SIMULATION MODELING OF PRE AND POST PROCEDURE BEDS FOR THE INTERVENTIONAL PLATFORM
SSM SAINT LOUIS UNIVERSITY HOSPITAL

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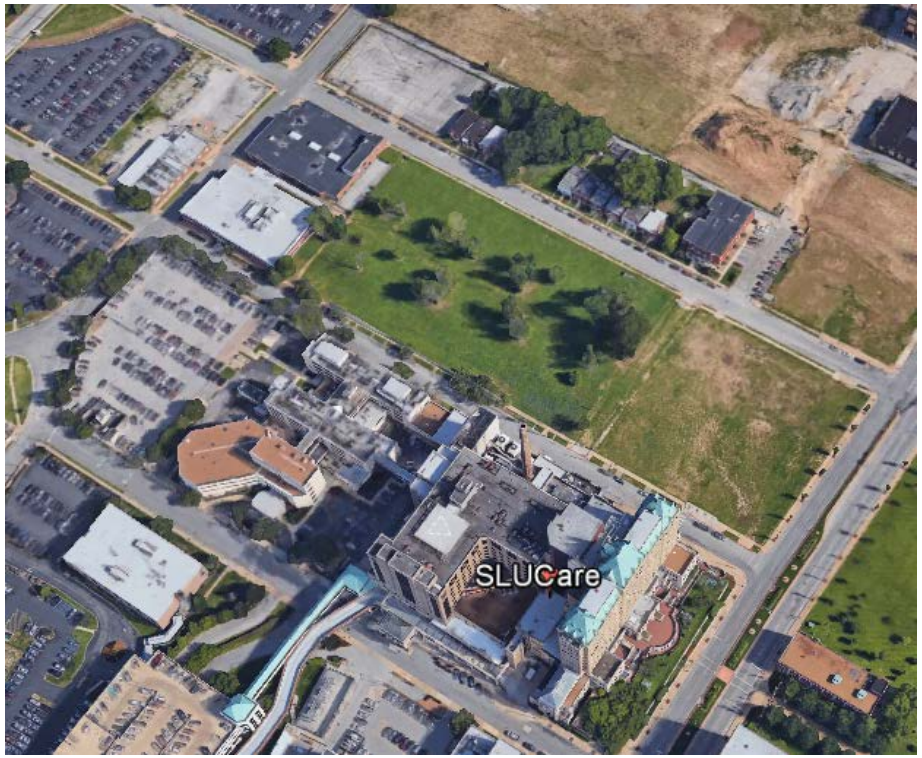
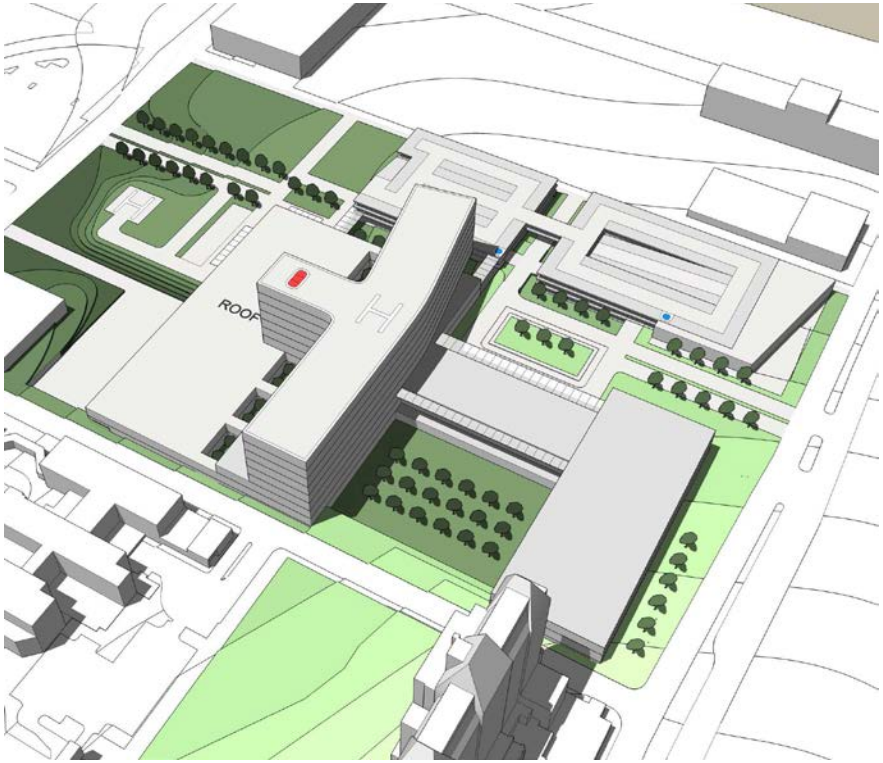
The University of Kansas

Presentation Agenda

- Overview of Interventional Platform
- Visioning future process
- Development of model
- Output/evaluation
- Questions

SSM St. Louis University Hospital Renewal Project





Planning Approach

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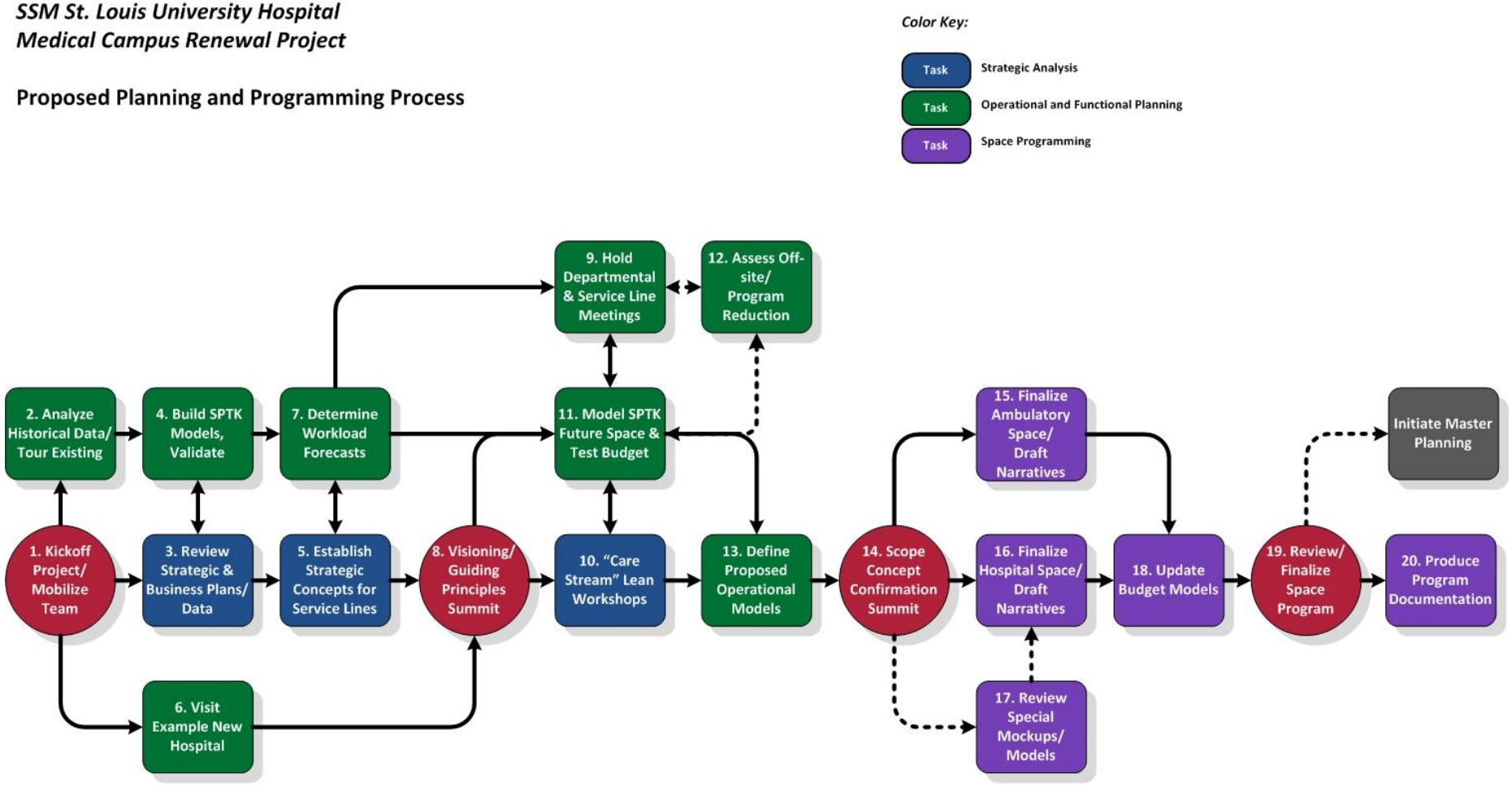
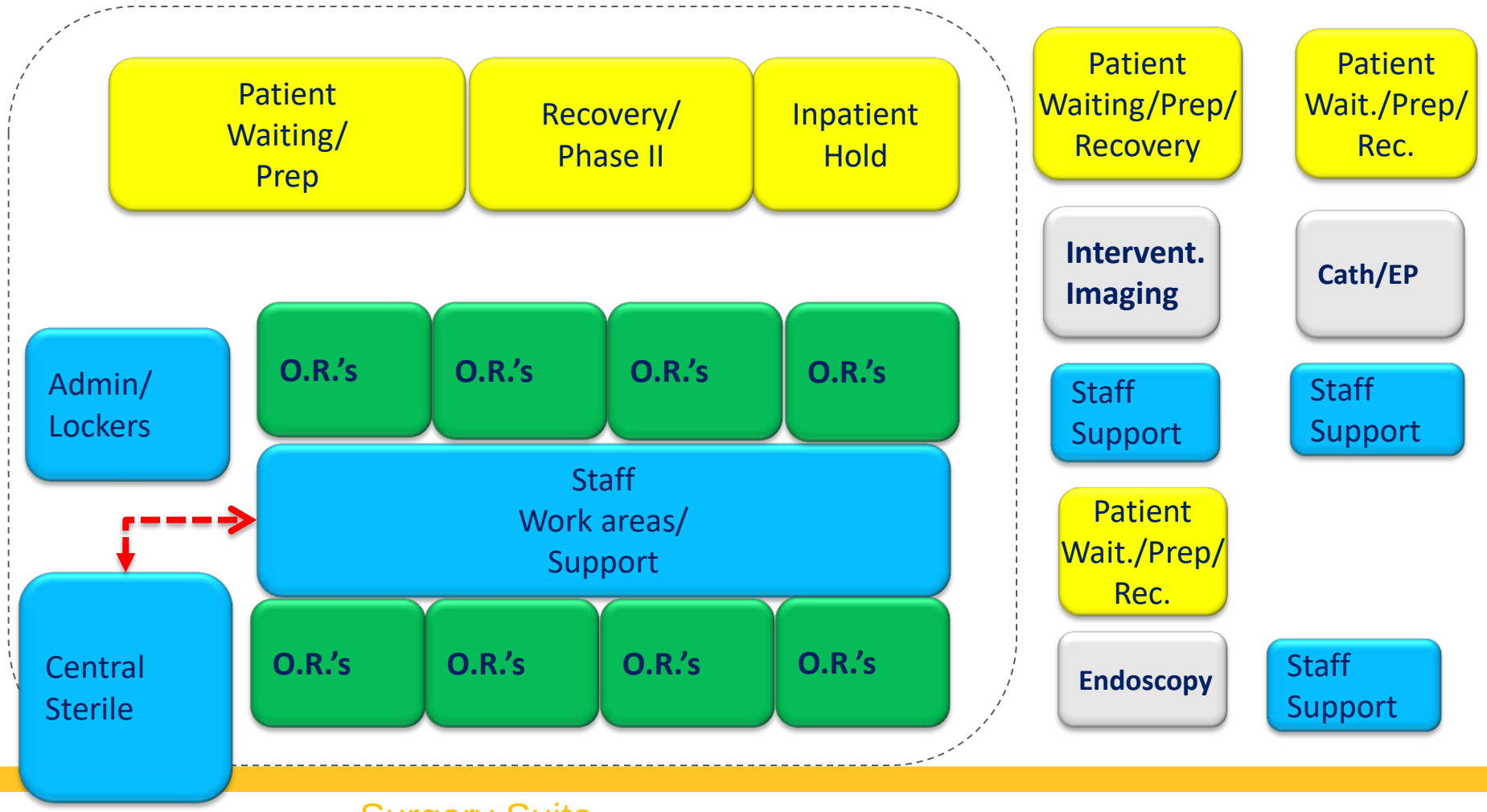
Medical Campus Renewal Project

Proposed Planning and Programming Process

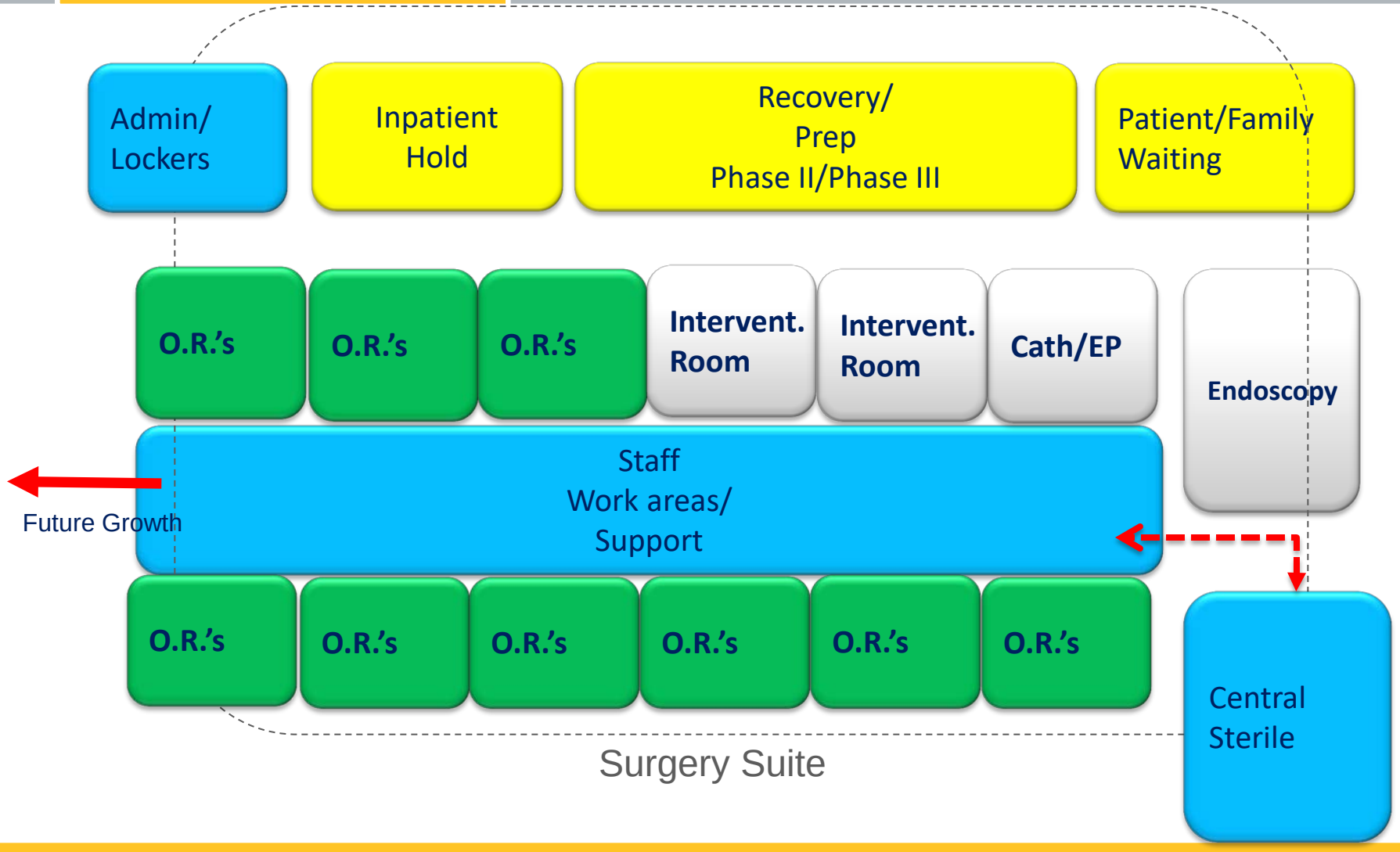


Traditional Model



Surgery Suite

Interventional Suite



University Medical Center at Princeton

Space Program

SSM SLUH **December 22, 2015**

Space List

Interventional Platform

	AREA/ROOM	NSF/ Unit	# of Units	Total NSF	Subtotal	Comments
	Public/Family					
1	Waiting Area	20	64	1,280		32 total rooms 2 per room.
2	Coat Alcove	30	1	30		
3	Computer workstation	20	4	80		
4	Nourishment alcove	80	1	80		
5	Volunteer desk	40	1	40		
6	Public Toilets	180	2	360		
7	Family Consult	120	4	480		
8	Consultation alcove	60	1	60		
	Subtotal				**2,410**	
	Pre-op/Phase II Holding					
9	Holding/Recovery Rooms	120	40	4,800		One per procedure room
10	Lounge areas for patients/family	60	16	960		Phase III recovery, sub divide for Endo
11	Charting alcove	15	20	300		
12	Patient clothes storage closet	120	1	120		Holding garment bags w/ patient clothes
13	Medication Alcove	80	2	160		
14	Nourishment Alcove	80	2	160		
15	Clean Supplies	120	2	240		
16	Linen	80	2	160		
17	Soiled Holding	100	2	200		
18	Pneumatic tube area	10	2	20		
19	Charting/Work area	140	4	560		
20	Housekeeping Closet	30	2	60		
21	Stretcher Storage	80	1	80		
22	Patient Toilet	50	8	400		
23	Staff Toilet	50	2	100		
	Subtotal				**8,320**	

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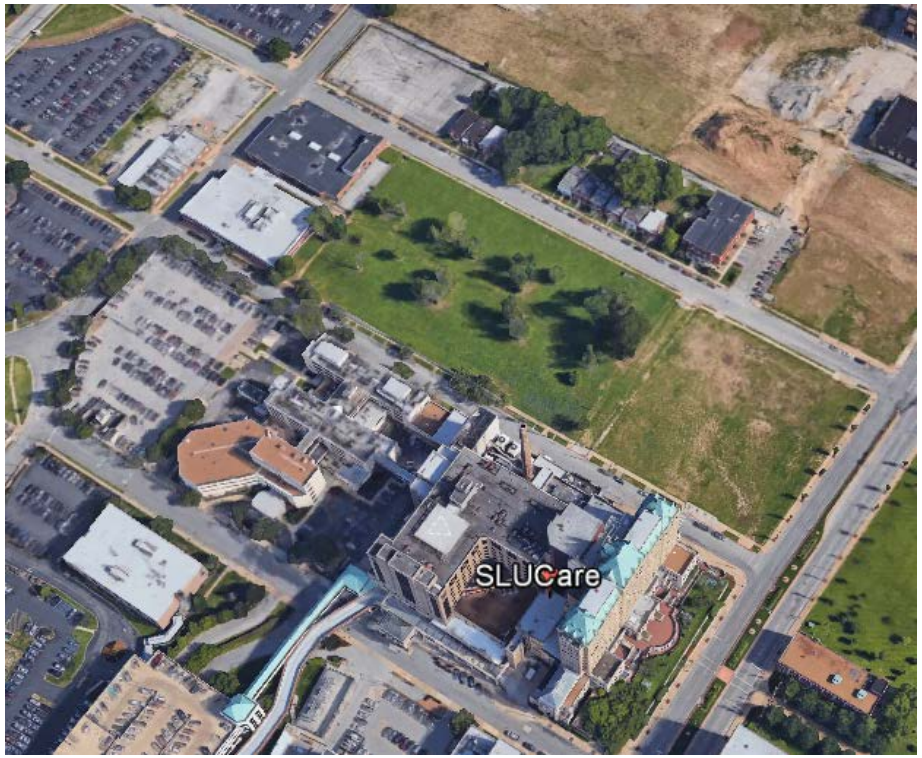
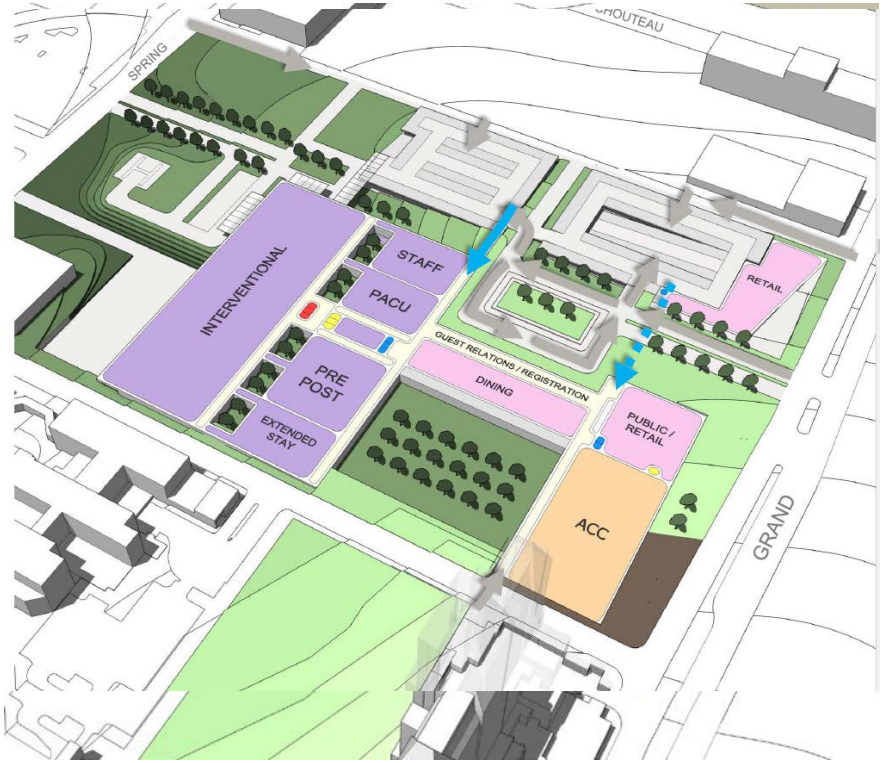




Interventional Platform Concept

Purpose of Modeling

- Identify proposed patient flows for services using the Interventional Platform (IP)
- Estimate bed requirements based on simulation models of proposed demand and flow. Components include:
  - PACU
  - Prep/Phase II
  - Phase III (recliner area)
  - Short stay (<23 hour observation)
- Test the sensitivity of the model results to key operational assumptions
- Recommend adjustments, if needed, to the IP space program

“Essentially all models are wrong, but some are useful”

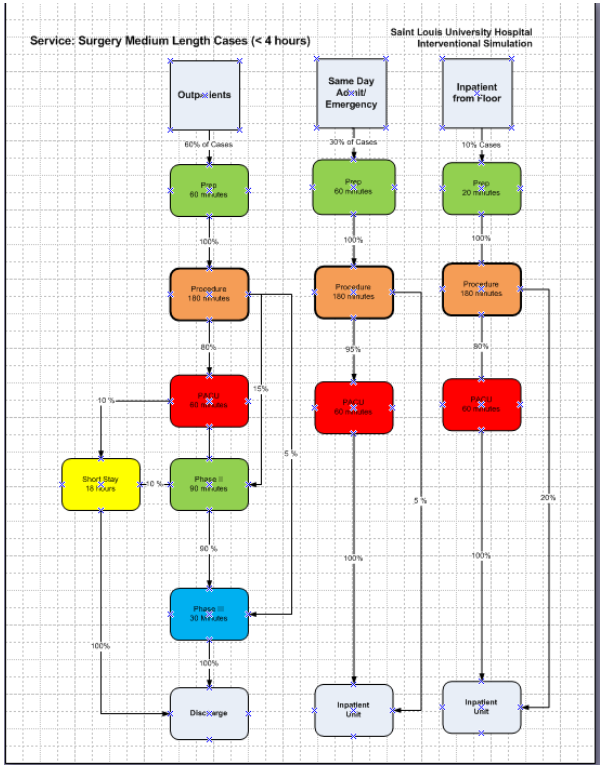
George Box, Professor Emeritus, University of Wisconsin

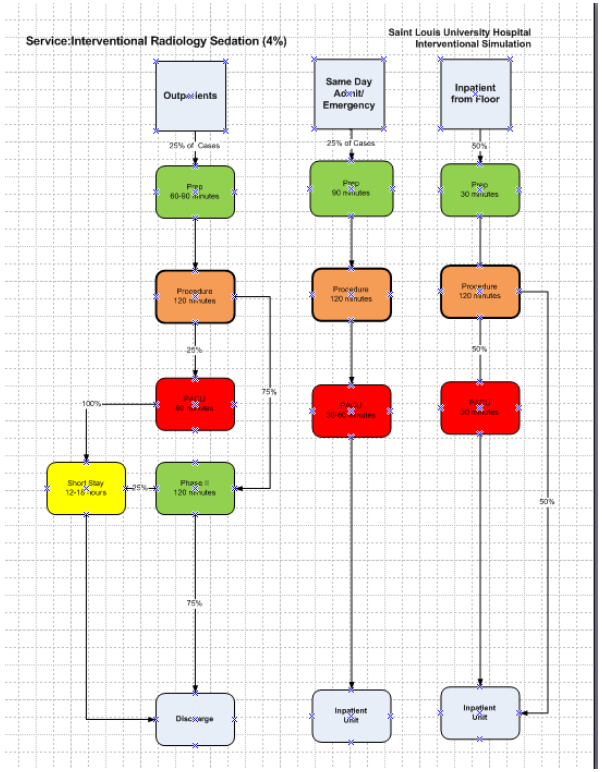
Process

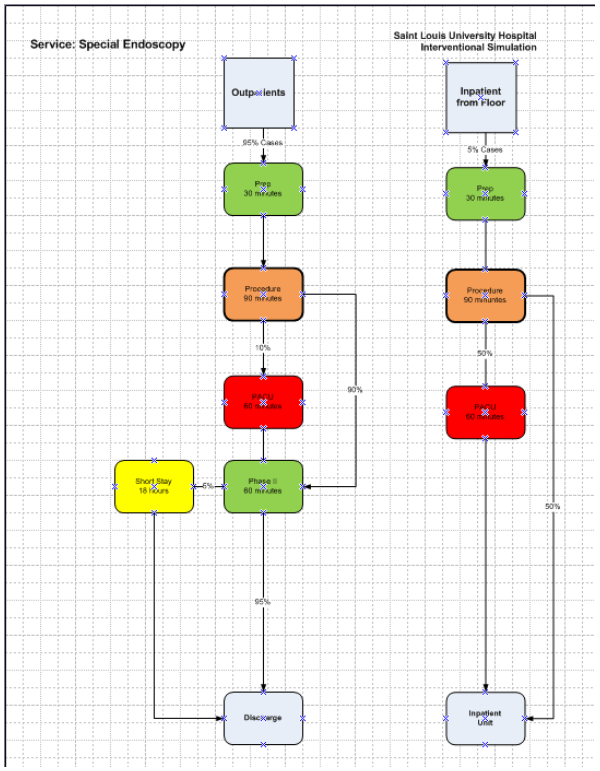
- Meetings with staff from affected services to explain project goals and data needs.
- Development of anticipated flow steps for major patient types.
- Established prototype schedule for patients.
- Modeling of proposed system.
- Testing of sensitivity of model results.
- Review with staff.
- Recommendations of adjustments to space program.

Examples of patient flows

- 18 types of patient procedures were identified for surgery, cardiology, interventional radiology and endoscopy.



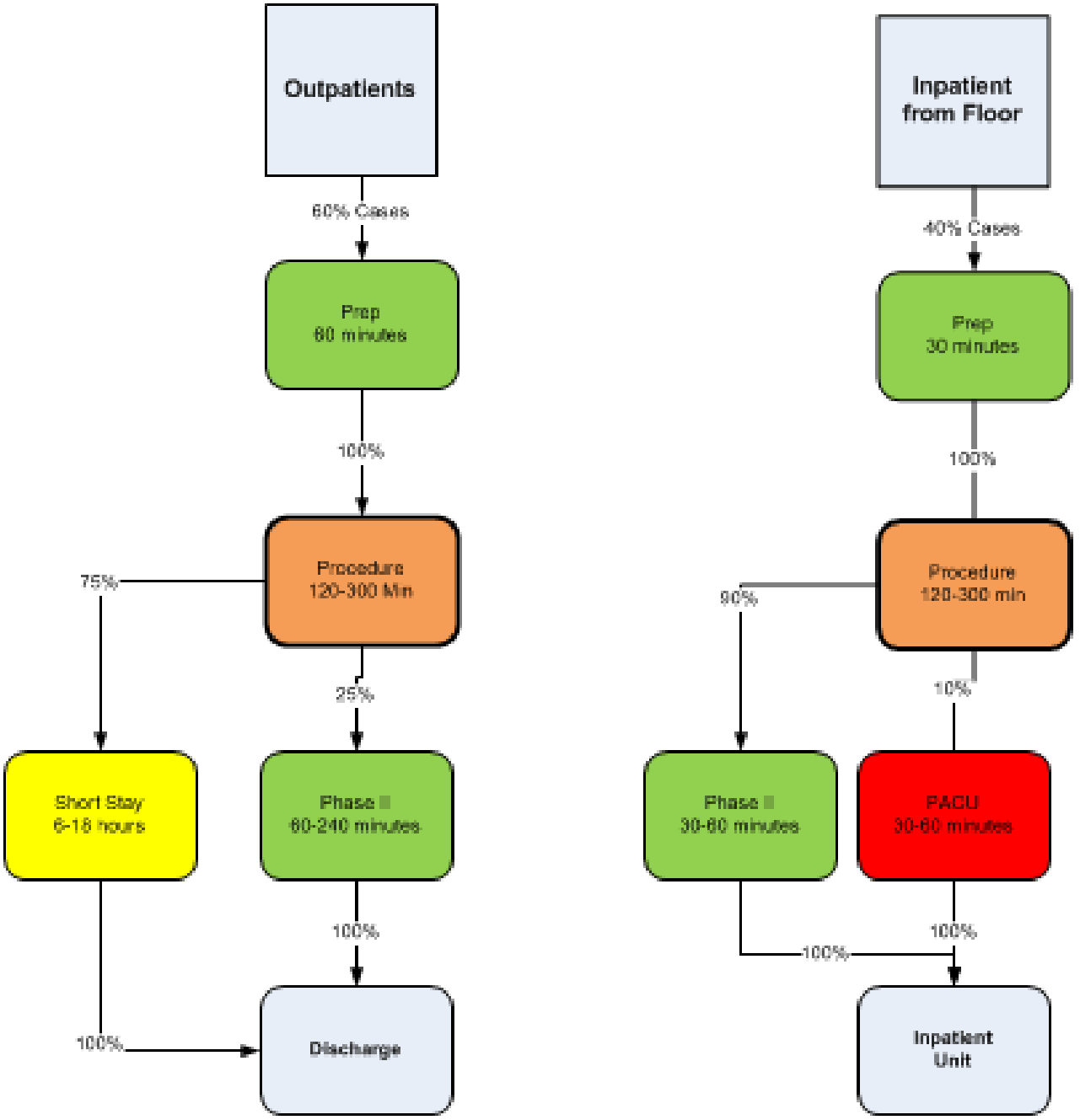




Example of patient flow diagrams

Service: Cardiology EP

Saint Louis University Hospital
Interventional Simulation



Prototype schedules

- Prototype schedules were developed for each patient group

	Standard 12					
	Short	Med	Long		ECT Out	ECT In
6:15	5					
6:30		5	6			
7:00					3	4
7:15	5					
7:30						
8:00					3	
8:15	5					
8:30						
9:00						
9:15	5					
9:30						
10:00						
10:30						
11:00		5				
11:30						
12:00	5					
12:30						
13:00	5					
13:30						
14:00						
14:30						
15:00						
15:30						
16:00						
16:30						
17:00						
17:30						
	30	10	6	46		

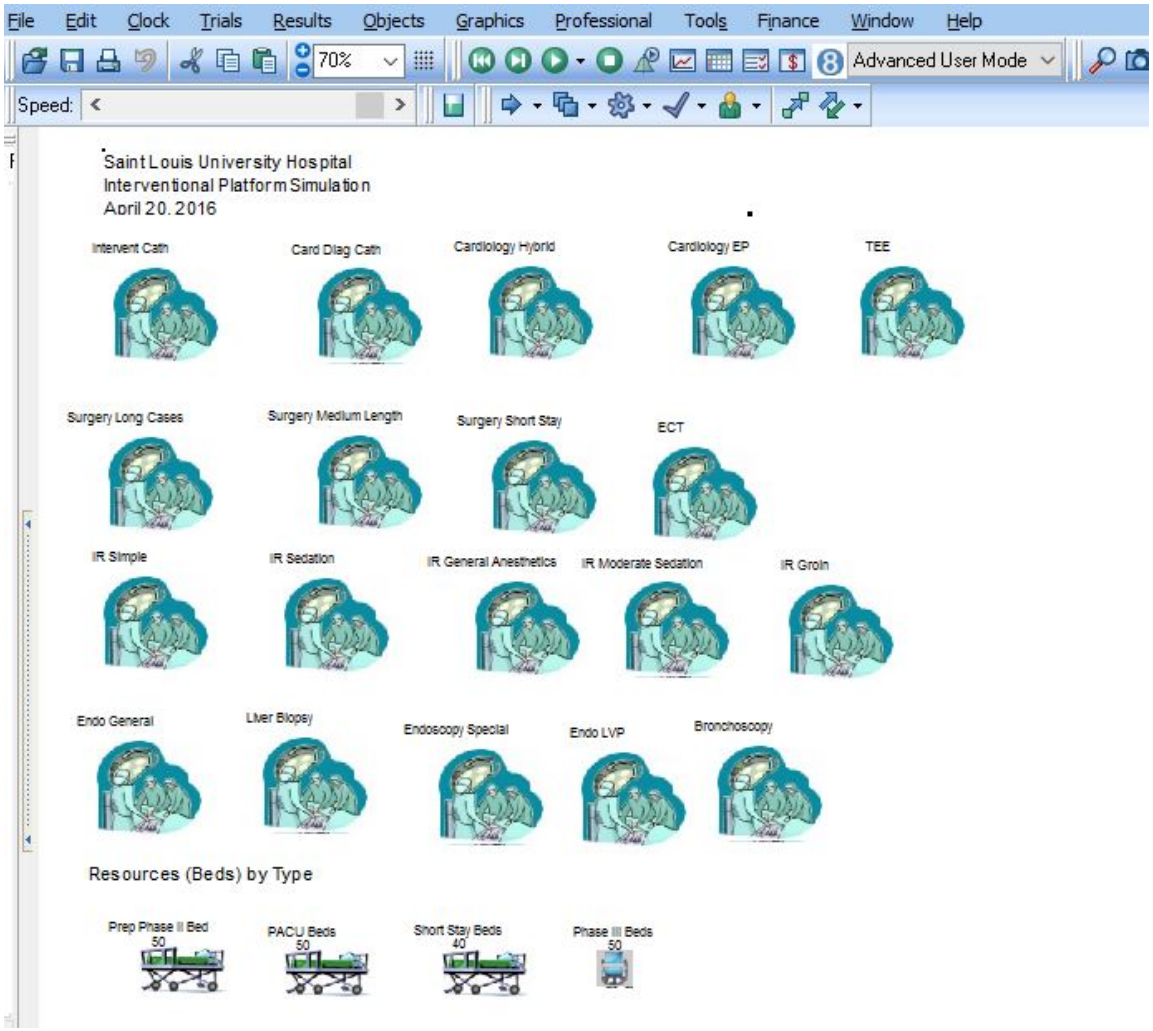
	Cardiolovascular				
	Diagnostic	Interventional	EP	Hydrid	TEE
6:00			1	1	
6:30	1	1			
7:00	1				1
7:30	1	1			
8:00	1				1
8:30	1		1		
9:00		1			1
9:30			1		
10:00				1	1
10:30		1			
11:00					1
11:30					
12:00					
12:30					1
13:00		1			
13:30					
14:00					1
14:30					
15:00					
15:30					
16:00					
16:30					
17:00					
17:30					

Prototype schedules

Endoscopy/Bronchoscopy					
	General (4)	Special (2)	LVP	Biopsy	Bronch
6:00					
6:30					
7:00	4	2	1	1	
7:30			1		
8:00	4		1		1
8:30		2	1		
9:00	4				
9:30					
10:00	4	2	1	1	1
10:30			1		
11:00	4				
11:30		2			
12:00	4				
12:30					
13:00	4				1
13:30					
14:00	4				
14:30					
15:00					1
15:30					
16:00					
16:30					
17:00					
17:30					
	32	8	6	2	4
	8000	2000	1500	500	1000

Interventional Radiology					
	Simple	Groin	Sedation	General	Moderate
7:00	3			1	
7:30					
8:00		2			3
8:30					
9:00	3		1		
9:30					
10:00		2		1	3
10:30					
11:00	3				
11:30					
12:00			1		3
12:30					
13:00	3	2		1	
13:30					
14:00					3
14:30					
15:00					
15:30					
16:00					
16:30					
17:00					
17:30					
	12	6	2	3	12
	Note: CT workload included in above distribution				

The Model


File Edit Clock Trials Results Objects Graphics Professional Tools Finance Window Help
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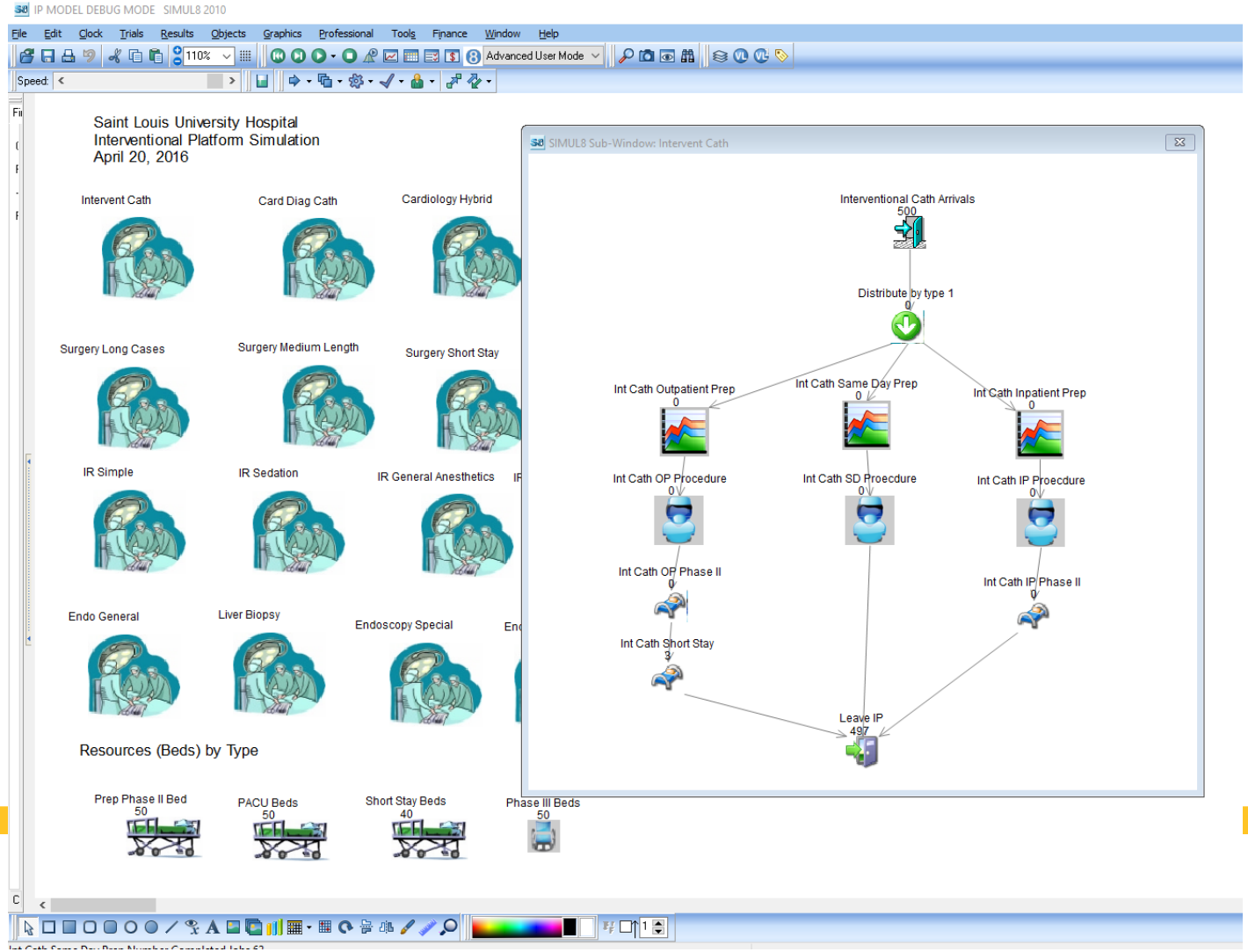
Saint Louis University Hospital
Interventional Platform Simulation
April 20, 2016
Intervent Cath
Card Diag Cath
Cardiology Hybrid
Cardiology EP
TEE
Surgery Long Cases
Surgery Medium Length
Surgery Short Stay
ECT
IR Simple
IR Sedation
IR General Anesthetics
IR Moderate Sedation
IR Groin
Endo General
Liver Biopsy
Endoscopy Special
Endo LVP
Bronchoscopy
Resources (Beds) by Type
Prep Phase II Bed
50
PACU Beds
50
Short Stay Beds
40
Phase III Beds
50

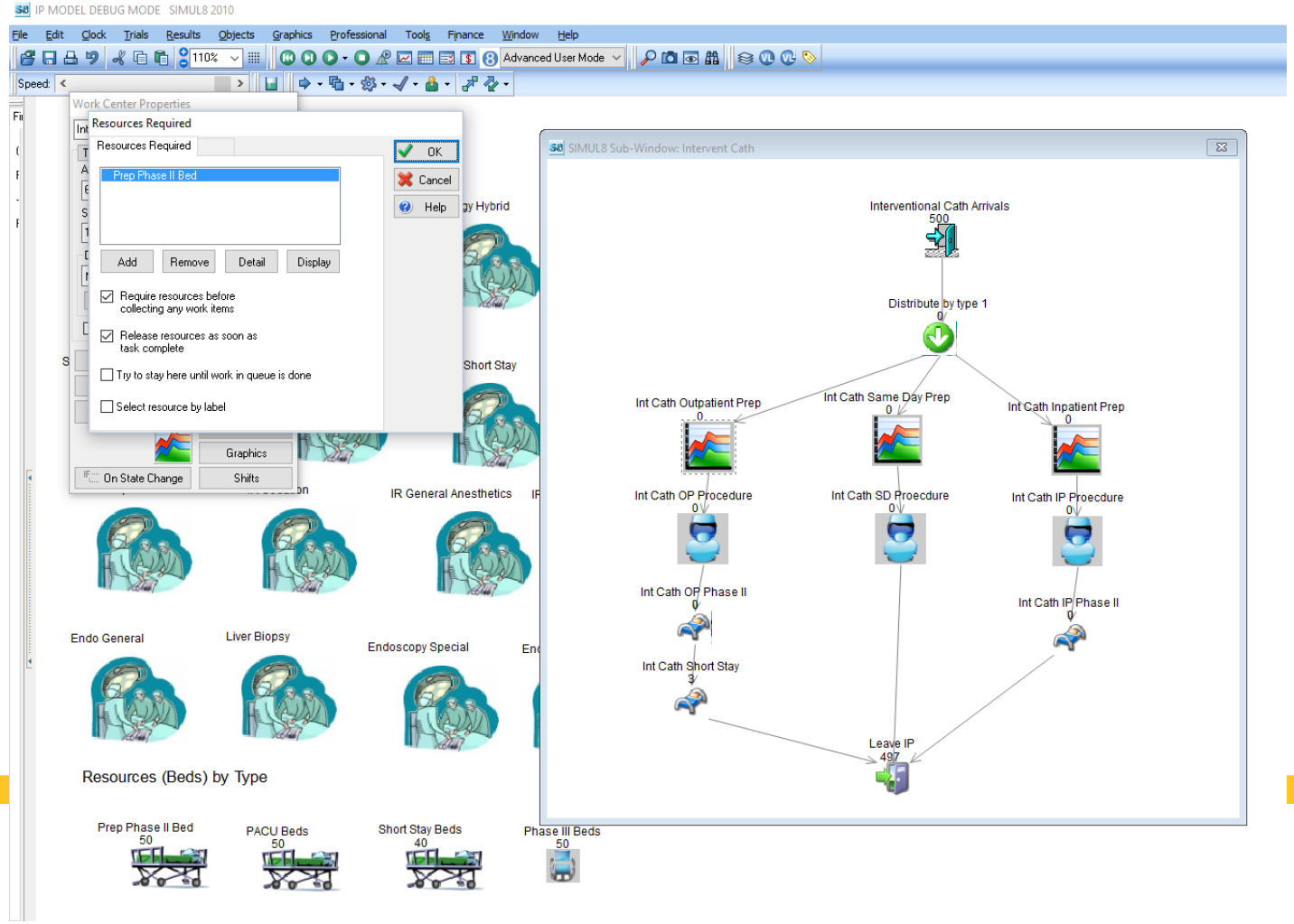
Model Development

- Arrivals and patient flow for each group were translated into a Simul8 model.



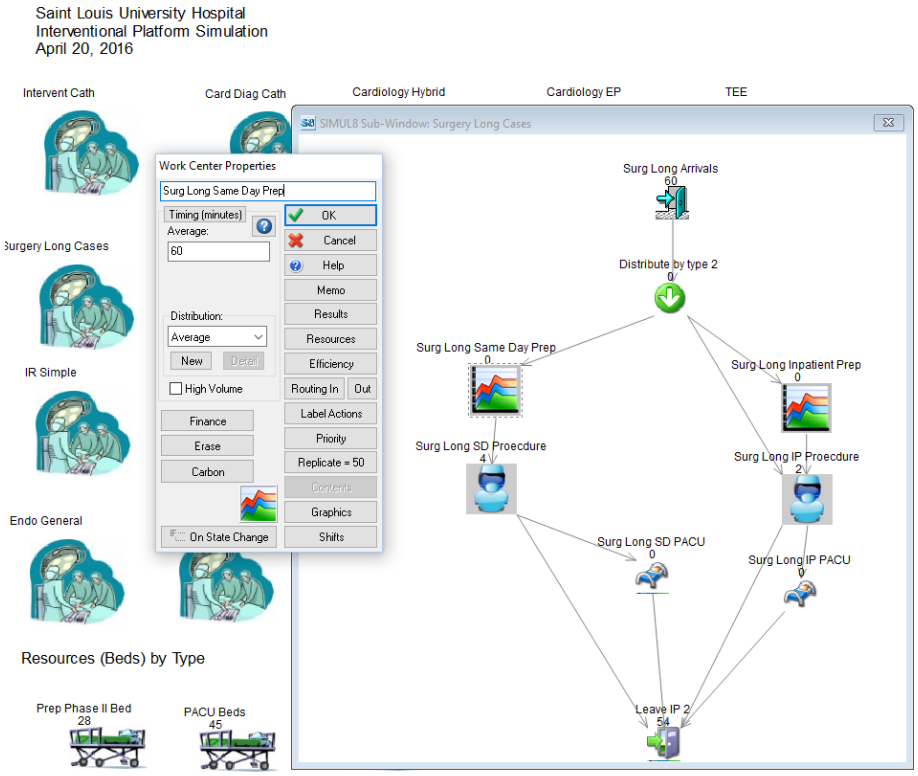
Model Development

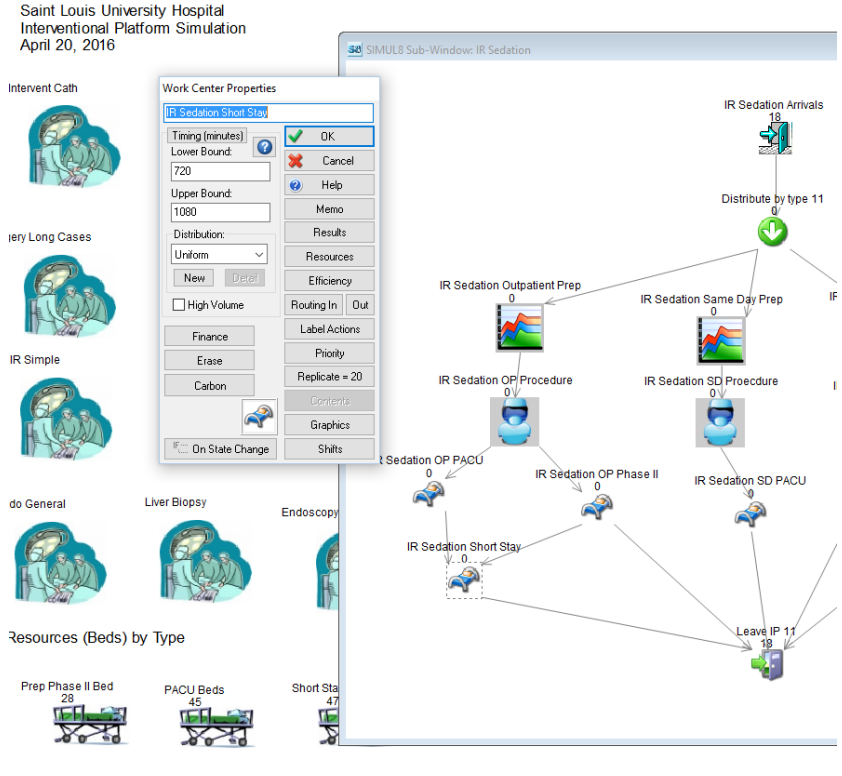
- As a patient moves through the Interventional Platform requests are made for the type of beds needed.



Model Development

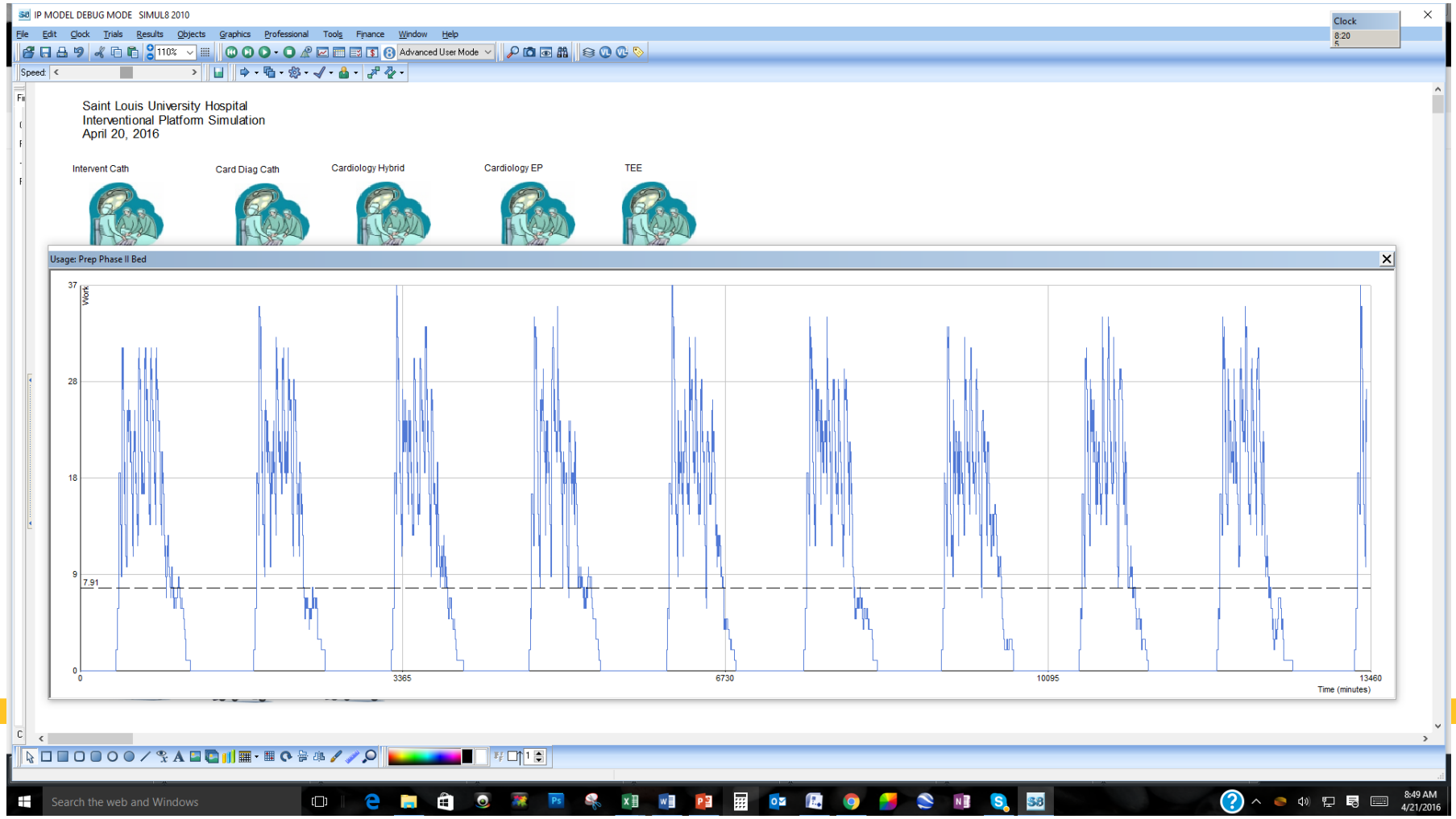
- Variability was built into most steps in patient process. Normal or uniform distributions were typical distributions



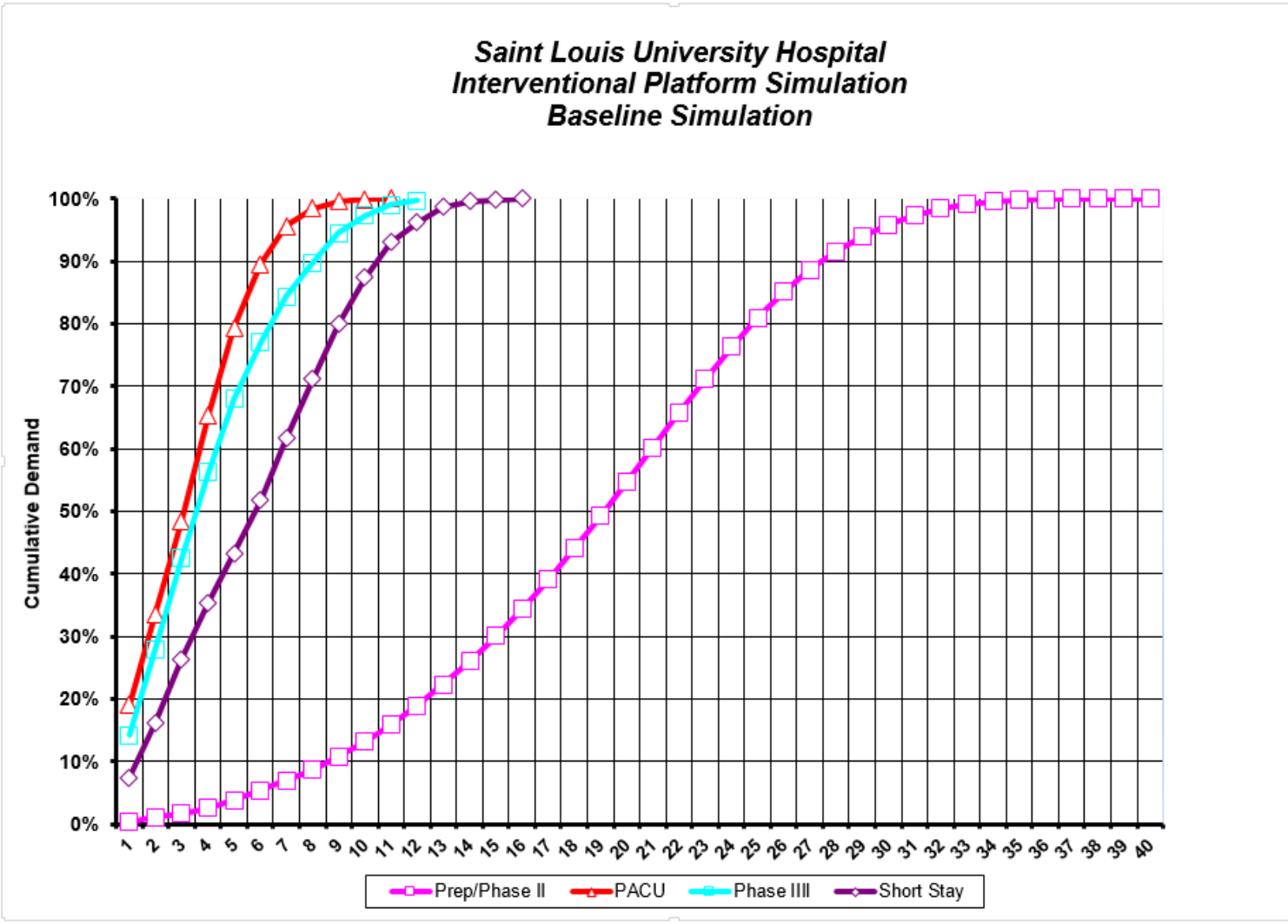


Model Development

- Total demand by all patients for each type of bed was recorded.



Initial Results



Initial Results

	Prep/Phase II	PACU	Phase III	Short Stay
Current Program	56	20	16	10
Model Max Estimate	40	11	14	16

Key Model Issues/Questions

- Model assumes no holding in IP for inpatient bed availability
- Prep/Phase II assumes complete sharing of beds, no holding of beds by a service line
- Current model assumes most inpatients are held in prep area prior to procedure rather than PACU
- Mix of surgery patients has six rooms used by long case time procedures, reducing peak demand on PACU beds
- Only 30% of short duration surgery patients are routed to PACU
- Turn around times for bed space are assumed in patient LOS
- Does this reflect worst case demand?

70% of Surgery Short Cases to PACU

	Prep/Phase II	PACU	Phase III	Short Stay
Current Program	56	20	16	10
Model Max Estimate	41	13	13	16

70% of Surgery Short & All Long Cases to PACU

	Prep/Phase II	PACU	Phase III	Short Stay
Current Program	56	20	16	10
Model Max Estimate	41	14	13	16

Add 5 minutes for clean up/turn

	Prep/Phase II	PACU	Phase III	Short Stay
Current Program	56	20	16	10
Model Max Estimate	44	12	13	14

Recommendations

- Shift 6 beds from Prep/Phase II beds to short stay, shell 6 Prep beds. (44 initial Prep/Phase II rooms, 16 Short Stay)
- Shell 4 beds in PACU for future growth or adjustments for final operational strategies. (16 initial PACU beds, 4 shell)
- Reduce Phase III to 14 stations

Recording available on SIMUL8Healthcare.com

Continue the discussion

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SIMUL8 in Health