



OPERATIONAL RESILIENCE · EFFECT-BASED MODELLING

The Effect-Based *Resilience Approach*

Moving from cause-based to effect-based resilience. Six universal effect categories that transform how insurers prepare for the unknowable.

SEVEN DOMAINS. ONE COUNSEL.

EXECUTIVE SUMMARY

Most operational-resilience programmes are organised around causes. The cause register lists the things that could go wrong — fire, flood, cyber attack, pandemic, vendor failure — and the resilience plan addresses each. The trouble with the cause-based approach is that the cause register is necessarily incomplete; the next material event is statistically likely to come from a cause not on the register. The effect-based alternative inverts the problem: rather than enumerate every possible cause, enumerate the small set of universal effects that any cause produces, and design resilience against those. This paper sets out the six effect categories Abgalis uses, why six is enough, and how to convert an existing cause-based programme into an effect-based one.

§ 1

The cause register is incomplete by construction

Every firm's operational-resilience cause register has the same structural problem. It contains every cause anyone has thought to enumerate. It does not contain the causes no one has thought to enumerate. The gap is not laziness — it is structural. The number of plausible causes of disruption to a modern insurer's operations is unbounded; the number that have been observed in modern memory is small. The register grows by post-event addition (after each new event, the cause is added) which means the register reliably tells the firm how to defend against the last battle.

The effect register, by contrast, is bounded. The number of effects any disruption can produce is small, because all causes ultimately act on the firm through a small set of mechanisms. Identify those mechanisms, design resilience against each, and the firm is covered against an unbounded class of causes.

§ 2

The six universal effect categories

EFFECT 1

Physical-asset disruption

The buildings, equipment, datacentre kit and physical infrastructure on which the firm's operations depend become unavailable. The cause does not matter — fire, flood, sabotage, supplier failure, regional power outage. The effect is the same: the asset is no longer producing. The resilience question is whether the firm can run without the asset, for how long, and at what alternative cost.

EFFECT 2**Workforce impairment**

The people on whom the firm's operations depend become unavailable, unable to attend, or unable to perform at standard. Cause: pandemic, transport disruption, displacement event, key-person loss, industrial action. Effect: the production function is workforce-constrained. The resilience question is which roles are critical, what fallback capacity is held against each, and at what skill level the fallback can perform.

EFFECT 3**Data and decision integrity**

The information on which the firm's decisions rest becomes unreliable, corrupted, lost, or in some other way no longer trustworthy. Cause: cyber, software defect, model failure, vendor data feed disruption, AI hallucination, ransomware. Effect: the firm cannot decide as it normally would. The resilience question is which decisions the firm must continue to make under data-integrity stress and what fallback rule-sets exist for each.

EFFECT 4**Capital-account drain**

The firm's solvency, liquidity, or capital position deteriorates beyond planned tolerances. Cause: insurance loss, market shock, reinsurance dispute, asset impairment, ring-fencing event. Effect: the firm cannot deploy capital where the business otherwise would. The resilience question is which capital-deployment decisions are pre-committed, which are revocable, and what the firm's capital posture would be in the days, weeks and quarters following a binding drain.

EFFECT 5**Regulatory-pressure cascade**

Supervisory action — letters, restrictions, capital add-ons, business-model constraints — limits what the firm is permitted to do, often more constrainingly than the underlying capital position. Cause: any of the above, plus conduct issues, reporting errors, governance failure. Effect: the firm's permissions narrow. The resilience question is which permissions are most material to the business model and what the firm's strategy would be if those permissions were narrowed.

EFFECT 6**Reputational and trust cascade**

The firm's reputation, with customers, distributors, counterparties, regulators, employees, or markets, deteriorates beyond the firm's standing communications strategy can address. Cause: any of the above, plus public conduct events, leadership controversy, customer-treatment failure. Effect: the firm's commercial position narrows independently of its capital position. The resilience question is which trust relationships are most binding on the firm's commercial future and what the firm's stance would be under sustained reputational pressure.

WHY SIX IS ENOUGH

The six categories are exhaustive in the sense that any operational disruption ultimately produces a combination of these effects. The categories are independent in the sense that a firm can be resilient against one without being resilient against any other. Five would miss something — typically the regulatory-pressure category, which is the one most often left implicit. Seven would split a category that does not need splitting — typically separating physical-asset from workforce, when they share enough resilience design that splitting wastes effort.

§ 3**Cause-based to effect-based — the conversion**

A firm with an existing cause-based resilience programme does not need to abandon it. The conversion to an effect-based programme is a structural overlay rather than a re-build. The conversion proceeds in four steps.

Step 1 — tag every existing cause with the effects it produces

For each cause on the existing register, identify which of the six effects it produces. Most causes produce two or three effects, not all six. The output is a cause-to-effect matrix.

Step 2 — invert the matrix

For each effect, identify the set of causes that would produce it. The output is an effect-to-cause matrix. The first thing this reveals is which effects have the most causes pointing at them. Those are the effects against which resilience investment is most leveraged.

Step 3 — design effect-level resilience for the high-leverage effects

Where the cause-level resilience plan exists, leave it. Where it does not, design effect-level resilience: for each high-leverage effect, determine the firm's tolerance to the effect (how long, how deep) and the resilience capability that meets the tolerance.

Step 4 — test the residual

Run the firm's standing severe-but-plausible scenarios against the effect-level resilience. Where the cause-level plan covers the scenario, the effect-level plan adds a redundant layer; where the cause-level plan does not, the effect-level plan should now carry it.

§ 4

Effect-based modelling and the unknowable

The effect-based approach is most valuable in handling causes that have not yet been observed — the so-called unknown unknowns of operational resilience. Three concrete categories where this matters in 2026:

- **AI-driven operational disruption.** The list of plausible AI failure modes is not yet stable. New ones are added quarterly. A cause-based resilience programme will be perpetually behind. An effect-based programme already has the categories — typically Effect 3 (data and decision integrity) and Effect 5 (regulatory cascade) — and asks the firm whether its existing tolerances hold.
- **Compound climate events.** Any specific compound event — wildfire-plus-drought-plus-power-outage, heatwave-plus-thermal-cooling-failure-plus-transport-disruption — may not have been on the register. The effects each compound event produces are on the effect register.
- **Geopolitical second-order disruption.** The first-order geopolitical risk register typically lists shipping disruption, sanctions, export controls. The second-order — what happens when a sanctioned counterparty is the firm's data-feed provider, or when an export control reaches a software supplier — is harder to register at cause level. At effect level it is straightforward.

The cause register tells the firm how to defend against the last battle. The effect register tells the firm how to defend against the next one.

§ 5

Effect-based ORSA scenarios

The effect-based approach produces scenarios that survive committee scrutiny better than cause-based ones. The scenario "a flood at our primary operations centre" invites debate about probability. The scenario "a 72-hour loss of physical-asset availability at our primary operations centre, by any cause" sidesteps the probability debate and focuses the firm on the resilience question. Abgalis's view is that ORSAs should now contain at least one effect-based scenario for each of the six effects — six standing scenarios, run annually, separate from the firm's cause-based scenarios which remain.

EFFECT	STANDING SCENARIO	TOLERANCE QUESTION
Physical-asset disruption	72h loss of primary operating site	Can the firm continue critical functions?
Workforce impairment	40% workforce unavailable for 14 days	Are critical roles backed up to standard?
Data and decision integrity	72h loss of confidence in primary data feed	Are fallback decision rules in place?
Capital-account drain	20% adverse SCR movement, 30 days	Are revocable capital deployments identified?
Regulatory-pressure cascade	Supervisory restriction on a material permission, 6 months	What is the firm's strategy under narrower permissions?
Reputational and trust cascade	Sustained adverse press, 4 weeks	What is the firm's stance and communications baseline?

§ 6

Where the Abgalis Engine fits

The Abgalis Engine treats effects as transmission targets in the same channel architecture used elsewhere on the platform. For operational-resilience use, the Engine produces three things specifically:

- A standing effect-to-cause matrix for the firm, kept current as the firm's cause register and operating model change.
- The six effect-based ORSA scenarios above, instrumented for SCR sensitivity, management-action testing, and disclosure narrative.
- Cross-domain effect tracing — for each of the six effects, the channels by which the effect cascades into the seven risk domains, drawing on the same channel architecture used in Paper 04.

§ 7

How to engage

1. **Effect-overlay diagnostic — four to six weeks.** The firm's existing cause-based resilience programme tagged to the six effects, with a high-leverage effect-level resilience plan.
2. **Effect-based ORSA scenario set — one quarter.** The six standing scenarios constructed for the firm, instrumented for use in the next ORSA cycle.
3. **Standing effect-to-cause maintenance.** The Engine keeps the matrix current as the firm's cause register and operating model change.

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Abgalis is a climate and cross-domain risk intelligence platform for insurers and reinsurers. The name draws from the Sumerian *Abgal* — the seven divine sages sent by Enki to counsel the earliest kings of civilisation — re-instantiated as seven cooperating analytical domains. The civilisation that invented the insurance contract, the actuarial table, and the systematic record of risk.

TRADEMARKS & METHODOLOGY IP

References in this paper to Abgalis frameworks — the **Abgalis Engine™** (Abgalis's cross-domain transmission framework), **ICRIP™** (Integrated Climate Risk Intelligence Platform), and **The Cascade™** (Abgalis's monthly intelligence brief) — are trade marks of Abgalis Ltd, used and explained inline. The internal mathematical methodology is reserved to Abgalis Ltd and is not disclosed in this document. Reproduction outside Abgalis requires written permission.

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FROM §1 — THE CAUSE REGISTER IS INCOMPLETE BY CONSTRUCTION

THE SERIES

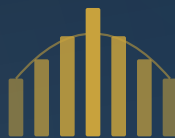
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