
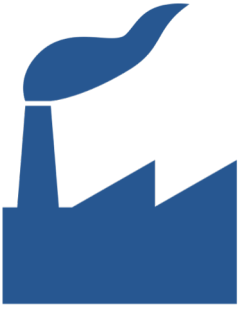



Building Information, Inhabitant, Interaction and Intelligent Integrated Modeling (BI⁵M)

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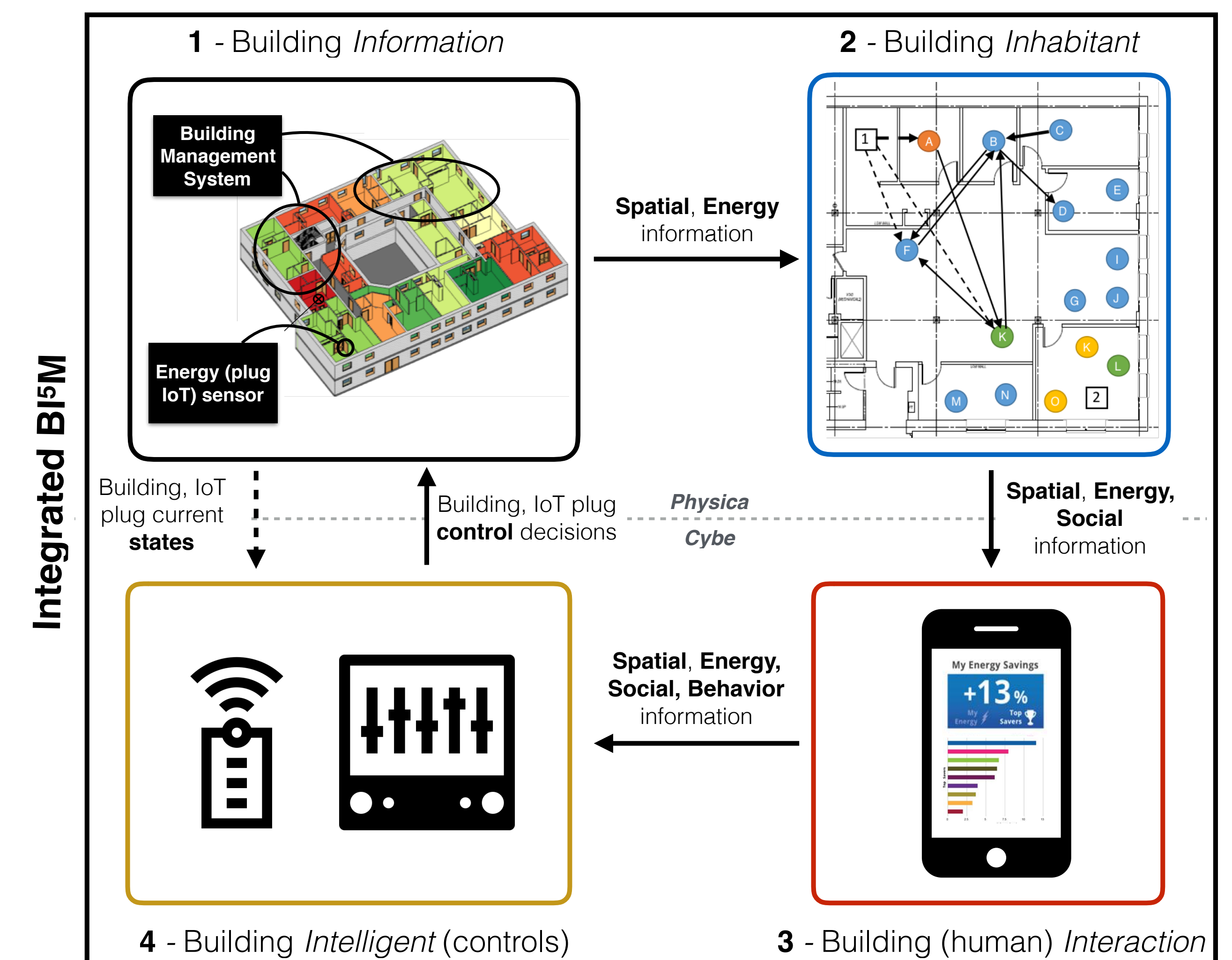
Challenge: *Our buildings are broken*

-  \$400B annually for power, heating, and cooling
-  Largest producers of environmental emissions
-  Low occupant comfort and satisfaction

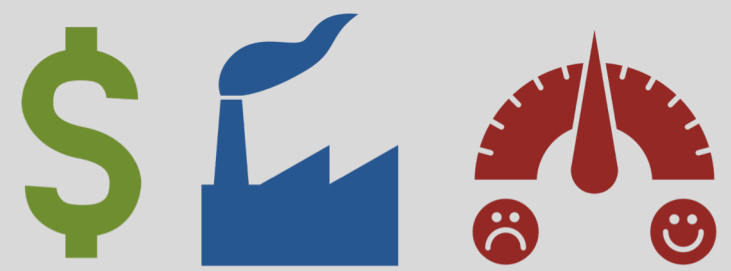
We require a new cyber-physical control paradigm that is capable of leveraging the two-way linkages between a **building's physical systems and layout** and **occupant behavioral dynamics**.

Solution: BI⁵M

Our proposed *integrated* approach combines physical building *information* with cyber *inhabitant* and (building-human) *interaction* models to enable *intelligent* control of commercial buildings.



Expected Broader Impacts

 Reduce energy consumption / costs / emissions from buildings + improve occupant satisfaction / productivity

Integration of research into pedagogy for participating subjects, students and industry practitioners (e.g., facility managers, startups)



Broadening participation in computing through collaborative hackathons with Girls who Code

Expected Scientific Impact

- + Dissemination in leading cross-disciplinary journals
- + Extension of integrated human-in-loop methods to other cyber-physical systems where physical – human boundary is critical:

- Power grid
- Autonomous vehicles
- Public transit
- ...



* Dollar by Shashank Singh, Feedback by Cuby Design, Factory by Nicholas DeForest, Autonomous Car by Effach, Transmission Tower by Stephen Plaster, Subway by Dan Hetteix, Green city by Chameleon Design, Learning by Gregor Cresnar from the Noun Project