

Infrastructure as a System of Systems

Understanding Interdependency and Performance

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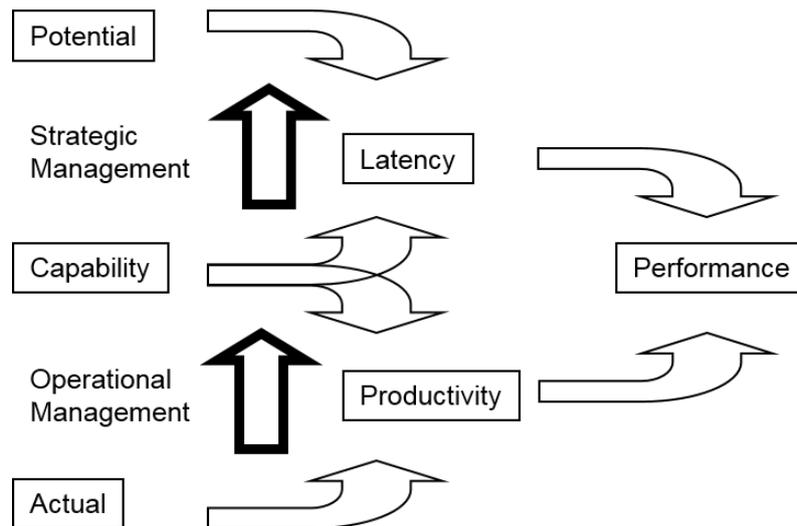
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- 1: Performance is measured by the extent to which an asset fulfils its purpose (or doesn't).
- 2: If we do not state the purpose of an asset (at any level from the individual element to a whole network or multi-network) then we cannot meaningfully measure its performance or establish any form of metric or KPI.
- 3: Any individual asset is a node in a network. We need to know:
 - What it is (specification)
 - Where it is
 - How we maintain it
 - Its capital cost
 - Its operating cost
 - What assets (including communication/control mechanisms) it depends on within its own network
 - What assets (including communication/control mechanisms) it depends on in other networks
 - What assets (including communication/control mechanisms) depend on it in its own network
 - What assets (including communication/control mechanisms) depend on it in other networks
- 4: We need to know what purpose it is intended to fulfil, the business model through which it fulfils that purpose and the external factors (particularly climate change and weather events) that (do or may) affect it.
- 5: Purpose, for infrastructure assets, is defined by 'the Public' as represented by Government and articulated through regulation (heavy or light touch!) that informs the business model.
- 6: That means that we must 'manage' the asset at four levels of resolution:
 - Network Operational Management
 - Inter-Network Operational Management

These include the management and mitigation of performance risk (NOT the outsourcing or insurance of that risk)

 - Strategic Management of the Network to achieve its purpose
 - Socio-Political Management of the whole to fulfil societal expectations

- 7: The first two levels of this will be cost-driven (the maximum short term performance for the lowest cost).
- 8: The second two levels of this will be value-driven (the maximum long term fulfilment of purpose)
- 9: An appropriate way of structuring this performance management is the potentiometer:



In this operational management is concerned with closing the gap between the ACTUAL performance of the asset/network/network of networks and its capability (the formal expression of what it CAN achieve).

The strategic management is concerned with closing the gap between current capability and its potential. Potential is what the asset/network/network of networks COULD do if constraints were removed.

- 10: Performance is the measure of the extent to which the asset/network/network of networks fulfils its purpose – and THAT is where we started!