NIF User Office – what's new since the last User Group meeting

Presented to the NIF/JLF User Group meeting

Kevin B. Fournier
NIF User Office Director

February 1, 2016

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This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344. Lawrence Livermore National Security, LLC

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There have been changes to all aspects of the user experience…

- New resources for users
- A new shot RI training curriculum
- A new shot lifecycle process
  - Gates and shot RI responsibilities
  - Where to go for help
- A new scheduling paradigm
- New target diagnostics
  - ARC capabilities
- New shot set-up tools
  - CMT, Fiber Delay and Pulse Shape Editor
  - Shot Request Editor (SRE)
  - Port and target requests

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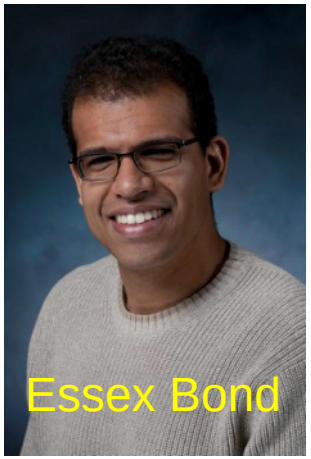
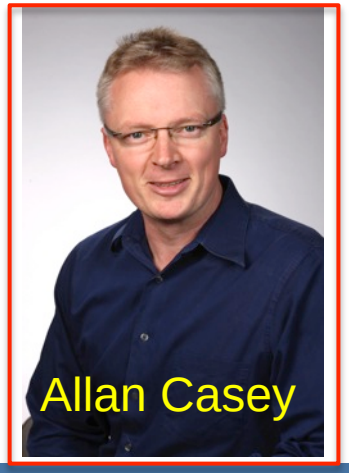
User Office Staff





The User Office is here to help with experimental design, experimental reviews, shot set-up software and data archive and visualization software, and schedule optimization

User Office Staff

The User Office is here to help with experimental proposal workflow, LLNL and NIF site access, NIF shot RI training, shot review tracking, and administrative support

The cycle of life according to the NIF User Office

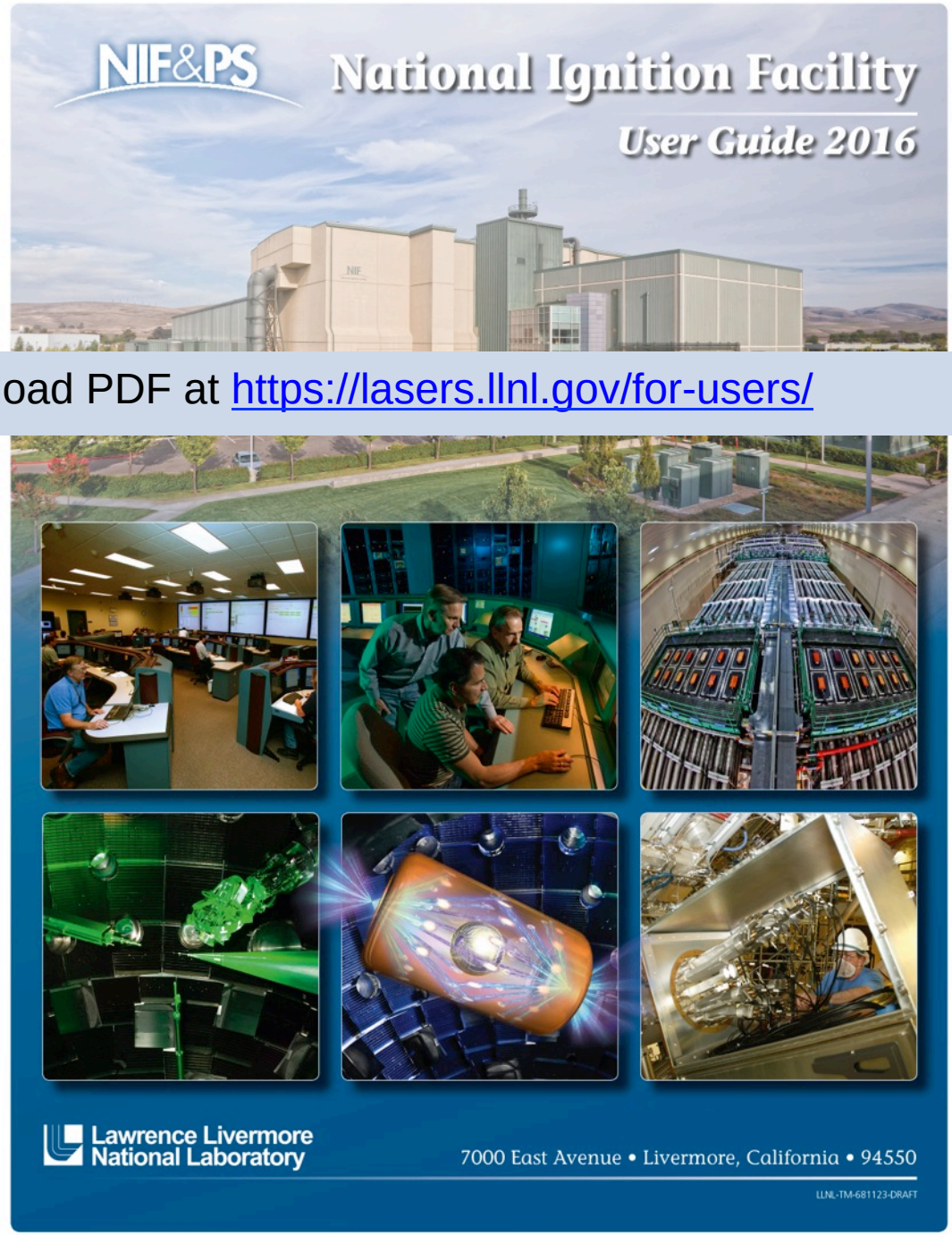
Start of fiscal year

	June	July	August	September	October	November	December	January	February	March	April	May
DS:	Call for Proposals*				TRC/FRC	Award notification					TRC mid-year	
NSA:					call for proposals			PRP/FRC	Award notification			
ICF/HED:	Q3Q4 call		Q3Q4 Councils, PRP, FRC	Q3Q4 Award notification				Q1Q2 call**	Q1Q2 Councils, PRP, FRC	Q1Q2 Award notification		
NUG						NUG EC APS-DPP			NIF User Group Meeting			
Schedule					FASC Q3Q4		FUP submitted				FASC Q1Q2	

New resources for Users

- NIF User Fora – cover salient or interesting topics monthly
  - The charts presented are available under Shot RI Resources > User Forum > Presentations
    https://nifsp.llnl.gov/diroffice/useroffice/Shot%20RI%20Resources/Forms/AllItems.aspx
- NIF User Guide – has been re-written from the 2012 version

Contact us at nifuseroffice@llnl.gov or 925 422-2179



Download PDF at https://lasers.llnl.gov/for-users/

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- NIF User Guide – has been re-written from the 2012 version
- Updated NIF Points of Contact list
  - https://lasers.llnl.gov/content/assets/docs/for-users/nif_poc.pdf
- NIF User Portal – all information about calls for proposals
  - https://nifpub.secure.force.com/
- Searchable publications - https://lasers.llnl.gov/science/journal-articles

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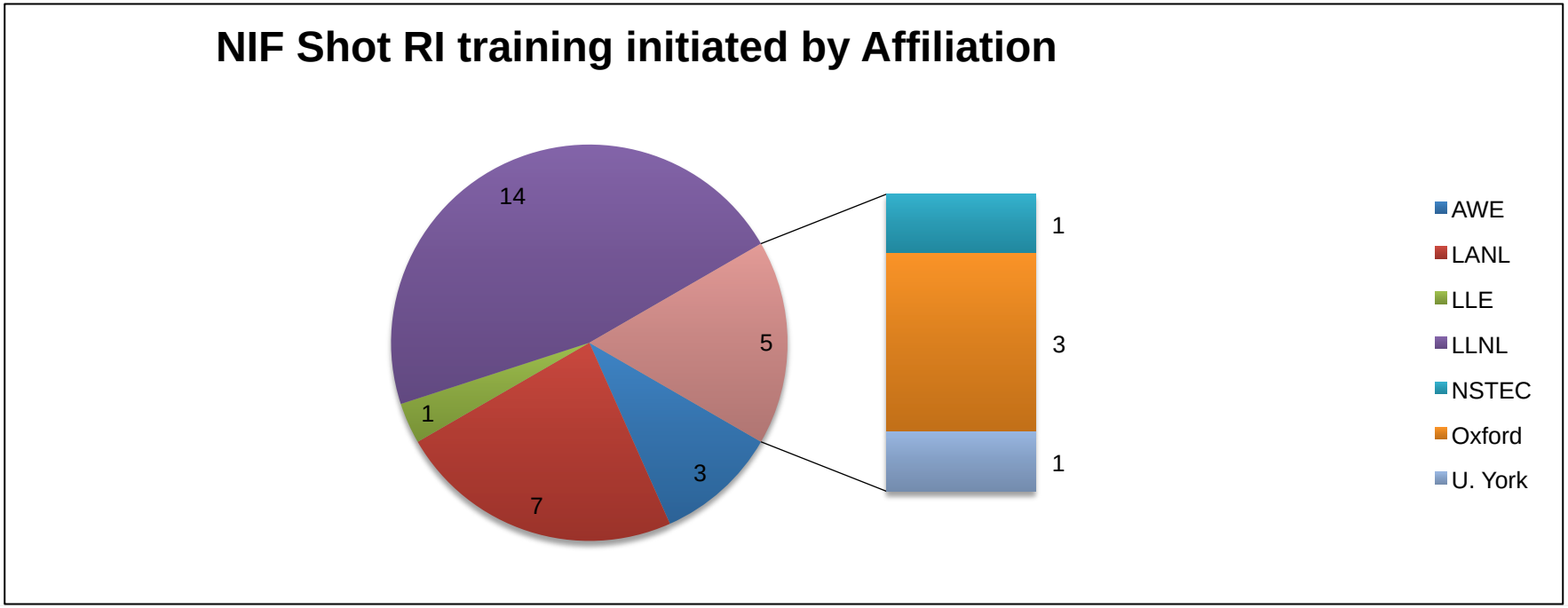
A new shot RI training curriculum

- Process Improvement Project (Phase 1) by Kim Hallock: Improve the administrative management of the Shot RI Training
- Created a Single Point of Contact: NIF User Office (NUO), coordinated by Mat Snyder
- Request form is now available via the web: https://lasers2.llnl.gov/forms/shot_ri_training.php)
- Created a NIF LTRAIN Course # now registers completions for easy reference for program leads and expert groups.
- Streamline training for Off-site Shot RI's
  - NUO works with trainees on scheduling 1-week back to back in-person SME training meetings.
  - Work with trainees to get access to various tools and NIF Site Access during this week of training.

2015 Shot RI training

- 30 New Shot RI's entered the training program
  - Over half of the new trainees are non-LLNL employees and represent multiple affiliations and programs.
- 23 Trainees became fully qualified Shot RI's



A new shot lifecycle process

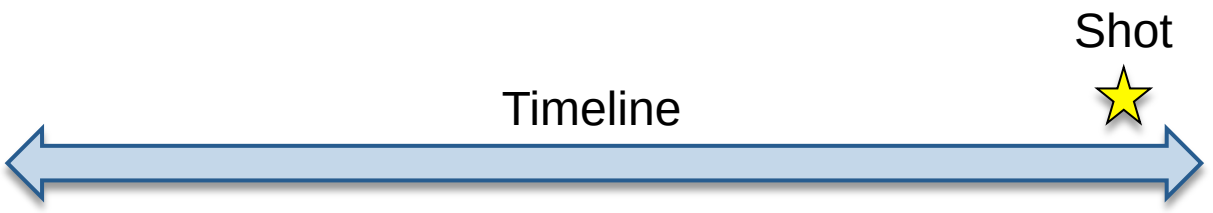
- We have streamlined and documented the roles and responsibilities of the facility and the shot RI's in an experiment's lifecycle.
- The current experimental process is being further defined by:
  - Identifying specific assessments and reviews.
  - Highlighting a set of tasks that guides the Shot RI through the process.
  - Assessments and reviews define the gates leading to shot readiness
- Early identification of unique aspects of the experimental configuration engages stakeholders to avoid crisis mode later in the lifecycle.

We continue to work with shot RI's to define and document the experimental process.

Definitions

- **Assessment:** Stakeholder evaluation of current experimental definition in order to gauge readiness to proceed and identify issues that place the shot schedule at risk. Assessment is done offline without Shot RI presence.
- **Review:** A presentation by the Shot RI to stakeholders. A forum to allow discussion and closure of issues.

The number of reviews depends on the degree of difference from previously shot experiments

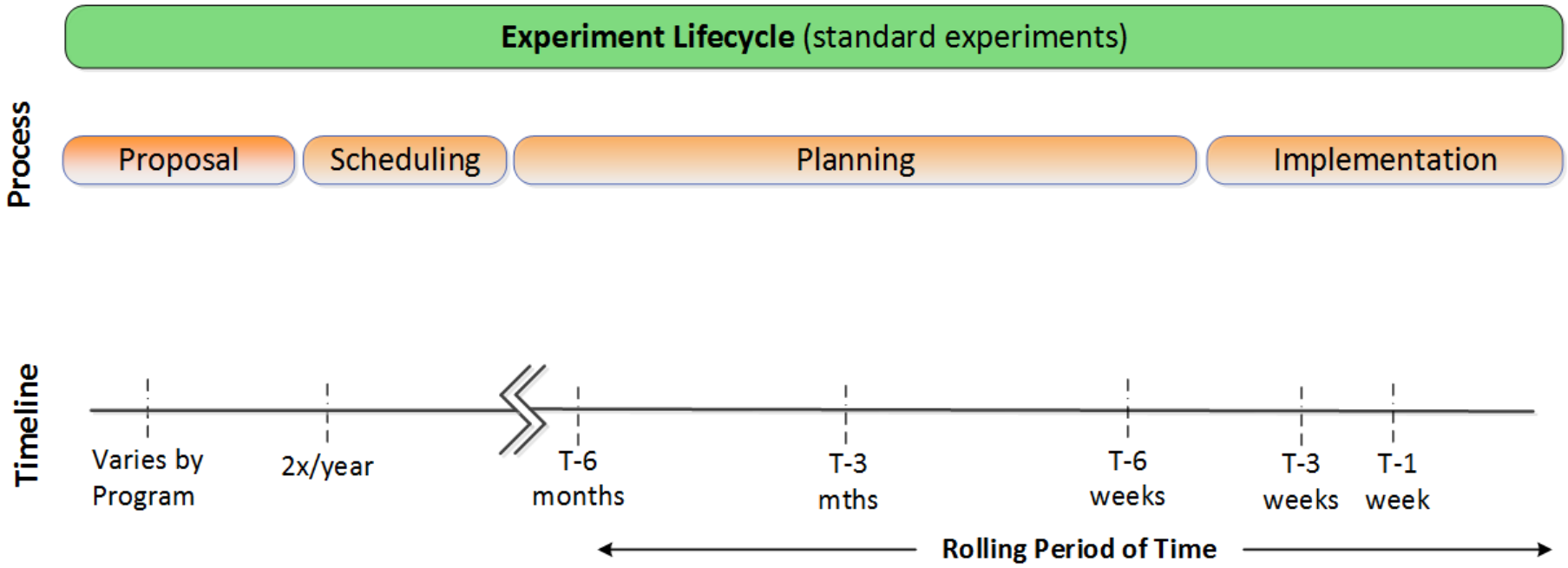


Setup Review

Simple Repeat Shot	R
Variation in Previous Shot (e.g. significantly different filter / change in fill temperature)	R R
New Target and/or Diagnostic Required	R R R R

Our process results in a minimally intrusive set of formal reviews for the Shot RI.

Top-level view of the Experimental Process



Process development led by Essex Bond

POCs: Rich Zacharias, Dan Kalantar, Gayatri Gururgangen

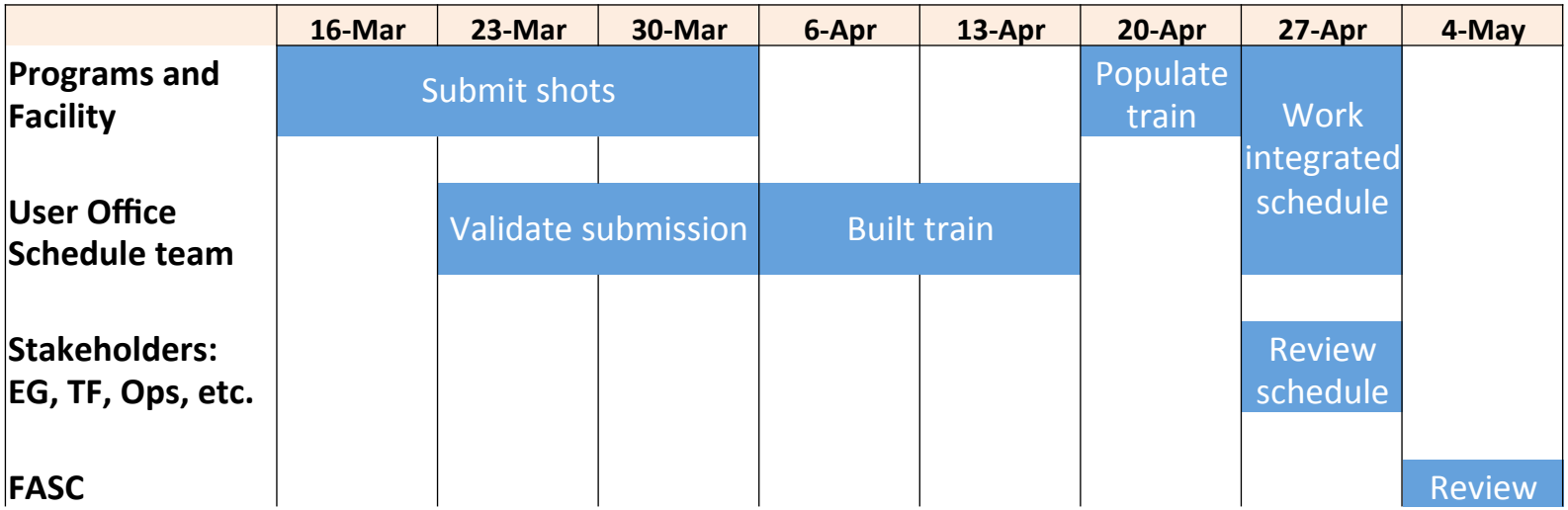
Project engineers and User Office staff are here to help!

New Scheduling Paradigm

- Schedule in 6 month increments, 6-12 months in advance – POC Bob Burr
- Allocate week-long single facility configuration blocks to programs as much as practical
  - Occasional shared weeks for little used configurations in HED, ICF and NSA
  - DS has its own week each quarter that shares multiple configurations
- Establish facility constraints to minimize mid-week facility re-configurations to the maximum extent possible
  - DISC rotation to vertical orientation
  - GXD rotation to vertical orientation
  - > 8 CPP configurations will be executed in groups per quarter
- Develop a new class of exploratory "high tempo" shots (3-4 hr shot cycle)

We prototyped this modus operandi in Q4FY15, have used it to build out the whole schedule for FY16

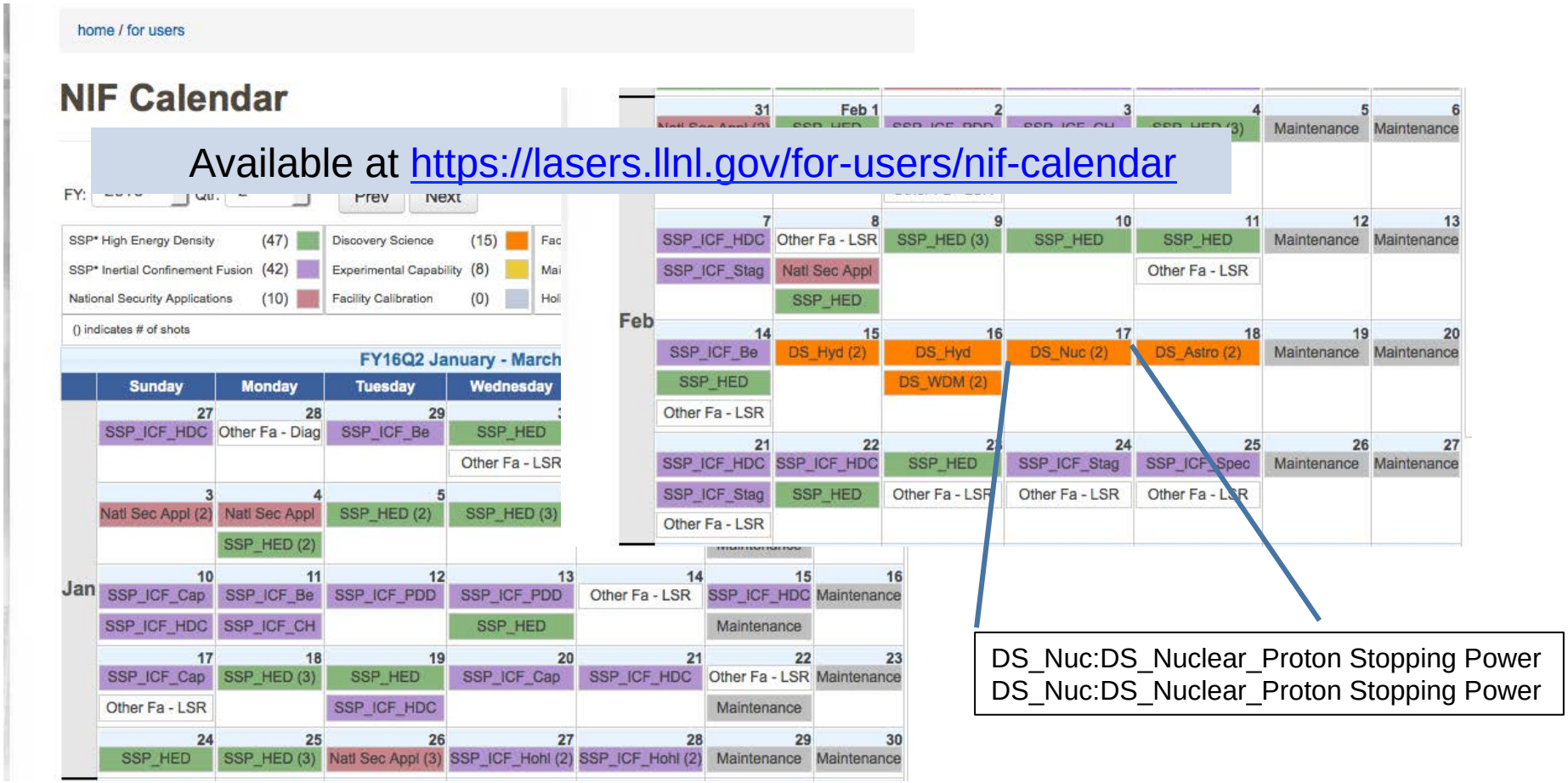
FY16 scheduling utilized the program-block methods piloted in FY15 Q4



- Programs submit experiments aligned with annual allocations
- NIF User Office Scheduling team creates the facility “Train Schedule”
- Programs worked with User Office Scheduling team to populate their calendar blocks with experiments according to the program priorities

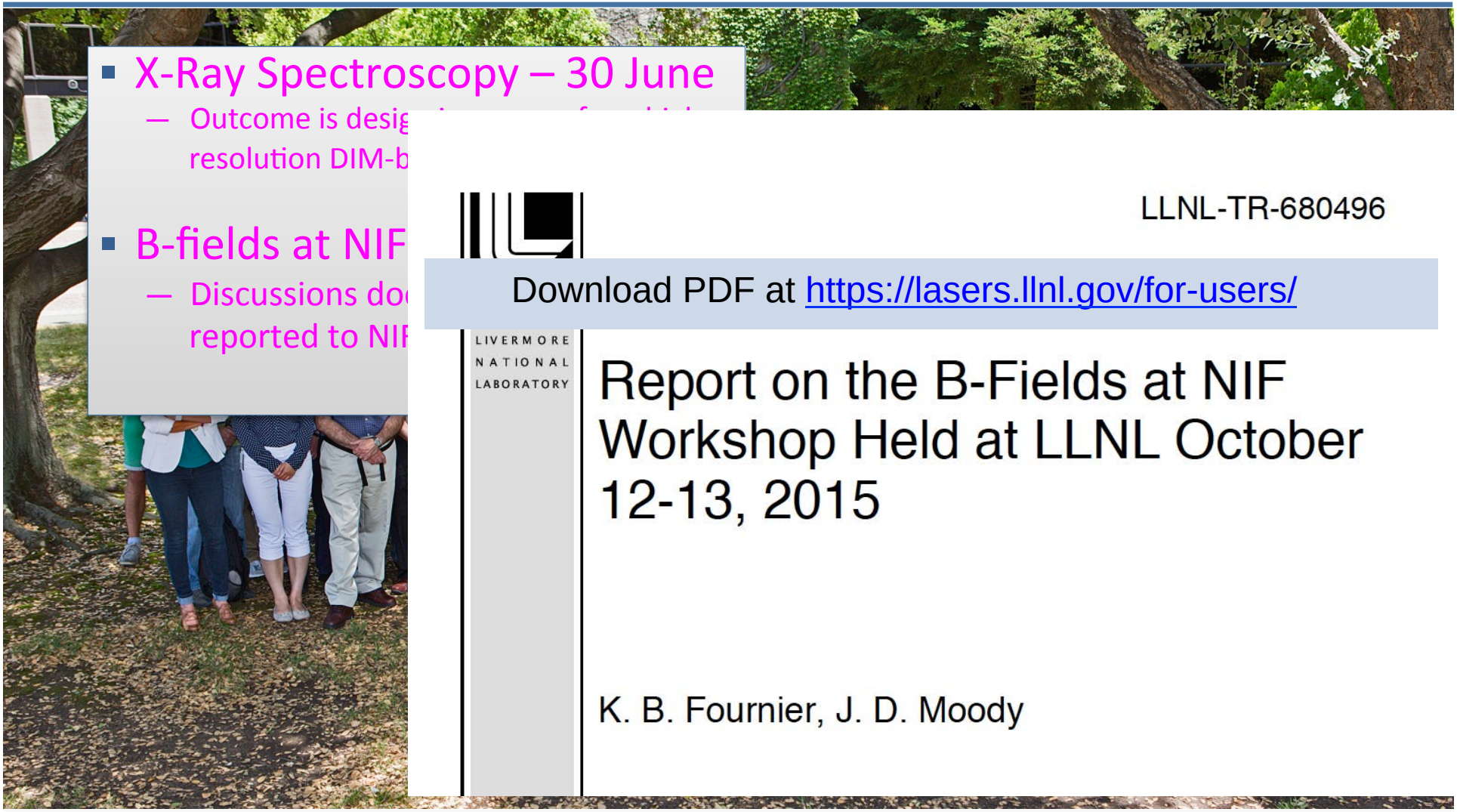
Scheduling process continues to evolve and become more efficient

A high-level calendar is available for users to view



Scheduling process continues to evolve and become more efficient

Workshops held in 2015



- X-Ray Spectroscopy – 30 June
  - Outcome is desig
    resolution DIM-b
- B-fields at NIF
  - Discussions do
    reported to NI

LLNL-TR-680496

Download PDF at https://lasers.llnl.gov/for-users/

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Report on the B-Fields at NIF Workshop Held at LLNL October 12-13, 2015

K. B. Fournier, J. D. Moody

New target diagnostics and facility capabilities

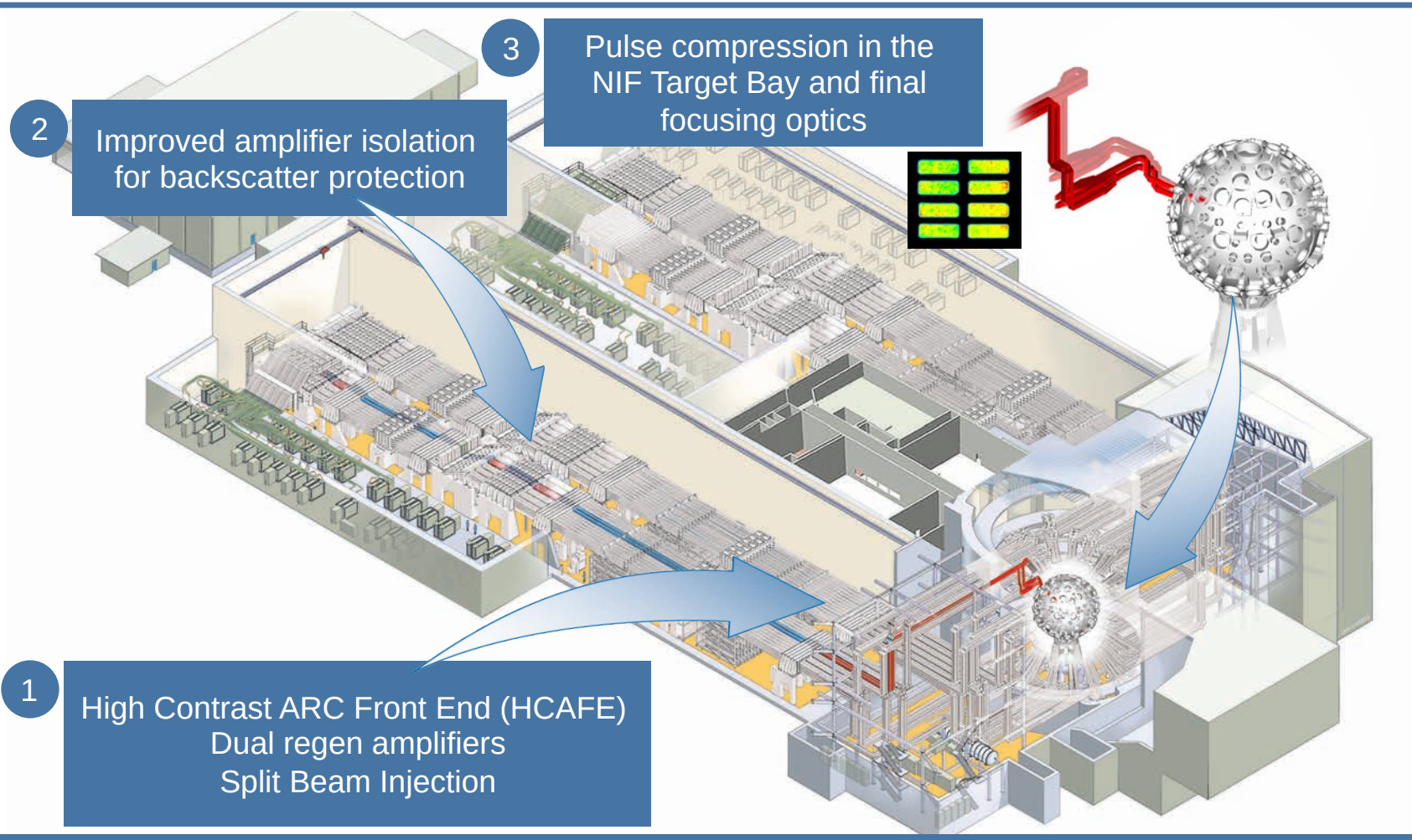
- ARC – advanced radiographic capability short pulse laser

  See "ARC" poster at this meeting
- TANDM – a dual target and diagnostic positioner (late FY16)
- G-LEH – gated laser entrance hole imager
- AXIS – detector for Compton radiography using the ARC laser
- KB Optics – A high-magnification, narrow band x-ray imaging system
- Virgil – soft x-ray spectrometer along DANTE line of sight
- ATLAS – laser-based alignment aid (late FY16)
- Fiber delay backlighter – made "pushbutton"

  See "New Diagnostic Capabilities in FY16" poster at this meeting

Capabilities continue to be developed according to programmatic priorities

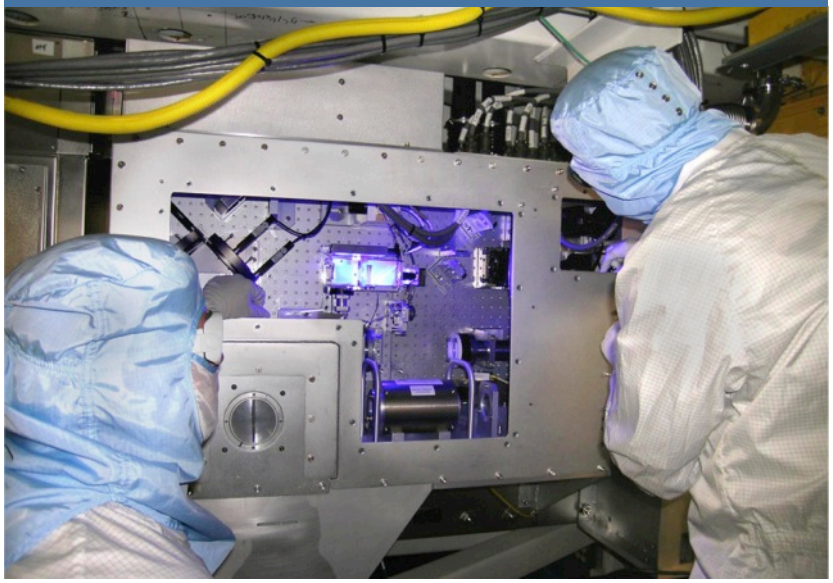
A number of facility changes were implemented for ARC



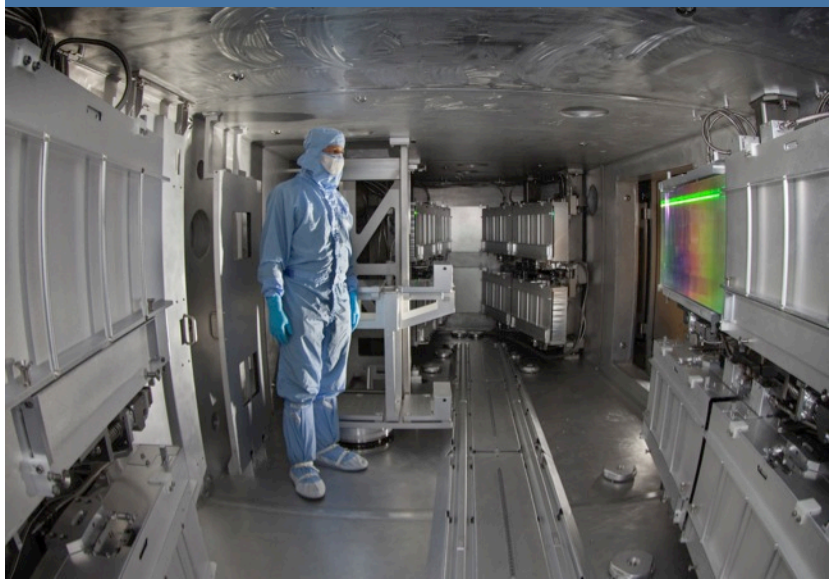
The ARC system has been brought on line and commissioned in the facility

ARC is a kilojoule-class laser delivering high intensity short pulses to target

The dual regens and split beam injection produce 2 beamlets with independent timing



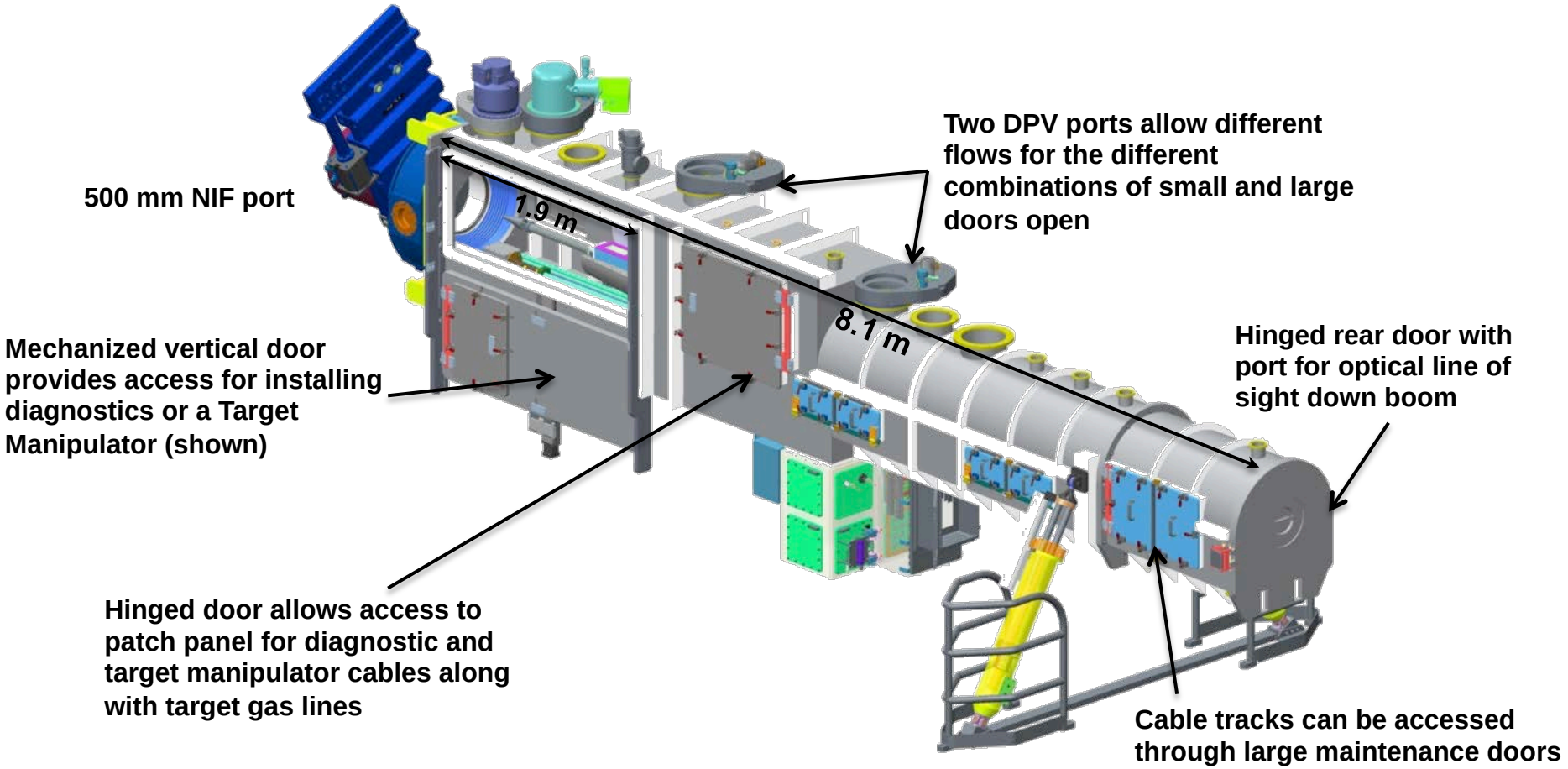
A total of 16 ARC compressor gratings are used for the 4 beamlets



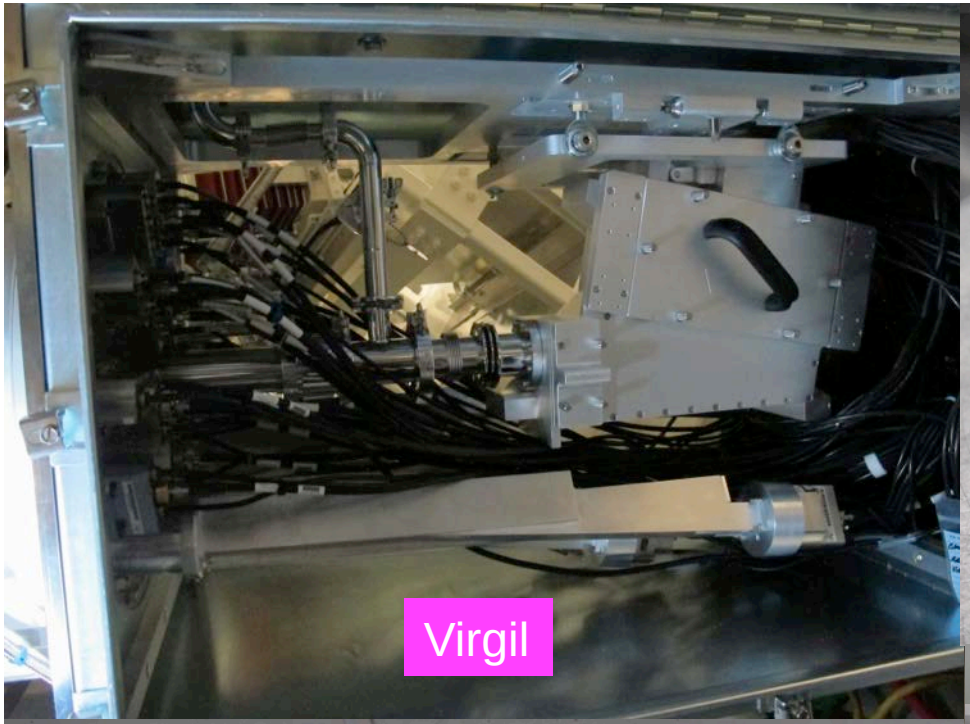
See ARC poster at this meeting and September User Forum charts:
https://nifsp.llnl.gov/diroffice/useroffice/Shot%20RI%20Resources/Forms/AllItems.aspx

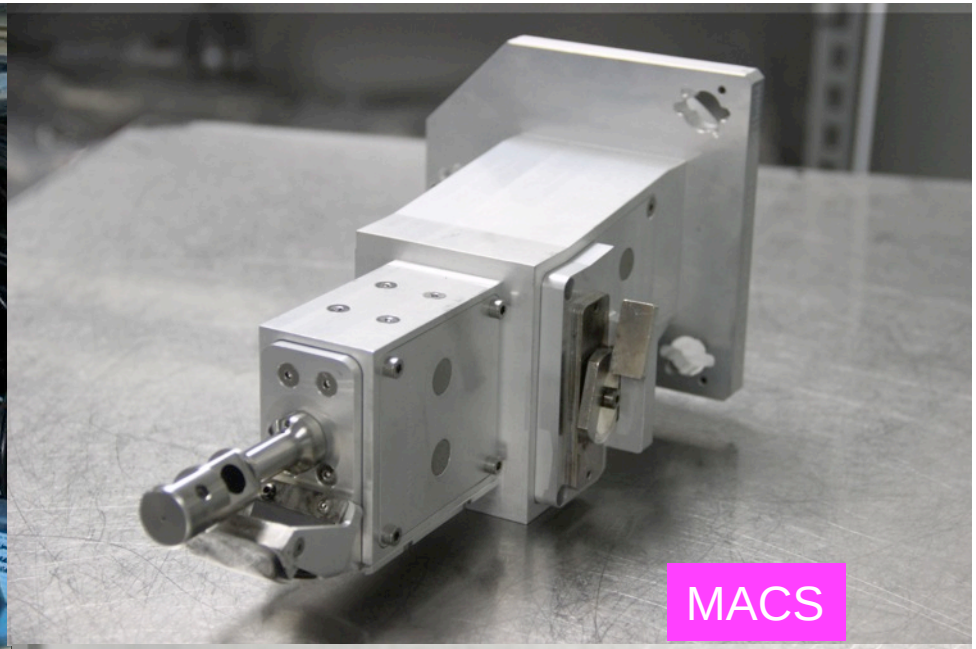
Shot RI's in the Discovery Science program are commissioning the system's full capabilities

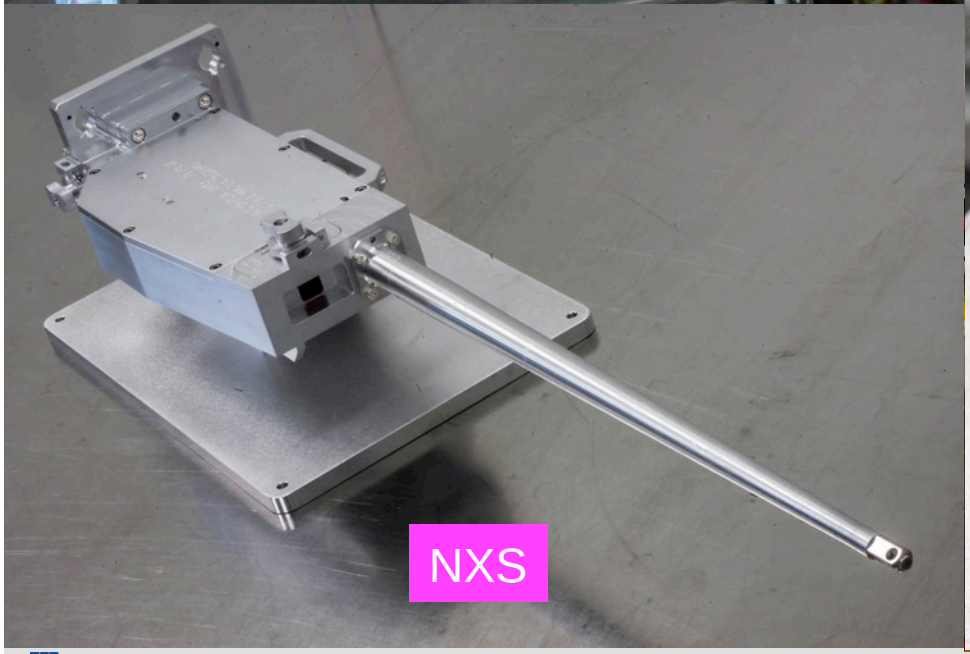
Multifunction Positioner- TANDM Fields warm targets or existing diagnostics

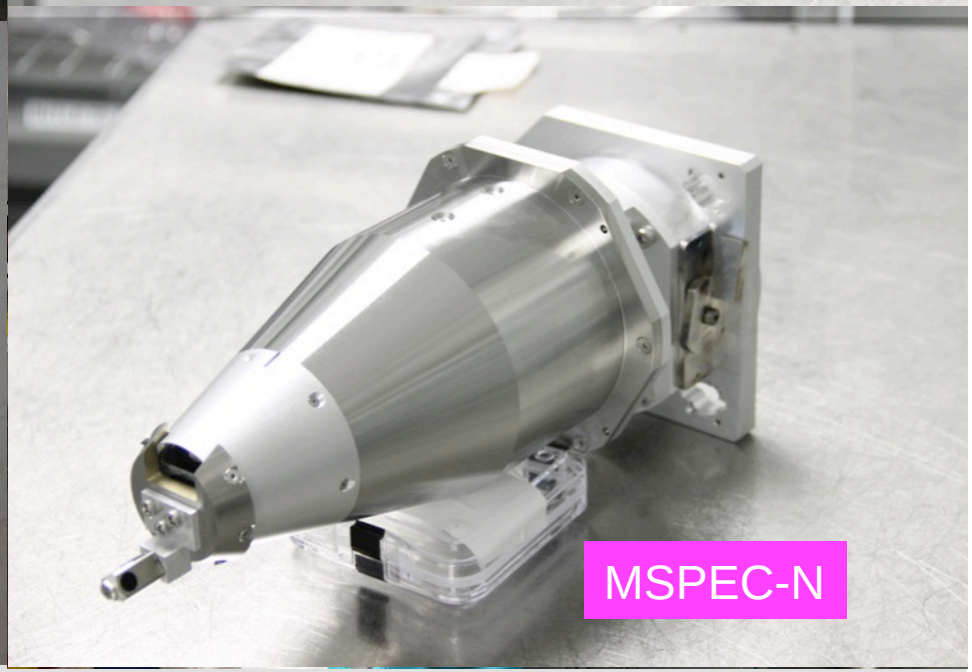


Changing from a Diagnostic Positioner to a Target Positioner << 4 hours


Virgil


MACS


NXS


MSPEC-N

New shot set-up tools

- CMT modifications
  - FDBL
  - Laser set-up tool
  - Multiple on-going diagnostic roll outs
- Golden templates

- SRE – shot request editor
- Target requests

New shot set-up tools

- CMT modifications – continuous upgrade of capabilities
  - FDBL
  - Laser set-up tool
  - Multiple on-going diagnostic roll outs
- Golden templates – automatic approval of target diagnostics with standard set ups

- SRE – shot request editor – web based UI and common data
- Target requests – simplified, menu-driven interface to enhance communication between RI's and Target Fab.

On-going tool development efforts and streamlining of legacy data systems is one of the User Office's greatest challenges

Summary of high-level requirements for the new setup tool (SRE)

Overall Goal: Maintain deliverables to laser modeling and the control system while improving shot setup by making it easier, faster, and more integrated with other user tools.

The setup tool shall:

1) ensure data is consistent with other user tools.
2) use rule sets to set up an experiment.
3) integrate with the facility configuration management system.
4) provide access controls.
5) employ a data group-centric setup.
6) support time-phased experiment setup.
7) maintain interfaces to external systems.
8) be easier to maintain and evolve.

Transition Strategy Between Old and New Editors

- **Run both editors in parallel during transition (most of 2016)**
- **Through monthly releases, migrate data groups from old to new editor**
  - Start simple – a few standalone TD systems in initial releases (i.e., not the laser, not the DIMs)
  - Receive user feedback at earliest stages of implementation
- **A data group will be editable in only *one* editor at a time**
  - Users will have access to a unified view of entire experiment from either editor

The NIF remains a highly dynamic environment that is constantly evolving to better serve users

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The NIF User Office is the users' go-to place for the latest information and support!

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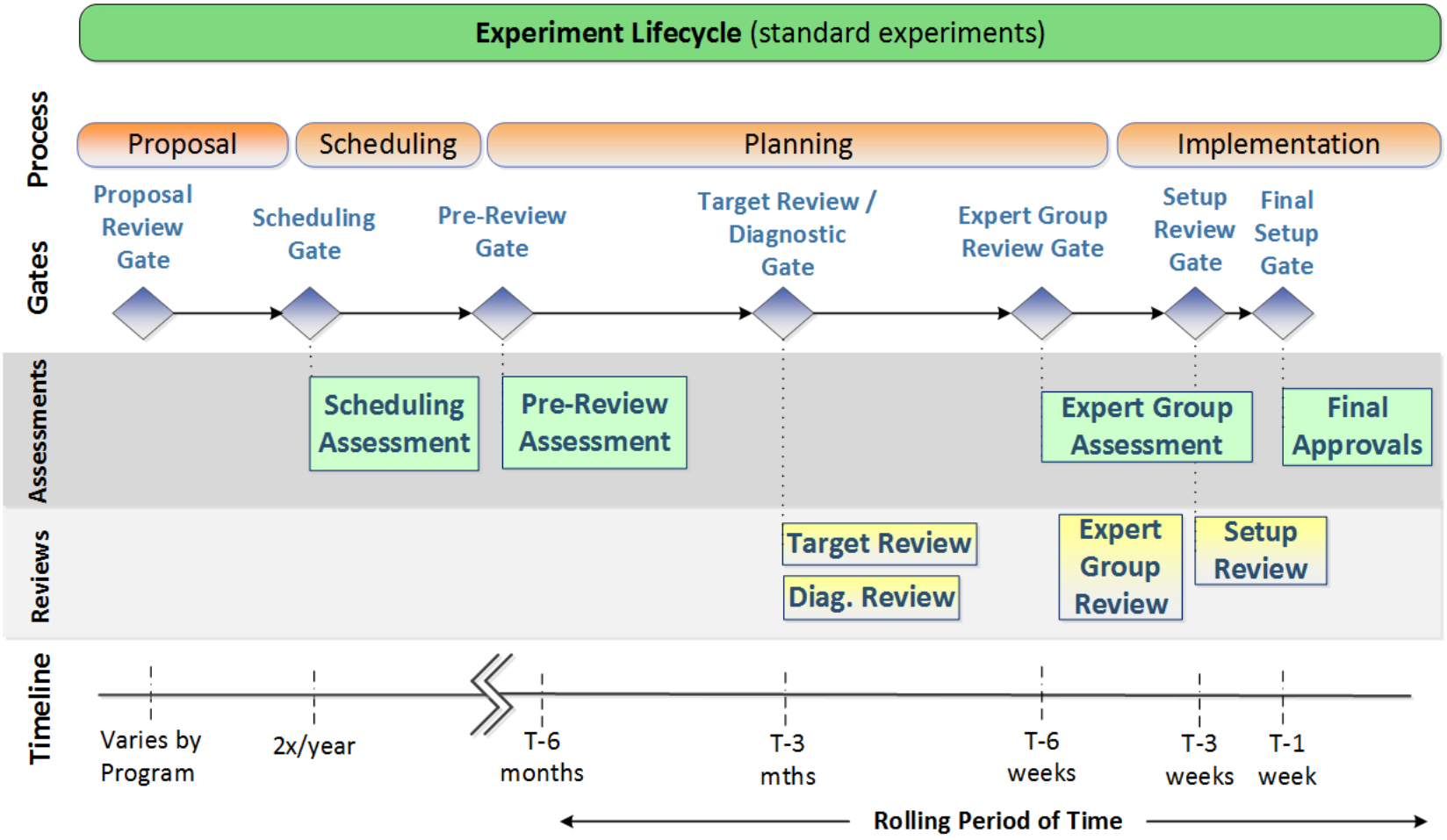
A new shot RI training curriculum

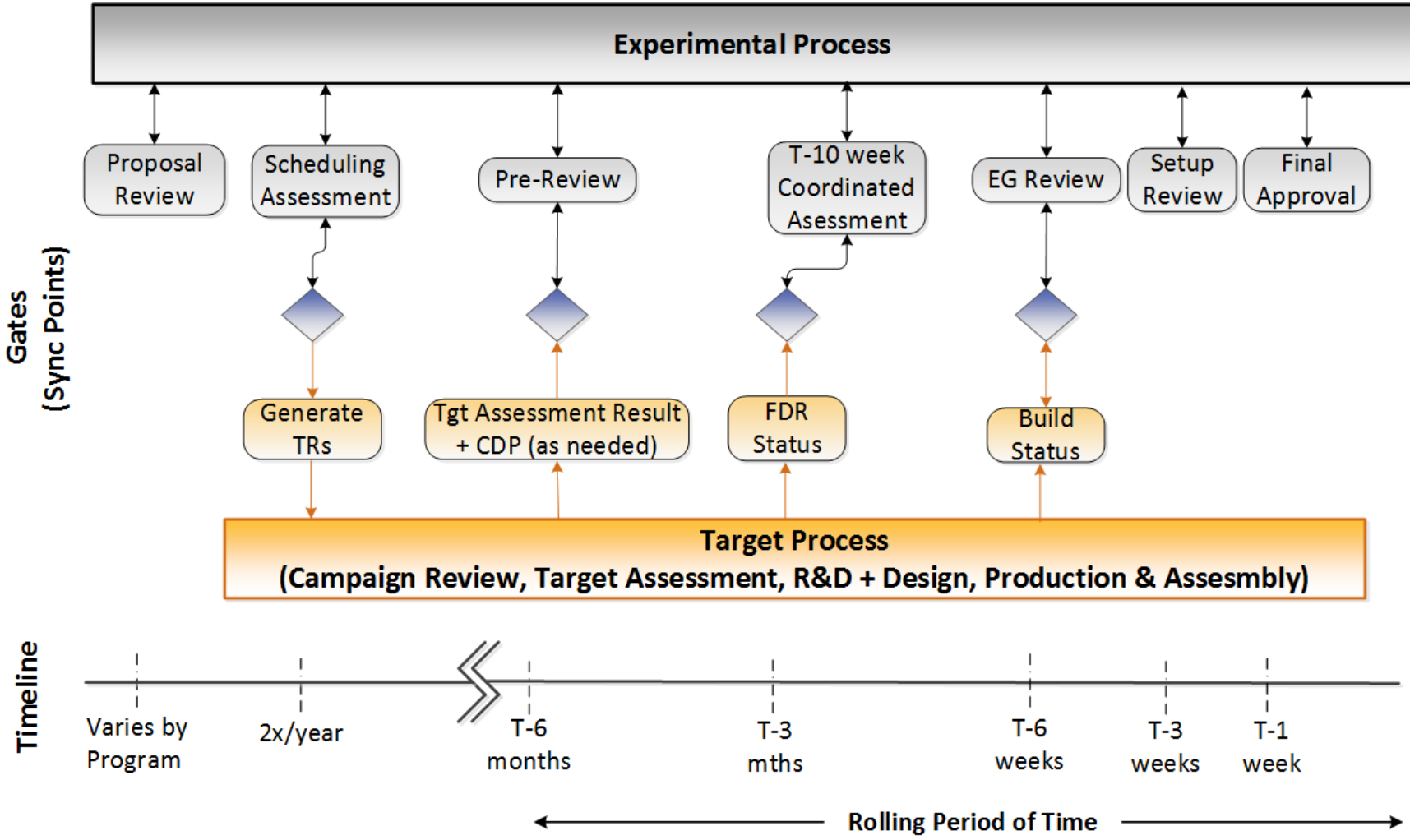
Topic areas:

- Introduction – M. Snyder
- NIF User Office and Shot RI Resources- M. Snyder
- Introduction to CMT, Shot Planning Tools, Visualization, and Data
- Laser Performance – B. MacGowan
- Target Fabrication Tools C. Choate
- Introduction to NIF Operations, and Introduction to Target Fielding – T. Kohut
- Diagnostics, Factory, RVP – B. Ehrlich
- Alignment – D. Kalantar
- They have to answer Dan's questions about shot set up etc. at a minimum they have to shadow one shot.

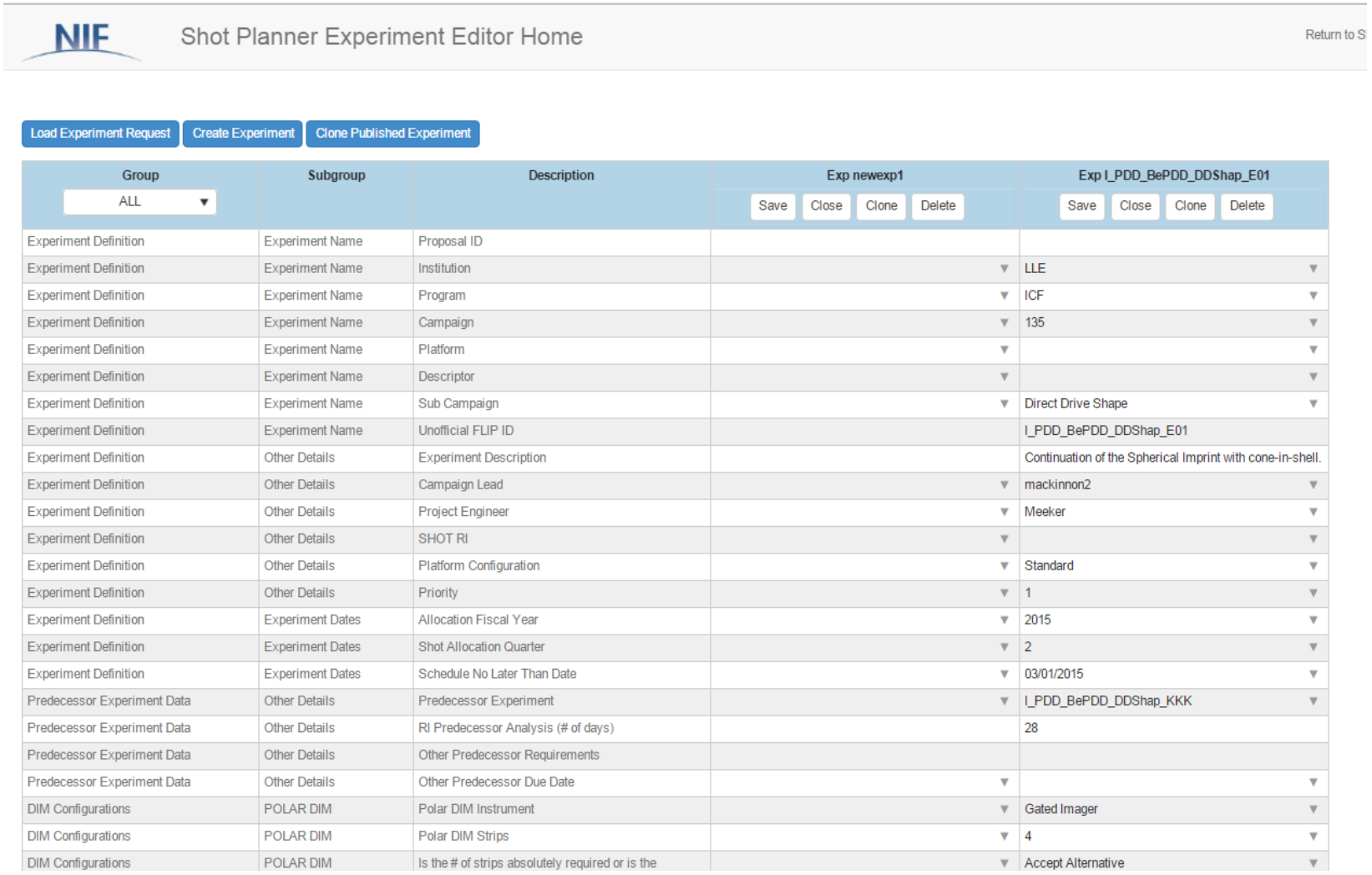
Gates, Assessments, and Reviews define the structure for the experimental process



The User Office is working more closely with Target Fab to define ways to minimize duplication of data and provide status on targets planned for experiments



Shot Planner Experiment Editor Screenshot



The train schedule established program blocks with specific facility configurations

Shot week start date	3-Apr	10-Apr	17-Apr	24-Apr	1-May	8-May	15-May	22-May	29-May	5-Jun	12-Jun	19-Jun	26-Jun	3-Jul	10-Jul	17-Jul	24-Jul	31-Jul	7-Aug	14-Aug	21-Aug	28-Aug	4-Sep	11-Sep	18-Sep	25-Sep	total shot days	
# Shot Days	5	5	5	5	5	5	5	5	4	FMR	FMR	FMR	5	4	5	5	5	5	5	5	5	5	4	FMR	5	5	107	
Week Type (DIM config)	GXD-CCD (2)	HY	HY	RDISC (2)	RGXD-CCD(2)	HY	HY	Diff-Str	DS-3				HY	HY	RDISC (2)	RGXD-CCD(2)	HY	DS-4	HY	Diff-Str	RGXD-CCD(2)	HY	HY		DIR RES	HY		
Program		HED	ICF			HED-FAC	ICF	HED	DS				HED-ICF-FAC	HED-ICF-NSA			HED	DS	ICF	HED	HED-ICF-NSA	ICF	HED-FAC		DR	ICF		
PDIM	RGXD1F	HGXD2F	HGXD2F	RDISC1	RGXD1F	HGXD2F	HGXD2F	RGXD1F	RGXD1F				HGXD2F	HGXD2F	RDISC1	RGXD1F	HGXD2F	RGXD1F	HGXD2F OTS	HGXD2F	RGXD1F	HGXD2F	HGXD2F		TBD	HGXD2F		
90-315	GXD3F	VNIS	VNIS	VNIS/GXD	RDISC1	VNIS	VNIS-SGMP	VISAR	VISAR				VNIS	VNIS	VNIS	GXD3F	VNIS	VNIS-DISC1	VNIS	VISAR	RDISC1	VNIS	VNIS		TBD	V-NIS		
90-78	RGXD4F	HGXD3T	HGXD6F	RDISC2	RGXD4F	HGXD6F	SGMP-AXIS	HEIDI/C	GXD/DISC				AXIS-KB	HGXD6F	RDISC3	RGXD4F	HGXD6F	RGXD4F	HGXD6F	HEIDI/C	RGXD4F XTRRA	HGXD6F XTRRA	HGXD6F		TBD	HGXD6F-AXIS		

- Layered weeks + standard DIM-based diagnostic configurations form the backbone of the schedule
- Shots were initially grouped into 7 “standard” facility configurations based on DIMs and 2ω CPP configurations
- Blocks of each configuration were created to support the demand

Grouping like shots into standard configurations improves the efficiency of scheduling by quickly focusing attention where needed

Shot Request Editor (SRE) – User Interface

Initial development focusing on a few stand-alone target diagnostics to build & validate data model and client/server infrastructure

- Diagnostics were chosen to facilitate development based on simplicity and/or suitability as a model for an “express” setup workflow and include eHXI, FFLEX, and Dante.

SRE About

Parameter	BC_DEM3_S02	BC_DEM3_S04	BC6I_S06
Dante 1	Draft REMOVE SAVE	PreApproved SAVE	Not Used USE SAVE
Description	v2010-08-28: Standard 1 MJ pulse Dante setup	v2010-08-28: Standard 1 MJ pulse Dante setup	yyyyy
Comment	abc	comment	comment
Template	DANTE-1 NIC Full Pulse, 50ns sweep	DANTE-1 NIC Full Pulse, 50ns sweep	NONE
Experiment	NONE	NONE	NONE
Configuration			
Analysis Parameters			
location	TC143-274	TC143-274	TC143-274
Dante 2	Draft REMOVE SAVE	Draft REMOVE SAVE*	Not Used USE SAVE
Description	ver.2010-08-29. 1 MJ Standard setup with 12 channels only. Attenuator selection for foot of pulse.	Standard 1 MJ pulse Dante setup	description
Comment	comment	Changed this	comment
Template	DANTE-2 NIC Full Pulse, 50ns sweep - 12 CHs, foot	RadT_D2_v1_ASM	NONE
Experiment	NONE	NONE	NONE
Configuration			
Analysis Parameters			
location	TC064-350	TC064-350	TC064-350
EHXI	Not Used USE SAVE	Not Used USE SAVE	Not Used USE SAVE
Description	description	description	description
Comment	comment	comment	comment
Template Applied	NONE	NONE	NONE
Pinhole Assembly	NONE	NONE	NONE
Image Plate Assembly	NONE	NONE	NONE
FFLEX	Approved SAVE	Draft REMOVE SAVE	Draft REMOVE SAVE
Description	secondary	secondary	description
Comment	Dewald did setup.	Dewald did setup.	comment
Template Applied	NONE	NONE	NONE
Scope 1			
PM Tube 1	Tertiary	Secondary	Not Used
HVPS 1 Voltage (V)	-910	-910	0
Channel 1 Full Vert Scale (V)	0.5	0.5	

Strategy for initial release

Initial release will include those target diagnostics used to drive initial development.

A series of milestones are designed to mature the user client and backend server together but are diverse enough to permit parallel development and limit serial dependencies between milestones

- Milestone 1 (90% complete) – foundational constructs and capabilities for data group-centric editing
- Milestone 2 (50% complete) – Basic data group lifecycle including database read/write
  - Common parameter types, lists, assemblies with read-only elements
  - No export
  - Partial validation
- Milestone 3 – Complete data group lifecycle
  - Export and complete validations for client and server
  - Client edit state persistence (e.g. user's editor configuration)
- Milestone 4 – Template support, Express setup models, Experiment Search
  - CMT's full experiment templates and separate target diagnostic templates to be unified under a single model, integrated into SRE to eliminate need for separate template editor
- Milestone 5 – CMT integration including features to support and ease transition between CMT and SRE
- Milestone 6 – Additional basic features including experiment details tab, administrative tools, integrated experiment history viewer