The future of QSO at CFHT

Optimizing the night time.

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Télescope Canada-France-Hawaii
Subaru Users Meeting FY2013
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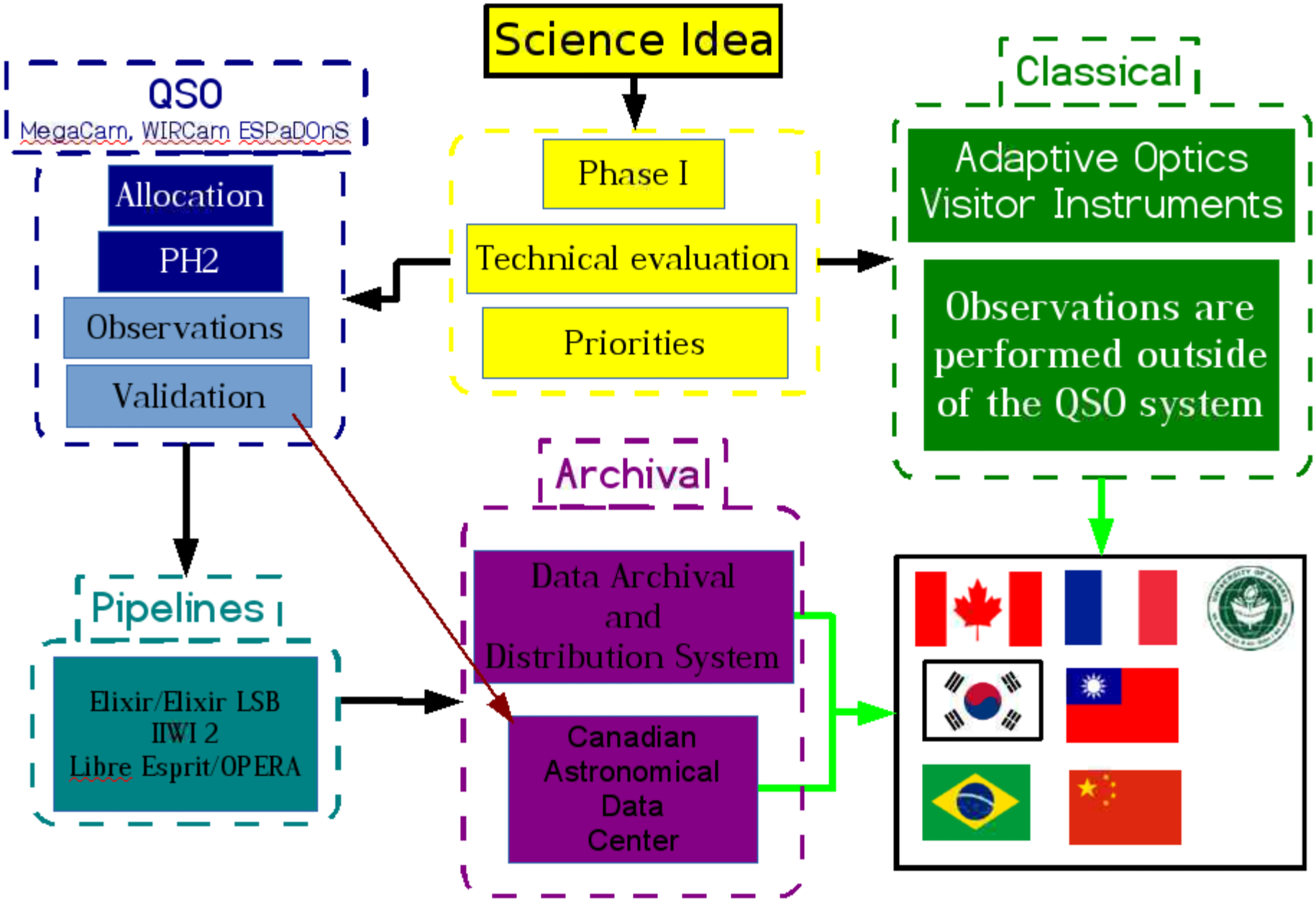
NAOJ Mitaka Campus, Japan

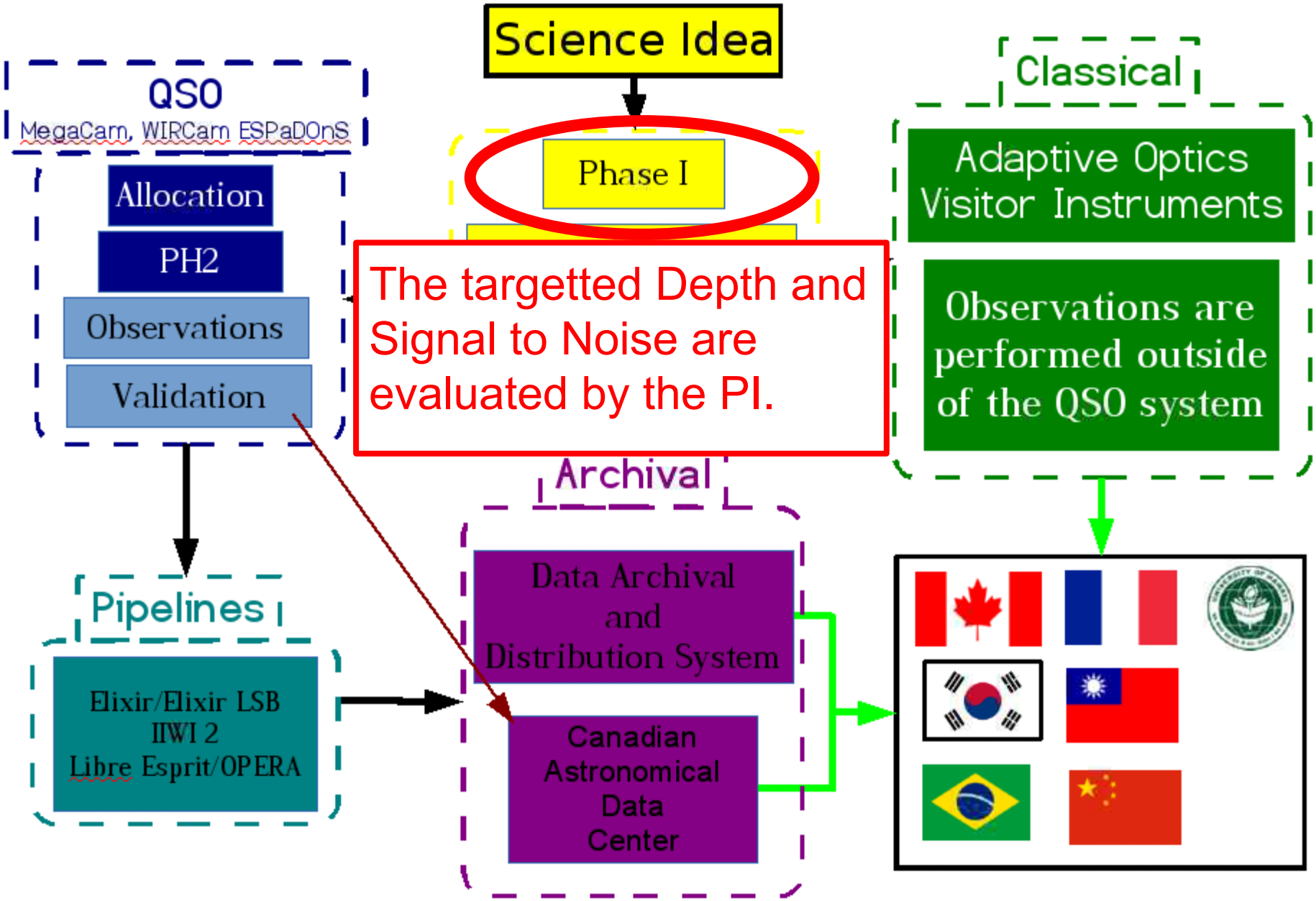
The current QSO.

How we plan to improve it.

The Science Operations at CFHT



The Science Operations at CFHT



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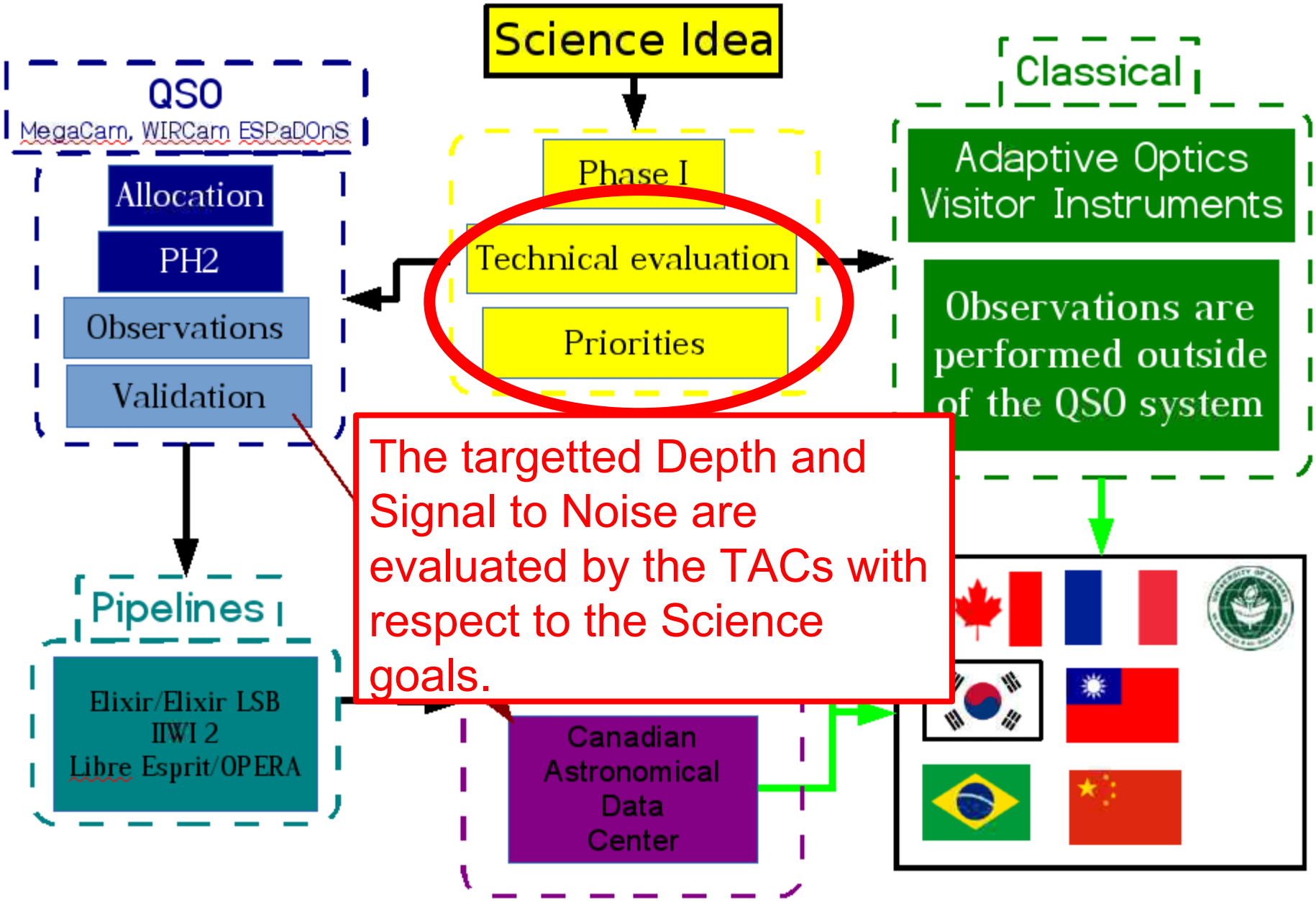

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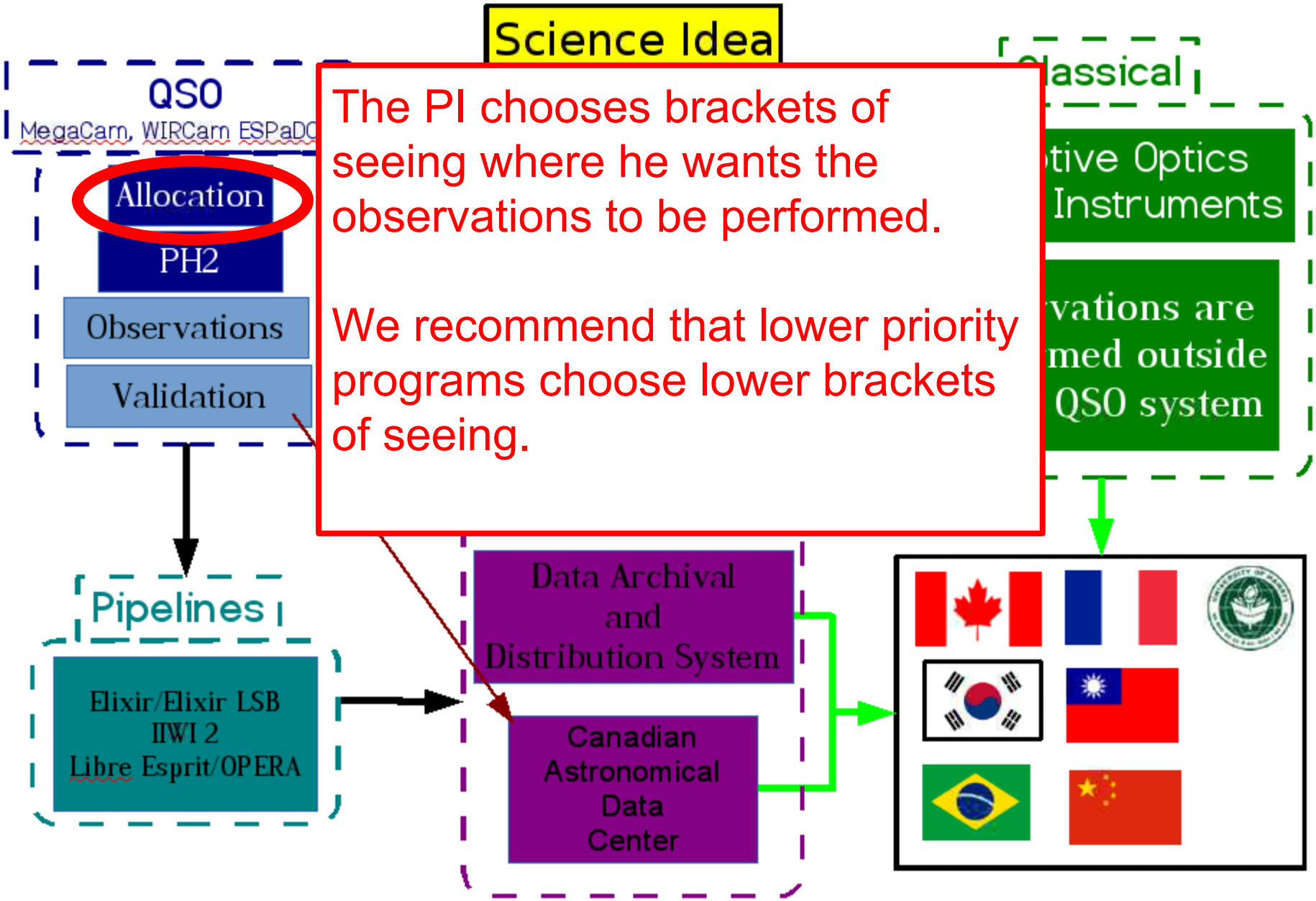

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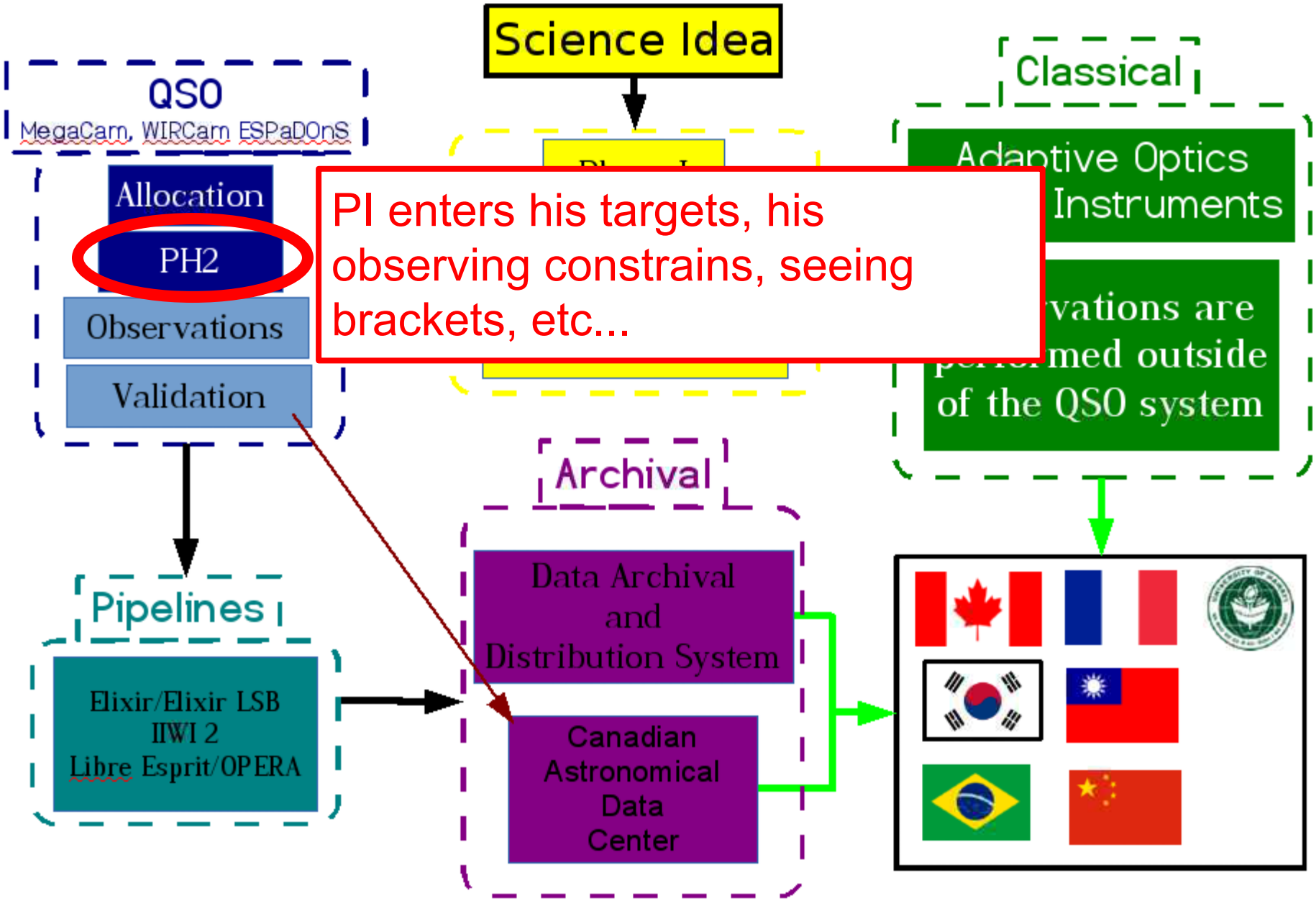

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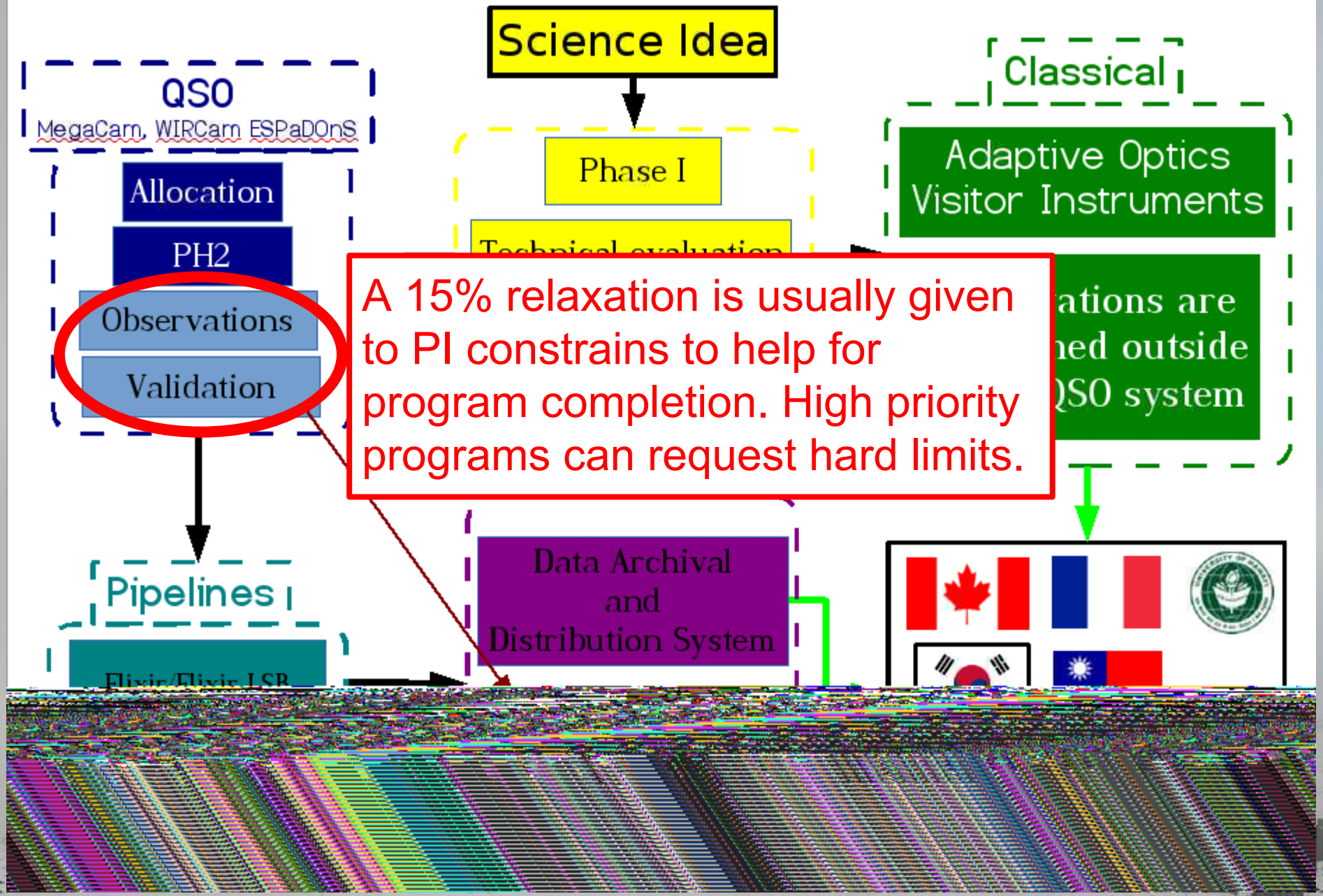

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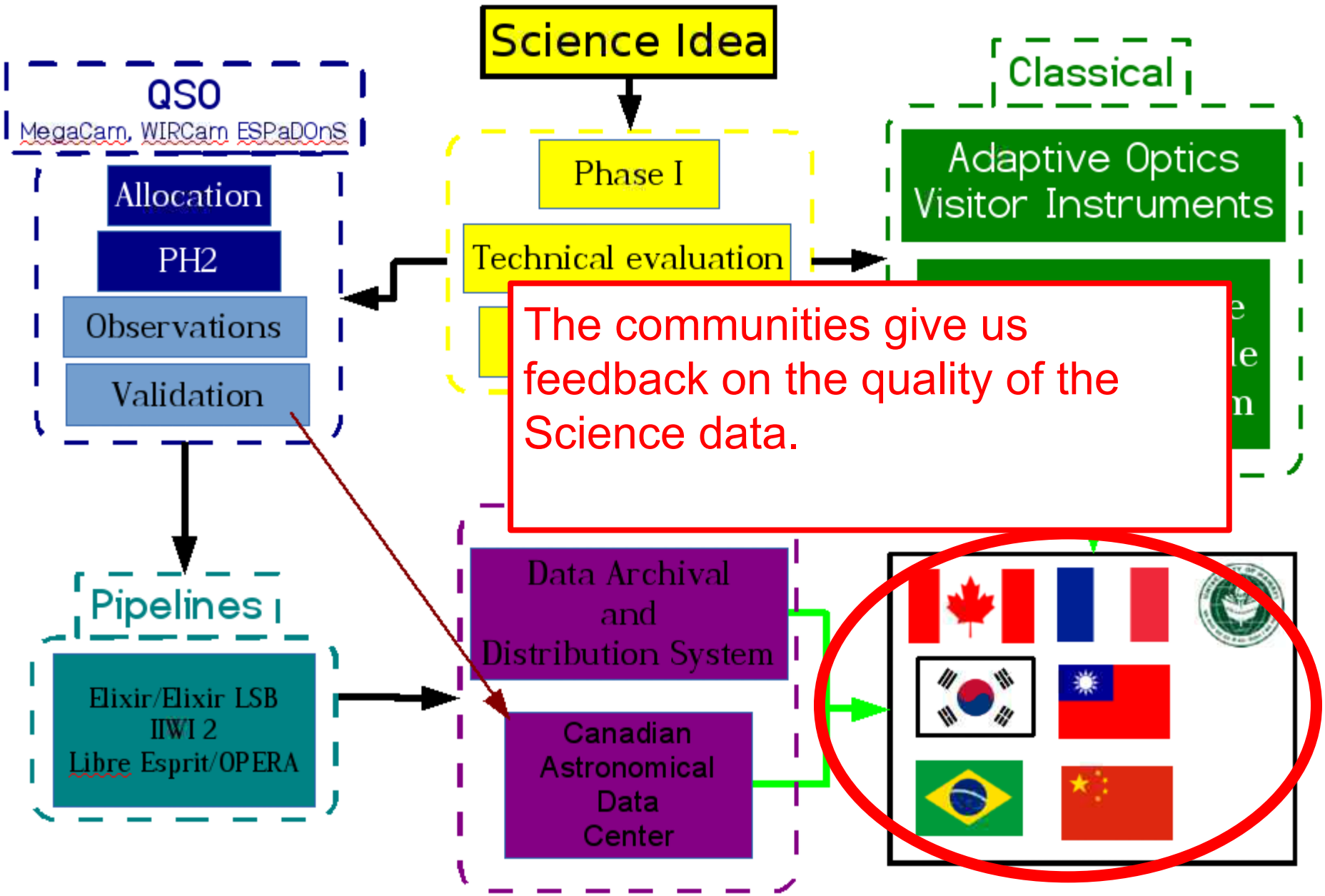
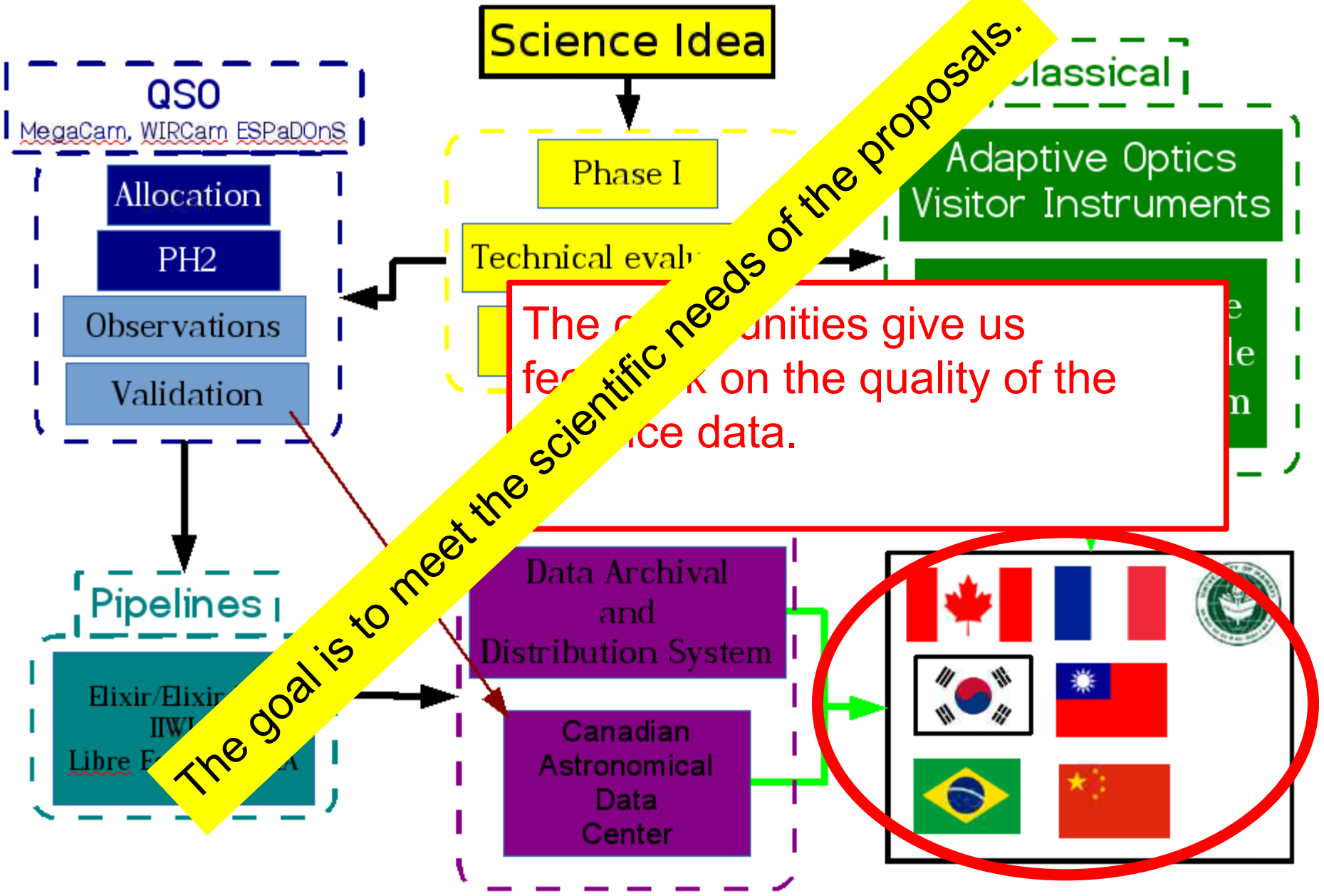


The Science Operations at CFHT



The planned improvements

SNR QSO Merge PH1 and PH2 Assisted Observing

The planned improvements

SNR QSO

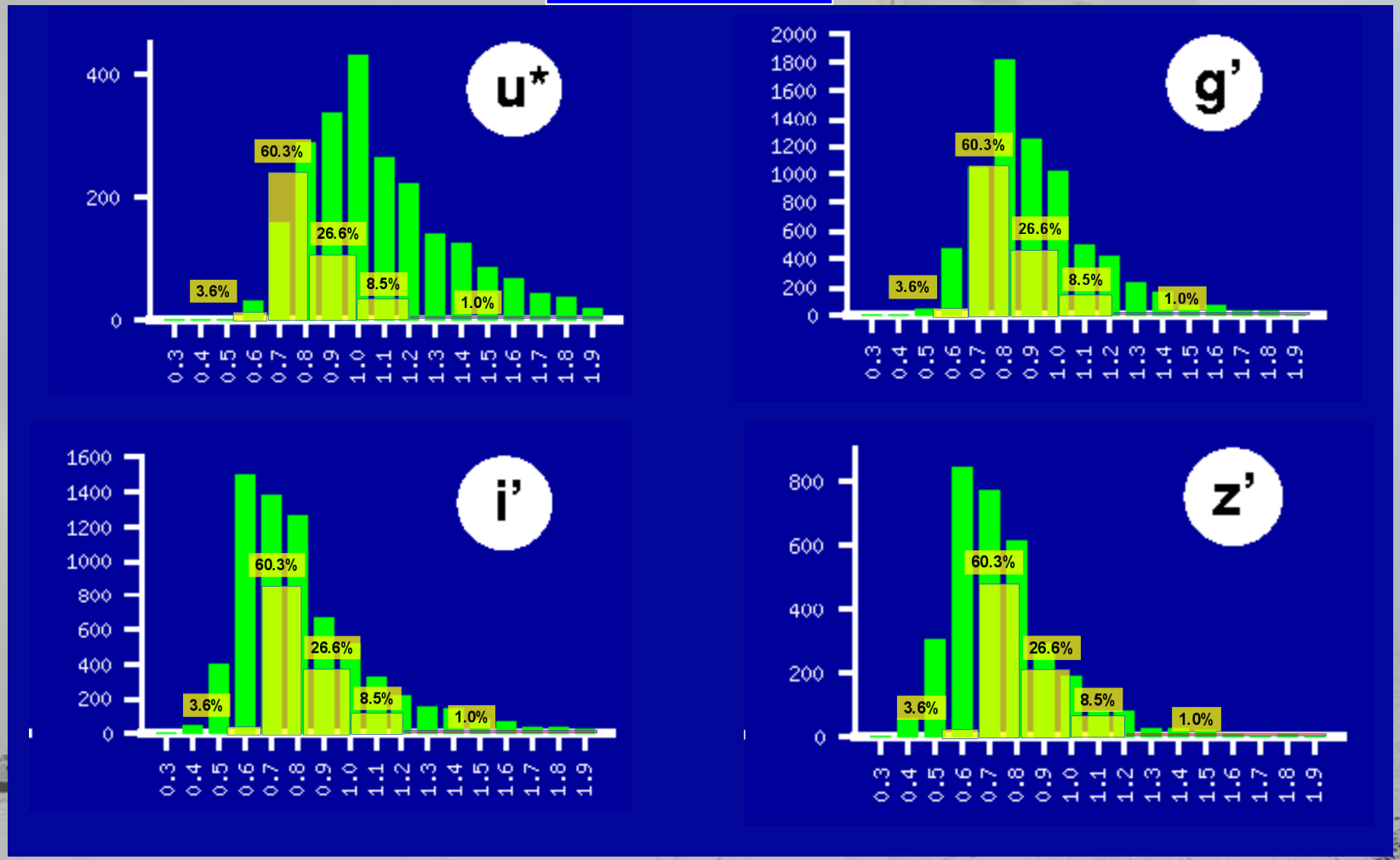
Optimize the integration time.
Integrate until the depth required by the science program is reached.

The principle is simple:
One magnitude,
One Signal to Noise Ratio
for one instrument configuration.

The planned improvements

SNR QSO

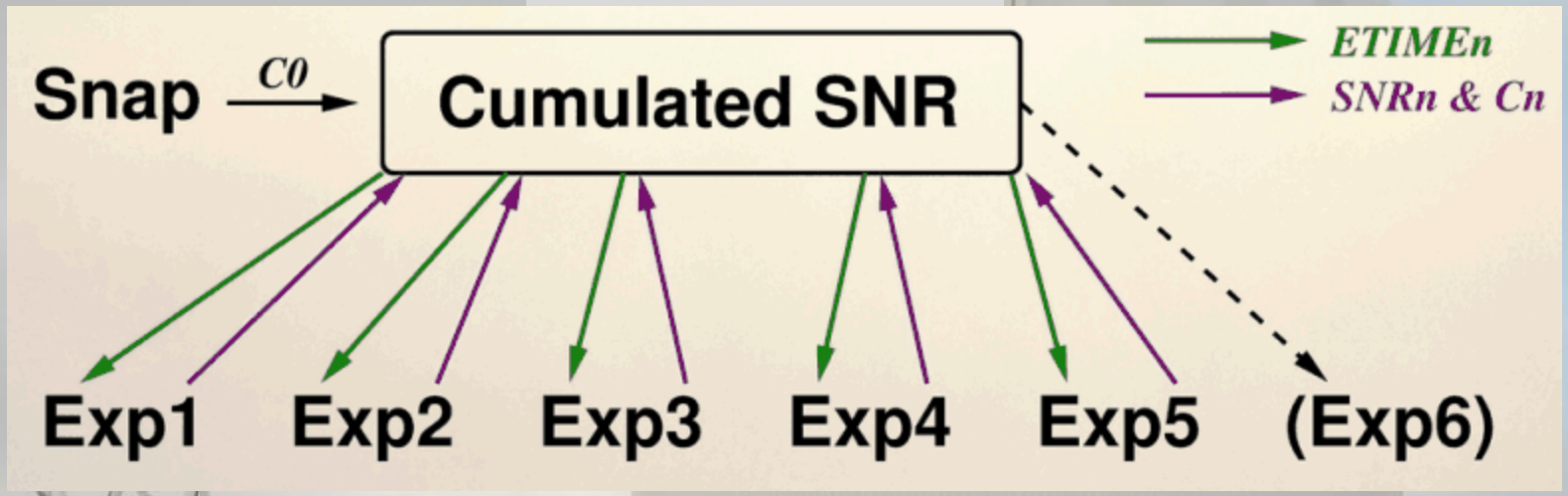
Motivation



The planned improvements

SNR QSO

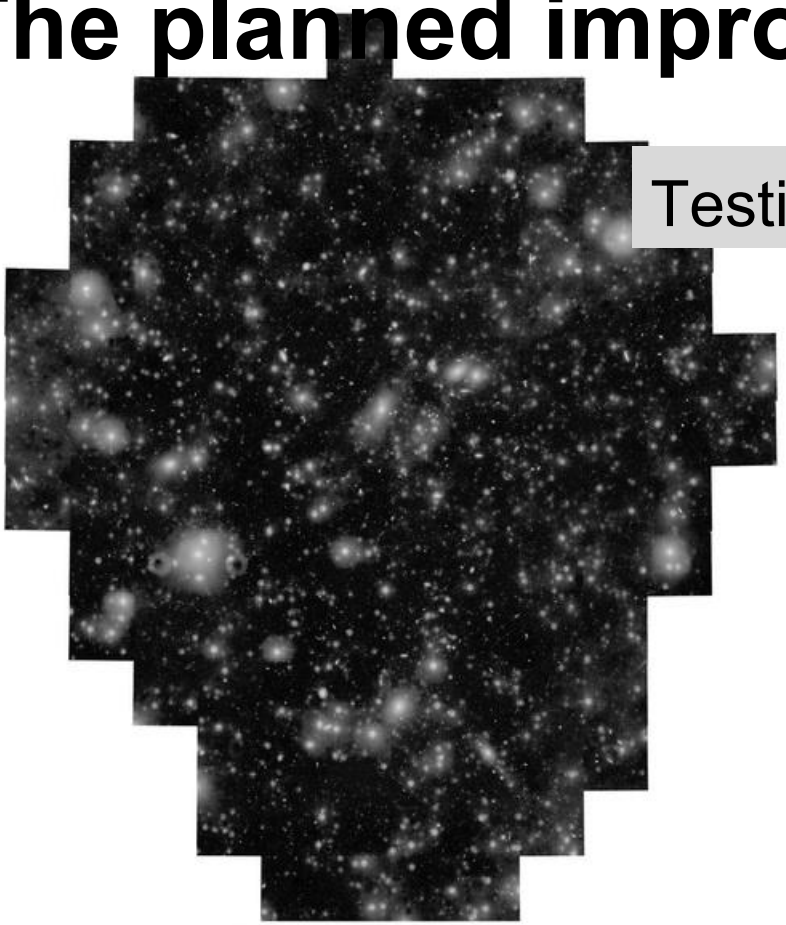
Implementation



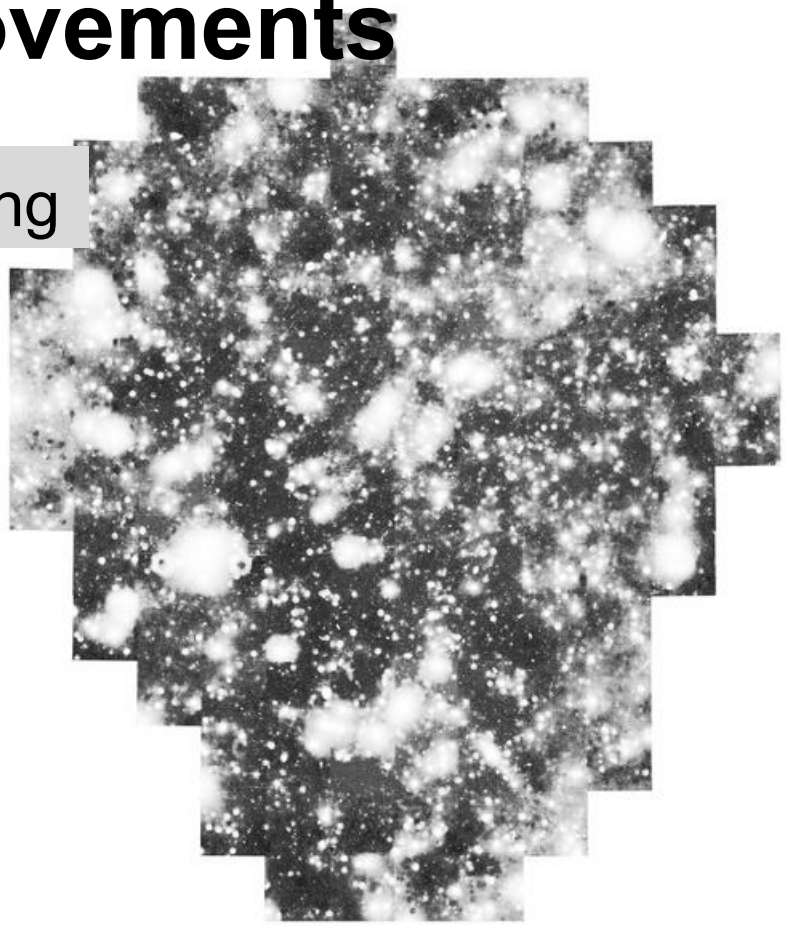
The planned improvements

S

Testing



Completed 104 sq. deg. mosaic in MegaCam g'–band
Image quality: 0.8'', 53 mn integration per 0.187'' pixel
Point source detection at SNR=5: g'=26.2



Completed 104 sq. deg. mosaic in MegaCam g'–band
Elixir–LSB mosaic of 117 MegaCam pointings (103 hr. int.)
Surface brightness detection limit: g'=28.5 mag. per sq.arcsec.

NGVS

The Next Generation Virgo Cluster Survey

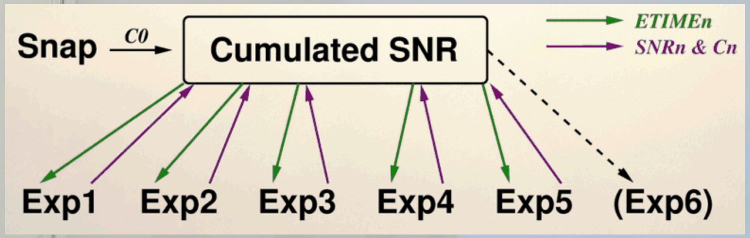
The survey is designed for point source and low surface brightness sciences

CFH

The planned improvements

SNR QSO

Testing

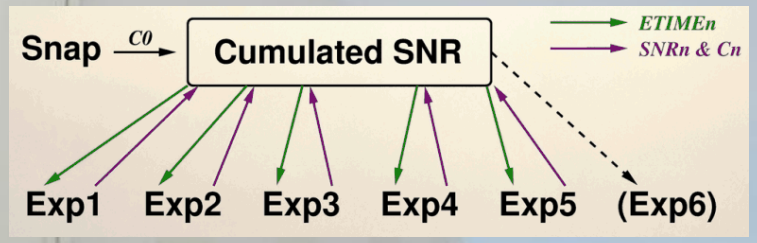


OG3 OB82 filter u depth 26.20 max iq 0.80	G12-u NGVS+0+6 NGVS_LDP11	nexp 11 min 9 curr 0	**req 5.00** **curr 0.00**	NOT STARTED	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582		
OG3 OB83 filter u depth 26.20 max iq 0.80	G12-u NGVS-3+5 NGVS_LDP11	nexp 11 min 9 curr 0	**req 5.00** **curr 0.00**	NOT STARTED	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582	SQ1, SQ2, SQ3 snr 1.67 et 700/6705 et0 582		

The planned improvements

SNR QSO

Testing

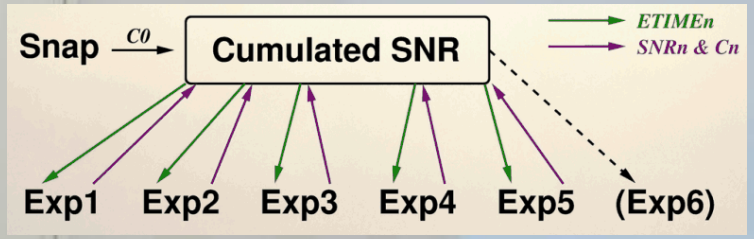


OG3 OB82 filter u depth 26.20 max iq 0.80	G12-u NGVS+0+6 NGVS_LDP11	nexp 11 min 9 curr 0	req 5.00 curr 0.00
OG3 OB83 filter u depth 26.20 max iq 0.80	G12-u NGVS-3+5 NGVS_LDP11	nexp 11 min 9 curr 0	req 5.00 curr 0.00

The planned improvements

SNR QSO

Testing



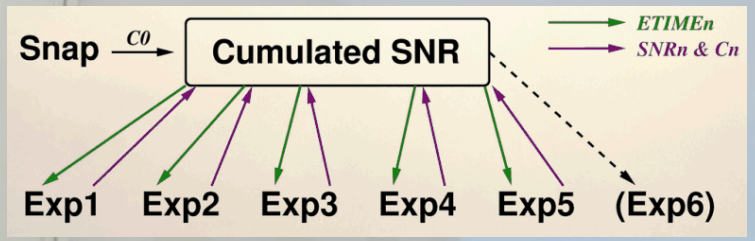
OG3 OB82 filter u depth 26.20 max iq 0.80	G12-u NGVS+0+6 NGVS_LDP11	nexp 11 min 9 curr 0	req 5.00 curr 0.00
OG3 OB83 filter u depth 26.20 max iq 0.80	G12-u NGVS-3+5 NGVS_LDP11	nexp 11 min 9 curr 0	req 5.00 curr 0.00

SQ1, SQ2, SQ3		
snr	1.67	
et	700/6705	
et0	582	

The planned improvements

SNR QSO

Testing

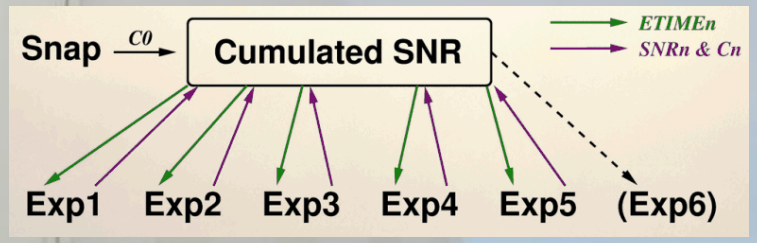


OG1 OB60 filter u depth 26.20 max iq 0.80	G6-u NGVS-4-3 NGVS_LDP11	nexp 11 min 9 curr 3	**req 5.00** **curr 2.97**	IN PROGRESS	1616672 **snr 1.40** iq 0.76 sky 0.48 atm 98.00 et 582	1616679 **snr 2.00** iq 0.62 sky 0.40 atm 98.49 et 582	1616885 **snr 1.70** iq 0.72 sky 0.38 atm 97.32 et 582	SQ1, SQ2, SQ3 snr 1.64 et 700/6497 et0 582	SQ1, SQ2, SQ3 snr 1.64 et 700/6497 et0 582
OG1 OB61 filter u depth 26.20 max iq 0.80	G6-u NGVS-4-4 NGVS_LDP11	nexp 11 min 9 curr 3	**req 5.00** **curr 3.03**	IN PROGRESS	1616673 **snr 1.40** iq 0.80 sky 0.47 atm 100.00 et 582	1616680 **snr 2.00** iq 0.63 sky 0.39 atm 99.86 et 582	1616886 **snr 1.80** iq 0.70 sky 0.38 atm 98.45 et 582	SQ1, SQ2, SQ3 snr 1.62 et 700/6357 et0 582	SQ1, SQ2, SQ3 snr 1.62 et 700/6357 et0 582

The planned improvements

SNR QSO

Testing

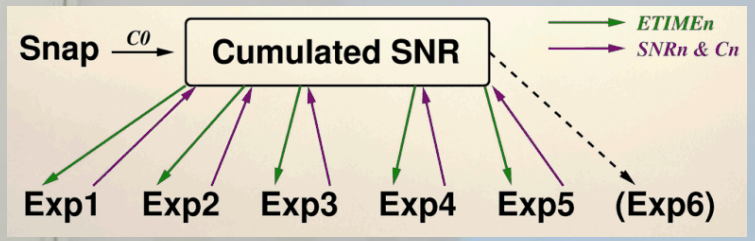


OG5 OB439					1617817		1617824		1617870		1617877		
filter r	G3-r5	nexp 11	req 5.00	RECOMMEND OB VALIDATION	snr	2.00	snr	2.40	snr	2.60	snr	3.10	OB HAS REACHED SNR GOAL.
depth 25.20	NGVS+3+0	min 4	curr 5.11		iq	0.85	iq	0.56	iq	0.48	iq	0.54	
max iq 1.00	NGVS_LDP11	curr 4			sky	4.20	sky	3.77	sky	5.68	sky	4.90	
					atm	96.03	atm	95.81	atm	96.25	atm	97.23	
					et	457	et	302	et	414	et	571	

The planned improvements

SNR QSO

Testing



OG5	OB439
filter	r
depth	25.20
max	1.00
iq	

req	5.00
curr	5.11

1617824	
snr	2.40
iq	0.56
sky	3.77
atm	95.81
et	302

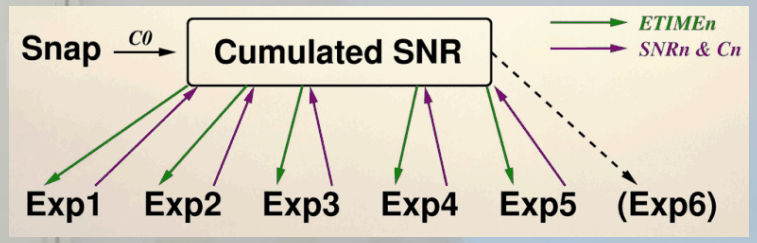
1617870	
snr	2.60
iq	0.48
sky	5.68
atm	96.25
et	414

1617877	
snr	3.10
iq	0.54
sky	4.90
atm	97.23
et	571

OB HAS REACHED SNR GOAL.

The planned improvements

SNR QSO



Results

	Field1	Field2	Field3	Field4	Field5	Field6	Field7
Seeing (avg)	0.53	0.58	0.57	0.51	0.56	0.62	0.51
Background (avg)	7.9	7.8	7.6	8.2	7.4	8.0	8.7
Exp. time (total)	1458	1827	1744	1497	1544	1753	1554
Cumulated SNR	5.0	5.2	5.2	5.1	5.0	4.6	5.2

Allocated time was 3400s to reach SNR 5 at 25.20 u' mag.

The test was successfull. The desired SNR and Depth were reached in half the allocated time.

The planned improvements

SNR QSO

Merge PH1 and PH2 Assisted Observing

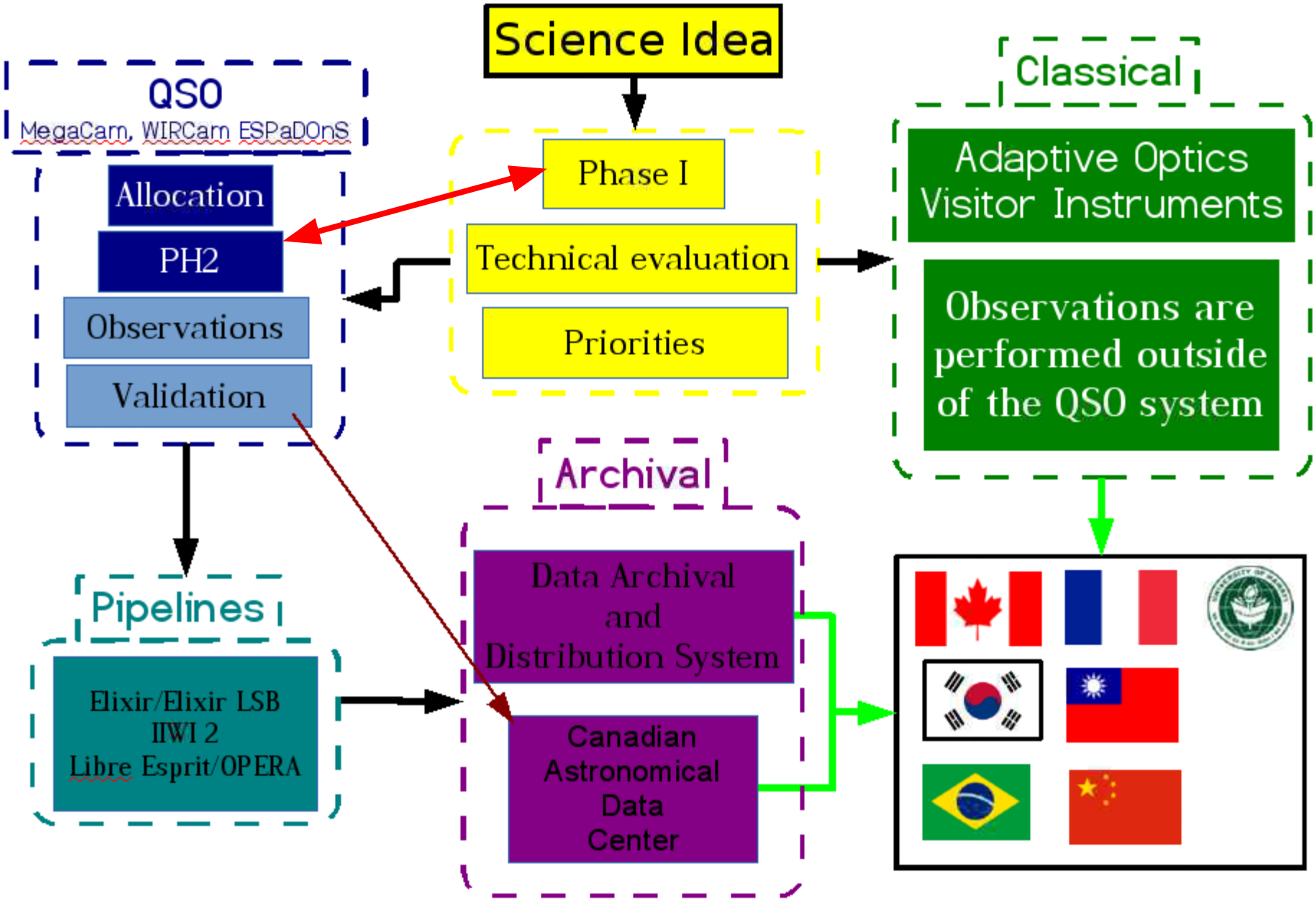
Of course, this successful test is not the whole story...

	Median	Best IQ	Poor IQ	Grey sky	Cirrus
Seeing (")	0.8	0.5	1.0	0.8	0.8
Background (e–/sec)	3.3	3.3	3.3	6.6	3.3
Atm. transmission (%)	100	100	100	100	85
Exp. time (total)	1620	659	2523	3212	2236
Exp. time scaling	0%	–60%	+55%	+100%	+40%

The planned improvements

Merge PH1 and PH2

The Science Operations at CFHT



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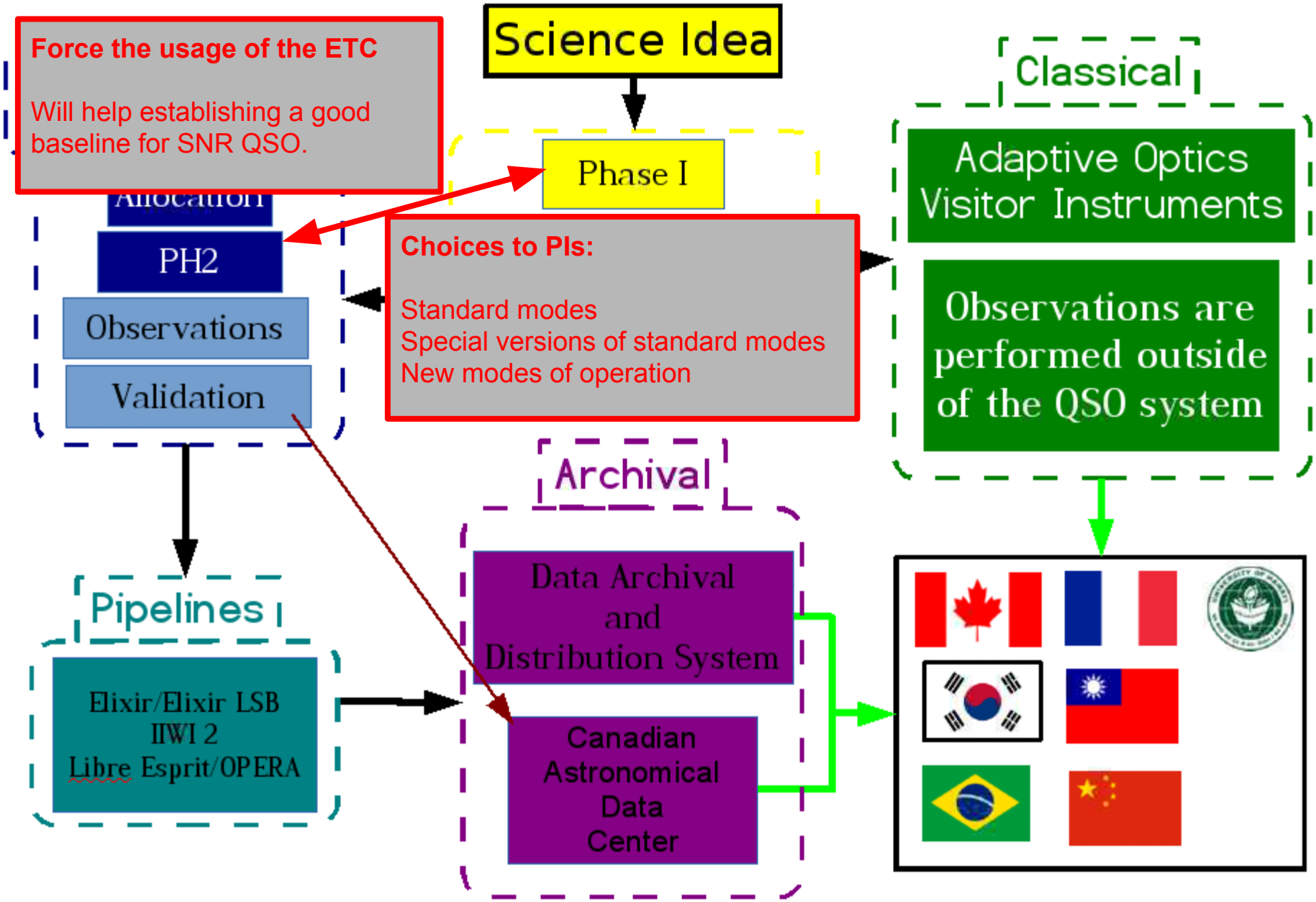

The Science Operations at CFHT

Force the usage of the ETC

Will help establishing a good baseline for SNR QSO.

Science Idea

Phase I

Allocation

PH2

Observations

Validation

Choices to PIs:

Standard modes
Special versions of standard modes
New modes of operation

Classical

Adaptive Optics
Visitor Instruments

Observations are performed outside of the QSO system

Archival

Pipelines

Elixir/Elixir LSB
IIWI 2
Libre Esprit/OPERA

Center

These changes will minimize mistakes and streamline the process of data input for science observing.

But the flexibility will keep the push for inovation and new science capabilities.

The planned improvements

Assisted Observing

Present a choice to the observer of the possible programs to execute depending on weather.

Optimizes the observing strategy for each run and for the semester.

Upcoming for CFHT's ScOps

A first gradual implementation of the SNR mode will be starting in 2014A. Programs will be selected in concert with the PIs.

The vents are integrated into Remote operations and will start to be used in the course of 2014A.

LSB mode will be officially offered in 2014B