	Question
Expertise	What experts (internal or external) are relied upon to make accurate and relevant forecasts? How are their skills/competencies developed to maintain adequacy in anticipating future threats?
Frequency	At what frequency are future threats/opportunities assessed? How far ahead are these forecasts made? Is this time horizon different for business and safety?
Communication	What mechanisms are in place to ensure forecast information is adequately shared with the appropriate/relevant part of the organisation?
Strategy	What systems and criteria are used to determine the scope and depth necessary to 'model the future'?
Model	Have the assumptions about the future been made explicit or implicit? Are they qualitative or quantitative?
Acceptability of risks	What risks are acceptable? What risks are unacceptable? What criteria are used to make these determinations?
Aetiology	What is the shared understanding across the organisation of the nature of the future (threats/opportunities)?
Culture	What is the organisational culture for risk awareness? How is risk understood across the organisation, including what could go wrong if the job requirements are not conducted properly? How is this understanding verified?

References

Hollnagel, E. (2010). *Resilience engineering in practice: a guidebook*. Ashgate.

Hollnagel, E. (2011). Epilogue: RAG – The Resilience Analysis Grid. In E. Hollnagel, J. Pariès, D. Woods, J. Wreathall (Eds.), *Resilience Engineering in Practice: A Guidebook* (pp. 275-296). Ashgate. https://doi.org/10.1201/9781317065265