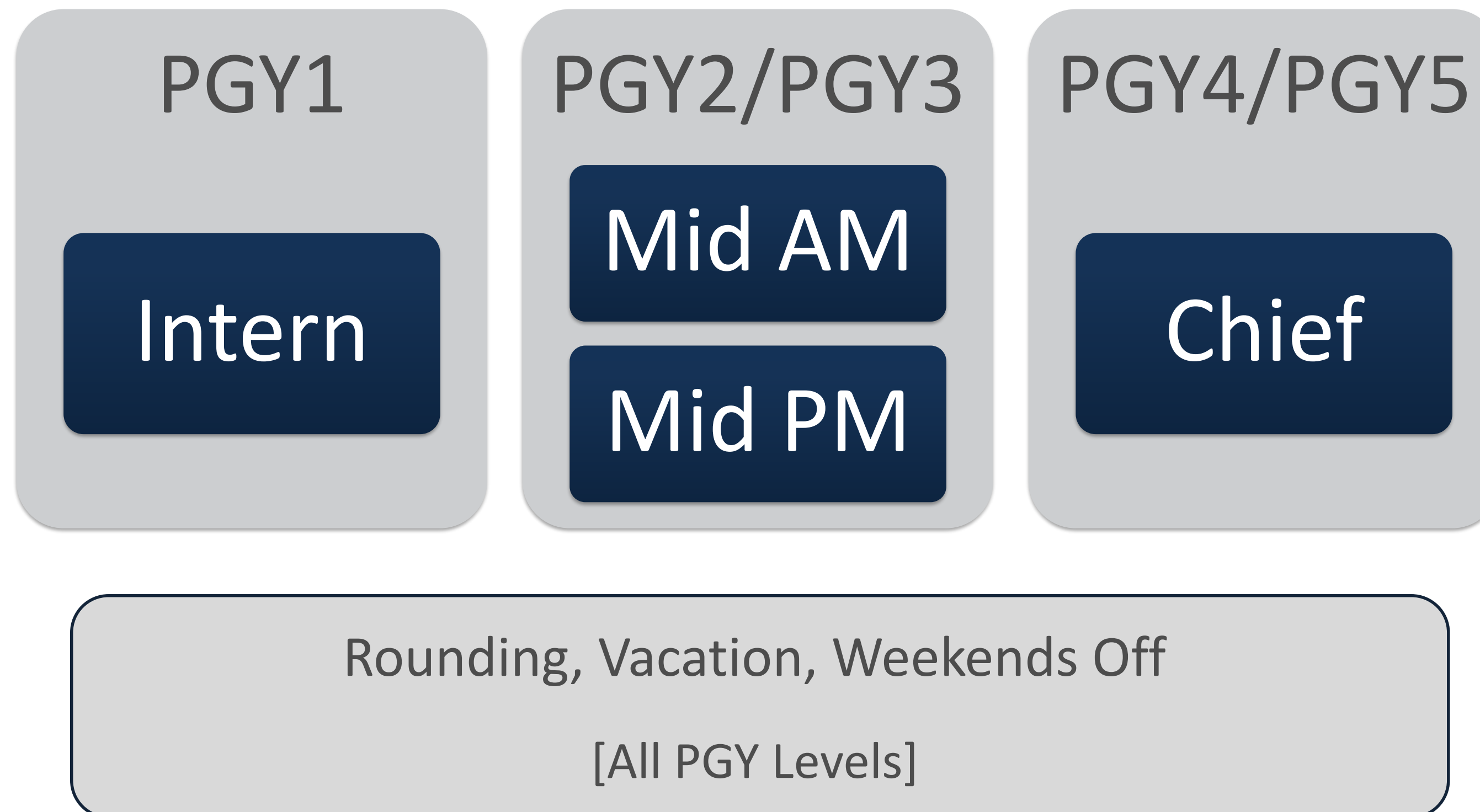


## Optimizing Resident Call Assignments

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### Problem Statement

The general surgery residency program at St. Joseph Mercy Ann Arbor must staff daily call and rounding teams



Abiding the rules governing the schedule makes coordinating the monthly call and rounding assignments a complex challenge

Traditionally, a chief resident constructs the resident assignment schedule by hand

The construction process is resource-intensive yet often fails to satisfy the individual & collective needs of stakeholders

### Importance of Schedule Quality

Schedule quality impacts



### Research Objective

Develop a decision support system to enable fast construction of high-quality resident schedules while improving measures of quality



### Model

#### How is an optimization problem defined?

There are three components to an optimization problem: decisions, rules, and metrics. For this specific problem, examples of these components are:

#### Decisions

- Is resident  $r$  assigned to task  $t$ ?

#### Rules

- Call and rounding teams require sufficient coverage
- Residents must have sufficient time between tasks

#### Metrics

- Post-call OR shifts, weekend equity, personal preferences, etc.

$$\text{Coverage} \quad l_c \leq \sum_{r \in R_c} \sum_{t \in T_c} \sum_{d \in D_c} x_{rtd} \leq u_c \quad \forall (R_c, T_c, D_c) \in C$$

$$\text{Pre-assignment} \quad x_{r_a t_a d_a} = 1 \quad \forall (R_a, T_a, D_a) \in A$$

$$\text{Prohibition} \quad x_{r_a t_a d_a} = 0 \quad \forall (R_p, T_p, D_p) \in P$$

$$\text{Resident Requirement} \quad l_q \leq \sum_{t \in T_q} \sum_{d \in D_q} x_{r_q t d} \leq u_q \quad \forall (r_q, T_q, D_q) \in Q$$

$$\text{Spacing} \quad x_{r_s s d} + x_{r_t s d'} \leq 1 \quad \forall r \in R, d \in D, d' \in D_s, (s_s, t_s, D_s) \in S$$

$$\text{Paired Tasks} \quad x_{r_f j d_j} - x_{r_s j e_j} = 0 \quad \forall r \in R, (f_j, d_j, s_j, e_j) \in J$$

### Results

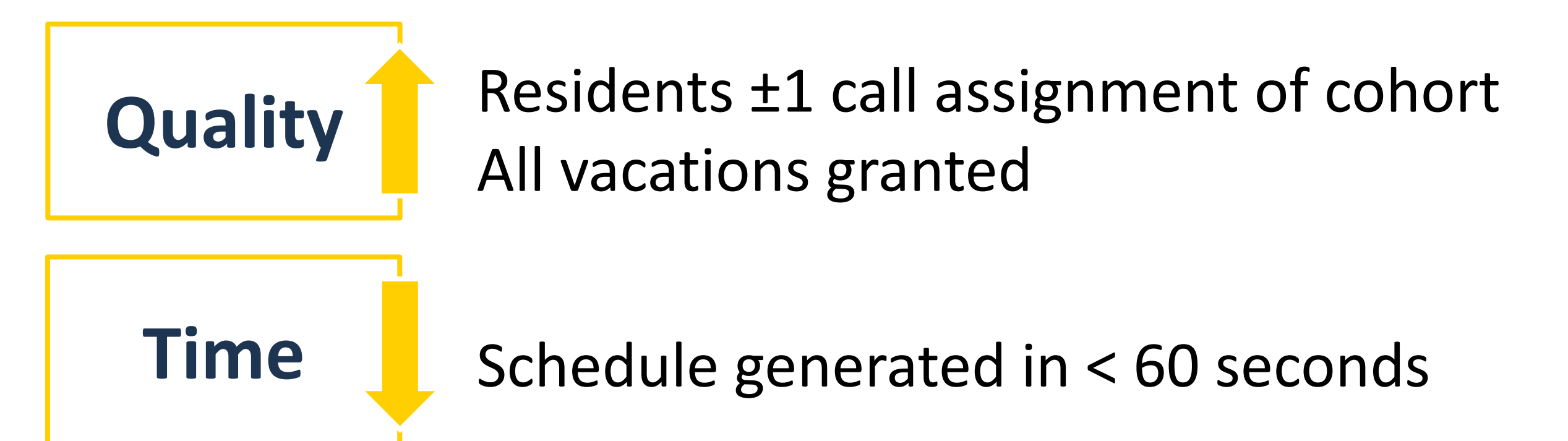
Preliminary results for the December 2017 scheduling horizon have been generated. Below are results snippets.

December 4, 2017	December 5, 2017	December 6, 2017	December 7, 2017	December 8, 2017
Monday	Tuesday	Wednesday	Thursday	Friday
Tadayon	Patel	Tadayon	Patel	Tadayon

We generate weekly views, like the one above, for each day of the scheduling horizon. This schedule of the horizon is generated for each task.

Walker's Schedule:			
Saturday	December 9, 2017	Mid AM	Rounding
Sunday	December 10, 2017	Mid AM	Rounding
Monday	December 11, 2017	Mid PM	
Tuesday	December 12, 2017	Mid PM	
Wednesday	December 13, 2017	Mid PM	

We generate schedule reports, like the one above, for each individual resident for the entire scheduling horizon.



### Future Goals

- Quality** Implement metrics based on leadership feedback
- Efficiency** Streamline administrative and schedule revision processes

### Acknowledgements

We graciously thank these organizations for their support:

