

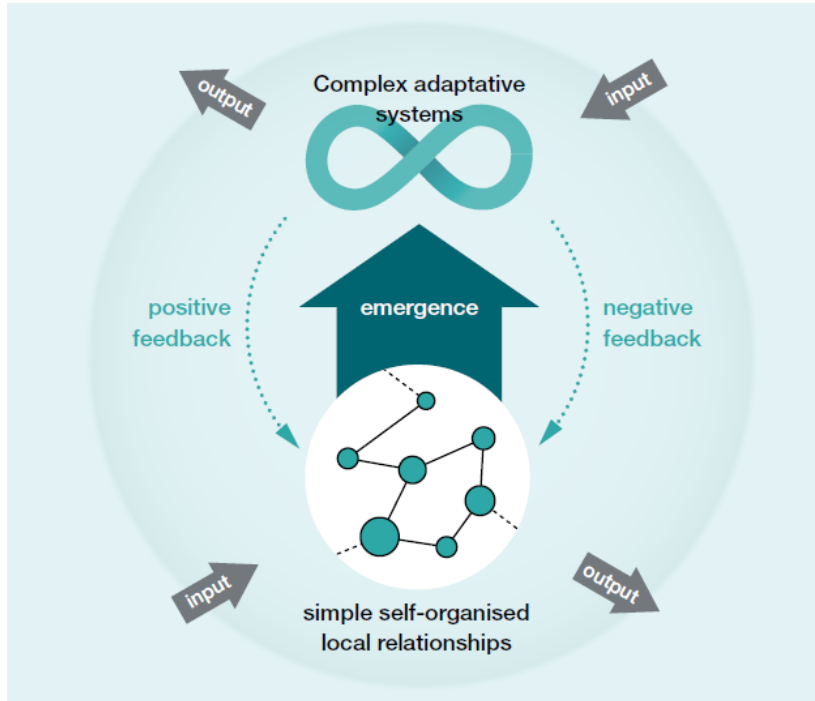
IRGC GUIDELINES FOR THE GOVERNANCE OF SYSTEMIC RISKS

In the context of transitions

- External shocks to interconnected systems, or unsustainable stresses, may cause uncontrolled feedback and cascading effects, extreme events, and unwanted side effects.
- Systemic risks are risks that evolve because of the inherently dynamic nature of **complex adaptive systems**, in particular, due to nonlinear interactions among system components.
- Organisations need to think about how they can avoid, mitigate or prevent the manifestation of systemic risks, which may affect their normal functioning.
- They must either **adapt** or **transform** to cope with systemic risks, that come with **transitions**. They must actively navigate through transitions. Otherwise, they may have no other choice but to be exposed to unexpected destructive consequences.

- Dynamic economies, societies and ecosystems
→ **constantly evolving complex systems** with interacting feedback loops
- **Interconnectivity**
→ can increase system efficiency and service delivery, but can also increase the possibility of cascading failures
- **Complex adaptive systems (CAS)**
→ are in constant flux, and transitions between regimes are natural processes
 - Traditional risk assessment and management practices are not sufficient
 - Practices for resilience-building must encourage adaptability

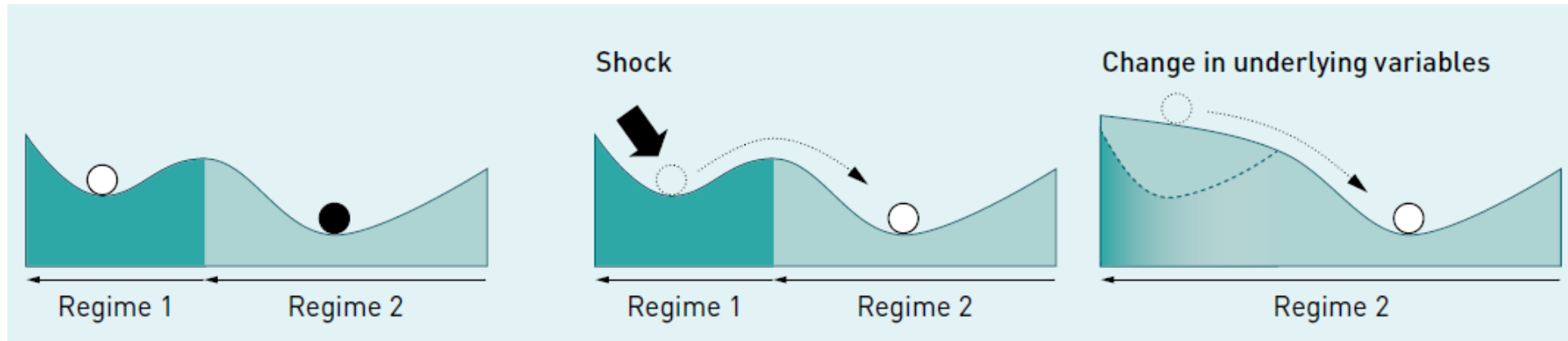
Complex adaptive system (CAS) in a changing external environment



CAS features:

- Self-organisation and emergence
- Feedback mechanisms, both positive and negative
- Alternative stable states and flipping from one regime to another
- Regime-shift cascade within and between systems
- Anthropogenic influence on the stage of the system
- Cause and drivers originate from inside or outside of the CAS
- Challenge human intuition and capability for action

EPFL Ball-in-cup diagram to illustrate regime shifts



Original design in Scheffer, M., 2009a. *Critical Transitions in Nature and Society*. New Jersey: Princeton University Press

Example of systemic risks

The collapse of the Aral Sea



The Aral Sea in 1989 (left) and 2014 (right)
(Source: NASA. Collage by Producercunningham)

Fish stocks depletion/overfishing



❶ A fish market at Nagor harbour in Nagapattinam, Tamil Nadu, India. The bay can provide only a meagre living: 61% of fisherfolk live below the poverty line. Photograph: Dhiraj Singh/Bloomberg/Getty Images

<https://www.theguardian.com/environment/2017/jan/31/bay-bengal-depleted-fish-stocks-pollution-climate-change-migration>

Other examples in:

- Water eutrophication
- Loss of biodiversity & ecosystem services
- Resource consumption and planetary boundaries
- Energy transition
- Personal transportation & mobility
- Supply chains
- Financial systems

Risks: Conventional, emerging, systemic

Type of risk	Definition	Main features	Example	Implications
Conventional risks	Known, well-defined risks	Familiarity – recognisable patterns and management regimes that are relatively stable and have proven to be effective if implemented according to certain rules	<ul style="list-style-type: none"> • Bicycle theft • Salmonella infection • Car accidents • Obesity 	Use standard risk management practices , e.g., regulation
Emerging risks	New risks or known risks that become apparent in new context conditions (IRGC 2015)	Uncertainty regarding causes, potential consequences, and probabilities of occurrence Lack of familiarity with the risk	<ul style="list-style-type: none"> • New processes and products in the field of synthetic biology • Malaria spreading to higher latitudes 	Focus on early detection and analysis of elements that triggers emerging risks. Prepare to revise decisions and adapt.
Systemic risks	Threats that individual failures, accidents or disruptions present to a system through the process of contagion	Highly interconnected risks with complex causal structures, non-linear cause-effect relationships Lack of knowledge about interconnections in an interdependent and complex environment, prevention	<ul style="list-style-type: none"> • Desertification and collapse of the Aral Sea • 2008 global financial crisis • Pandemics • Cyber-security • Global climate change • Fish stocks depletion 	Focus on adaptation and transformation of the organisation and the system

EPFL Objectives of the guidelines for dealing with systemic risks

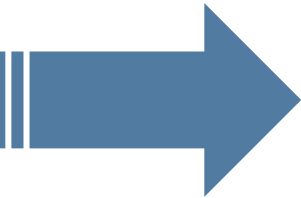
- Guide organisations in understanding complex system dynamics and reflecting on their position within these dynamics
- Help actors in a system to:
 - (a) **prevent the shift** of the system within which the organisation operates to an undesirable regime, or
 - (b) **trigger and facilitate the transition** of the respective system to a preferable regime, considering changes in underlying context conditions or proximity to a tipping point that may trigger a regime shift.

→ Build **capacity to adapt and transform**, rather than bounce back after recovery

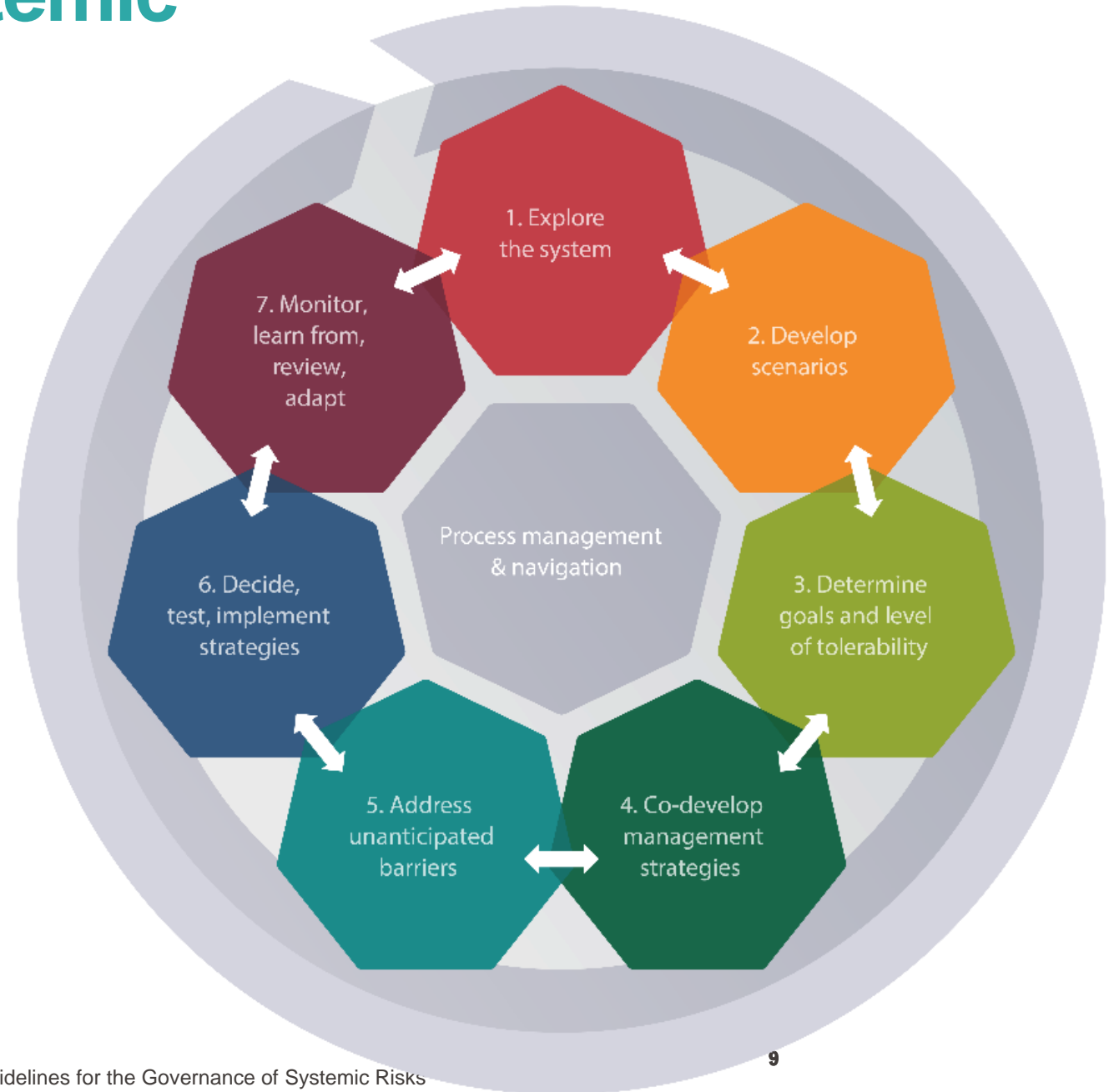
Elements of the Systemic Risks Governance Guidelines

Managing the process Navigating transitions

Communication
Openness
Transparency



Collaboration
Experimentation
Learning



Step 1 - Explore the system, define its boundaries and dynamics

1

Key objective	Explore and frame the system in which the organisation operates and define its position within a dynamic environment (“know your system”)
Required actions	<ul style="list-style-type: none">• Environment scanning• Taking a ‘systems thinking’ approach• Understanding possible ongoing transitions
Expected outcomes	<ul style="list-style-type: none">• Characterisation of the environment / context• Definition of the boundaries of the system• Understanding of the direction in which the system seems to be heading• Understanding key external triggers of change• Development of communication and collaboration strategies for external boundaries and triggers for change

Step 2 – Develop scenarios

2

Key objective	Explore possible future evolutions of the system and organisation-relevant risks, considering possible ongoing and future transitions
Required actions	<ul style="list-style-type: none"> • Deepen the understanding of interconnections and forces that could trigger change • Identify and monitor critical system functions • Modelling • Develop scenarios of future developments ('alternative futures'), include low-probability scenarios
Expected outcomes	<ul style="list-style-type: none"> • Improved understanding of key system characteristics and dynamics • Explorative scenarios of possible developments of the system • Communication of the resulting understanding of how the system develops

Step 3 – Determine goals and level of tolerability for risk and uncertainty

3

Key objective	Set goals for the organisation, considering possible scenarios and ongoing or anticipated transitions
Required actions	<ul style="list-style-type: none">• Review of the list of system components (Step 1) and scenarios (Step 2)
Expected outcomes	<ul style="list-style-type: none">• A clear vision and goal for the organisation• A list of the organisation's short-, mid-, and long-term objectives

Step 4 – Co-develop management strategies

4

Key objective	Develop management strategies to deal with systemic risks that affect or may affect the organisation	
Required actions	<ul style="list-style-type: none"> Co-develop solutions with other actors in and at the periphery of the system Set objectives for each intervention 	<ul style="list-style-type: none"> Reduce the exposure of the system and its vulnerability to various shocks and stresses, including un-knowns (e.,g. build resilience) Provide incentives to those actors who contribute to reducing systemic risks by adding diversity, modularity or other components of resilience, in such a way that the value chain can be more adaptive and able to re-organise if needed (multi-stakeholder partnerships and value-chain analysis).
Expected outcomes	<ul style="list-style-type: none"> A list of management strategies to address the scenarios developed in Step 2 The creation of an institutional space for innovation and trial and error 	<ul style="list-style-type: none"> Prepare proactive measures to adapt or transform the system, should a fundamental change occur Consider planned adaptive governance Prepare for when a window of opportunity opens, which will make possible the implementation of a strategy to adapt or transform the system or organisation.

Step 4 – Co-develop management strategies

4

Main strategic approaches to governing systemic risks

1.

Support and strengthen the ability of a system to self-organise and self-control.

2.

Pro-active intervention strategies

- Prevention
- Mitigation
- Adaptation
- Transformation

3.

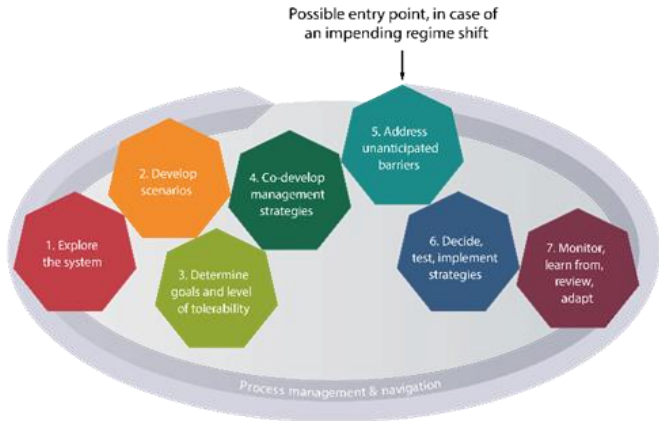
Prepare for disruptions, accidents and crises

These strategies can be combined or implemented successively if proximity to a regime shift seems to increase.

Step 5 – Address unanticipated barriers and sudden critical shifts



Key objective	Identify and pro-actively address unanticipated obstacles, which may require specific interventions
Required actions	<ul style="list-style-type: none">• Watch out for barriers and lock-ins, remove them, develop counter-measures• Engage all relevant stakeholders in the resolution of unanticipated problems
Expected outcomes	<ul style="list-style-type: none">• Unanticipated obstacles do not cause major disturbances to achieve the long-term goal



Step 6 – Decide, test and implement strategies

Key objective	Implement an appropriate strategic response
Required actions	<ul style="list-style-type: none"> • Decide which option to implement • Test and experiment, if possible • If an unexpected event is occurring, revise the strategy and adopt a crisis preparedness and management approach • Allocate resources to match operational capabilities with strategy • Clearly define roles, responsibilities and incentives • Support strategy implementation
Expected outcomes	<ul style="list-style-type: none"> • Final decision as to which management option will be implemented • Translation of the strategic objectives into individual and collective objectives • Implementation of the decisions made

Step 7 – Monitor, learn from strategy implementation, review and adapt

7

Key objective	Review and, if needed, adapt the strategy to changing risk patterns or circumstances
Required actions	<ul style="list-style-type: none"> • Ex-ante decision to review (planned adaptive governance) • Deploy monitoring capabilities • Establish periodic reviews of strategic decisions • Adapt where necessary
Expected outcomes	<ul style="list-style-type: none"> • Increased capacity to anticipate and execute adaptation to a more favourable • organisational state • An increased overall resilience of the organisation, with the ability to adapt and transform in a dynamic environment

The role of the process manager or 'navigator' - for 'navigating transitions' and the systemic risks that come with them



- Facilitating and coordinating
 - Challenging existing organisational routines
 - Balancing conflicting stakeholders' objectives and views
- More specifically:
- Bringing new knowledge to the organisation
 - Validating and legitimising the technical methods and approaches used
 - Ensuring that scientific concepts are translated into understandable concepts
 - Working to break silos
 - Monitoring performances
 - Organising capacity-building of all staff
 - Communicating internally and externally
 - Reporting and reviewing

Concluding remarks

- Guidelines intend to provide a basis to help organisations get a first grip on the challenges and threats posed by systemic risks in the context of transitions
- Each organisation must **adapt these guidelines** to their own context
- Approach different from traditional resilience: **build capacity to adapt and transform**, rather than focus on bouncing back
- Willingness to challenge **organisational routines**, to focus on mid- and **long-term** issues, and to resolve **trade-offs** is key

Complex
adaptive
systems

Systemic
failures,
collapses,
regime shifts

Systemic risks

Foresight and
exploration

Transitions

Avoid
Adapt
Transform
Prepare for
failures