POP modeling of a green dorm

John Kunz
Class Deliverables

• For the Stanford Sustainable Dorm, submit
  – *POP model*
    • Level-1: the 10 product, organization and process elements that “cost” most
  – *Product, organization & process models* associated with the POP model
    • Level-1 CAD, organization, process models
  – *Description* of POP model content
  – *Description* of POP relationships (Design Narrative)
  – *Final presentation*
POP model content

- **Columns**
  - Product
  - Organization
  - Process (design + construction)

- **Rows:**
  - Functions
    - Program Function, Schedule, Cost, Sustainability, ....
  - Forms (design choices)
    - L1: x10
  - Behaviors (predictions)
# Example “Level-0” POP Model

<table>
<thead>
<tr>
<th>Product</th>
<th>Organization</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional requirements and Measurable objectives</td>
<td>Required generic physical spaces, components and systems</td>
<td>Required generic Organization groups</td>
</tr>
<tr>
<td>House 60 students</td>
<td>Design</td>
<td>Design</td>
</tr>
<tr>
<td>Sustainability &gt; 2002 comparables by 25%</td>
<td>Build</td>
<td>Build</td>
</tr>
<tr>
<td>Designed forms [~10 each for Level-1]</td>
<td>Generic space, systems and physical elements</td>
<td>Organization actors</td>
</tr>
<tr>
<td>Building Elements: Dorm</td>
<td>Design-build team</td>
<td>Design-build plan</td>
</tr>
<tr>
<td>Predicted behaviors</td>
<td>Capacity</td>
<td>RFIs</td>
</tr>
<tr>
<td></td>
<td>Annual Energy use (BTUs)</td>
<td></td>
</tr>
</tbody>
</table>

## Product Organization Process

- **Functional requirements and Measurable objectives**
  - Required generic physical spaces, components and systems
  - Required generic Organization groups
  - Required major milestones and types of process activities

- **Designed forms [~10 each for Level-1]**
  - Generic space, systems and physical elements
  - Organization actors
  - Process Milestones and Tasks

- **Predicted behaviors**
  - Capacity
  - Annual Energy use (BTUs)
Design narrative for L-0 POP model

Design-Construct Organization

PM

Plan Design

VDT

Design-Construct Project Duration

Human

Project RFIs

Reasoning

Representation

Legend

Simple calc

Number of Dorm Beds

Energy calc

Number of BTUs/year

Information flow

Designer

Dorm Design

Copyright © 2003
Friday, Oct 15

- For the Stanford Sustainable Dorm, develop draft-1
  - **POP model**
    - Level-1: the 10 product, organization and process elements that “cost” most
  - **Product, organization & process models** associated with the POP model
    - Level-1 CAD (ADT, other?)
    - Organization (SV)
    - process models (SV, MSP, P3)
  - **Description** of POP model content
  - **Description** of POP relationships (Design Narrative)
• Design session results
## POP model

<table>
<thead>
<tr>
<th>Function</th>
<th>Product</th>
<th>Organization</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>House 100 students</td>
<td>Excellent stakeholder coordination</td>
<td>on time</td>
</tr>
<tr>
<td>2</td>
<td>Energy use &lt; 75% of 2002 comparable</td>
<td>Developer organization: design - build - operate</td>
<td>on budget</td>
</tr>
<tr>
<td>3</td>
<td>Water use &lt; 75% of 2002 comparable</td>
<td>on budget</td>
<td>good product</td>
</tr>
<tr>
<td>4</td>
<td>Intererior noise w/windows closed &lt; 30dB</td>
<td>design</td>
<td>time</td>
</tr>
<tr>
<td>5</td>
<td>Air quality &gt;10% better than ASHRAE standard</td>
<td>Design QA</td>
<td>build</td>
</tr>
<tr>
<td>6</td>
<td>50% open space on site</td>
<td>Construction QA</td>
<td>operate</td>
</tr>
<tr>
<td>7</td>
<td>50% recycled construction materials</td>
<td>Operations QA</td>
<td>Reuse any trees that need to be removed</td>
</tr>
<tr>
<td>8</td>
<td>Five story</td>
<td></td>
<td>No disturbance &gt; 40 feet from building</td>
</tr>
<tr>
<td>9</td>
<td>2 person/apartment</td>
<td></td>
<td>Construction noise only 8-5, M-F</td>
</tr>
<tr>
<td>10</td>
<td>Support apartment-level recycling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>
Green dorm architectural sketch
Green Dorm Functional objectives

• House 60 students
• Energy savings of 25%
• Water savings of 25%
• Interior noise w/ windows closed - less than 30 db
• 50% open space on site
• 50% recycled materials used in construction
• Air quality - 10% above ASHRAE
• Recycling program on each floor
Partial, Initial Narrative

- Project Product
- What is the Form of Building?
- Number of Students Per room, etc.
- Provide Privacy?
- Access to Light?
- Amount of Daylight
- Is it conducive to study?
- Study Conductivity
- Is it Green?
- LEED Certifiable
- LEED Score
- How successful are we?
- Our Green Measures
- Measures of Success
- Do we improve the quality of life?
- Number of Students per area, etc.
- Access to Community?
- Access to Recycle Bins
- Recycle Areas
- How LEED Certifiable is it?
- How LEED Certifiable is it?
- Access to Recycle Bins
- Recycle Areas
- Project Organization
- What Organization will we use?
- Project Process
- What is the Process we will follow?
- Project Organization
- Project Process
- What is the Form of Building?
- Number of Students Per room, etc.
- Provide Privacy?
- Access to Light?
- Amount of Daylight
- Is it conducive to study?
- Study Conductivity
- Is it Green?
- LEED Certifiable
- LEED Score
- How successful are we?
- Our Green Measures
- Measures of Success
- Do we improve the quality of life?
- Number of Students per area, etc.
- Access to Community?
- Access to Recycle Bins
- Recycle Areas
- How LEED Certifiable is it?
- How LEED Certifiable is it?
- Access to Recycle Bins
- Recycle Areas
- Project Organization
- What Organization will we use?
- Project Process
- What is the Process we will follow?
- Project Organization
- Project Process
- What is the Form of Building?
- Number of Students Per room, etc.
- Provide Privacy?
- Access to Light?
- Amount of Daylight
- Is it conducive to study?
- Study Conductivity
- Is it Green?
- LEED Certifiable
- LEED Score
- How successful are we?
- Our Green Measures
- Measures of Success
- Do we improve the quality of life?
- Number of Students per area, etc.
- Access to Community?
- Access to Recycle Bins
- Recycle Areas
- How LEED Certifiable is it?
- How LEED Certifiable is it?
- Access to Recycle Bins
- Recycle Areas
- Project Organization
- What Organization will we use?
- Project Process
- What is the Process we will follow?
- Project Organization
- Project Process
- What is the Form of Building?
- Number of Students Per room, etc.
- Provide Privacy?
- Access to Light?
- Amount of Daylight
- Is it conducive to study?
- Study Conductivity
- Is it Green?
- LEED Certifiable
- LEED Score
- How successful are we?
- Our Green Measures
- Measures of Success
- Do we improve the quality of life?
- Number of Students per area, etc.
- Access to Community?
Process Model
What do you have? ... What do you want?

2005?, ... 2015?