Optimizing Building Layouts with BIM
Minimizing Walking Distances

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Speakers

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Boost Your BIM
Industry Challenge: Make Hospitals More Efficient

“Unlike warehouses… it is very difficult to make dramatic changes to a hospital once it is built.” - Kaizen Institute

Children’s Hospital of Saskatchewan
Goal to reduce walking time by 50%

Virginia Mason Hospital
Reduced “people travel distance” by 44%
Previous Workflow

While slightly more accurate, electronic manual solutions are error prone and take substantial labor.
Our Goal:
Allow designers using BIM to optimize building design and reduce walking distances in a new hospital.
Stantec / Boost Your BIM “PathFinder” Project

Client required measurements showing an efficient corridor circulation system for key paths of travel.

- Compute distances between multiple rooms
- Compare walking distance with straight-line distance
- Follow “walking rules”

Walking Distance: 22’ 4”
Straight-Line Distance: 15’ 10”
Measurement Rules from Client

- Paths measured along the center of corridors
- Paths start and end at door centers
- Remain at least 1200mm from the wall
- Travel through sterile zones is prohibited

Where is the center of this corridor?
Read BIM data to build path network

- Find all pairs of rooms, for example:
  - *From every Critical Care Room to every Imaging Room*
- Find doors & “points of entry”
- Find all walls & doors in corridors
- Get data about spaces (is it sterile?)
Finding the Shortest Path...

http://qiao.github.io/PathFinding.js/visual/
Graphic Results
Tabular Results

<table>
<thead>
<tr>
<th>Rule ID</th>
<th>Rule Name</th>
<th>Start Room</th>
<th>End Room</th>
<th>Actual Design Distance</th>
<th>Actual + Penalty</th>
<th>Euclidian Distance</th>
<th>Corridor Efficiency</th>
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<tbody>
<tr>
<td>003</td>
<td>Surgery OR's to PARR</td>
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<td>CRH-DT04-09.01</td>
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48.25 Average Actual Corridor Efficiency 33.14 Average Euclidean

- **Corridor Efficiency**: 68.68%
- **Travel Efficiency**: 63.36 Lower = 3.75 points

RFP Min: 101.00
RFP Max: 88

<table>
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<th>7-Jan</th>
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<td>41.55</td>
<td>65.03</td>
<td>63.69</td>
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</table>
Other Potential Applications

Airports, where people walk from
- Entrance to gate
- Gate to baggage claim / customs / tram
- Tram to gate

Campus Planning

Educational/Research Buildings
- Classroom Buildings
- Lab Buildings

Life Safety
- Farthest from stair exit
- Total exit travel distance
Key Take-aways

Think of BIM as more than software that can count elements, measure areas, and keep data consistent across multiple views.

Seek opportunities to analyze the building and better understand how it will be used to better meets your clients’ goals.

Consider extending BIM with API solutions