



# “DES-ign”: Integrating DES into the Architectural **Design** Process

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*Sean Carr + Olivia Pewzer + Zhanting Gao*

*May 7<sup>th</sup> 2018*

**01** HDR & Operations Design

**02** Problem Statement

**03** Approach

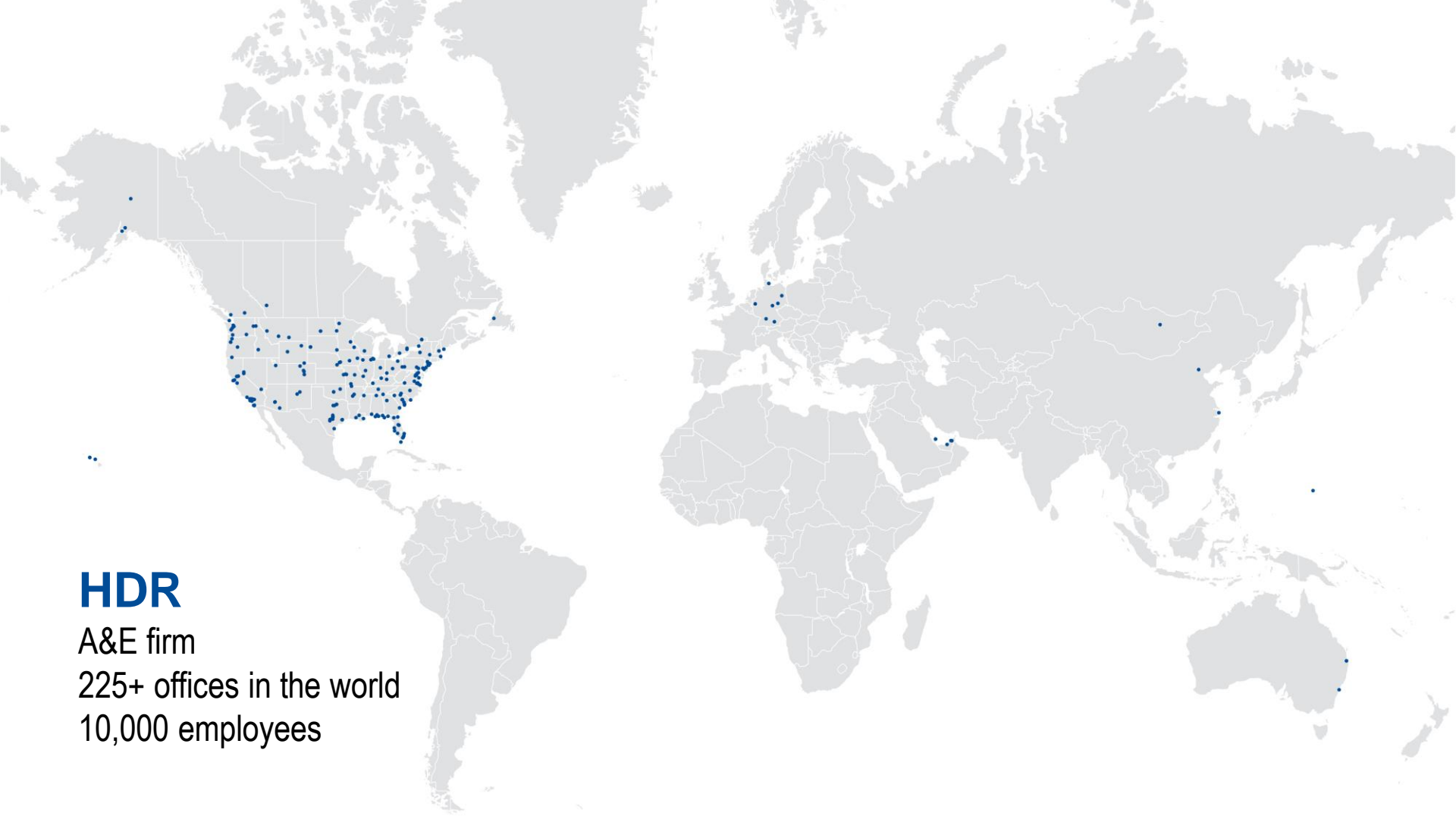
**04** Results & Solution



HDR

01

# HDR & Operations Design

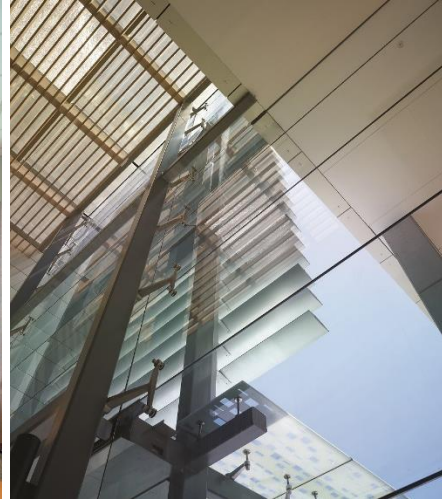


# HDR

A&E firm

225+ offices in the world

10,000 employees



## Our Portfolio

Manhattan Beach Health Hub Clinic (US)

Beijing University of Traditional Chinese Medicine (China)

Liverpool Hospital (Australia)

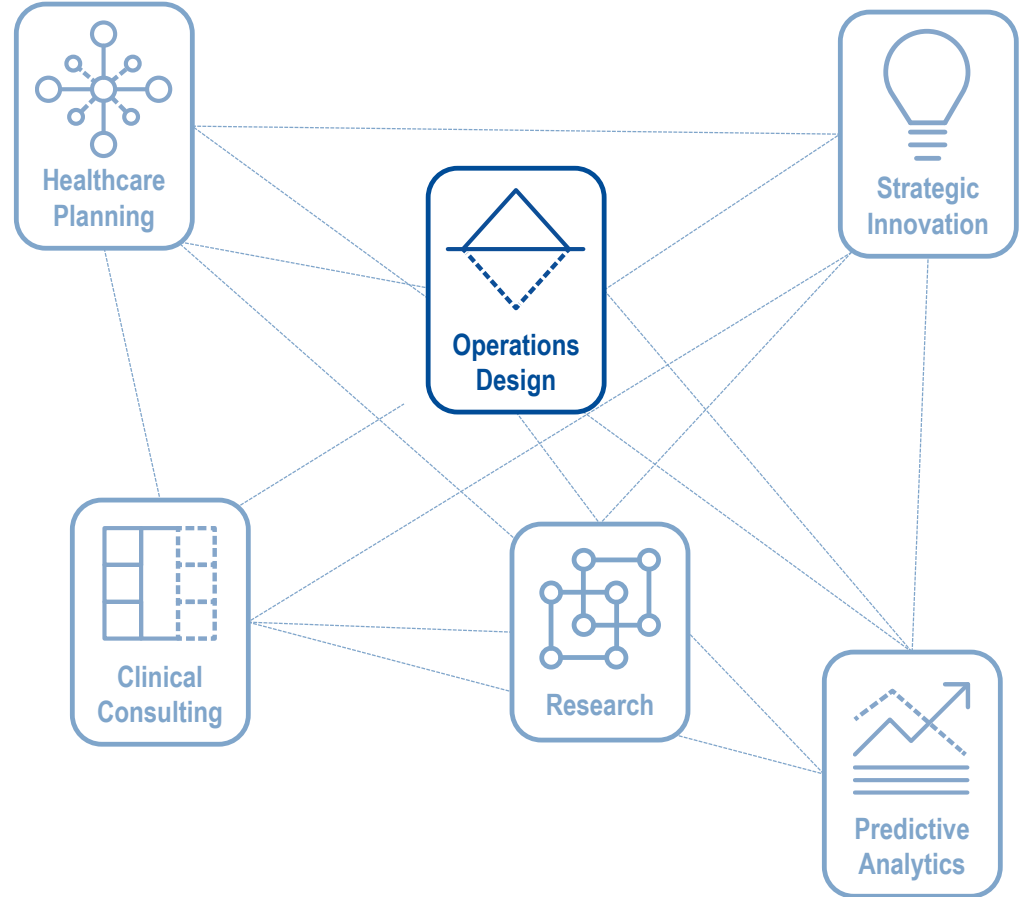
Dortmund Hospital (Germany)

Mubadala Healthcare (Abu Dhabi)

# Who We Are

## To the client

- Patient experience designers
- Operational efficiency improvers
- Value hunters
- Flow designers
- Troubleshooters
- Problem solvers



# Our Tools

- DISCRETE EVENT SIMULATION (DES)
- 2P/3P (full-scale mockups)
- Value Stream Mapping
- Process Mapping
- Interactive Data Visualization
- Root Cause Analysis
- Personas/Scenario Modeling
- 5S





**02**

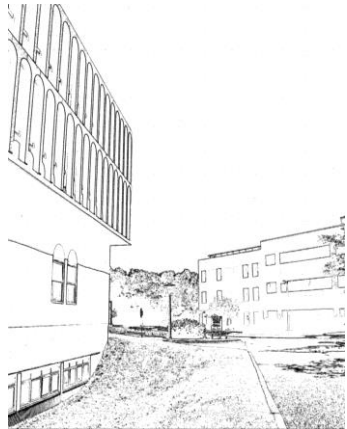
## Problem Statement



# Architectural Environment

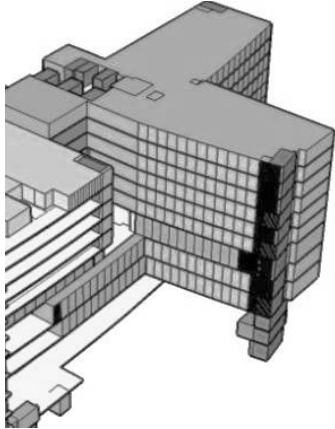
## Typical Design Process

### Pre Design



Team Structure  
Orientation  
Detailed Programming  
Cost Management  
Land-use Development

### Schematic Design



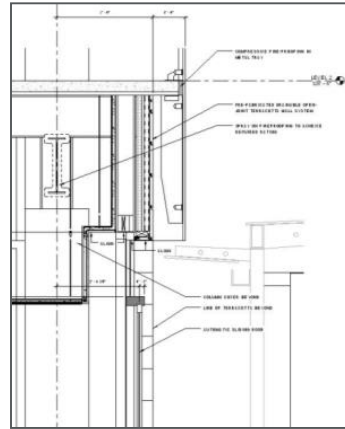
Massing  
Character  
Design  
Room Layout  
Cost Models

### Design Development



Detail  
Phasing  
Delivery  
Finishes  
Cost Models

### Construction Document



Design Intent  
Quality  
Process  
Verification  
Cost Models

### Construction

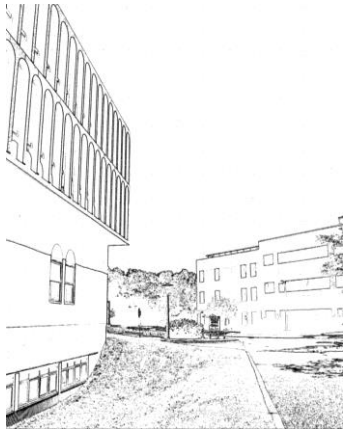


Design Intent  
Quality  
Process  
Verification  
Cost Models

# Architectural Environment

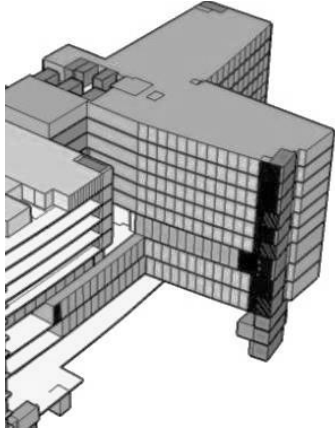
## Typical Design Process

### Pre Design



Team Structure  
Orientation  
Detailed Programming  
Cost Management  
Land-use Development

### Schematic Design



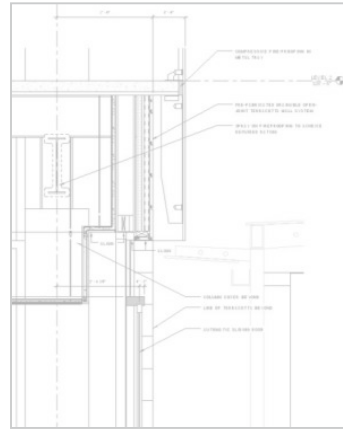
Massing  
Character  
Design  
Room Layout  
Cost Models

### Design Development



Detail  
Phasing  
Delivery  
Finishes  
Cost Models

### Construction Document



Design Intent  
Quality  
Process  
Verification  
Cost Models

### Construction



Design Intent  
Quality  
Process  
Verification  
Cost Models

# Architectural Environment

## Common Challenges & Implications



Multiple **Layout Options**



**Tight Design Timeline**



**Large-Scale** Project Scope



**Heavy competition** for  
planning services



Dynamic **client priorities**  
and **strategy**

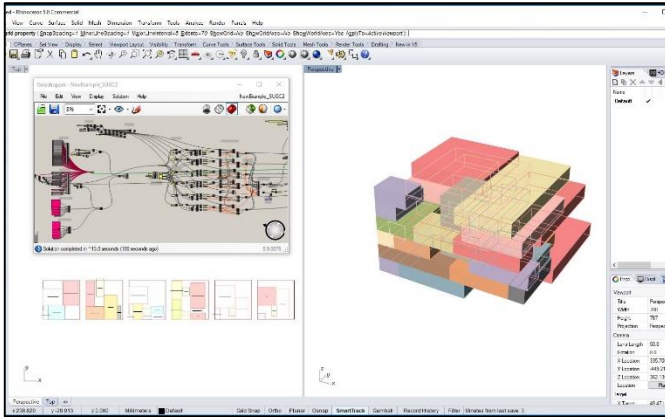


**Modeling efficiency** is very important in  
order to:

- provide time for investigating multiple design options and,
- remain competitive on the market

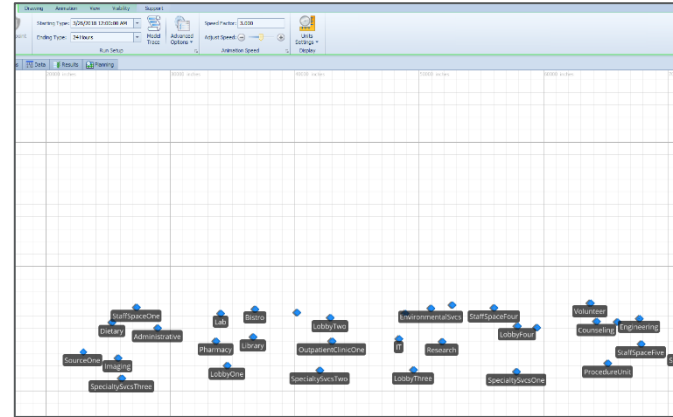
# Architectural Environment

## Design vs. Operational Applications



### Building and Space Efficiency

- Sunlight Exposure
- Noise Exposure
- Façade/Envelope Development
- Energy Consumption
- Site and Building Layout
- Building Material Selection

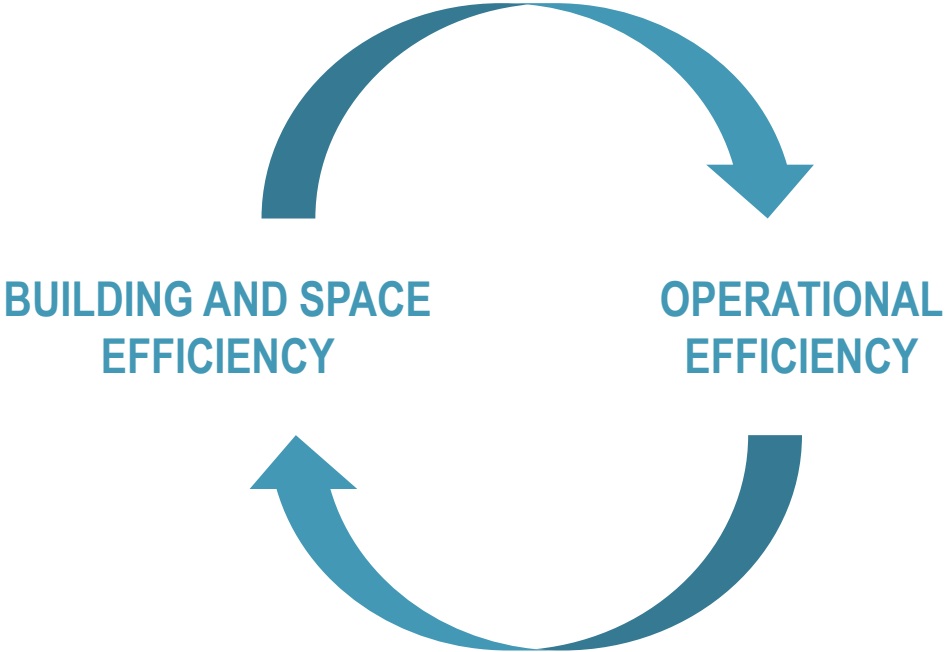


### Operational Efficiency

- Staff and patient travel distance
- Room utilization
- Patient throughput
- Patient value added time
- Staff Utilization

# Architectural Environment

Design vs. Operational Applications



# Problem Statement

*How can we improve simulation development efficiency in order to achieve a more effective design process?*

In other words, how can we automate the interaction between Design & DES applications in order to expedite the modeling phase and provide a comprehensive analysis to our client?

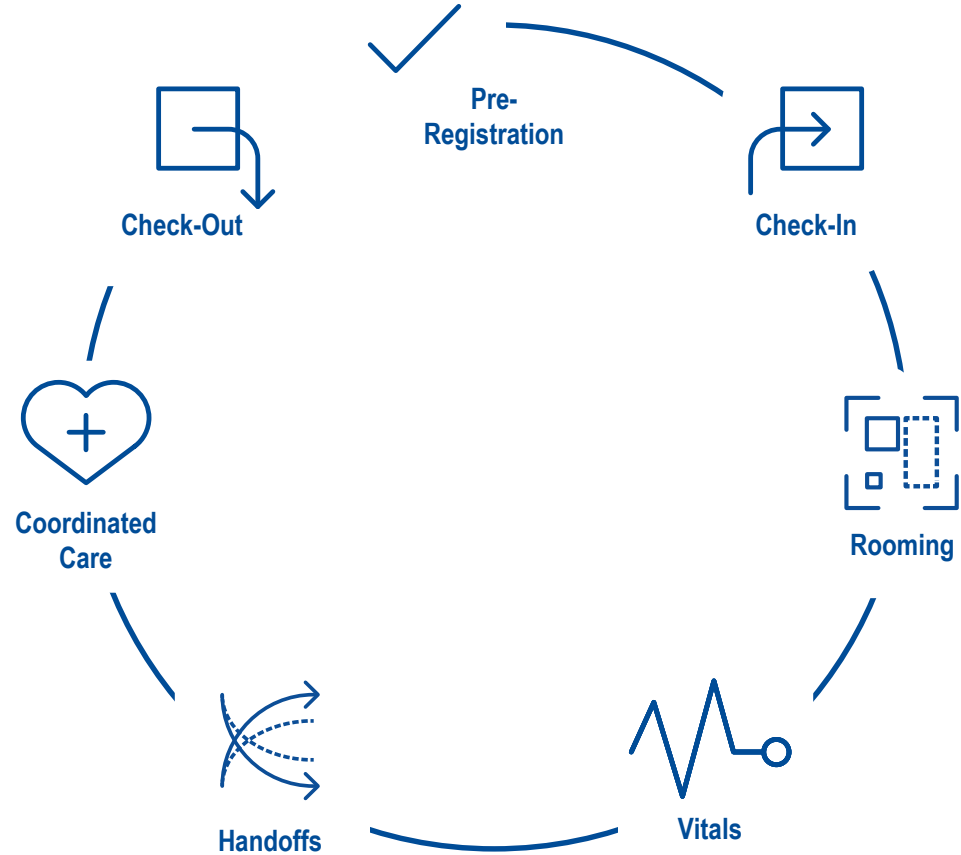


**03**

**Approach**

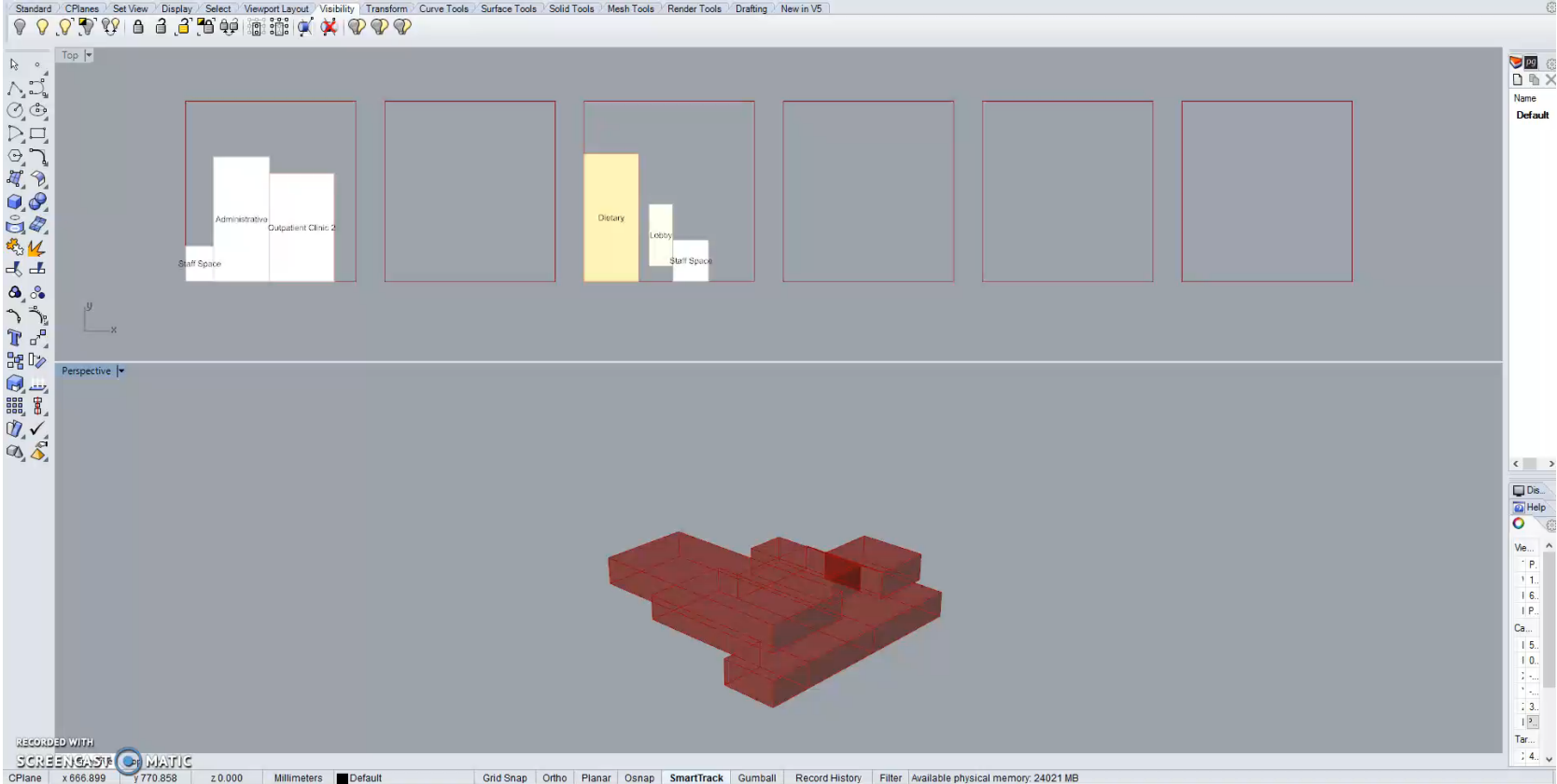
# Example

- Environment
  - Large **Outpatient Ambulatory** Healthcare Facility
- Space
  - ~30 Functional Departments over 6 Levels
    - Clinical Space
    - Support Space
    - Administrative





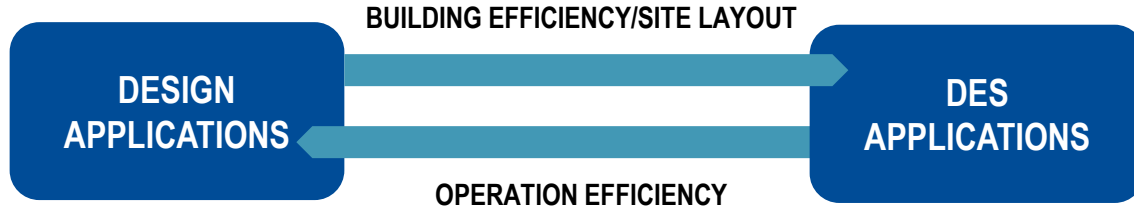
# Design Application Example: Optimal Layout Based On Desired Adjacencies



# Our solution



# Our solution



## Four focused points:

**Link Simio to  
Database**

**Place Fixed  
Objects**  
*according to layout*

**Place Nodes**  
*according to layout*

**Connect Objects  
& Nodes with  
Paths**

# Customized Solution For Each Focused Point

**Link Simio to  
Database**

**Place Fixed  
Objects**  
*according to layout*

**Place Nodes**  
*according to layout*

**Connect Objects  
& Nodes with  
Paths**

*DB Binding  
Functionality*

*Simio  
Scheduling  
Functionality*

*Excel import  
add-in*

# Customized Solution For Each Focused Point

**Link Simio to Database**

**Place Fixed Objects**  
*according to layout*

**Place Nodes**  
*according to layout*

**Connect Objects & Nodes with Paths**

*DB Binding  
Functionality*

*Simio  
Scheduling  
Functionality*

*Excel import  
add-in*

# Focused Points

## DB Binding & Simio Scheduling Functions

File Project Home Table States Targets Support

Add Data Table Add Sequence Table Add Output Table Remove Table Convert to Repeat Group Standard Property Element Reference Object Reference Foreign Key Set Column As Key Move Left Move Right Change Type Remove Column Insert Row Remove Row Bind To Remove Binding Binding Options Import Export Add Scheduling Lists and Tables Configure Scheduling Resources Add Wonderware MES Lists and Tables Configure Wonderware MES Entities

Tables Add Column Edit Column Data Scheduling Wonderware

Facility Processes Definitions Data Results Planning

Views <

- Tables
- Lookup Tables
- Rate Tables
- Work Schedules
- Changeover Matrices
- Input Parameters

To add a new table, click the "Add Data Table" button. To add a sequence table, to specify destinations for a route, click the "Add Sequence Table" button

# Focused Points

## DB Binding & Simio Scheduling Functions

The screenshot shows the Simio software toolbar with the following sections and buttons:

- File**
- Project Home**
- Table**
  - Add Data Table
  - Add Sequence Table
  - Add Output Table
- States**
  - Remove Table
  - Convert to Repeat Group
- Targets**
  - Standard Property
- Support**
  - Element Reference
  - Object Reference
  - Foreign Key
  - Set Column As Key
  - Move Left
  - Move Right
  - Change Type
  - Remove Column
  - Insert Row
  - Remove Row
  - Bind To
  - Remove Binding
  - Binding Options
- Data**
  - Import
  - Export
  - Add Scheduling Lists and Tables** (circled in red)
  - Configure Scheduling Resources
- Scheduling**
  - Add Wonderware MES Lists and Tables
  - Configure MES Entities
- Wonderware**

The screenshot shows the navigation tabs in the Simio software interface:

- Facility
- Processes
- Definitions
- Data** (selected)
- Results
- Planning

The screenshot shows the Views panel in the Simio software interface, listing various table types:

- Tables
- Lookup Tables
- Rate Tables
- Work Schedules
- Changeover Matrices
- Input Parameters

To add a new table, click the "Add Data Table" button. To add a sequence table, to specify destinations for a route, click the "Add Sequence Table" button

# Focused Points

## DB Binding & Simio Scheduling Functions

The screenshot displays a software interface with a top toolbar and a left navigation pane. The toolbar includes various icons for data management and scheduling, such as 'Add Data Table', 'Remove Table', 'Move Left', 'Move Right', 'Remove Column', 'Insert Row', 'Remove Row', 'Bind To', 'Remove Binding', 'Binding Options', 'Import', 'Export', 'Add Scheduling Lists and Tables', 'Configure Scheduling Resources', 'Add Wonderware MES Lists and Tables', and 'Configure MES Entities'. The left navigation pane lists 'Views' including 'Tables', 'Lookup Tables', 'Rate Tables', 'Work Schedules', 'Changeover Matrices', and 'Input Parameters'. The main area shows a table with columns: Order Id, Routing Key, Scheduled Resource, Scheduled Start Time, Scheduled End Time, and Scheduled Quantity. The table contains one row with an asterisk in the first column.

Order Id	Routing Key	Scheduled Resource	Scheduled Start Time	Scheduled End Time	Scheduled Quantity
*					



# Focused Points

## DB Binding & Simio Scheduling Functions

The screenshot displays the Simio software interface. The top ribbon includes tabs for File, Project Home, Table, States, Targets, and Support. The 'Table' tab is active, showing a 'Bind To' dropdown menu with options: Database, CSV File, Excel, Wonderware MES, and XML Transformation. The 'Database' option is highlighted. Below the ribbon, the 'Views' pane shows a table with columns 'Matrix' and 'Secondary Resource Name'. The 'Matrix' column contains 'RN' and 'standardWeek'. The 'Secondary Resource Name' column is empty. The 'Import' dropdown menu is also shown, with options: Import, Import All, and Import. The 'Import' option is highlighted. The 'Import' menu item is also highlighted in the ribbon. The 'Import' menu item is also highlighted in the ribbon.

**Bind To**

- Database: Reads data from a database
- CSV File: Reads data from a CSV file
- Excel: Reads data from an Excel spreadsheet
- Wonderware MES: Reads data from Wonderware MES
- XML Transformation: Reads and transforms data from an XML file

**Import**

- Import: Import this table's data from its data source.
- Import All: Import each bound table's data from its data source.
- Import: Import the current table's data from the external data source.

Matrix	Secondary Resource Name
RN	
standardWeek	0

# Focused Points

## DB Binding & Simio Scheduling Functions

File Project Home Table States Targets Support

Add Data Table ▾
 Add Sequence Table
 Add Output Table
 Remove Table
 Convert to Repeat Group
 Standard Property ▾
 Object Reference ▾
 Foreign Key
 Set Column As Key
 Move Left
 Move Right
 Change Type ▾
 Edit Column
 Remove Column
 Insert Row
 Remove Row
 Bind To
 Remove Binding
 Binding Options ▾
 Import
 Export
 Add Scheduling Lists and Tables
 Configure Scheduling Resources
 Add Wonderware MES Lists and Tables
 Configure MES Entities

Tables Add Column Data Scheduling Wonderware

Facility Processes Definitions Data Results Planning

Views Resources Materials Material Lots Manufacturing Orders Routings Bill Of Materials Work In Process Manufacturing Orders Output Routing Destinations

Bound to Database: SQL Server, Data Object: RESOURCES

	Resource Name	Description	Update Location	Update Properties	XLocation (Meters)	ZLocation (Meters)	Parent Resource Name	Object Type	Node List	Work Schedule	CostRate (Default Currency per Hour)	Changeover Matrix	Secondary Resource Name
1	MaterialsMgmt	MaterialsMgmt	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1240.8	603.911764705882	Resource1	Server	null	StandardWeek	0		
2	EnvironmentalSvcs	EnvironmentalSvcs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1293.8	594.236842105263	Resource1	Server	null	StandardWeek	0		RN
3	Engineering	Engineering	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1719.25	614.5	Resource1	Server	null	StandardWeek	0		
4	Dietary	Dietary	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	642.8	623.111111111111	Resource1	Server	null	StandardWeek	0		
5	StaffSpaceOne	StaffSpaceOne	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	692.8	592.357142857143	Resource1	Server	null	StandardWeek	0		
6	Lab	Lab	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	864.8	604.672413793104	Resource1	Server	null	StandardWeek	0		
7	Volunteer	Volunteer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1618.8	582.833333333333	Resource1	Server	null	StandardWeek	0		
8	Pharmacy	Pharmacy	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	854.876923076923	660.844827586207	Resource1	Server	null	StandardWeek	0		RN
9	Counseling	Counseling	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1631.8	621.166666666667	Resource1	Server	null	StandardWeek	0		RN
10	LobbyOne	LobbyOne	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	878.000000000001	710.833333333333	Resource1	Server	null	StandardWeek	0		
11	Research	Research	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1316.46666666667	661.973684210526	Resource1	Server	null	StandardWeek	0		
12	Administrative	Administrative	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	735.966666666667	634.5	Resource1	Server	null	StandardWeek	0		
13	StaffSpaceTwo	StaffSpaceTwo	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1020.19285714286	602.5	Resource1	Server	null	StandardWeek	0		RN
14	LobbyTwo	LobbyTwo	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1088	613.392857142857	Resource1	Server	null	StandardWeek	0		RN
15	Bistro	Bistro	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	934.8	595.333333333333	Resource1	Server	null	StandardWeek	0		RN
16	IT	IT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1228.8	656.050802139037	Resource1	Server	null	StandardWeek	0		
17	Imaging	Imaging	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	654.8	695.159722222223	Resource1	Server	null	StandardWeek	0		
18	ProcedureUnit	ProcedureUnit	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1654.8	706.583333333333	Resource1	Server	null	StandardWeek	0		
19	StaffSpaceThree	StaffSpaceThree	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1336.8	587	Resource1	Server	null	StandardWeek	0		
20	LobbyThree	LobbyThree	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1258	720	Resource1	Server	null	StandardWeek	0		
21	OutpatientClinicOne	OutpatientClinic...	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1091.58571428571	661.268472906404	Resource1	Server	null	StandardWeek	0		RN
22	OutpatientClinicTwo	OutpatientClinic...	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1510	632.833333333333	Resource1	Server	null	StandardWeek	0		RN
23	Library	Library	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	930.731623931625	652.844827586207	Resource1	Server	null	StandardWeek	0		RN
24	LobbyFour	LobbyFour	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1470	630	Resource1	Server	null	StandardWeek	0		RN
25	StaffSpaceFour	StaffSpaceFour	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1422.8	593.25	Resource1	Server	null	StandardWeek	0		
26	SpecialtySvcOne	SpecialtySvcOne	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1468.8	723.404731187796	Resource1	Server	null	StandardWeek	0		

Tables

Lookup Tables

Rate Tables

Work Schedules

Changeover Matrices

Input Parameters

# Focused Points

## DB Binding & Simio Scheduling Functions

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Bound to Database: SQL Server, Data Object: RESOURCES

Resource Name	Description	Update Location	Update Properties	XLocation (Meters)	ZLocation (Meters)	Parent Resource Name	Object Type	Node List	Work Schedule	CostRate (Default Currency per Hour)	Changeover Matrix	Secondary Resource Name
1 MaterialsMgmt	MaterialsMgmt	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					null	StandardWeek	0		
2 EnvironmentalSvcs	EnvironmentalSvcs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					null	StandardWeek	0		RN
3 Engineering	Engineering	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					null	StandardWeek	0		
4 Dietary	Dietary	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					null	StandardWeek	0		
5 StaffSpaceOne	StaffSpaceOne	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					null	StandardWeek	0		
6 Lab	Lab	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					null	StandardWeek	0		
7 Volunteer	Volunteer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					null	StandardWeek	0		
8 Pharmacy	Pharmacy	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					null	StandardWeek	0		
9 Counseling	Counseling	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					null	StandardWeek	0		RN
10 LobbyOne	LobbyOne	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					null	StandardWeek	0		RN
11 Research	Research	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					null	StandardWeek	0		
12 Administrative	Administrative	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	735.966666666667	634.5	Resource1	Server	null	StandardWeek	0		
13 StaffSpaceTwo	StaffSpaceTwo	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1020.19285714286	602.5	Resource1	Server	null	StandardWeek	0		RN
14 LobbyTwo	LobbyTwo	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1088	613.392857142857	Resource1	Server	null	StandardWeek	0		RN
15 Bistro	Bistro	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	934.8	595.333333333333	Resource1	Server	null	StandardWeek	0		RN
16 IT	IT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1228.8	656.050802139037	Resource1	Server	null	StandardWeek	0		
17 Imaging	Imaging	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	654.8	695.159722222223	Resource1	Server	null	StandardWeek	0		
18 ProcedureUnit	ProcedureUnit	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1654.8	706.583333333333	Resource1	Server	null	StandardWeek	0		
19 StaffSpaceThree	StaffSpaceThree	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1336.8	587	Resource1	Server	null	StandardWeek	0		
20 LobbyThree	LobbyThree	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1258	720	Resource1	Server	null	StandardWeek	0		
21 OutpatientClinicOne	OutpatientClinic...	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1091.58571428571	661.268472906404	Resource1	Server	null	StandardWeek	0		RN
22 OutpatientClinicTwo	OutpatientClinic...	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1510	632.833333333333	Resource1	Server	null	StandardWeek	0		RN
23 Library	Library	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	930.731623931625	652.844827586207	Resource1	Server	null	StandardWeek	0		RN
24 LobbyFour	LobbyFour	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1470	630	Resource1	Server	null	StandardWeek	0		RN
25 StaffSpaceFour	StaffSpaceFour	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1422.8	593.25	Resource1	Server	null	StandardWeek	0		
26 SpecialtySvcOne	SpecialtySvcOne	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1468.8	723.434731187796	Resource1	Server	null	StandardWeek	0		

Configure Scheduling Resources  
Add Wonderware MES Lists and Tables  
Configure MES Entities

Configure Scheduling Resources  
Create and Update Scheduling Resources in Simio.

# Focused Points

## DB Binding & Simio Scheduling Functions

The screenshot displays the Simio software interface. At the top, there is a menu bar with options: File, Project Home, Run, Drawing, Animation, View, Visibility, and Support. Below the menu bar is a control panel with various icons and settings:

- Run (play icon), Stop (square icon), Step (up arrow icon), Fast-Forward (right arrow icon), Reset (circular arrow icon), Breakpoint (shield icon).
- Starting Type: 3/26/2018 12:00:00 AM
- Ending Type: 24 Hours
- Speed Factor: 3.000
- Adjust Speed: (minus, plus, and slider icons)
- Units Settings (dropdown menu)
- Display (checkbox)

The main workspace is a grid with a vertical axis labeled in inches (10000, 20000, 30000) and a horizontal axis labeled in inches (20000, 30000, 40000, 50000, 60000, 70000). On the left side, there is a 'Libraries' panel with a tree view:

- Standard Library
  - Source
  - Sink
  - Server
  - Workstation
  - Combiner
  - Separator
  - Resource
  - Vehicle
  - Worker
  - BasicNode
  - TransferNode
  - Connector
  - Path
  - TimePath
  - Conveyor
- Flow Library

The simulation model is represented by a collection of nodes and connectors on the grid. The nodes are labeled as follows:

- SourceOne
- Imaging
- SpecialtySvcsThree
- Dietary
- Administrative
- StaffSpaceOne
- Pharmacy
- LobbyOne
- Lab
- Bistro
- Library
- LobbyTwo
- OutpatientClinicOne
- SpecialtySvcsTwo
- LobbyThree
- EnvironmentalSvcs
- IT
- Research
- LobbyFour
- StaffSpaceFour
- SpecialtySvcsOne
- Volunteer
- Counseling
- Engineering
- StaffSpaceFive
- ProcedureUnit
- SinkOne

# Customized Solution For Each Focused Point

**Link Simio to Database**

**Place Fixed Objects**  
*according to layout*

**Place Nodes**  
*according to layout*

**Connect Objects & Nodes with Paths**

*DB Binding  
Functionality*

*Simio  
Scheduling  
Functionality*

*Excel import  
add-in*

# Focused Points

## Place & Connect Nodes and Objects

The image shows a Windows File Explorer window with the ribbon menu at the top. The ribbon includes tabs for File, Home, Share, and View. The Home tab is active, showing groups for Clipboard, Organize, New, Open, and Select. The address bar shows the path: This PC > OSDisk (C:) > Users > opewzer > Documents > SimioUserExtensions. The main pane displays a list of files with columns for Name, Date modified, Type, and Size. The file 'ImportObjectsAndLinksFromSpreadsheetAddIn.dll' is highlighted with a blue box.

Name	Date modified	Type	Size
HDR_Utility.dll	3/1/2016 9:11 PM	Application extens...	28 KB
<b>ImportObjectsAndLinksFromSpreadsheetAddIn.dll</b>	1/23/2018 1:54 PM	Application extens...	39 KB
Simio.resources.dll	12/14/2016 5:35 PM	Application extens...	1,411 KB

# Focused Points

## Place & Connect Nodes and Objects

The screenshot shows a software interface with a menu bar at the top and a grid workspace below. The menu bar includes options like 'New Experiment', 'New Symbol', 'New Texture', 'Load Library', 'Check For Updates', 'Select Add-In', 'Documentation Report', 'Trace', 'Errors', 'Breakpoints', 'Watch', 'Search', 'Profile', 'Properties', 'Reset', and 'Render to Oculus'. Below the menu bar, there are tabs for 'Definitions', 'Data', 'Results', and 'Planning'. The grid workspace is divided into sections by vertical lines labeled '10000 inches', '40000 inches', '50000 inches', '60000 inches', and '70000 inches'. A yellow circle highlights a mouse cursor hovering over a grid intersection. The workspace contains several nodes and objects, including 'SourceOne', 'Imaging', 'SpecialtySvcsThree', 'Dietary', 'Administrative', 'StaffSpaceOne', 'Pharmacy', 'LobbyOne', 'Lab', 'Library', 'Bistro', 'LobbyTwo', 'OutpatientClinicOne', 'SpecialtySvcsTwo', 'EnvironmentalSvcs', 'IT', 'Research', 'LobbyThree', 'StaffSpaceFour', 'LobbyFour', 'SpecialtySvcsOne', 'Volunteer', 'Counseling', 'Engineering', 'StaffSpaceFive', 'ProcedureUnit', and 'SinkOne'. Blue arrows indicate connections between these nodes. A watermark in the bottom left corner reads 'RECORDED WITH SCREENCAST MATIC'.

# Focused Points

## Place & Connect Nodes and Objects

### Excel File Tab: Object

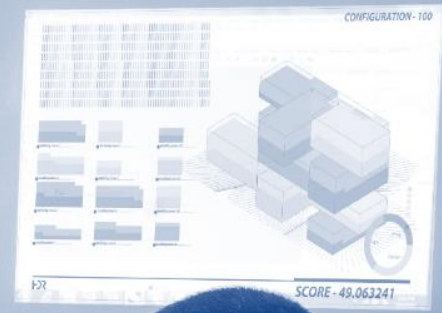
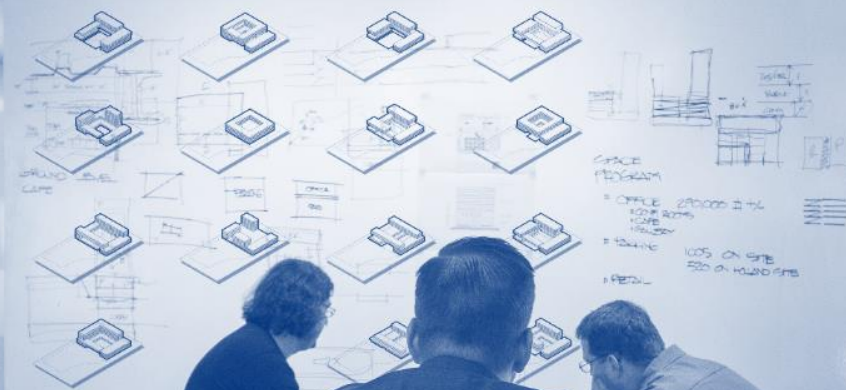
Object Class	Object Name	X	Y	Z
TransferNode	TransferNode1	617.0	8.0	677.0
TransferNode	TransferNode2	670.0	8.0	677.0
TransferNode	TransferNode3	744.0	8.0	677.0
TransferNode	TransferNode4	670.0	8.0	600.0
TransferNode	TransferNode5	670.0	8.0	620.0
TransferNode	TransferNode6	670.0	8.0	729.0
TransferNode	TransferNode7	617.0	8.0	620.0
TransferNode	TransferNode8	744.0	8.0	620.0
TransferNode	TransferNode9	817.0	8.0	620.0
TransferNode	TransferNode10	870.0	8.0	620.0
TransferNode	TransferNode11	944.0	8.0	620.0

### Excel File Tab: Paths

Link Class	Link Name	From Node	To Node
Path	Path_1	TransferNode1	TransferNode2
Path	Path_2	TransferNode2	TransferNode3
Path	Path_3	TransferNode4	TransferNode5
Path	Path_4	TransferNode5	TransferNode2
Path	Path_5	TransferNode2	TransferNode6
Path	Path_6	TransferNode7	TransferNode5
Path	Path_7	TransferNode5	TransferNode8
Path	Path_8	TransferNode9	TransferNode10
Path	Path_9	TransferNode10	TransferNode11
Path	Path_10	TransferNode12	TransferNode13
Path	Path_11	TransferNode13	TransferNode14



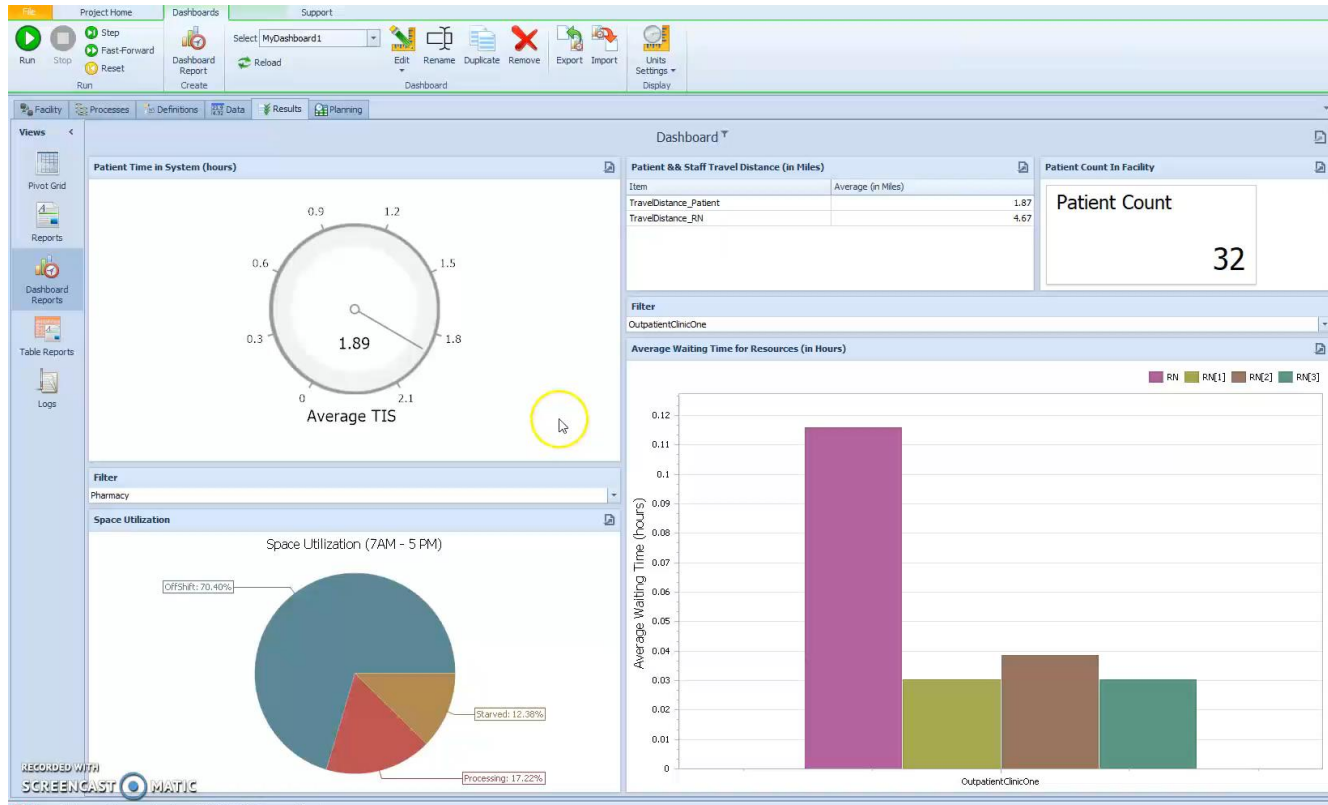
EXIT



04

# Results & Solution

# Outcome



# Outcome

1

**Reduce time of development**

Ability to align pace and timeline with design-oriented simulation

2

**Minimize error**

Ability to build robust models limiting manual manipulation and errors

3

**Easy to change (Agile)**

Ability to modify both space and modeled processes

# Next Steps

1

**3D coordinates in  
Scheduling Functions**

*(Future Simio Sprints?)*

2

**Work toward “process  
step” free SIMIO  
models**

3

**Investigate  
information sharing  
from Simio to Design  
Application**

4

**Incorporate lighting,  
sound & heat testing**

A blue-tinted photograph of an office environment. In the foreground, a man with dark hair, wearing a checkered shirt, is seen from the back, sitting at a desk. In the background, two other men are visible: one on the left in profile, and one on the right wearing glasses and gesturing with his hand. A large, complex diagram with many nodes and connecting lines is pinned to the wall behind them. A dark blue rectangular box is overlaid on the lower-left side of the image, containing the text 'Q&A' in white, bold, sans-serif font.

**Q&A**