



Source: C. Benton

Monitoring Program Development

1. Background/assumptions
2. Monitoring Program Development: proposed approach
 - a. 3 year plan
 - b. Year 1
3. Feedback

David Senn, Emily Novick, Anthony Malkassian
February 4, 2014



Goal: Feedback on discussion topics

Discussion Topics/Questions

- Highest priority experimental studies to inform monitoring?
- Highest priority data analysis to inform monitoring?
- Approach to program development

Nutrient science/management questions

- Increasing biomass ← does trajectory indicate future impacts?
- Phytoplankton composition, toxins ← Caused by nutrients?
- Low DO in margin habitats, impacts ← Anthropogenic nutrients?
- Future adverse impacts ← Current loads + future scenarios
- How do various nutrient sources contribute to ambient concentrations (space, time) Bay?
- What load reductions will mitigate or prevent impairment?

Monitoring Program Background

1. Need for a sustainably-funded, regulatory-driven nutrient monitoring program

1. Declining support (\$) for USGS science program

1. Future monitoring program will
 - a. include/build around current USGS program + other efforts
 - b. regulatory-driven approach will have different requirements

1. Program should be an optimal blend blend of ship-based measurements, moored sensors, and other methods (e.g., AUVs, remote sensing)

Monitoring Program Background

5. Broad goals of program:

- a. Assess current conditions (impaired? yes or no)
- b. Track status and trends
- c. Data for model calibration (physical, chemical, biological)

5. Want/need to take advantage of cooperative/collaborative efforts

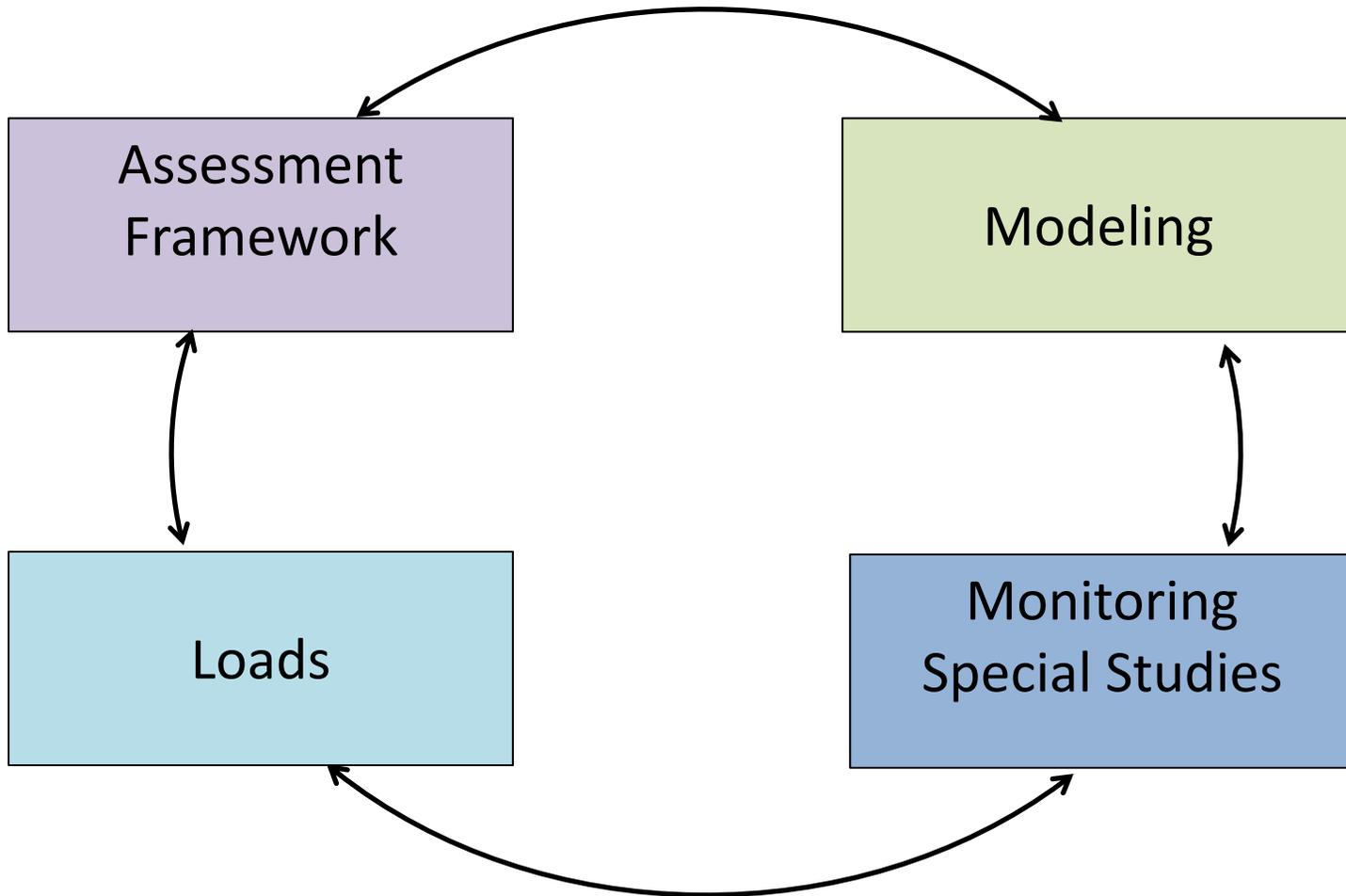
- a. USGS-Menlo Park
- b. USGS-Sac (moored sensors)
- c. IEP/DWR (both discrete and moored programs)
- d. other institutions (e.g., RTC)

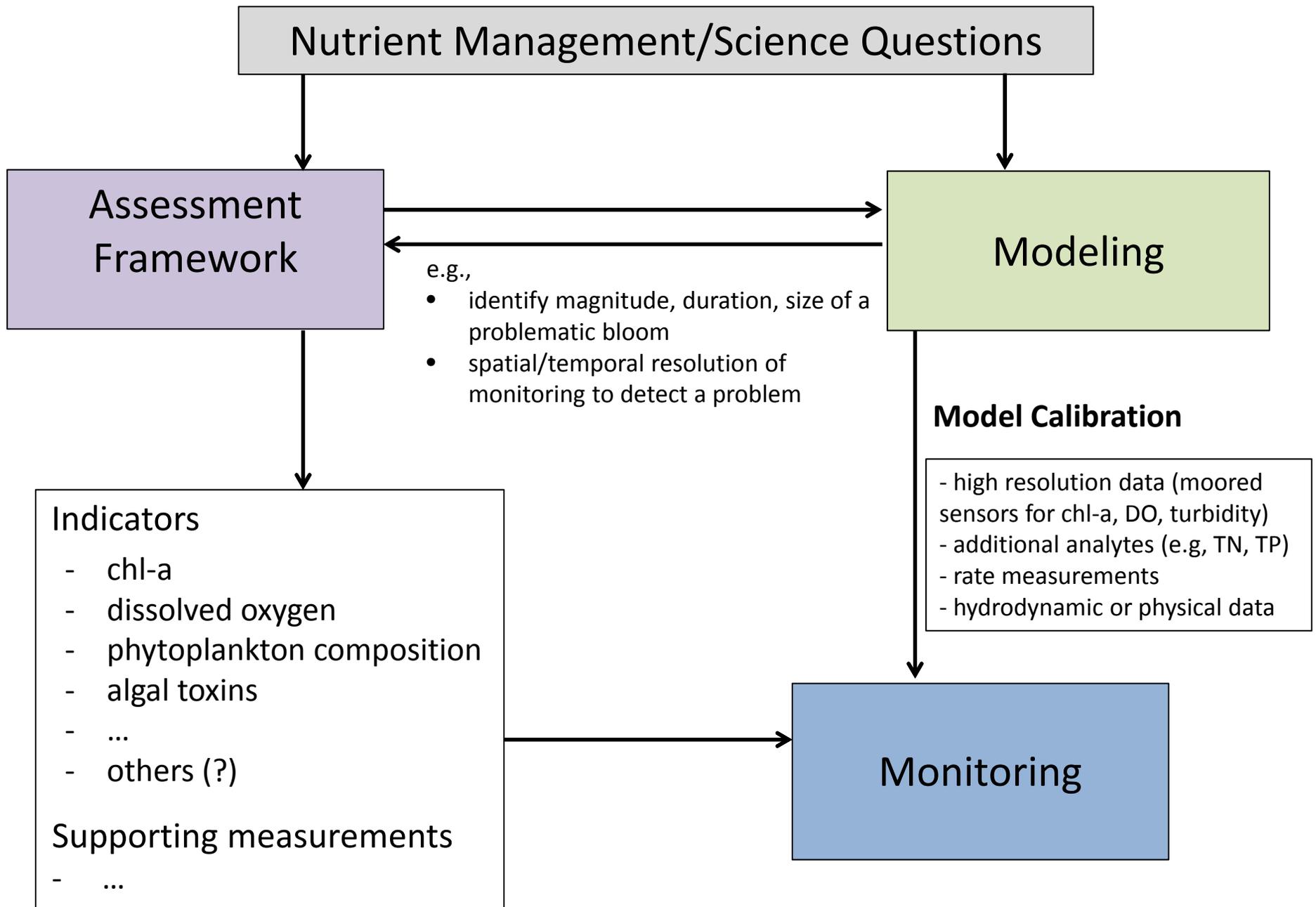
5. Need for a research vessel

- a. Polaris aging, USGS may not continue supporting
- b. need to carry out work on shoals/shallows

What will shape Monitoring Program?

Nutrient Science Program

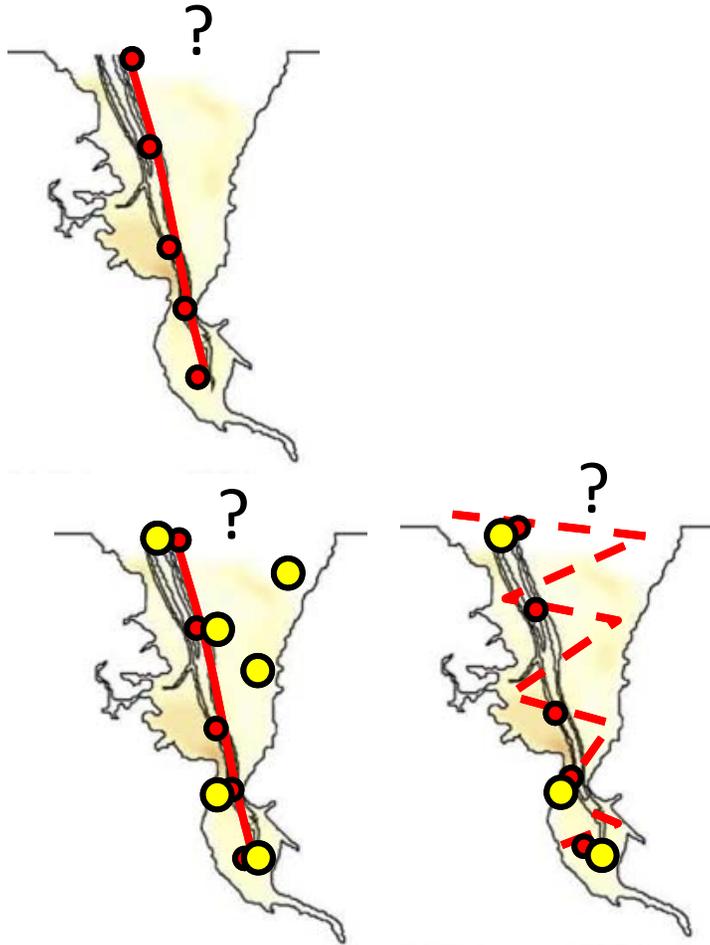




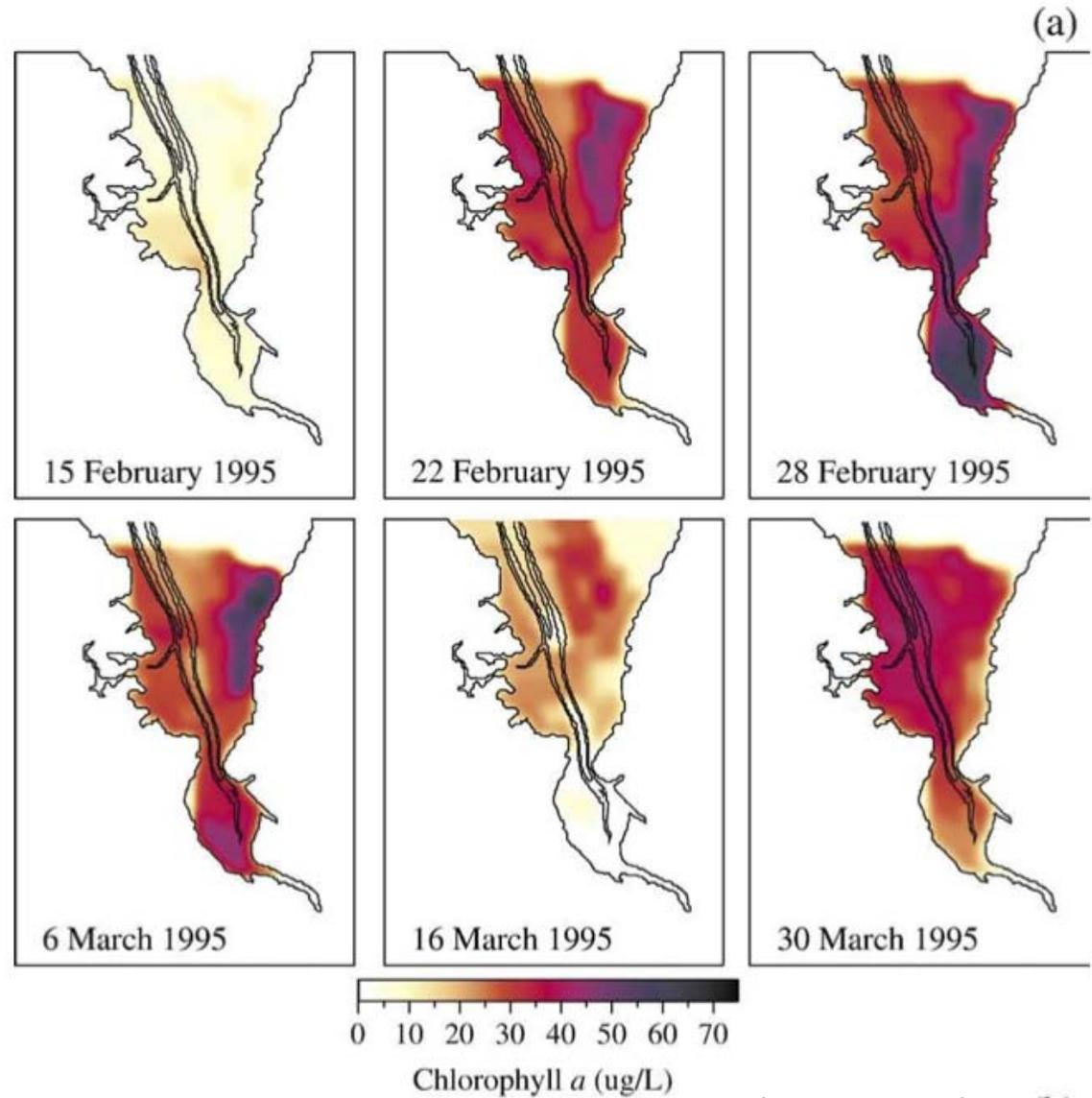
What monitoring is needed to detect this?

Either for...

- compliance
- model calibration

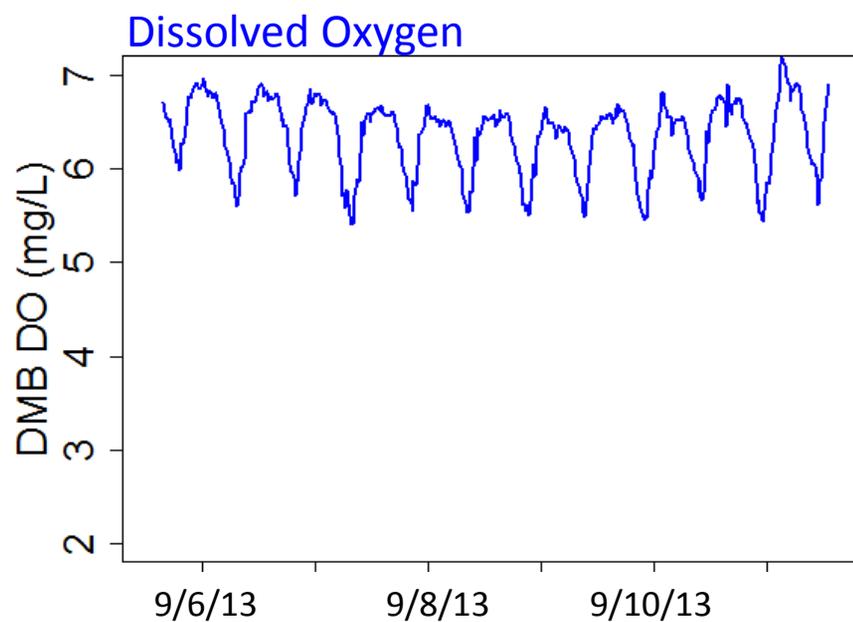
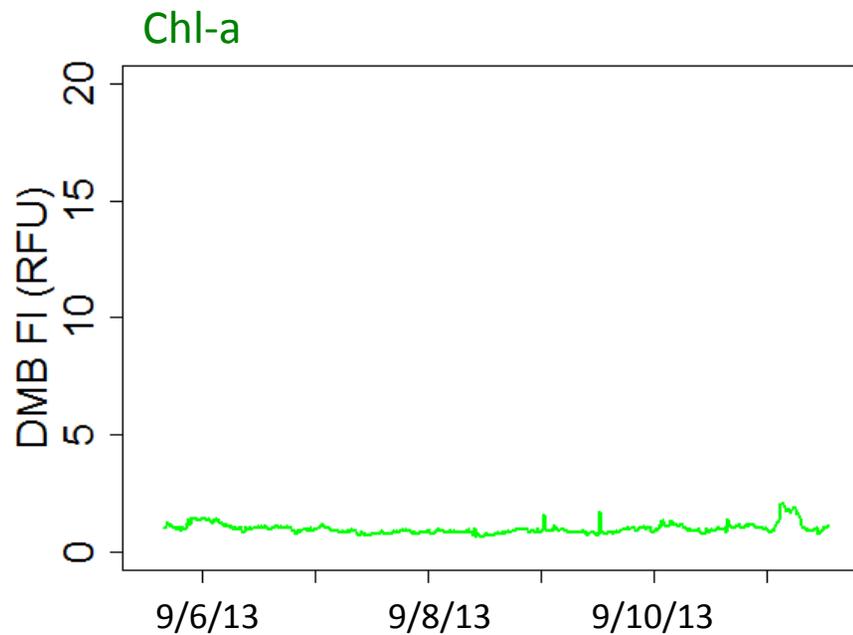


- Long-term USGS cruises/stations
- Moorings, continuous sensors

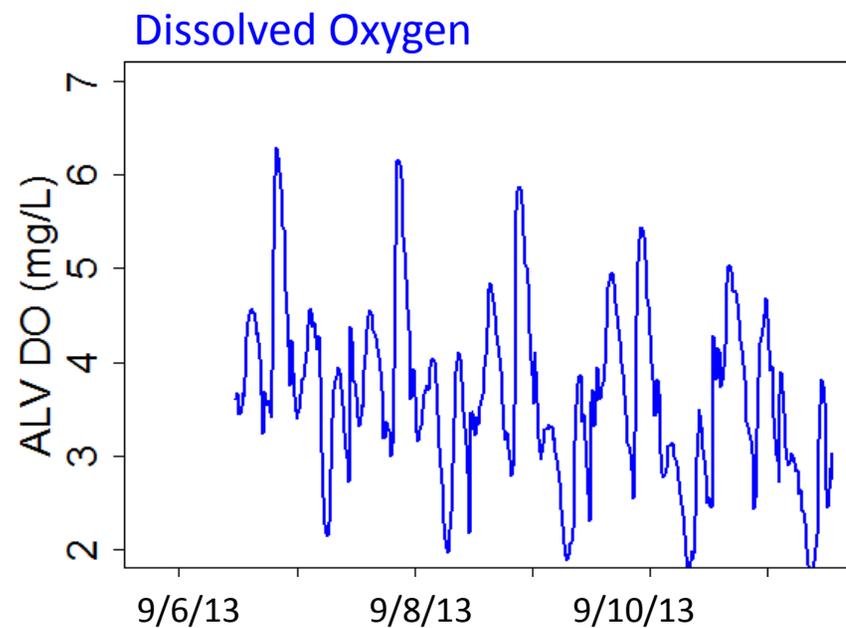
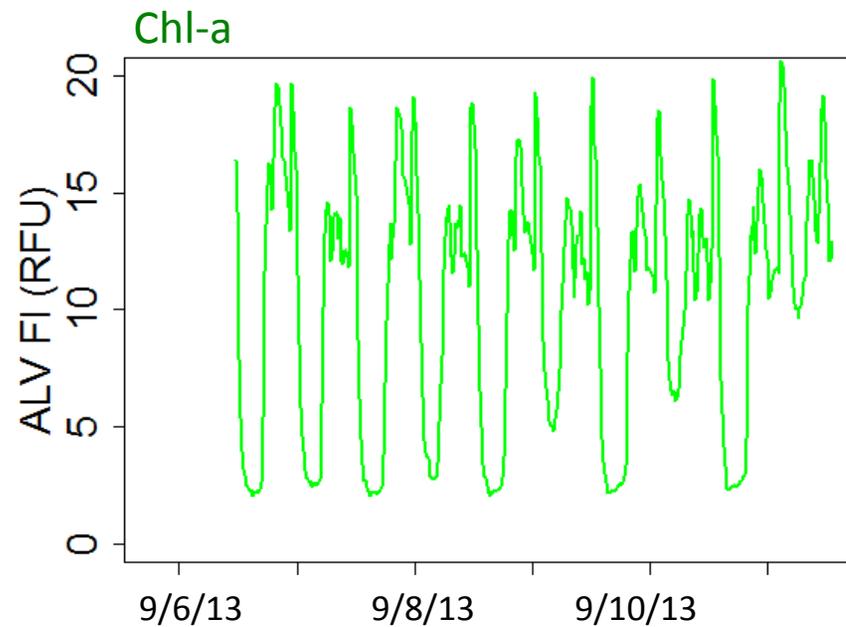


Thompson et al., 2008

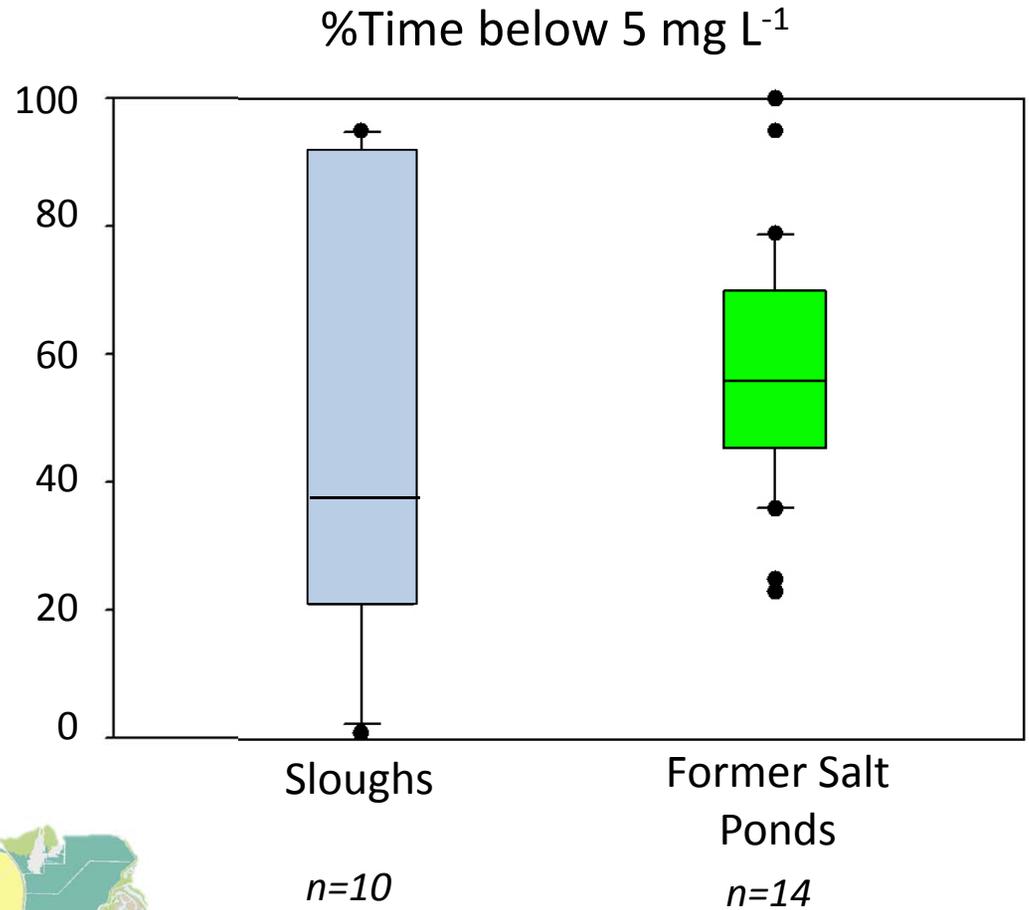
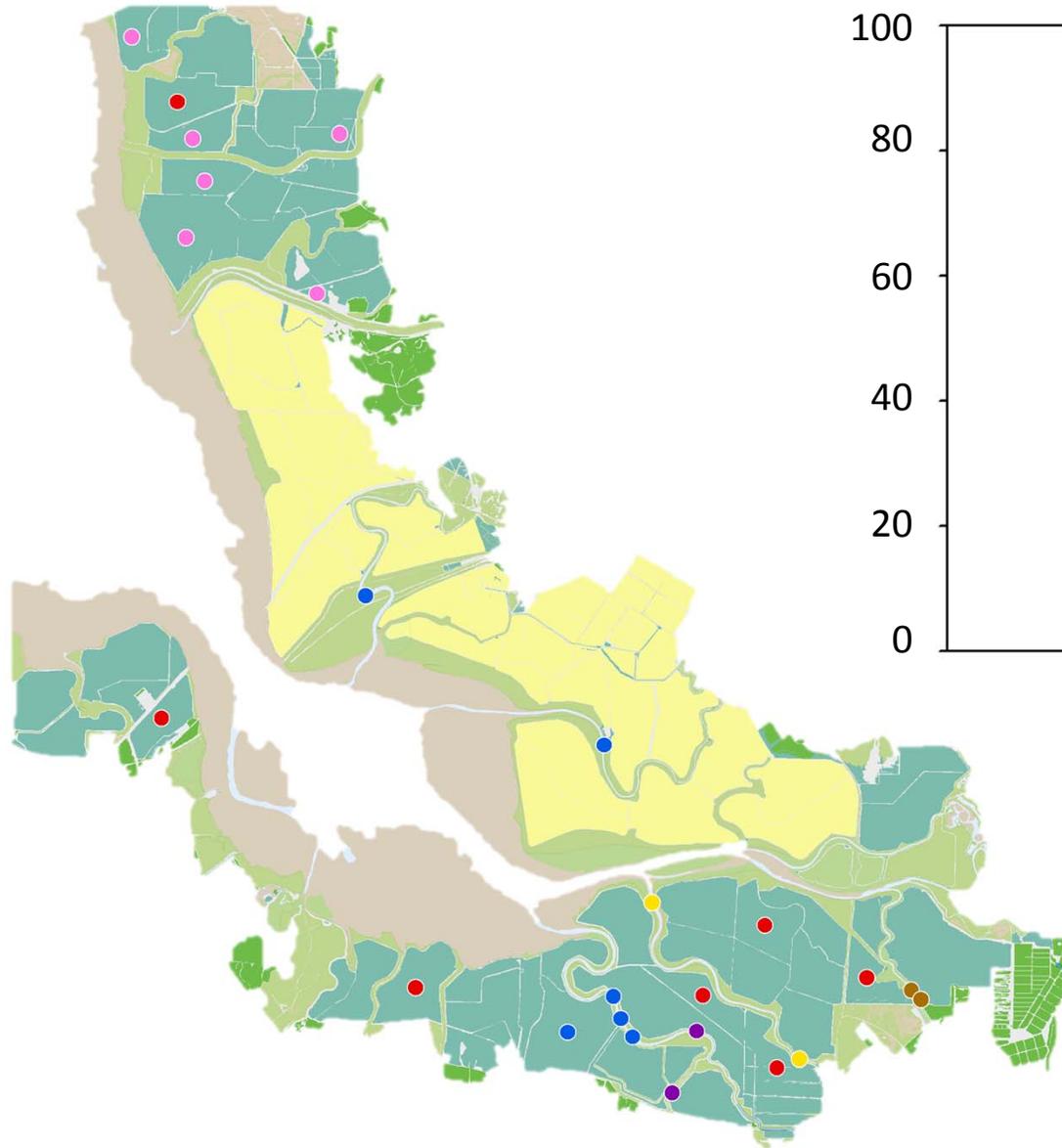
Dumbarton



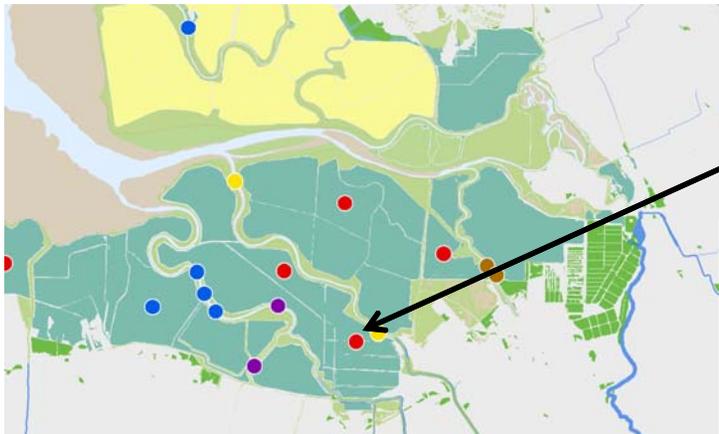
Alviso Slough



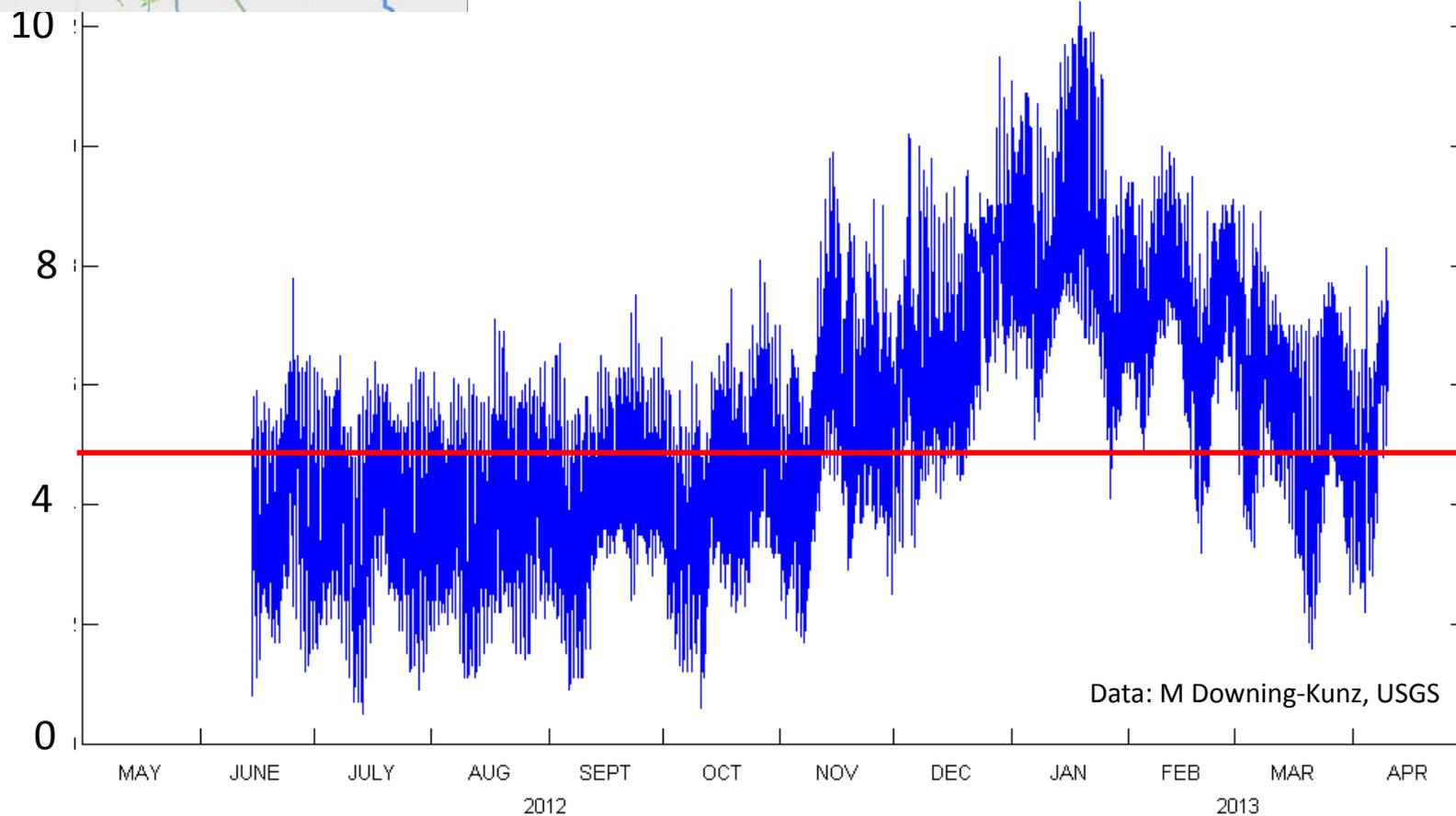
DO in Sloughs and Former Salt Ponds (data = 2004-2012)



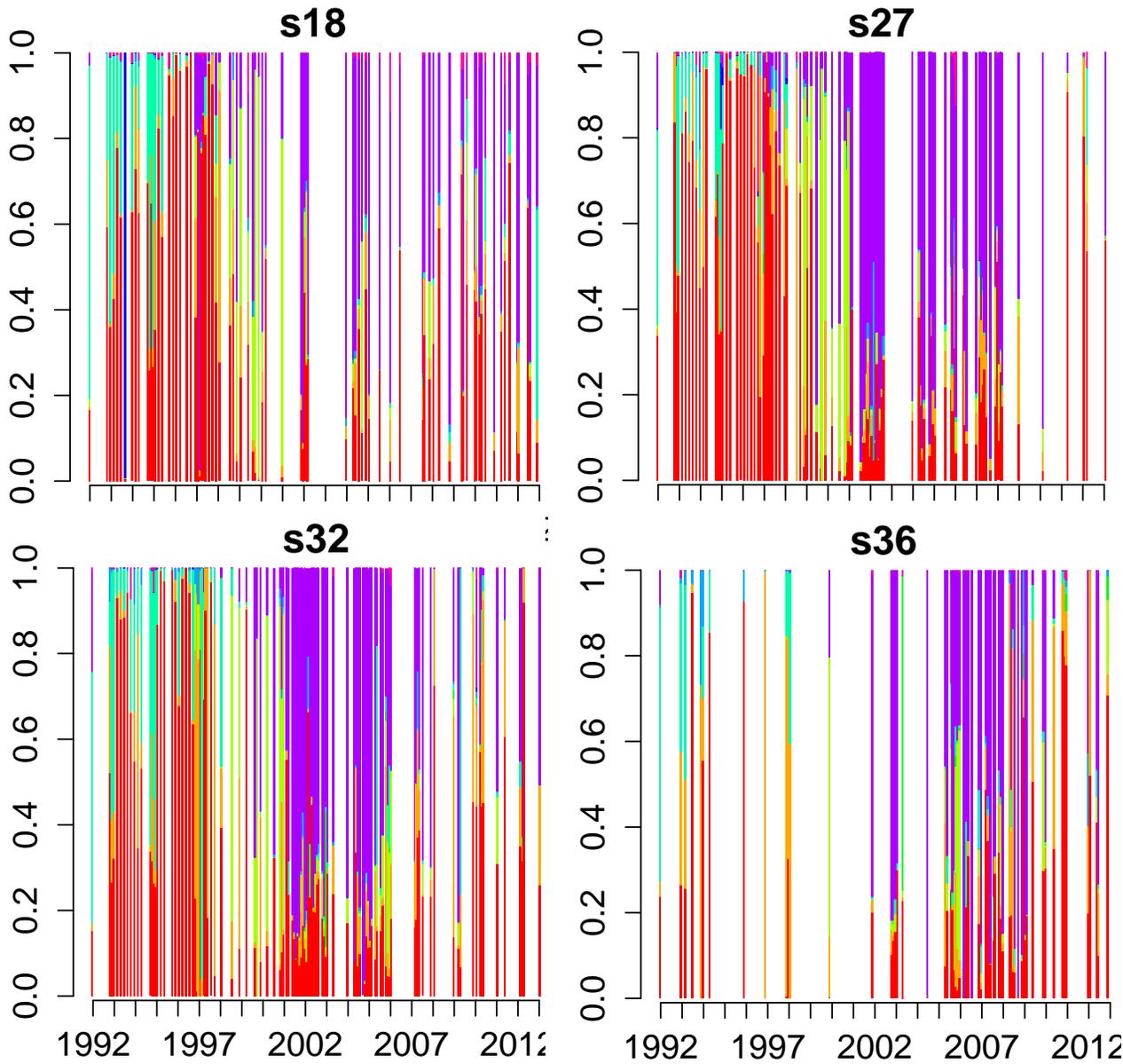
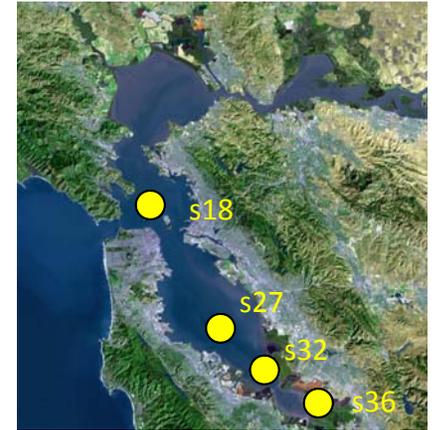
SFEI (2013)



Alviso Slough: June 2012 – April 2013



Phytoplankton composition in South Bay and Lower South Bay



Cell counts (%total)

- Cyanobacteria
- Green Algae
- Other Flagellates
- Euglenoids
- Dinoflagellates
- Cryptomonads
- Pennate Diatoms
- Centric Diatoms

Data: USGS

Nutrient Management/Science Questions

Assessment Framework

Modeling

- e.g.,
- identify magnitude, duration, size of a problematic bloom
 - spatial/temporal resolution of monitoring to detect a problem

Indicators

- chl-a
- dissolved oxygen
- phytoplankton composition
- algal toxins
- ...
- others (?)

Supporting measurements

- ...

Model Calibration

- high resolution data (moored sensors for chl-a, DO, turbidity)
- additional analytes (e.g. TN, TP)
- rate measurements
- hydrodynamic or physical data

Monitoring

Monitoring Planning Needs

Habitats

- Deep subtidal
- Shoals
- margins

Approach

- Ship-based
- Moorings, AUVs

Compartments

- Sediments
 - Biota
 - chemistry/process
- Water column
 - Basic chemistry
 - Other chemistry, processes, toxins
 - Phytoplankton biomass, composition
 - Other biota

What to measure

- Analytes/processes
- Approach(es)

Organizational/Institutional

- Funding, partnerships, logistics

2014

2015

2016

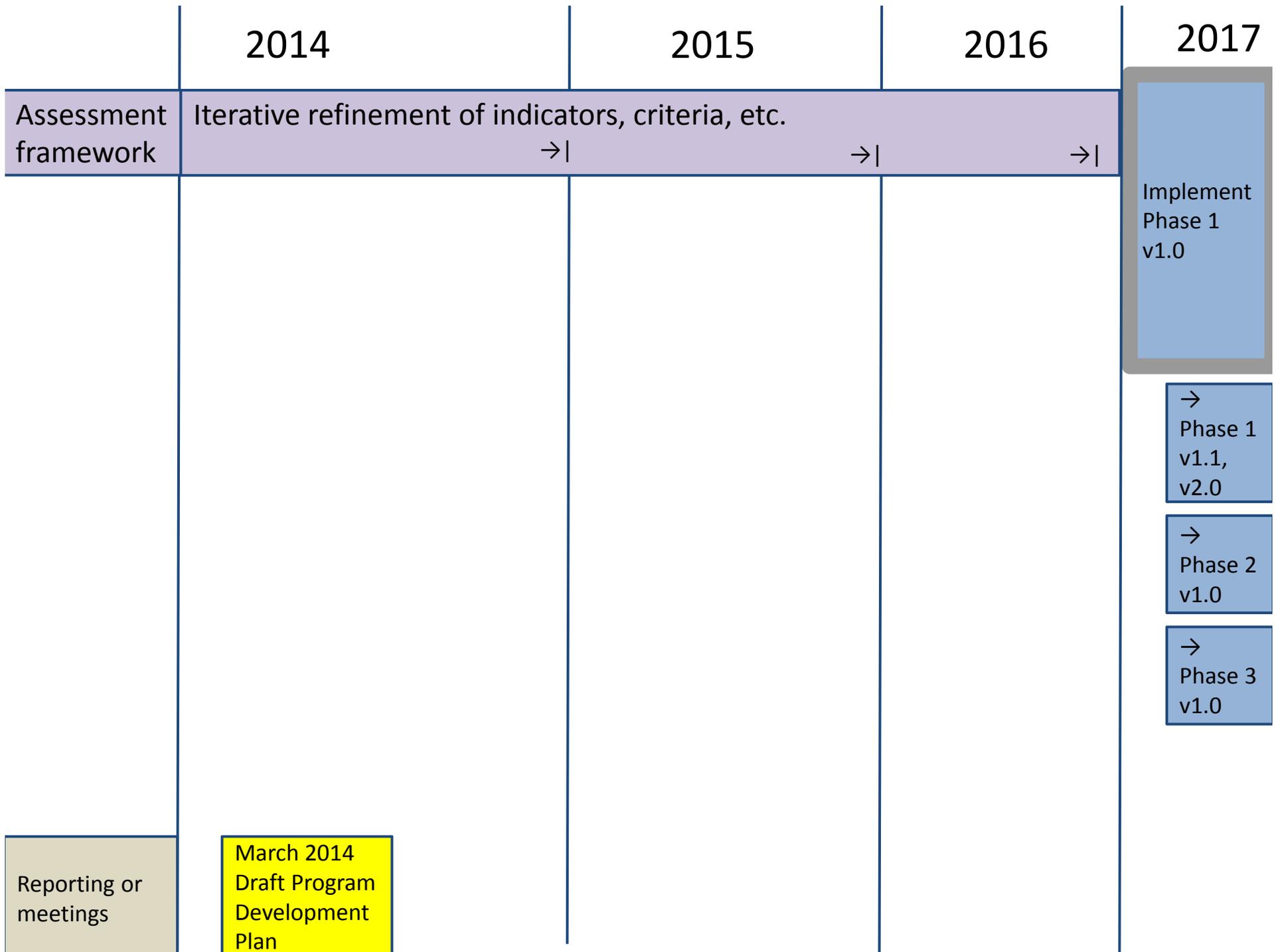
2017

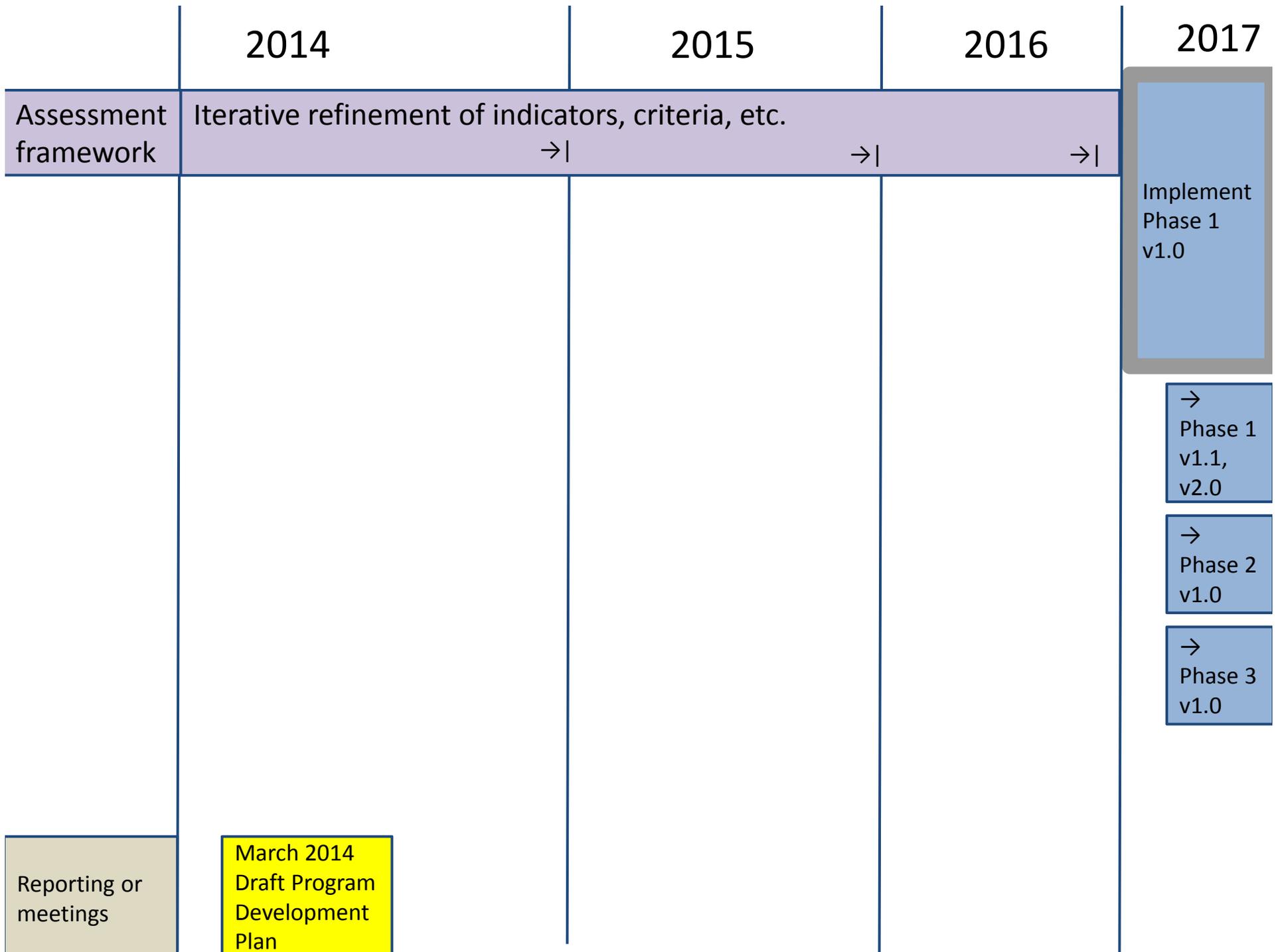
Implement
Phase 1
v1.0

→
Phase 1
v1.1,
v2.0

→
Phase 2
v1.0

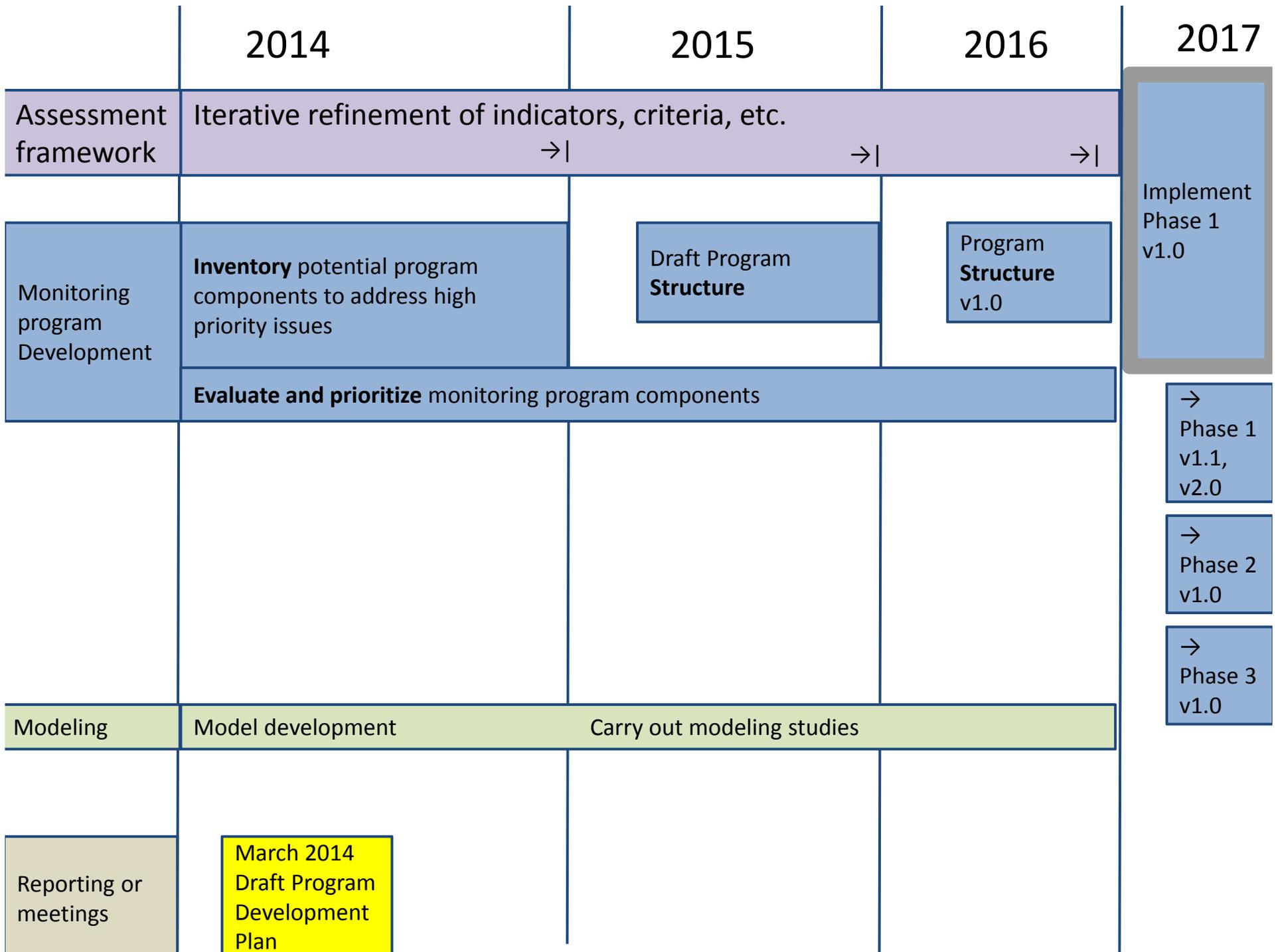
→
Phase 3
v1.0

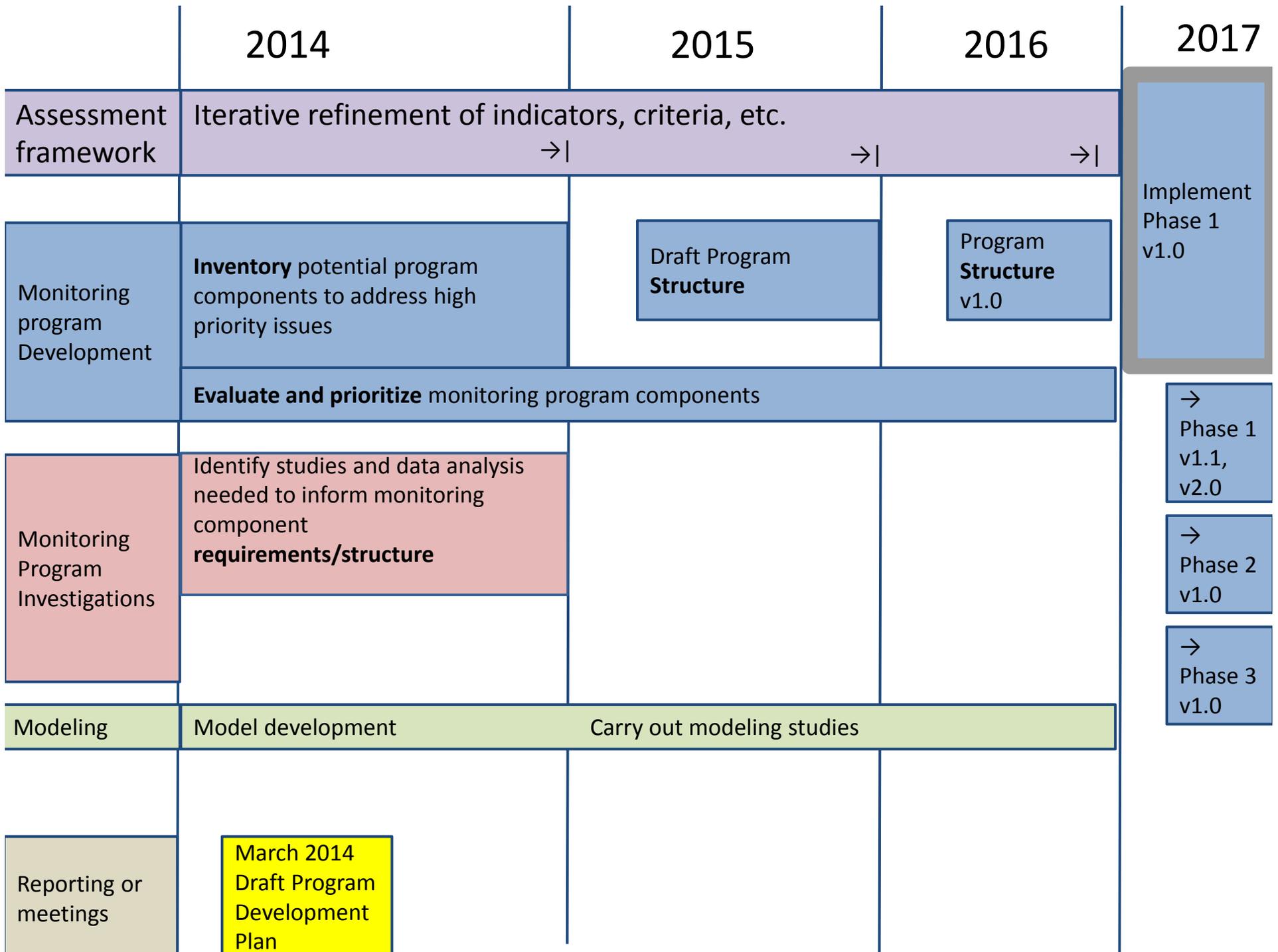


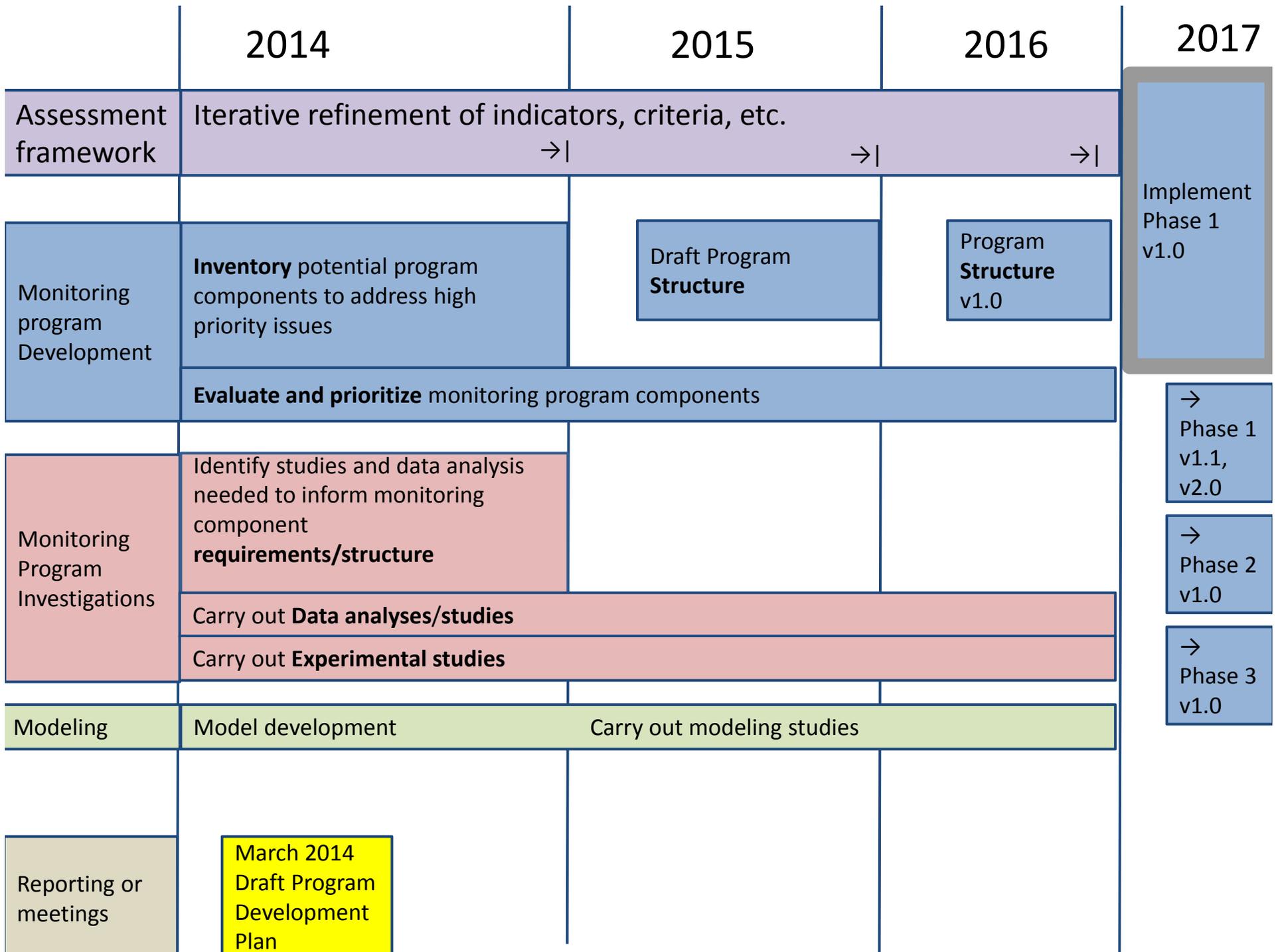


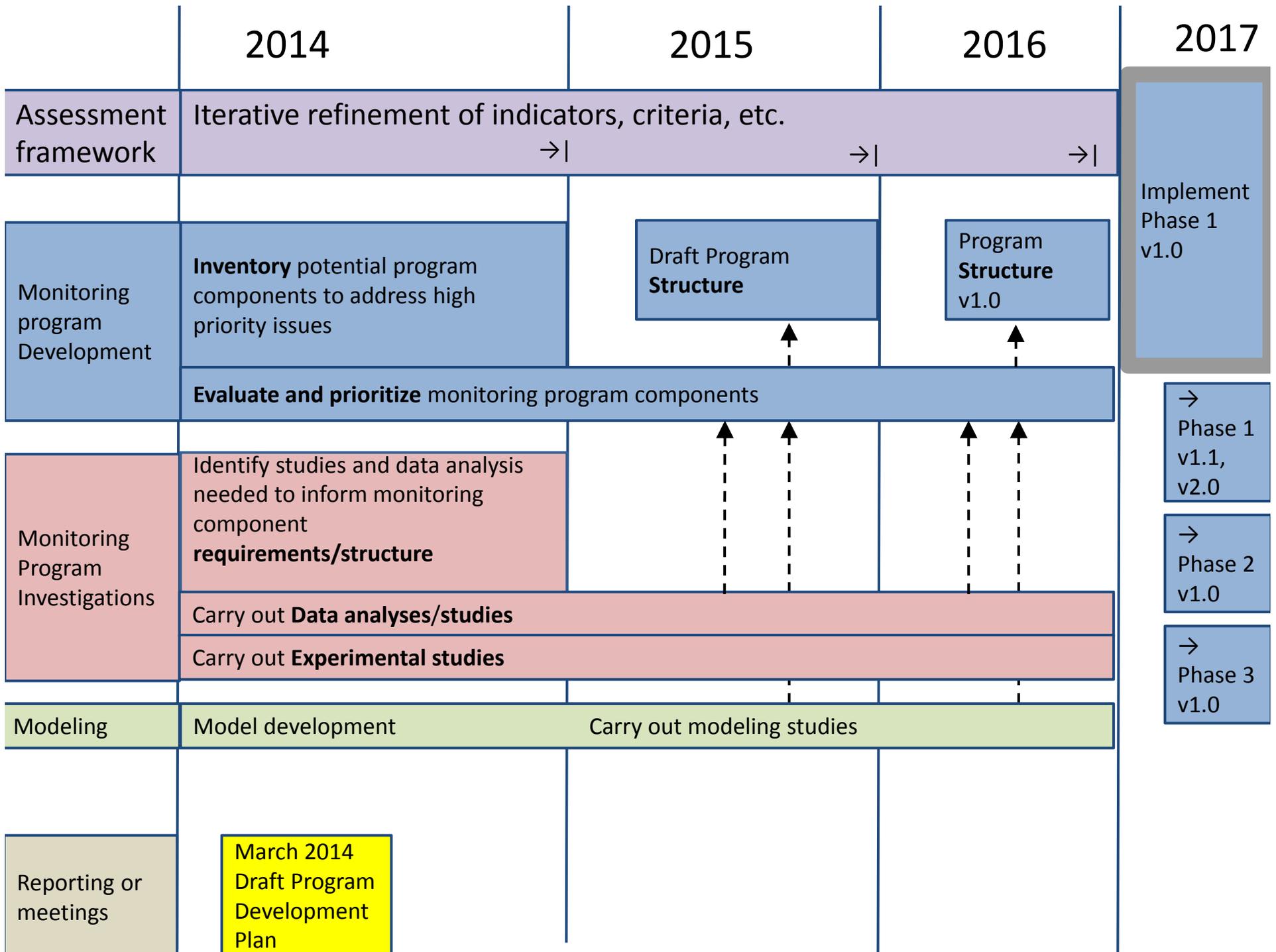
	2014	2015	2016	2017
Assessment framework	Iterative refinement of indicators, criteria, etc. → → →			Implement Phase 1 v1.0
				→ Phase 1 v1.1, v2.0
				→ Phase 2 v1.0
				→ Phase 3 v1.0
Modeling	Model development	Carry out modeling studies		
Reporting or meetings	March 2014 Draft Program Development Plan			

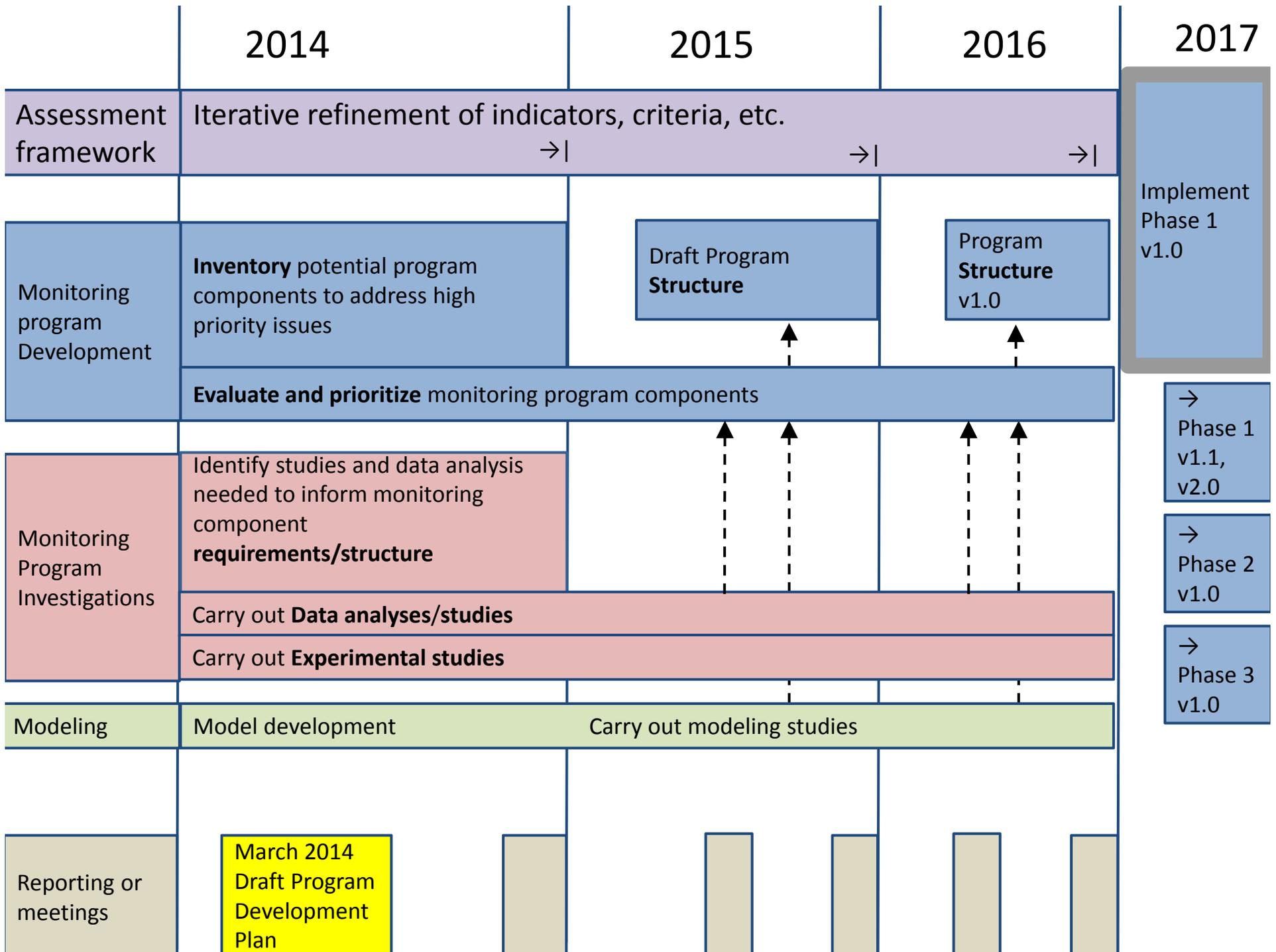
	2014	2015	2016	2017
Assessment framework	Iterative refinement of indicators, criteria, etc. → → →			Implement Phase 1 v1.0 → Phase 1 v1.1, v2.0 → Phase 2 v1.0 → Phase 3 v1.0
Monitoring program Development	Inventory potential program components to address high priority issues			
	Evaluate and prioritize monitoring program components			
Modeling	Model development	Carry out modeling studies		
Reporting or meetings	March 2014 Draft Program Development Plan			

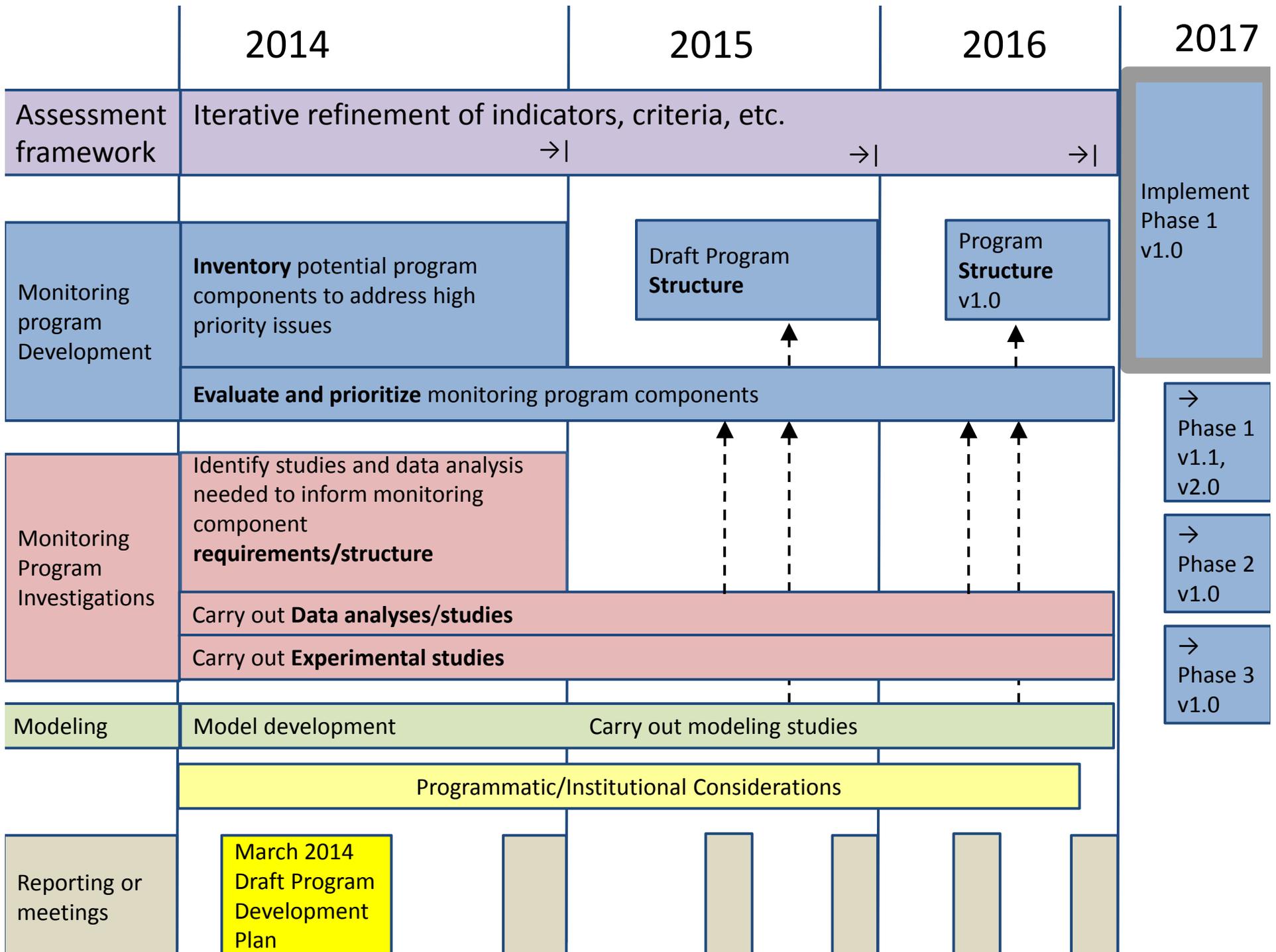


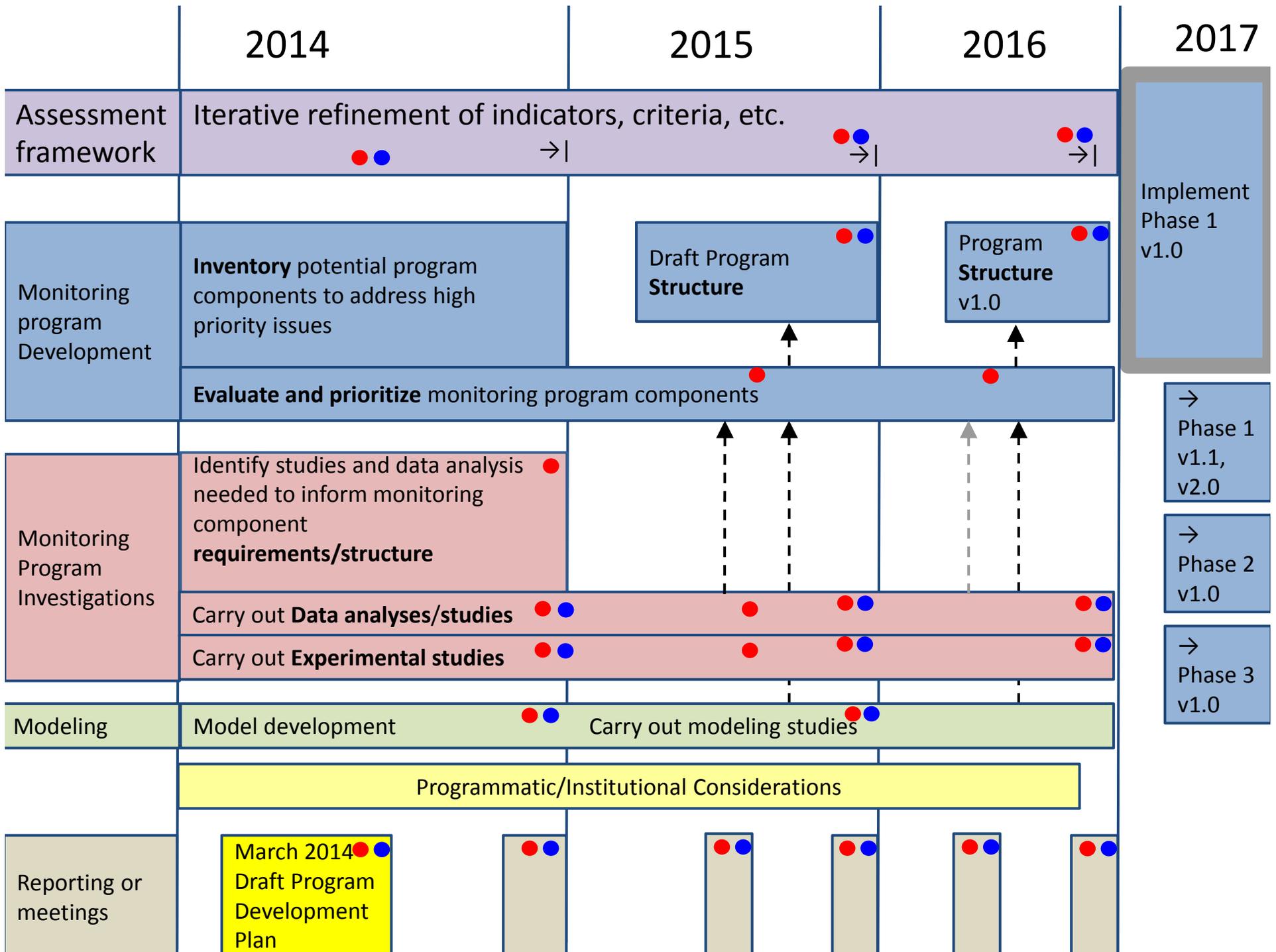












Implement Phase 1 v1.0

→ Phase 1 v1.1, v2.0

→ Phase 2 v1.0

→ Phase 3 v1.0

March 2014
Draft Program
Development
Plan

Monitoring Planning Needs

Habitats

- Deep subtidal
- Shoals
- margins

Approach

- Ship-based
- Moorings, AUVs

Compartments

- Sediments
 - Biota
 - chemistry/process
- Water column
 - Basic chemistry
 - Other chemistry, processes, toxins
 - Phytoplankton biomass, composition
 - Other biota

What to measure

- Analytes/processes
- Approach(es)

Organizational/Institutional

- Funding, partnerships, logistics

Lay out issues related to ...

- Habitat
- Compartments
- Approach
- What to measure/how
- Organizational/Institutional

Put forward...

- Approach for monitoring program development
- Obvious major components
- Major unknowns, uncertainties

Monitoring Program Investigations	Identify studies and data analysis needed to inform monitoring component requirements/structure	✓ Some work underway
	Carry out Data analyses/studies	
	Carry out Experimental studies	

Data analysis

- ✓ • Historical data: spatial/temporal resolution to address need
 - Historical data + modeling
 - what are we measuring (mixing, space, time)?
- ✓ • Moored sensors: data analysis, logistics/maintenance

Experimental Studies

- Measuring phytoplankton composition
 - ✓ • Pigments
 - flow cytometry/imaging
- ✓ • Toxins

Discussion Topics/Questions

- Highest priority experimental studies to inform monitoring?
- Highest priority data analysis to inform monitoring?
- Approach to program development