



Midwest Healthcare Engineering Conference

Resilience Design for Healthcare Facilities

October 26, 2016

Speakers



Shayda Bradley,
Executive Director,
Design &
Construction, IUH

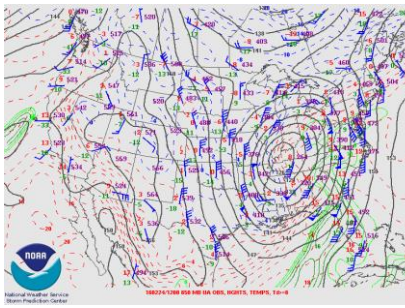


Mara Baum,
Healthcare
Sustainable Design
Leader, HOK



Fred Betz, Building
Performance
Consultant, AEI

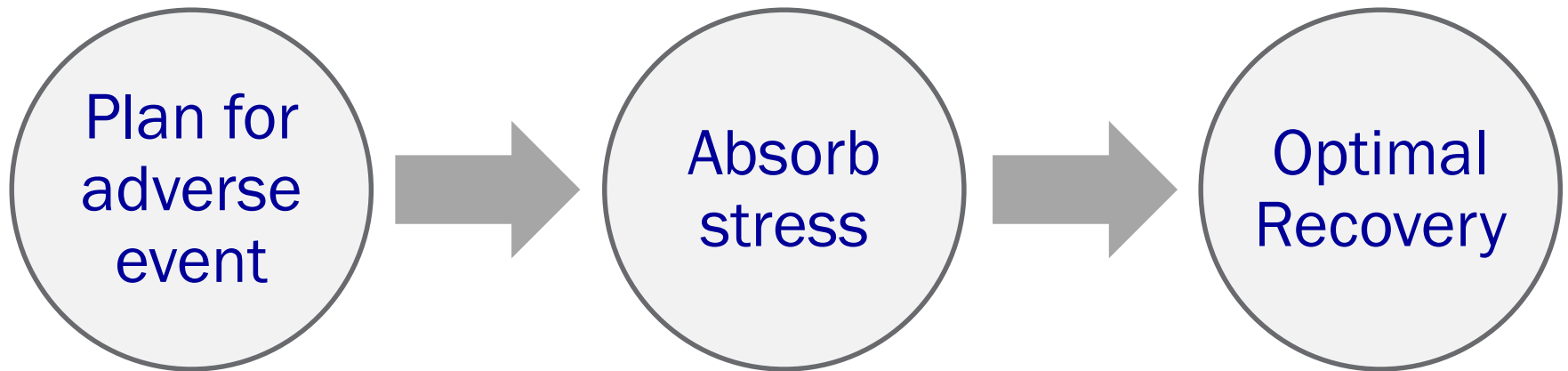
What do these places have in common?





"The Joplin Tornado: The Hospital Story and Lessons Learned", Marcia Reynolds, RN, BSN, MSN, CPHRM, Mercy Health,
http://c.ymcdn.com/sites/www.leadingagemissouri.org/resource/resmgr/annual_conference/wednesday_joplin_tornado_les.pdf

Definition of Resilience



Resilience is “the ability to prepare and plan for, absorb, recover from, or more successfully adapt to actual or potential adverse effects”

- National Research Council

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Centre of British Columbia, Vancouver, BC



Redwood City Hospital, Redwood City, CA



Ng Teng Fong General Hospital, Singapore



EMERGENCY CARE

Lessons from Storm Sandy: When Hospital Generators Fail

In the wake of superstorm Sandy, much of New York City was plunged into darkness. What happened to the patient?

By Alexandra Sifferlin @acsifferlin | Oct. 30, 2012

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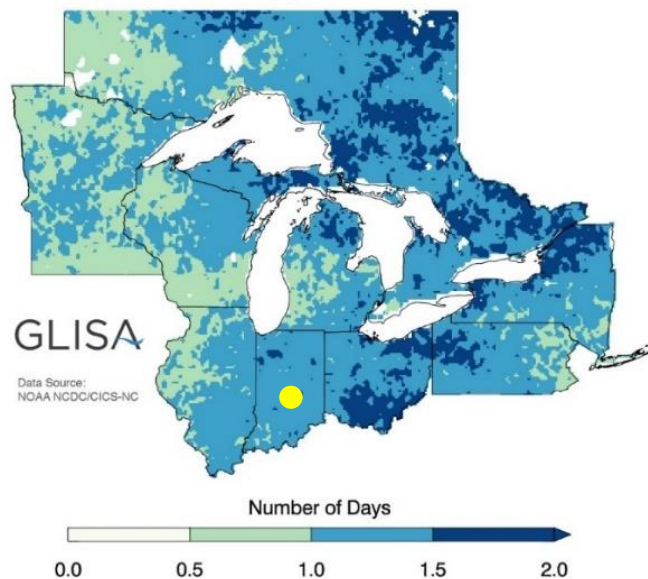


Weather Pattern Unpredictability



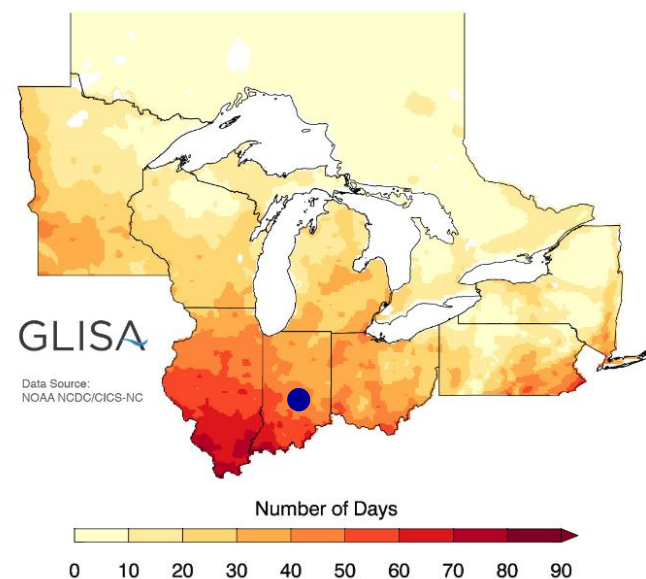
Projected Change in Number of Heavy Precipitation Days

Period: 2041-2070 | Emission Scenario: A2



Change in the Number of Days Over 90°F

Period: 2041-2070 | Emission Scenario: A2



Primary concerns: *Extreme heat, tornado & high winds*

Secondary concerns: *Drought, flood, earthquake, wildfire equipment & utility failures, fire, ice storms, lightning*

Key Design Principles



1

Exceed codes & standards as needed

2

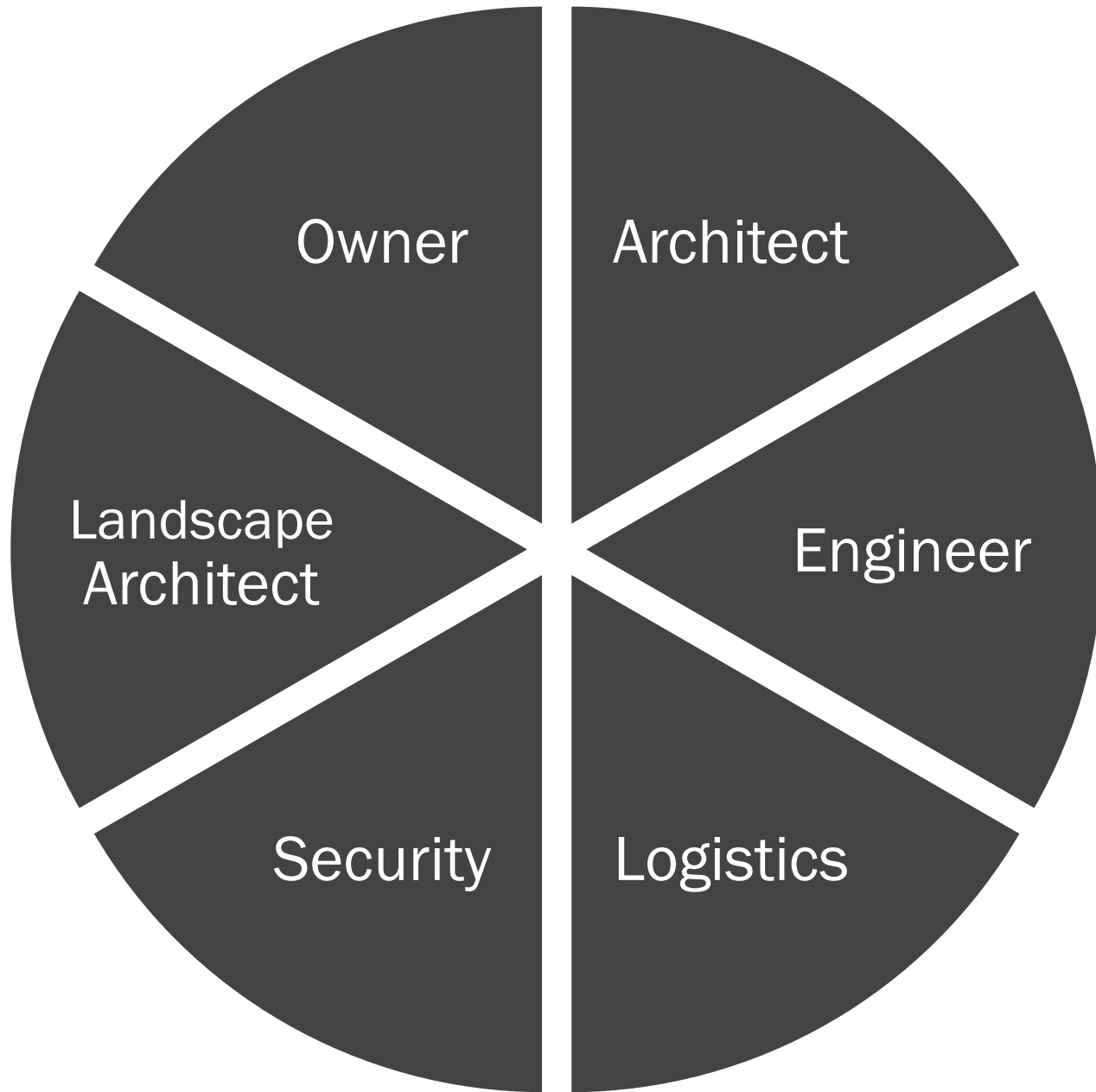
Categorize building program for criticality

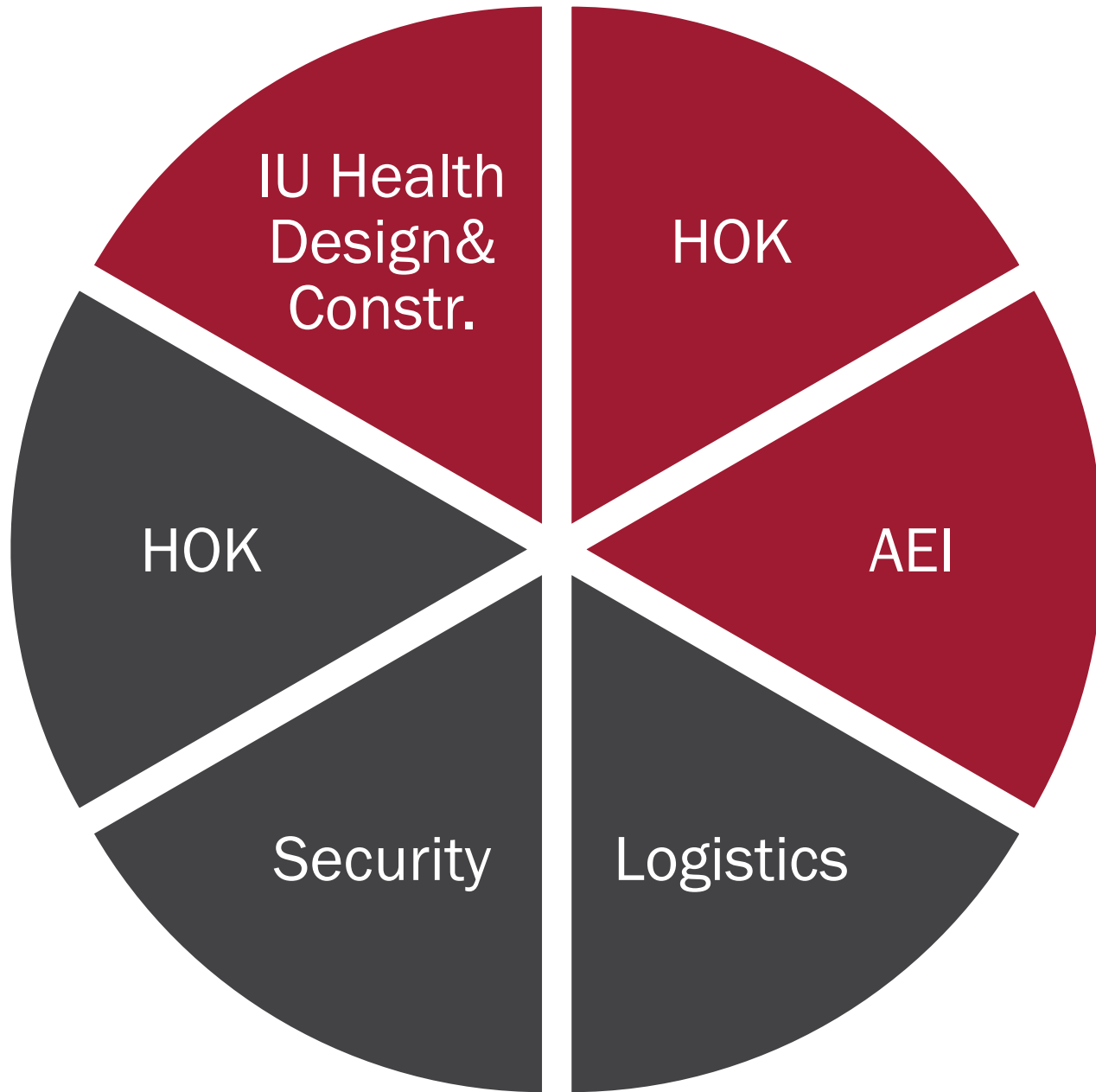
3

Energy & water efficiency will make goals easier/cheaper to achieve

4

Consider potential long-term weather patterns

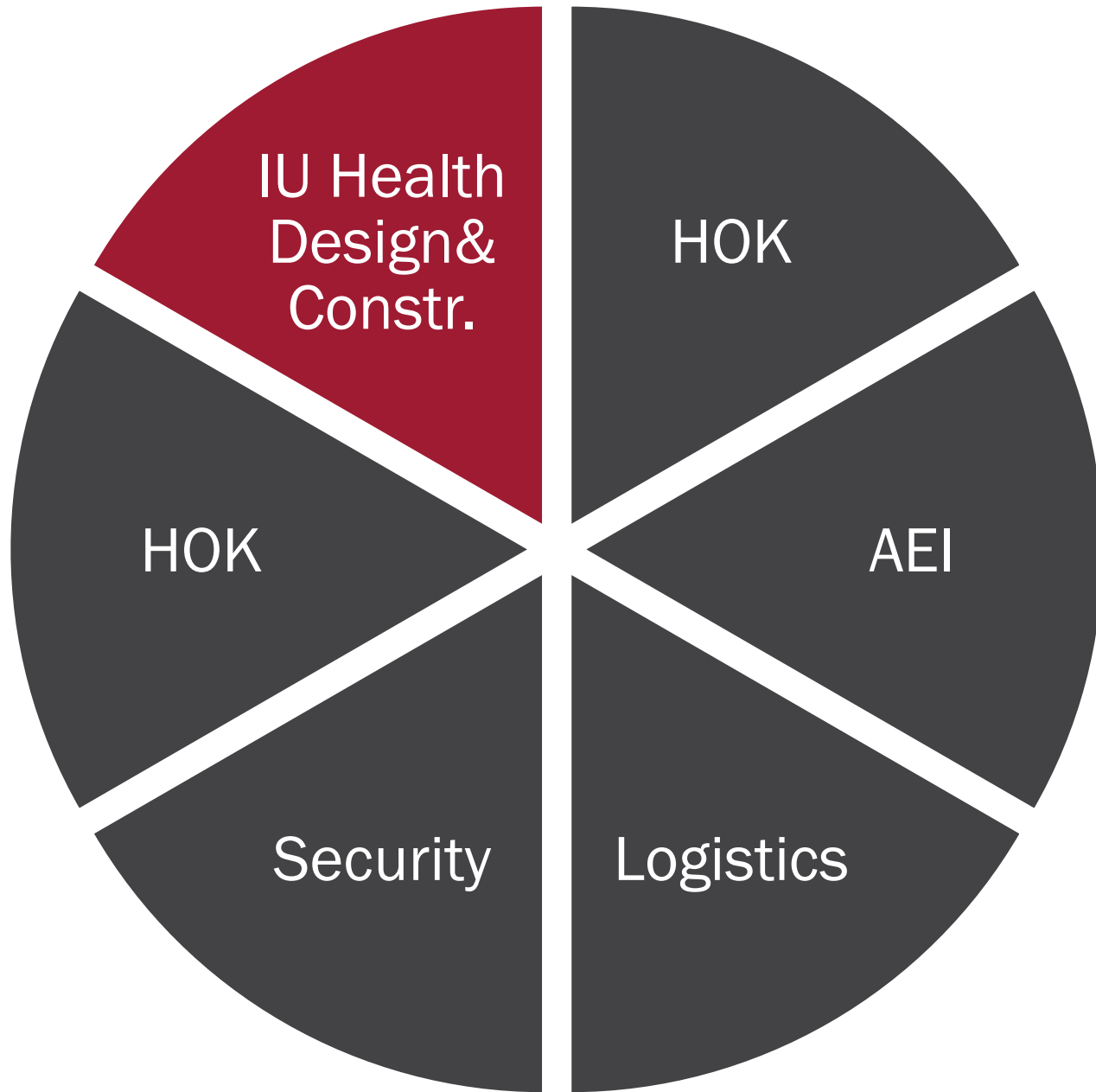




IU Health Hazard Assessment



- Natural Hazards
 - Pandemic influenza
 - Tornado
 - Severe winter storm
- Critical Infrastructure
 - Information system failure
 - Communications failure
 - Cyber attack
- Human Hazards
 - Active shooter
 - Mass casualty incident
 - Bomb threat
- Hazardous Materials
 - In-hospital spill
 - Incident requiring decontamination of staff or patients
 - Nuclear detonation



Indiana University Health Statewide Presence



- **15** hospitals plus health centers, partners, affiliates & joint venture operations
- **3,098** staffed beds
- More than **29,000** full-time team members
- More than **2.7 million** admissions and outpatient visits
- More than **1,400** research studies



IU Health Highlights



In partnership

IU School of Medicine

the nation's largest medical school and a national leader in medical education and research

IU Health Transplant

is one of the nation's largest transplant programs

1,200+

IU HEALTH PHYSICIANS

teach medical students and/or medical residents



Ten clinical programs ranked among the **top 50 national programs** in *U.S. News & World Report's* 2015-16 edition of America's Best Hospitals



Riley Hospital for Children
Indiana University Health

NATIONALLY RANKED IN **10** OUT OF **10** PEDIATRIC SPECIALTIES



Seven IU Health hospitals have achieved Magnet status—the gold standard for nursing excellence

IU Health Mission

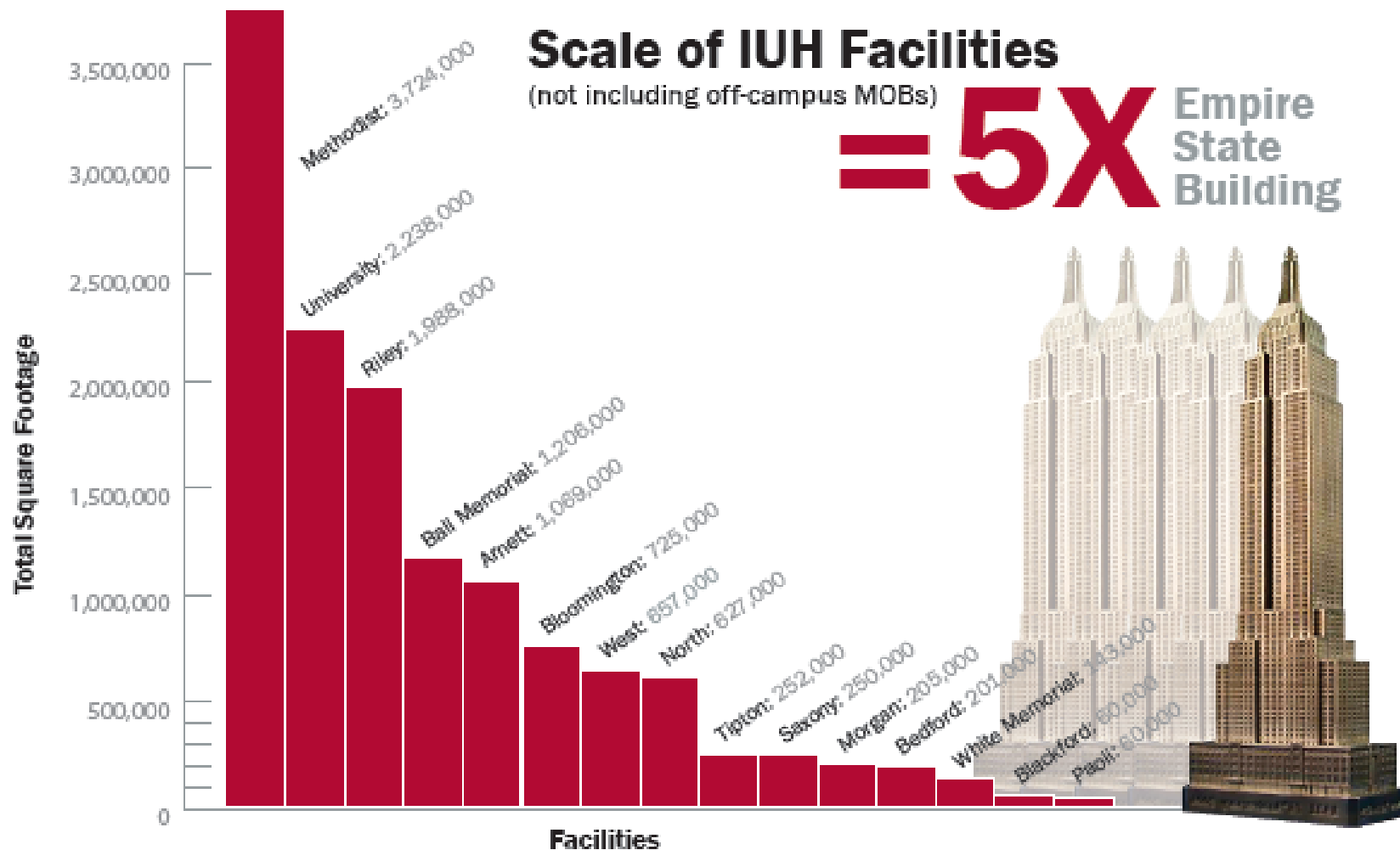


To *improve* the *health* of our *patients* and *community*
through *innovation*, and *excellence* in *care*, education,
research and *service*.



Indiana University Health

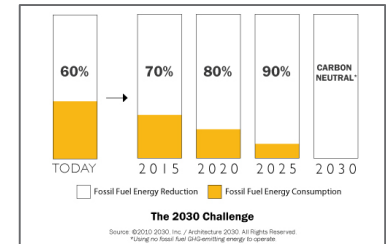
IU Health Facilities



IU Health Sustainability



- Educate patients and staff on Sustainability
- Reduce carbon footprint
- Align with Indiana University to achieve LEED Gold
- Apply lean design methodology



IU Health Sustainability Direction



1

Campus Environments – facilities design, construction and maintenance



2

Administration & Oversight – corporate goals, policy and measurement



3

Team Engagement– IU Health team education, personal involvement and celebrations around *achievement and results*



New Adult Hospital, Downtown Indianapolis



Existing site area

- *5.7 million sq. ft.*

Existing beds: 1,428

- *Methodist 750*
- *University 387*

Building ages

- *10 to 100 years*

Investment plans:

- *\$900M*

IU Health Bloomington (Preliminary)



Total site area

- ***70 acres***

Design phase

- ***Schematic Design***

Investment plans

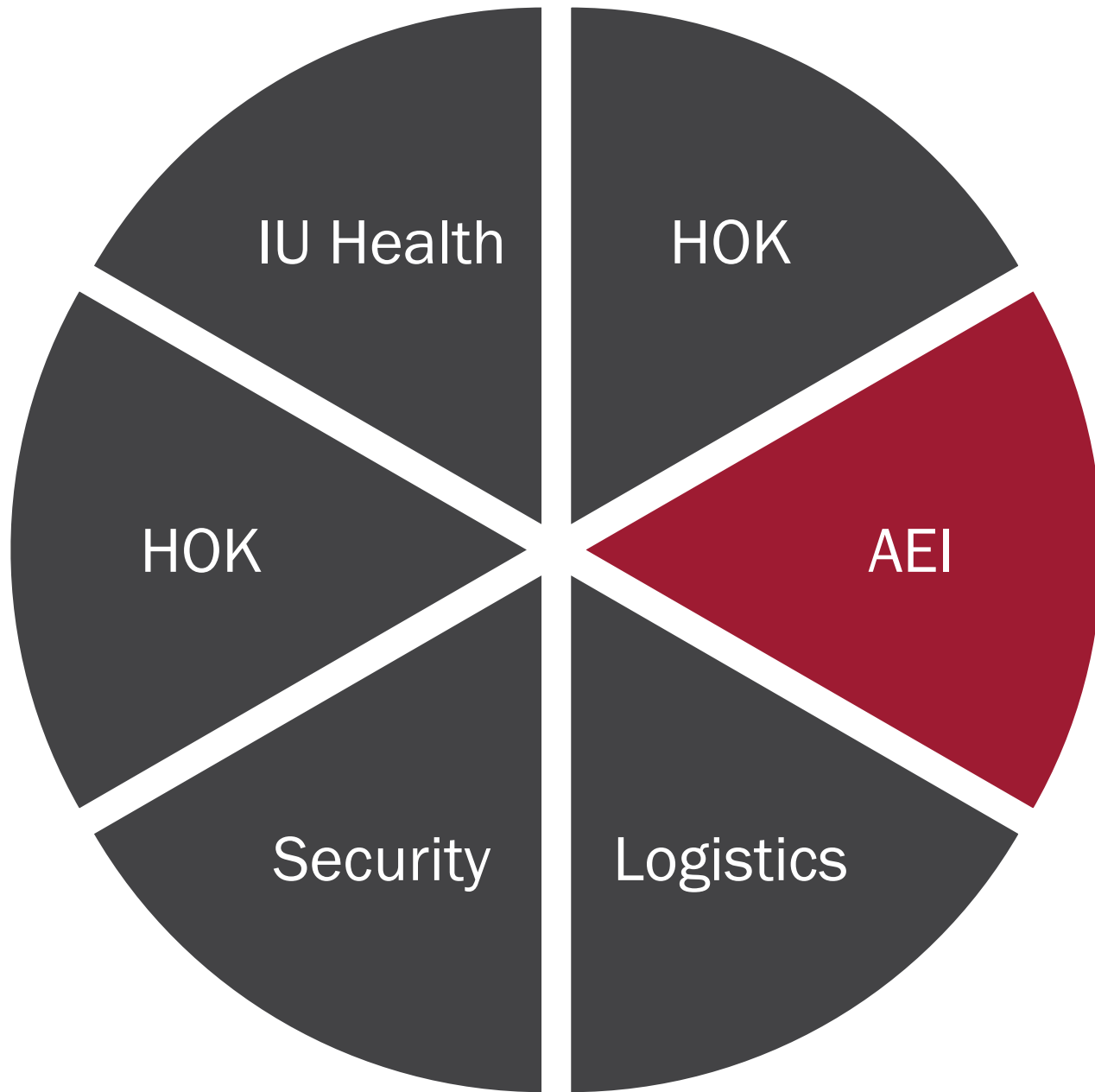
- ***\$340M***

IU Health's Resilience Interests and Concerns

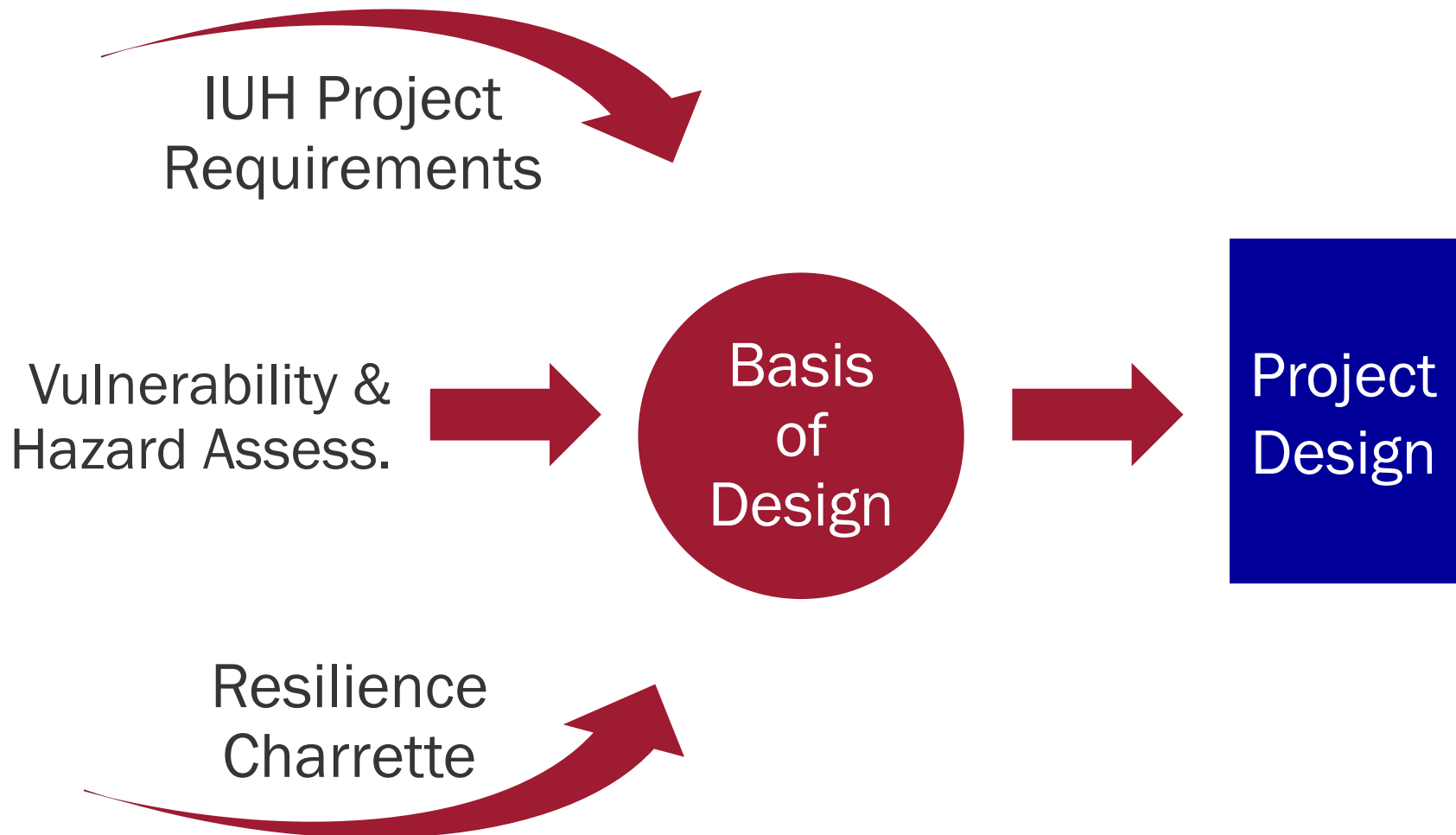


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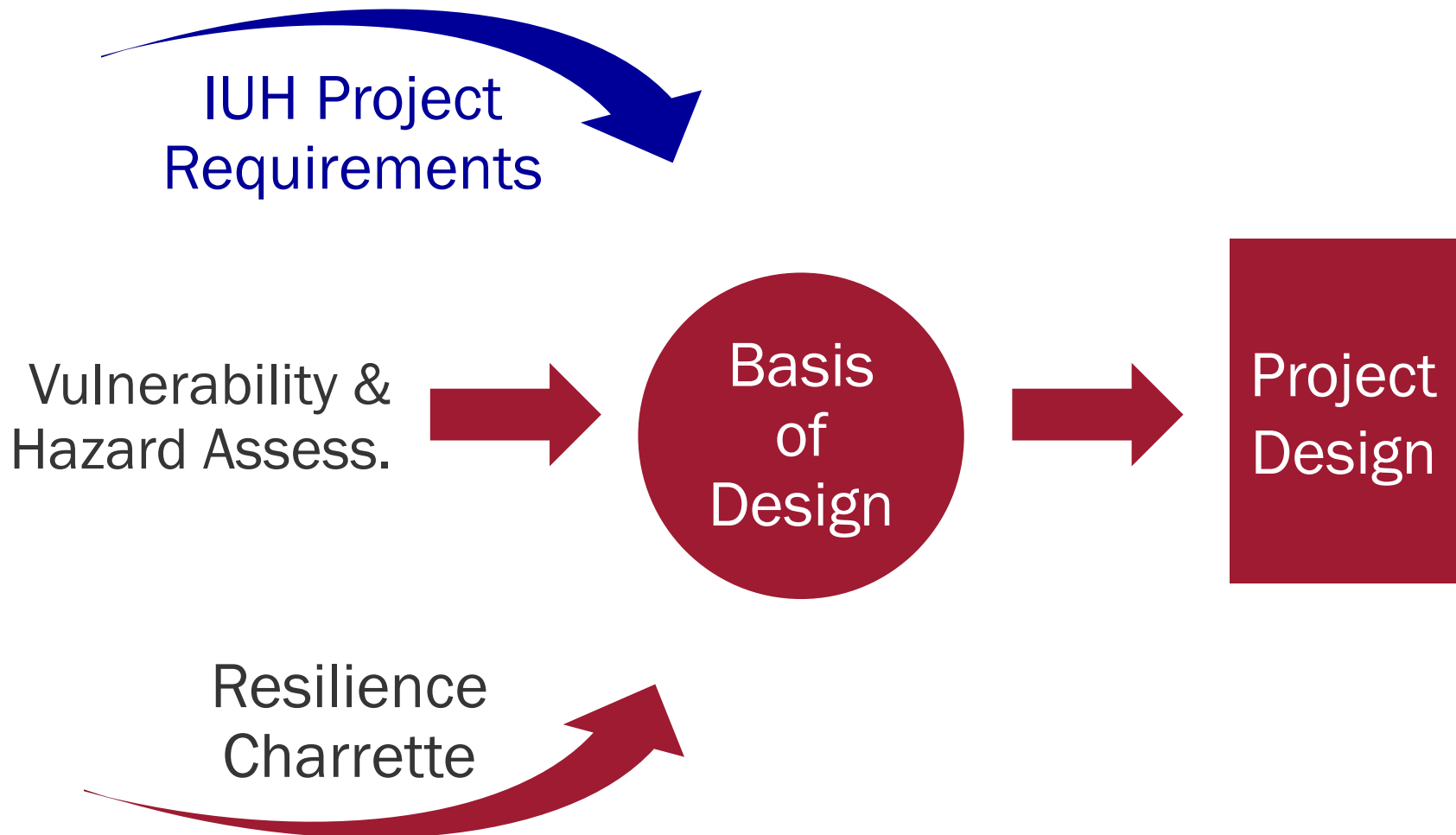
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Expanded Consideration of Risk



Expanded Consideration of Risk



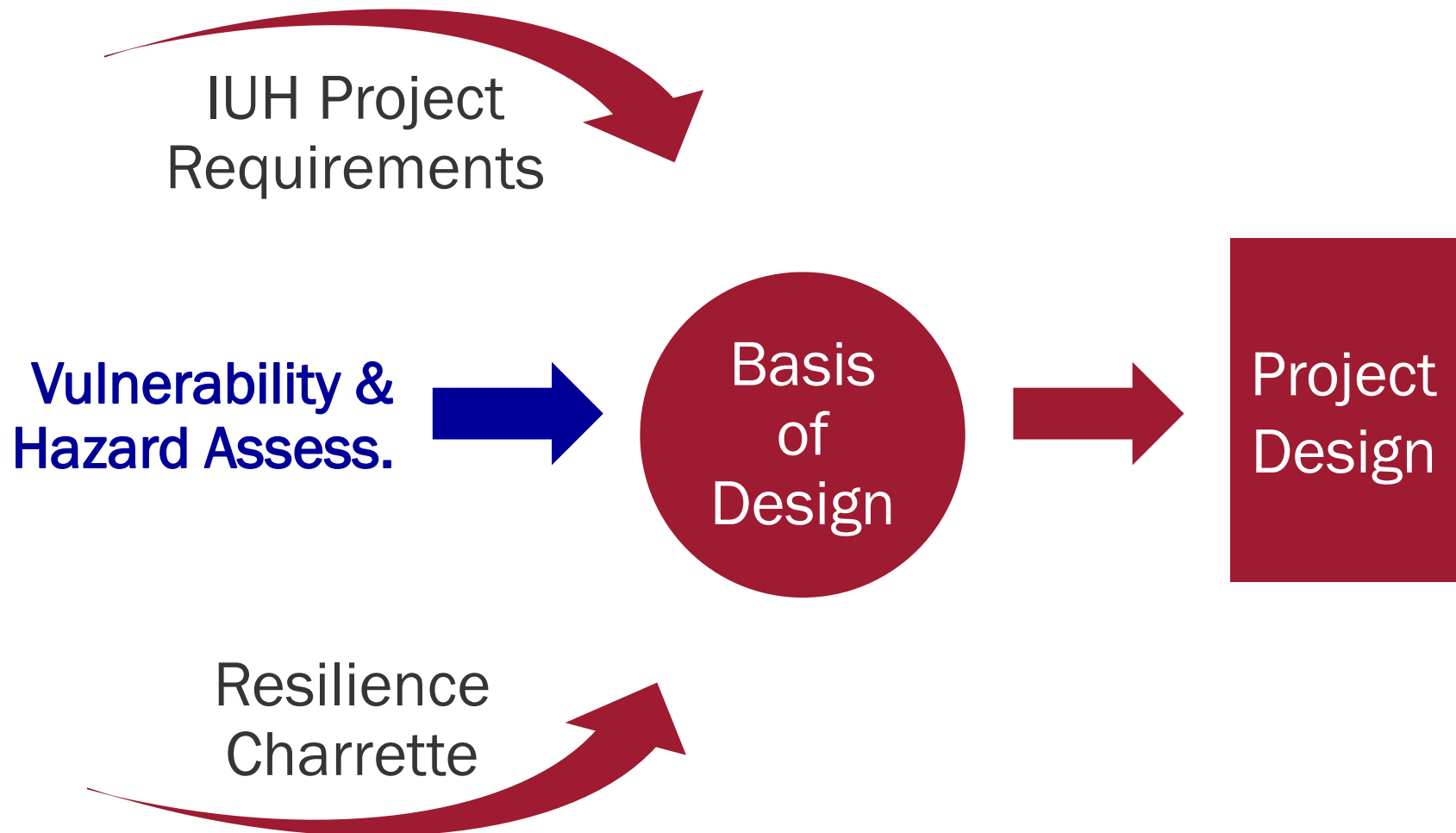
IU Health Project Requirements



IU Health's needs, goals and directives

- Design to address high risks as is reasonable
- 96 hours of operations during disruptive events
- Incorporate IU Health's Hazard Vulnerability Assessment and AEI's Resilience All Hazards Assessment
- Use LEED Resilience Pilot Credits framework

Expanded Consideration of Risk



Hazard Vulnerability Assessment: Probability - Magnitude - Preparedness



Qualitative Hazard Assessment – undertaken with limited data, supports priority setting

Natural hazards

- Pandemic influenza
- Severe winter storm
- Tornado

Human hazards

- Active shooter
- Mass casualty incident
- Bomb threat

Critical infrastructure

- Cyber attack
- Information system failure
- Communications failure

Hazardous materials

- In-hospital spill
- Incident requiring decontamination of staff or patients
- Nuclear detonation

IU Health focus

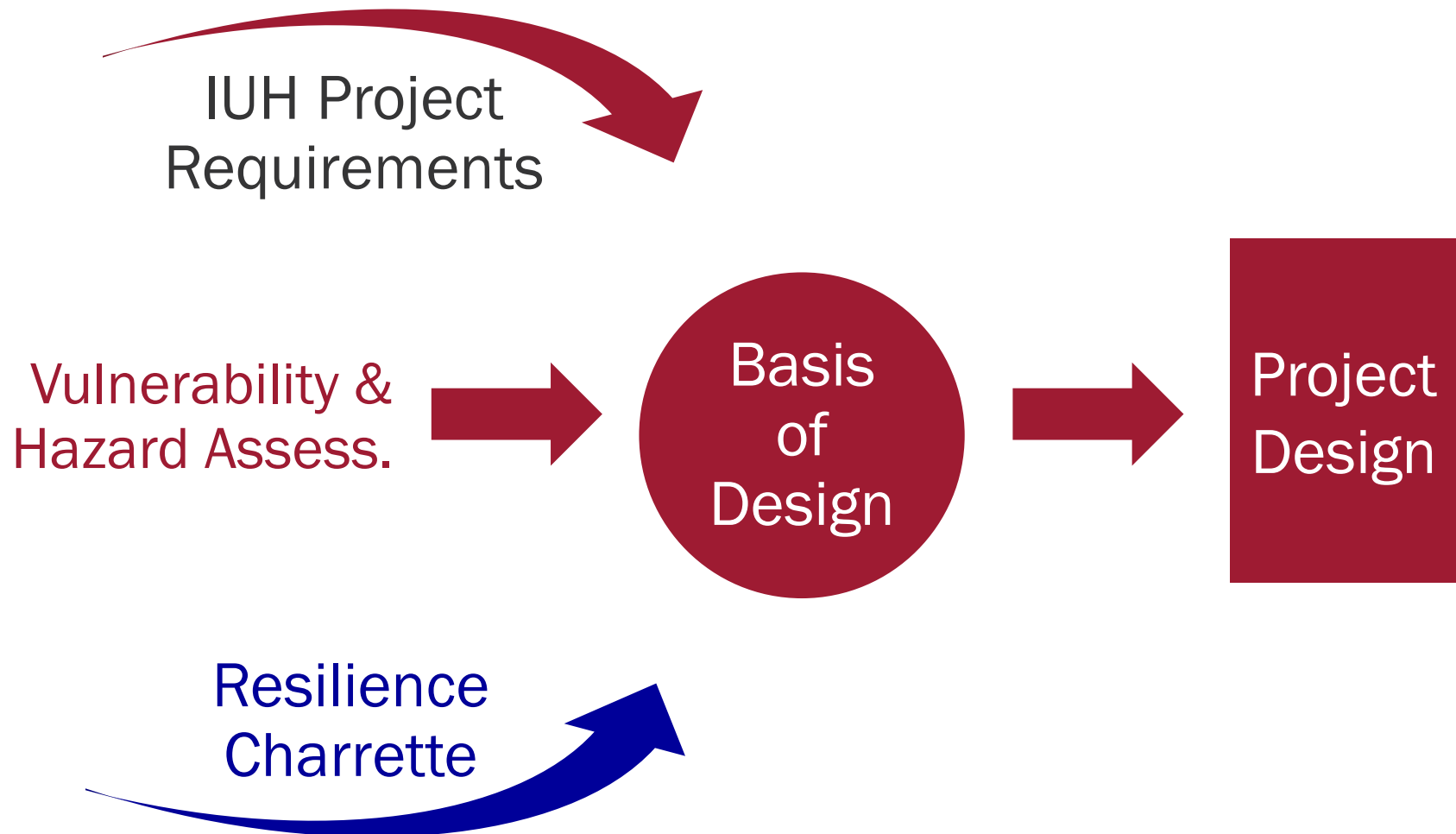
Additional consideration

- Equipment failure
- Fire
- Lightning
- Utility failure

- Drought
- Flooding
- Weather changes
- Earthquake
- Winter storms
- Tornado/
high wind
- Wildfire

- Hurricanes
- Landslides & unstable soils
- Sea level rise, storm surge
- Tsunami
- Sand storm

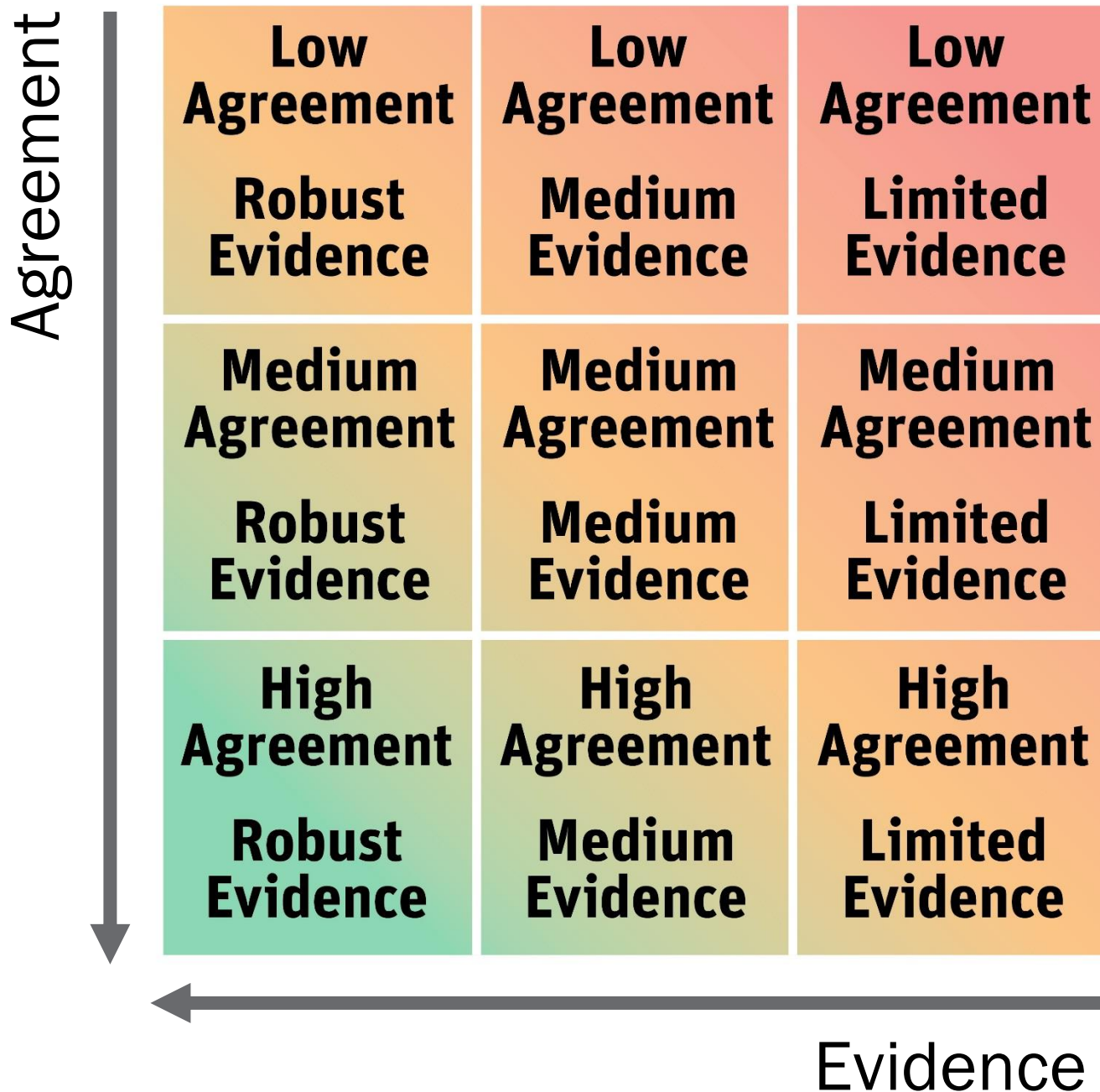
Expanded Consideration of Risk



Resilience Charrette Guidelines



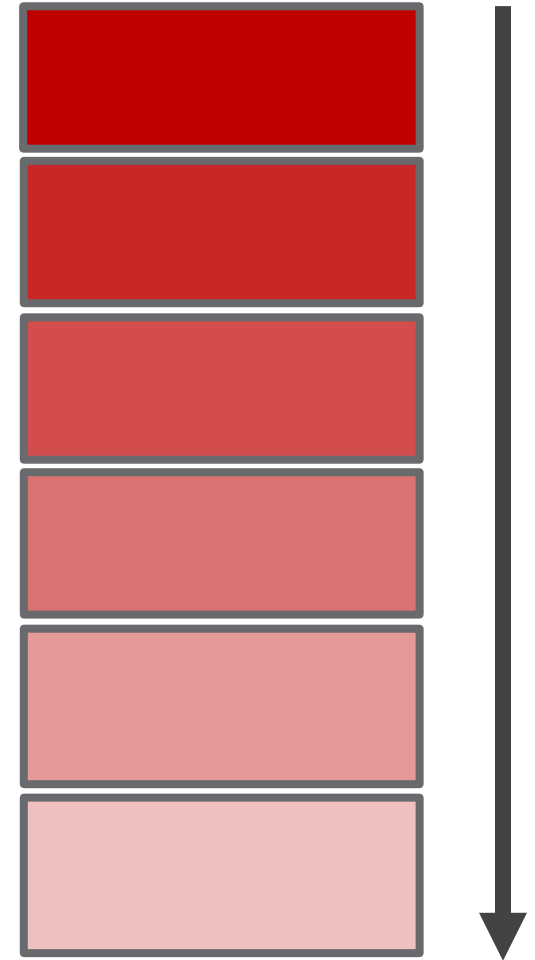
- The project will be designed to meet the resilience requirements of the OPR.
- Buildings will be well-maintained.
- The emergency preparedness strategy is supported through design.
- Projects are designed to align with municipal/regional emergency response plans.



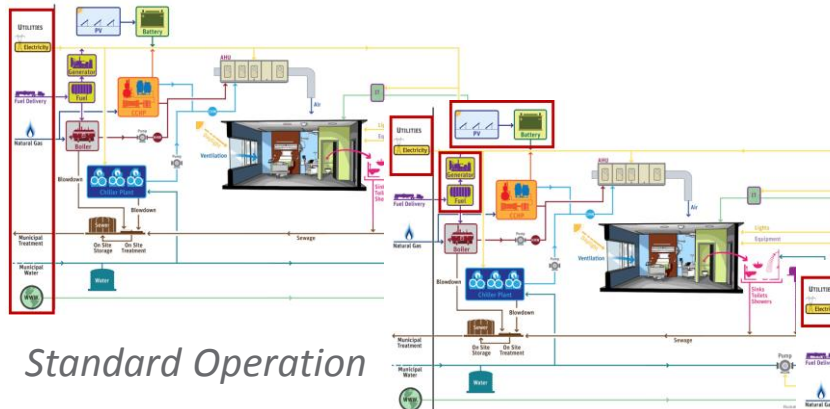
Categorize Space by Resilience Need



- Address needs in critical spaces
 - Thermal comfort
 - Power
 - Water
 - Waste Management
- Can we provide natural ventilation in critical spaces?
- Can spaces be flexible for changed use needs during hazard event?

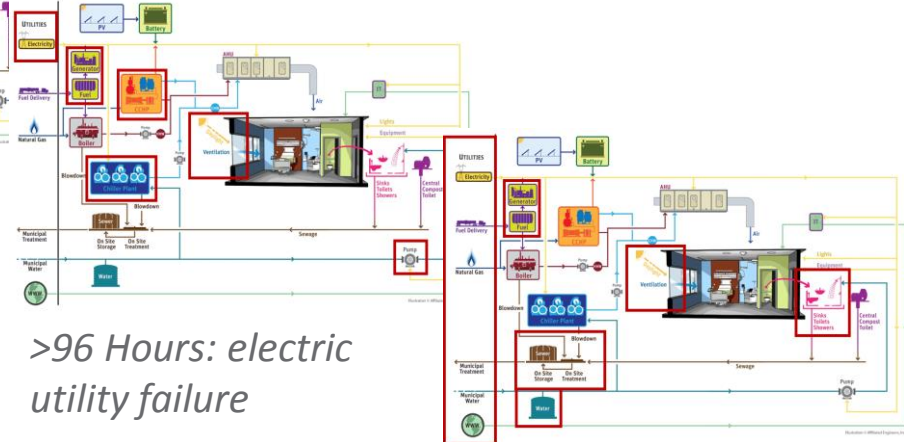


Resilience Charrette – Failure Scenario Exercise



Standard Operation

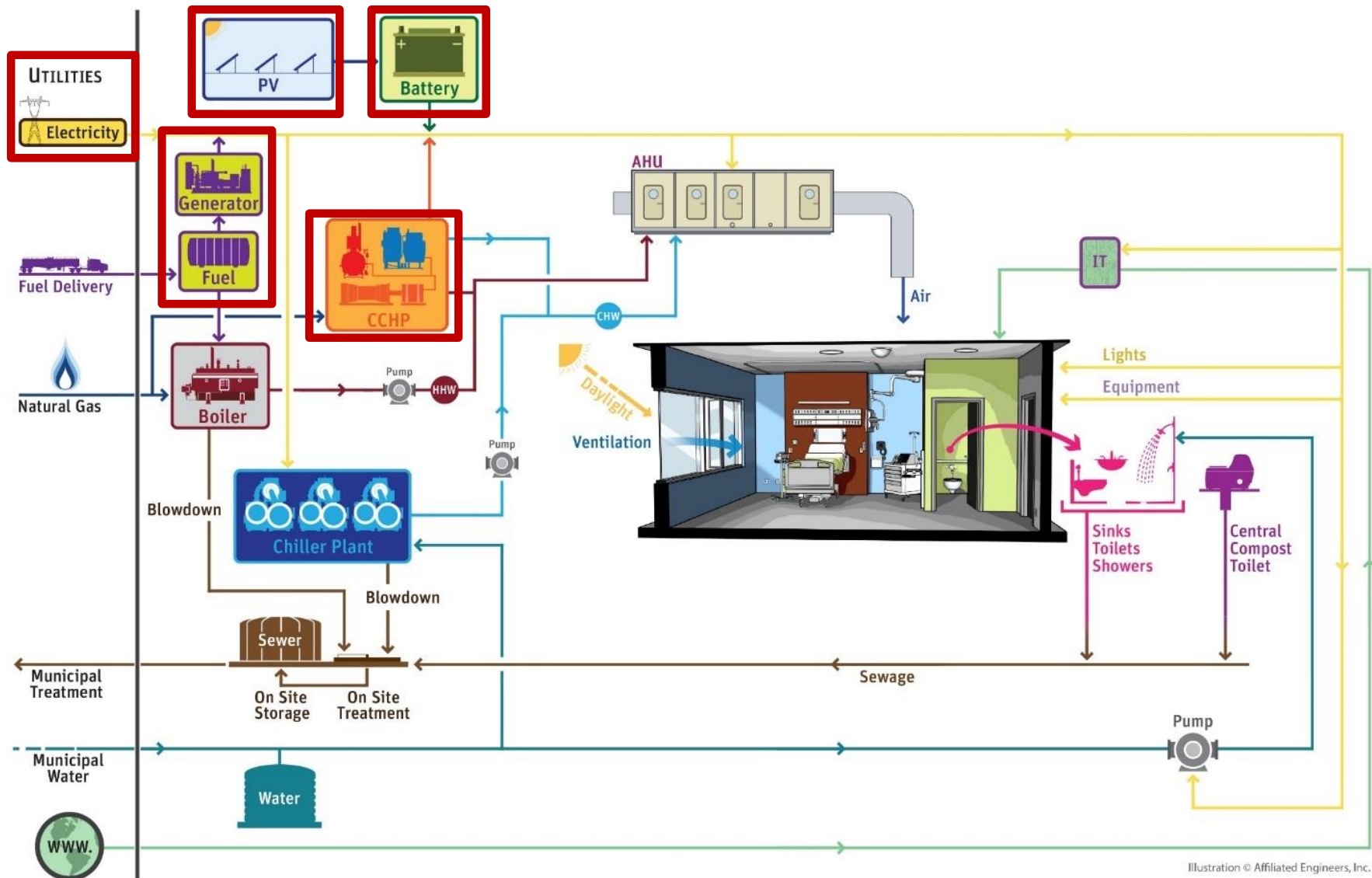
*<96 Hours: electric
utility failure*



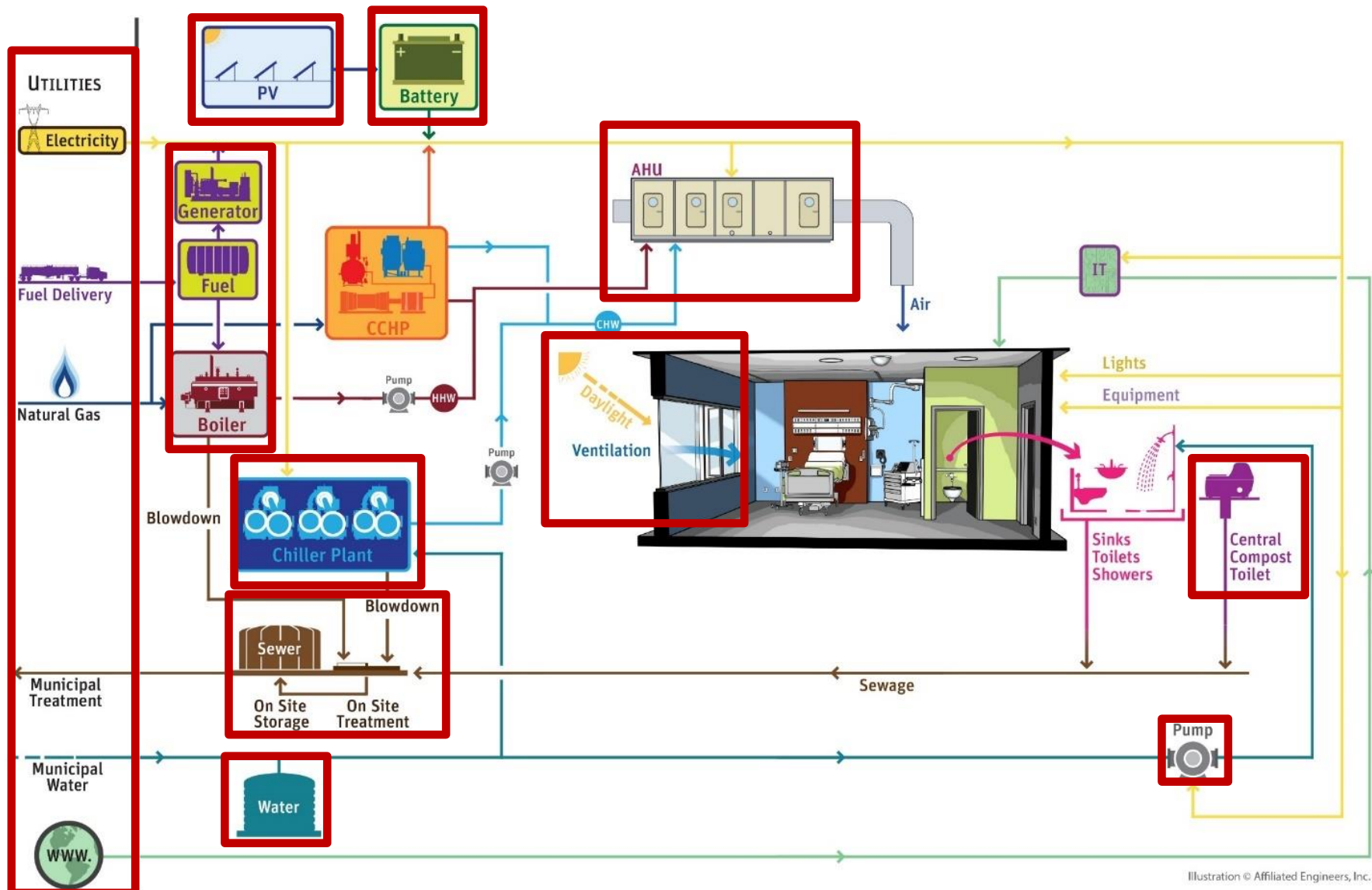
*>96 Hours: electric
utility failure*

Catastrophic Event

Resilience Charrette – Electrical Utility Outage



Resilience Charrette – Catastrophic Failure



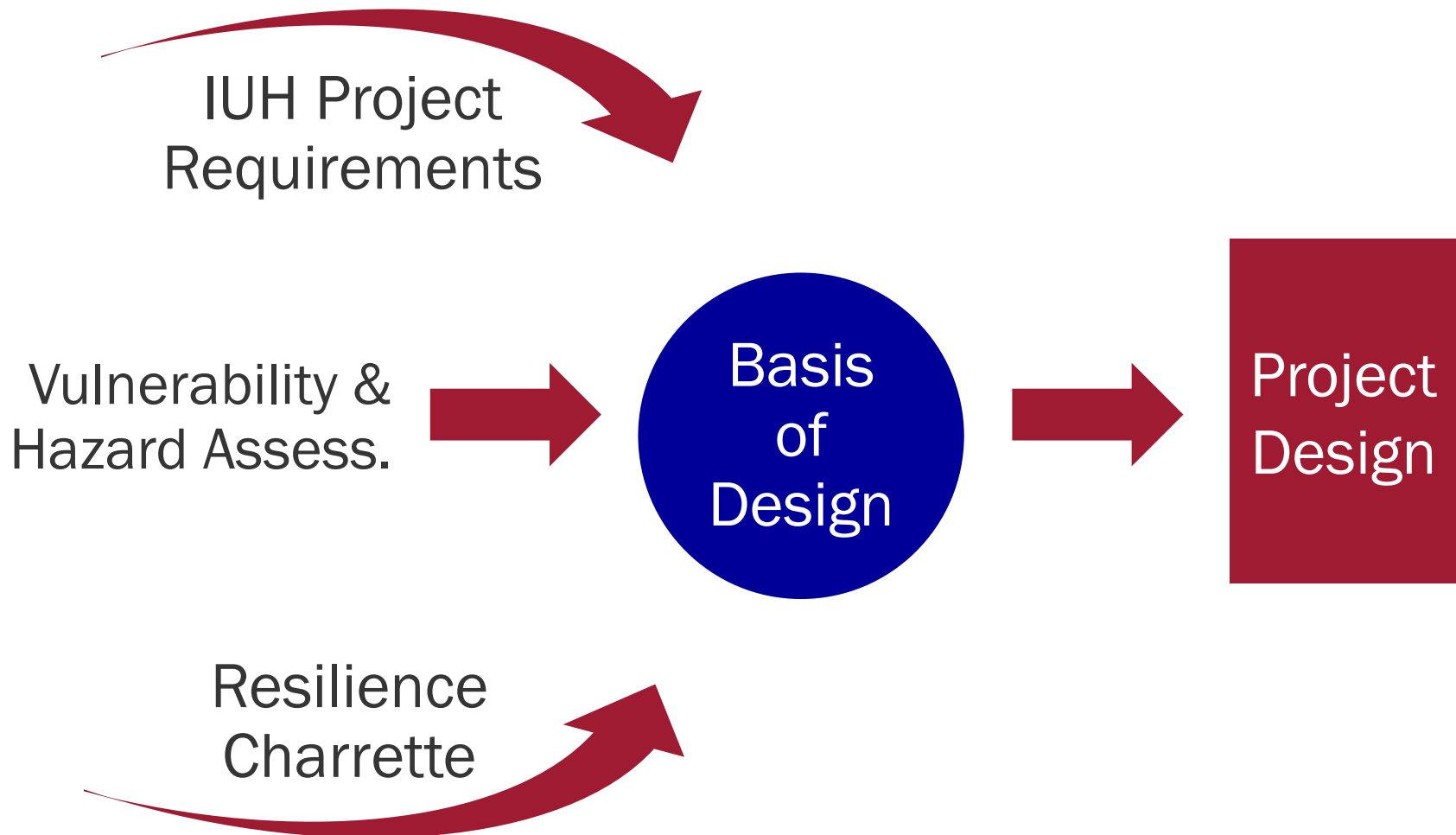
Resilience Results



Well-articulated commitment to specific metrics & details



Expanded Consideration of Risk



Example Quantitative Metrics



- 96 hours of operation during disruptive events
- Energy Star score of 75
- LEED v2009 Gold
- 50% less potable water than baseline



Conclusions



- Process, process, process!
- Collaborative, collaborative, collaborative!
- Meet early, discuss often
- Overcome ownership challenges



Thank You



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