# Beyond Blast Radius:

## Dimensions of Breadth, Depth, and Recovery Complexity

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# A Little About Me

- Senior Software Engineer at Bloomberg
- Active member of SRE Guild in Bloomberg, hence SRE enthusiast



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# Why Go Beyond Blast Radius?

- What is Blast Radius about?
  - Refers to the extent of applications & users affected by an incident or mishap
  - Clearly important given the interconnected nature of most enterprise systems
  - Can manifest itself in surprising or unexpected ways

- System owners often have knowledge of immediate dependencies and client footprint
  - May have formal or informal SLAs established
  - May also have risk mitigation measures in place (hence, blast containment)

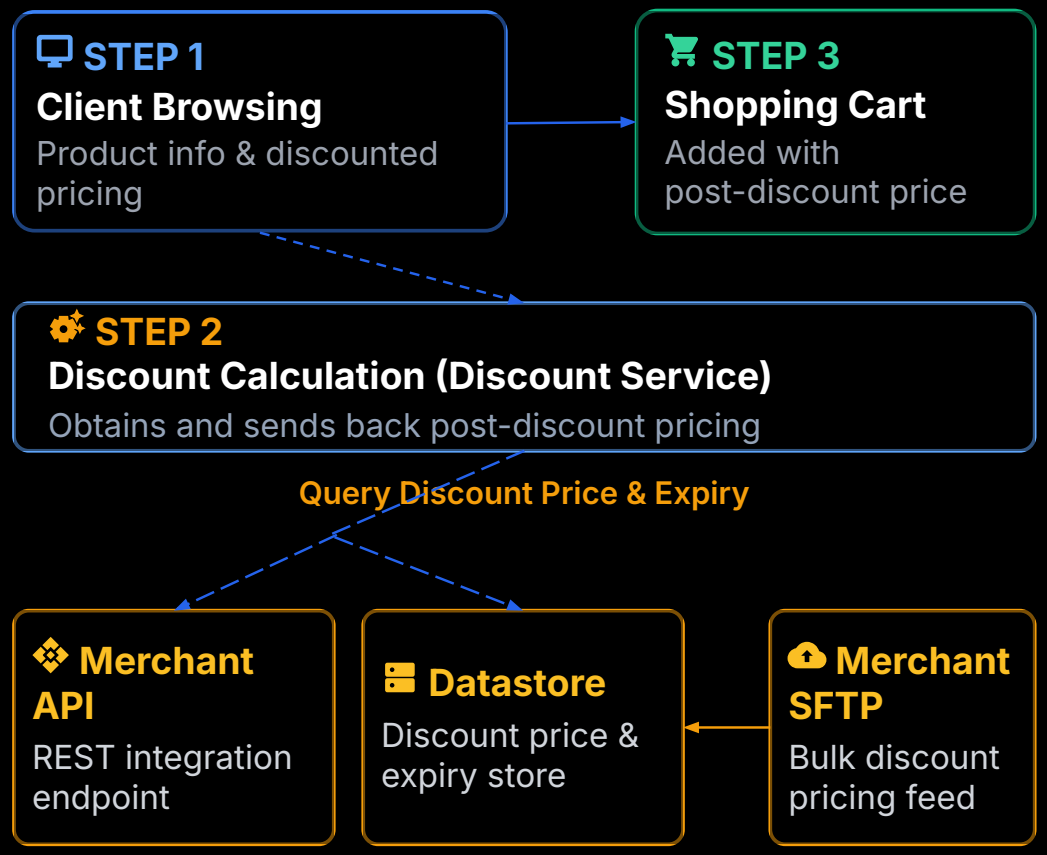
- But what truly happens in the face of an incident or mishap?



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# Case Study: Pricing Discount Infra for Shopping Website

## SHOPPING CART WORKFLOW




## BUSINESS REQUIREMENTS

- Price placed on shopping cart must be honored
- Discount service is not on critical path for item purchase

## POTENTIAL FAILURE SCENARIOS

- Bad/corrupted data in SFTP file upload
- Merchant API service brownout or outage

## BLAST IMPLICATIONS OF FAILURES

- Items purchased at unintended / incorrect prices
- Reverberating latency across product pages
- *But there's more to the story...*

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# Blast Radius Dimensionality

## Impact Breadth

Traditional assessments, while using the physical analogy of an explosion, measure only **how far** an incident spreads.

This breadth-only view fails to capture the true structural severity and lingering effects of complex failures.

## Impact Depth

Quantifies the degree to which critical systems are driven into a persistent **"bad state."**

Focuses on stateful corruption, faulty data propagation, and the reverberating effects that persist long after the initial trigger is resolved.

## Recovery Complexity

Evaluates the intricate, often manual, operational processes required to safely restore the system to a correct state.

Directly impacts MTTR and serves as a vital dimension in resilient system design and risk management.

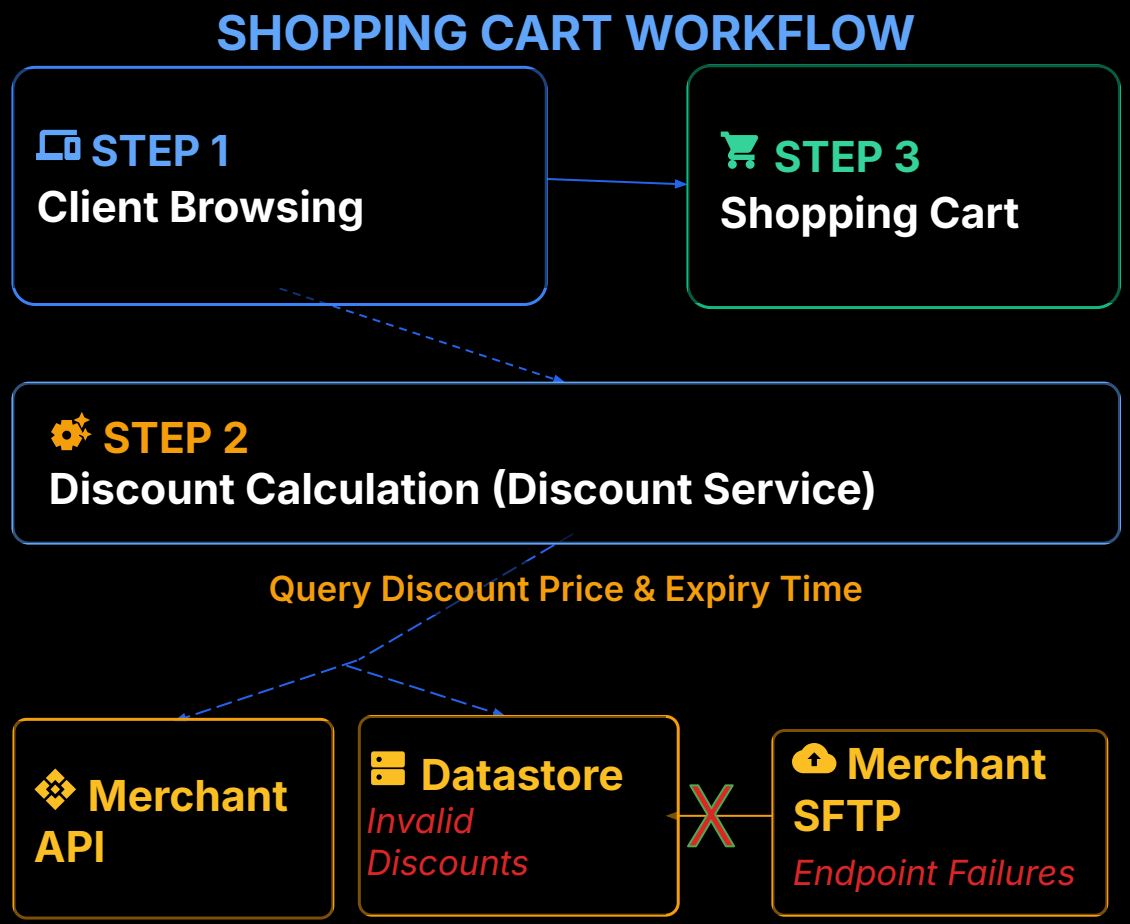
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# Blast Scenario: Bad SFTP Price Upload & Endpoint Failures




## Trigger

- Merchant sent invalid discount data
- SFTP permission checks start failing
- Uploads blocked for all merchants (including restatement)

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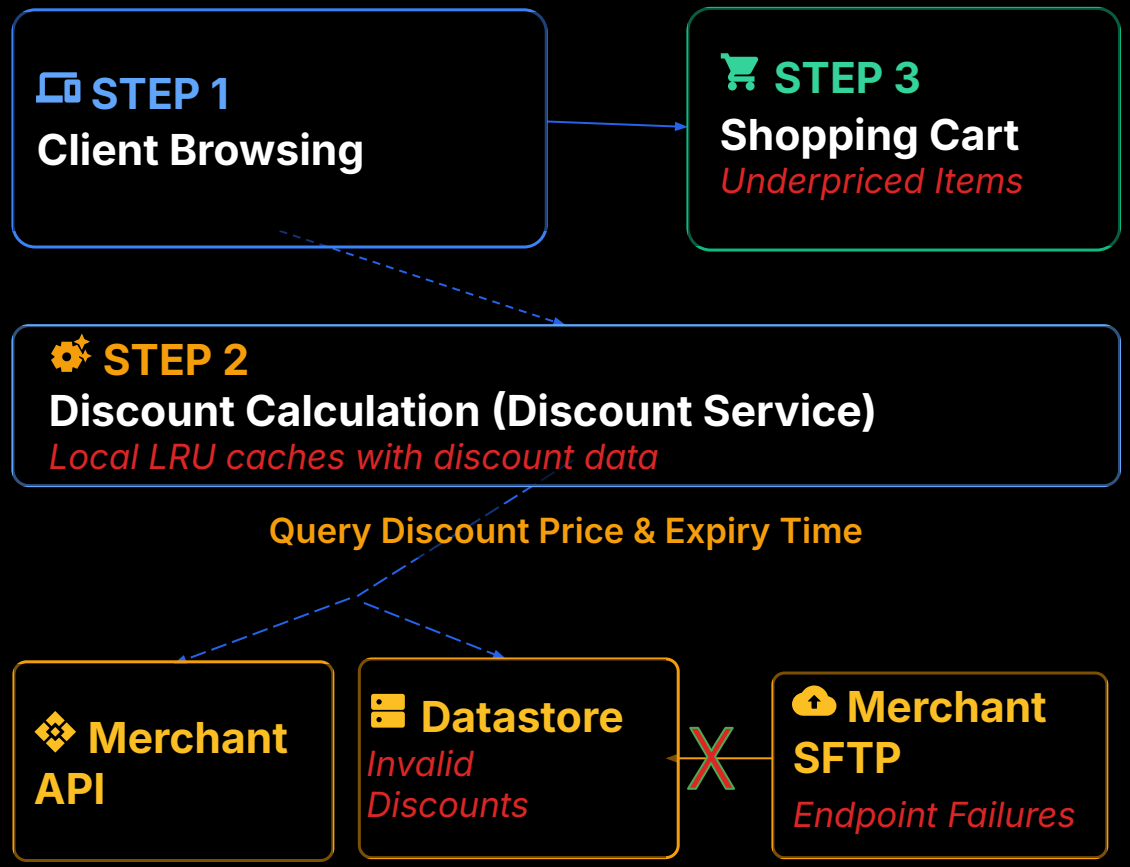
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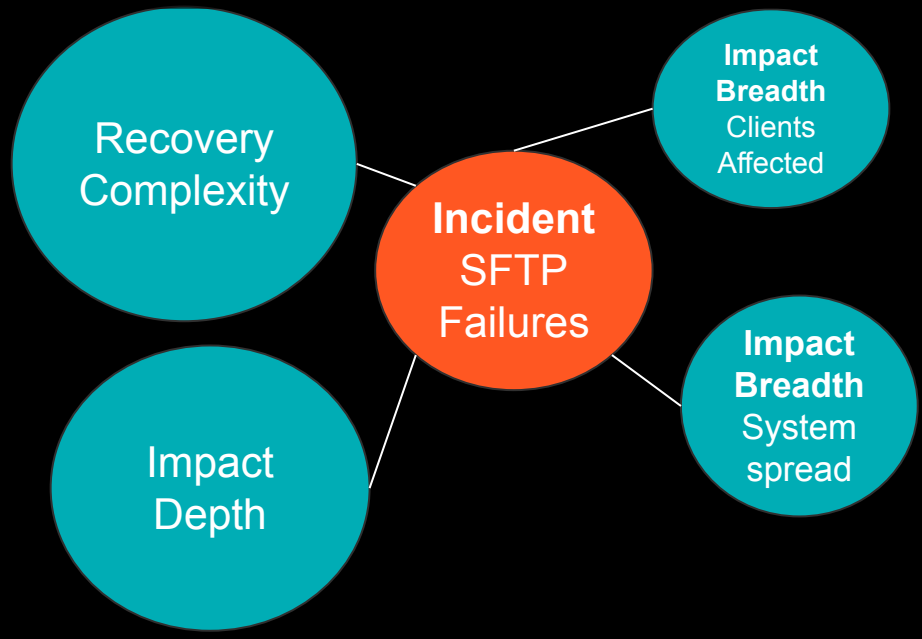
# Blast Scenario: Bad SFTP Price Upload & Endpoint Failures

## SHOPPING CART WORKFLOW




## Impact & Recovery Efforts

- Datastore purge of undervalued pricing
- Discount service cache invalidation
- Shopping cart queries, possible invalidation



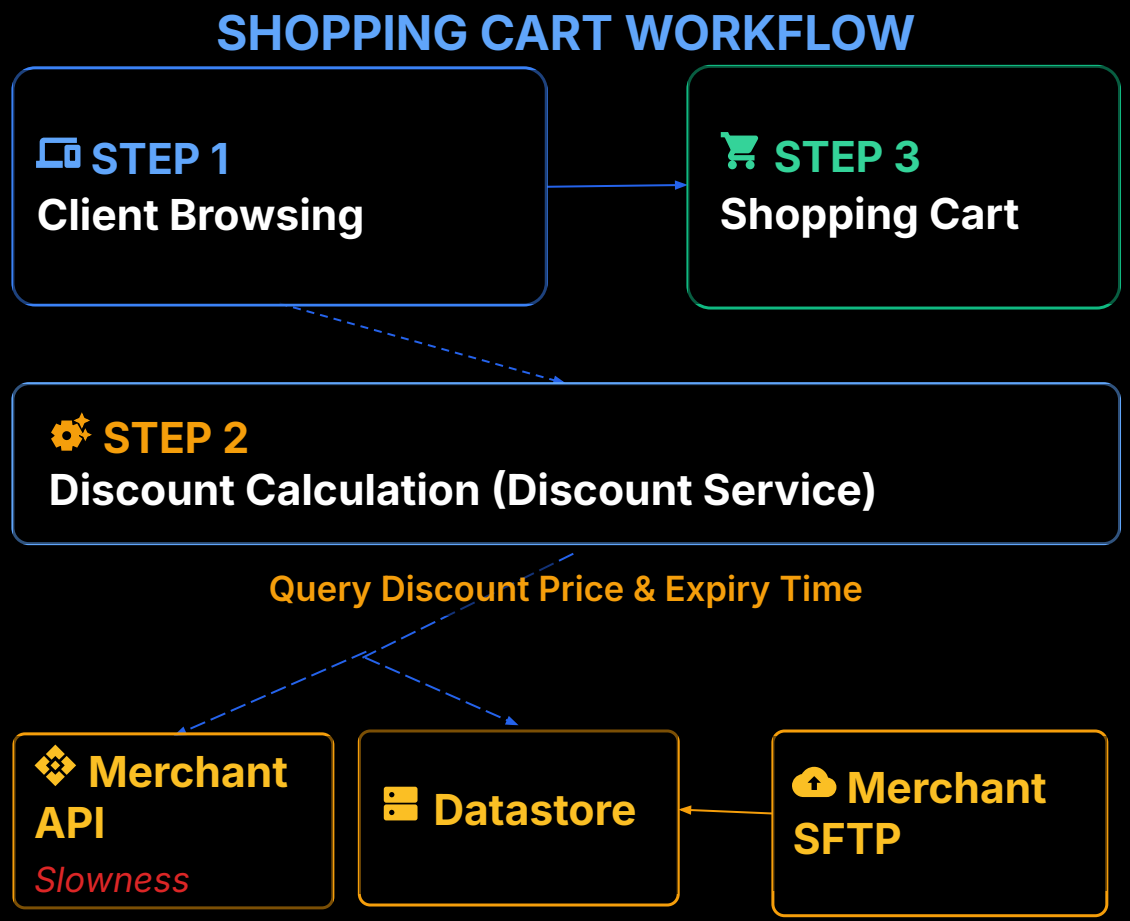

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# Blast Scenario: Merchant API Slowness




## Trigger

- Egress proxy hosts under high load
- Merchant API slowness (not outage)
- Discount service instances held up waiting

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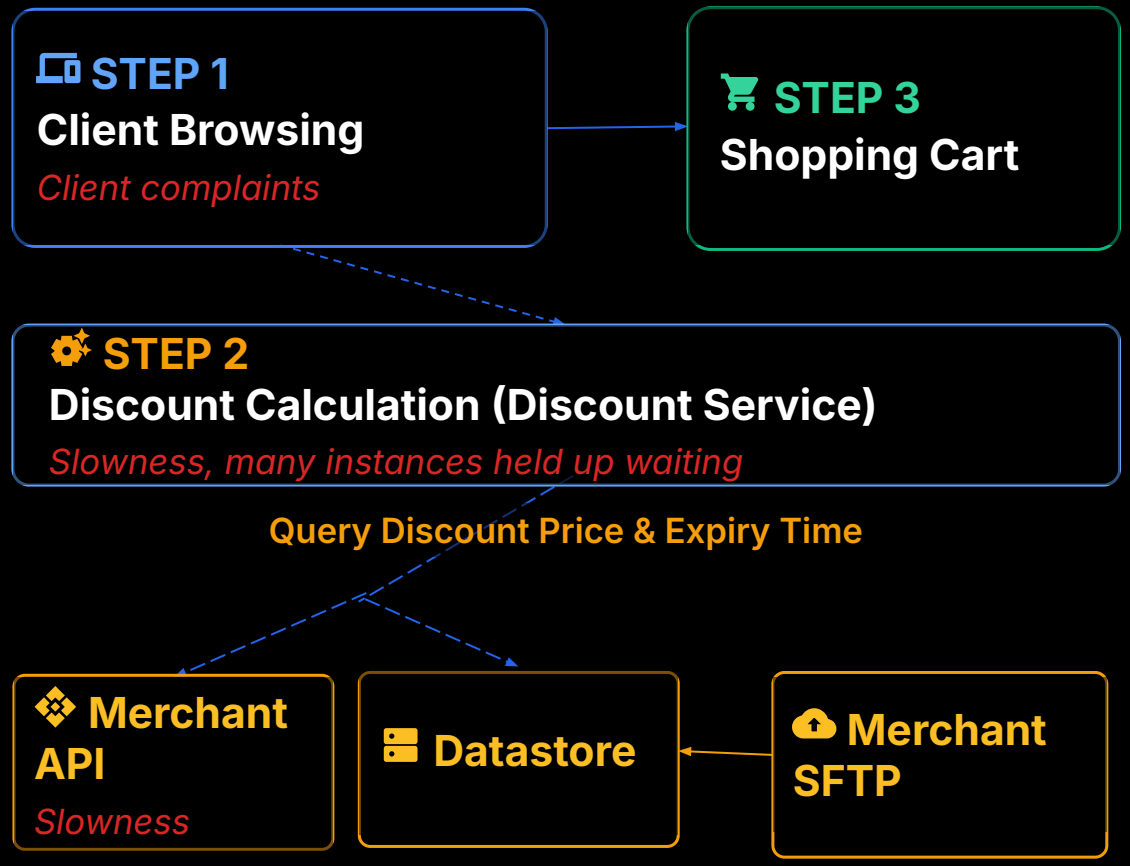
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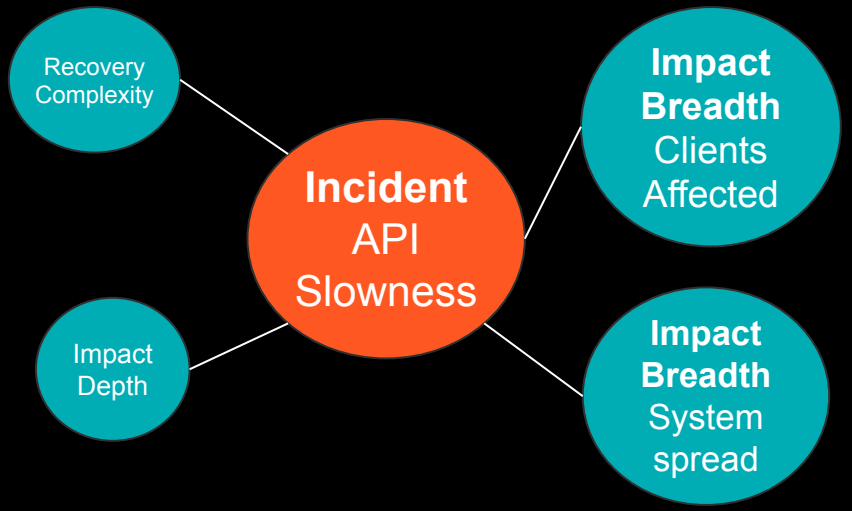
# Blast Scenario: Merchant API Slowness

## SHOPPING CART WORKFLOW




## Impact & Recovery Efforts

- Numerous client complaints
- Non-trivial set of missed orders
- Immediate recovery post-resolution




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# Integrating Blast Dimensionality into System Design & Risk Management

### Post-Mortems & Remediation

Formalize blast dimensionality in incident post-mortems & remediation plans

### Systemic Risk Registries

Periodic risk exposure analysis, to continuously evaluate system stability

### Proactive Design Vetting

Stability risk analysis during design, vetting choices and tradeoffs against blast dimensions

## Impact Breadth

How far an incident spreads, in terms of systems impacted, or extent of client issues

## Impact Depth

Quantifies the degree to which critical systems are driven into a persistent **"bad state"**

## Recovery Complexity

Evaluates the intricate, often manual, operational processes required to safely restore the system to a correct state

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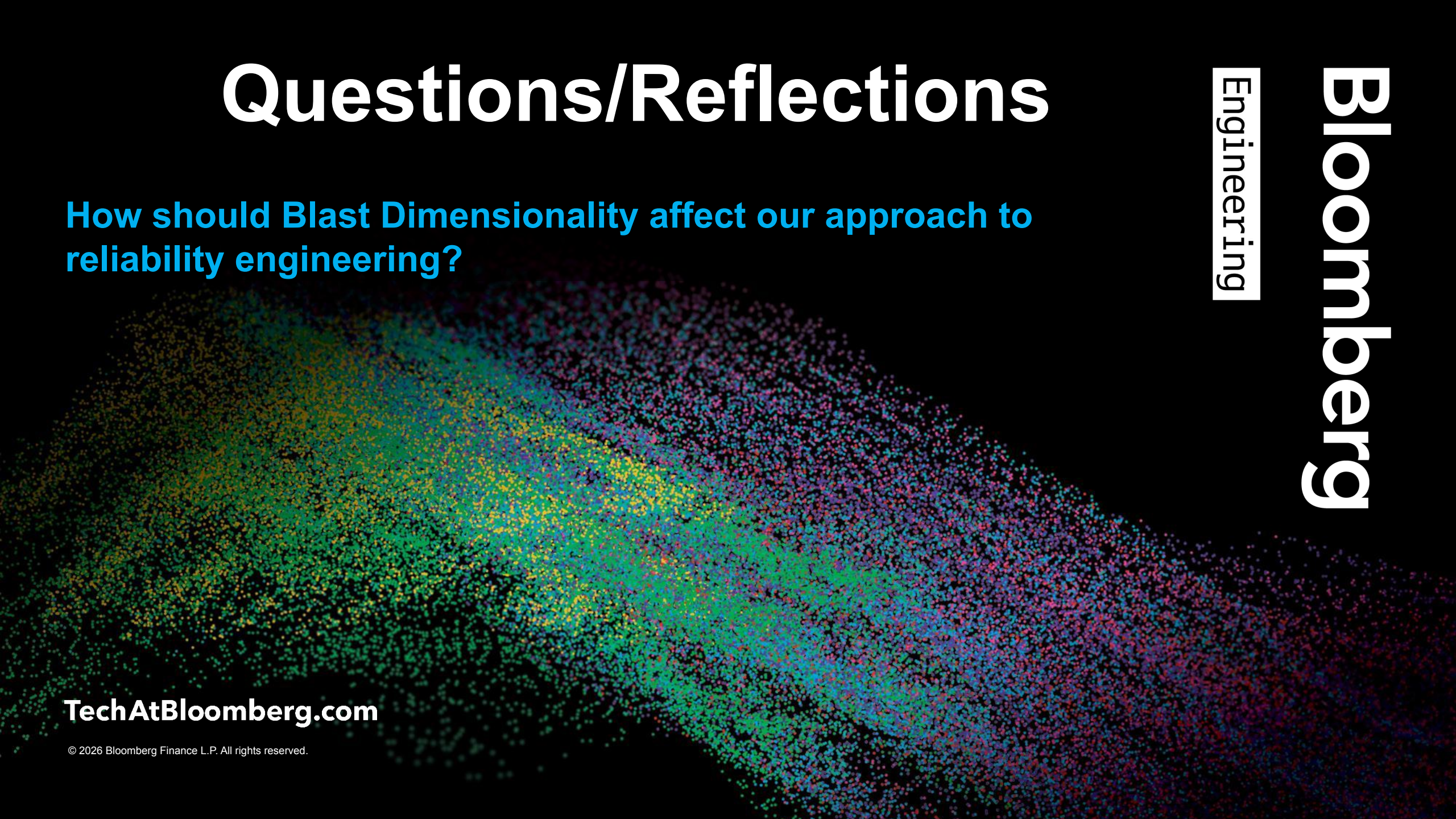
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# Questions/Reflections

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## How should Blast Dimensionality affect our approach to reliability engineering?



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