A Mobile Design Application for Energy Efficient Buildings

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Overview of presentation

- Background and motivation
- Development
- Testing and evaluation
- Application interface
- State of development
- Conclusion

Background and motivation

Background

- Poorly designed buildings use large amounts of energy
- Majority of this usage from HVAC systems

Background

- Building design affects energy usage
- Thermal analysis important for initial design phase
- Manage demand-side before construction starts

Motivation

- Modern thermal analysis requires:
  - Requires dedicated computer
  - Detailed information
- Analysis becomes:
  - Complicated
  - Time consuming

Motivation

- Thermal analysis rarely incorporated into preliminary design practice:
  - Preliminary design
  - Consultation with clients
- Current methods:
  - Experience
  - Expert rules

Development

Development

- Design tool needs:
  - User-friendly interface
  - Easily interpreted results
  - Low cost
  - Simulation speed
  - Design comparisons
  - Default values and templates
  - Inclusion of building codes/energy ratings

Development

- Software already exists
- NewQuick
  - Developed and tested in late 1990’s early 2000’s
  - Viewed as quintessential example of simplified design tool by many
  - Development abandoned in mid 2000’s

Development

- NewQuick designed to run on old hardware
- Modern smartphones easily meet resource requirements
- Possibilities as a mobile application
- QUICK Mobile

Development

- QUICK Mobile features:
  - Accurate simulation
  - Fast simulation time (runs in ms)
  - Easy to use
- QUICK Mobile ideal for:
  - Preliminary design
  - Consultation with clients

Testing and evaluation of simulation model

Testing

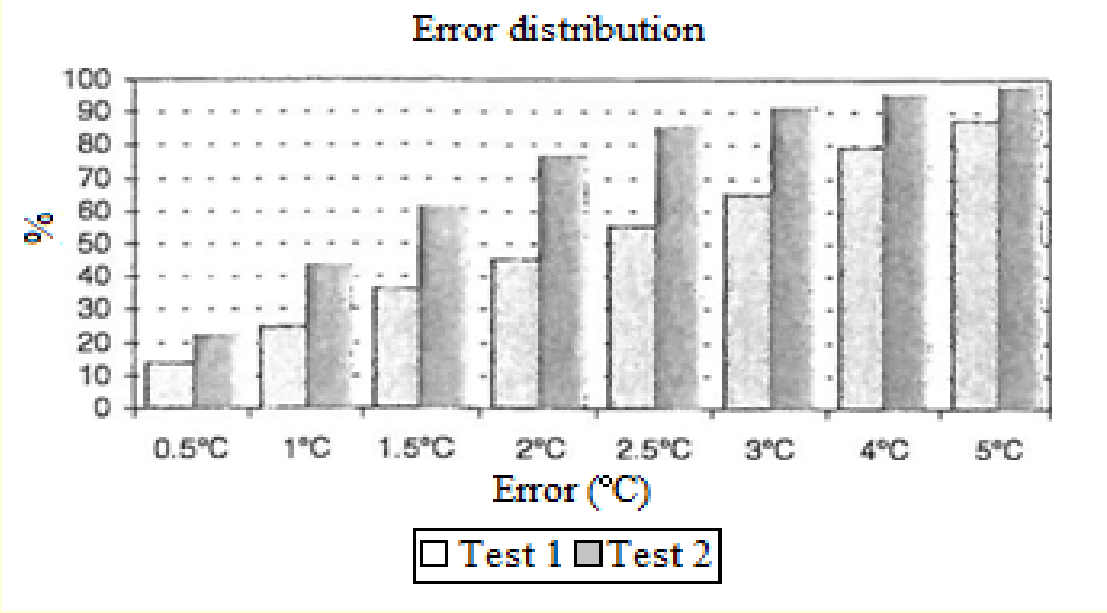
- NewQuick tested in two tests in 2001
- 89 verification studies/56 building zones
- Two sets of tests:

  1) Using default figures

  2) Using detailed figures

Evaluation

- Test 1 accurate to 3°C - 65% of time
- Test 2 accurate to 3°C - 90% of time



Application Interface

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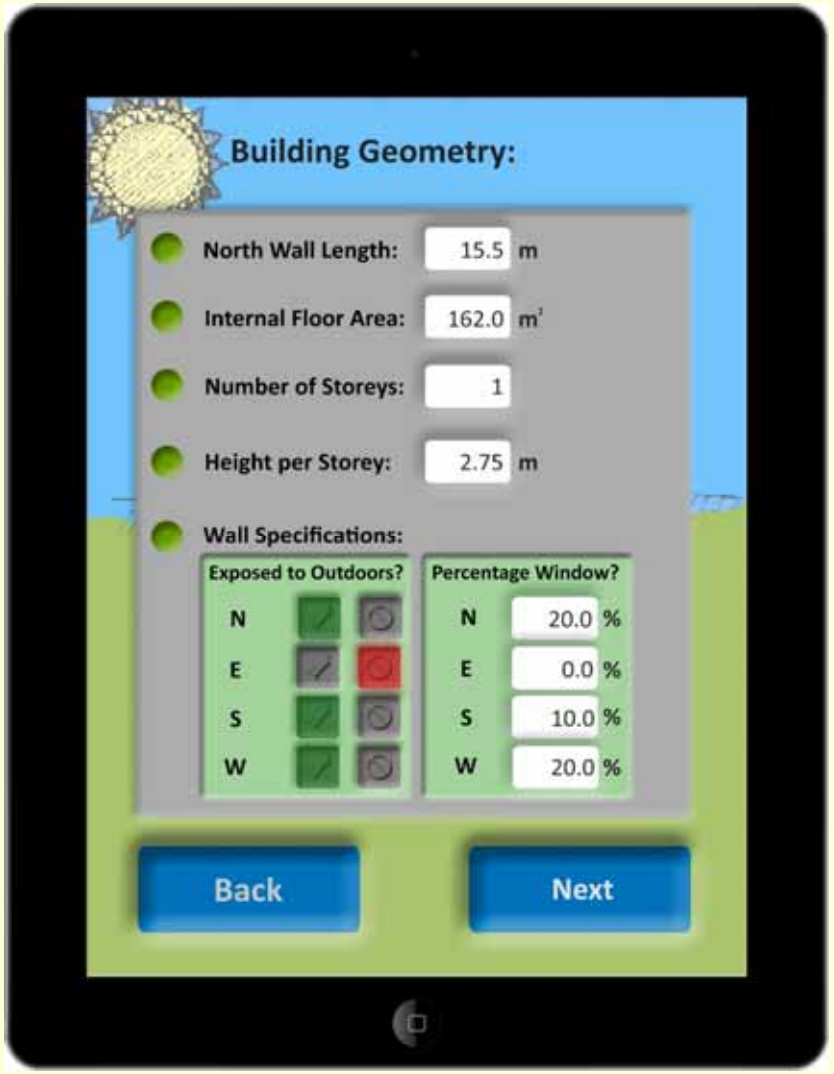

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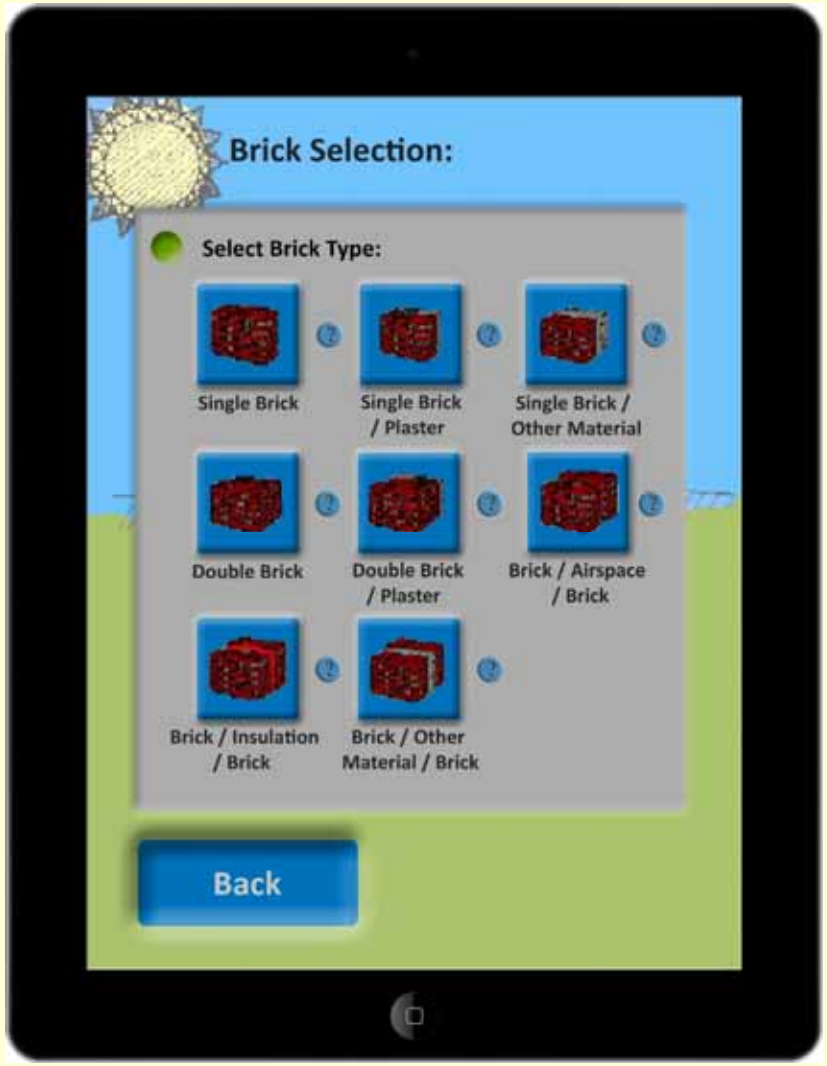

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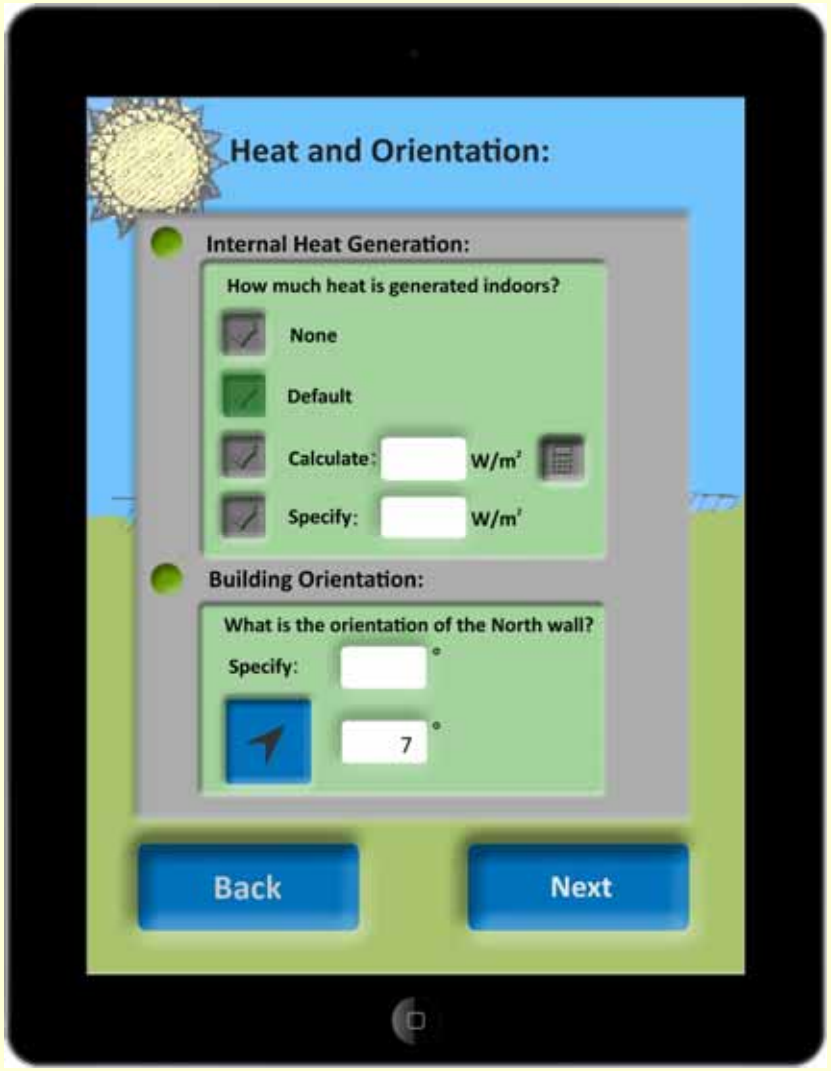

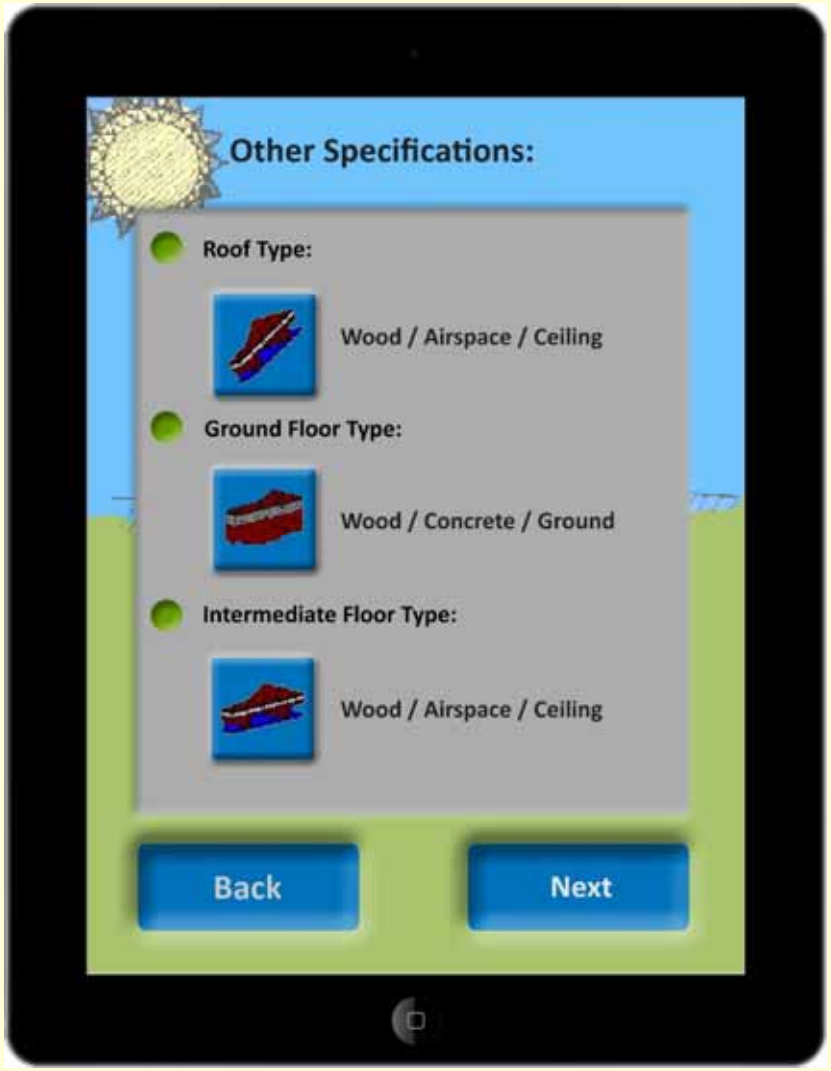

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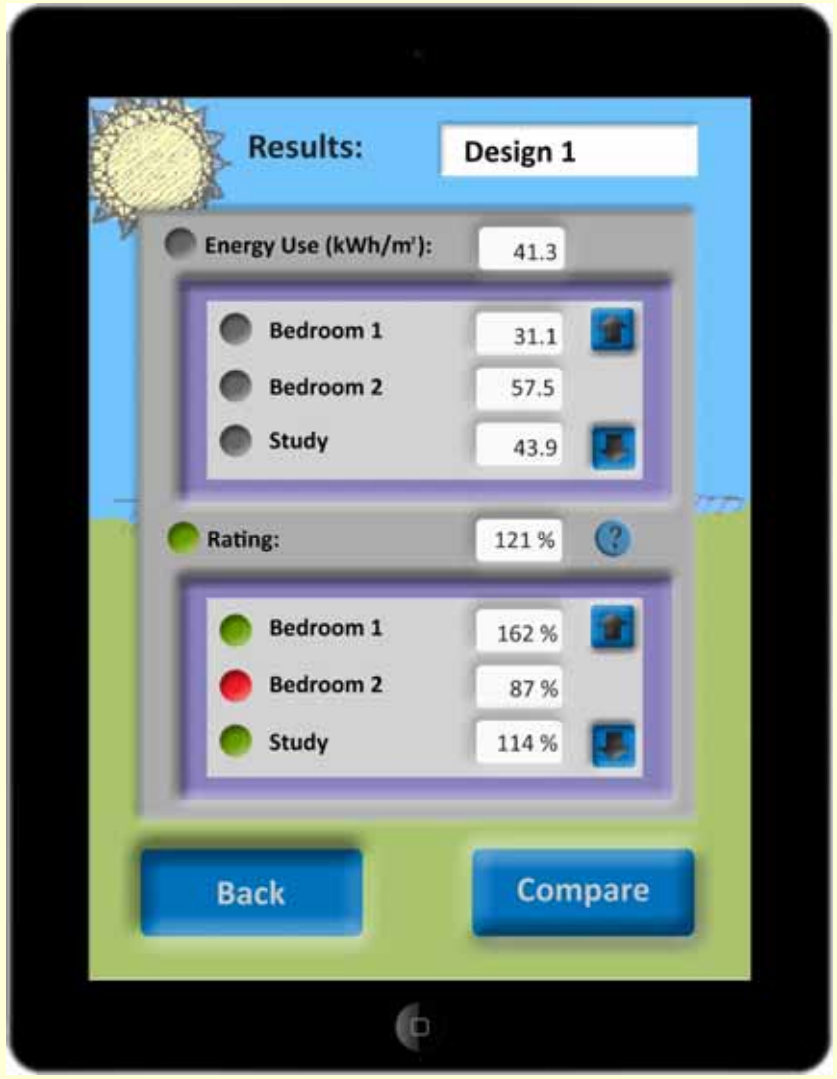

State of development

- Application currently in early design phase
- Simulation model already proven
- Currently gauging interest in application

Conclusion

- Need for simplified design tool exists
- Tool should be:
  - Accurate
  - Fast
  - Easy to use
- QUICK Mobile application satisfies these requirements

Questions?