

# VaccCAP: A community-based project to develop advanced genetic tools to improve fruit quality in blueberry and cranberry

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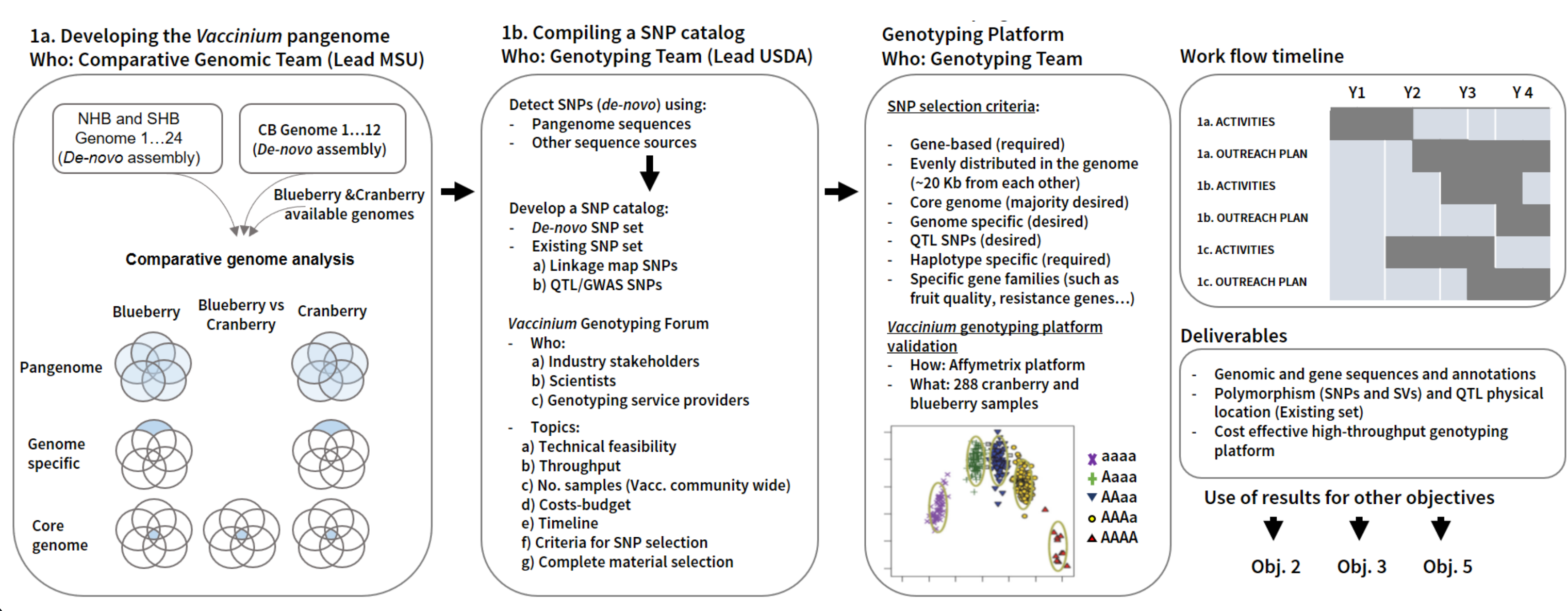


## Overview

*Vaccinium* crops (primarily blueberry and cranberry) provide a vital contribution to the U.S. economy and numerous health and social benefits. The production and consumption of these crops continue to expand worldwide. However, U.S. *Vaccinium* industries face numerous challenges to maintain profitability. Stakeholders have asserted that breeding blueberry and cranberry cultivars with improved fruit quality is a priority for continued success; these traits include fruit firmness, flavor, shelf life, and appearance (Gallardo et al. 2018a,b). *Vaccinium* breeders select for these traits, however, lack empirical data to assign a level of importance to fruit characteristics (FC) relative to consumer preferences, and deterioration during production, processing and distribution. Additionally, breeders have limited molecular tools to select for higher quality fruit. The VacciniumCAP project was funded by USDA-NIFA-SCRI (Award #2016-51181-25400, 2019-2023) to create a nationwide transdisciplinary research approach to develop marker-assisted selection (MAS) capacity in *Vaccinium* breeding programs to develop cultivars with enhanced fruit quality to increase their market value ([www.vaccinium.org/vaccap](http://www.vaccinium.org/vaccap)).

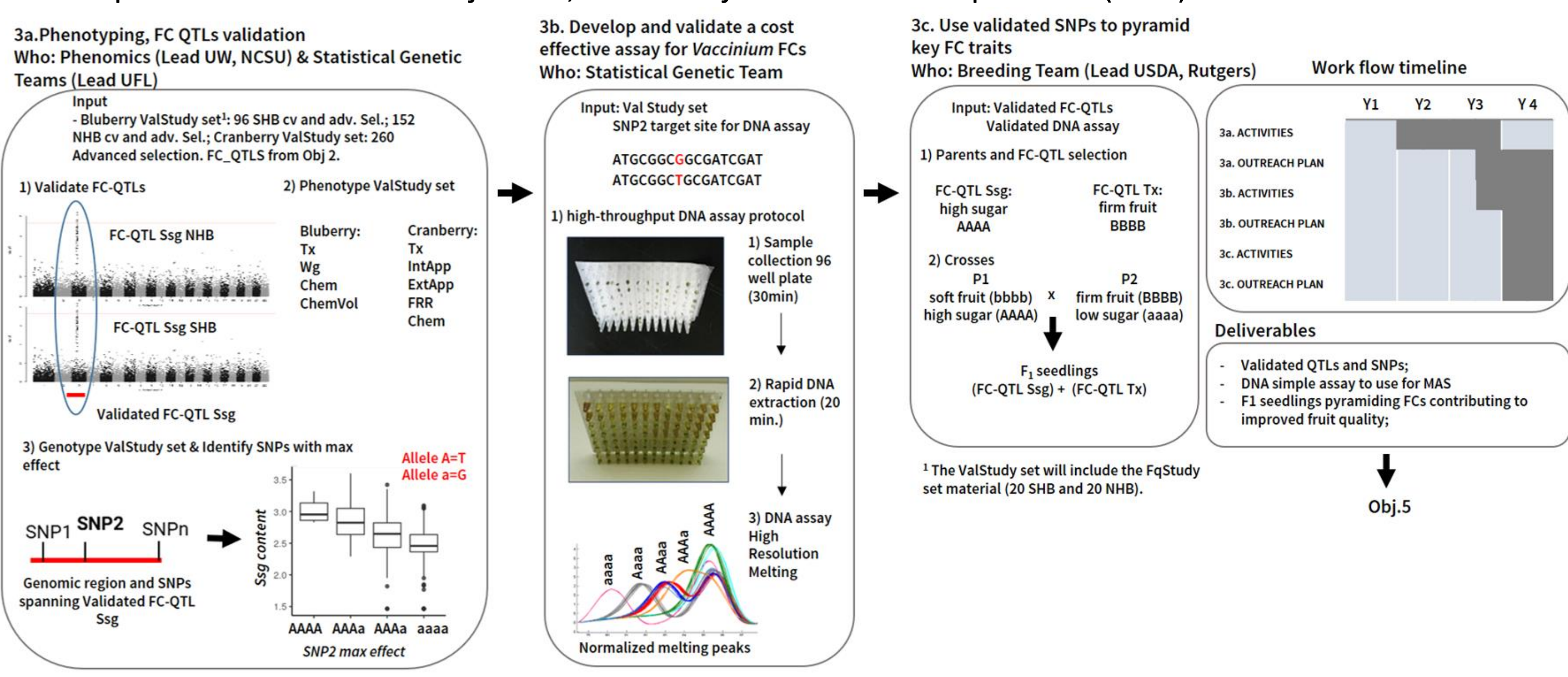
## Objective 1 – Establish genomic resources to enable association mapping studies in blueberry and cranberry

A cost effective genotyping platform that takes advantage of shared ancestry and marker transferability between blueberry and cranberry that works for both crops is not available, limiting GWAS studies. To achieve this objective, three major activities are planned (1a-c).



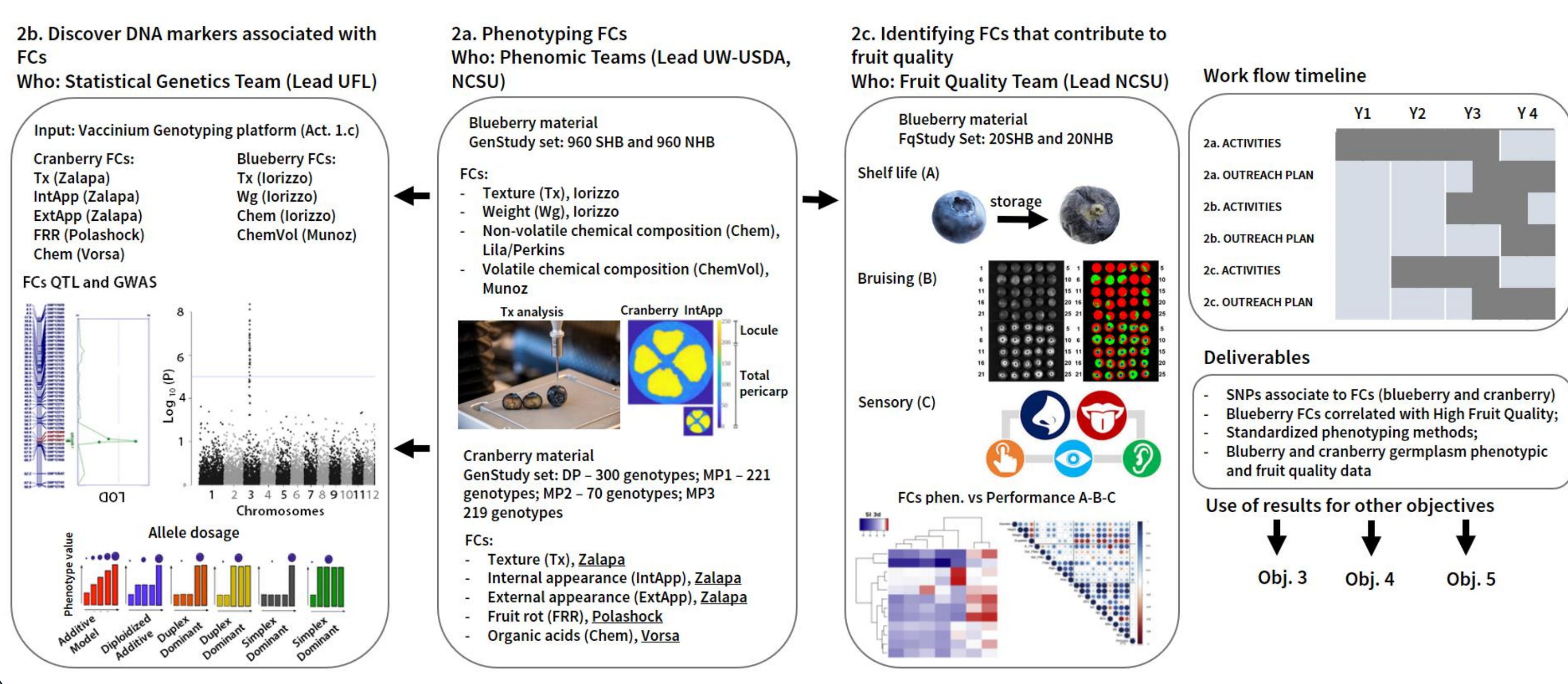
## Objective 3 – Deliver molecular and genetic resources to improve blueberry & cranberry fruit quality traits that match consumer preferences and maximize industry profitability

The use of cost-effective DNA marker assays in *Vaccinium* breeding programs has not been developed or adopted. To achieve this objective, three major activities are planned (3a-c).



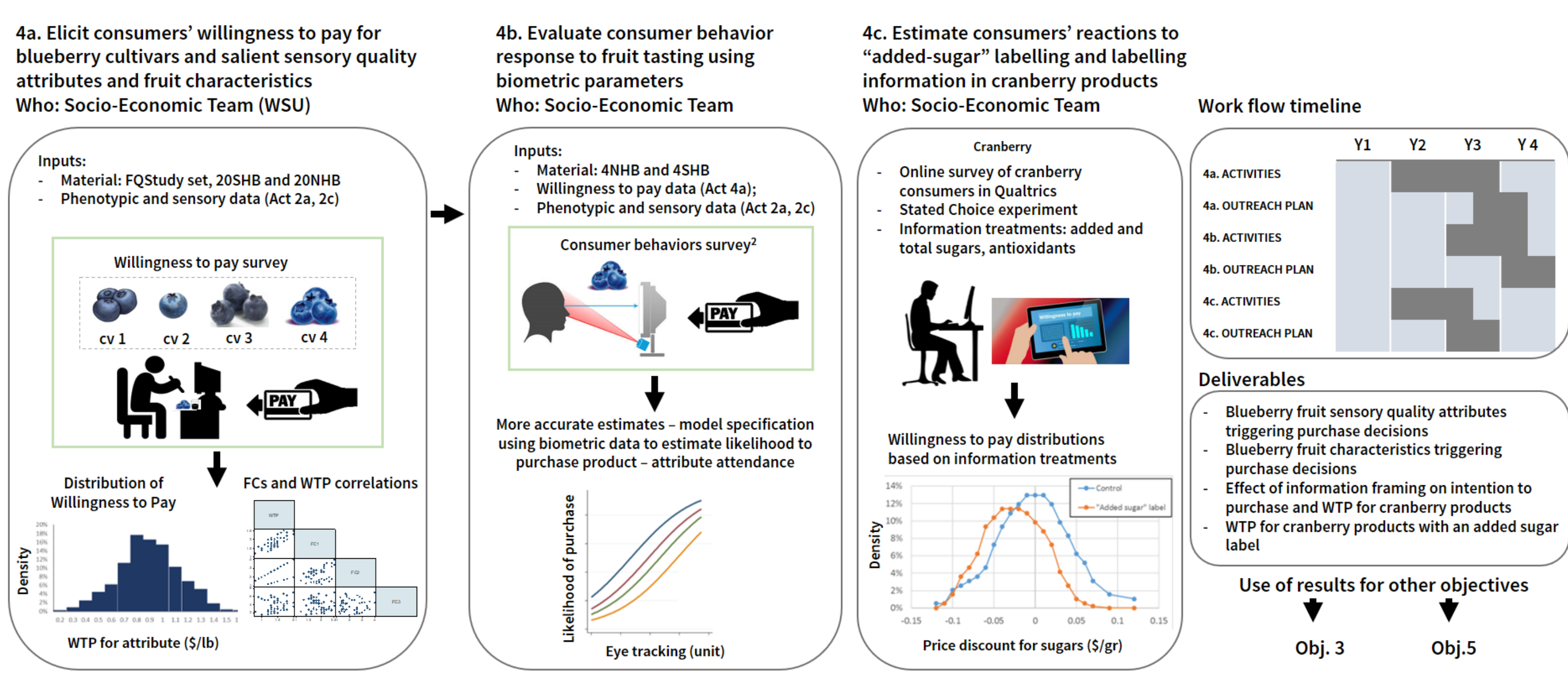
## Objective 2 – Discover DNA markers and fruit characteristics that match consumer preferences and maximize industry profitability

Blueberry and cranberry fruit characteristics (FCs) that affect fruit quality include chemical composition, texture, and appearance; however, relatively few DNA markers have been associated with these FCs. Additionally, the level of importance that each FC sub-components have in terms of fruit quality is unknown. To achieve this objective, three major activities are planned (2a-c).



## Objective 4 – Assess the potential socio-economic impact of blueberry and cranberry fruit quality improvements on market demand

Researchers, breeders and industry must pay attention to consumer preferences to ensure the economic sustainability of blueberry and cranberry production. Although blueberry and cranberry fruit sensory quality attributes are known to affect consumer preferences, research is lacking regarding consumers' willingness-to-pay for these attributes. To achieve this objective, three major activities are planned (4a-c).



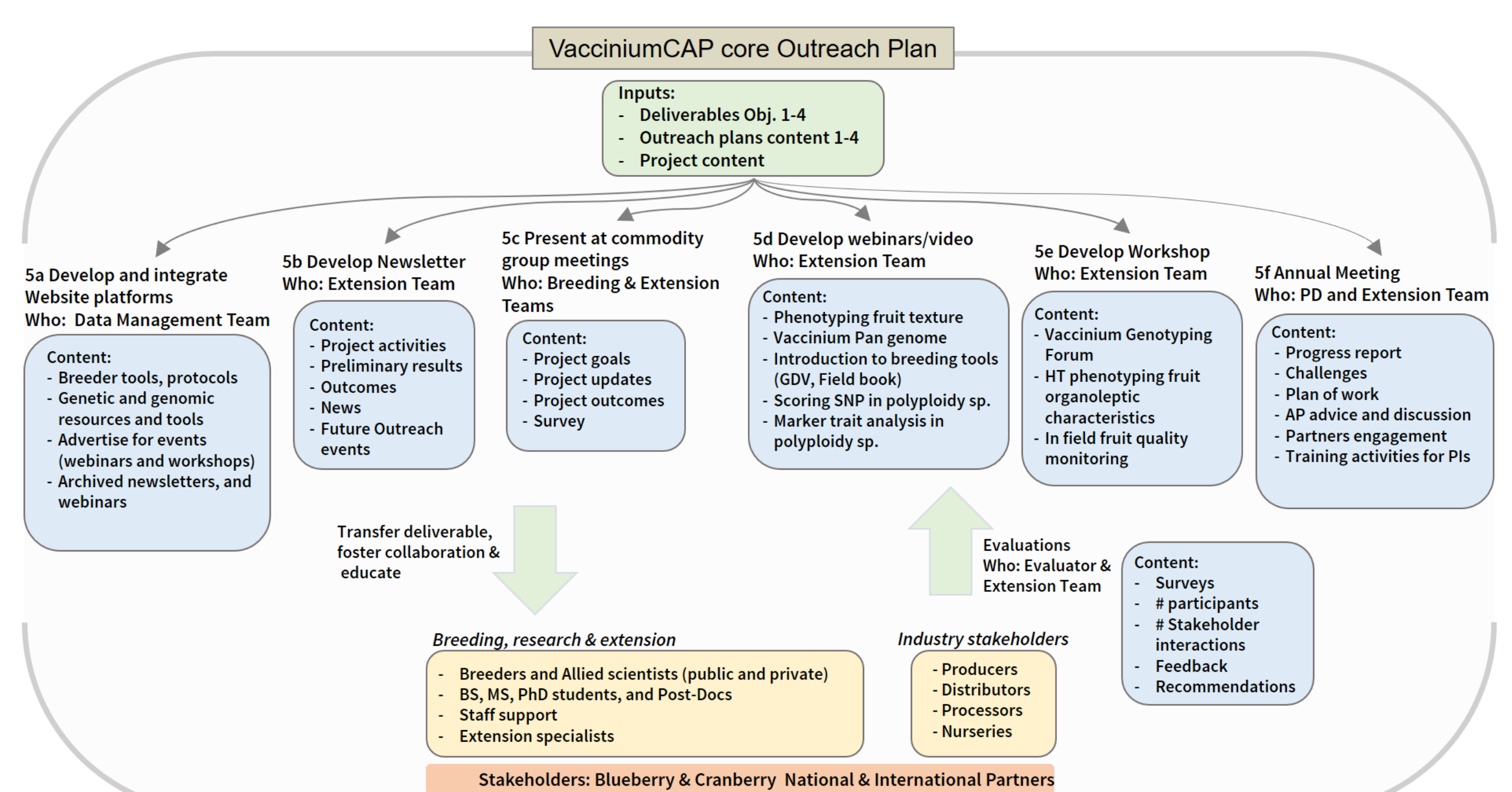
## Objective 5 – Engage U.S. *Vaccinium* stakeholder groups to transfer advanced phenomic and genomic tools to build a more efficient cultivar development system

Implementation of MAS and outcomes from the fruit quality studies to select and adopt blueberry and cranberry material with superior fruit quality depends upon the development of an effective outreach plan and platforms. Project background information and deliverables from the outreach plans of Objectives 1-4 will be used to develop outreach activities for this objective, which will represent the project core-outreach plan to engage stakeholders. Six outreach activities (5a-5g) are planned to engage *Vaccinium* stakeholders and aims to:

- 1) Transfer project deliverables
- 2) Educate on project outcomes
- 3) Foster new collaborations and spin off projects
- 4) Solicit feedback on the project to fine-tune research and extension activities

Who: Extension Team (Lead UW and WSU)

Four annual meetings will target project participants, advisory panel members and national and international partners.



## Expected Output/Impact

The VacciniumCAP project goals are to: 1) Expand DNA assay capacity and implement MAS for fruit quality and other traits; 2) Expand fundamental knowledge and tools to inform breeders and industry about the added value of fruit quality traits; 3) Identify and use existing cultivars with superior alleles as parents in new crosses; 4) Recruit and train students and postdoctoral scholars, and inform and engage the public. These results will enable a long-term impact of established MAS skills and tools, facilitating successful *Vaccinium* breeding programs which will lead to improved fruit quality production and delivery to markets, while improving the profitability, consumption and sustainability of *Vaccinium* crops.

## Bibliography

- Gallardo, R., Zhang, Qi., Dossett, M., Polashock, J. J., Rodriguez-Saona, C., Vorsa, N., Edger, P. P., Ashrafi, H., Babiker, E., Finn, C. E., & Iorizzo, M. (2018). Breeding Trait Priorities of the Blueberry Industry in the United States and Canada, *HortScience*, 53(7), 1021-1028.
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