

FOSTERING RESILIENCE THROUGH CHANGING REALITIES

INTRODUCTION TO OPERATIONAL RESILIENCE CAPABILITIES

TNO



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INTRODUCTION TO OPERATIONAL RESILIENCE CAPABILITIES

COLOFON

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INTRODUCTION

RESILIENCE CAPABILITY: ABILITY TO ADAPT OPERATIONAL PRACTICES TO CHANGING REALITIES BY ORCHESTRATING STRATEGIES, RESOURCES AND COMPETENCES

The reality of operations does not always follow the book. Operational circumstances may develop into surprising situations that procedures have not accounted for. Still, we make things work. Resilient performance recognizes surprise early and acts upon it through adaptation, which is critical for an organization to succeed. It enables continued safe operations under changing circumstances in everyday or crisis situations by creating innovative ways to deal with progressively changing circumstances.

As operational situations become increasingly complex and interconnected, the predictability of disruptions decreases. Consequently, resilience capability becomes more relevant to cope with unexpected situations. Achieving that requires a

seamless understanding throughout the organization and the organization's leadership team about what resilience means.

Because of its implicit nature, resilience capability has not yet become part of organizational learning. TORC (Training for Operational Resilience Capabilities) aims to provide a reference guide for operational teams and management to recognize and facilitate resilience as a critical capability and take it out of the shadows of compliance. This booklet introduces the concept of operational resilience and guides you through the training and the TORC game, and it serves as a reference while the organization is maturing these concepts in day-to-day practice.

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RESILIENCE AND COMPLIANCE

MAKING THINGS WORK WITHIN THE
BOUNDARIES OF COMPLIANCE IS
PART OF EVERYONE'S SKILLSET AND
WE DO IT ALMOST ROUTINELY

RESILIENCE AS A ROUTINE CAPABILITY

Operational constraints and environmental circumstances are good for a fair share of everyday surprise and adaptation. Each situation has its unique parameters as installations differ in configuration, teams change, time frames are reduced and external factors, like weather conditions, come into play. These factors influence the way in which the work is performed in reality. This type of activity, making things work within the boundaries of compliance, is part of everyone's skillset, and we do it almost routinely. Resilience and adaptation may even have to cross the boundaries of compliance in situations in which procedures no longer work. To become resilient, an organization has to develop the ability to adapt to changes in circumstances into an organizational capability.

ANTICIPATING SURPRISE

Everyday operations require continuous re-interpretation of the situation to fit work to emerging circumstances. But continuous adaptations can gradually stretch the operation to its limits. This may go unnoticed until it manifests itself as an unwelcome surprise. Yet surprises usually send signals ahead. Resilient operations develop a strong sense of unease and are always on the lookout for these –often– weak signals and act upon them. Their management is receptive to these alerts, accommodates action under pressure of operational targets and assesses how a local disturbance may escalate to other areas.

RESILIENCE AND COMPLIANCE

RESILIENCE AND COMPLIANCE

Compliance is there for good reasons. It incorporates many years of learning and it provides “room for manoeuvre” for adaptation within boundaries. In some situations, deviation from compliance is unavoidable or simply seems a safer choice. When moving outside of compliance boundaries, adaptation will result in dilemmas between operational demands and compliance; it requires a convincing argument that there is a better alternative which has been given careful consideration.

When stepping outside of the existing boundaries of the planned operation, there are three options:

1. Immediate escalation to the crisis or emergency response process.
2. Controlled permission on a case-by-case basis in accordance with an explicit exceptions process.
3. Adherence to a process for crossing compliance boundaries under certain conditions, e.g. by accommodating an option for resilience response in the Management of Change process.

BENEFITS OF RESILIENCE

Resilience allows people, teams and organizations to anticipate and cope with variation, disturbance and surprise as these situations emerge during normal operations. It appeals to expertise and a focus on positive outcomes when dealing with the unexpected. Once a situation has been dealt with, successful and unsuccessful outcomes must receive equal attention; to learn from and to support and stimulate enhanced resilience in people and organizations.

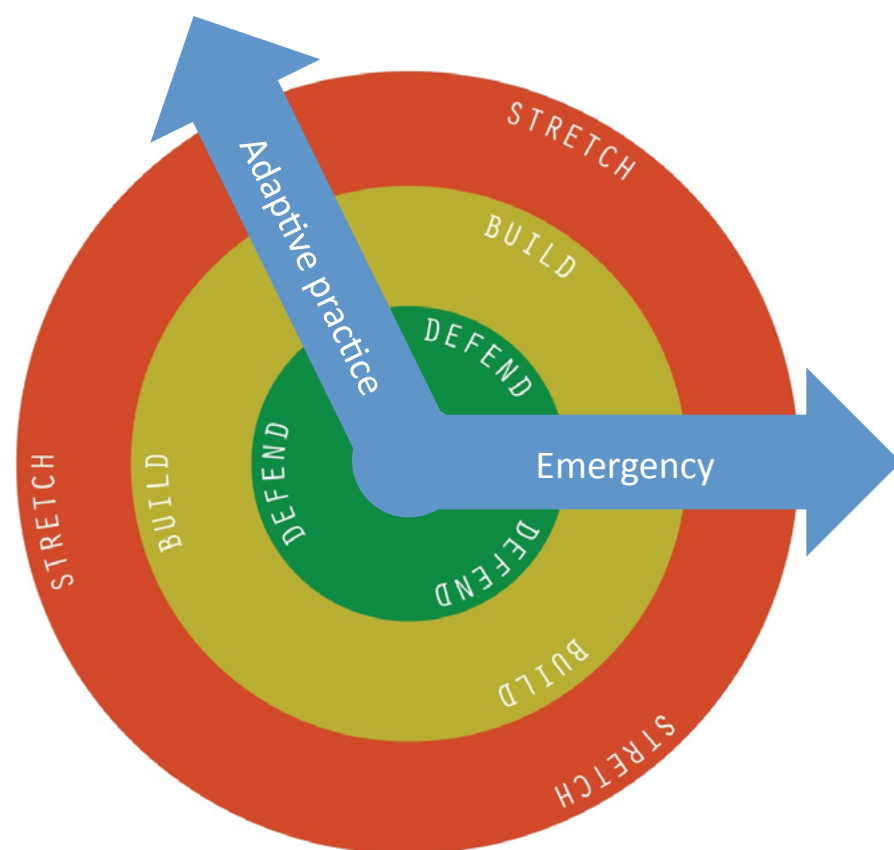
**IN SOME SITUATIONS
DEVIATION FROM
COMPLIANCE IS
UNAVOIDABLE OR SIMPLY
SEEMS A SAFER CHOICE**

RESILIENT ACTING DURING REPAIRS

A malfunctioning valve of a live supply line in a refinery needs replacing but it has only one safety barrier, not two as required by compliance. During assessment of the situation the safety manager and the operations team jointly develop an alternative approach to replace the valve during operations. Because of the single safety barrier, the operation takes place in a closely monitored space for manoeuvre, extended outside of compliance boundaries yet fitted with additional controls, and the valve is replaced while a safe situation is maintained. This prevents a full shut down of the production plant.

ORGANIZATIONAL RESILIENCE OPTIONS

Organizations can vary across the modes of resilience and set their aspiration levels depending on the nature of their operational activity. For high-risk operations, the organization may decide to escalate any disruptions to the Emergency Response process. The room for manoeuvre tolerated will allow operational staff a certain degree of flexibility in responding to upcoming demands. The blue arrows in the figure below symbolize resilience activity in emergency situations and in everyday operations.



ORGANIZATIONAL ASPIRATION LEVELS FOR RESILIENCE

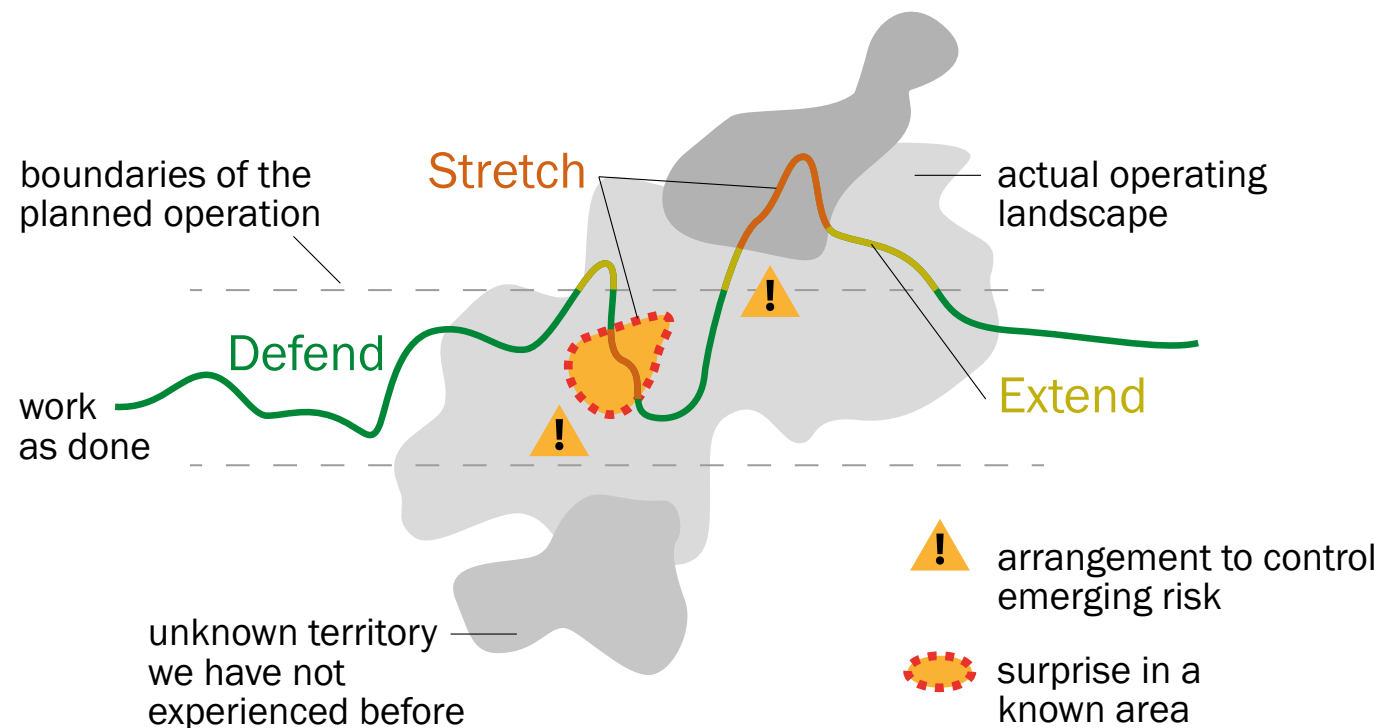
Defend (R1): this is the preferred mode of operation. Resilient action takes place to deal with everyday operational surprise within the boundaries of the normal operation.

Build (R2): the organization provides additional defences. This can be done by adding robustness to the normal operation at spots where there are known vulnerabilities, or where procedures are known to need interpretation.

Stretch (R3): on a case-by-case basis, controlled acting outside of the modelled operation in a controlled manner is an option when responding to unexpected situations, e.g. through the Management of Change process if the available work permits, procedures and resources no longer support the necessary action.

Sustain (R4): a continual prepared state in which the organization accommodates resilient action across teams in the organization. It regards resilience as an operational capability, governed by a controlled resilience process. This allows for proposing compensating measures across the modes immediately.

RESILIENT NAVIGATING IN EVERYDAY WORK



RESILIENCE MODES

The planned operation depicts the operation as a straight line. In reality this line is very dynamic, and adapting to changing situations all the time. The three aspiration levels help you assess the situation as you navigate through the operating landscape.

Defend: decisions to adapt within the boundaries of the Standard Operating Procedure (SOP) are considered normal operations (R1). There is no need for a roadmap; you know the area, you know what is expected from you and you know what you can expect on your route.

Extend: as you progress, you may encounter unexpected situations that require adapting of planned arrangements (R2). You are still operating within the planned operation. Alternatively, you may decide to take a different route and use a road map for guidance.

Stretch: when you move outside of the planned operation while adapting work, you are going “off-road” (R3 or R4). You may still have an option to rebound, or you may find yourself completely off the map, in which case you will need different strategies for navigating.

BEING ALERT AND MAKING SENSE OF CHANGING SITUATIONS

Still, ‘routine’ and ‘extend’ situations may surprise you. The boundaries of the planned operation are blurry as a result of interpretation. There may be interdependencies combining into risks outside of your range of sight, particularly when adaptations have also been made in adjacent areas, in which case your resilience action may look safer than it actually is, and the distance to the area for which no road map is available may be closer than you perceive. The mental steps in the training will help you make sense of a situation and act upon it in a well-considered way.

OPERATIONAL RESILIENCE CAPABILITIES

ORGANIZATIONS WHICH NURTURE RESILIENCE SHARE A NUMBER OF DISTINCT CAPABILITIES

Organizations which nurture resilience share a number of distinct capabilities which allow them to facilitate and encourage resilient performance.

These organizations:

- know what to expect and discuss gaps between work planning and what is required for the operation
- know what to look for, but are alert to weak signals and changing patterns in the operational situation and act upon these changes
- easily find and have access to expertise in order to collaboratively develop alternative action plans
- maintain an active dialogue on operational situations between field and management when making trade-offs
- smoothly switch between resilience grades considering needs and ability

- regard variations a normal part of the SOP but are reluctant to simplify operations; they continuously reinterpret the situation as the operation evolves
- understand stretching and crossing of compliance boundaries and facilitate it in accordance with the mandated room for manoeuvre
- demonstrate receptiveness to organizational learning through adaptation
- want to know what has happened and therefore discuss unplanned actions in an after action review
- nurture a supportive and just management culture, well aligned with the operational reality.

A resilience capability requires:

- Strategies: actions one can take to deal with a situation
- Resources: tools and aids which can be deployed to a situation
- Competences: knowledge, skills and behaviours aimed at adaptive and safe problem solving

RESILIENCE LEARNING ACROSS LEVELS

THE TORC PROGRAM INCORPORATES RESILIENCE TRAINING FOR BOTH OPERATIONAL STAFF AND MANAGEMENT AND AN INTEGRATED SESSION

Resilience requires collaboration and open communication between organizational areas and levels. The TORC program incorporates resilience training for both operational staff and management and an integrated session which combines the perspectives on work as expected (imagined) and work as done. Learning is reinforced through a specially designed TORC game.

OPERATIONAL TRAINING

Operational training will let you experience the ‘margin for manoeuvre’ and explore different resilience strategies based on a real case taken from operational practice. The case is only a starting point and takes an unpredictable course by means of ‘action cards’ driving the game.

MANAGEMENT TRAINING

To experience decision-making on “room for manoeuvre” management assumes an operator role while at the same time closely assessing and monitoring the situation for continued stability. Extensive communication with those in the situation and those in peripheral areas which may be impacted by the situation (e.g. as the operation moves towards or across the boundaries of compliance) is critical for assessing when additional expertise is required and when a situation needs to be escalated.

INTEGRATED TRAINING

The main objective of integrated training is for management and operational teams to jointly experience the trade-offs made from both the operational and the management perspective, while discussing adaptive plans and strategies as the situation evolves over time. E.g. do different views need harmonization? Are resources adequate? Is decision support available?

PREVENTING A RAIL-TRAFFIC NIGHTMARE

A night crew executing rail maintenance reports a truck stuck on the tracks. On arrival, the safety supervisor recognizes that it concerns a vehicle undetectable by traffic control. With morning rush-hour approaching quickly, the safety manager consults key stakeholders on a series of unconventional actions. The collaborative action successfully reinstates a safe situation and frees up the country's most heavily used hub. A rail traffic nightmare is prevented.

SHARPENING YOUR RESILIENCE SKILLSET

A certain level of resilience is a familiar phenomenon in everyday operations as you will have experienced while executing work. It is part of any operational team's skillset. This training will create a mutual understanding of how resilience works within teams and across levels in the organization, in order to facilitate its application as a valuable capability for everyday adaptation and continuous improvement.

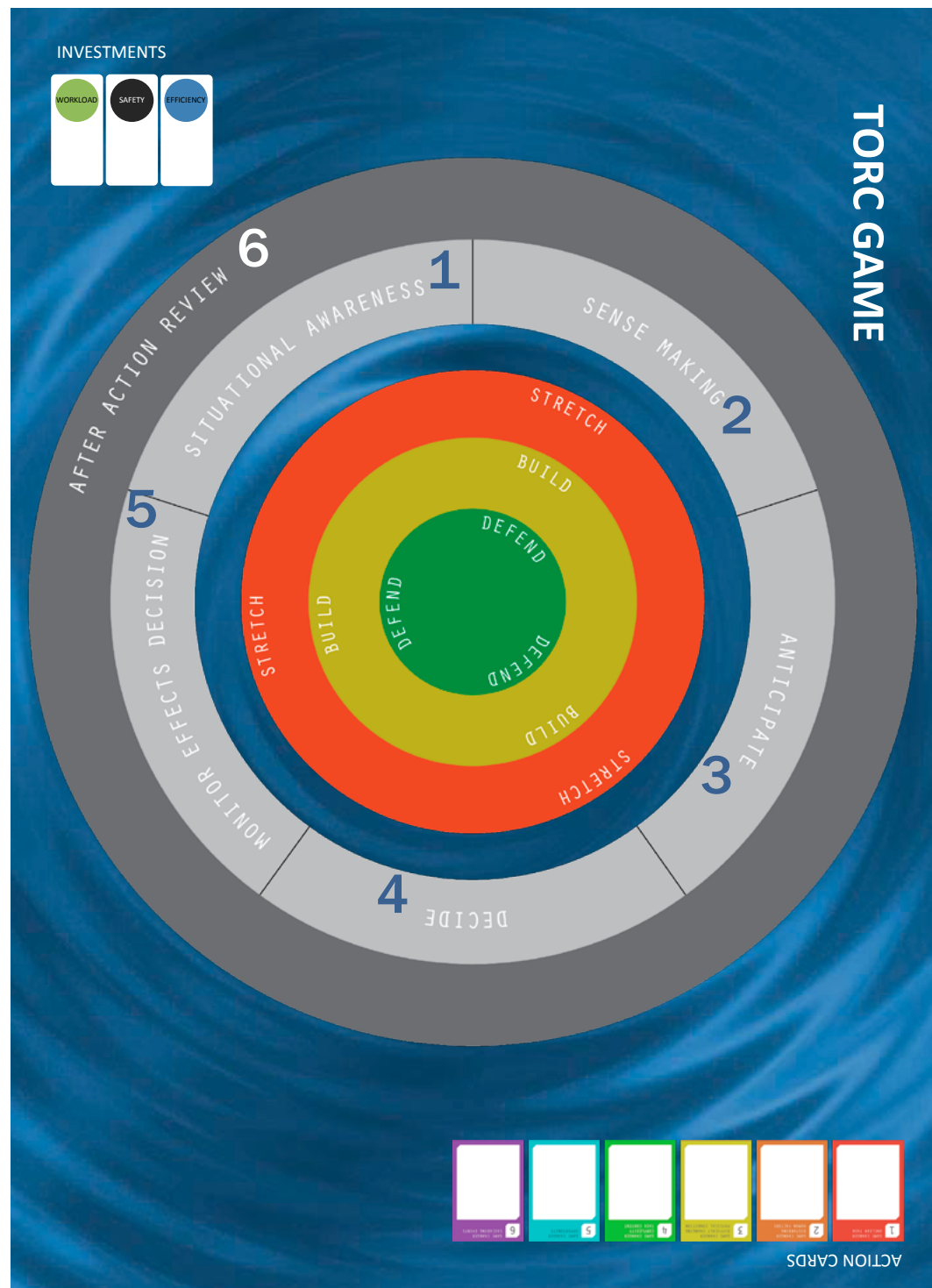
Successfully orchestrating strategies and resources applied by competent people are the keys to resilience capability. Strategies represent the actions you can take to respond to a situation. As the case evolves, new situations arise which may require you to adapt your strategy and hence develop resilience competences. If a situation requires a strategy which is not yet included you can add it, and thus expand the organization's adaptive repertoire. Resources represent the 'instruments' you usually require to apply a strategy. An overview of the strategies and resources is included in the quick reference guide.

DURING THE TRAINING YOU WILL:

- Experience resilience in action by simulating practices in real company cases
- Learn about resilience as an operational capability to cope with sudden or unexpected demands when executing work
- Collaboratively explore and decide on strategies to deal with unexpected situations in the operation
- Jointly explore and decide on resources to be deployed in order to support and back up your adaptive action
- Experience how your team and company network support and cooperate in resilient action
- Reflect on applied capabilities and the learning in positive as well as negative outcomes

**THIS TRAINING CREATES A
MUTUAL UNDERSTANDING
OF HOW RESILIENCE WORKS**

TORC GAME BOARD



MENTAL STEPS IN RESILIENT PERFORMANCE

- 1 **Situational awareness** A seemingly stable situation may unexpectedly change. Is there anything you hear, smell, see or anything you can think of that may explain what is happening? Act upon these early warnings signs of disturbance!
- 2 **Sense making** How may this changing reality affect you, your team and the work to be completed? Could it affect stakeholders outside of your team? What strategies and resources will you need to deal with the situation?
- 3 **Anticipate** What is the impact of the selected strategies and resources. What is it that you will be facing, and what will you have to take into account?
- 4 **Decide** Carefully consider your decisions and action plan and adapt your work process in a controlled way. What did you gain? At what cost?
- 5 **Monitor effects** Monitor the impact of your decisions locally and throughout the delivery process.
- 6 **After action review** Learn from the situation at individual and organizational level by discussing afterwards with the team what happened.

STEPS IN THE TORC GAME



STEP 1 The case is introduced to the trainees. It concerns a real-life case taken from operational reality.

STEP 6 The player hands over his turn to the next player who is presented a new action card which kicks off the next turn.

STEP 5 The player indicates the resilience position on the resilience map, records the resources and strategies on the applicable cards, and processes payment of the investment by means of the investment tokens for safety, workload and efficiency.

STEP 4 The player considers the team's input to make final decisions on resilience position, the strategies to be applied, the resources needed and the investment required for the selected approach.

STEP 2 By placing the token on the situational awareness phase, the first player kicks off the game and the minutes start ticking away...

STEP 3 The player leads the consultation process with the team through the phases in such a way that each phase receives due attention and assembles the input from other team members in a timely manner to describe the evolving situation.

HOW THE TORC GAME SUPPORTS YOU

THE GAME CONTRIBUTES TO THE AWARENESS OF RESILIENT ACTING AND THE SENSE MAKING IN THE PROCESS

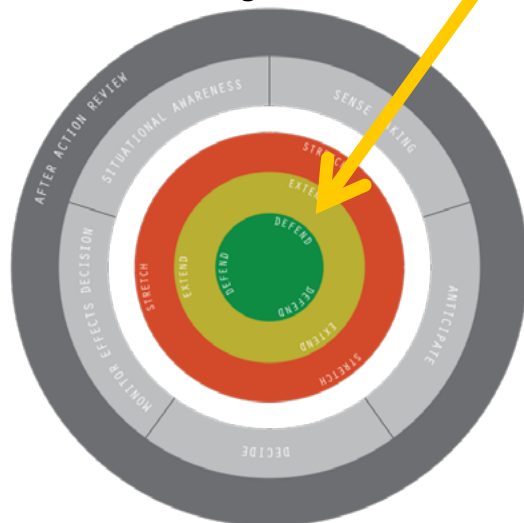
In the reality of day-to-day work, there are different ways to execute work safely, effectively and efficiently. Variation in operational conditions and operational targets and the dilemmas raised by these challenges are part of everyday work.

While playing the TORC game, you will share your individual approaches and discuss alternatives. This provides indications as to how the

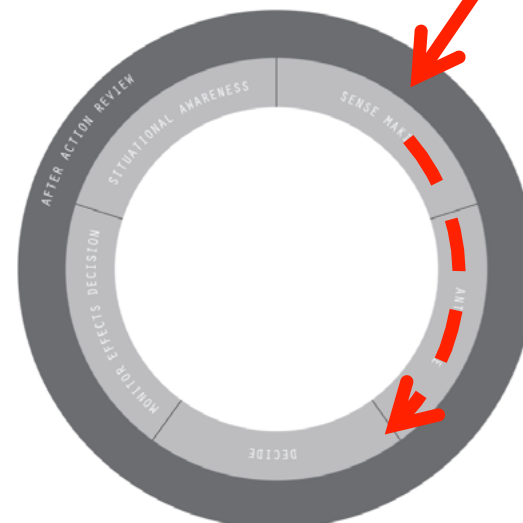
organization supports resilient performance and reveals the enablers and barriers. You will experience the benefits and risks of acting in a resilient manner through cases presented. You will also experience dilemmas and trade-offs, and you will try different strategies to overcome operational challenges.

The game contributes to the awareness of resilient acting and the sense-making in the process. It identifies the playing field for resilient action in the operation and identifies the conditions required to make resilience work in the organization.

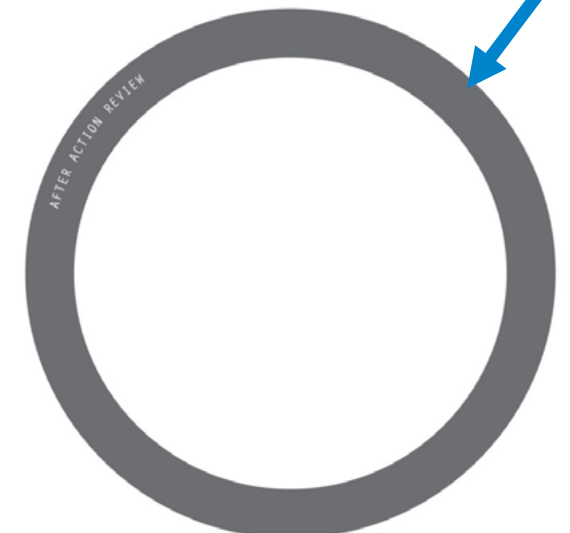
strengthen the resilience capability experimenting with resilient action every time demands change



experiment with the decision-making process for taking resilient action



in an after-action review, discuss the resilience experience with the team and share the learning.



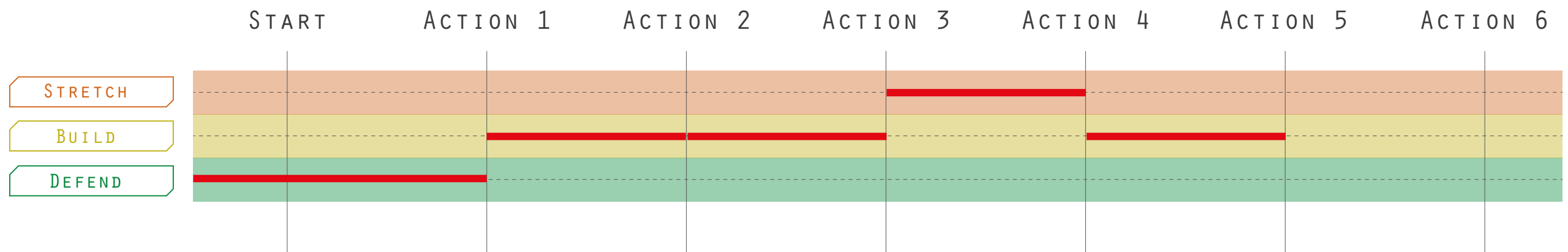
PLAYING THE TORC GAME



Once the case has been introduced, team members take turns in leading the team through an operational challenge. You will select strategies and resources to deal with the operational challenge at hand and determine the required investment in close collaboration with your team. The investment impact is 'funded' by means of fiches for Safety, Workload and Efficiency. A guide to acting resiliently is available to support your decisions. At the end of each turn, a new operational challenge is initiated by means of a random 'action card'. The range of actions, strategies and resources fits the context of your operation.

PLOTTING THE RESILIENCE PATH

As the game progresses, you will find that it takes the operation out of normal operations into the three temporary modes of resilience. To visualize the resilience course you decided on while working through the case, these decisions are plotted on the resilience log. The decisions form the nodes of the resilience path which is addressed during the after action review. The after action review is for the team to share the considerations made for the decisions and the findings from the process. It is also to capture observations regarding resilience enablers and barriers, and suggestions for management system changes.



QUICK REFERENCE GUIDE: STRATEGIES

S1

ADAPT WORK PROCESS

- a. Adapt targets to focus on what is critical for the emerging situation
- b. Adapt roles to what is needed to deal with the situation
- c. Reduce the level of inexperienced personnel in critical tasks
- d. Intensify monitoring of the work and the environment
- e. Evaluate the match of the procedure or plan with the emerging situation
- f. Add redundancy and buffers in order to reduce the mental load

S2

ADD HUMAN RESOURCES

- a. Defer to expert assistance
- b. Open a channel to escalate the situation to the mandated decision maker
- c. Appoint a special team to coordinate and assist
- d. Create a cross functional network to deal with upcoming political issues
- e. Connect or deploy third party personnel

S3

PRIORITIZE

- a. Remove stressors from people (mental and physical stressors)
- b. Shift tasks that distract from the situation (cancel, defer, reduce frequency, delegate)
- c. Adapt leadership style to deal with consequences of fatigue and stress of team members and prevent reduced alertness and emotional responses
- d. Be available on the location where the situation-critical work is performed

S4

UNDERSTAND WHAT YOU SEE

- a. Appoint a team member to coordinate and reinterpret the situation continually with the input received from the team
- b. (Re)allocate tasks when the evolving situation requires it
- c. Create a climate that invites team members to speak up and ask critical questions
- d. Search for relevant information and share it timely with the team

S5

SEEK ACTIVE REFLECTION ON DEVELOPMENTS

- a. Be sensitive to signs of brittleness in teamwork, e.g. incomplete or unclear information on status, disconnects in liaisons internally and externally, accuracy of assumptions, no back up for key individuals
- b. Consult the team on disturbances, concerns and capacity in handling the situation:
 - What back-up/ redundancy is needed?
 - What is obstructing their ability to perform

QUICK REFERENCE GUIDE: STRATEGIES

S6

REALLOCATE RESOURCES

- a. Reassign multiskilled team members (experience, know how) to roles where this advantage is applied to its best effect
- b. Reallocate team members trained in processes interacting with the situation at hand to apply their experience on the interface with these processes.
- c. Reconfigure the team by splitting them up into sub-teams with dedicated tasks

S7

SEEK DIFFERENT VIEWPOINTS

- a. Improve the understanding of the situation by inviting non-team members related to the situation to contribute complimentary perspectives
- b. Conduct real time risk analyses taking multiple perspectives into consideration to reveal non-evident risks
- c. Arrange a briefing prior to the next action to inform the team on the situation, inviting them to provide their input

S8

SHARE LEARNING

- a. Stay alert to changing situations as work progresses and share (safety-) critical information immediately and other observations in regular team meetings
- b. Refer to similar situations experienced in the past to help make sense of the situation
- c. Foster open communication to share information and insights

S9

APPOINT TEAM AND INFORMATION LEAD

- a. Appoint one team member with decision authority and obtain extra room for manoeuvre for coordination under pressure
- b. Appoint one person to act as the central information exchange point, keeping an integrated status of upcoming reports and news
- c. Facilitate team members to exchange information about the evolving situation

S10

CREATE LIAISON FOR DECISION SUPPORT

- a. Liaise early with mandated line decision-makers the situation may escalate to.
- b. Liaise timely with functional decision-makers who may become involved in the situation, e.g. the engineering department and the HSE department
- c. Liaise timely with other stakeholders

QUICK REFERENCE GUIDE: RESOURCES

R1

INFORMATION

- a. Manuals/Procedures:
 - Decision making process
 - Procedure on dialogue
- b. Work preparation
- c. Work instructions
- d. (New) permit to work
- e. (De)briefing
- f. System knowledge
- g. Detailed information on assets, equipment, safeguards
- h. Technical drawing

R2

PEOPLE

- a. Experts on safety, environment
- b. Engineers
- c. Managers
- d. External stakeholders
- e. Back office
- f. Operating/control room
- g. Additional shift/crew
- h. (Sub) contractors
- i. Translator
- j. Operator on other location(s)
- k. Technical authority

R3

ASSETS

- a. Equipment
- b. Additional safeguards
- c. Tele communication means
- d. Network access
- e. Personal protective equipment
- f. Measuring and monitoring equipment

R4

TIME

- a. Create an extra timeslot to conduct the task

R5

COMMUNICATION

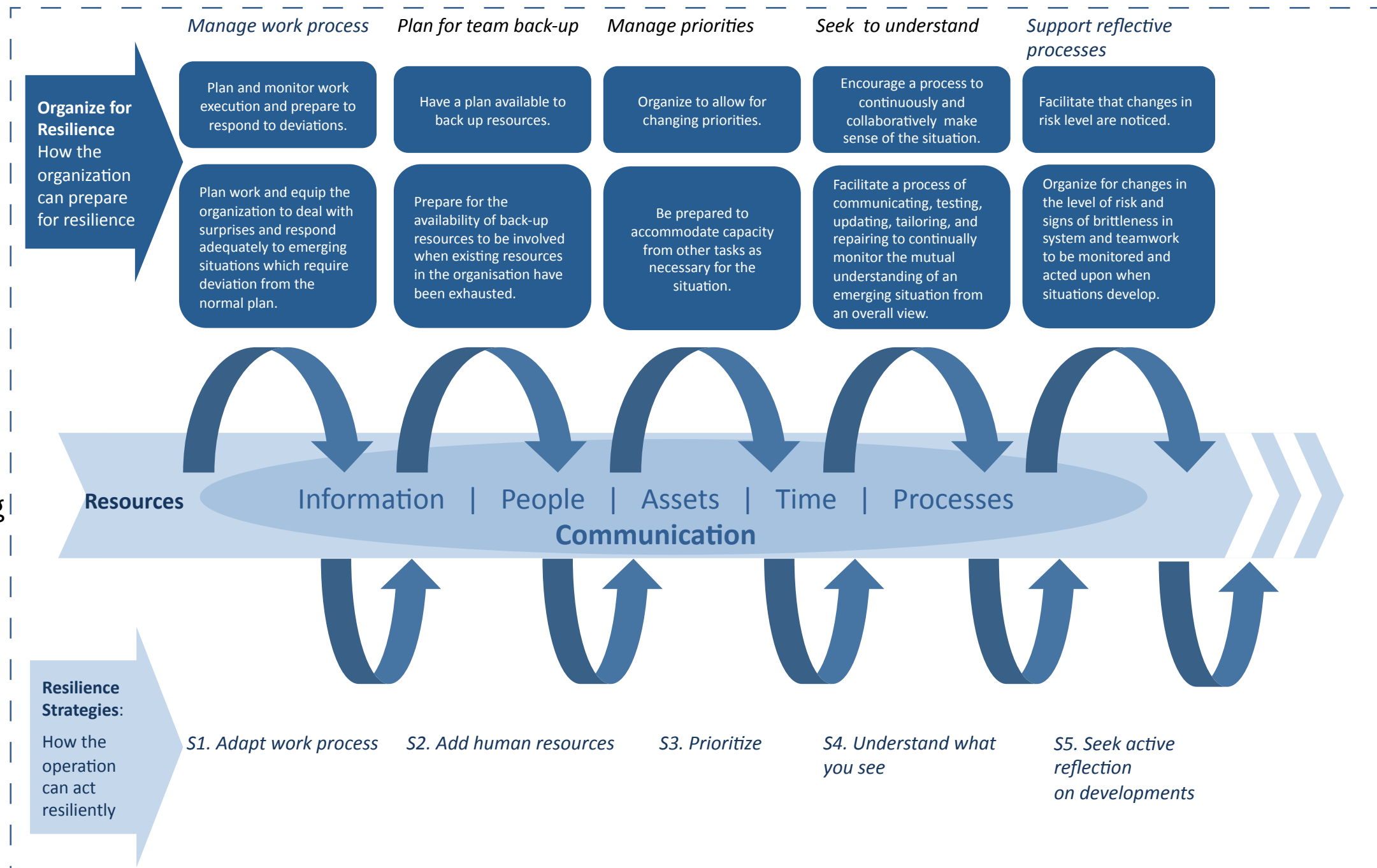
- a. Close communication lines on the team
- b. Create liaison with safety critical contact externally

QUICK REFERENCE GUIDE: MENTAL PROCESS QUESTIONS AND DIALOGUE

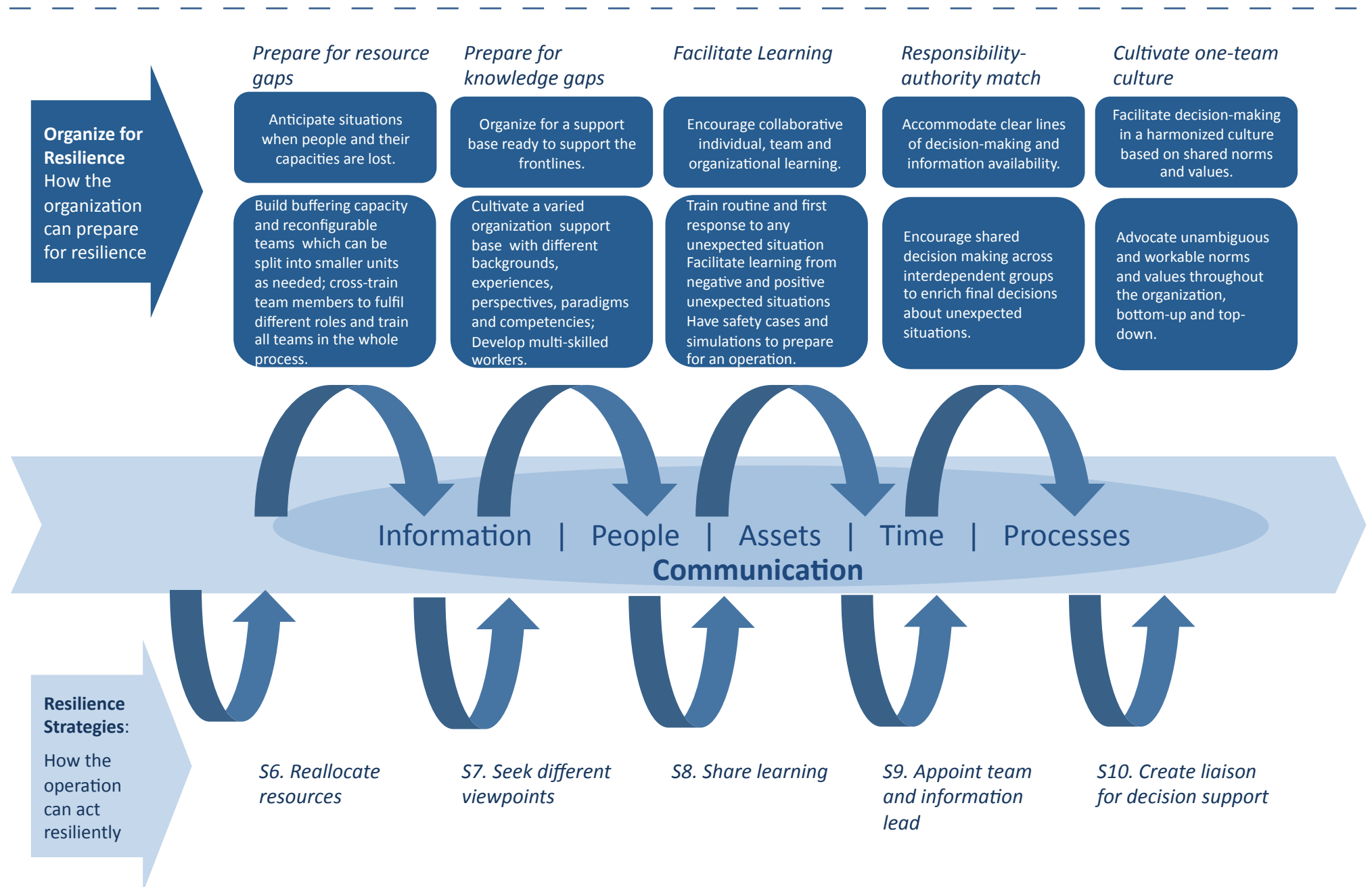
Phase	Operational	Dialogue	Management
SITUATIONAL AWARENESS (Take Pulse)	Is there anything out of the ordinary that may start behaving unexpectedly: • Do you understand what you are looking at? Do you know what to look for? What do you “hear, sense, see, smell, imagine”? • Do you have what is needed to cope with new demands? (competence, tools, information, etc.) • What is happening in your environment?	Enrich understanding of situations by sharing observations and discussing what is planned with peers and co-workers as a natural part of the work.	Understand how a situation sits in the bigger picture. Understand how a situation moves under the influence of variations in the interfaces. Scan variations in planned work, scope, scale or capacity of the operation, for possible knock-on effects.
SENSEMAKING (Understand)	Is the present situation likely to drift into an unwanted outcome: • What is the story now?	Discuss event horizon – prognosis on what might happen next. And now what?	No blame. Listen through different channels. Look from perspectives unavailable at the sharp end.
ASSESS (Risks and Impact)	If a variation that looks normal turns out not normal: • How might it impact? What will it look like if you take an action? Consider success/fail options (and cascades). What strategy and resources are needed?	Interlink functions. ‘Unfiltered’ communication (team and network, bottom up and top down) to interpret the flow of experiences into words and categories as a springboard for action.	What do you need? Mandate room for manoeuvre.
ANTICIPATE (Analyse and Projecting)	What is the likely impact of your strategy and deployment of new resources: • What impact to expect? • Who to talk to before my next step? • What new development may emerge?	Project the consequences of a decision onto the future.	Deal with dilemmas: what is the intention of the rule? If this intention is still achieved, how? (by means of which actions or precautions?) If not, what are the risks / impacts?
DECIDE (Select and Respond)	Draw your conclusion on which actions to initiate: • Who needs to know about it?	Is there a good balance between resilience and compliance?	Does the team have sufficient room for manoeuvre? May non-compliance be a responsible alternative?
MONITOR ACTION (Evaluate and Learn)	Monitoring effects of adapted way of working: • What are the effects on your team, adjacent teams, stakeholders? • Is the response effective enough?	Keep communicating about the evolving situation and the impact of the actions taken.	Are adaptations backed up by the four-eyes principle. What new lines of defence are considered?
AFTER ACTION REVIEW (Incorporate Learning)	What are the positives? What are implicit and explicit assumptions? Have adaptations been executed in a controlled way?	Reflect on the collaboration during the resilience activity with collaborating domains and management involved.	Is our resilience strategy adequate for work as done? Was the gap between work as we imagined and work as done closed?

OPERATIONAL RESILIENCE AS AN ONGOING PROCESS

As surprise and adaptation will always be inherent to operations, resilience exists as an ongoing iterative and dynamic process within the operation and also between operations and management, to make sense of changing situations in order to adapt responsibly, ensuring that the operation proceeds safely and effectively. Through these dynamics the operation continuously evolves and innovates.



OPERATIONAL RESILIENCE AS AN ONGOING PROCESS



TORC TAKE-AWAYS

DURING THIS TORC SESSION YOU WILL:

- Experience the relevance of resilience activity in a compliance environment as a phenomenon for closing the gap between work as imagined and the operational reality
- Observe how the organization recognizes resilience as an operational capability
- Experiment with operational resilience through strategies and resources to be better equipped for future surprise
- Share resilience strategies enhancing the adaptive repertoire of the organization as a whole
- Experience the criticality for resilience of collaborative relationships with stakeholders in and outside of the team
- Reveal the difference in perceived room for manoeuvre for resilient acting between operators and managers
- Gain an insight into the dilemmas at the point where operational decisions are made
- Create an understanding of the organizational climate required for responsible resilience acting
- Reflect upon and evaluate positive and negative experiences with resilience and suggest options

for further improvement of the resilience capability in the organization

RESILIENT ORGANIZATIONS

- Continuously reinterpret the situation and are alert to early signals of surprise in their work and environment
- Jointly make sense of unexpected situations, taking the time to anticipate the impact of their decisions and monitoring how the situation develops over time
- Reach out for additional expertise irrespective of hierarchies and combine capability to the benefit of the situation
- Adapt by acting and collaborating in changing situations
- Understand what went well and what did not and the reasons for this, and learn from sharing adaptive practices
- Never assume a complete understanding and always prepare to adapt again

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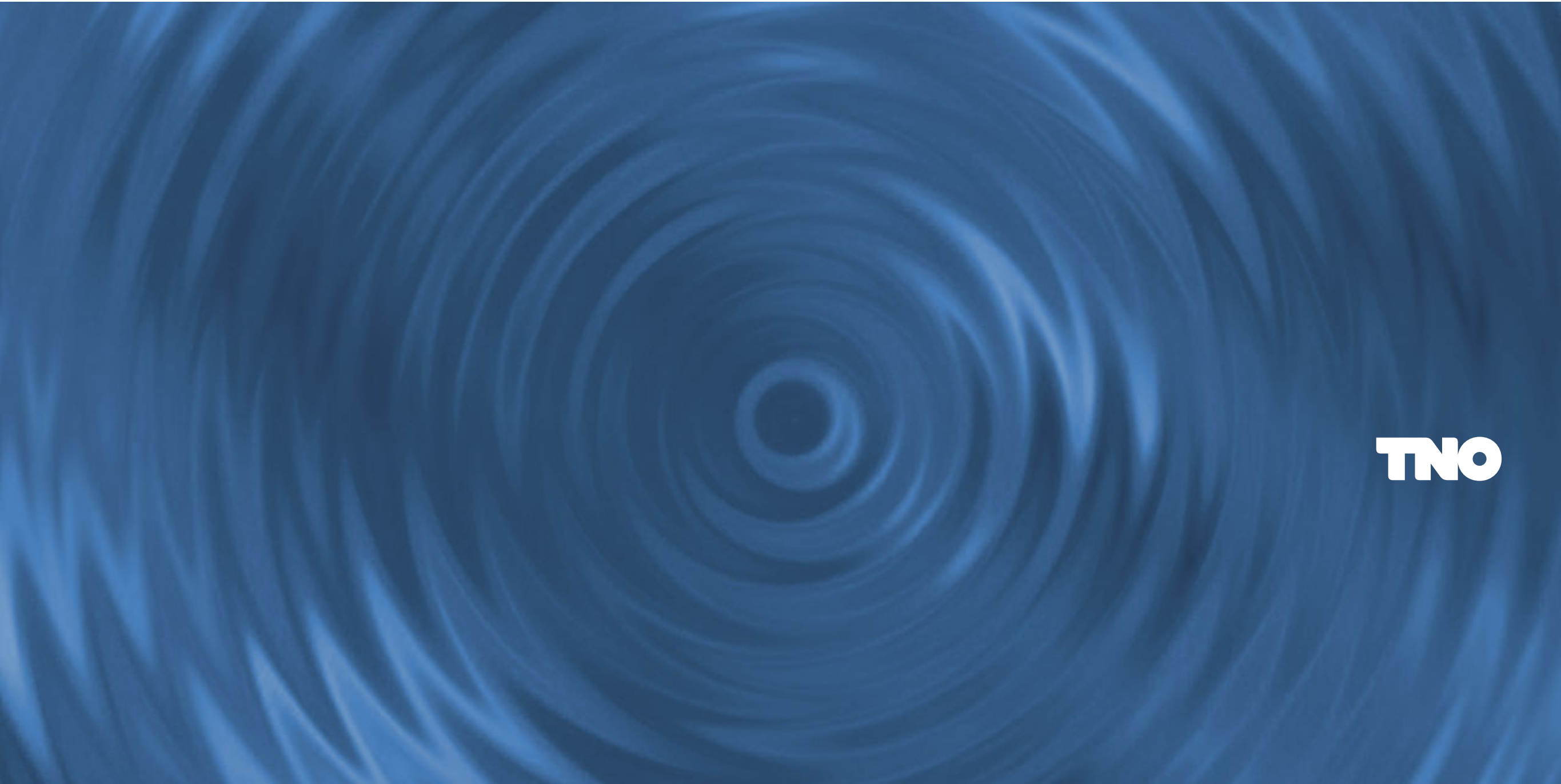
Luigi Macchi

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TRAINING FOR OPERATIONAL RESILIENCE CAPABILITIES

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The background of the lower half of the page is a deep blue color with a subtle, abstract pattern of concentric circles or ripples, creating a sense of depth and movement.

TNO