SIMULATION MODELING

RADIOLOGY ANALYTICS NEW PARTNER

VIDANT HEALTH™

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VIDANT MEDICAL CENTER

VIDANT HEALTH™

MISSION

To improve the health and well-being of eastern North Carolina

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PURPOSE

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Running over 90% capacity

Hospital Growth

Situation?

Vidant Medical Center has increasingly expanded many medical services creating consistent demands on Radiology Services to keep up with capacity, particularly with MRI and VIR

Radiology proposed that it needed to expand and make upgrades if it was to meet the demands costing millions in investment

More FTEs for Techs & Nurses

New equipment requires infrastructure construction

Purchasing of new MRI & VIR Single-Plane to increase capacity

Radiology Demand

≈5,400 Inpatient MRIs/year
13 VIR procedures/day

METHOD

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The proposed solution will require millions of dollars. Leadership would like a clear understanding of the current capacity and utilization before operational efficiencies can be made?

01 SIX SIGMA: DMAIC Methodology

A structured process improvement project was deployed to critically assess and analyze MRI and VIR operations. This allowed to develop the data needed for discrete event simulation modeling and devise operational improvements.

02 Simulation Modeling

Simulation modeling provided the advanced analytics to support improvement and insight of the leadership to make key and impactful.

03 Leadership Support

The analytics produced from simulation modeling inspired confidence in how to proceed with the recommendations for Radiology Services.

04 Improved Strategic Planning

With Leadership able to make better decisions, an improved strategic plan was developed that had improvements to radiology operations with major cost avoidance opportunities.

BIG DATA to help support ***BIG INVESTMENTS***

SIMULATION MODELING vs TRADITIONAL ANALYTICS

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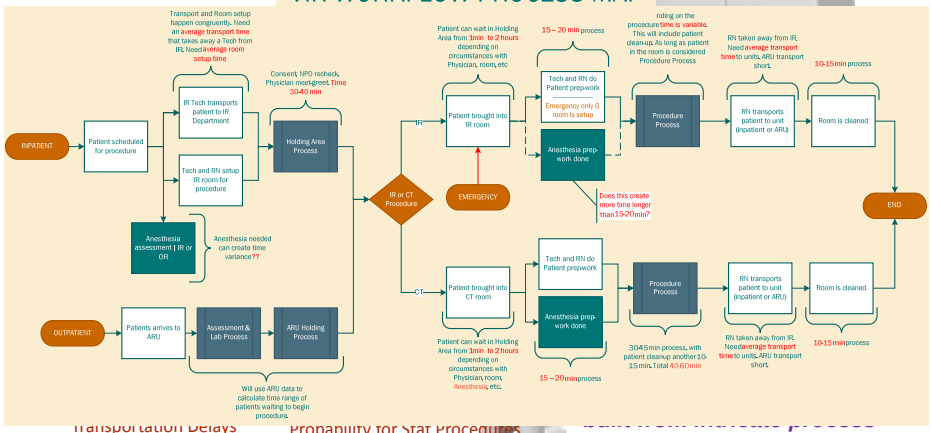
TRADITIONAL A VIR WORKFLOW PROCESS MAP ON MODELING



Transportation Delays Probability for Stat Procedures

maps & workflows

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METHOD

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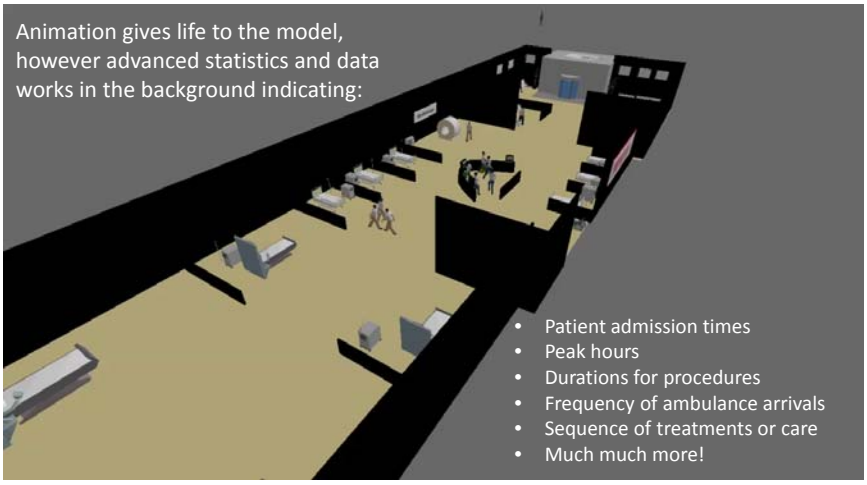

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MRI & VIR MODELS – METHOD

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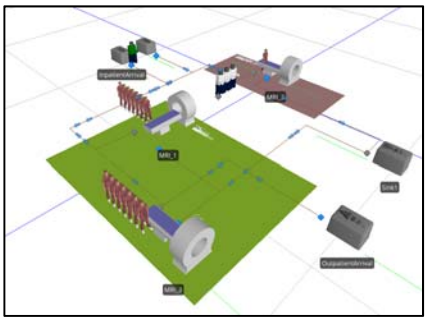
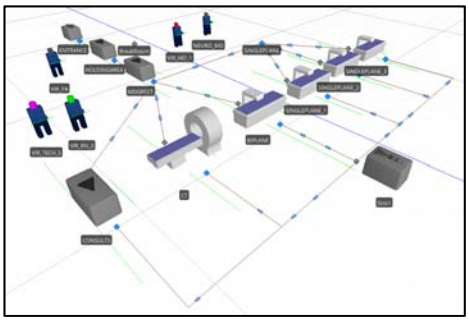
SOLVING THE OBJECTIVES FOR MRI & VIR OPERATIONS

- For MRI operations, what can be done to specifically increase the capacity for inpatient volume?
- What do we know about utilization of each operating room and staff resources in VIR?

Producing the answers for Leadership to make the appropriate decisions for their investments!



MRI Simulation Model Design



VIR Simulation Model Design

MRI RESULTS

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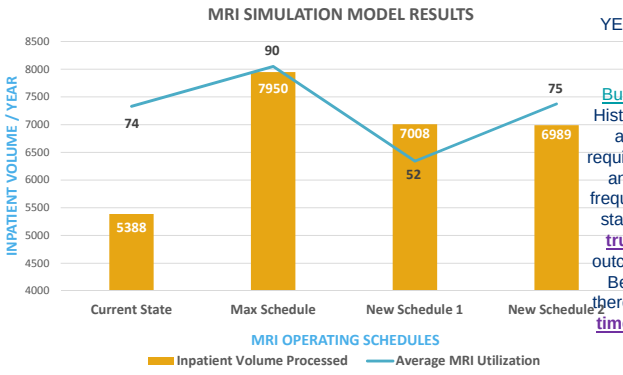

YES…More time in a day = more patients.

But how and what exactly?

Historical data on MRI use of all patient acuities, staff requirements, procedure types and respective durations, frequency of procedure types, stat MRIs, etc. was used to **truly predict** what kind of outcomes could be expected. Between Schedule 1 & 2, there is a major difference on **time** well spent and **cost** for the use of the MRIs.

CURRENT STATE	MAX SCHEDULE	NEW SCHEDULE 1	NEW SCHEDULE 2
MRI 2 operating 24 hours per day, 7 days a week MRI 1 & 3 operating from 6AM to 11PM, MON – FRI	Current State schedule but assuming no delays and a perfect transition through all parts of the process. This was used to find the upper limit only.	MRI 2 operating from 6AM to 11PM, MON – FRI MRI 1 & 3 operating 24 hours per day, 7 days a week	MRI 2 operating from 6AM to 11PM, MON – FRI MRI 1 & 3 operating 24 hours per day, MON – FRI MRI 2 operating 24 hours per day, SAT & SUN

VIR RESULTS

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VIR WORKERS	UTILIZATION CURRENT STATE
NEURO MD	20.36
VIR MD 1 (7A-3P)	69.96
VIR MD 2 (8A-5P)	65.38
VIR MD 3 (12P – 7P)	59.33
VIR PA	47.95
VIR RN 1	32.76
VIR RN 2	30.74
VIR RN 3	32.22
VIR RN 4	32.74
VIR RN 5	31.31
VIR TECH 1 (7A-330P)	64.22
VIR TECH 2 (7A-330P)	65.23
VIR TECH 3 (8A-430P)	62.27
VIR TECH 4 (8A-430P)	60.59
VIR TECH 5 (9A-530P)	60.06
VIR TECH 6 (7A-530P)	63.81
VIR TECH 7 (1030A-7P)	55.38
VIR TECH 8 (1030A-7P)	55.25

VIR EQUIPMENT (OPERATING ROOMS)	UTILIZATION CURRENT STATE
SINGLEPLANE A	30.67
SINGLEPLANE B	29.53
SINGLEPLANE C	29.32
BIPLANE	21.46
CT	17.48

UTILIZATION Δ

Worker Productivity ≠ Equipment Productivity

The simulation model gave critical insight on how staff operated within the VIR center. When you feel you're busy, you think your operation is at peak capacity. BUT…is that really true?

CONCLUSION

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Value of Simulation

- Supported the decision making process with quantitative descriptive analytics
- Illustrated the correlation between MRI/VIR utilization, capacity and clinical resources
- Validated the ROI of additional staff needed to support potential volume increases
- Leveraged simulation to dispel myths, support opinions and show relationships between operational processes and outcomes
- Expanded professional development of key stakeholders through active participation in the design and testing of key outcomes

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