

CRESCENT/USGS Community Velocity Model

Topical Workshop Introduction

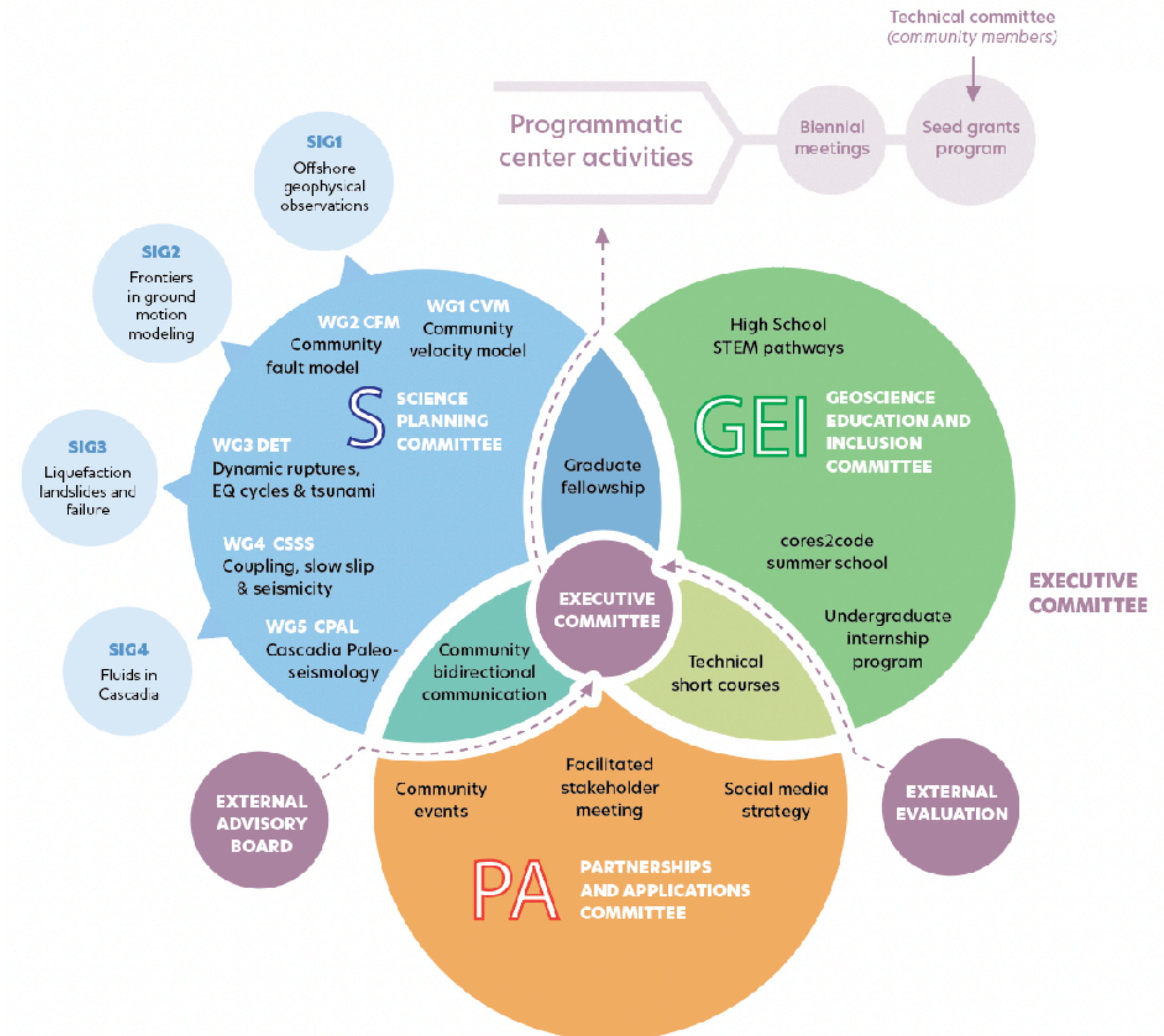
V.J. Sahakian, 5/13/2024



CRESCENT's 3 pillars

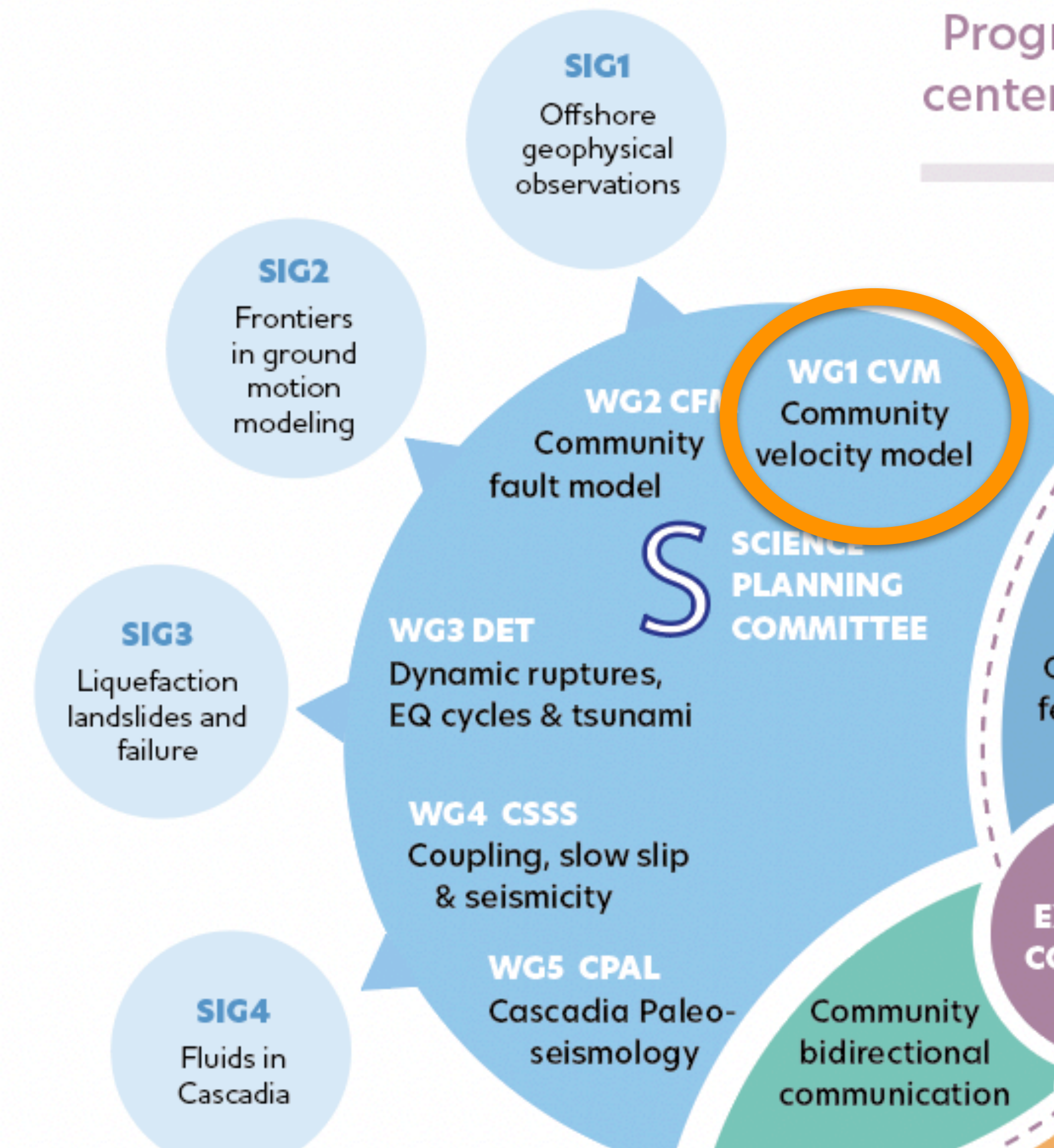


- The **science** behind earthquakes and their hazards
- Connecting the science to meaningful societally relevant outcomes through **partnerships** and development of **applications**
- Expanding access to careers through **geoscience education and inclusion**.



CVM Goals:

- **Generate versions of a 3D, observational-empirical-structural hybrid model, from N. California to S. British Columbia, with:**
 - ✦ A large-scale regional base developed from inversions of seismological data,
 - ✦ Shallow and geotechnical data embedded
 - ✦ Use geological constraints, empirical rock property relationships, and near-surface seismic information.
- **Expected Uses:**
 - ✦ Compute Green's Functions for block models and strain modeling (C3S)
 - ✦ Seismicity relocation (C3S, CFM, Community)
 - ✦ Dynamic rupture simulations (DET)
 - ✦ Ground-Motion Modeling (SIG2, Community)
 - ✦ Tectonics and Geodynamics (Community)



CVM Committee



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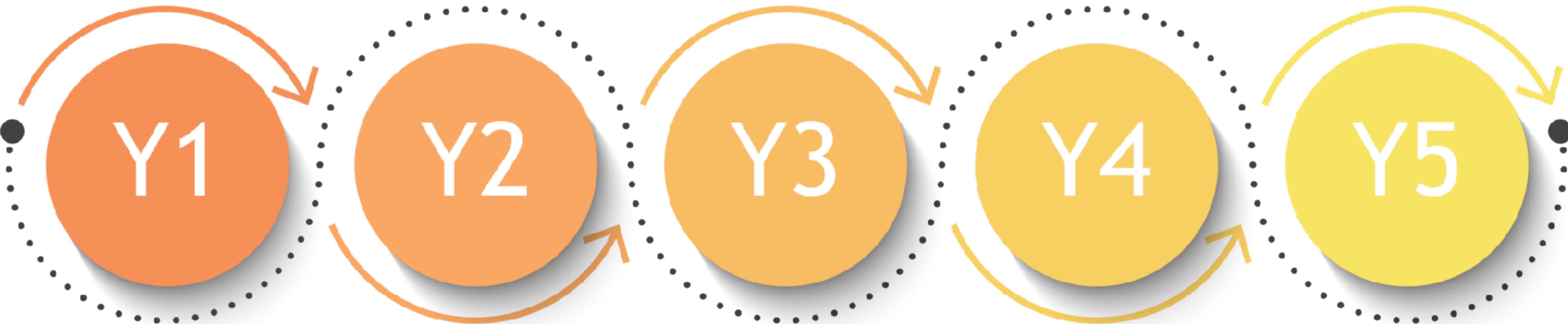


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Work Plan



YEAR 1

- CVM topical workshop to gather input
- Compile regional-scale models of velocity and major discontinuities
 - Generate the Generation (Gen) 0 large-scale, onshore/offshore CVM

YEAR 2

- Perform validation and uncertainty analyses for the Gen 0 CVM
 - Compile data for shallow velocity structure and sediment-basement interface
- Begin embedding shallow structure for the Gen 1 CVM

YEAR 3

- Finish embedding the shallow structure, to complete the Gen 1 CVM
 - Embed USGS Geotechnical Layer to make a Gen 2 CVM

YEAR 4

- Begin validation and uncertainty analysis of Gen 1 CVM
 - Complete and uncertainty analysis of Gen 1 and 2 CVMs
- Training Workshop on Geophysical Inversion and Interpretation

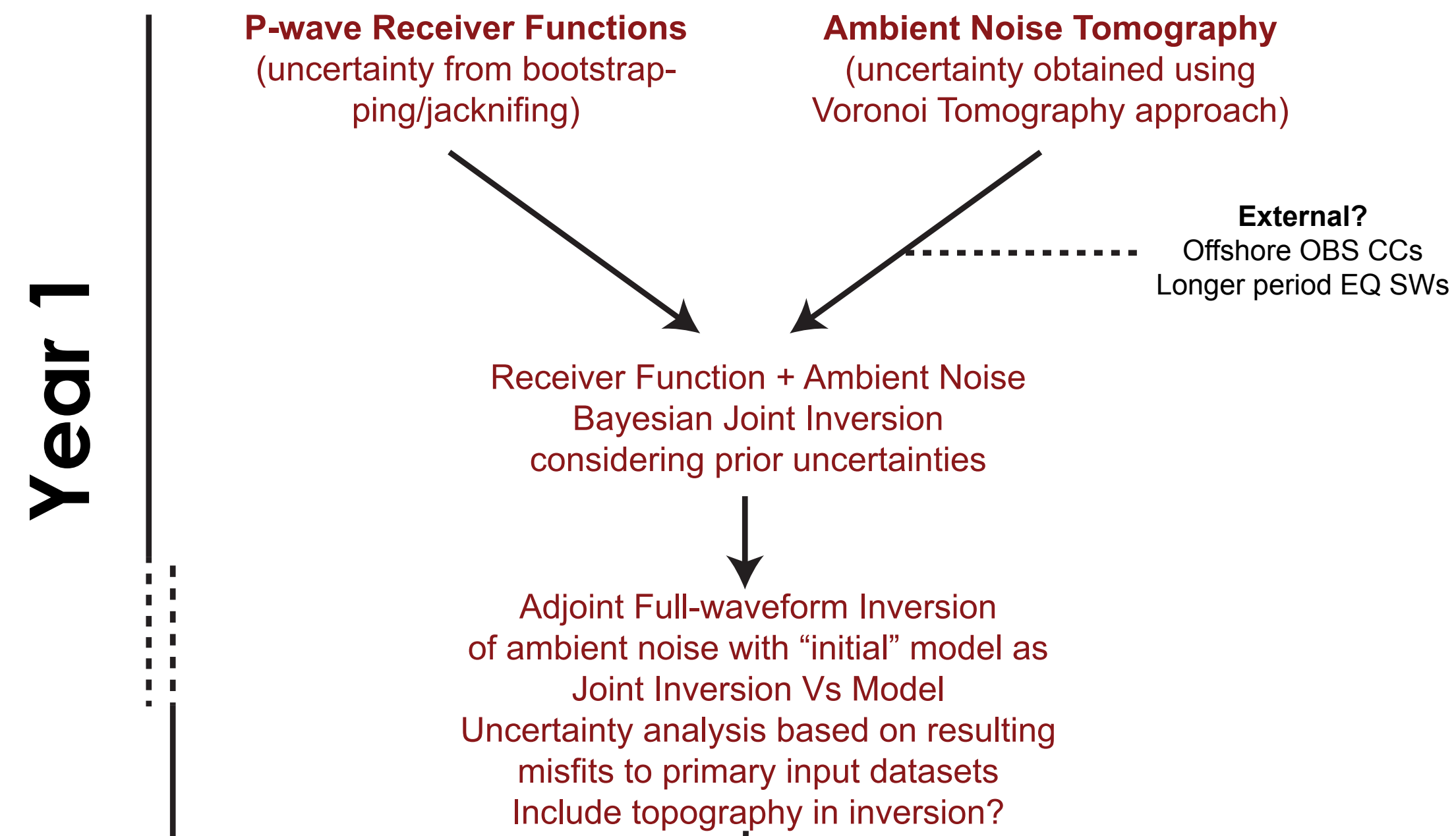
YEAR 5

- Complete and uncertainty analysis of Gen 1 and 2 CVMs
- Complete validation and uncertainty analysis of Gen 1 and Gen 2 CVMs

Work Plan



INPUTS



DATA PRODUCTS

3D Adaptive Common Conversion
Point Amplitude Model of Cascadia
margin from receiver functions

2D frequency maps of ANT Phase
Velocities from ?-50s

“Generation 0” Models* **Joint Inversion (JI) base**

- 1) 3D Vs Model with posterior uncertainties
- 2) Moho “surface” model

“Generation 1” Models*
JI + Adjoint inversion base
3D Model* for initial use by other groups

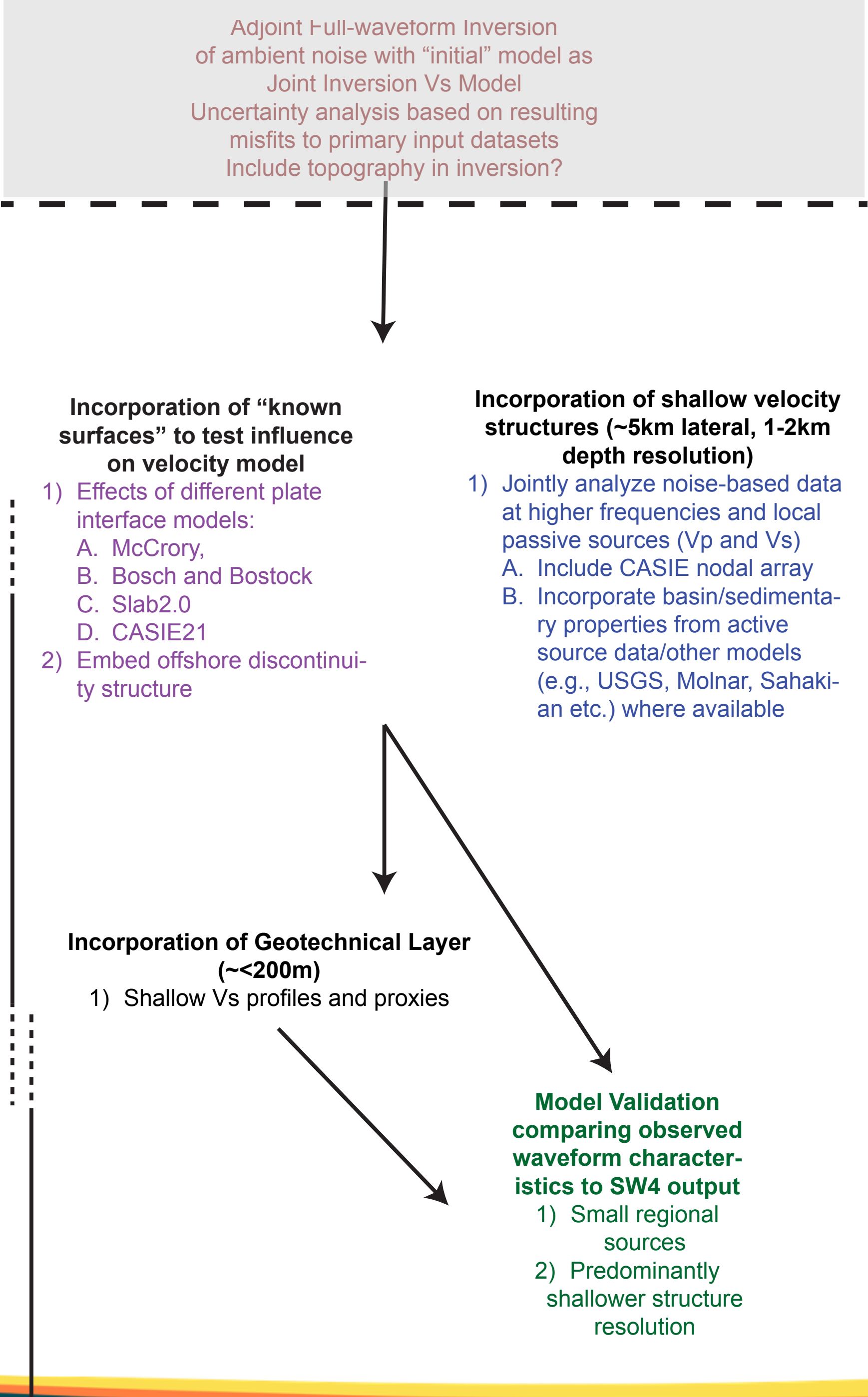
Work Plan



YEAR 2

YEAR 3

YEAR 4



“Generation 2” Models
3D Model with offshore structure constrained by imaging, shallow structure, and constraints on basins
Include Vp constraints where available??

“Generation 3” Models
Gen2 model + geotechnical layer / CFM constraints

Model Performance Metrics
Constraints on regions and characteristics of model performance

Workshop Goals:



- Build CVM Community and collaborations
- Learn about and synthesize community needs for a CVM, to incorporate into the Working Group's workflow and considerations as much as possible
- Tutorial and feedback on community tools for model conversion, access, and sampling
- Discuss model repository (for model merging, other community uses)

Up Next:

- Talks featuring expected uses of the CVM
- Breakout Groups to discuss needs and uses of the CVM

