



**University of Pisa**  
**Department of Information Engineering**  
**Master Degree in Cybersecurity**  
**Organizational Sciences Module**

**Academic Year 2024 -25**

**Cybersecurity within organizational  
sciences – awareness, culture and  
resilience**

# People, not only technology

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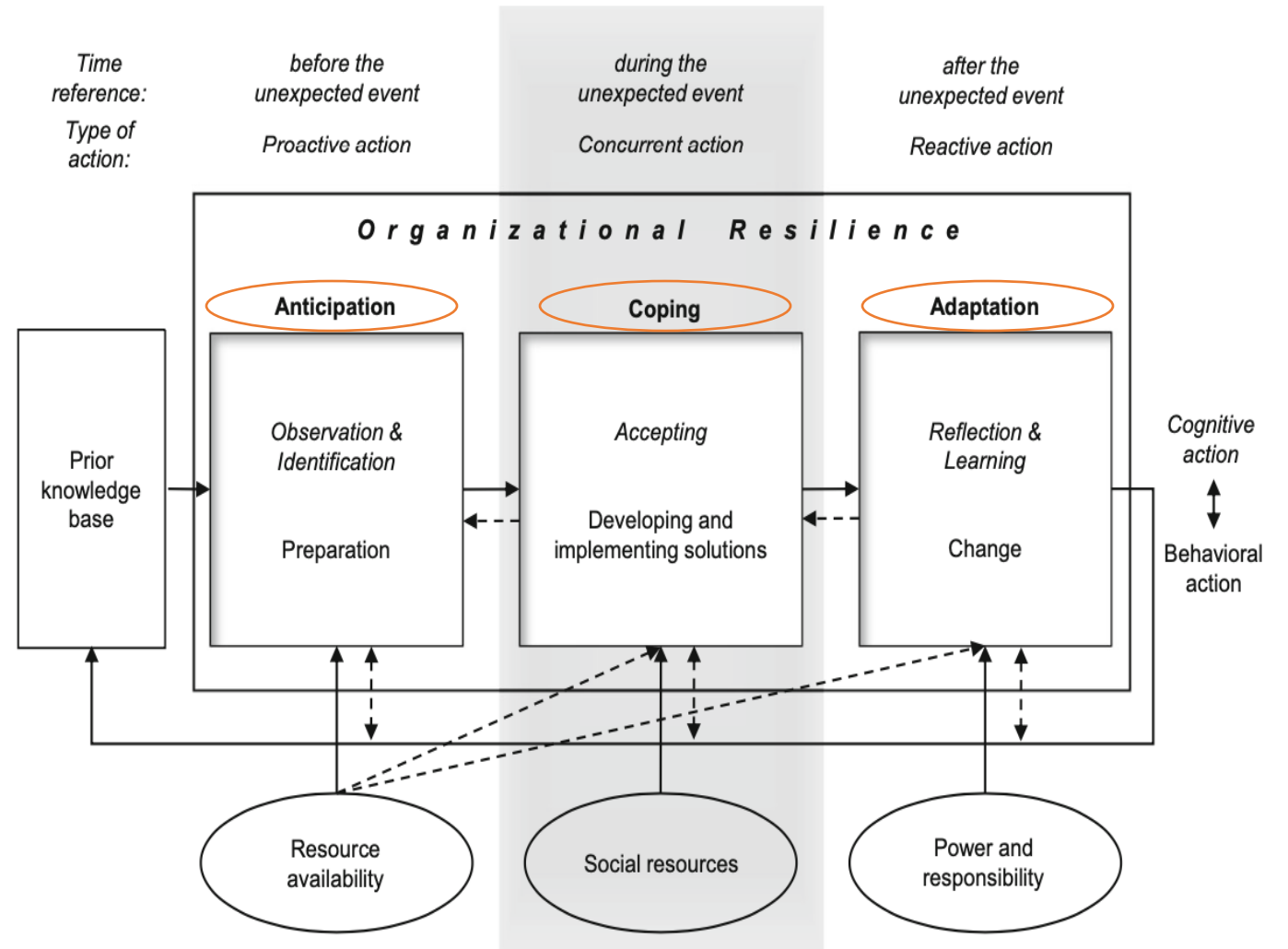


**Awareness**

**Culture**

**Resilience**

# Organizational resilience: a capability-based conceptualization



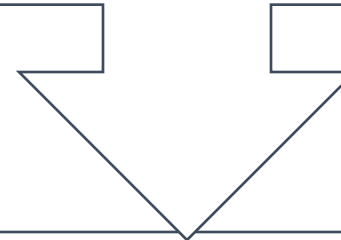
# Organizational resilience: a capability-based conceptualization

Resilience means to **effectively** respond to adverse events, **not only after adverse events, but before, during, and after as well.**

Resilient organizations respond **not only** to the past (**reactive action**) or to current issues (**concurrent action**), but also to the future (**anticipatory action**).

# Organizational resilience: a capability-based conceptualization

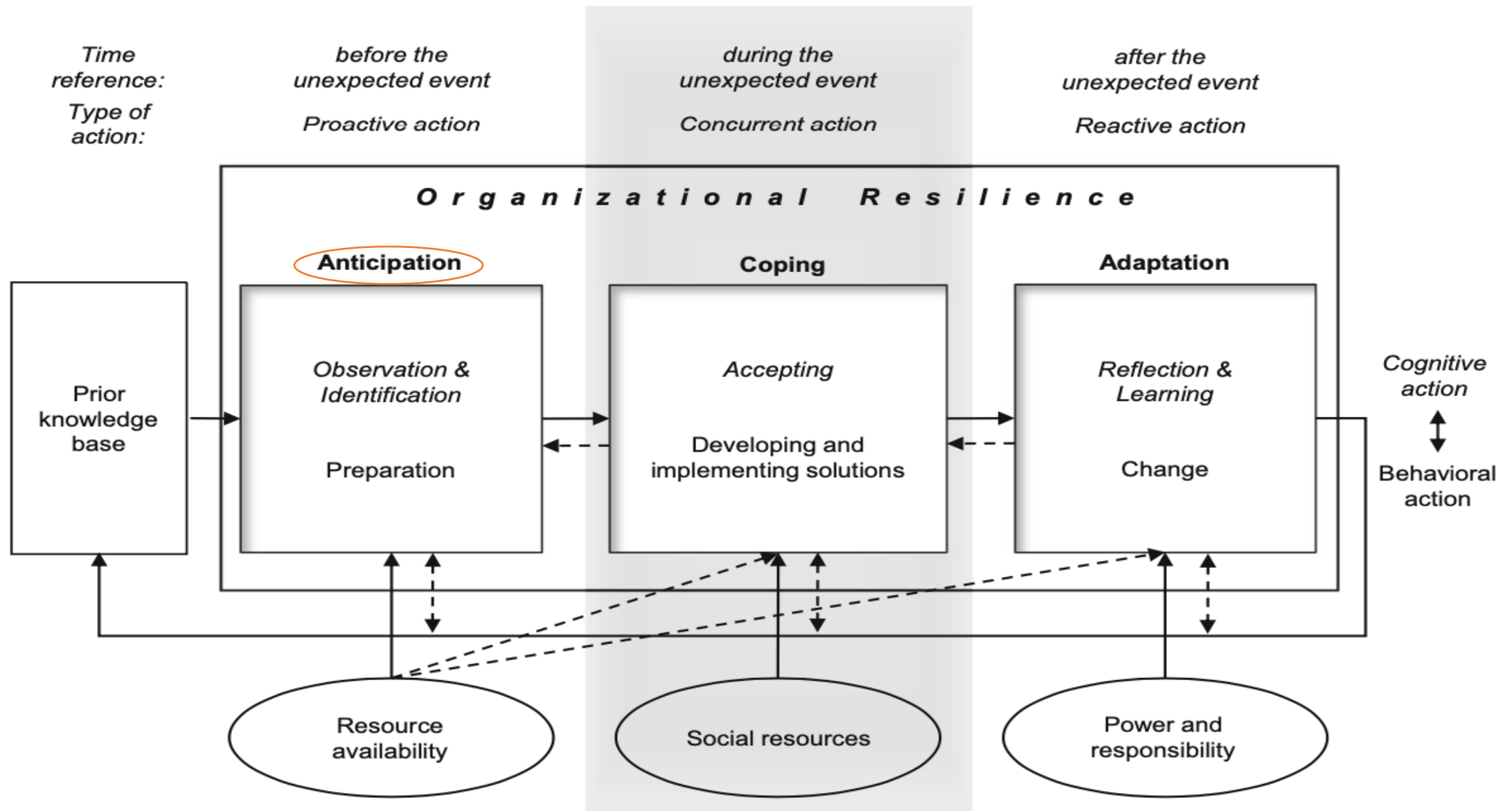
The first stage of the resilience process refers to **the attempt to anticipate critical developments and potential threats and be prepared**



An **offensive response** comprises a **purposeful coping during critical situations** as well as some kind of **adaptation, transformation, or learning after** critical situations have occurred

# Organizational resilience: a capability-based conceptualization





## *A) Anticipation*

- Avoid threatening situations or at least minimize potential negative consequences
- Anticipation stage comprises **three specific capabilities**:  
1) the ability to observe internal and external developments; 2) the ability to identify critical developments and potential threats; 3) to prepare for unexpected events.



### *A.1) Observation and identification*

- Organizations must recognize **early signals** of crisis to **respond quickly** and, thus, avoid escalation

## *A.1) Observation and identification*

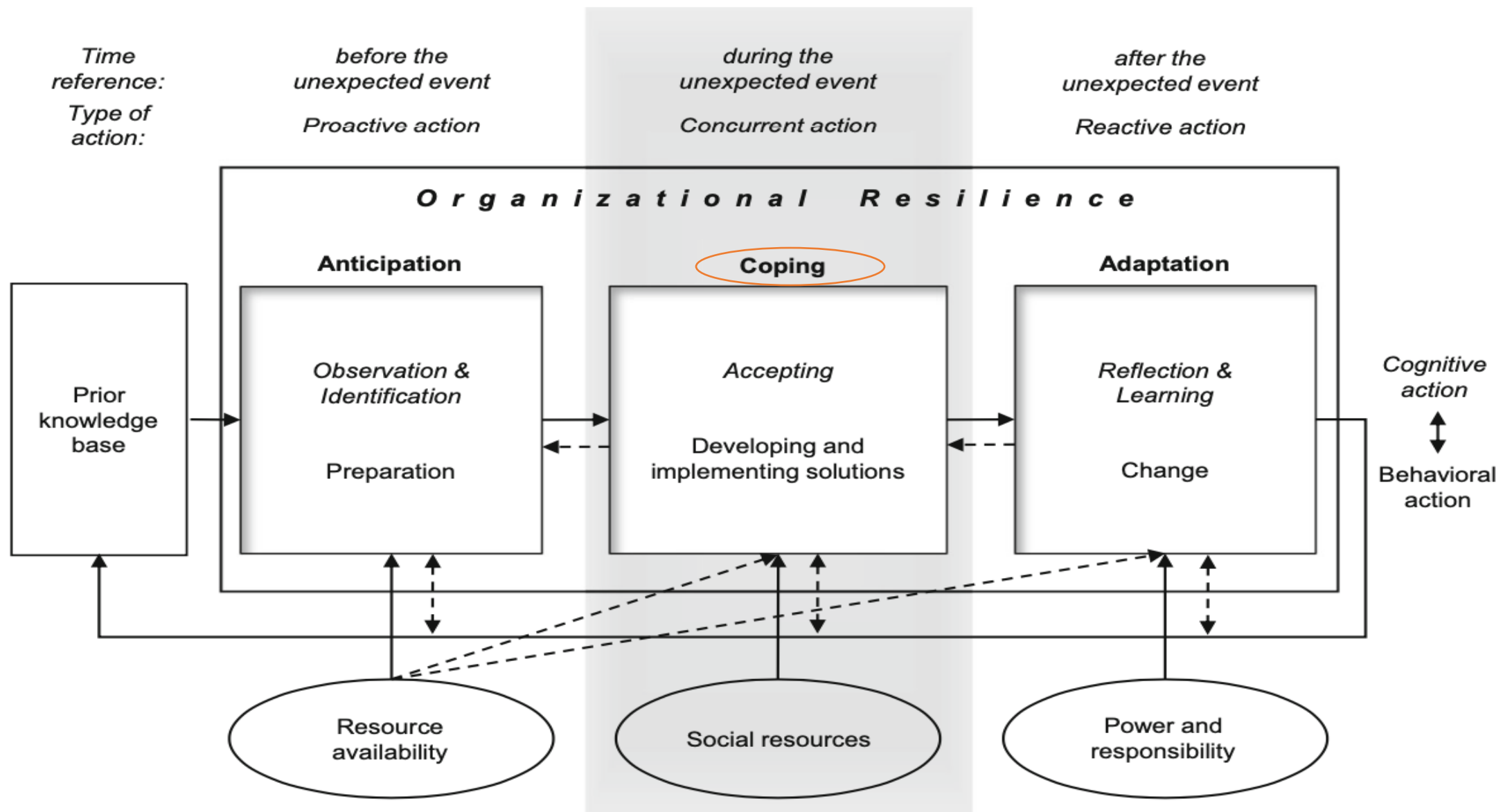
- **Environmental scanning** (i.e., acquiring external knowledge – e.g., gathering data in the most deliberate fashion—as by an extensive market research program)
- **Scenario planning** (i.e., thinking about different possible futures and ways to handle them)

## *A.2) Preparation*

- Being prepared means that an organization is **equipped to deal with unforeseen adversity** and it is ready to **capitalize** on unexpected opportunities
- Organizations prepare without knowing **if, when, or where** an unexpected event will occur in the future (e.g., by expanding general knowledge and technical facility, and generalized command over resources)

## *A.2) Preparation*

- Develop resources that are necessary in times of crisis (e.g., suitable recovery plans)
- Risk management, emergency planning, and business continuity management (BCM)
- Training and simulation practices



## *B) Coping*

- **Effective handling** of unexpected events so as to resist destruction
- **Immediate or short-term actions** in response to unexpected events
- Deal with unanticipated dangers **after they have become manifest**

## *B.1) Accepting*

- For many organizations, the future is **less unknowable than it is unthinkable**
- Organizations require too much time to realize and act on those events. For this reason, organizations need to develop the ability to accept a problem. **Only then can they face critical situations and react quickly.**

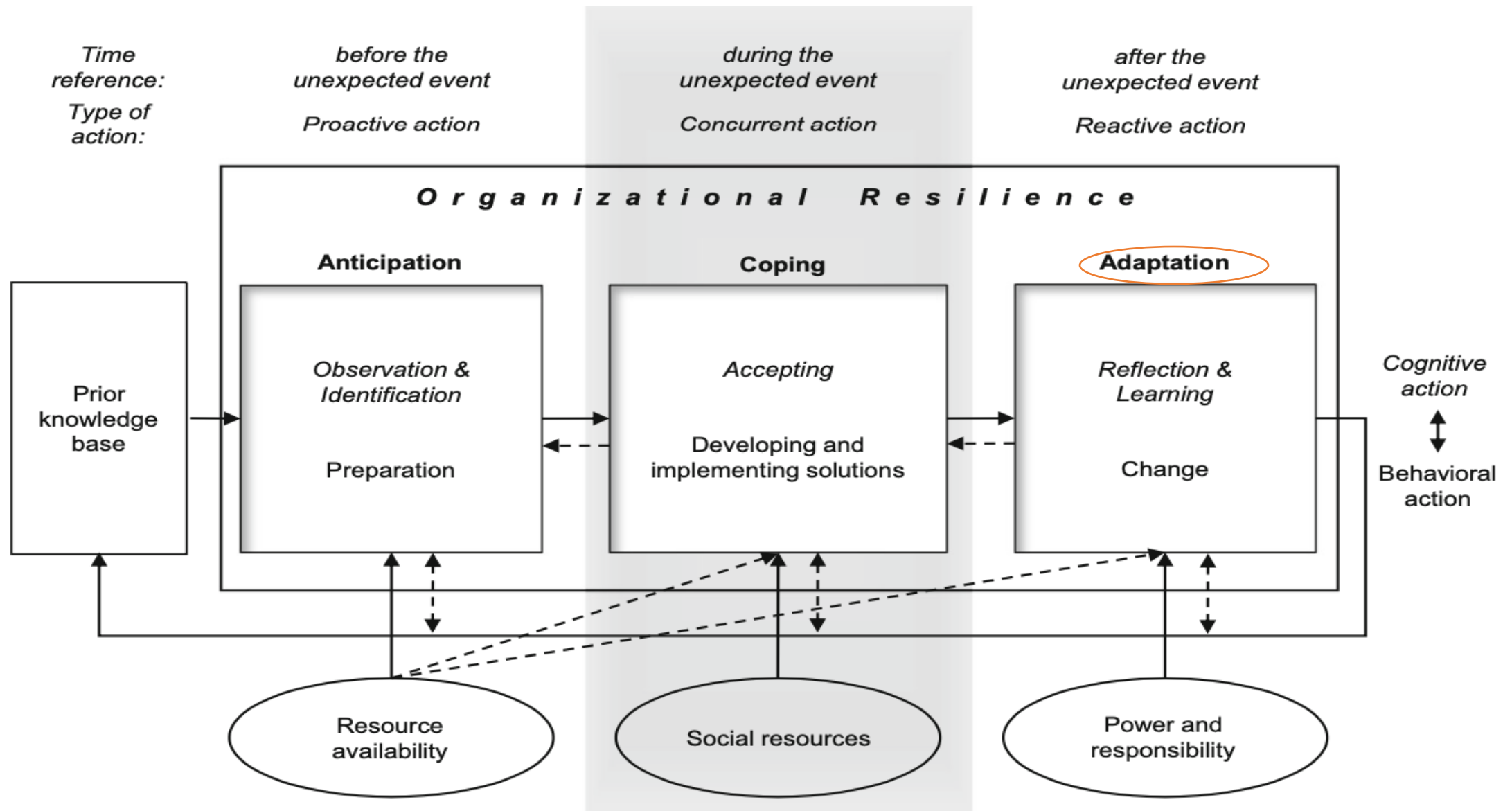
## *B.1) Accepting*

- Possible ways to promote acceptance: 1) Understanding the environment in which the system operates; 2) Defining a reference state for the system; 3) Being aware of and accepting system failures
- An **overlap** exists with the anticipation capabilities. It can be assumed that anticipation and coping capabilities are **closely connected** (i.e., anticipation capabilities may also have positive effects on the ability to accept a problem)



## *B.2) Developing and implementing solutions*

- **Sensemaking:** continual **feedback** between understanding and action, which means that sense must continually be made and remade
- **Bricolage:** improvise and to solve problems **creatively** thus recombining those actions that are already in the organization's repertoire into **novel combinations**
- **Coordination:** system-wide alignment and thus a whole-system response



## *C) Adaptation*

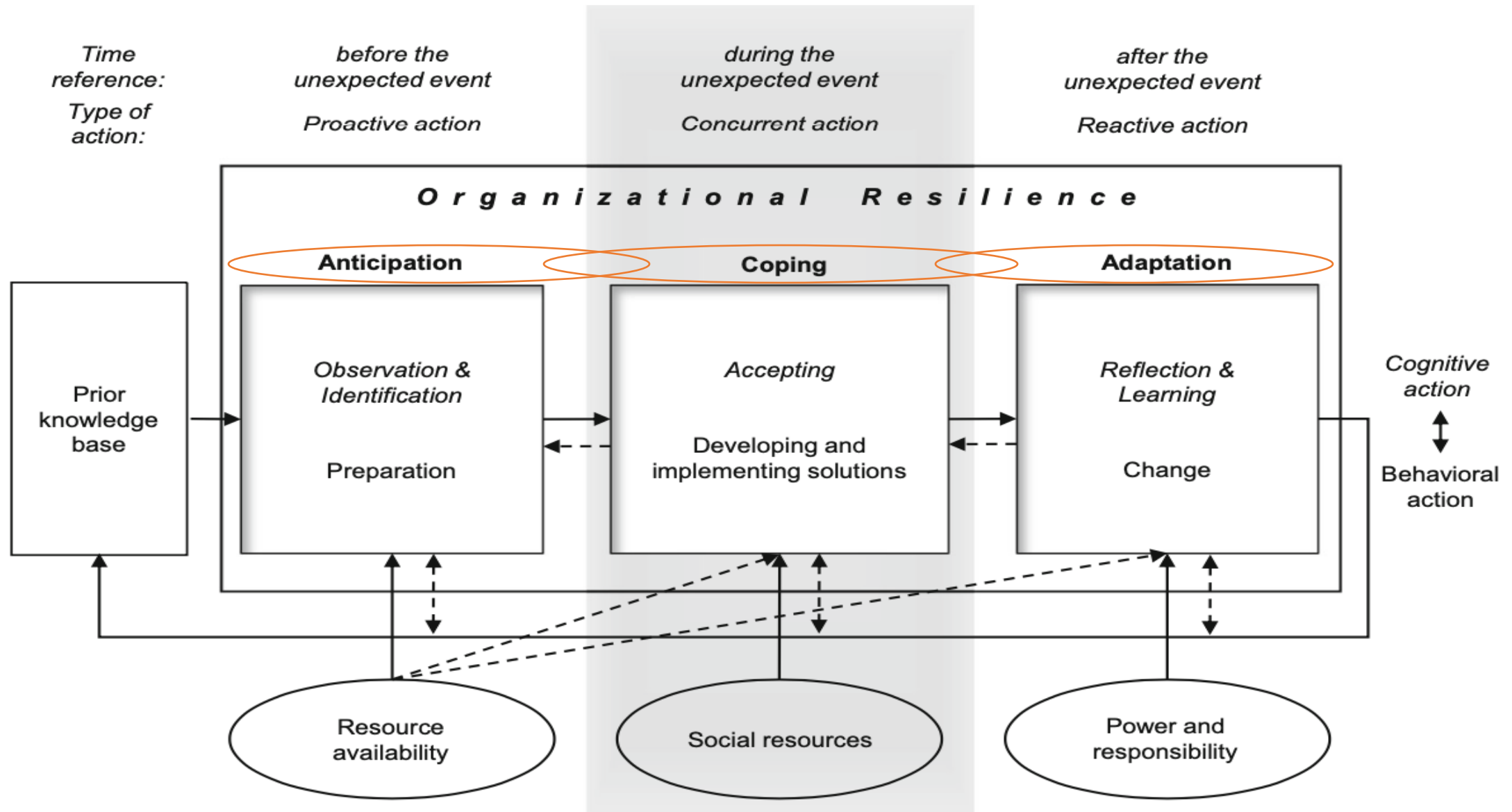
- This ability refers to **adjustments** following crises and is directed toward **organizational advancement**
- Help organizations **avoid or reduce** negative consequences from unexpected events
- **Increases the knowledge base of a firm**, which in turn acts as a main antecedent for the anticipation dimension

## *C.1) Reflection and Learning*

- **Ongoing process** of reflection and action characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions
- Knowledge exchange between units
- Problem-solving meetings, project review sessions, or informal discussions with friends/colleagues

## *C.2) Organizational change*

- Development of new **norms, values, and practices** (i.e., cultural readjustment of the organization's view of the world must change to stimulate a shift in beliefs and precautionary norms)
- Effective communication and «change agents» that sustains change practices
- Overcoming resistance to change both individual and organizational (e.g., employees and managers)



## *Anticipation and Coping*

- It is important to **anticipate change** to be able to **quickly and successfully act on it**
- Organizations with a **broad range of actions** also **show a broad range of perceptions of critical developments and threats**

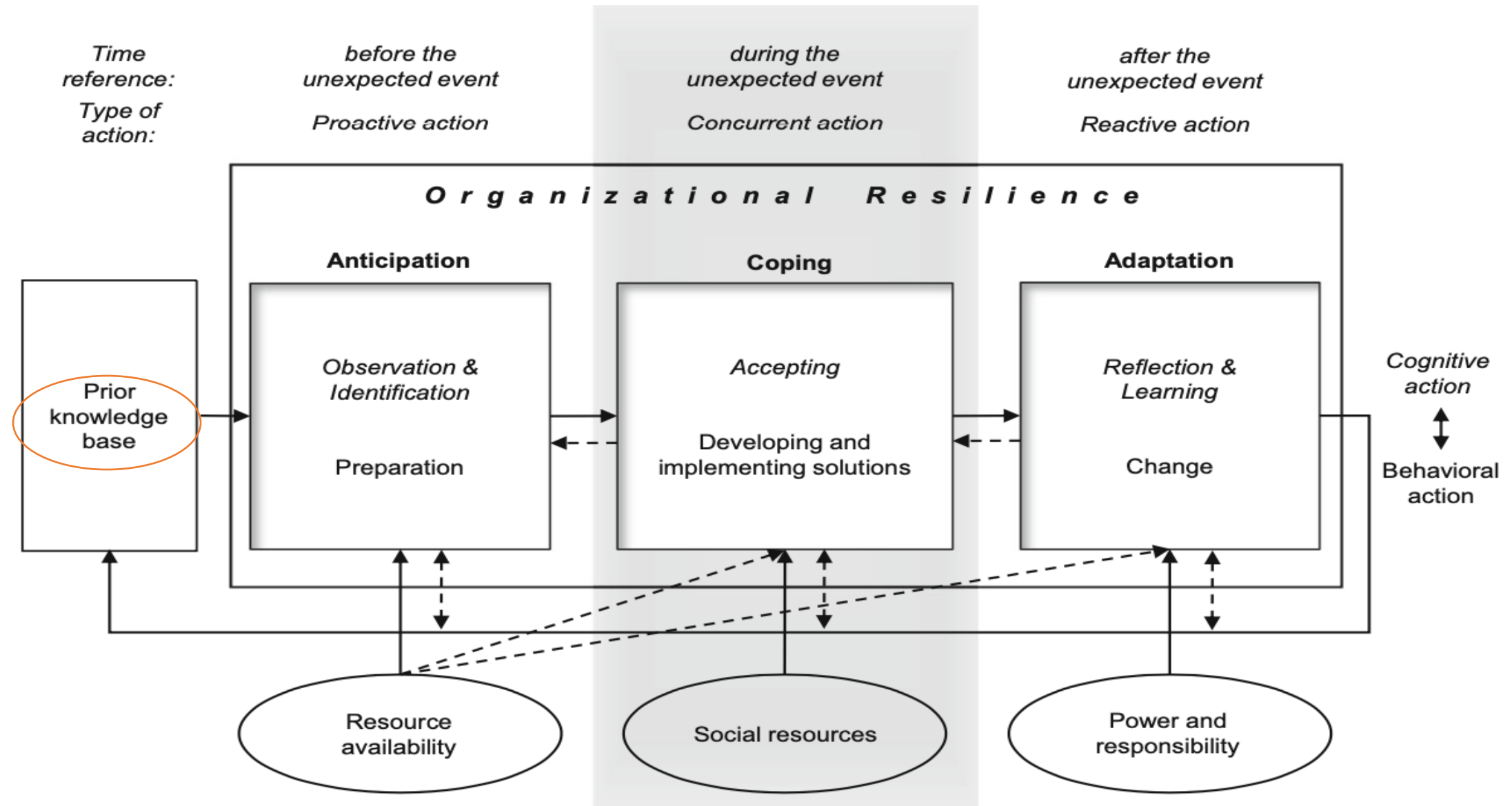
## *Coping and Adaptation*

- **Coping with crises builds the foundation for reflection, learning, and change.**
- Successful coping allows for learning from success and unsuccessful coping allows for learning from failure.
- Both types of learning may enhance an organization's coping capabilities by broadening its spectrum of actions.



## *To summarize*

- It can be said that **the three resilience stages build on each other.**
- **Anticipation influences coping and coping influences adaptation.**
- There is also a **backward influence.**



# Antecedent

Knowledge  
base

➤ *Definition:* knowledge about the **environment**, knowledge about **former crises**, knowledge about **successful or unsuccessful actions**

# Antecedent

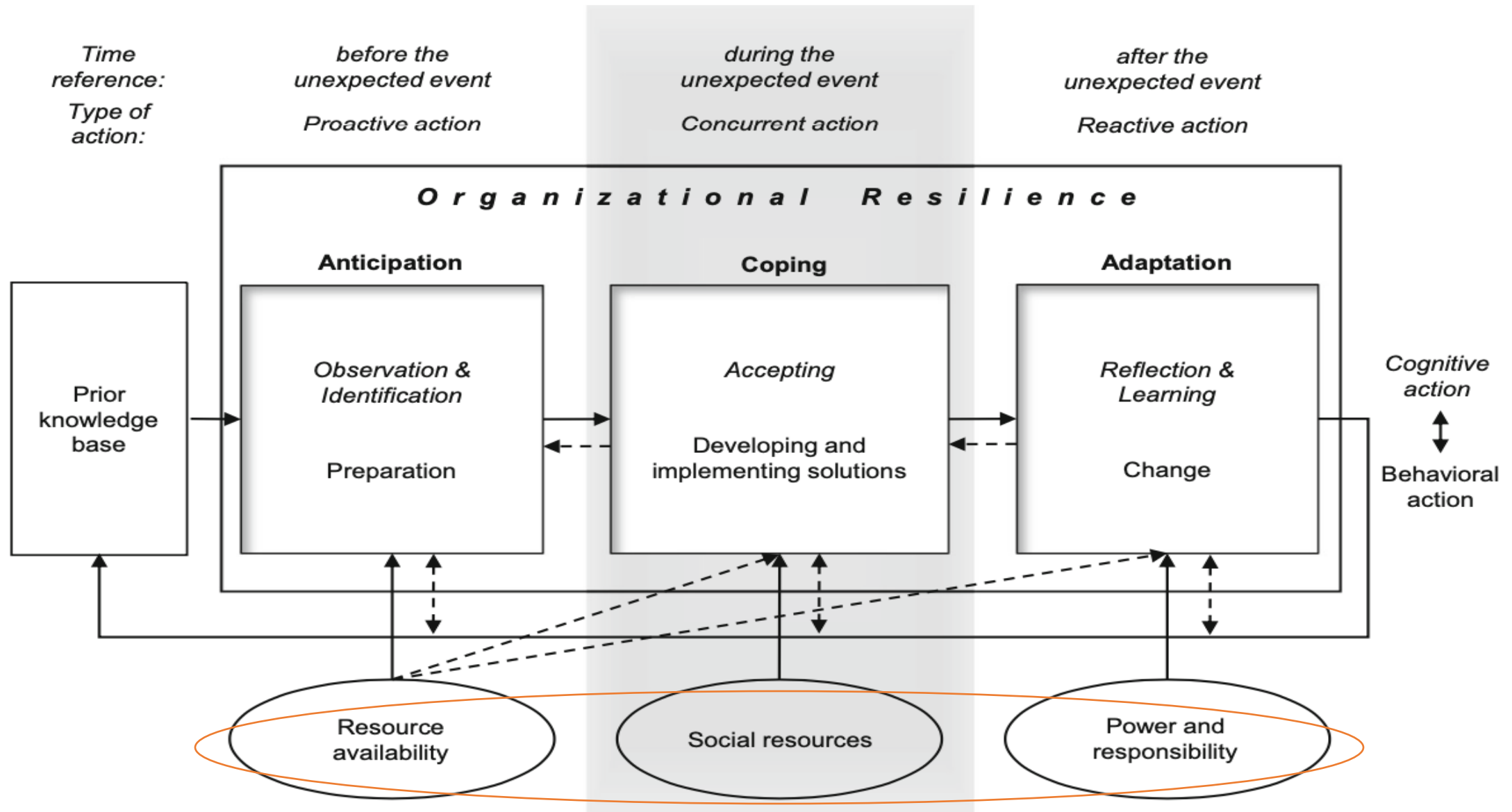
## Knowledge base

- anticipation capabilities largely depend on a firm's prior knowledge base
- broad and diverse knowledge base to **anticipate** both internal and external change
- help to develop multiple ideas for **crisis reaction** and decide for the most suitable solution
- in each phase of the resilience process, the knowledge base may be enhanced through **learning**, which in turn positively influences resilience capabilities

# Antecedent

## Knowledge base

- Serves as a mediator between the adaptation and anticipation phases
- If an organization is able to learn from crisis situations and adapt to that, it can extend its knowledge base and thus foster its anticipation capabilities
- All resilience phases have an influence on the knowledge base. Each resilience phase includes some kind of learning—learning for crisis (anticipation), learning as crisis (coping), or learning from crisis (adaptation).



## *Resource availability*

- **Quick and adequate reactions** under challenging conditions
- **Environmental scanning and preparation** for future events require **financial** (i.e., cash flow) and **human resources** (i.e., skills) to develop recovery plans or train employees and leaders.
- **Financial resources** can serve as a shock absorber and thus contain the negative consequences of a crisis

**Drivers**

## *Social resources*

- **Deep social capital** can enhance resilience by offering contextual benefits (e.g., information sharing, resource exchange, or cross-functional collaboration)
- **A shared vision** among the organization's members can also help to successfully implement a solution, especially during a crisis

**Drivers**



## *Power and responsibility*

- **power based on expertise and experience** rather than hierarchical position
- organizations rely on **decentralization, self-organization, and shared decision-making**
- Organizations are **not managed hierarchically**

**Drivers**