Micro? Meso? Macro?
the Scale Invariance of Resilience

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Healthcare is complex (meta level)

How can this be managed?
How can healthcare be managed?

A healthcare system can only be managed if it can be described and understood.

The cybernetic Law of Requisite Variety: “Every good regulator of a system must be a model of that system”
The standard approach is to decompose the system into meaningful elements. This assumes linear interactions (tractable cause-effect relations) and a well-defined boundary to environment.
Levels of system description

Metasystem: frames, rules, models and theories

Macrosystem: strategic goals and functioning of health care organisation

Mesosystem: exists to support the microsystem’s functioning

Microsystem: smallest functional units of healthcare systems (sharp end)
## Different working conditions

<table>
<thead>
<tr>
<th>Limitations</th>
<th>Part of work, but not always easy to see.</th>
<th>Vague, uncertain, usually time and money</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resources, means</td>
<td>Many, specific, due to system design.</td>
<td>Limited, general</td>
</tr>
<tr>
<td>Decision space</td>
<td>Limited (local).</td>
<td>Large, extensive (global)</td>
</tr>
<tr>
<td>Detection, correction</td>
<td>Good possibilities (part of system design).</td>
<td>Few possibilities (delays).</td>
</tr>
<tr>
<td>Predictability</td>
<td>Reasonable in most cases.</td>
<td>Low, due to complexity and delays</td>
</tr>
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**microsystem**

**macrosystem**
Different work processes

Work is typically focused:
Activities are joined (are a whole).
Activities have a clear beginning and end.
Dependence on others is limited.
Work environment is specific.
Information is concentrated.

Work is typically scattered:
Activities are isolated, loosely connected to what went before or what comes after.
Dependence on others often considerable.
Work environment is generic.
Information is dispersed.
Pros and cons of microsystems

Limited size, limited interactions.
Well-defined and familiar tasks/functions.
Tractable (simple descriptions, comprehensibility, stability)
Linear cause-effect relations.
Well-defined activities (start – stop).

Work differently from meso / macrosystems.
Different ‘mechanisms’ at different levels require transitions.
Assumes that ‘ceteris paribus’ principle is true.
Dependent on what happens outside the microsystem.
Boundaries not stable, heterogeneous environment.
Example: How are decisions made?

**macrosystem**
- “Muddling” through
- Calculative - costs dominate benefits
- Parkinson’s Law of Triviality
- Discussions / decisions give disproportionate weight to trivial issues

Processes may be described in different ways on different levels.

**microsystem**
- Individual ("rational") decision making
- Satisficing
- Recognition Primed Decisions
Systems and system contexts

A macrosystem can be decomposed into several mesosystems.

How can the vertical relations be described?
How can the horizontal relations be described?

A mesosystem can be decomposed into several microsystems. A mesosystem exists in a context of mesosystems.

How can the vertical relations be described?
How can the horizontal relations be described?

A microsystem exists in a context of other microsystems.
What is scale invariance?

Scale invariance is a feature of structures or functions that does not change when the scale changes.

Scale invariance is attractive because the same principles apply on every level.

Fractals are an example of structural scale invariance: An object whose parts, at infinitely many levels of magnification, appear geometrically similar to the whole.

Commonly used ‘causes’ and concepts are not scale invariant.

“Human error” vs. organisational failure.
Individual behaviour vs. leadership style.
Mindset vs. culture.

Resilience is scale invariant
What is resilience?

Resilience is an expression of how people, alone or together, cope with everyday situations - large and small - by adjusting their performance to the conditions.

An organisation’s performance is resilient if it can perform as required under expected and unexpected conditions alike (changes / disturbances / opportunities).

To do so, an organisation must be able to adjust its functioning prior to, during, or following events. This requires the abilities to respond, monitor, learn, and anticipate.
Resilience: Evolution of definitions

2005  The essence of resilience is the intrinsic ability of an organisation (system) to maintain or regain a dynamically stable state, which allows it to continue operations after a major mishap and/or in the presence of a continuous stress.

2012  An organisation is resilient if it can adjust its functioning prior to, during, or following events (changes, disturbances, and opportunities), and thereby sustain required operations under both expected and unexpected conditions.

2015  Resilience is an expression of how people, alone or together, cope with everyday situations - large and small - by adjusting their performance to the conditions. An organisation’s performance is resilient if it can perform as required under expected and unexpected conditions alike.
Resilience is needed on all levels

**macro**
Overall strategic goals and functioning of the healthcare organisation.

**meso**
Organisational functions that support the work of the microsystem.

**micro**
An interdisciplinary healthcare group who work with the patient in a particular setting.
The four resilience potentials

Improve everyday performance by being able to **respond** to threats and opportunities alike.

Improve everyday performance by being able to **learn** both from what goes right and what goes wrong.

Improve everyday performance by being able to **anticipate** long-term changes to demands and resources.

Improve everyday performance by being able to **monitor** what happens externally and internally.
The potential to respond

<table>
<thead>
<tr>
<th>Category</th>
<th>Question</th>
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</thead>
<tbody>
<tr>
<td>Events</td>
<td>Is there a prepared list of possible and potential events or conditions (internal or external) for which the organisation should be ready to respond?</td>
</tr>
<tr>
<td>Relevance</td>
<td>Have the events been verified and/or revised on a regular basis?</td>
</tr>
<tr>
<td>Responses</td>
<td>Have responses been planned and prepared for every event considered?</td>
</tr>
<tr>
<td>Relevance</td>
<td>Has the organisation ensured that the responses are adequate?</td>
</tr>
<tr>
<td>Start and stop</td>
<td>Are the triggering criteria well defined? Are there clear criteria for ending the response?</td>
</tr>
<tr>
<td>Activation &amp; duration</td>
<td>Can an effective response be activated fast enough? Can it be sustained as long as needed?</td>
</tr>
<tr>
<td>Response capability</td>
<td>Are there sufficient support and resources to ensure response readiness (people, equipment, materials)?</td>
</tr>
<tr>
<td>Verification</td>
<td>Is the readiness to respond verified and maintained?</td>
</tr>
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</table>
## The potential to monitor

<table>
<thead>
<tr>
<th>Indicator list</th>
<th>Does the organisation have a list of regularly used performance indicators?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevance</td>
<td>Is the list verified and/or revised on a regular basis?</td>
</tr>
<tr>
<td>Validity</td>
<td>Has the validity of the indicator been established?</td>
</tr>
<tr>
<td>Delay</td>
<td>Is the delay in sampling indicators acceptable?</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>Are the indicators sufficiently sensitive?</td>
</tr>
<tr>
<td>Frequency</td>
<td>Are the indicators measure or sampled with sufficient frequency?</td>
</tr>
<tr>
<td>Analysis / interpretation</td>
<td>Are the indicators / measurements directly meaningful or do they require some kind of analysis?</td>
</tr>
<tr>
<td>Organisational support</td>
<td>Is there a regular inspection scheme or -schedule? Is it properly resourced? Are the results communicated to the right people and put into use?</td>
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## The potential to learn

<table>
<thead>
<tr>
<th>Selection criteria</th>
<th>Does the organisation have a clear plan for which events to learn from (frequency, severity, value, etc.)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning basis</td>
<td>Does the system try to learn from things that go well as well as from failures?</td>
</tr>
<tr>
<td>Learning style</td>
<td>Is learning event driven (reactive) or continuous (scheduled)?</td>
</tr>
<tr>
<td>Categorisation</td>
<td>Are there any formal procedures for data collection, classification, and analysis?</td>
</tr>
<tr>
<td>Responsibility</td>
<td>Is it clear who is responsible for learning? (A common responsibility or assigned to specialists)</td>
</tr>
<tr>
<td>Delay</td>
<td>Does learning function smoothly or are there significant delays in the learning process?</td>
</tr>
<tr>
<td>Resources</td>
<td>Does the organisation provide adequate support for effective learning?</td>
</tr>
<tr>
<td>Implementation</td>
<td>How are ‘lessons learned’ implemented? (Regulations, procedures, training, instructions, redesign, reorganisation, etc.)</td>
</tr>
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</table>
The potential to look ahead

<table>
<thead>
<tr>
<th>Corporate culture</th>
<th>Does the corporate culture encourage thinking about the future?</th>
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<tbody>
<tr>
<td>Acceptability of uncertainty</td>
<td>Is there a policy for when risks / opportunities are considered acceptable or unacceptable?</td>
</tr>
<tr>
<td>Time horizon</td>
<td>Is the time horizon of the organisation appropriate for the kind of activity it does?</td>
</tr>
<tr>
<td>Frequency</td>
<td>How often are future threat and opportunities assessed?</td>
</tr>
<tr>
<td>Model</td>
<td>Does the organisation have a recognisable model of the future?</td>
</tr>
<tr>
<td>Strategy</td>
<td>Does the organisation have a clear strategic vision? Is it shared?</td>
</tr>
<tr>
<td>Expertise</td>
<td>What kind of expertise is used to look into the future? (In-house, outsourced?)</td>
</tr>
<tr>
<td>Communication</td>
<td>Are the expectations about the future known throughout the organisation?</td>
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How to develop and use the RAG

The RAG (Resilience Assessment Grid) is a set of diagnostic questions to determine the resilience potentials of an organisation.

Develop a set of diagnostic questions for the organisation by using a focus group, discussion group or similar. Agree on the answer categories. Include already known issues or problems if possible.

Apply the RAG, collate the results and present them to stakeholders, respondents, and the organisation as a whole. Use the findings to decide where changes are needed. Agree on remedial actions to bring about the changes. Repeat the RAG.

The RAG is for long term use – repeated assessments rather than a single measurement. Managing an organisation, regardless of type, takes place over a long period of time.

Use a stable set of respondents. The focus should not be the distribution of attitudes among the respondents but the common view they represent.
Assessing resilience in practice

Resilience Assessment Grid (RAG) developed for the Emergency Department at St. Paul’s Hospital (Vancouver, Canada).
St Pauls RAG: Potential to respond

We have a list of everyday and unexpected clinical, system, and environmental events for which we prepare and routinely practice action plans.

We revisit and revise our list of events and action plans on a systematic basis.

We follow defined thresholds, actions, and stopping rules to adapt/transform operations and proactively mobilize resources in order to maintain our capacity for response under conditions of increased volume and acuity.

We effectively team, communicate and work together within the department, and with other departments and services.

We have organizational support and resources to maintain our capability to meet acuity and volume demands.

We link our local department adaptations to organizational and health system changes.
St Pauls RAG: Potential to monitor

We systematically monitor, (re)prioritize, and match current patient acuity to required resources.

We attend to formal and informal signals of work saturation.

We continuously monitor operational tempo to detect when we are falling behind.

We continuously monitor, measure, and revise consensus and evidence-based departmental and regional performance metrics and health systems outcomes.

We regularly monitor system recovery.

We graphically display critical real-time operational performance indicators (vital signs).
We cherish stories of success and failure in everyday practice.

We routinely debrief and learn together as providers and supporters of patient care.

We partner with patients and families to learn what matters to them.

We support systematic selection, analysis, and learning from what happened.

We follow learning opportunities to confirm that change in action has had the desired effect.

We share learning across provincial emergency departments, and with the Patient Safety Learning System.
St Pauls RAG: Potential to anticipate

We make it easy and welcoming to voice potential or anticipated safety threats.

We routinely anticipate and manage risk of potential or anticipated safety threats.

We invest in developing and maintaining capability to understand and predict future threats to safety and operational performance.

We use historical data, early warning signals, and thresholds to inform our real time response.

We reassess and recalibrate our response based on real time data.

We prepare and practice for potential threats and everyday hazards.
Holistic Safety Sample Questions

5.1. The ability to respond

5.2. The ability to monitor

5.3. The ability to anticipate

5.4. The ability to learn

a) What systems are in place to ensure the organisation learns from safety-related events? How does the organisation learn from incidents and accidents as well as near-misses or free-lessons?

b) What systems are in place to establish and maintain in staff an appreciation of the importance of reporting and learning?

c) What systems are in place to encourage reporting of events and information relevant to learning?
Resilience Assessment Grid (RAG)

RAG profile for the ability to respond (constructed example)
Conclusions

It is necessary to break down the larger system (macro) into smaller (sub)systems (meso, micro). A microsystem should not be managed in isolation. Each microsystem has horizontal couplings to other microsystems and vertical couplings to the meso-macro systems.

To understand how multiple systems work it is an advantage to have a scale invariant framework. The resilience potentials (respond, monitor, learn, anticipate) are scale invariant, and can be used on all levels.

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