



# System Downtime: Global Analysis

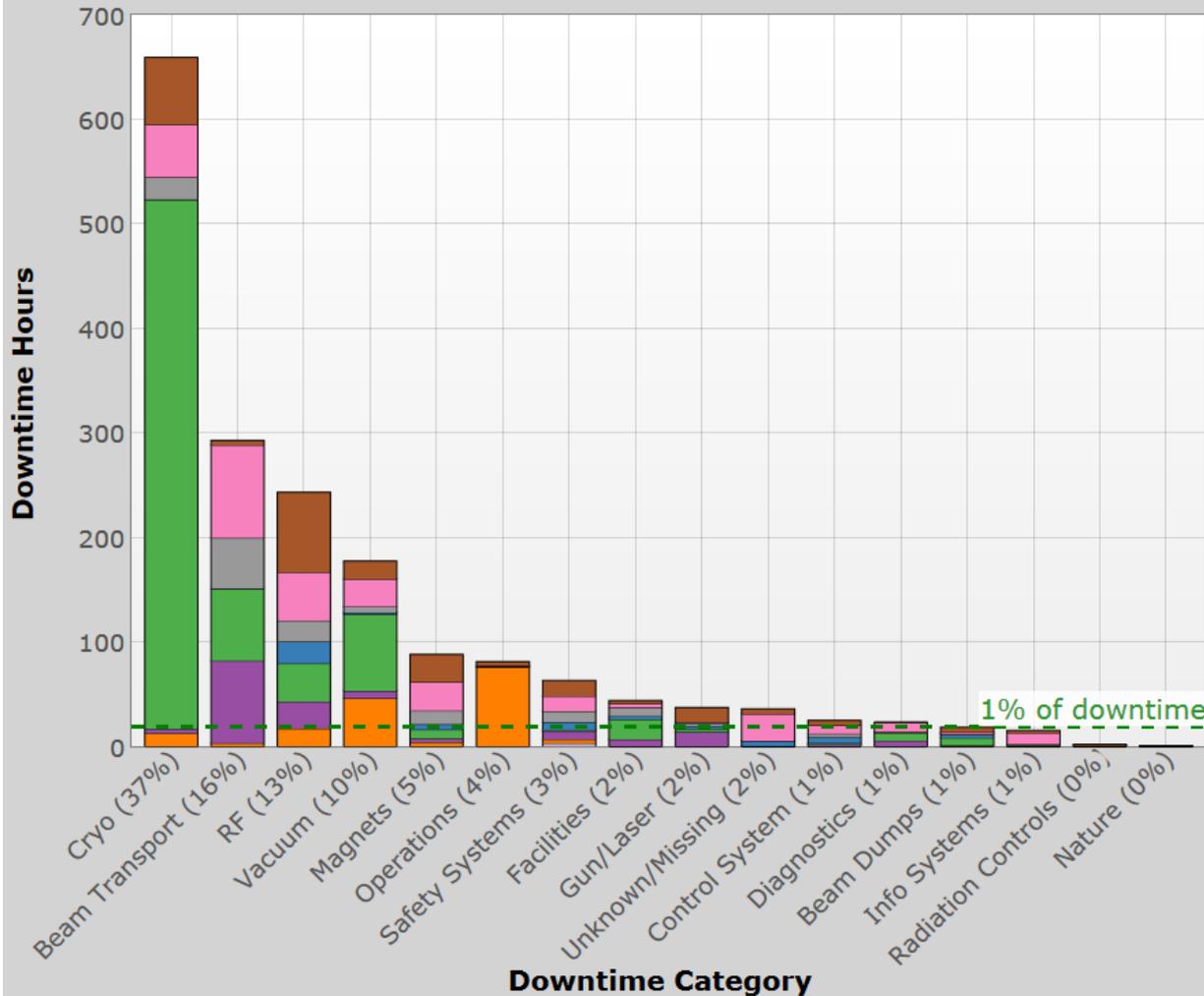
Randy Michaud

“Stay-Treat July 16, 2015”

# FY2015

## Accelerator System Repair Report

October 1, 2014 - October 1, 2015



	Hrs	%
Oct 2014	244	14%
Nov 2014	315	17%
Dec 2014	134	7%
Feb 2015	56	3%
Mar 2015	735	41%
Apr 2015	157	9%
May 2015	161	9%
Jun 2015	3	0%
<b>Total:</b>	<b>1,805</b>	

# Data Driven Decisions

Without data  
you're just  
another person  
with an opinion.

- W. Edwards Deming, engineer, statistician, author, consultant

# Plan – Do- Check- Act - Repeat



**Lost Time Accounting Apr 5 - Apr 11, 2011**

Lost Time Last Week	Hardware	Software	FSDs	DnHard	Availability*	Scheduled Hours**
4.26	9.15	1.3	3.7	7.9	87.6%	161
	4.26	0.0	2.6	4.2	92.6%	166

Major Sources of Accelerator Downtime		Status	Action	Resolved By
Description	Time Lost			
DC Power - LAM3C/MBN3C04 instabilities & tuning	3.41	Ongoing	Shunt module replaced. Operational conditions resulting in instabilities. Tuning performed to address.	DC Power/OPS
Radcon - Rad Monitor #16 alarm	1.72	OK		Radcon
DC Power - MARC 2 investigation	1.17	OK	Neutron probe replaced.	DC Power
Total Accelerator Major Sources	6.30			

FSD Breakdown		RF	Vacuum	MISC
BLM	Dumps	Gun	Hall	Ion Ch.
0.748	0.173	0.067	0.000	0.232
0.671	0.122	0.061	0.000	0.195
				1.146
				0.784
				0.275
				0.127
				0.049
				0.014
				sums
				3.679
				2.463

**NOTES**  
 \*Accelerator Availability - Any Hall UP  
 \*\* Hall(s) with greatest scheduled beam time.

**Metrics are for doing,  
 not for staring.  
 Never measure just  
 because you can.  
 Measure to learn.  
 Measure to fix.**

# Tracking System Downtime...

- Is a major investment.
- Is a team effort.
- Is controversial.
- Is not the same across all machines.
- Is not perfect, but improving.
- Is how we monitor systems health.
- Is where we identify improvements.
- Is how we set goals to be better.

# Accelerators for America's Future

The Department of Energy's Office of Science has launched an initiative to encourage breakthroughs in accelerator science and their translation into applications for the nation's health, wealth, and security. 2010 Report highlights topics from an inaugural workshop, sponsored by the Office of High Energy Physics. ([Link to Accelerators for America's Future Report](#))

Potential uses for Accelerator Technology	
•shrink a tumor	•diagnose a disease
•produce cleaner energy	•reduce nuclear waste
•spot suspicious cargo	•detect an art forgery
•make a better radial tire	•implant ions in a semiconductor
•clean up dirty drinking water	•prospect for oil
•map a protein	•date an archaeological find
•study a nuclear explosion	•package a Thanksgiving turkey
•design a new drug	•discover the secrets of the universe

# What's the big deal?

**Reliability – the future will be determined by how we conquer that obstacle.**

Areas of R&D identified by each working group. All areas are of importance to each working group. Color coding indicates areas with greatest impact.

R&D Need	Energy & Environment	Medicine	Industry	Security & Defense	Discovery Science
Reliability	High Impact	High Impact	High Impact	Medium Impact	High Impact
Beam Power/RF	High Impact	Low Impact	Medium Impact	High Impact	High Impact
Beam Transport and Control	Medium Impact	High Impact	Low Impact	Medium Impact	Medium Impact
Efficiency	Medium Impact	Low Impact	Medium Impact	Medium Impact	Medium Impact
Gradient (SRF and other)	Low Impact	Medium Impact	Medium Impact	High Impact	Medium Impact
Reduced Production Costs	Medium Impact	Medium Impact	High Impact	Low Impact	Medium Impact
Simulation	Medium Impact	Medium Impact	Low Impact	Medium Impact	Low Impact
Lasers	Medium Impact	Low Impact	Low Impact	Medium Impact	Medium Impact
Size	Low Impact	Medium Impact	Medium Impact	Low Impact	Medium Impact
Superconducting Magnets	Low Impact	Medium Impact	Medium Impact	Medium Impact	Low Impact
Targetry	Medium Impact	Medium Impact	Low Impact	Low Impact	Low Impact
Particle Sources	Low Impact	Low Impact	Medium Impact	Low Impact	Low Impact

Color code: Increased priority (indicated by a vertical color bar on the right with an upward arrow)

# Challenge the Status Quo



“If everyone is thinking alike, then  
**somebody isn't thinking.**”

- General George Patton

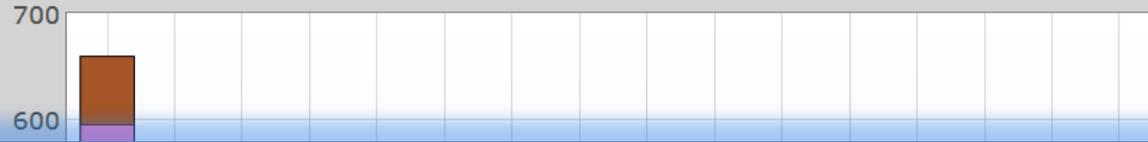
# It is up to us

- **Set system by system goals to improve.**
  - 99% reliable? Great – go for 99.1%
- **Without risk, there is no reward.**
  - Think outside the box; create and innovate.
- **What you measure, you can improve.**
  - Use the data we collect; help make it better
- **Pay attention to system and overall performance.**
  - Team work to develop metrics, tools, ideas
- **If it was easy, everyone would do it.**
  - Overcome challenges; funding, technology, time are always going to be obstacles

# Discussion

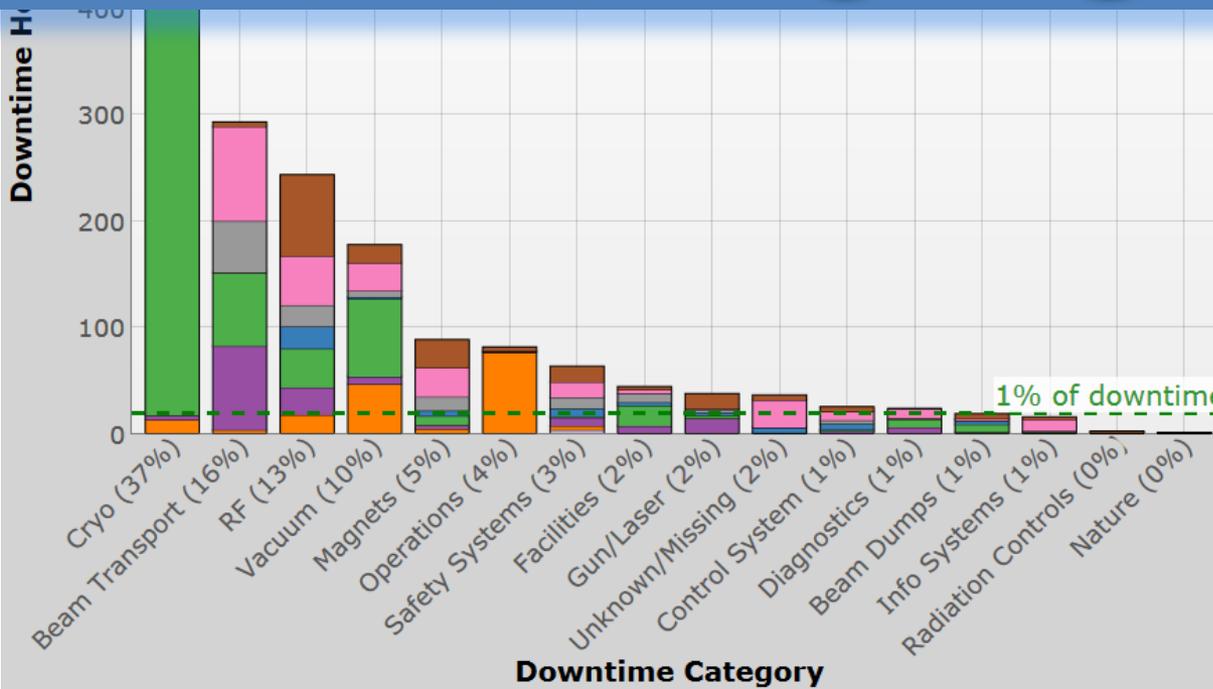
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**What are we going to do!?!**



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