APS Upgrade: Roadmap Scenarios Revisited

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Stakeholders Committee

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Simplified Discussion: Presented to SAC

Program	Base	Option 1	Option 2	Option 3	~~Option 4~~
	J	I	L	M	N
DCS	35-ID	35-ID	35-ID	35-ID	35-ID
ISN	9-ID-2	9-ID-2	9-ID-2	9-ID-2	9-ID-2
MS-S	2-ID-2	2-ID-2	4-ID	2-ID-2	25-ID-1
RIXS	27-ID	27-ID	27-ID	27-ID	27-ID
S3DD micro	34-ID-2	34-ID-2	34-ID-2	34-ID-2	34-ID-2
S3DD nano	34-ID-1s	34-ID-1s	34-ID-1s	34-ID-1s	34-ID-1s
WFI	20-ID	20-ID	20-ID	20-ID	19-ID
XIS	28-ID	28-ID	28-ID	28-ID	28-ID
ASD-D	30-ID	30-ID	30-ID	30-ID	30-ID
ASL	25-ID	25-ID	25-ID	25-ID	20-ID
BCDI	32-ID-2	32-ID-2	32-ID-2	32-ID-2	32-ID-2
BIO	18-ID	18-ID	18-ID	18-ID	9-ID-1
MD	2-ID-1	2-ID-1	2-ID	9-ID-1	25-ID-2
SBC	19-ID	19-ID	19-ID	19-ID	18-ID
XSD LSS	28-ID*	15-ID-2	28-ID*	28-ID*	28-ID*
XSD mDiff	34-ID-1s	34-ID-1s	34-ID-1s	34-ID-1s	34-ID-1s
XSD mFluor	9-ID-1	9-ID-1	9-ID-1	2-ID-1	2-ID
Cost diff	**0**	**$4.25M**	**-$2.67M**	**-$2.20M**	**-$0.51M**

Moving CAT programs at sectors 18 and 19 not desirable

Follow Up Meetings

- Meeting with SBC-CAT and BIO-CAT Directors: March 15
  - Both favor leaving BIO in sector 18 and SBC in sector 19
- Mark Schlossman and Kent Blaise (LSS): April 9
- Microscopy Group: April 11
- Steve Wang (TXM): April 19
- Jonathan Lang and Doug Robinson (MD): April 19
- Barry Lai and Stefan Vogt (ISN, XSD mFluor): April 19
- Alan Goldman (6-ID HE program): April 27
- Ross Harder (BCDI): TBD

Comment on Option 4

Option 4:

- WFI in 19-ID; move SBC and BIO-CAT (-$0.51M)
- Possibly cost effective but very disruptive to SBC and BIO
- Not practical to consider any further

Revised Option 4 (Scenario O) proposed by Microscopy Group

- Attractive and cost effective

Revised Scenarios

Program	BASE	Option 1	Option 2	Option 3	Option 4
	J	I	L	M	O
DCS	35-ID	35-ID	35-ID	35-ID	35-ID
ISN	9-ID-2	9-ID-2	9-ID-2	9-ID-2	9-ID-2
MS-S	2-ID-2	2-ID-2	4-ID	2-ID-2	2-ID-2
RIXS	27-ID	27-ID	27-ID	27-ID	27-ID
S3DD micro	34-ID-2	34-ID-2	34-ID-2	34-ID-2	34-ID-2
S3DD nano	34-ID-1s	34-ID-1s	34-ID-1s	34-ID-1s	34-ID-1s
WFI	20-ID	20-ID	20-ID	20-ID	20-ID
XIS	28-ID	28-ID	28-ID	28-ID	28-ID
ASD-D	30-ID	30-ID	30-ID	30-ID	30-ID
ASL	25-ID	25-ID	25-ID	25-ID	25-ID
BCDI	32-ID-2	32-ID-2	32-ID-2	32-ID-2	9-ID-1
BIO	18-ID	18-ID	18-ID	18-ID	18-ID
MD	2-ID-1	2-ID-1	2-ID	9-ID-1	32-ID-2
SBC	19-ID	19-ID	19-ID	19-ID	19-ID
XSD LSS	28-ID*	15-ID-2	28-ID*	28-ID*	28-ID*
XSD mDiff	34-ID-1s	34-ID-1s	34-ID-1s	34-ID-1s	34-ID-1s
XSD mFluor	9-ID-1	9-ID-1	9-ID-1	2-ID-1	2-ID-1
	0	**$4.25M**	**-$2.67M**	**-$2.20M**	**$-1.81M**

Roadmap Components

- Many components invariant with respect to all scenarios
- Except the following need further evaluation:
  - XSD LSS
  - MS-S
  - BCDI
  - MD
  - XSD mFluor
  - ISN (although proposed at 9-ID-2 in all scenarios it will come to play as we consider variations)

Starting Point: Base Scenario

	J
DCS	35-ID
ISN	9-ID-2
MS-S	2-ID-2
RIXS	27-ID
S3DD micro	34-ID-2
S3DD nano	34-ID-1s
WFI	20-ID
XIS	28-ID
ASD-D	30-ID
ASL	25-ID
BCDI	32-ID-2
BIO	18-ID
MD	2-ID-1
SBC	19-ID
XSD LSS	28-ID*
XSD mDiff	34-ID-1s
XSD mFluor	9-ID-1

Option 1: XSD LSS

- Cant 15-ID for XSD LSS (+ $4.25M)

  - Significant additional cost

  - We will carry out design work on this option as APS-U contingent scope

  – Meeting with Mark and Kent: seeking NSF funds was discussed
  – This is independent of the rest of the roadmap

- Base scope will be to move fixed energy LSS programs to XIS, with LSS experiments needing tunable energy accommodated at existing 15-ID facility

Option 2: MS-S

- MS-S to stay in 4-ID-C

  - Interference between future APPLE-II and existing CPU could be difficult to solve

  – Conservative recommendation is to move MS-S

  – Scenarios of putting it at 2-ID on a cant will work

- Option 2: Risky to consider

Option 3

- ISN and MD on 9-ID

  - ISN: optics requires station as far downstream

  - MD: high field magnets and associated infrastructure require significant lateral space

  – Both programs incompatible on the same cant

- Option 3: Technically not feasible to consider

Revised Scenarios for Baseline

Program	BASE	Option 1	Option 2	Option 3	Option 4
	J	I	L	M	O
DCS	35-ID	35-ID	35-ID	35-ID	35-ID
ISN	9-ID-2	9-ID-2	9-ID-2	9-ID-2	9-ID-2
MS-S	2-ID-2	2-ID-2	4-ID	2-ID-2	2-ID-2
RIXS	27-ID	27-ID	27-ID	27-ID	27-ID
S3DD micro	34-ID-2	34-ID-2	34-ID-2	34-ID-2	34-ID-2
S3DD nano	34-ID-1s	34-ID-1s	34-ID-1s	34-ID-1s	34-ID-1s
WFI	20-ID	20-ID	20-ID	20-ID	20-ID
XIS	28-ID	28-ID	28-ID	28-ID	28-ID
ASD-D	30-ID	30-ID	30-ID	30-ID	30-ID
ASL	25-ID	25-ID	25-ID	25-ID	25-ID
BCDI	32-ID-2	32-ID-2	32-ID-2	32-ID-2	9-ID-1
BIO	18-ID	18-ID	18-ID	18-ID	18-ID
MD	2-ID-1	2-ID-1	2-ID	9-ID-1	32-ID-2
SBC	19-ID	19-ID	19-ID	19-ID	19-ID
XSD LSS	28-ID*	15-ID-2	28-ID*	28-ID*	28-ID*
XSD mDiff	34-ID-1s	34-ID-1s	34-ID-1s	34-ID-1s	34-ID-1s
XSD mFluor	9-ID-1	9-ID-1	9-ID-1	2-ID-1	2-ID-1
	0	**$4.25M**	**-$2.67M**	**-$2.20M**	**$-1.81M**

Remaining Beamlines and Programs to Consider

Beamlines

- 2-ID-1 (MS-S on 2-ID-2)
- 9-ID-1
- 9-ID-2
- 32-ID-2

Programs

- ISN
- XSD mFluor
- BCDI
- MD

Beamlines: 2-ID and 9-ID

- 2-ID
  - If possible, we would like to reuse most of 2-ID existing infrastructure
  - Options are XSD mFluor (existing program) or MD
- 9-ID
  - Available because RIXS/LSS will move
  - Tall hutches, compatible with canting
  - ISN, XSD mFluor, BCDI, MD can all go there
  - *ISN/MD are not compatible on a cant (already discussed)*
  - Options are ISN/BCDI, MD/BCDI, XSD mFluor/ISN

Beamline: 32-ID

- 32-ID
  - Existing programs are WFI, high speed imaging (HSI) and TXM
  - WFI will move to 20-ID
  - HSI challenge: No other program wants to move to 32-ID with it, because it takes 25% of the beamtime for both branches (it uses all hybrid fill time)
  - We should consider moving HSI to a non-canted beamline
    - 7-ID or 6-ID would use non-SPX time (SPX not available during hybrid fill)
    - 30-ID with HERIX and ASD-D might be possible if undulator is appropriate
  - TXM: claims to need end station, claim needs to be revisited
  - BCDI could go there, but they make a good partner for a long beamline and should really go to 9-ID
  - Options are MD, ISN, possibly BCDI
- All scenarios are close in cost

Summary

Program	BASE	Option 1	Option 2
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DCS	35-ID	35-ID	35-ID
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RIXS	27-ID	27-ID	27-ID
S3DD micro	34-ID-2	34-ID-2	34-ID-2
S3DD nano	34-ID-1s	34-ID-1s	34-ID-1s
WFI	20-ID	20-ID	20-ID
XIS	28-ID	28-ID	28-ID
ASD-D	30-ID	30-ID	30-ID
ASL	25-ID	25-ID	25-ID
BCDI	32-ID-2	9-ID-1	9-ID-2
BIO	18-ID	18-ID	18-ID
MD	2-ID-1	32-ID-2	2-ID-1
SBC	19-ID	19-ID	19-ID
XSD LSS	28-ID*	28-ID*	28-ID*
XSD mDiff	34-ID-1s	34-ID-1s	34-ID-1s
XSD mFluor	9-ID-1	2-ID-1	9-ID-1

NB: It is desirable for HSI to move from 32-ID