Building Design and Site Attribute Predictors of Physical Activity *(and some thoughts about policy opportunities)*

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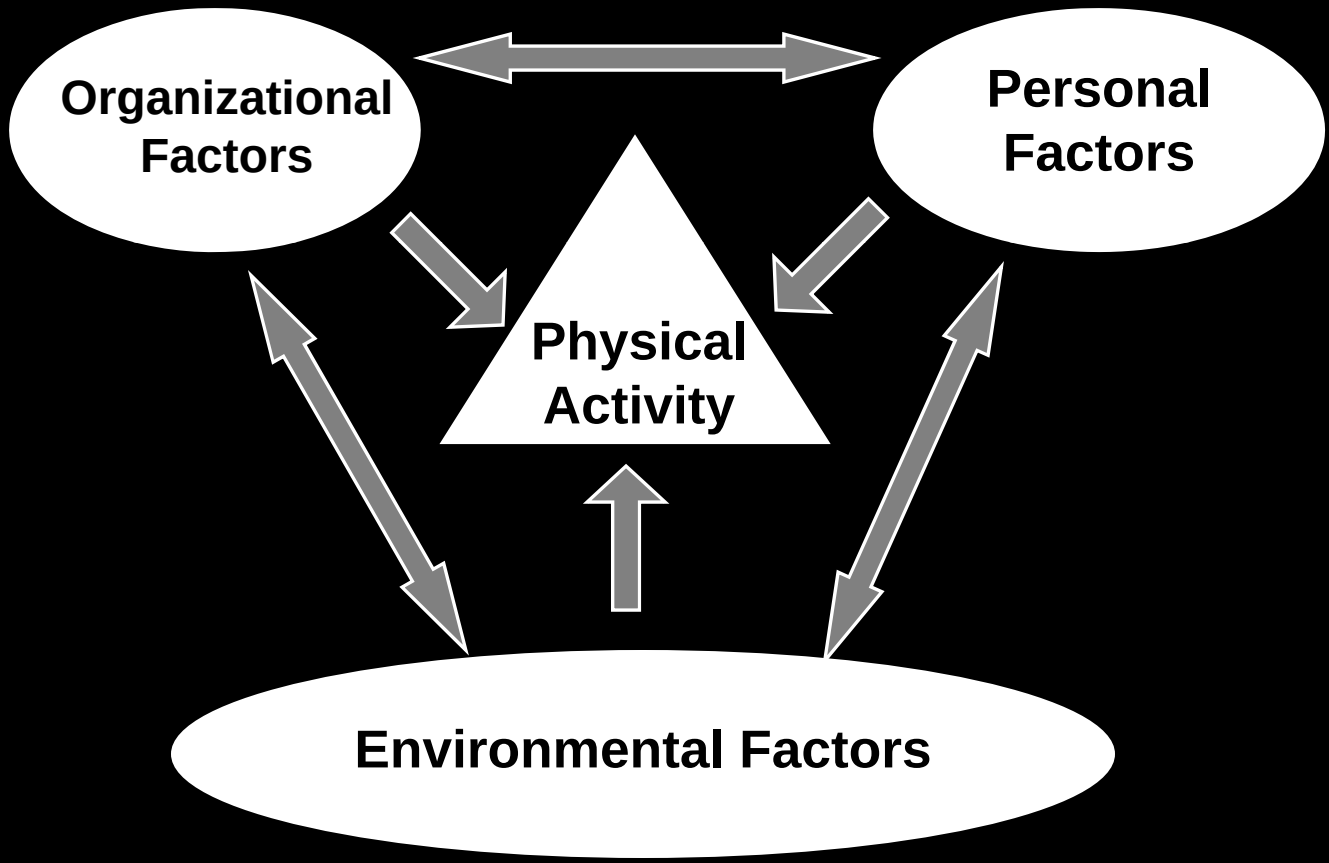
Outline

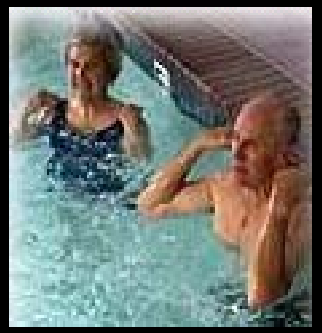
- What do we know about how characteristics of buildings and sites affect physical activity?
- Low-hanging lettuce: Policy-development opportunities

What factors likely affect people's decision to be active?



Physical activities in or near buildings

- Walking
- Biking
- Stair climbing
- Running
- Use of indoor exercise facilities on/off site
- Use of outdoor facilities on/off site
- Occupational/ household activities



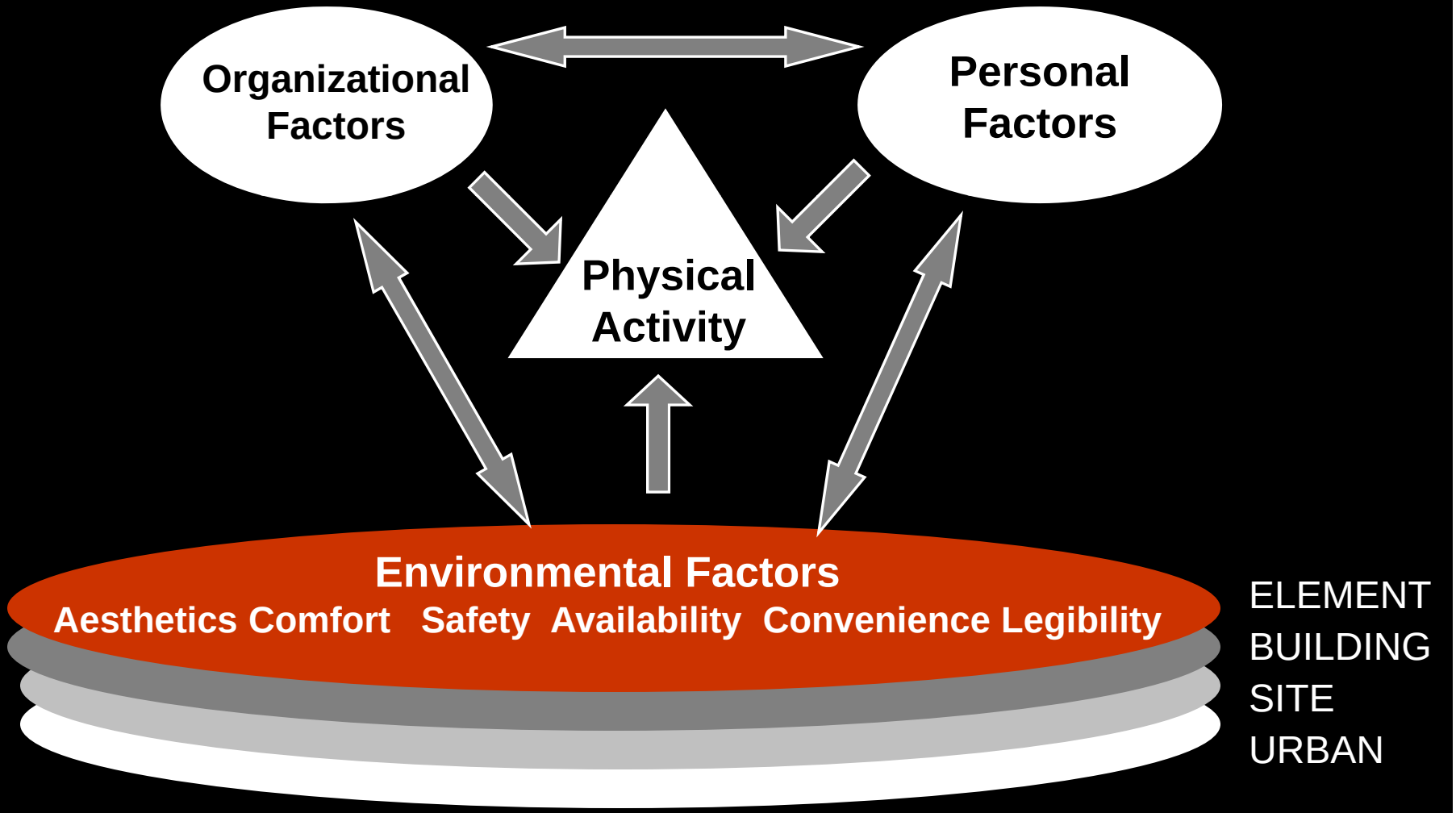
Why will people do physical activity?

Intentional

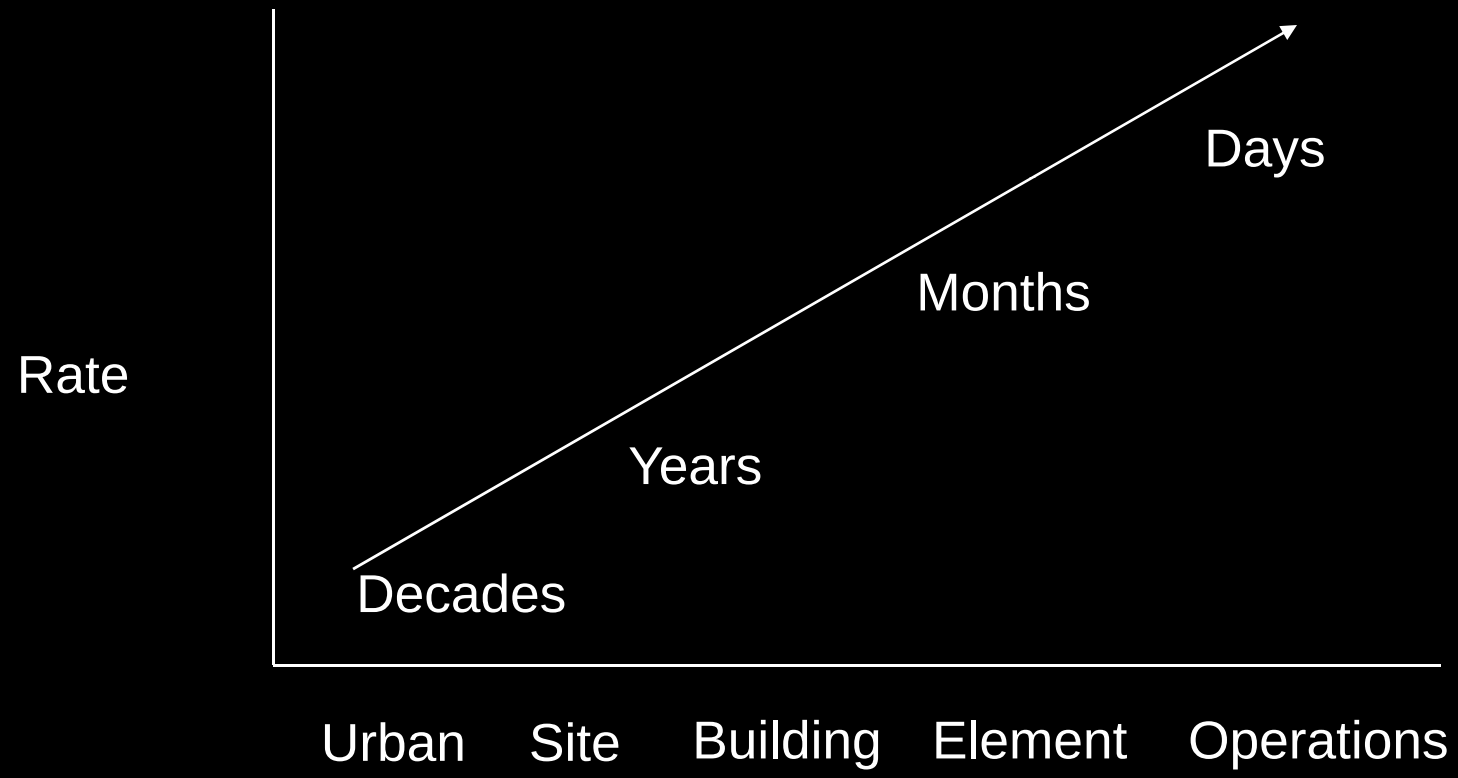
Incidental

Hybrid

Environmental Factors at Different Scales



Scales of Change



Element Design: Stairs

If people spent two more minutes per day going upstairs, they would burn an extra 5800 kcal per year, or 1.6 pounds…The average weight gain for US adults from 1990 to 2000 was 1 pound per year

Source: Jim Sallis Ph.D., San Diego State University, Andy Danenberg, CDC

Source: Kerr, Nicole Angelique MPH, Centers for Disease Control Stairwell Project slide set

Harvard Alumni Health Study

In a study of more than 11,000 men, climbing at least 20 floors per week resulted in a 20% lower risk of stroke or death from all causes

Source: Lee & Paffenbarger, 1998; Lee, personal communication

Stair Use Statistics

Stair Promotion Studies

Motivational Signage

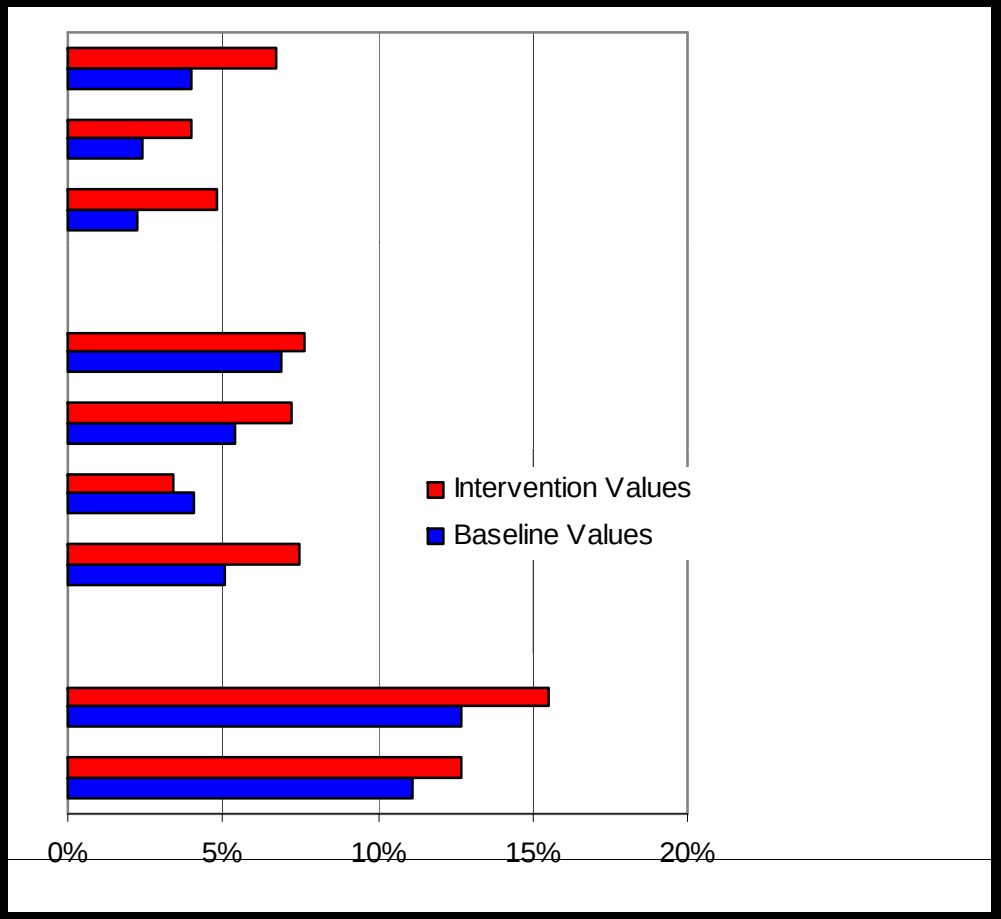
Kerr J., Eves F., & Carroll D. (2001)

Motivational Signage

Anderson R. E., Franckowski S., et al (1998)

Motivational Signage and Aesthetic Upgrades

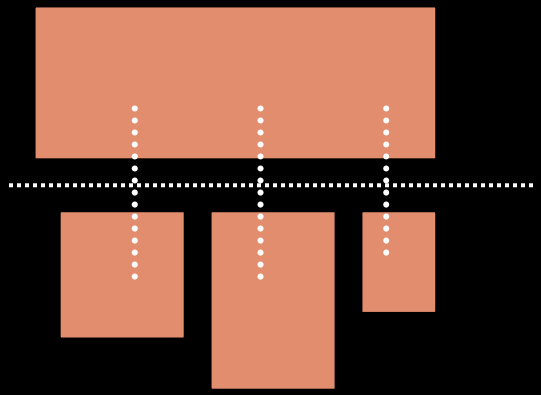
Boutelle, K., Jeffrey, R. W., Murray D. M., & Schmitz K. (2001)



Percentage stair use

Building Design

- Building design: programming →schematic design → design development → detailed design
- Experiential qualities of buildings are global, relational and local



State of the Evidence
Element Design

Stair Design

- Point-of-Decision Prompts/Signage increase stair use (Anderson, 1998; Balmey, 1995; Brownell, 1980; Coleman, 2001, Kerr 2001)
- Attractive stairs encourage stair use (CDC, 2002, Boutelle, 2001)

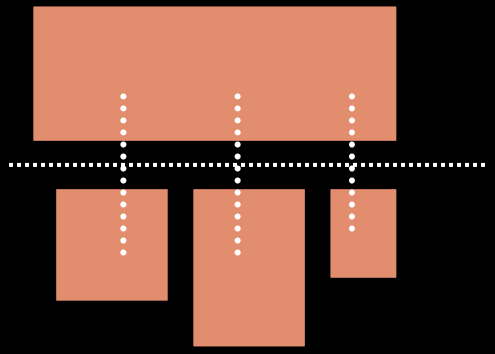
Exercise Room Design

- Views into activity rooms encourages use and helps create culture that supports physical activity (Regnier, 1994)
- Views to outdoors and activity areas supports use of exercise room (Regnier, 1994)

State of the Evidence

Building Design: Programming

Layout and Configuration



Layout and configuration impact walking behavior at the building level (Peponis et al., 1997; Ul-Haq, 2001; Gross& Zimring, 1992)

Activity Programmed Areas

Locating activity areas in central, visible areas promotes use (Regnier, 2002)

Providing shower/change facilities in buildings supports biking and walking to work (Vouri, et al.,1994)

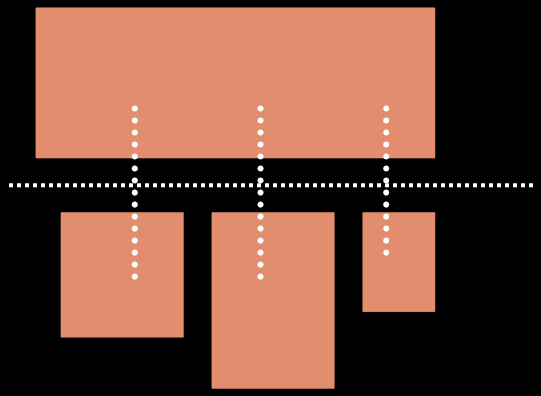
Activity Inducing Areas

Attractors motivate pedestrian movement (Turner & Penn, 2000)

Providing visual connections aids wayfinding within buildings (Regnier, 2002)

Building Design: Programming & Schematic Design

Layout and Configuration



Activity Programmed Areas

Activity Inducing Areas

Building Design: Design Attributes

Design studies suggest that walking is increased by:

- Well integrated circulation with good wayfinding
- Seating spaces provided for support and rest
- Wide corridors
- Well lit paths
- Views to activity areas and outdoor spaces.
- Attractive routes (finishes, artwork, color, style)

Site: Site Design

Size matters, connectivity to off-site, connectivity within site and amenities

•**Barriers to walking are perceived crime, bad weather, lack of enjoyable scenery, lack of perceived safety, difficulty in walking and not seeing others exercise** (Clark, 1999, Henderson and Ainsworth, 2002; Wilcox, et al., 2000; Booth, Owen, Bauman, Clavisi, & Leslie, 2000)

•**Pedestrian amenities such as visible sidewalks, seating areas and support features influence walking** (State of Louisiana, 1998; Regnier, 2002, Turner &Penn, 2000)

•**Aesthetic qualities of the site influence walking** (Lee, 2000; Rapoport, 1977)

•**Office workers (long term) are willing to walk longer distances to parking** (Pushkarev and Zupan, 1975, Seniveratne, 1985)

Site: Site Selection

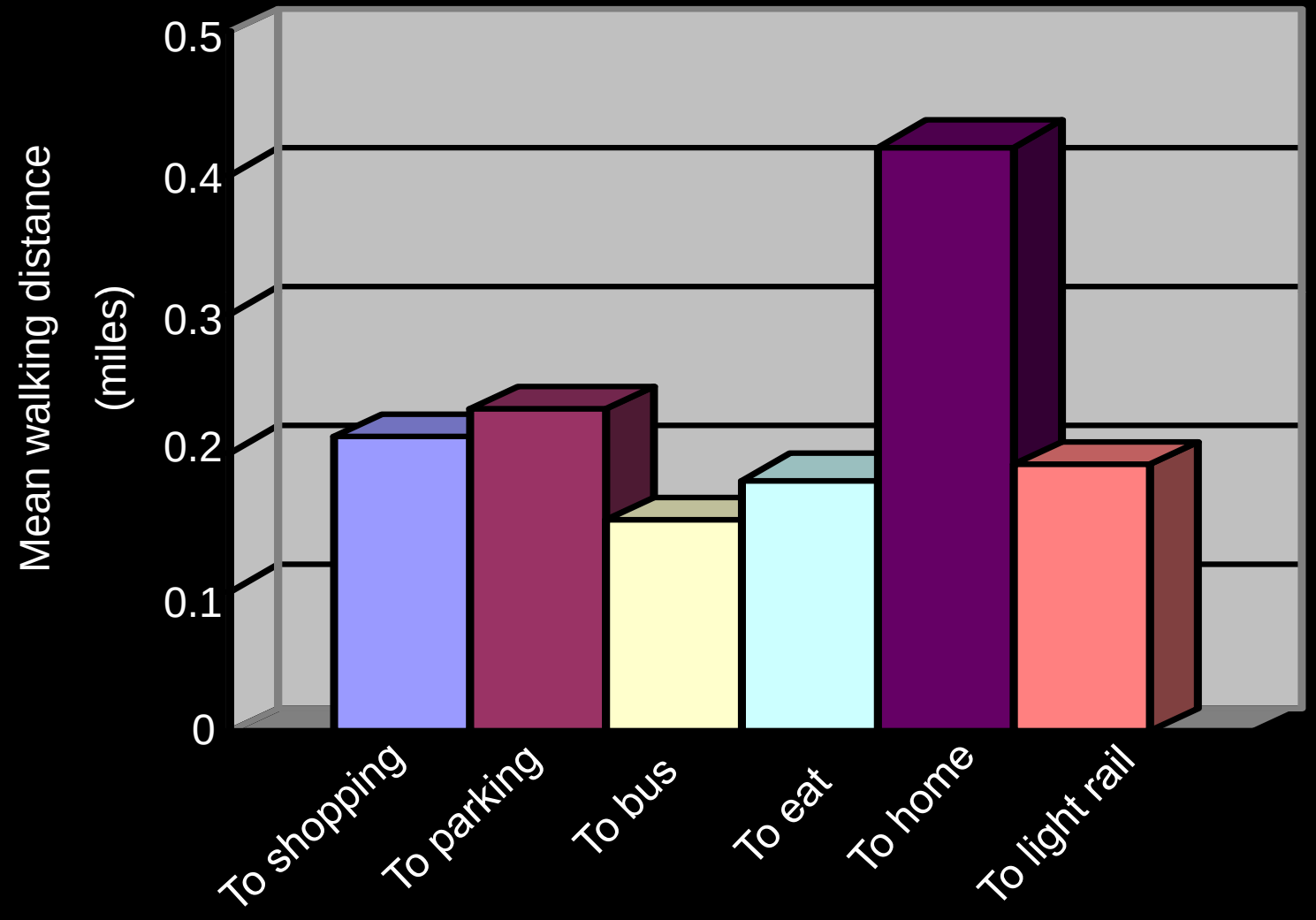
It matters where you locate the building:

- **Older adults who live in areas within walkable distance of green areas such parks and tree-lined streets live longer** (Takano, et al., 2002)
- **Older adults who reported shops, parks and beaches close to home were more likely to be physically active** (Carnegie, 2002)
- **Connections between public transit and workplace increase walking trips** (O'Sullivan S & Morrall, J., 1996; Seneviratne, P.N., 1985)
- **Public office buildings are walking trip generators** (Zacharias, 2000)
- **Under the right conditions individuals undertake non-work walking trips at work These conditions are:**
  1. Nearby trip destinations
  2. Connectedness and integration to surroundings
  3. Optimum walking distance

(Pushkarev and Zupan, 1975; Seneviratne, 1985; Wegman & Jang, 1998; Hillier, 1993, Berrigan & Troiano, 2002).

Mean walking distances from work

(Seneviratne, 1985)



Research Opportunities

- **Establish baselines**: How much do people walk before, during, and after work? What are the trip-types?
- **Develop and validate global, relational and local measures**: building layout, views, local attractiveness, task support
- **Explore selected urban-scale variables in sites and large buildings:** destinations, route quality, connectivity
- **Element Design**: How does stair design and location affect use? How do views into activity areas affect use? How can we construct long interior paths?

Research Opportunities

- How do views to others exercising impact individual decision making?
- What are the roles of attractors in generating movement? Nature and types of attractors?
- What is the role of pedestrian amenities (fountains, seating, bike racks, etc.)? Facilities? (exercise rooms, changing/shower rooms)
- What are appropriate measures? (objective vs. self-report; operationalization of design elements)

Building Design and Site Attribute Predictors

- What is a working model for studying links between building and site characteristics and physical activity? What is the state of the evidence?
- What are the possible points of intervention to produce more activity-friendly sites and buildings**?**
- What can we do?

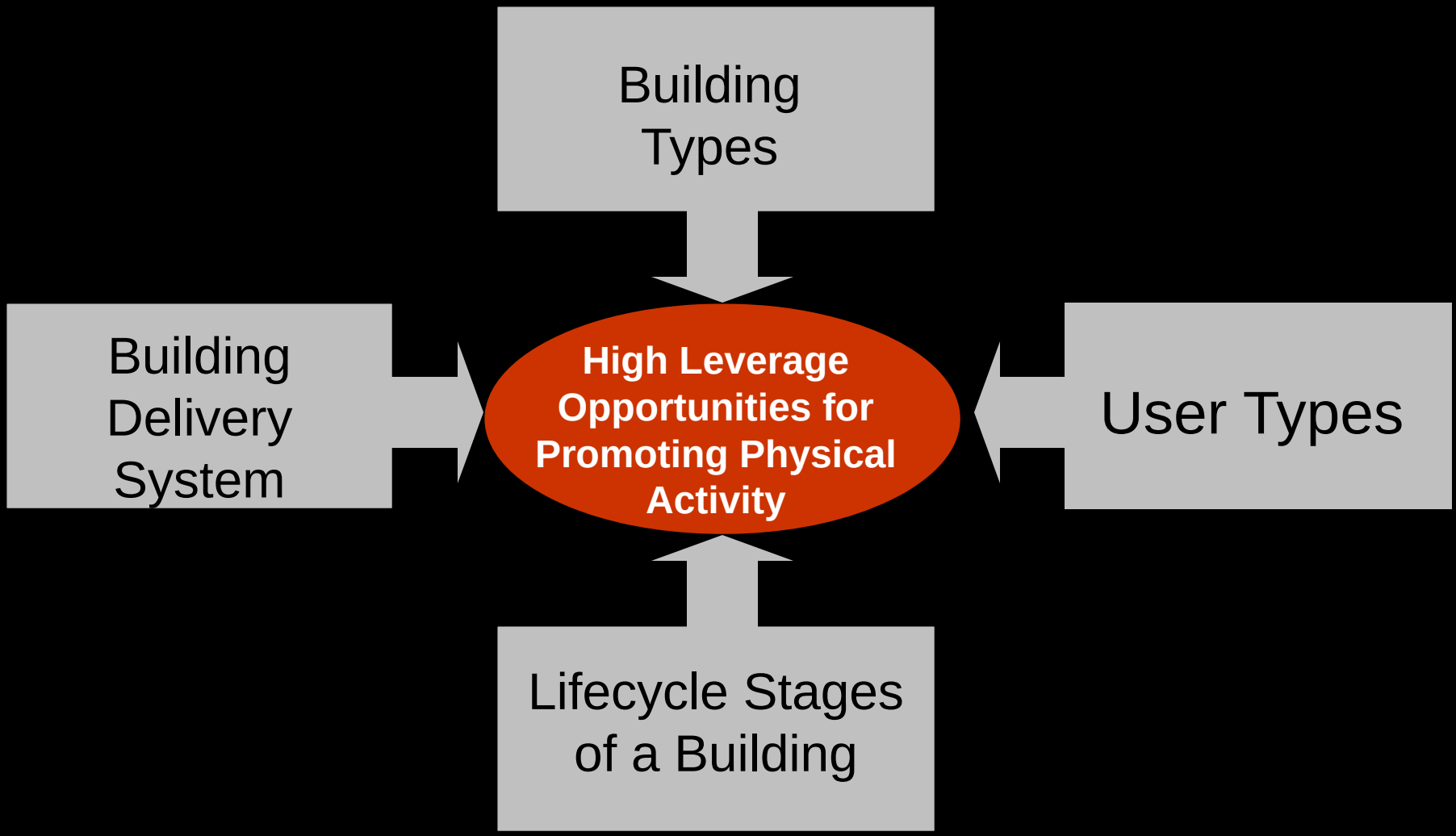
Outline

- What do we know about how characteristics of buildings and sites affect physical activity?
- Policy-development opportunities

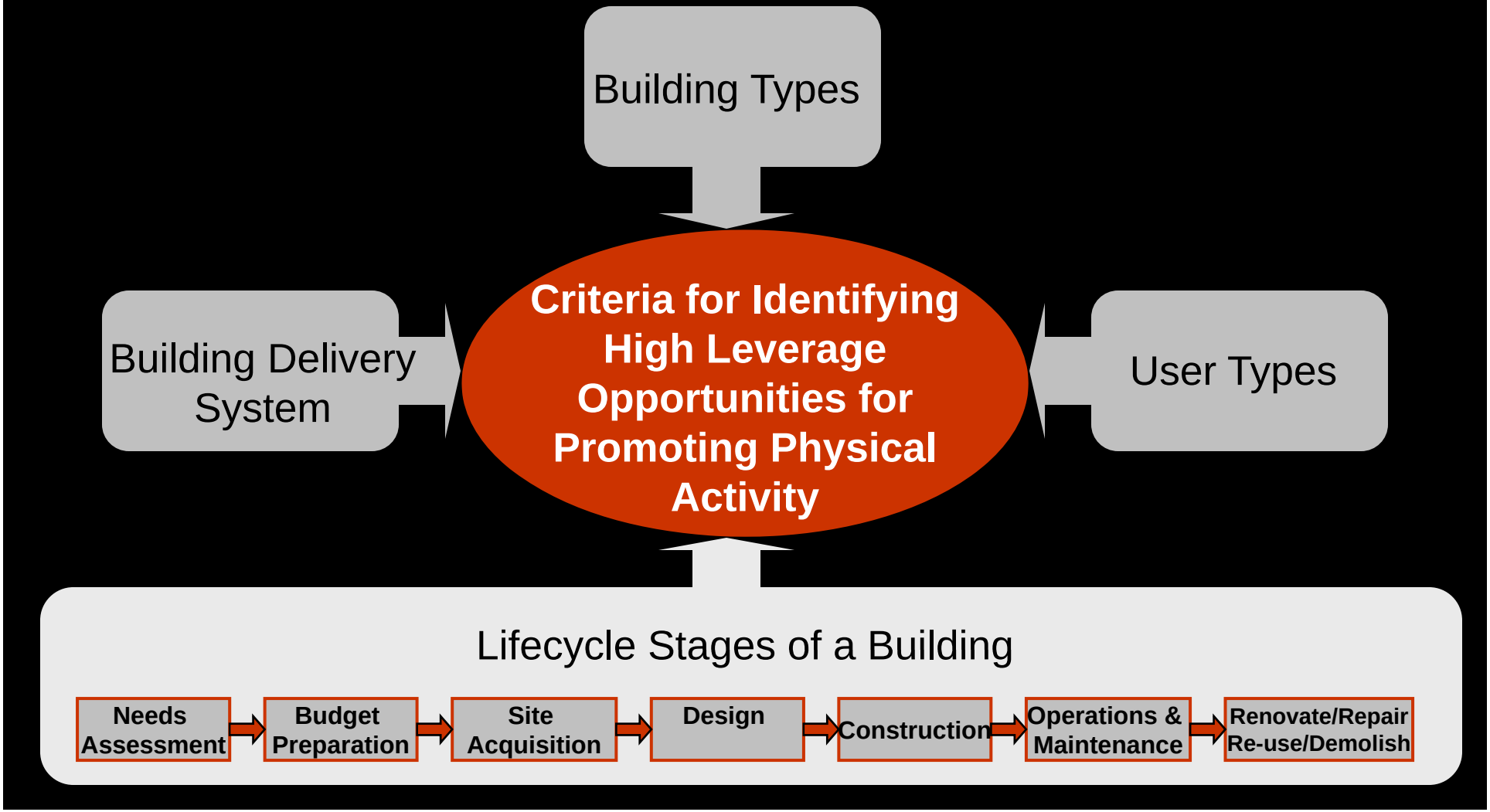
Why public buildings?

- Decision-making is concentrated
- Public agencies have cradle-to-grave responsibility and are programmatic in their perspective
- Public agencies can be innovative
- Public agencies can be catalytic
- Public buildings have symbolic importance

Aspects of Building Delivery



Identifying High Leverage Opportunities for Promoting Physical Activity



United States Department of General Services (GSA)

Building Delivery Process

Capital Planning

Agency Request
Department or Program

Feasibility Study
GSA

Site & Design Prospectus
GSA

Congressional Approval of Site & Design Prospectus
Congress

Design

Site Acquisition Activities
GSA

ESA, NEPA, Special Studies
Consultants

Pre Design
GSA, Consultant, Client Agency

Preliminary Plans
GSA, A/E, Client Agency

Design Development
GSA, A/E, Client Agency

Construction Dwgs
A/E

Construction Prospectus
GSA

Congressional Construction Prospectus Approval
Congress

Construction
General Contractor, GSA

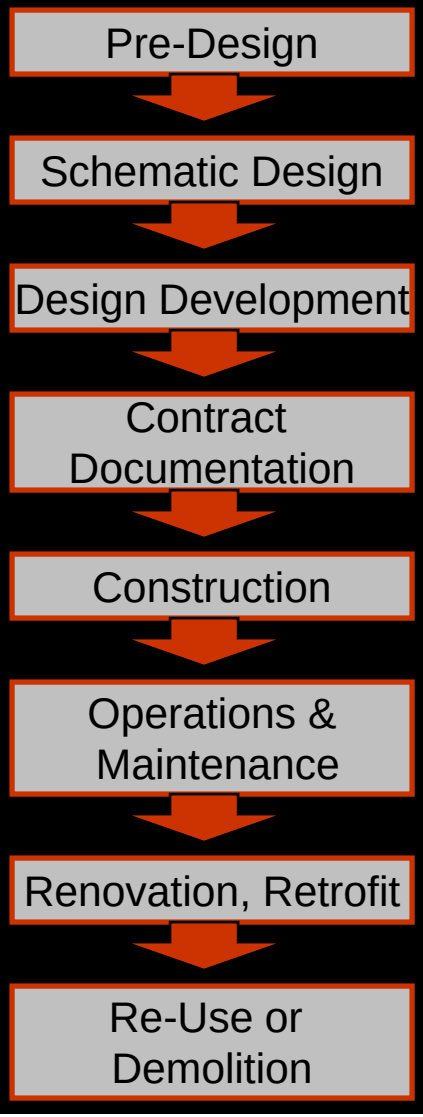
Maintenance / Renovation

Building O&M
Agency, GSA

Renovation/Addition
GSA

Demolition or Reuse
GSA

Phases in the Lifecycle of a Building



The building industry is structured in a systematic manner

There are developed roles and practices that define the participants and their roles in the process

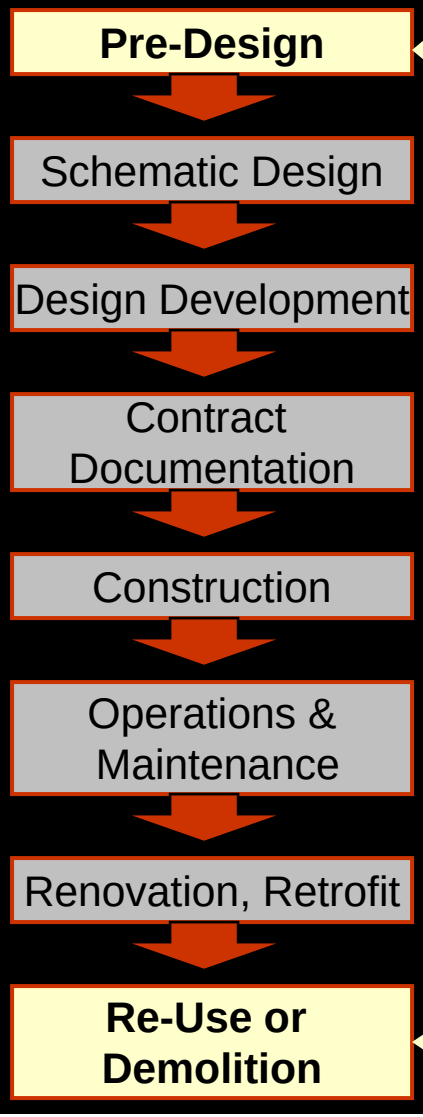
Policy Opportunities

- Develop a learning consortium for top decision makers
- Education modules for students, design professionals, owners, managers
- Certification standards
- Professional recognition and awards

Policy Opportunities

- Develop programmatic support
  - Plug-in **language**: model language for budgeting, programs, commissioning, request for proposals
  - Plug-in **procedures**: health-impact assessment, value engineering, facility performance assessment, balanced scorecards
  - Design guidelines
- Illustrated codes
- Case library with best practice examples (hopefully evaluated!!)

Phases in the Lifecycle of a Building



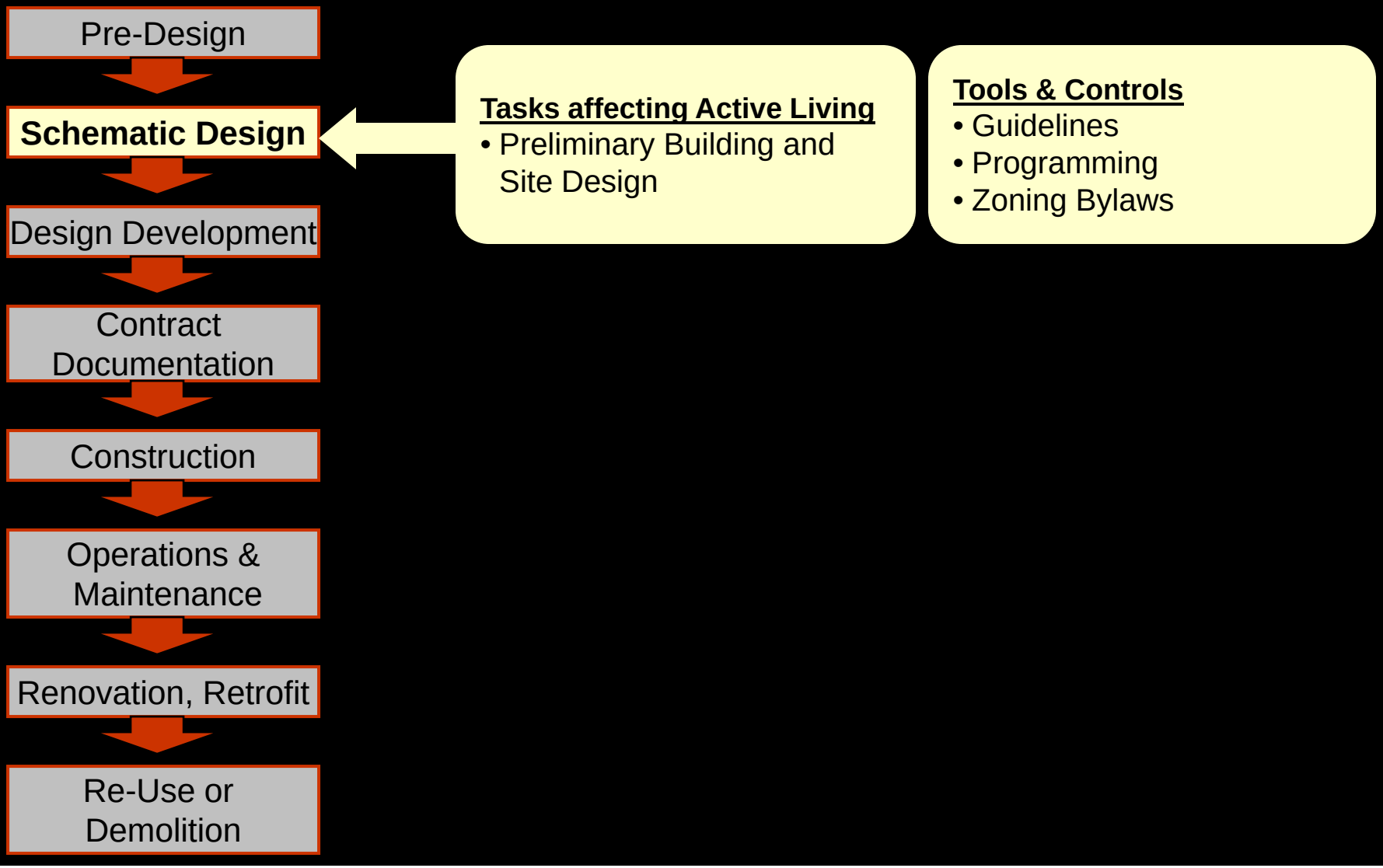
Tasks affecting Active Living

- Needs Assessment
- Protocol Development
- Budget Preparation
- Capital Planning
- Site Acquisition
- Consulting Team Selection

Tools & Controls

- Program Guidelines
- Budget Guidelines
- Assessment Protocols
- Site Acquisition Protocols
- Service Acquisition Protocols

Phases in the Lifecycle of a Building



Phases in the Lifecycle of a Building

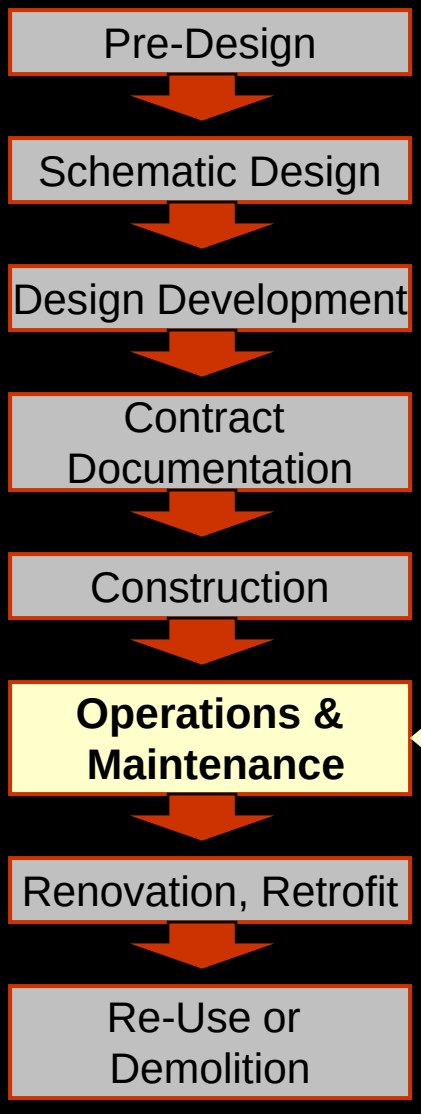
Tasks affecting Active Living

- Detail Design
- Choice of Materials & Finishes
- Production of Working Drawings & Specifications
- Arch/Eng Co-ordination

Tools & Controls

- Building Codes
- Insurance Requirements
- Project Cost Estimates
- Co-ordination Checklists
- Specifications

Phases in the Lifecycle of a Building



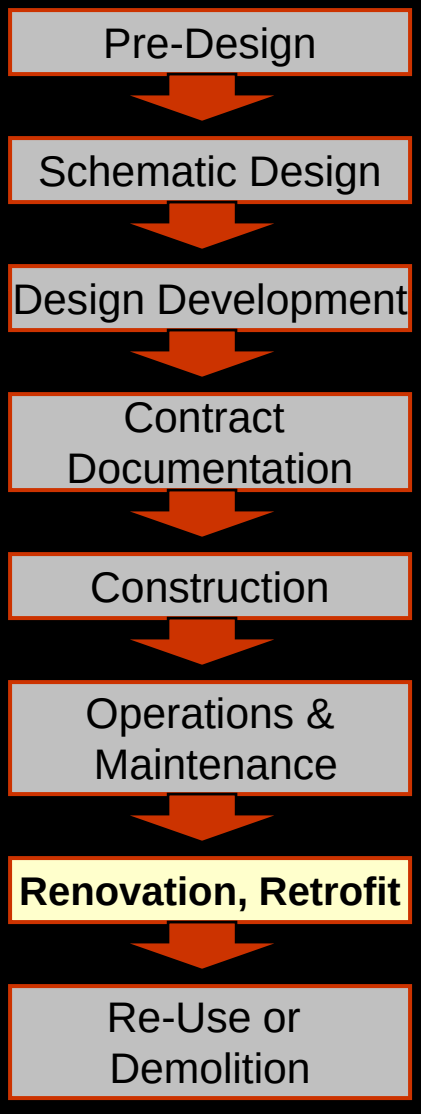
Tasks affecting Active Living

- Maintenance Program
- Repair Issues
- Security Issues
- Tenant Churn and Marketing

Tools & Controls

- Post-Occupancy Evaluations
- Operations Manuals
- Service Programs & Manuals
- Marketing Programs

Phases in the Lifecycle of a Building



Tasks affecting Active Living

- Changes in Material and Configuration of Building to accommodate Program Changes
- Changes in Material and Systems of Building to accommodate Technological Changes

Tools & Controls

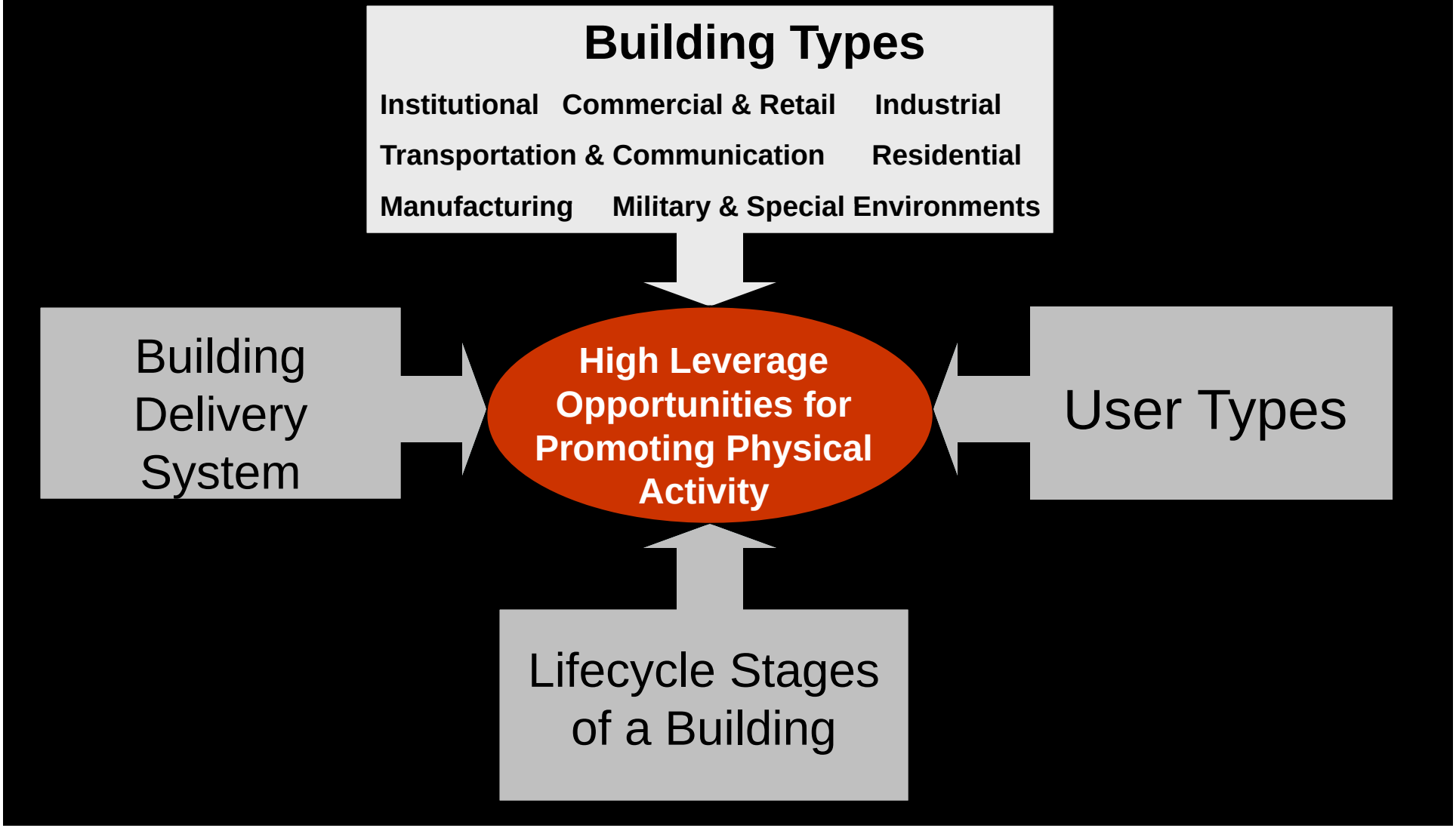
- Post-Occupancy Evaluations
- Building Codes
- Insurance Requirements
- Program Guidelines
- Budget Guidelines
- Assessment Protocols

What's next?

- Research: assess baselines, create measures, examine the role of layout, design attributes, elements on activity
- Implementation: create awareness, buy-in by decision-makers, enlist organizations, create programmatic support

It’s all downhill from here

Aspects of Building Delivery



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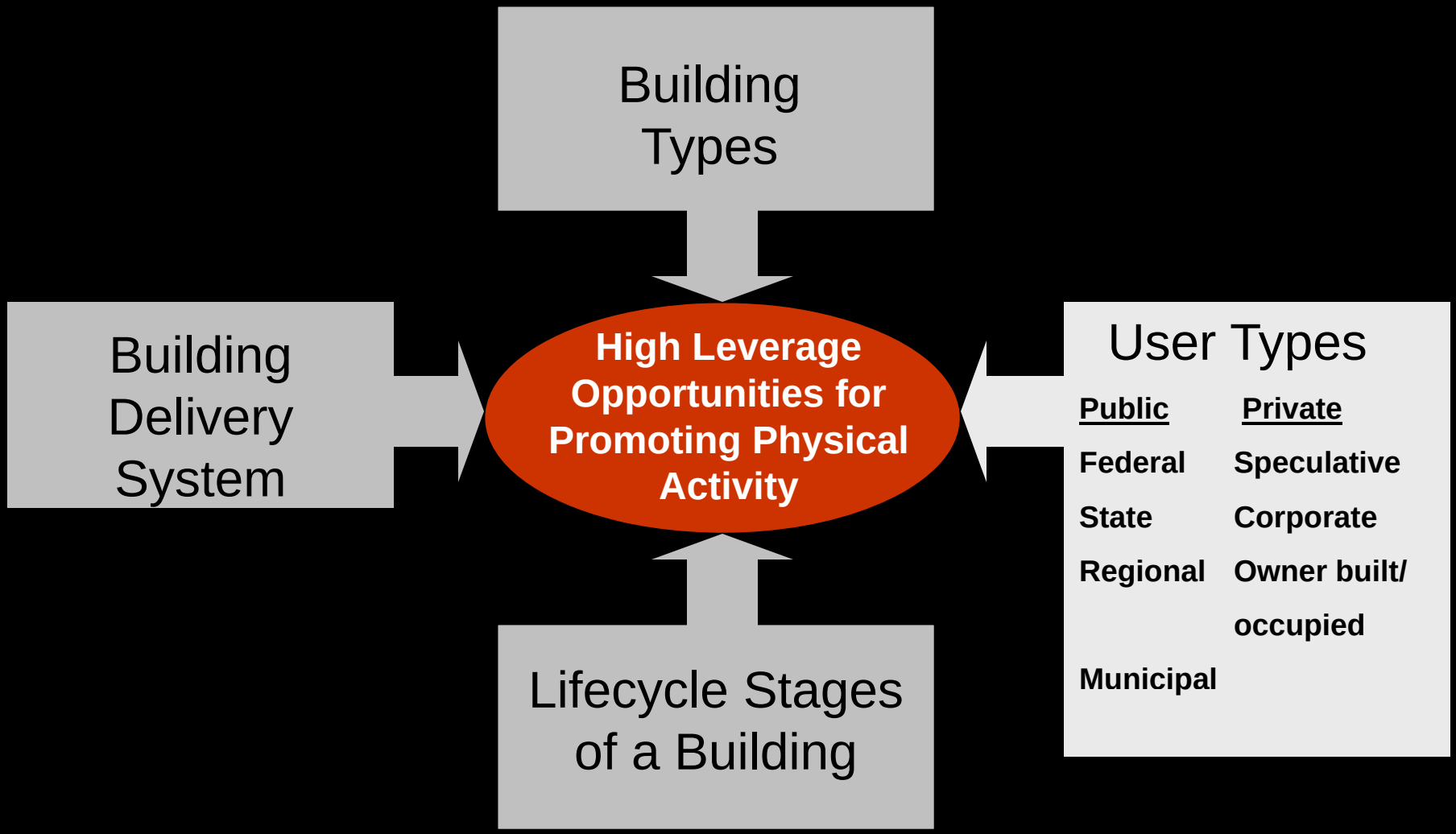

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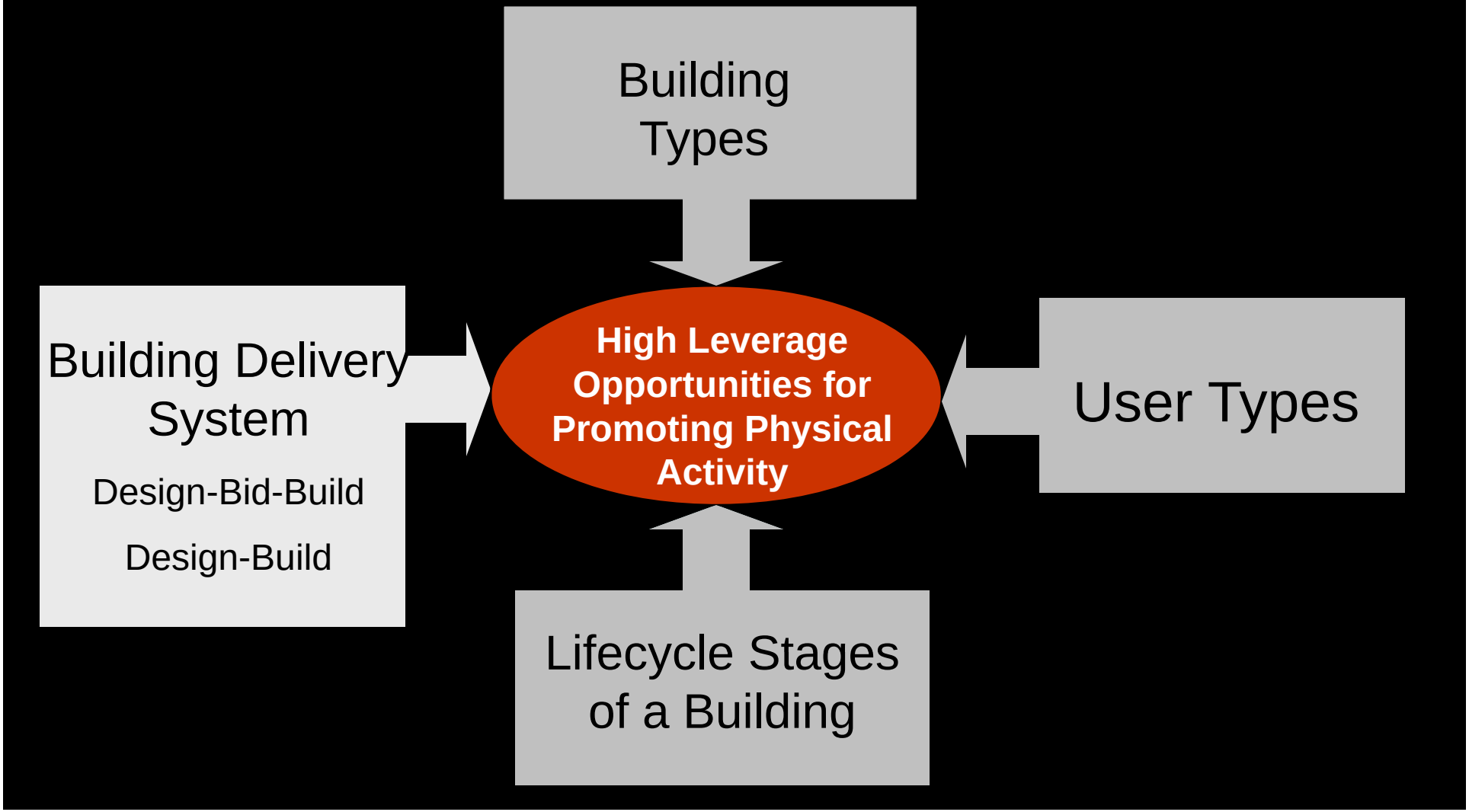

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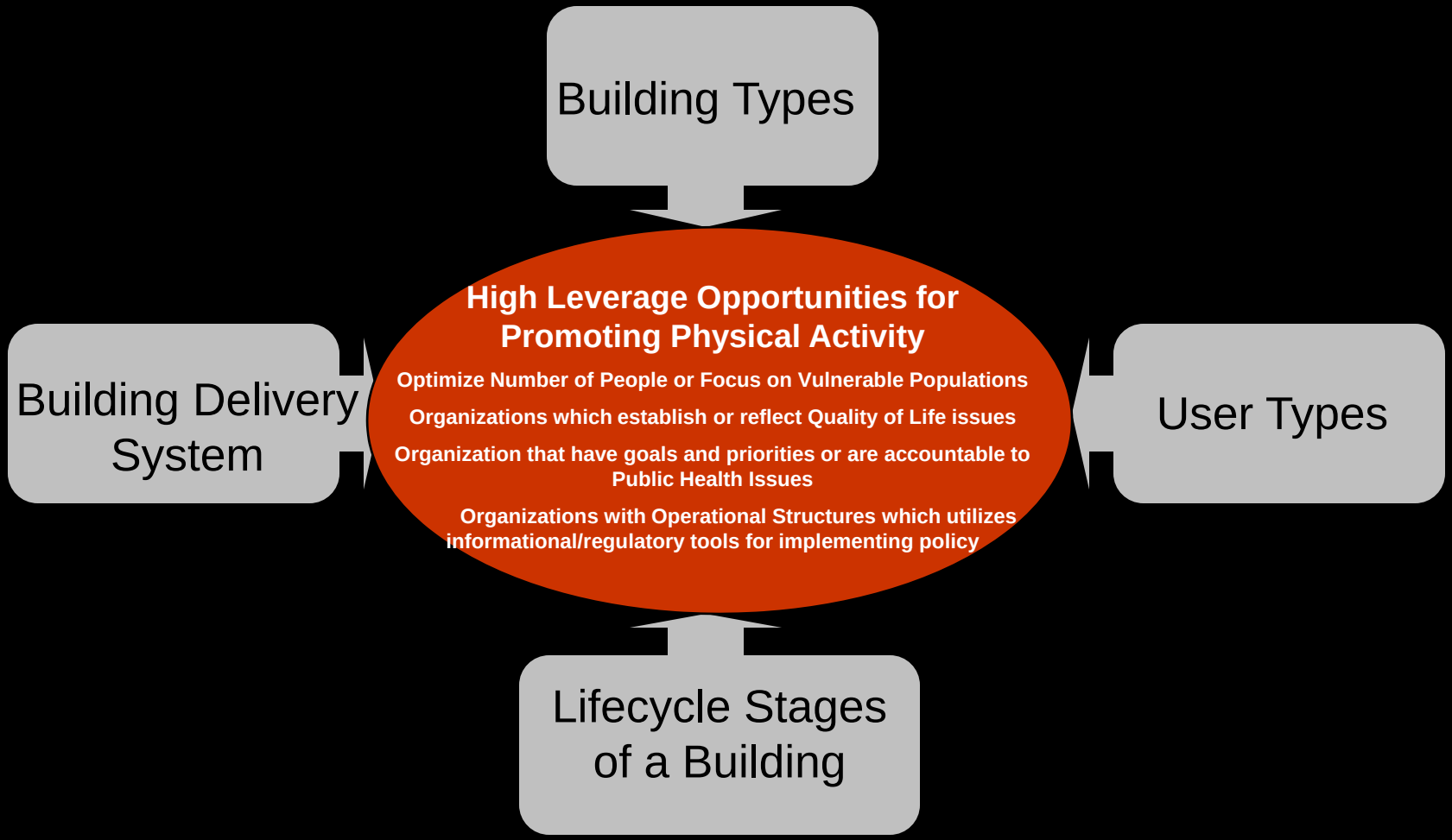
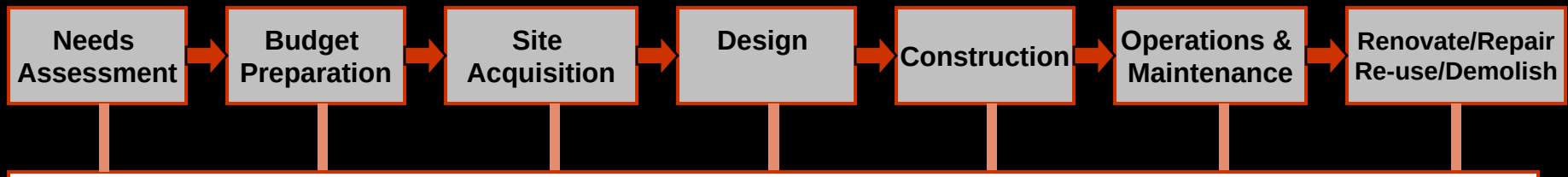


Building Design and Site Attribute Predictors
Presentation Outline

- How does the design of buildings and sites affect participation in physical activity
- How is the building industry structured and where are the high-leverage opportunities for policy, research and implementation?
- **What can we do?**

Action Model



INPUTS

Identify key procedures and participants in each stage of the delivery process where intervention strategies for activity-friendly design can be introduced.

IMPEDIMENTS

Identify the procedures and participants that impede activity-friendly design at each stage of the delivery process.

INTERVENTION STRATEGIES

Identify the specific intervention strategies for activity-friendly design relevant to each phase of the delivery process.

Action Model