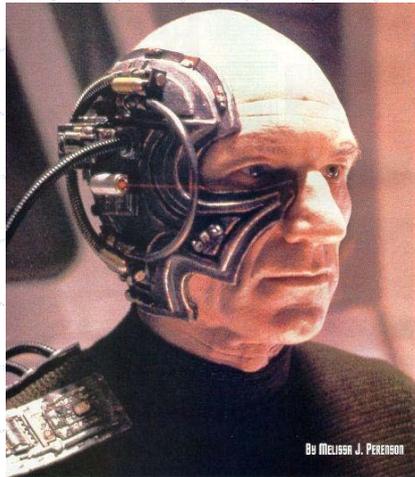


Efficient Use of Humans



The claim:

- ◆ We lose a lot of time in little bits to operator inexperience.
- ◆ Turnover will probably not change much. We will have to fix the effects.
- ◆ Even if turnover got better, we would still have a problem because:

SENIORITY != EXPERIENCE

- The problem will get worse as the most experienced RHIC-ers go off shift.
- ◆ Formal offline training is great (LRH), but saturated. Our OJT is ... lacking.

How does this affect machine performance?

- ◆ It is the 'undiagnosed failure'
- ◆ Impossible to quantify but 'anecdotal' suggest everything is faster:

Diagnosis of problems
General tuning
Triage of small failures
Establishing workarounds
Configuration changes
Machine performance assesment

Response to alarms, pop-ups
Identifying call-ins
Procedure execution
Anticipating 'gotchas'

'Speed bumps' and PREparation

Why is experience decoupled from seniority?

Operators
Do
Not
Operate

RHIC -> Shift leaders/systems experts
AGS -> Shift leaders or dormant
Booster -> Zeno

Operator Roles (in practice)

	<i>Shift leaders/Sys. Specialist</i>	<i>Operations</i>
Setup	<ul style="list-style-type: none"> ◆ Acc. equipment checkout ◆ Injector tuning ◆ AGS extraction setup (+AtR) 	<ul style="list-style-type: none"> ◆ MCR equip. checkout. +Coordination
Start up	<ul style="list-style-type: none"> ◆ RHIC Injection ◆ First turn ◆ RF capture ◆ Instrumentation setup* ◆ Injection lifetime ◆ + redo with snakes ◆ Ramp tuning/feedback ◆ Store lifetime ◆ Collisions + lifetime ◆ Initial collimator setup 	<ul style="list-style-type: none"> ◆ Coordination + ◆ Inject, Prep, Up, Down
Ramp up	<ul style="list-style-type: none"> ◆ Polarization development ◆ Increase bunch number and int. <ul style="list-style-type: none"> ▪ ODTC 	<ul style="list-style-type: none"> ◆ Inject, Prep, Up, Down ◆ Inject, Prep, Up, Down

Continues into physics.....

Consequences

- ◆ Longer diagnosis times
- ◆ Misidentification of failure
- ◆ Repeated meals of red herring.
 - ◆ Because every noisy signal is possibly a problem if you didn't know it was noisy before.
- ◆ Dwindling sense of responsibility for machine performance, particularly RHIC.

Operator Roles (A proposal)

	<i>Shift leaders/Sys. Specialist</i>	<i>Operations</i>
Setup	◆ Acc. equipment checkout	◆ MCR equip. checkout.
	◆ Injector tuning	
	◆ AGS extraction setup (+AtR)	◆ AGS extraction setup(+AtR)
Start up	◆ RHIC Injection	◆ RHIC Injection
	◆ First turn	◆ First turn
	◆ RF capture	
	◆ Instrumentation setup*	
	◆ Injection lifetime	◆ Injection lifetime
	◆ + redo with snakes	◆ + redo with snakes
	◆ Ramp tuning/feedback	◆ Ramp tuning/feedback
	◆ Store lifetime	◆ Store lifetime
	◆ Collisions + lifetime	◆ Collisions + lifetime
Ramp up	◆ Initial collimator setup	
	◆ Polarization development	
	◆ Increase bunch number and int. ▪ ODC	◆ Increase bunch number and int. ▪ ODC

This has been said before.

Why has nothing been done?

- ◆ Space camp vs. machine performance issue
- ◆ Reliance on buy-in from shift leaders (OK, and it's tough to 'teach and tune')
- ◆ Lack of specific strategies

Specific strategies

- ◆ Lean on the Ocs
 - Mini-practicals in the injectors
 - Specific assignment of general roles/spec. tasks
 - OC training training (they're new too!)
- ◆ Operator BRIEF-ings (≤ 10 min)
 - Keep them connected to 'run narrative'
 - Recent lesson learned/gotchas
 - Could be done by sitting in on shift change
 - Easy to schedule/repeat
- ◆ Shorten the RHIC shift season (-setup, -rampup)
- ◆ AGS on the midnight shifts