

1

ACCEPTABLE PERFORMANCE BOUNDARY
ECONOMIC FAILURE BOUNDARY
Efficiency pressure
margin
Counter gradient from campaigns for safety
OPERATING POINT
Less effort
MARGINAL BOUNDARY
UNACCEPTABLE WORKLOAD BOUNDARY
Modified from Rasmussen, 1997

- Work takes place in a space with economic, workload, and “acceptable performance” boundaries.
- Management pressure for economic efficiency and the consequences of workload form gradients.
- The gradients push the operating point towards the failure boundary.

2

Accident

- The operating point is dynamic; it moves as conditions change.
- Punching through the acceptable performance boundary results in an accident.
- Staying well away from the margin is inefficient.
- Most operations take place around the margin, and organizations normally “flirt” with the margin.

3

original MARGIN
Closeup: Normalization of deviance (Vaughn, 1997)
new MARGIN
Normalization

- Crossing the margin (① to ②) is treated as a violation and produces effort to return operations to the “normal” (② to ③).
- Repeated margin crossing (③ to ④) without accident leads to the belief that operations around ④ are “normal”; boundary may shift.
- The new margin allows operations nearer the acceptable performance boundary to seem normal (⑤).

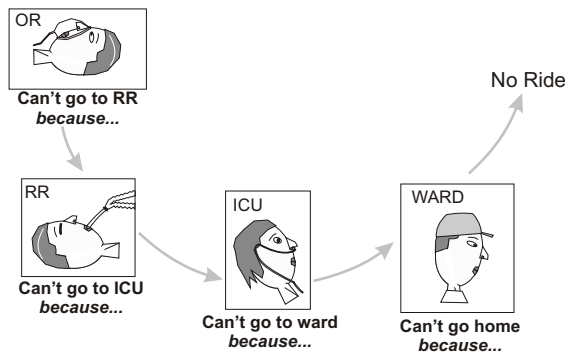
4

Feature	Coupling	
	Loose	Tight
Delays	Tolerated	Not tolerated
Sequences	Changeable	Fixed
Methods	Multiple	One or few
Sack	Available	Absent
Buffers	Designed in	Fortuitous
Substitution	Designed in	Fortuitous

From Perrow, 1984, *Normal Accidents*

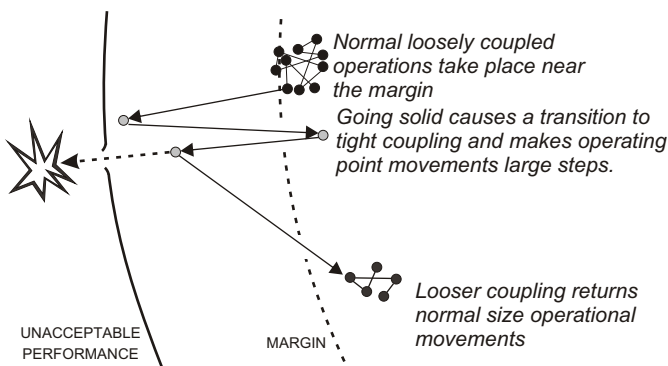
- Tight coupling connects parts of the system together in ways that allow actions at one place and time to have effects at a distant place or time. Prediction and control become harder and the scale of accidents increases.

5 Going solid



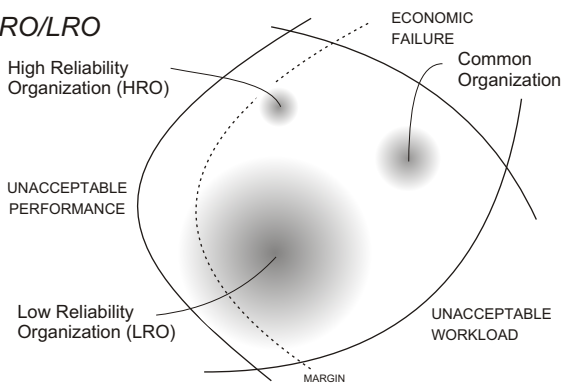
- Hospital units are mostly operationally independent. Saturating occupancy makes operations in one area critically dependent on operations in another. In this example, the system becomes “solid” when all bed spaces are filled with patients. Going solid raises the stakes for ordinary activities and puts a premium on speed and precision in decision making.

6 Closeup: Tight coupling and the operating point



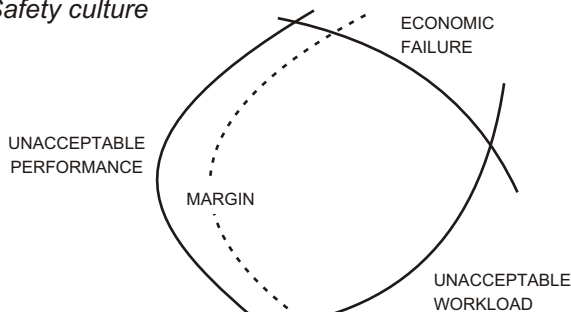
- Going solid produces a state of tight coupling that amplifies the movements of operating point.
- Because normal operations occur near the margin, going solid can result in fast movements that punch through the acceptable performance boundary and result in an accident.

7 HRO/LRO



- High reliability organizations may operate quite near the margin and the boundary of unacceptable performance. The operating point does not move quickly and its location is known with precision.
- The operating point for low reliability organizations moves over a larger region and there is little consensus about where it is at any moment.

8 Safety culture



© Where are you?

Safety culture is one where workers and management agree about:

- Where the operating point is now.
- Where the operating point could move next.
- How close the operating point is to the margin.
- How close the margin is to accident boundary.