

# Performance measures : how do we know what we've got?

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7 November 2008



# “feedback”

- Workplace performance –
  - how workers are affected by and respond to features of their physical work environment
- Building performance –
  - 1. operating costs,
  - 2. effect on building users
- Employee performance - evaluations
- Portfolio performance – asset management



# Measuring building performance

- **‘technical’** – based on measuring systems operation, energy in and out, meeting standards ...
- Using instrument measurements
- **‘human’** – based on user behaviour and feedback, comfort and satisfaction levels, user participation ...
- Using interviews and questionnaires



# Satisfaction surveys?

- Likes and dislikes
- Personal preferences
- Opinion poll
- Built environment as a service not a tool



# Post-Occupancy Evaluation?

- Focused on user satisfaction
- Focused on technical operations (PBS)
- More oriented to social science than to building science
- Possibly replaced with Evidence-Based Design (EBD)



# Functional comfort: support for tasks

- Link to task requirements
- Tools and access to tools part of physical environment
- Minimizes individual differences
- Connects environment with productivity



# User comfort measure of user-building interface

- Physical Comfort

- +

- Psychological Comfort

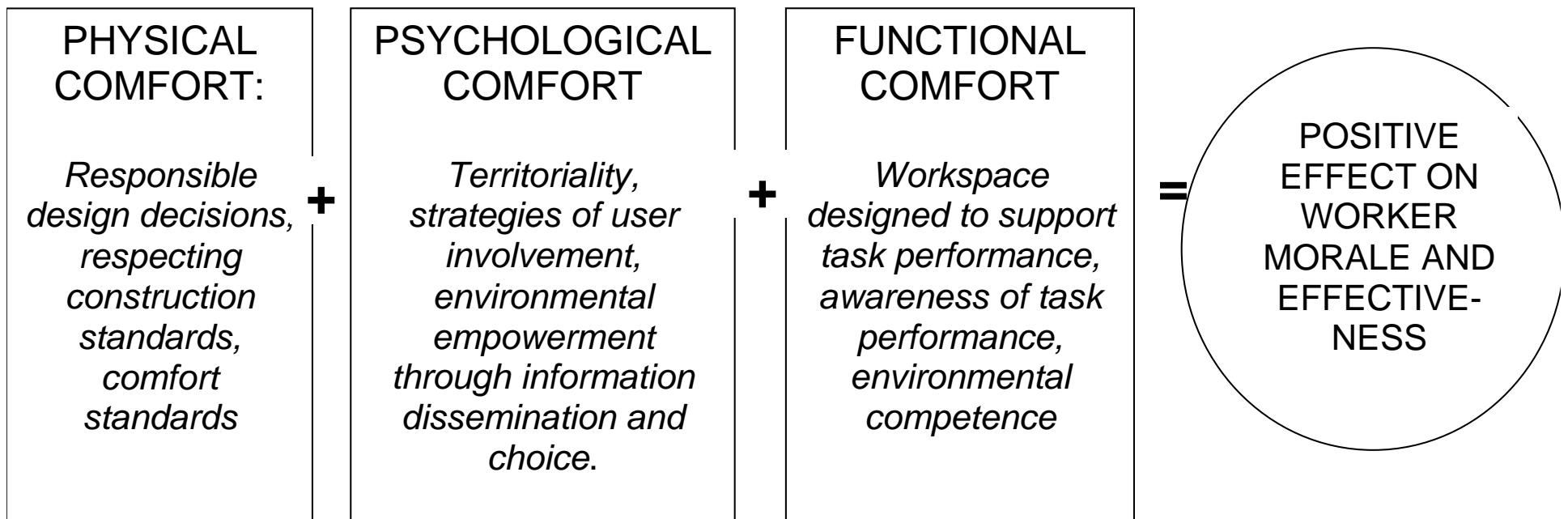
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- Functional Comfort

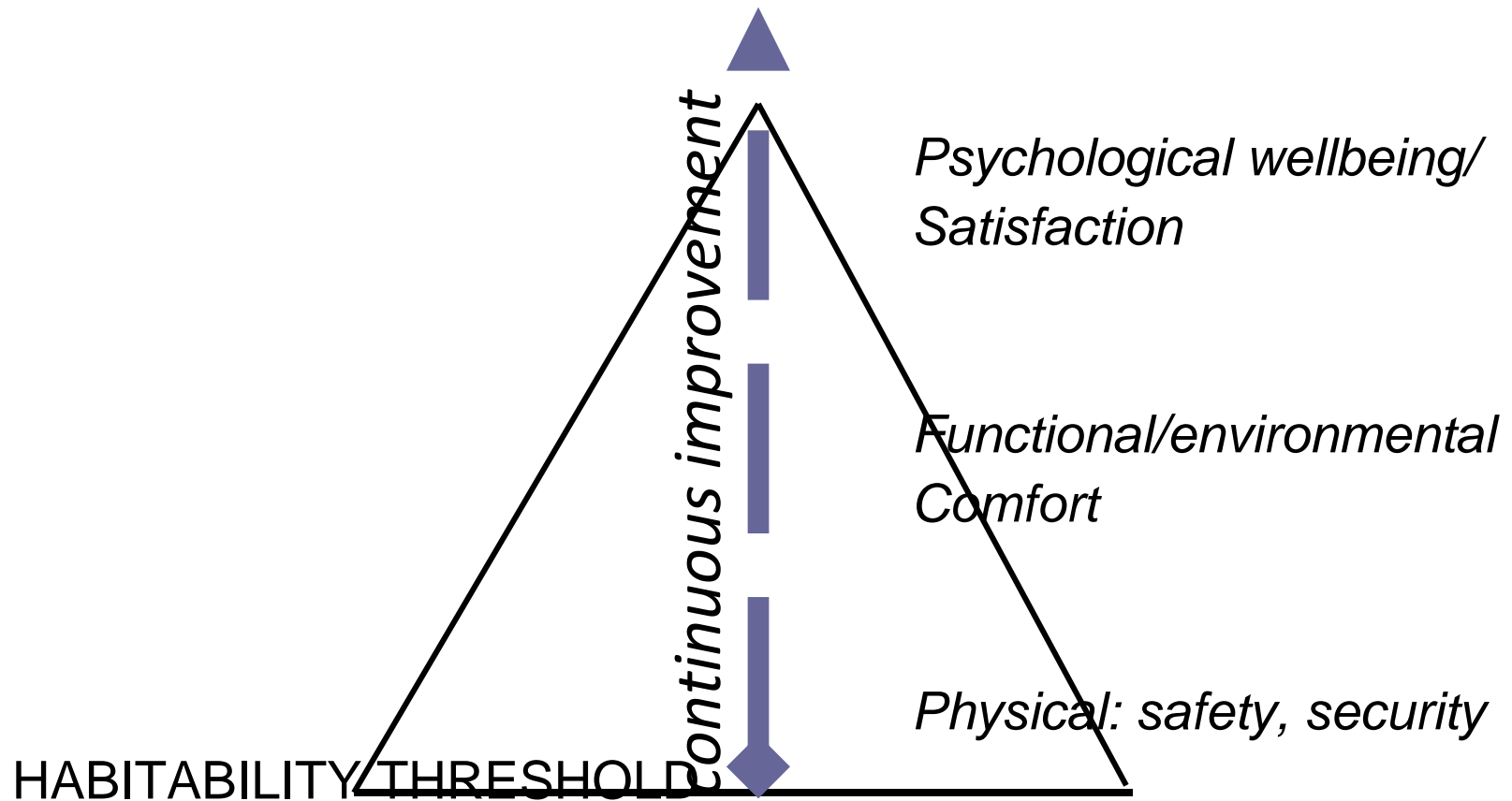
- = occupant well-being / 'flow'



# User comfort measure of user-building interface



# Habitability Pyramid



# MEASURING PHYSICAL COMFORT

- Responsible design decisions
- Quality construction standards, code requirements
- Good base building decisions
- Making sure everything works (elevators, bathrooms, parking)



# MEASURING FUNCTIONAL COMFORT

- Environment designed to support the performance of work – space as tool
- Not oriented to users' likes and dislikes
- Needs analysis focused on tasks
- Environmental competence of users





# Measuring functional comfort

- BIU Assessment developed in 1980's, tested in N.America, Australia, Europe
- Self-administered questionnaire – now on-line
- Results computed into scores on functional comfort dimensions
- Scores compared to database scores (norms) based on  $\pm$  100 buildings
- Deviations from norms provide diagnostic profile of user comfort
- Quantitative basis for follow-up action to increase functional comfort



# Dimensions of functional comfort:

## *BUILDING SYSTEMS*

- Air quality
- Thermal comfort
- Building noise

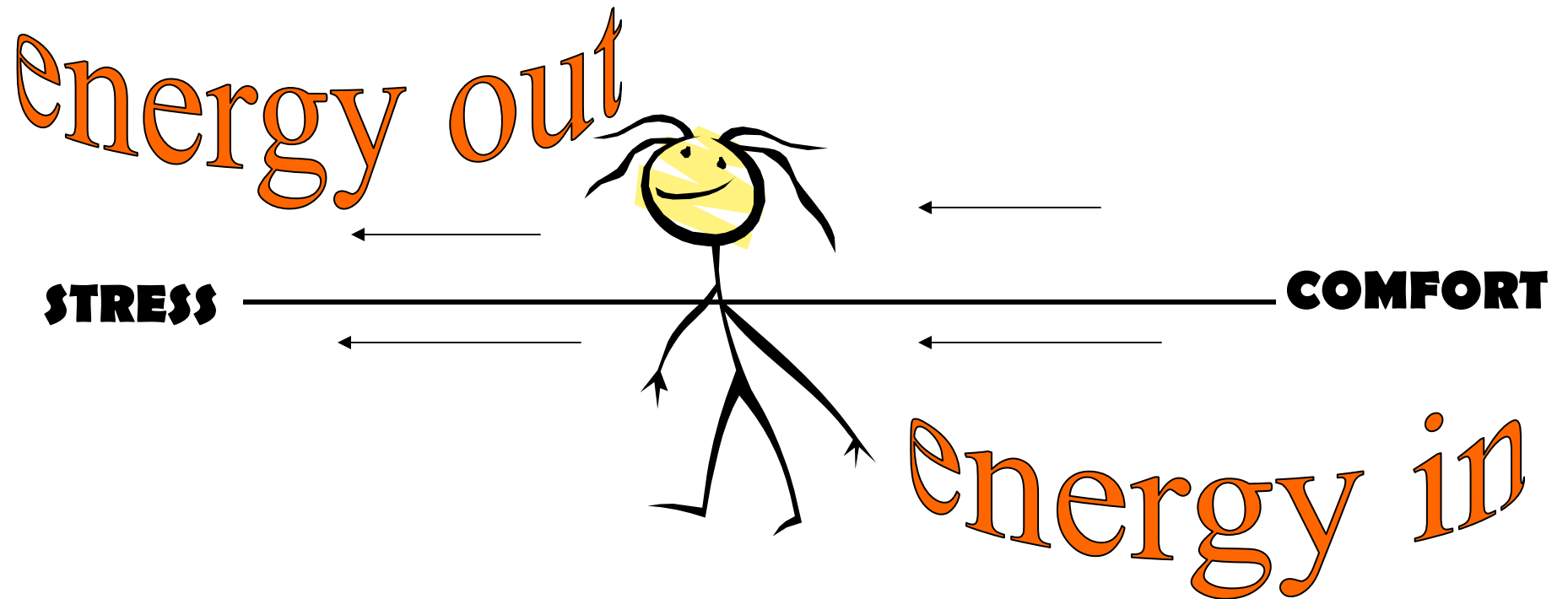
## *BUILDING INTERIOR*

- Spatial/workstation comfort
- Privacy
- People noise
- Lighting quality
- Daylighting

## *BUILDING MANAGEMENT*

- Cleaning/maintenance
- Safety
- Appearance

# FUNCTIONAL COMFORT:





**-E = sustained STRESS**

**+E = sustained COMFORT**

■ **ENERGY OUT**

- Longer time and more effort for task performance
- Fatigue
- Stress
- Illness
- Absenteeism

■ **ENERGY IN**

- All energy focussed on work
- Efficient task performance
- More ideas, creativity
- Good fit between environmental demands and psychological control



## About the tool:

- Standardised questionnaire, valid and reliable
- Depends on self-assessment & reflects users' experience
- So what? question – importance of norms, or reference baseline
- Links with building performance technical measures?
- Links with facility audits, energy use studies, LEED criteria?