

CIHR Team in

Operations Research *for*
Improved Cancer Care

Operations Research / Advanced Analytics in Cancer Care:

Tools to improve service delivery and system performance

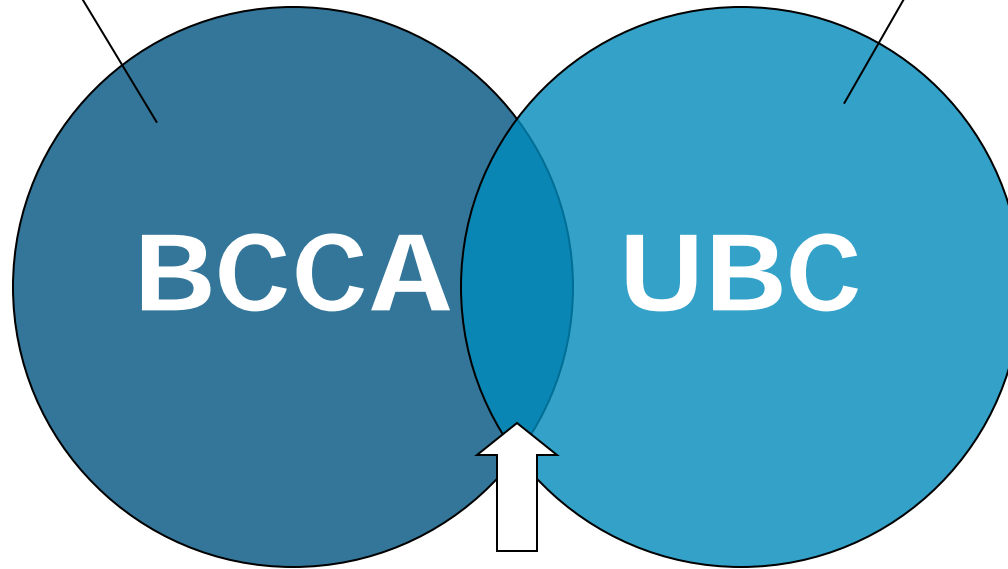
A BCCA/Sauder Collaboration

www.ORinCancerCare.org/cihrteam

Operations Research in Cancer Care Team

- Oncologists
- Administrators
- Statisticians

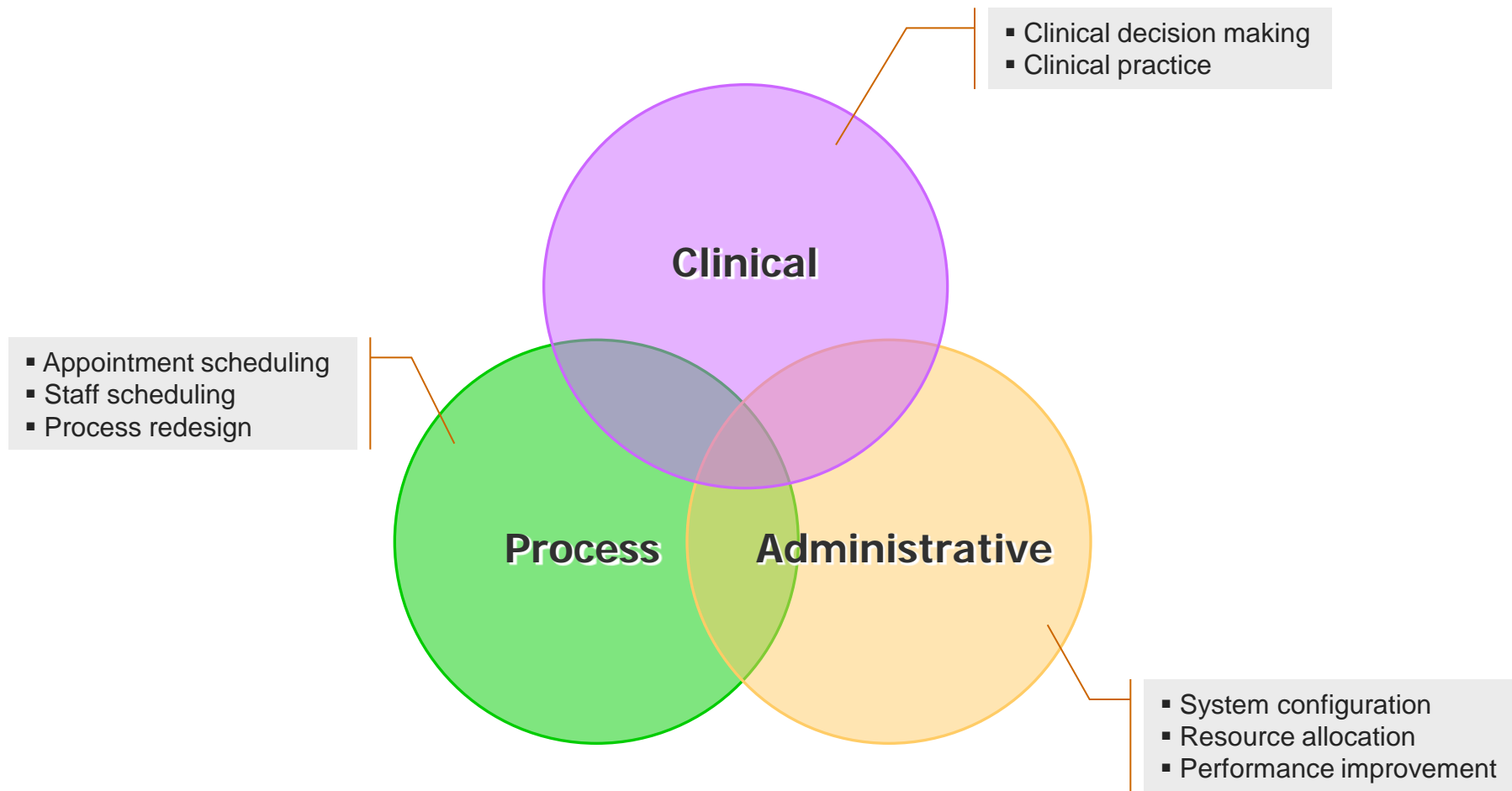
- Faculty
- Researchers
- Post-doc fellows
- PhD Students



- Operations Research Professionals



Challenges in Oncology: Solutions in Analytics



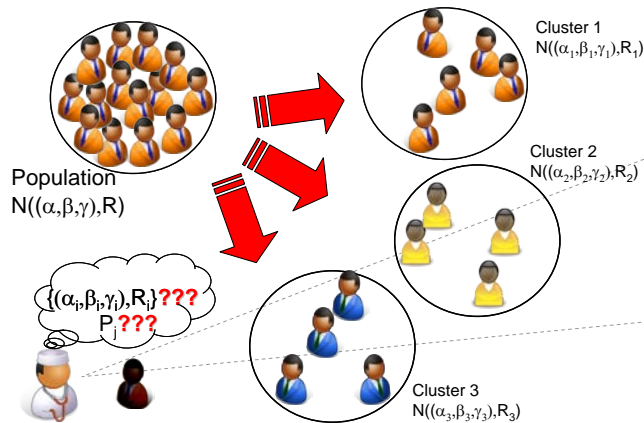
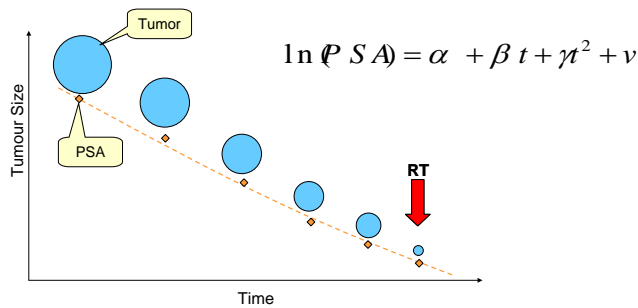
What is “Advanced Analytics”?



- An analytical, data-driven approach to decision making

Prostate Cancer Treatment Decision Models

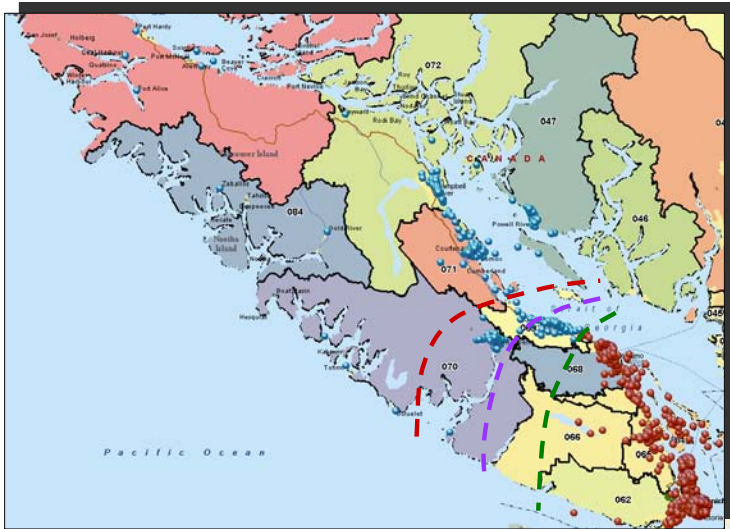
Support clinical decision making, estimating optimal time to start radiation therapy treatment on a patient-specific level (*advanced statistics*)



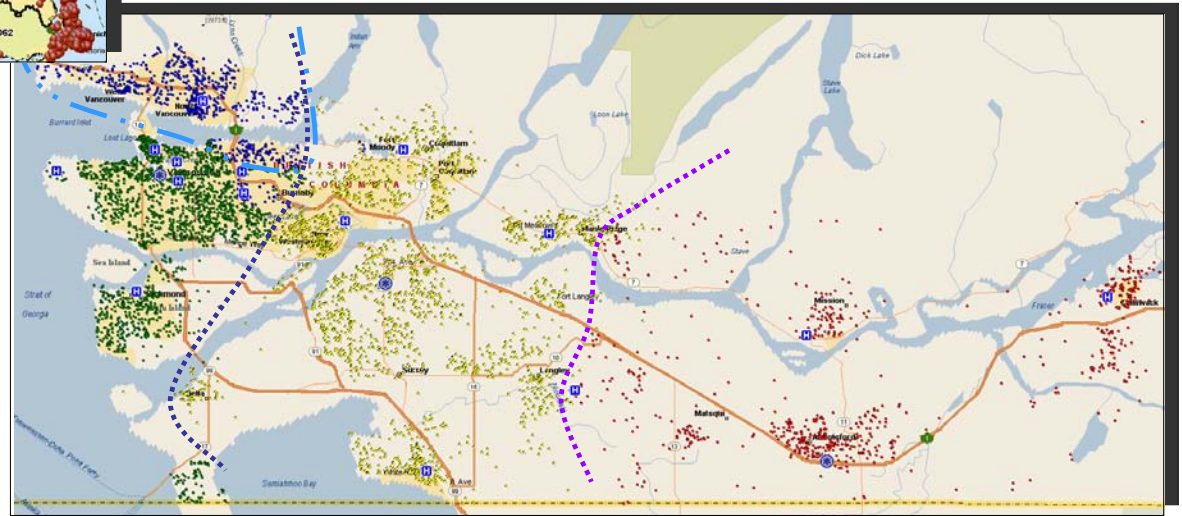
The screenshot shows the 'PSA Kinetics Modeling Tool - Main Menu' with several windows open:

- Create a New Patient:** Shows patient information for Peter Parker (Patent ID: 129380, Initial PSA: 7, PSA date: 27/11/08, Hormone start date: 27/11/08).
- Additional Patient Information:** Shows clinical details like Gleason grade (4), Tstage (T2b), Pre-treatment PSA (7), and Pre-treatment testosterone (11.6).
- View Outputs:** Displays the 'Summary of outputs' for the patient:
 - Estimated time of the nadir (dd/mm/yyyy): 06/11/2025
 - Probability of reaching the nadir in the next 60 days: 1.7%
 - Probability of having reached the nadir: 1.38%
- PSA vs Time:** A line graph showing PSA levels over time for different scenarios.
- 1: distribution of time of Nadir:** A bar chart showing the distribution of time to reach the nadir.

Patient Referral Analysis and System Configuration

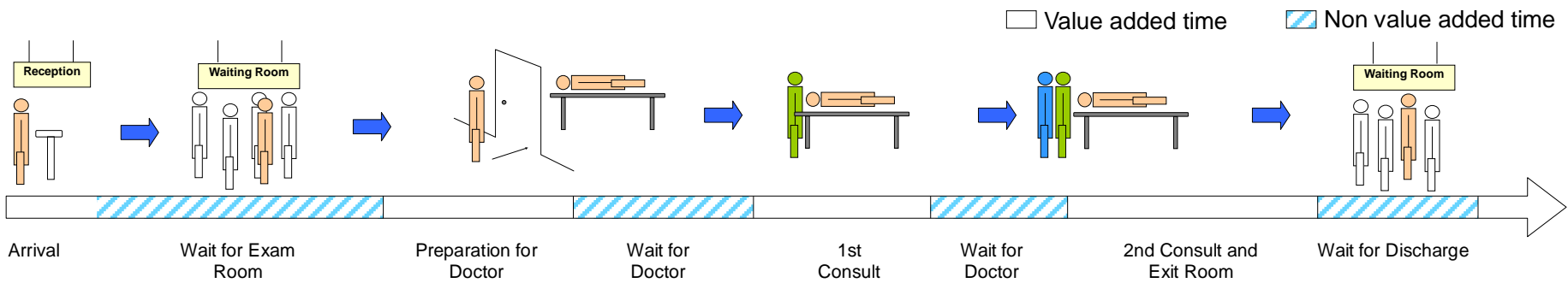


Analysis of geographic distribution of patient demand and utilization of provincial resources to plan for optimal capacity allocation across BCCA centres in the future (*geographic analysis, mathematical programming*)



Outpatient Process Review

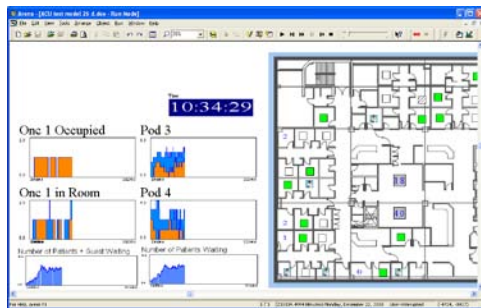
Understand the patient wait experience during physician appointments and identify process improvement opportunities (*discrete event simulation*)



Input

- Clinic schedules
- Student/resident participation
- Exam room allocation
- Resource availability
- Others

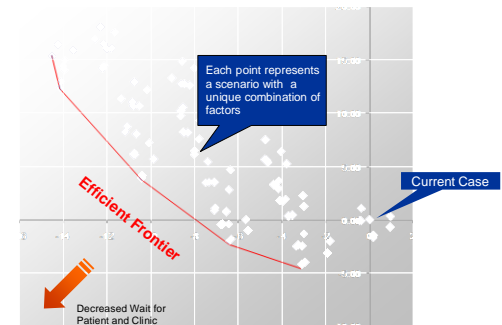
Simulation Model



Output

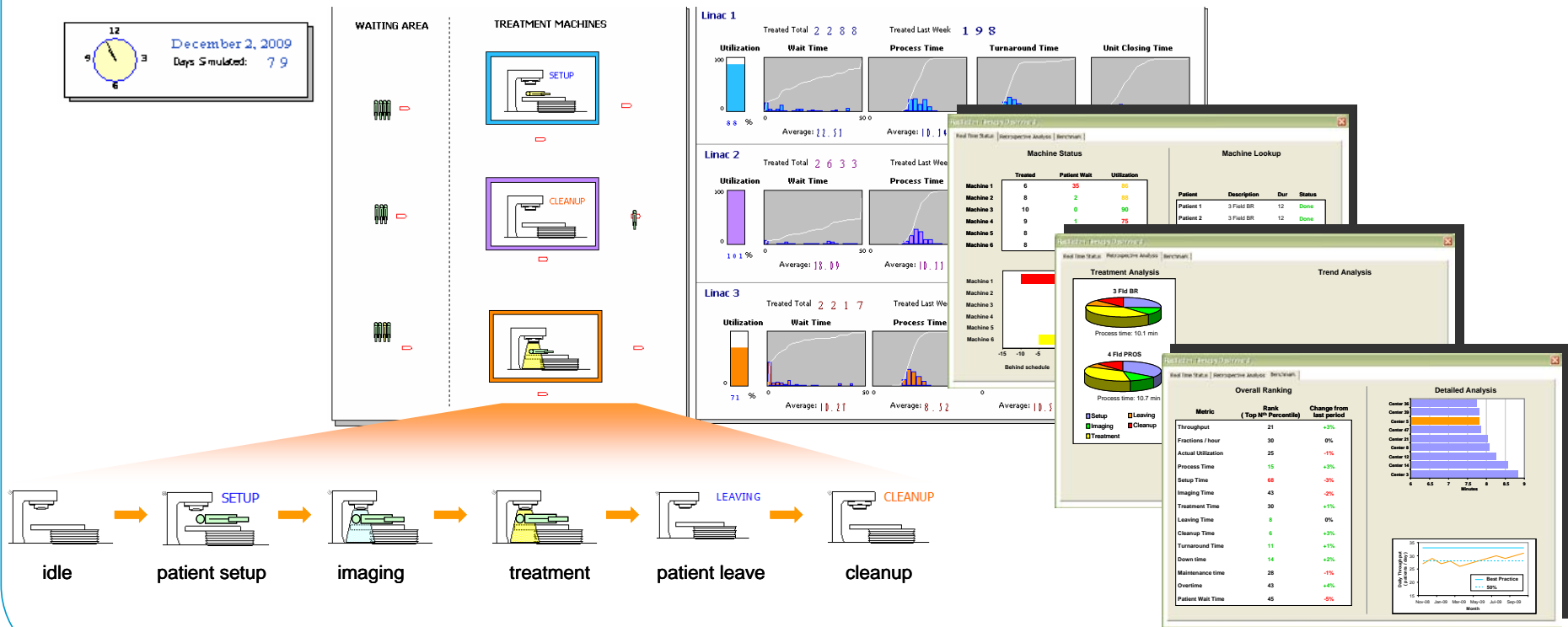
- Patient wait time
- Clinic duration
- Doctor idle time
- Exam / wait room utilization

Change in Wait Time vs. Change in Clinic Duration for Tested Scenarios



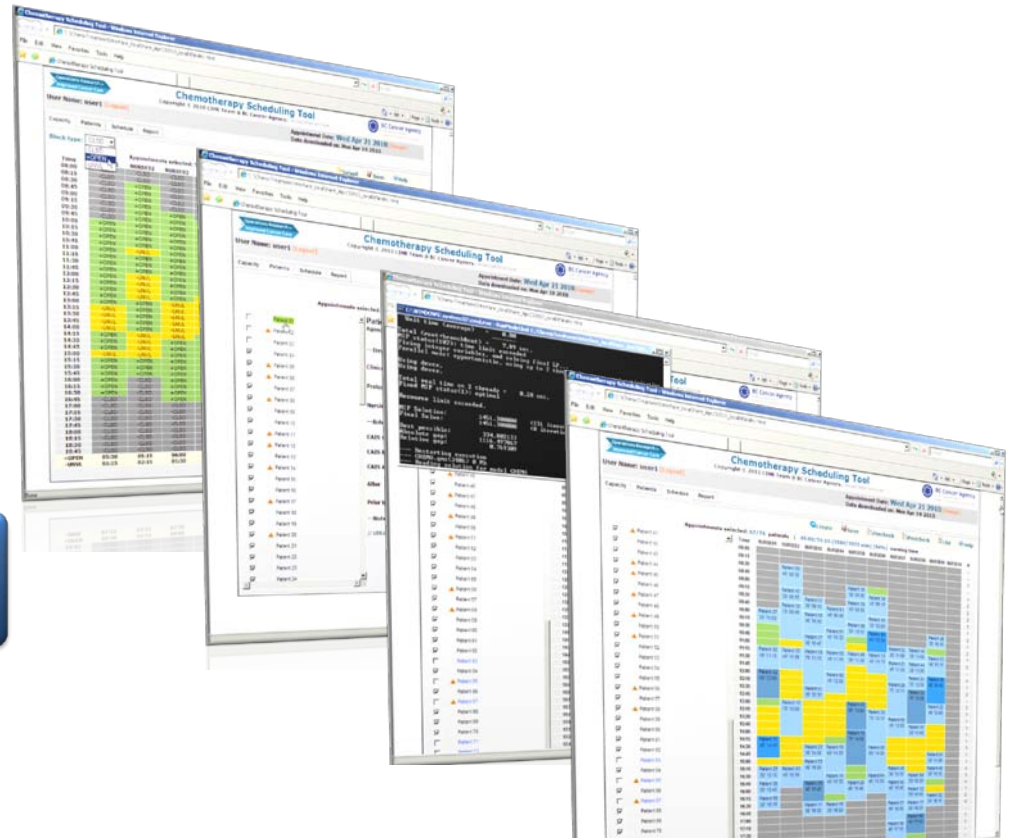
Performance Benchmarking and Advanced Modelling of RT Operations

Development of performance metrics and advanced analytical models for benchmarking and operational improvements in a radiation therapy department (*statistical analysis, discrete event simulation*)



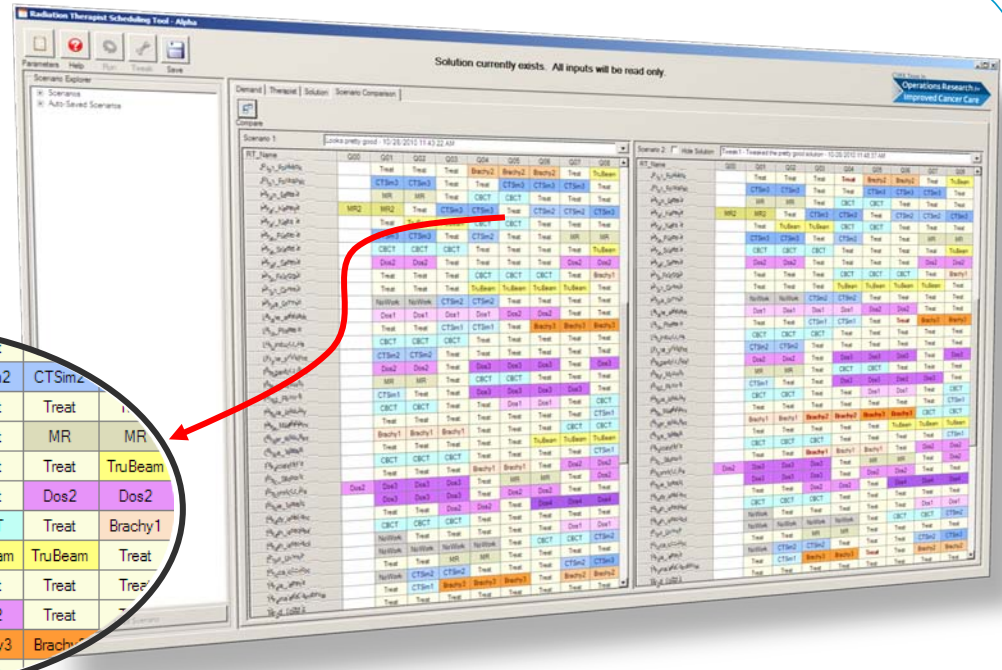
Chemotherapy Scheduling

Schedule chemotherapy treatment more efficiently to improve the patient experience and reduce clerical rework (*discrete event simulation, mathematical programming*)

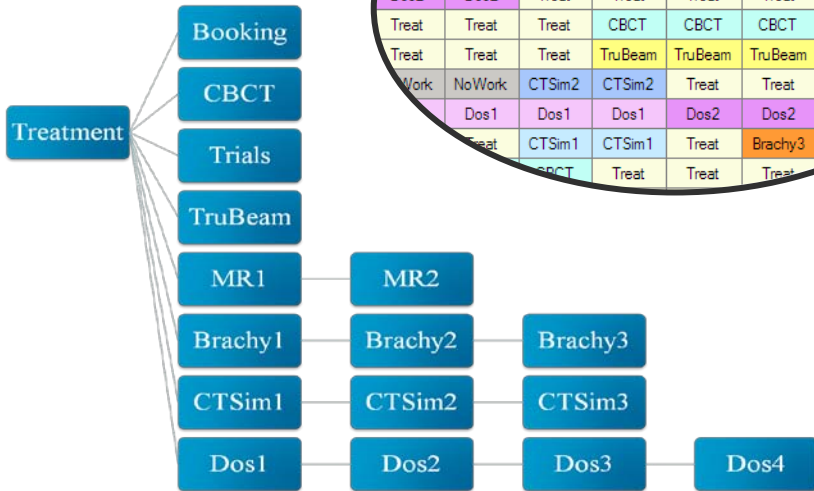


Radiation Therapy Staff Planning

Develop a model to create a strategic staff plan for radiation therapists describing which task area each therapist will work in for the next two to three years



	Treat	CBCT	CBCT	Treat			
	Treat	CTSim3	CTSim3	Treat	CTSim2	CTSim2	
	TruBeam	TruBeam	CBCT	CBCT	Treat	Treat	
	CTSim3	CTSim3	Treat	CTSim2	Treat	Treat	MR
	CBCT	CBCT	CBCT	Treat	Treat	Treat	TruBeam
	Dos2	Dos2	Treat	Treat	Treat	Dos2	Dos2
	Treat	Treat	Treat	CBCT	CBCT	CBCT	Brachy1
	Treat	Treat	Treat	TruBeam	TruBeam	TruBeam	Treat
	Work	NoWork	CTSim2	CTSim2	Treat	Treat	Treat
	Treat	Dos1	Dos1	Dos1	Dos2	Dos2	Treat
	Treat	CTSim1	CTSim1	Treat	Brachy3	Brachy3	
	CBCT	Treat	Treat	Treat			



- Create a plan
- Adjust the plan
- Compare plans
- Use for schedule

**Through a path breaking
collaboration we are changing the
way cancer care is delivered**

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