The Business Resilience Calculator (BRC)

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Economic Resilience

- **Static Resilience:**
  - General Definition: Ability of a system to maintain function when shocked.
  - Econ Definition: *Efficient use of remaining resources* at a given point in time to produce as much as possible.

- **Dynamic Resilience:**
  - General: *Ability & speed* of a system to recover.
  - Economic: *Efficient* use of resources over time for investment in repair and reconstruction, including expediting the process & adapting to change.

- Resilience essentially synonymous with *efficient business continuity*

- **Metric:** losses avoided by using a resilience tactic as % of potential losses without it
Key Distinctions: ‘Mitigation,’ ‘Resilience,’ & ‘BI’

- Resilience: Often refers to *any action* that reduces hazard losses
- But there’s a perfectly good word for actions taken *before* the event – “mitigation”
- Best use of “resilience” – actions taken *after* an event
  - can *build up resilience capacity beforehand* – it’s a process
  - (inventories, resource agreements, identify back-up locations)
  - but these tactics are *not implemented until after* the event
- Can only prevent property damage before the event, but can reduce *business interruption* afterwards
- BI begins when the disaster strikes & continues until recovered
- Measured in terms of lost sales revenue, GDP, employment
Why BI Matters

September 11 World Trade Center Attacks
- property damage (PD): $25 Billion
- business interruption (BI): $100 Billion

Hurricane Katrina
- PD: $75B
- BI: >$100B

ShakeOut San Andreas Fault Earthquake Simulation
- PD: $100B
- BI: $68B
## Resilience Tactics (Actions)

<table>
<thead>
<tr>
<th>Resilience Tactic</th>
<th>Definition (Activities Involved)</th>
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<tbody>
<tr>
<td>Conservation</td>
<td>Maintaining intended production using lower amounts of an input or inputs</td>
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<td>Resource Isolation</td>
<td>Modifying a portion of business operations to run without a critical input</td>
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<td>Input Substitution</td>
<td>Replacing a production input in short supply with another</td>
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<td>Inventories</td>
<td>Continuing business operations using emergency and ordinary stockpiles</td>
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<td>Excess Capacity</td>
<td>Using idle plant or equipment idle in place of a damaged ones</td>
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<td>Relocation</td>
<td>Moving some or all of the business activity to a new location</td>
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<td>Management Effectiveness</td>
<td>Improving the efficiency of business operations in the aftermath of a disaster</td>
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<tr>
<td>Import Substitution</td>
<td>Importing needed production inputs when not available from local suppliers</td>
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<tr>
<td>Technological Change</td>
<td>Improvising the production process without requiring a major investment</td>
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<td>Resource Pooling</td>
<td>Recontracting, selective exchange of resources, creating new partnerships</td>
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<tr>
<td>Production Recapture</td>
<td>Making up for lost production by working overtime or extra shifts</td>
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BRC

Business Resilience Calculator
The BRC

- **What:** Data-driven decision-support software tool
- **Purpose:** To safeguard business continuity in a cost-effective manner
- **Users:** private enterprises, as well as HSEs (including FEMA), SBA, NIST, Emergency Managers
- **Knowledge Gap:** Primary data & statistical analysis for business resilience decisions
- **Underlying Research:** Primary source survey data professionally collected from firms impacted by Superstorm Sandy and Hurricane Harvey
  → Not simulation or model
  - **Research Results:**
    - Firm’s resilience tactics are cost-effective with an average benefit-cost ratio of >$4.50:1
    - Business interruption exceeded property damage by >900%
Software Demo