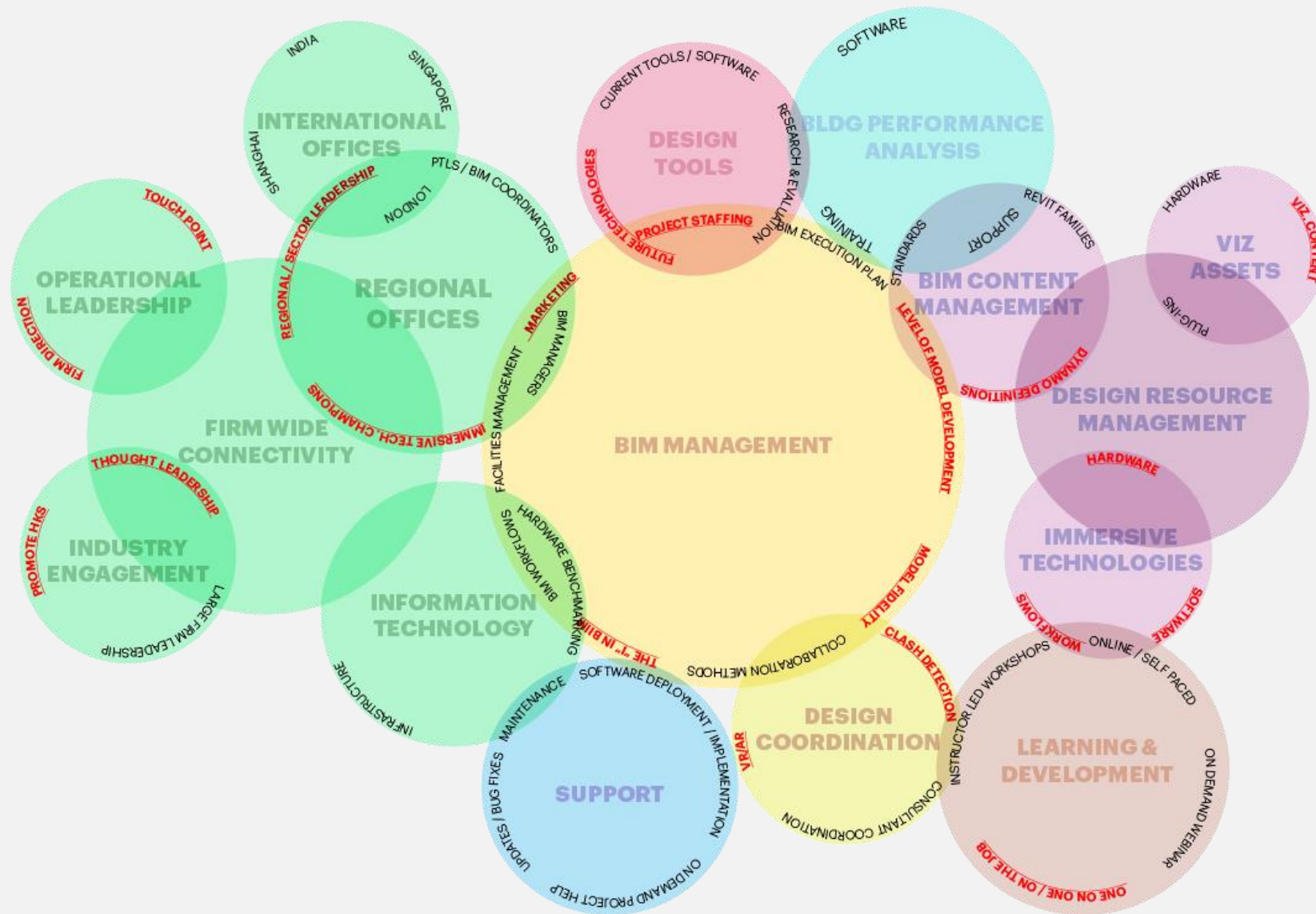


HKS

| PRACTICE TECHNOLOGY



Our vision is to connect the Design Practice at all phases to the most efficient workflows and processes by providing access to the appropriate set of tools and education.

HKS

Creating **places** that enhance the **human** experience

DATA
INTERPRETATION

**data
informs
design?**

NEW
CREATIVITY
&
EXISTING
BUILT ENVIRONMENT

DATA
RESEARCH

SPACE
DESIGN

FUNCTION
MAPPING

FORM

**IN [FORM] ED
DESIGN**

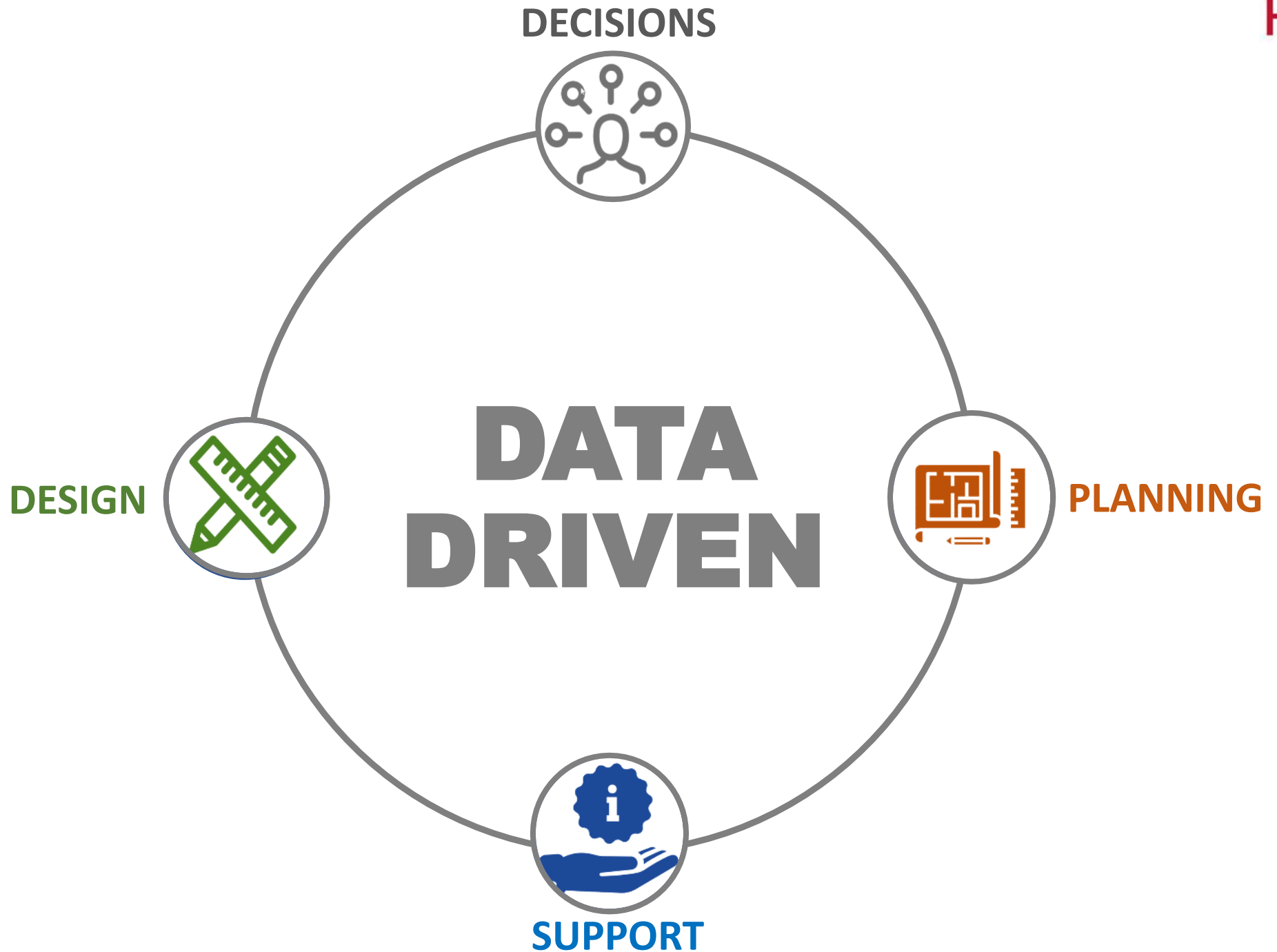


Knowing



Seeing

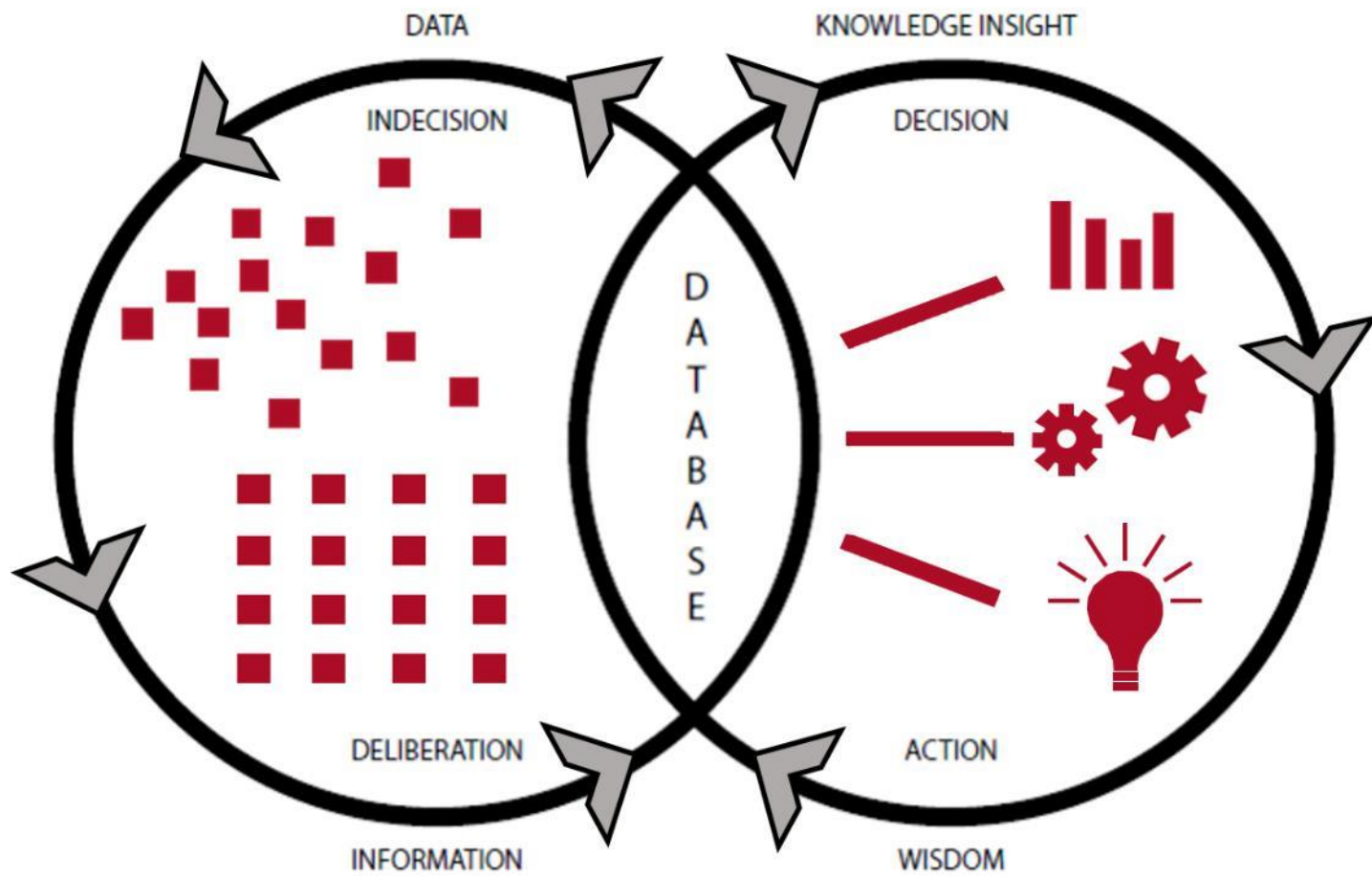






Creating a Design Intelligence System

HKS



DEFINE

CAPTURE

EVALUATE

VALIDATE

GENERATE

ANALYSE

INTERROGATE

INFO. → DATA → KNOWLEDGE → MODEL (BIM) → INFO.



CONSTRUCTION INDUSTRY INSTITUTE HEALTH CARE BENCHMARKS

INPATIENT HOSPITAL – JULY 2017



QUARTILE CHART ANALYSIS

INTER-QUARTILE
RANGE (Q1 - Q3)
the middle 50%

MEAN
average value

N / SAMPLE SIZE — (n=15)
size of data set

COMPARING PERFORMANCE

A value within the inter-quartile range shows a project's performance in a metric is consistent with the performance of others in the data set. A value below the inter-quartile indicates that the project is performing more efficiently than most projects in the data set for that metric as a value above the inter-quartile range indicates poor or inefficient performance when compared to the sample size.

MAXIMUM
greatest value

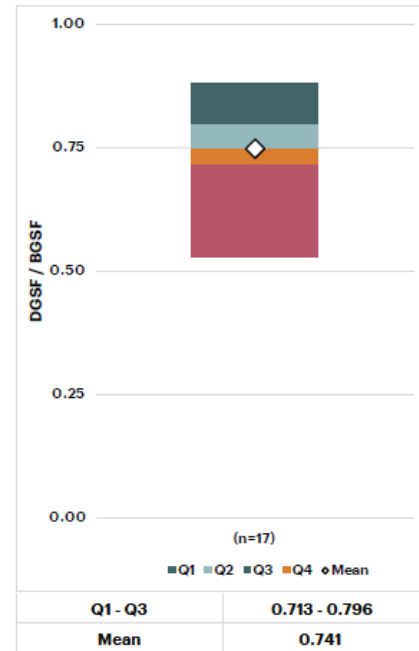
QUARTILE THREE
25% of data greater
than this value

MEDIAN
middle of dataset

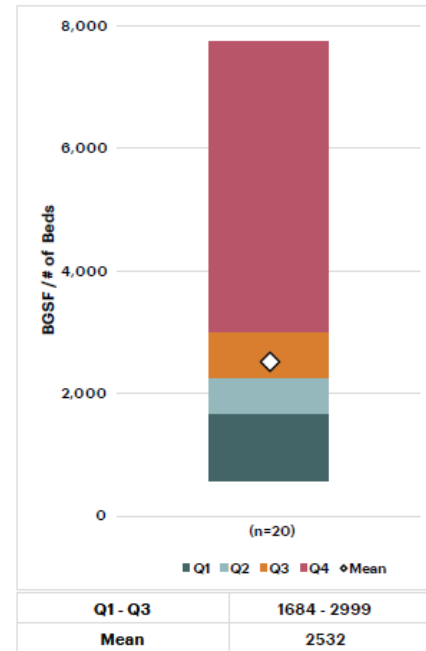
QUARTILE ONE
25% of data less
than this value

MINIMUM
smallest value

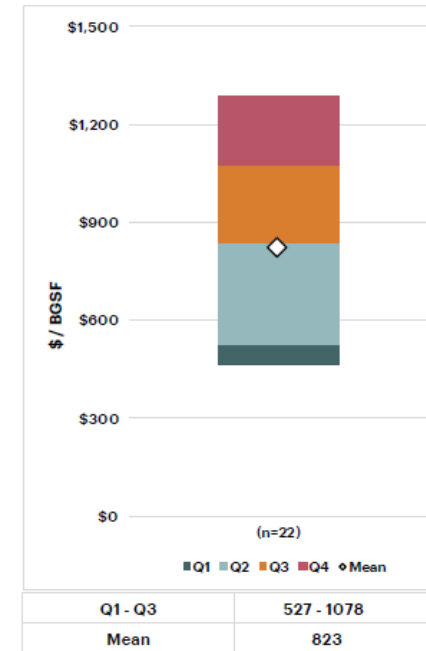
DGSF / BGSF



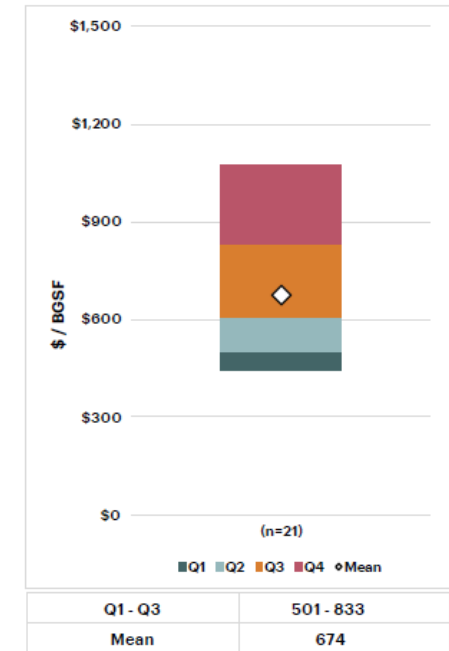
BGSF / # OF LICENSED BEDS



PROJECT COST / BGSF



CONSTRUCTION COST / BGSF





HKS HEALTH BENCHMARKING INPATIENT CARE UNIT STUDY

CONTRIBUTORS:

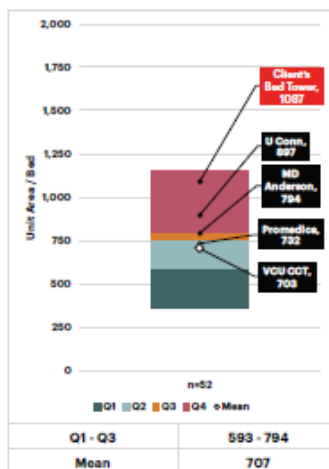
Kate Renner
Kaitlyn Badlato
Upali Nanda
Tyler Schwede

BACKGROUND

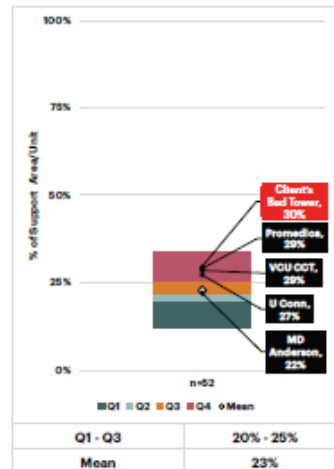
Analysis of more than 50 inpatient units worldwide. Selected projects shown here represent projects with similarities to the client's facility-- academic medical centers, cancer centers and 600+ bed hospitals.



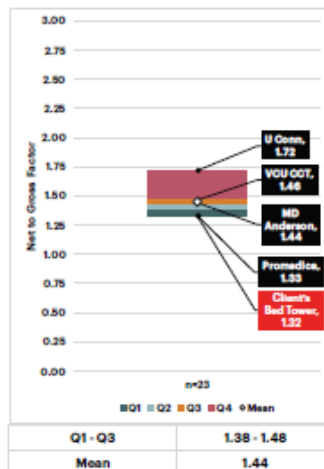
1. UNIT AREA / BED ACUTE CARE UNIT



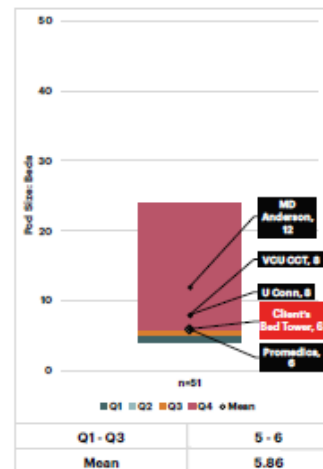
2. % SUPPORT AREA / UNIT ACUTE CARE UNIT



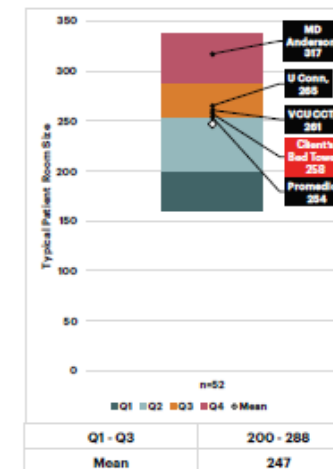
3. NET TO GROSS FACTOR ACUTE CARE UNIT



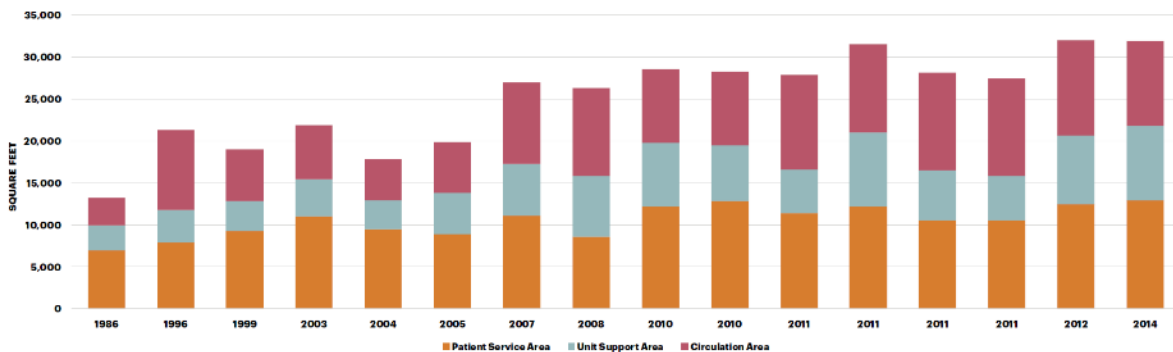
4. POD SIZE: BEDS ACUTE CARE UNIT



5. TYPICAL PATIENT ROOM SIZE ACUTE CARE UNIT



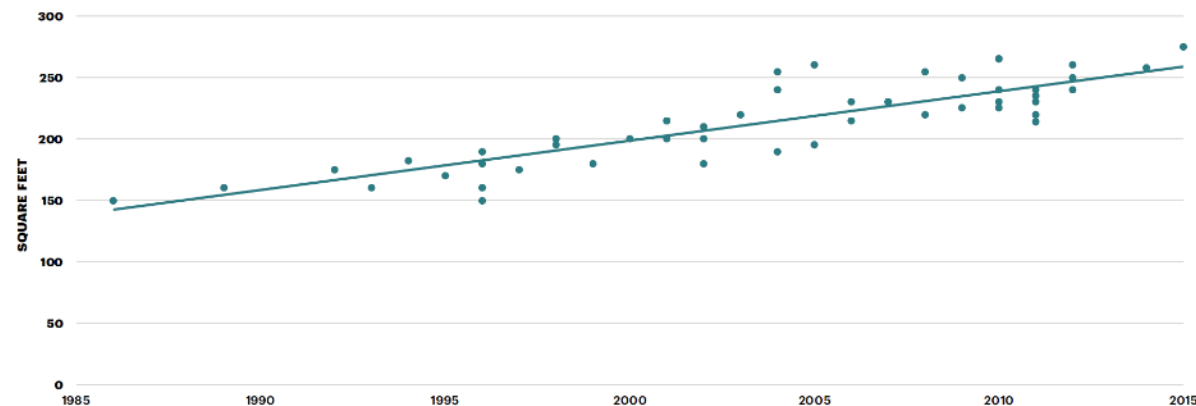
36-BED UNIT



Inpatient unit area growth for 24-, 30-, and 36-bed units: 1986-2014

Image credit: HKS

TYPICAL PATIENT ROOM SIZE

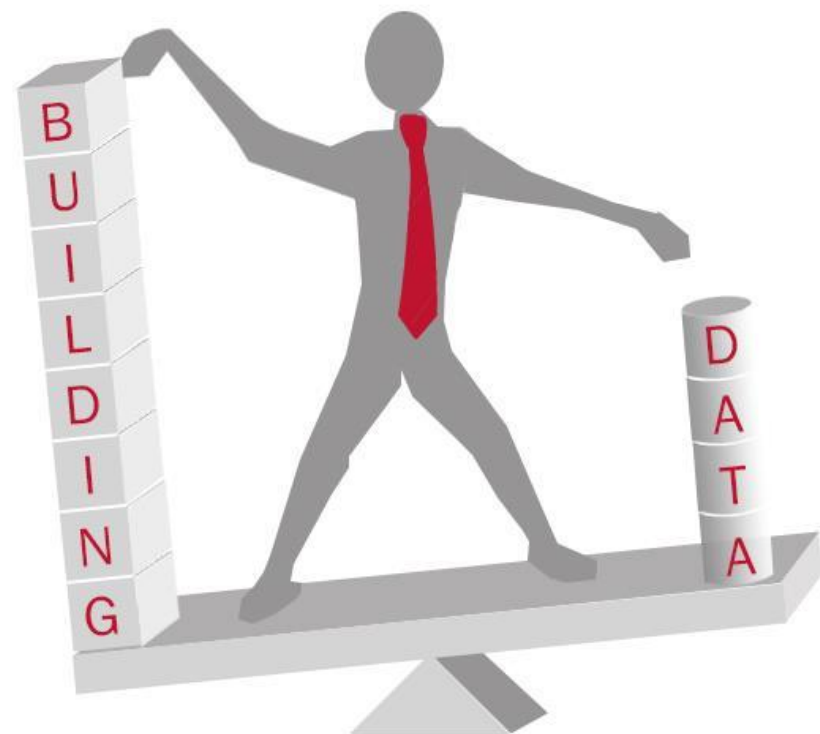


Patient room size growth: 1986-2019

Image credit: HKS

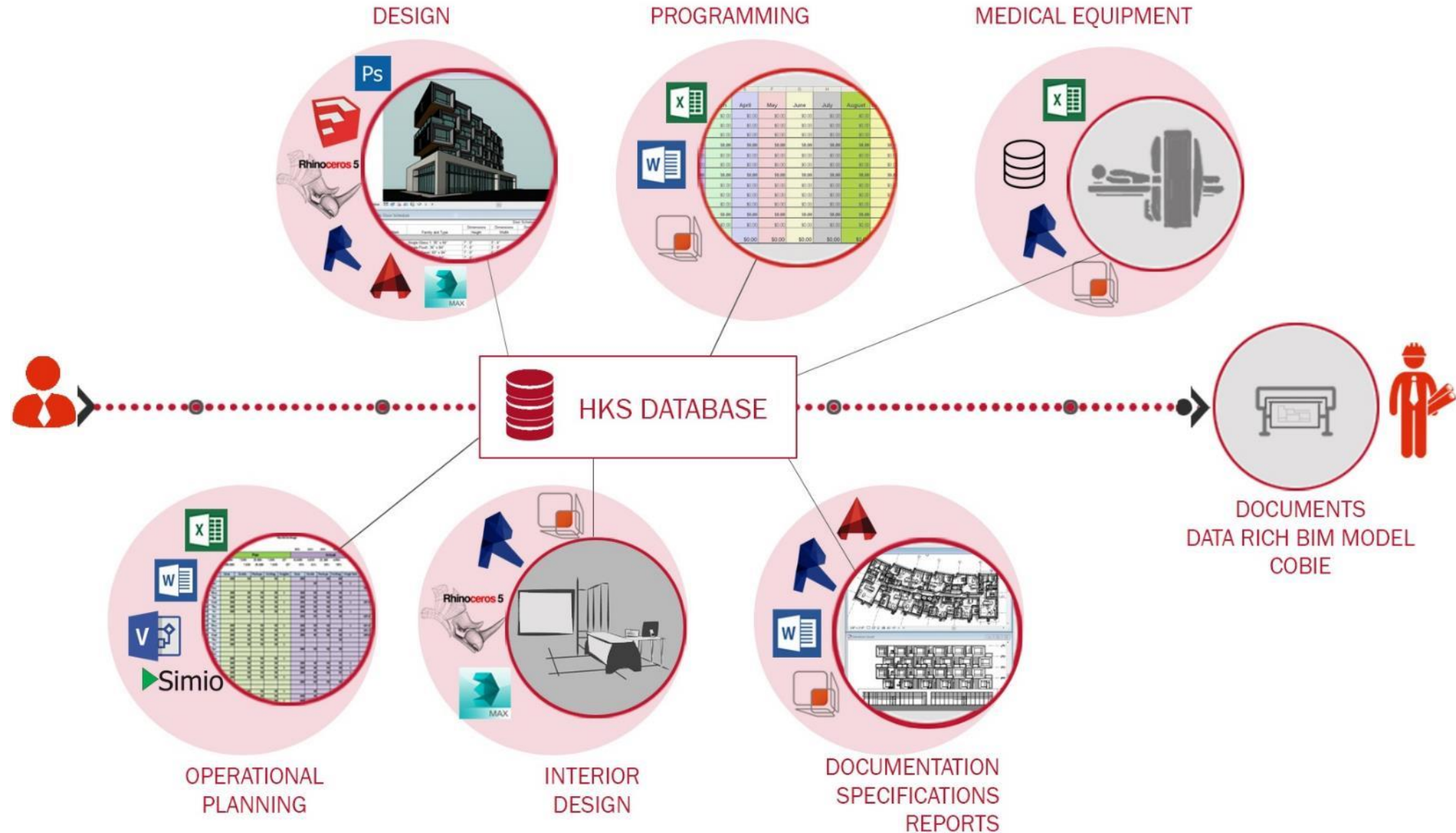


The Architect's balancing Act: Geometry & Data





'Data-Centric' Process – Single Repository

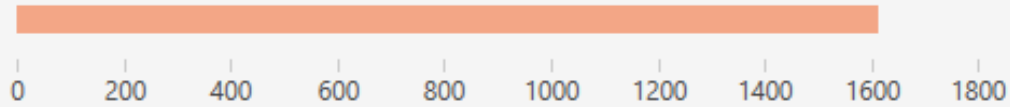




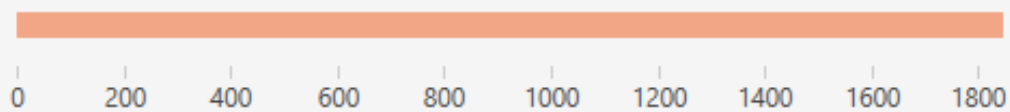
Project Snapshot in dRofus

Progress

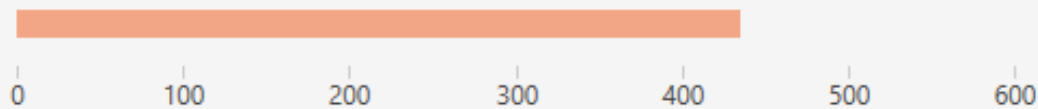
Rooms designed



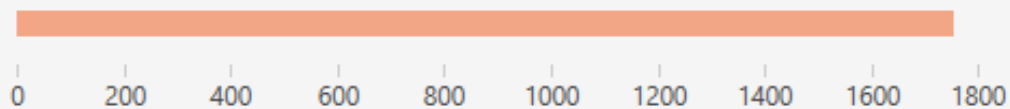
Rooms with Room Data



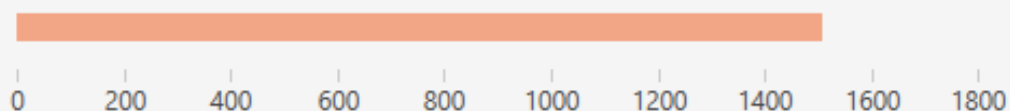
Items in use (with occurrences)



Finishes



JSNs



Key data

Programmed Areas: Gross Area	390,474
Programmed Areas: Net Area	390,474
Programmed Areas: Gross/Net factor	1
Designed Areas: Gross Area	73,542
Designed Areas: Net Area	541,835
Designed Areas: Gross/Net factor	0
Number of Rooms	1,935
Number of Items	622
Number of Occurrences	2,095,554

WHAT

PROGRAM
FLOOR PLAN
FINISH PLAN
AREA VALIDATION
PROGRAM MGMT
DOCUMENTS
DATA SHEETS
FM DATABASE

WHO

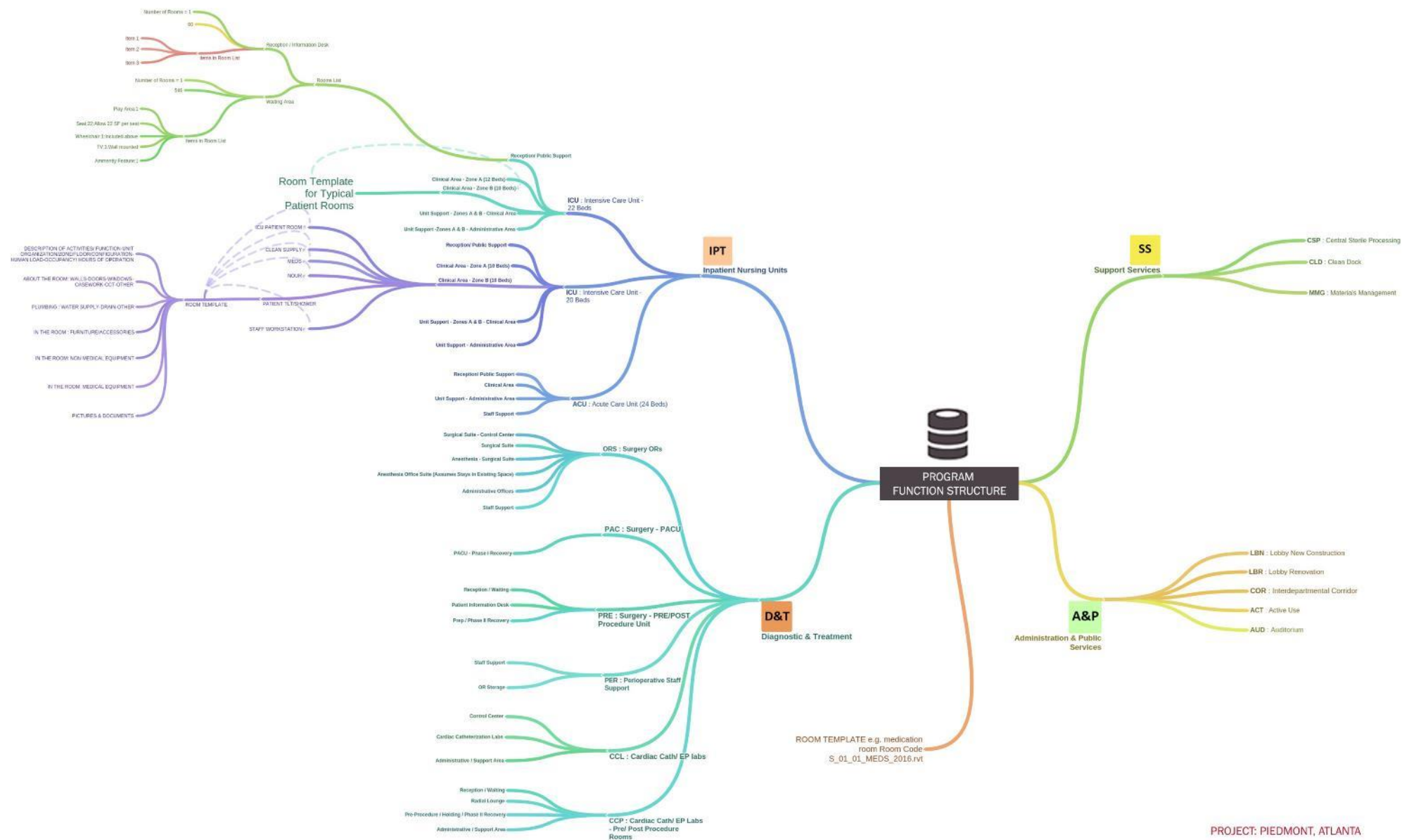
Planner
Designer
Int. Designer
Proj. Manager
Proj. Architect
Consultants
Owner



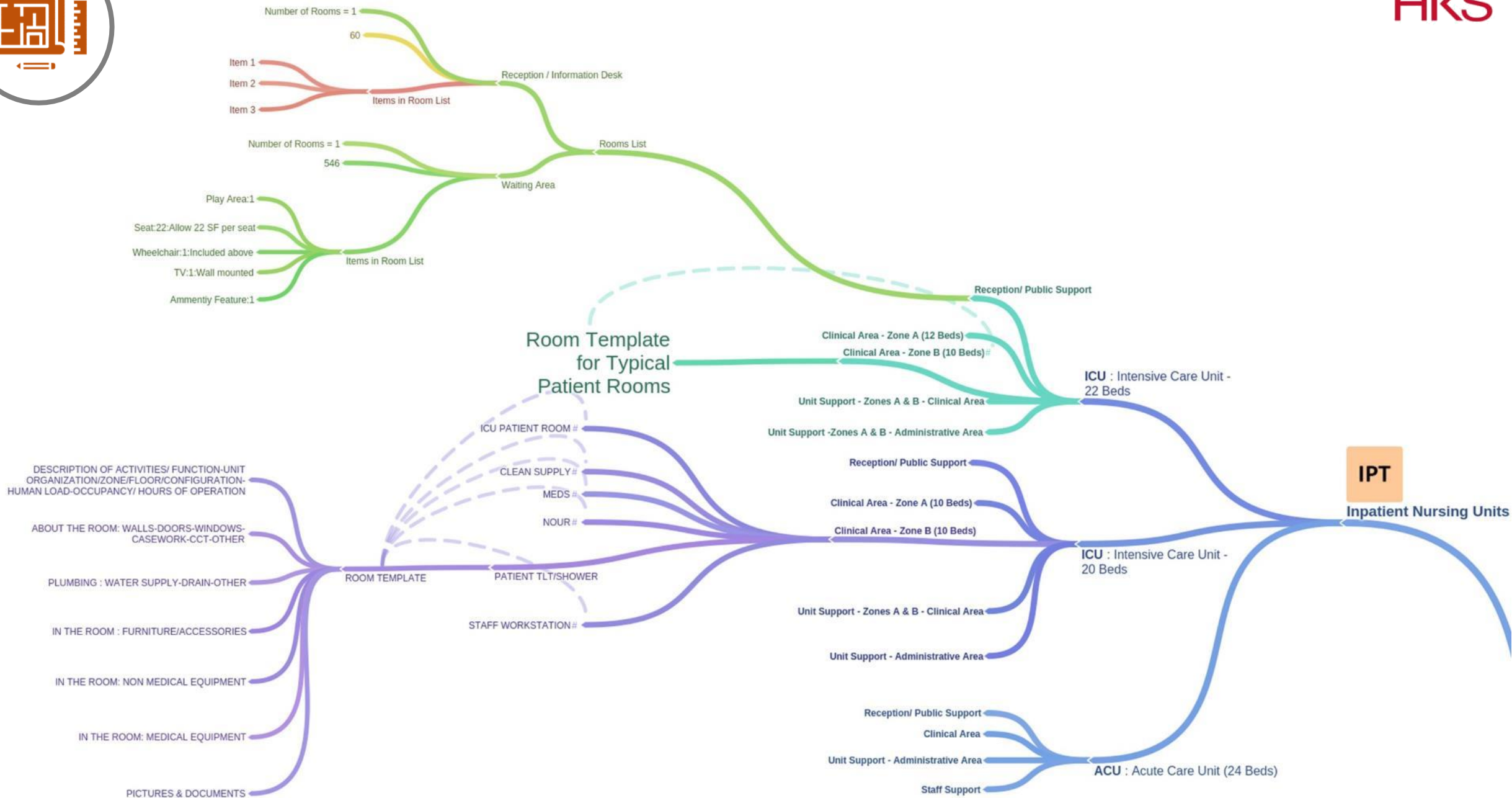


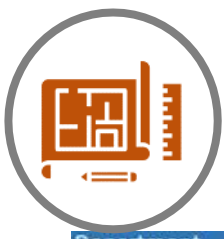
Healthcare Program Function Structure

HKS



PROJECT: PIEDMONT, ATLANTA





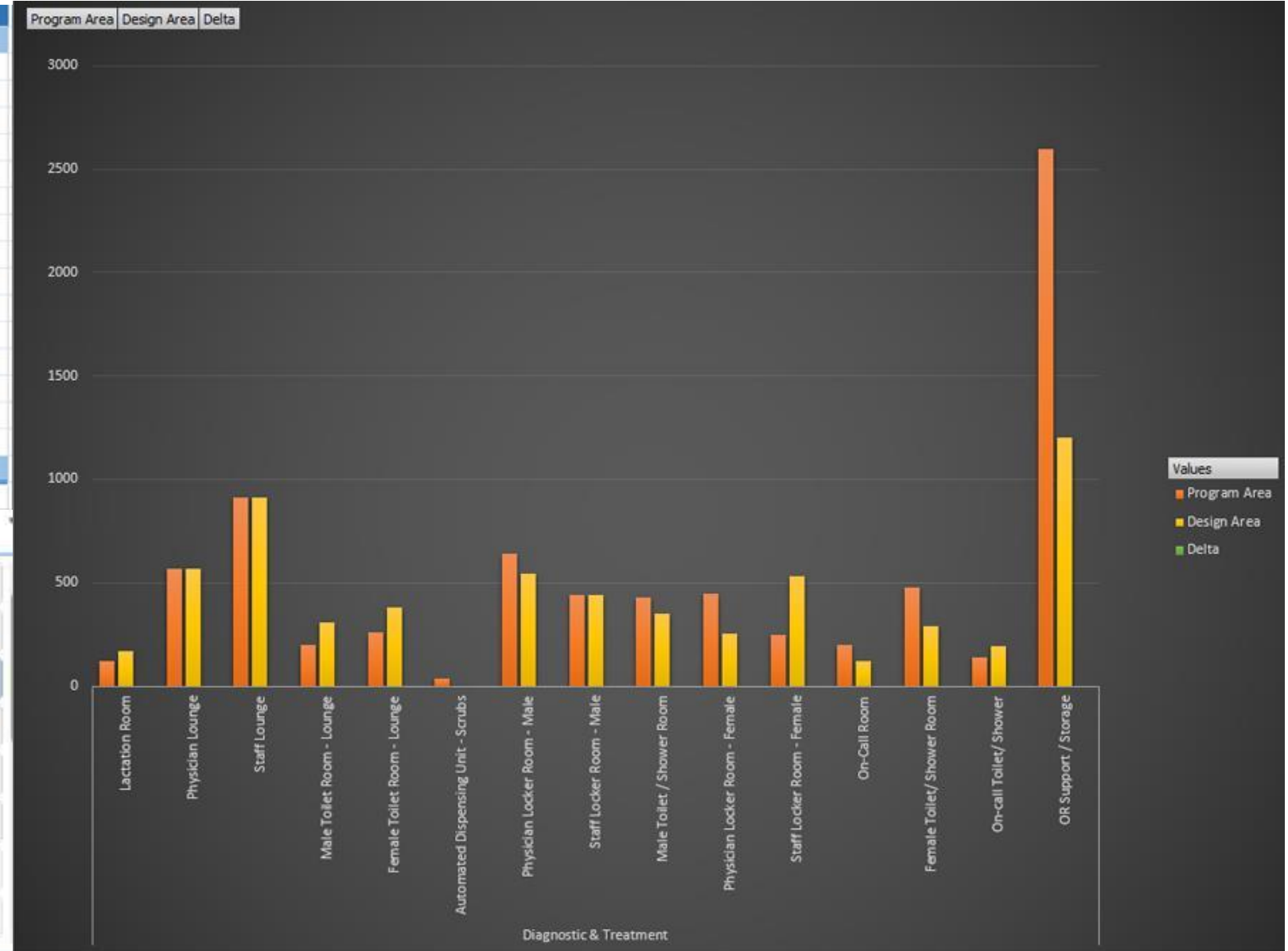
Area Validation : Sub Departments (D&T)

HKS

Department	Program Area	Design Area	Delta
Diagnostic & Treatment			
Lactation Room	120	171.68	
Physician Lounge	570	570.13	
Staff Lounge	910	911.64	
Male Toilet Room - Lounge	200	308.27	
Female Toilet Room - Lounge	260	381.08	
Automated Dispensing Unit - Scrub	35	0	
Physician Locker Room - Male	640	542.37	
Staff Locker Room - Male	440	439.52	
Male Toilet / Shower Room	430	351.91	
Physician Locker Room - Female	450	254.55	
Staff Locker Room - Female	250	529.39	
On-Call Room	200	119.99	
Female Toilet/ Shower Room	480	292.01	
On-call Toilet/ Shower	140	192.06	
OR Support / Storage	2600	1203.38	
Diagnostic & Treatment Total	7725	6267.98	
Grand Total	7725	6267.98	

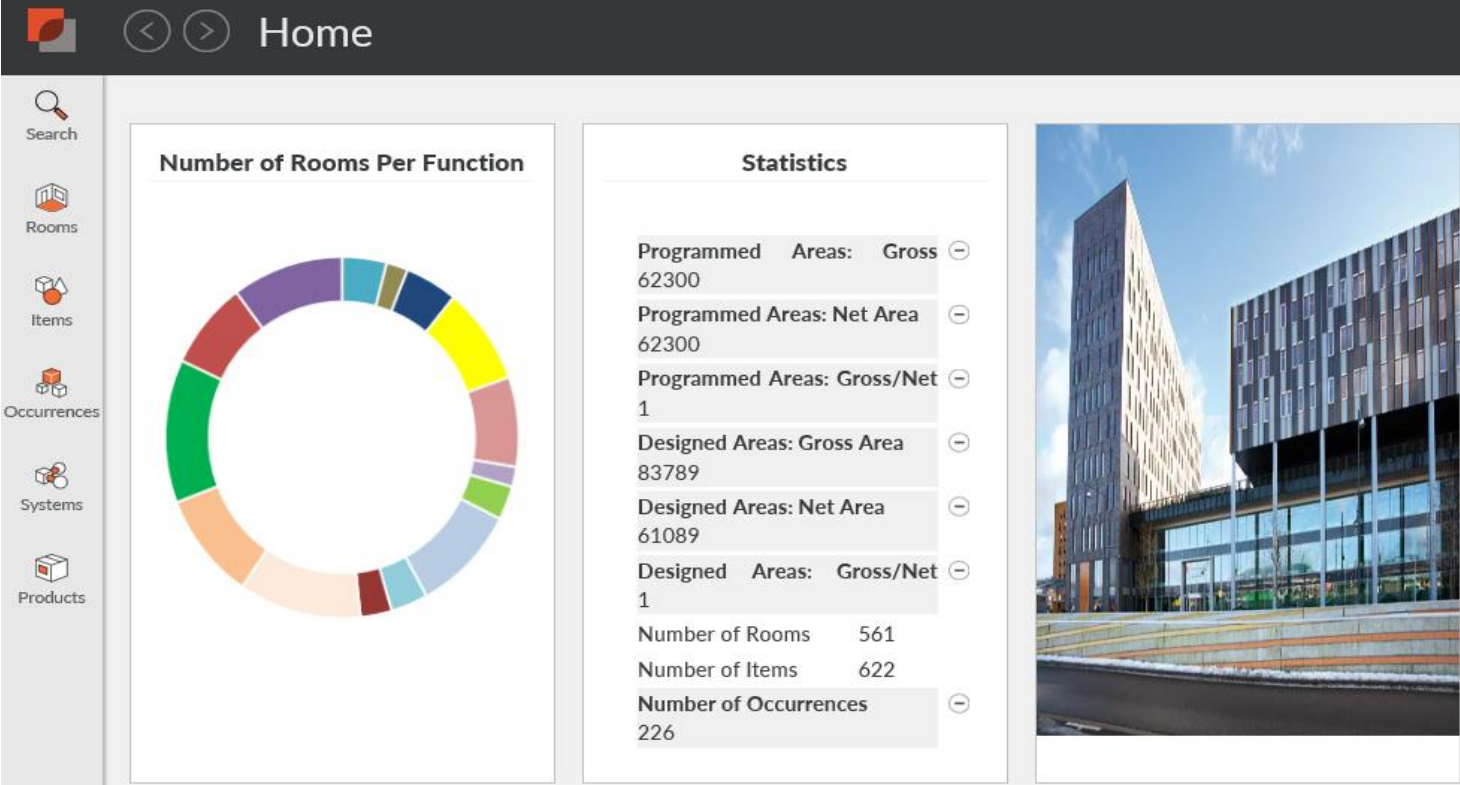
Department (Na...
Diagnostic & Treatment
Administration and Pu...
Inpatient Nursing Units
Support Services

SubDepartment (...
CARDIAC CATH / EP ...
CARDIAC CATH / EP ...
PERIOPERATIVE ST...
SURGERY - ORs
SURGERY - PACU
SURGERY - PRE / PO...
ACTIVE USE
ACUTE CARE UNIT (...

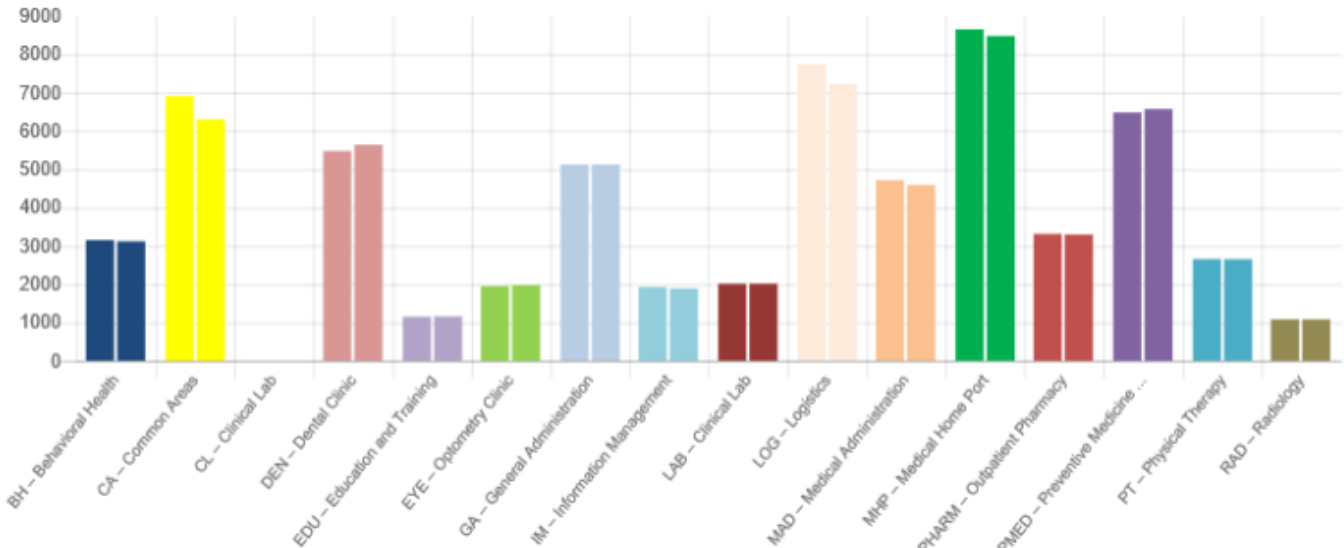




Web Analytics



Area Validation : Area per Function

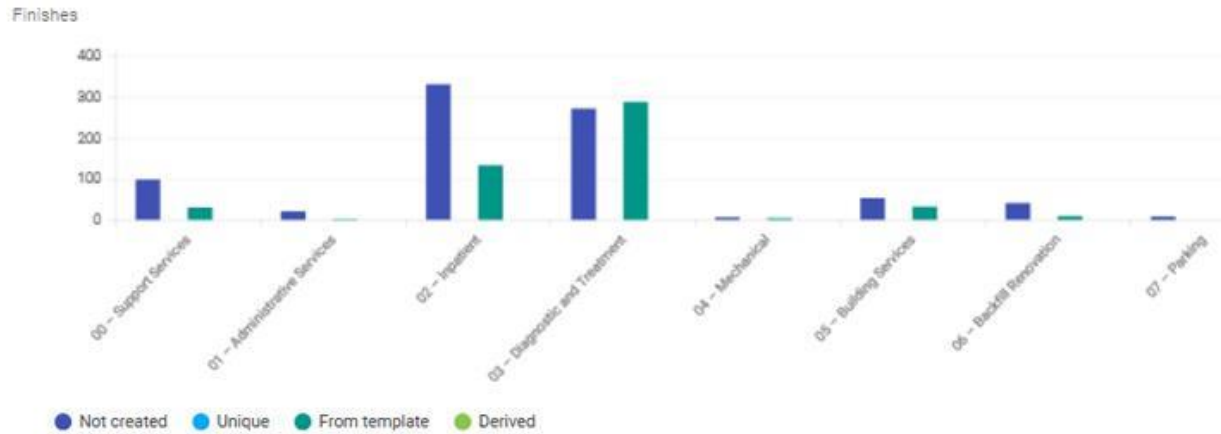


Programmed vs Actual

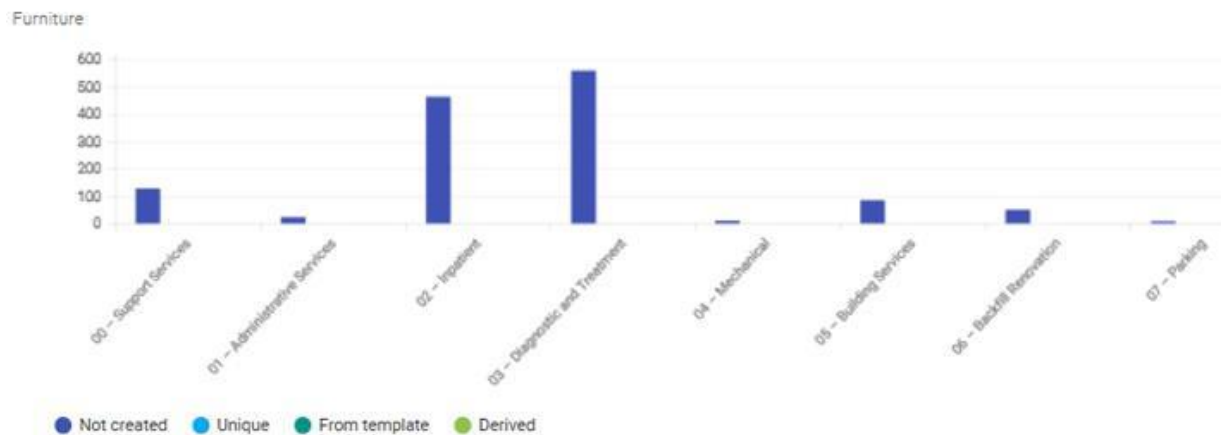
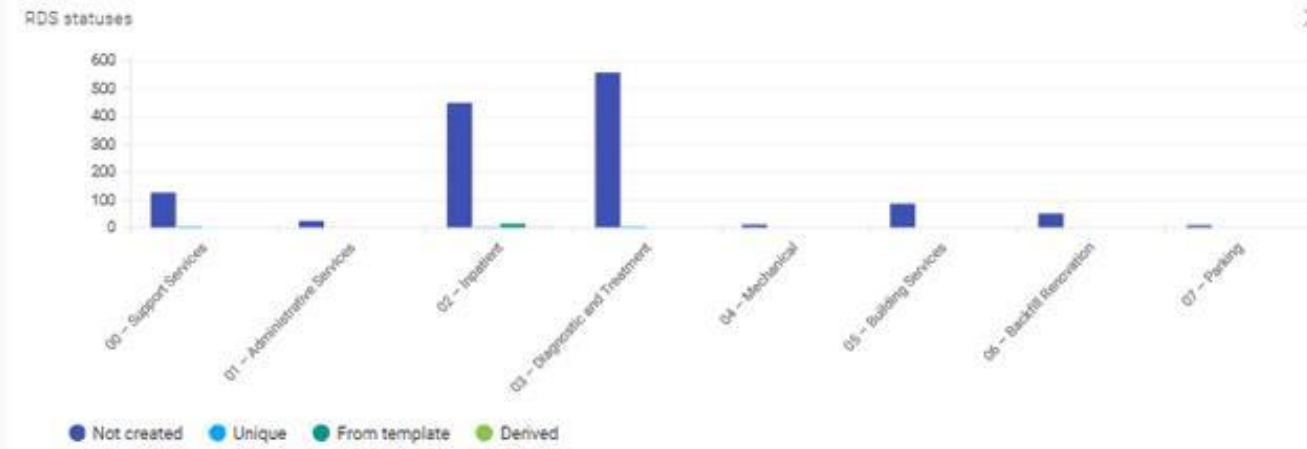


Web Analytics: dRofus Templates & Revit Rooms

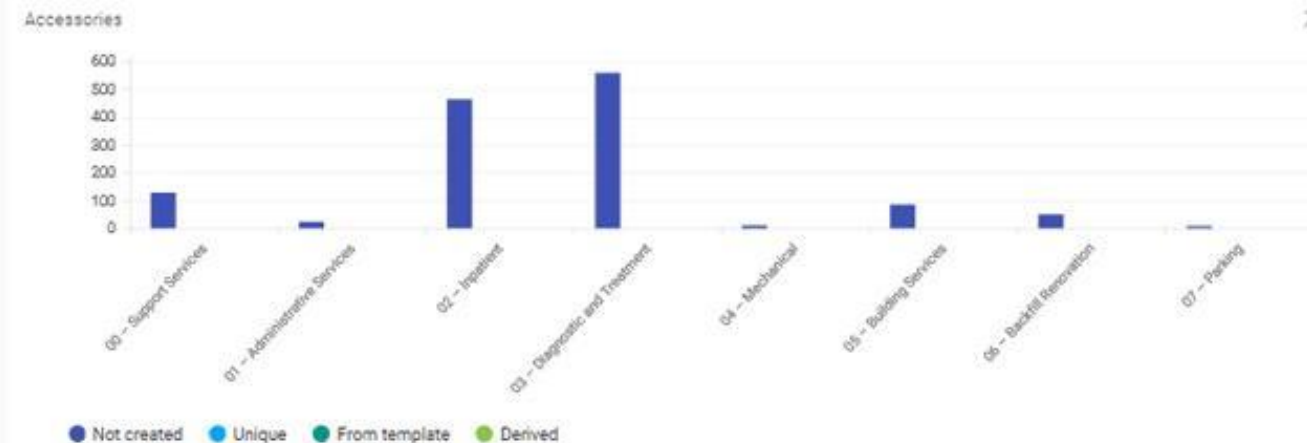
Room Finishes and Furniture Status Reports



Room Data Sheets Status Reports



Equipment List Status





Web Viewer: IFC Model

Rooms Navigation pane

VIEWER asmu...

Search

Rooms

Items

Occurrences

Systems

Products

1.15.2.0 (Production)

Room match	Room Name and Number	...
✗	04.006 - Office	...
✗	04.007 - Office	...
✗	04.008 - Gen. Dent. Dtr #4	...
✗	04.009 - Gen. Dent. Dtr #5	...
✓	04.010 - Dental Waiting	...
✓	04.011 - Dental Waiting	...
✓	04.012 - X-Ray	...
✓	04.013 - X-Ray Alcove	...
✓	04.014 - Developing	...
✓	04.015 - Admin	...
✓	04.016 - Dtr Support	...
✓	04.017 - Gen. Dent. Dtr #6	...
✓	04.018 - Consult.	...
✗	04.019 - Gen. Dent. Dtr #7	...
✓	04.020 - Gen. Dent. Dtr #8	...
✓	04.021 - M. Staff Locker/...	...
✓	04.022 - W. Staff Locker/...	...
✓	04.023 - Gen. Dent. Dtr #9	...
✓	04.024 - Dipc Decon	...
✓	04.025 - Dipc Clean	...
✓	04.026 - Gen. Dent. Dtr #...	...
✓	04.027 - Ceramic Lab	...
✓	04.028 - Prosth. Lab	...
✓	04.029 - Central Issue	...

Room 04.018 - Consult. / 2C03

✓ Exists both in dRofus and IFC

Details

3D Zoom

3D Viewer

IFC Data

Settings

Level: First Floor (34) Second Floor (45) Roof - Main

Function Structure



Interior Design Workflow

dRofus : ITEMS

Interior Design Super User (Champion)

**FINISHES
LIST**

- wall
- floor
- ceiling
- base

**ITEM
OVERVIEW**

**FURNITURE
LIST**

- seating
- tables
- outdoor
- other

Furniture

- Furniture List creation in Item Groups
- Adding Supplier Info
- Connecting Revit Families to Furniture Items
- Ability to dump Furniture in Revit Room based on Occurrence assignment in dRofus

Finishes

- Item Overview
- Item Groups
- Adding Items : have an items list copied from HKS Template database as a starting list
- Specifications Menu (Manufacturer, Color, Size, Style, Installation Instructions)
- Company: Pre-Populate a list of preselected manufacturers' and suppliers

Equipment

Equipment List

Medical Equipment

Med Equipment List

- Responsibility User Group
- Link to Revit Family
- Report



Furniture Reports in dRofus

UPHOLSTERY REPORT

Images for reference only - Not to Scale

IMAGE	CODE	MANUFACTURER	PATTERN#	COLOR#	WIDTH	REPEAT	CONTENT	FINISH/BACKING	FLAME RESISTANCE	DURABILITY	CLEANING CODE	SPECIAL INSTRUCTIONS
	F9	Leather Creations	full	red	54"	Horizontal	50% leather 50% vinyl	yes	no	50-50	special solution cleaning	do not wipe with water
	1	Dunlee Carolina Grey	x	Grey	58.00"	V. 14.5, H. 6.00	88% Rayon / 12% Polyester	None	Yes	not	dry clean	Washable
	3	Bundy	807-55	Blue	54"	None	84% post-consumer, 16% pre-consumer recycled polyester	Stain resistant	Class A rated ASTM E-84 (unadhered), NFPA 703 UFAC Class 1, California TB 117-2013 Section 1 compliant	100,000 double rubs (IV)	Fabric Cleaning code	Upholstery, wrapped panel, systems panel
	F9	Leather Creations	full	red	54"	Horizontal	50% leather 50% vinyl	yes	no	50-50	special solution cleaning	do not wipe with water

HKS 101 Peachtree St, Atlanta, GA 30322

Page 1 of 5

FURNITURE PUNCH LIST

DATE: 11/13/2018

LOCATION	TAG CODE	QTY	MANUFACTURER	NAME/ COLLECTION	FURNITURE THUMBNAIL	FABRIC THUMBNAIL	COMMENTS
Patient Room	S2	1	_Crate and Barrel	Montclair 2 seat Roll Arm Sofa			
Patient Room	S6	1	_Ashcroft	Carolina Sleep Storage Sofa			
101 Reception	S2	1	_Crate and Barrel	Montclair 2 seat Roll Arm Sofa			
101 Reception	S3	1	_Lazyboy	Blue sofa			
101 Reception	S3	1	_Lazyboy	Blue sofa			
101 Reception	S3.2	1					
101 Reception	S4	2	_Cube Company	Curved Bench			
101 Reception	T1	1	_Carolina Table	Table			

HKS 101 Peachtree St, Atlanta, GA 30322

Page 21



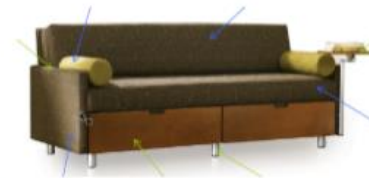
**Erlanger - Children's Hospital
Outpatient Center**
975 East Third Street, Chattanooga, TN 37403
HKS Project Number: 18321.007

ISSUE: **S6**
Date Issued: 09/04/2018 Quantity: 0
Revised: 09/04/2018 (Dealer responsible for
Addendum: 1 confirming quantity.
Refer to plan.)

Manufacturer _Ashcroft
Name/Collection Carolina Sleep Storage Sofa
Manufacturer Code 23541
Description Sleep Sofa testing for multi finish and multi
fabric to be placed in patient room.
Dimensions 66" W 34" D 38" H
Special Instructions Type any Special Instructions here
Contact Information Bob Smith 404.111.1234

UPHOLSTERY A CODE: 5
Manufacturer Kauffman Essex Yarn
Pattern# FH-750
Color# Black
Width 43"
Repeat none
Finish/Backing n/a
Special Instructions machine Wash Cold/Tumble Dry Low
Contact Information Sarah Smith 234-123-0989

UPHOLSTERY B CODE: 6
Manufacturer Kauffman Essex Yarn
Pattern# 0445787
Color# Peacock Blue
Width 43"
Repeat none
Finish/Backing n/a
Special Instructions machine Wash Cold/Tumble Dry Low
Contact Information Sarah Smith 234-123-0989



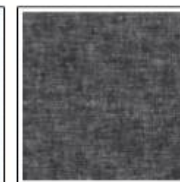
Images for reference only



Images for reference only



Images for reference only



Images for reference only

HKS 101 Peachtree St, Atlanta, GA 30322

Continued on next page Page 6 of

Design Decisions Life Cycle : Reduces Redundancy and Increases Efficiency



*Real-Time Cloud
based tool to speed
up workflows*



*HKS Templates for
Typical Room
Typologies to reduce
redundancy and
repetitive work for
projects of similar
types / clientele.*



*Streamlined Planning
and Programming
directly ties to our
documentation &
project delivery tool :
Revit*



*Function
Performance
Evaluation Reports
can be fed back to
the Rooms Database
to improve future
projects*



*Analyze, interpret,
observations to
create a 'Best In
Class' Room
Typologies each year*



*Save Change Lists,
create Audit Trails*



*Capture our work process >
Analyse the waste > Implement
better processes by providing
project metrics.*



INSPECT



KNOWLEDGE



TIME



DATA



KNOWLEDGE



IMPROVE



AUTOMATED DATA MINING

HKS

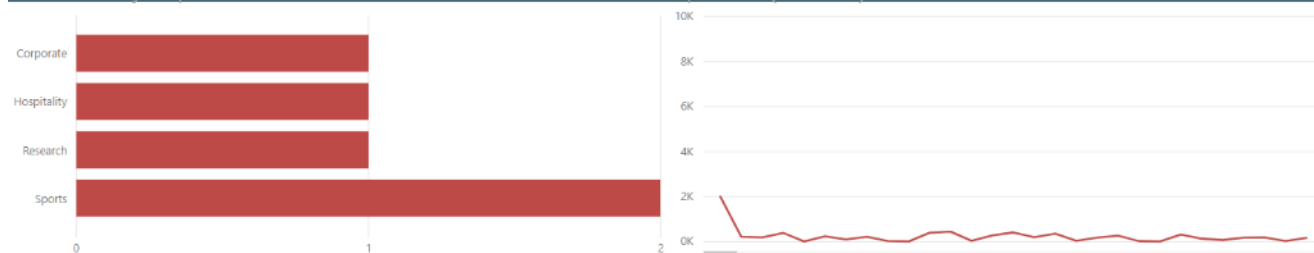
Office
Dallas

Sector
All

HKS Company Summary

2,254.67 Session Hours
619.16 Largest File Size (MB)
114.40 Avg. File Size (MB)
311.97 Avg. Open Time (sec)
31 # of Models
15 # of Contributors

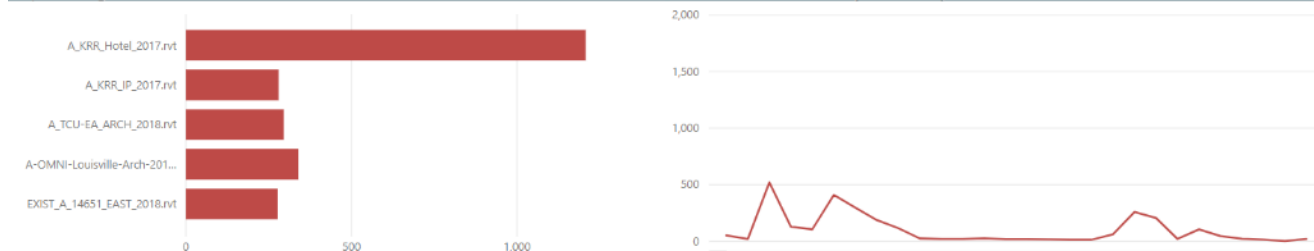
Number of Projects per Sector



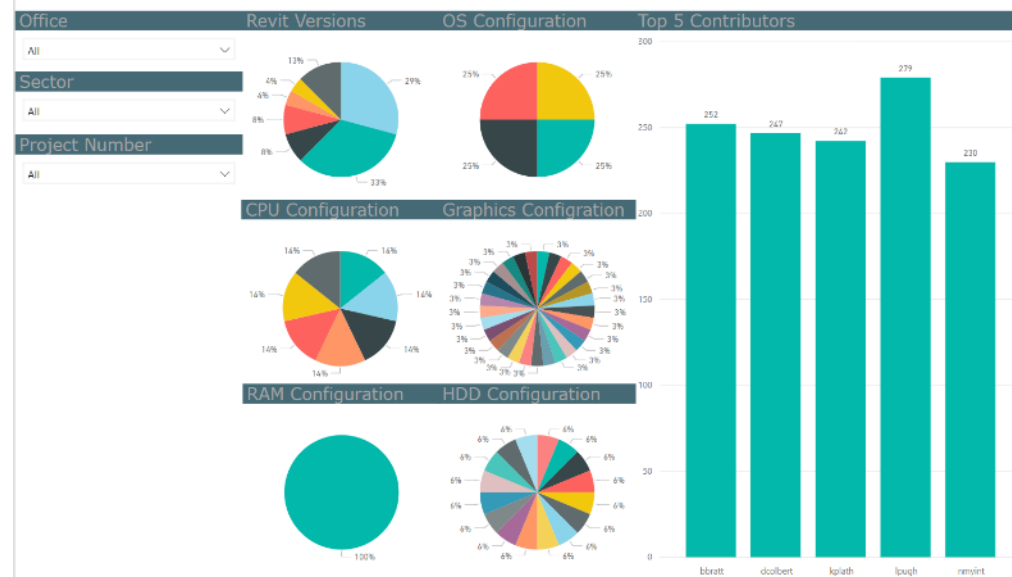
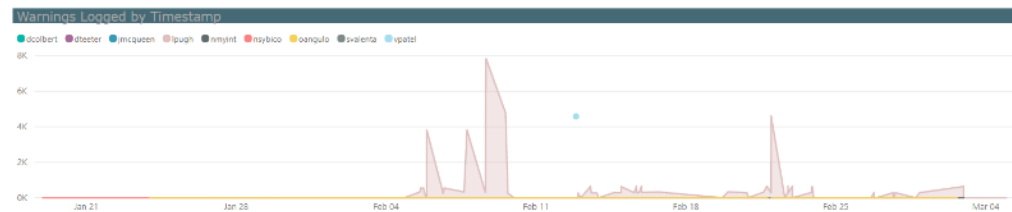
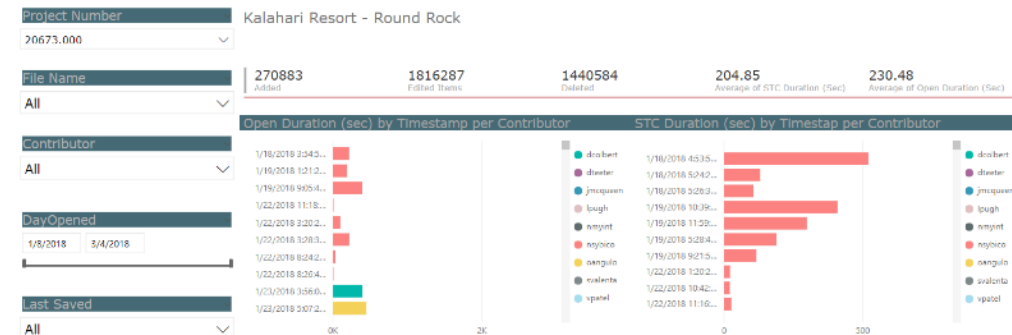
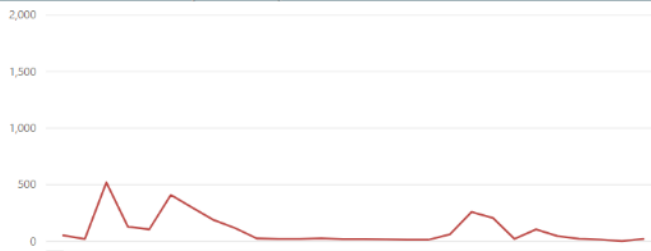
Open Time (Maximum)



Top 5: Largest File Size



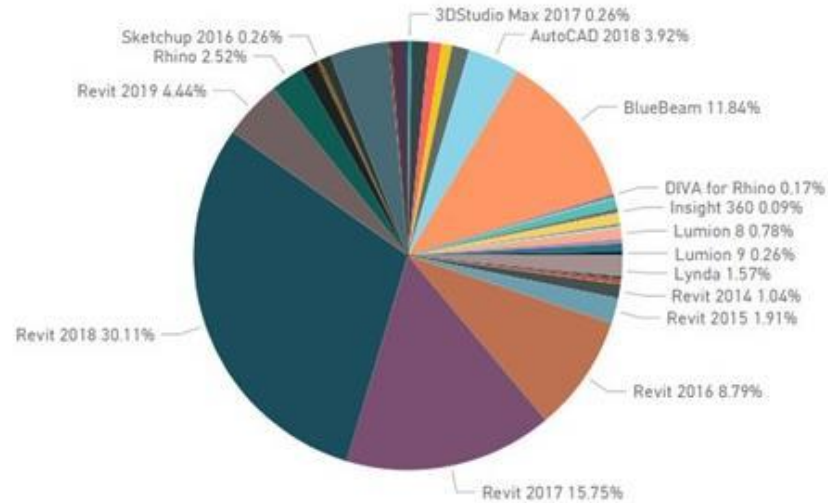
Save to Central Time (Maximum)



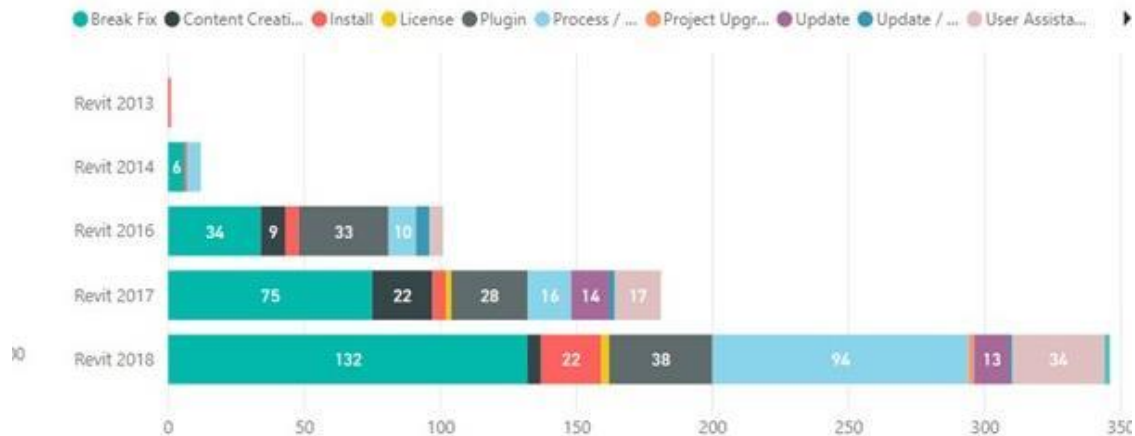


SUPPORT METRICS - 2018

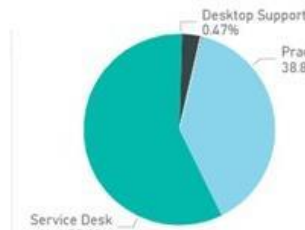
of Tickets per Product



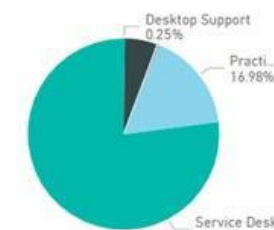
Revit Tickets per Category



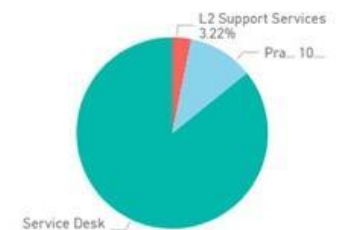
Revit



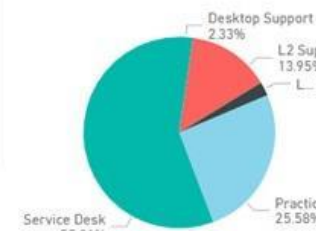
Bluebeam



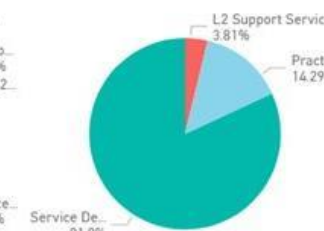
Sketch-Up



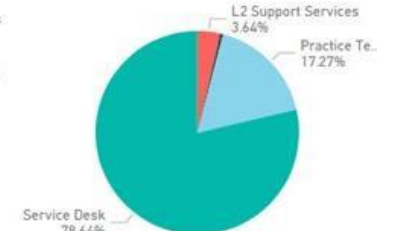
Lumion



3DS Max & VRay



All Other





- **Data Driven Decisions** : Tap into multiple data sources, to create insights
- **Data Centric Planning** and **Data Driven Design** : Leverage new tools that enhance our workflows
- **Data Driven Support** : Analyze your **Revit Model Data** to have better project implementation
- **Data Driven Culture**: Share outcomes, Improve training, Craft new skills & roles!

DATA DRIVEN CULTURE

HKS

Tianjin Qanjian Stadium

THANK YOU!

Reeti Gupta – rgupta@hksinc.com
Director-Practice Technology, HKS