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Layers and beyond, modern use of connected spatial and non-spatial datasets to unlock insights in R&D

The Implications of Using Multiple Data Sources for Major Survey Programs

16th May 2022 - NAS

PUBLIC

Agriculture faces profound opportunities and challenges

/// Vegetables by Bayer

Grow ***enough*** food on ***less*** land

Scarcity of natural resources

Societal changes and influence ***of NGOs***

Consumers need to be informed about food choices

Agriculture

Farm economics strive for efficiency

Disruptive technologies and Big Data

New entrants in established markets

Demographics and succession

Innovation is essential *to address challenges and seize opportunities*

Focusing on our customers and their growing environments

/// Vegetables by Bayer

Vegetable Seeds Strategic Segments

Open Field	***Professional growers*** *cultivating* ***many types*** *of vegetables to supply fresh, nutritious and convenient fruits and vegetables*
Protected	*Highly* ***specialized, technology-focused*** *greenhouse and glasshouse growers. Increasing* ***value chain orientation*** *working retail, food service, or end consumers*
Smallholder	*Growers working on* ***small*** *land holdings for sustainably feeding communities and* ***help manage risk to earn and maximize stable farm income***
Processing	*Companies processing vegetables contracted from large-scale operations and dealers who work with them. Focused on* ***operational efficiency*** *and trading of fresh, frozen and shelf stable products.*

A changing landscape requires continuous evolution

Vegetables by Bayer

Our Breeding pipeline is strong across crops and addresses grower and consumer benefits

Grower Benefits

Yield

Pest and Disease Management

Harvestability

Consumer Benefits

Quality Produce

Convenience

Sensory Experience

Product Highlights

Sweet Onions: convenience

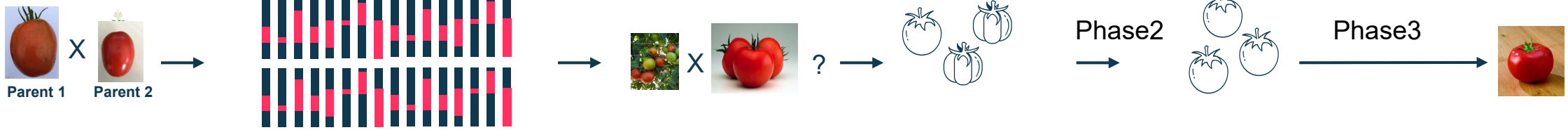
Sweet Pepper: shelf life – snacking

Watermelon: eating pleasure – seedless

Cherry tomato: eating pleasure & taste

E2E Breeding workflow requires predictive capability

DATA ENABLED



New Breeding Population Selection

Genome Wide Selections
Linking phenotype with genotype – Prediction models

Prediction :general combining ability of lines and specific (GCA and SCA)

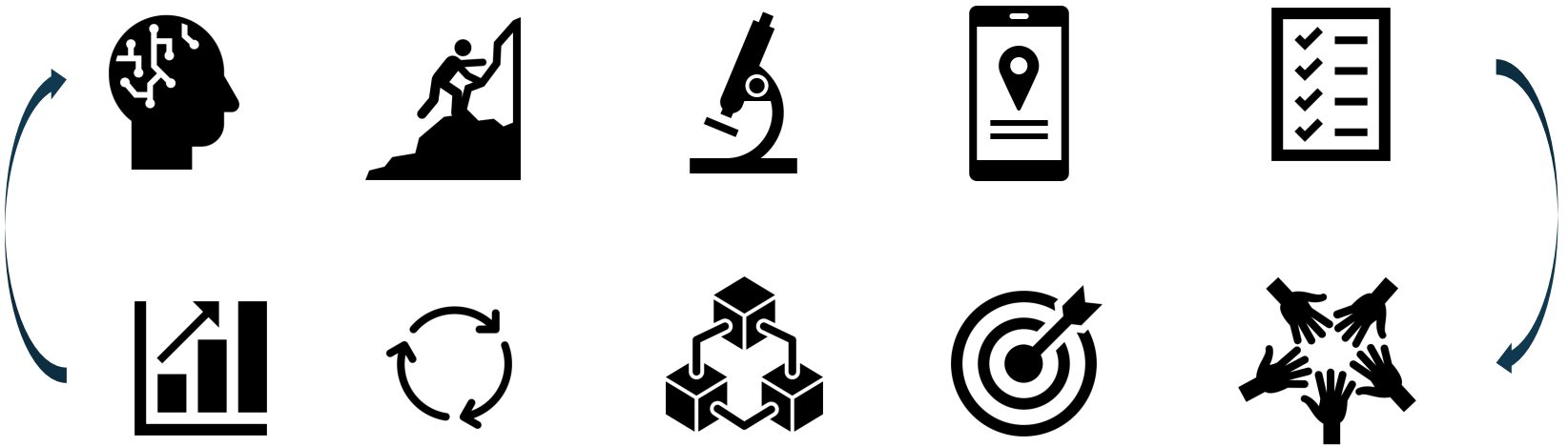
Agronomic Performance Testing in the field –. Best material advanced Breeders and analytic prediction models

Product

DATA ENABLED

Stage 1: Data Collection

Stage 2: Analytics/Insights



Goals	predict the best breeding populations predict the best hybrids predict the best performance (small trial and grower conditions)

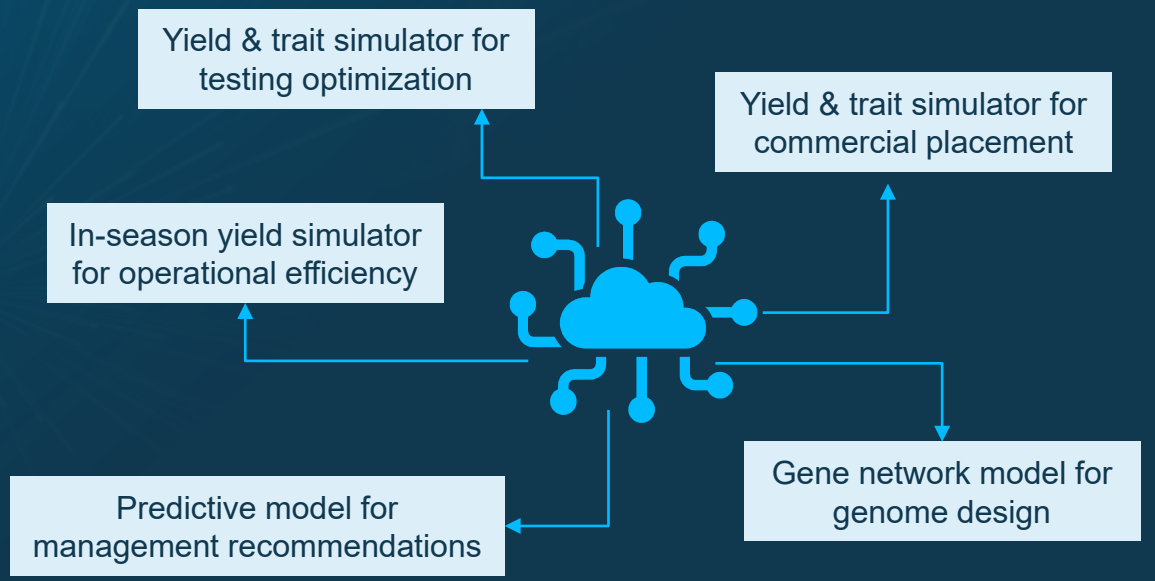
A core set of data improves every step ability to deliver value

Core set of environmental and imagery data

A strong foundation of data means we can build something amazing.

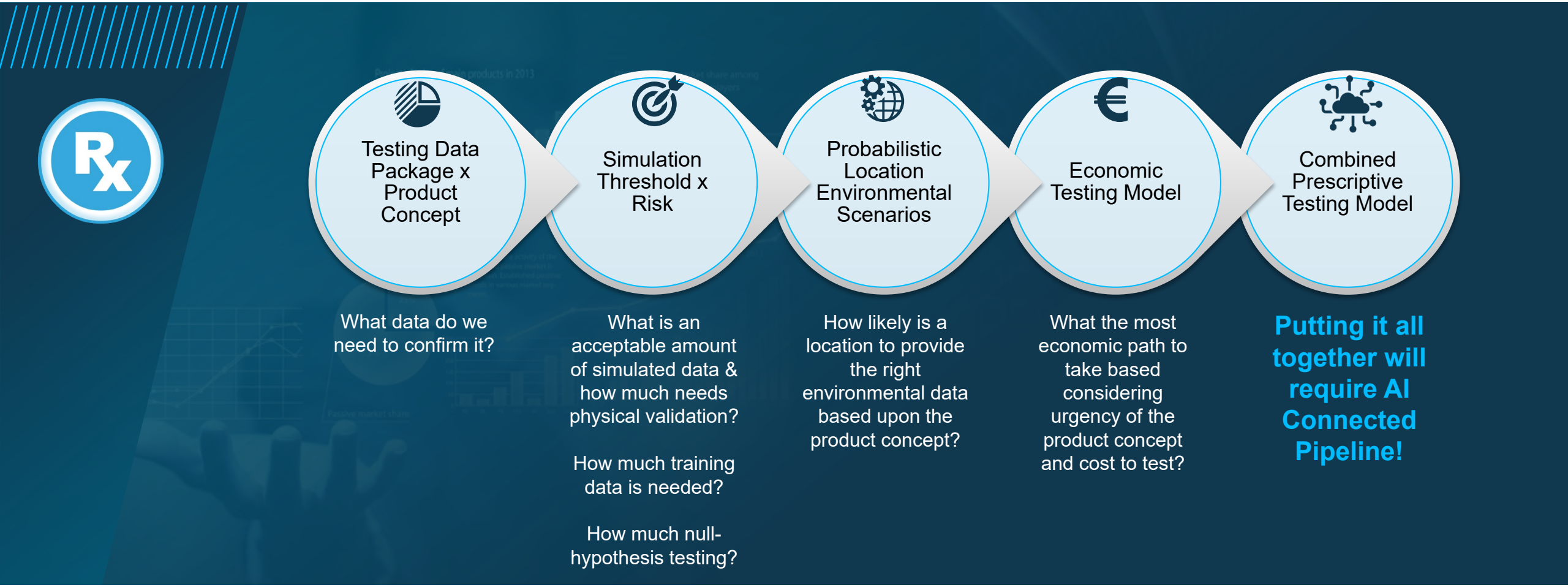
Additional, specific data collected by each group still improves the collective modeling effort.

Core modeling engine that can be tuned for specific applications



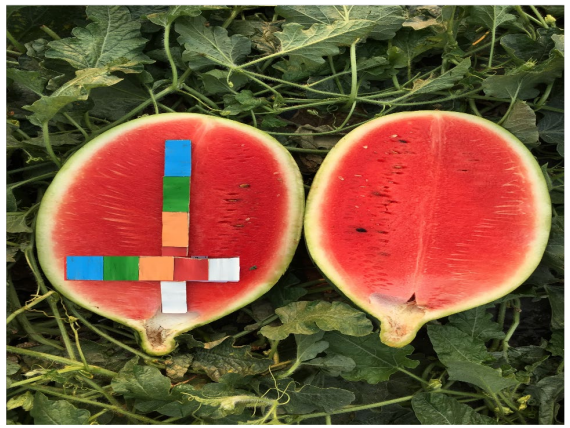
With better data, the model improves, and we can use simulated data in more ways.

Target State: Decreased time to market and improve resource efficiency



Project Objective:

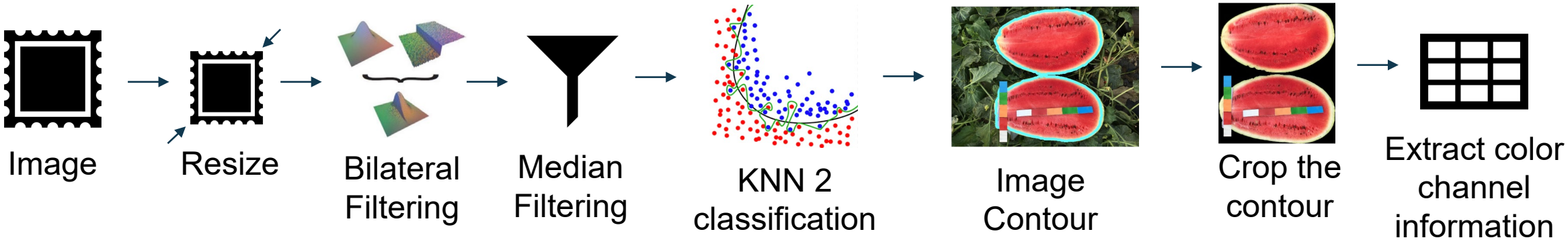
Rate watermelon based on the amount of red, of two cut halves.



Rating: 1

Rating: 9

Watermelon Image Pre-Processing Pipeline



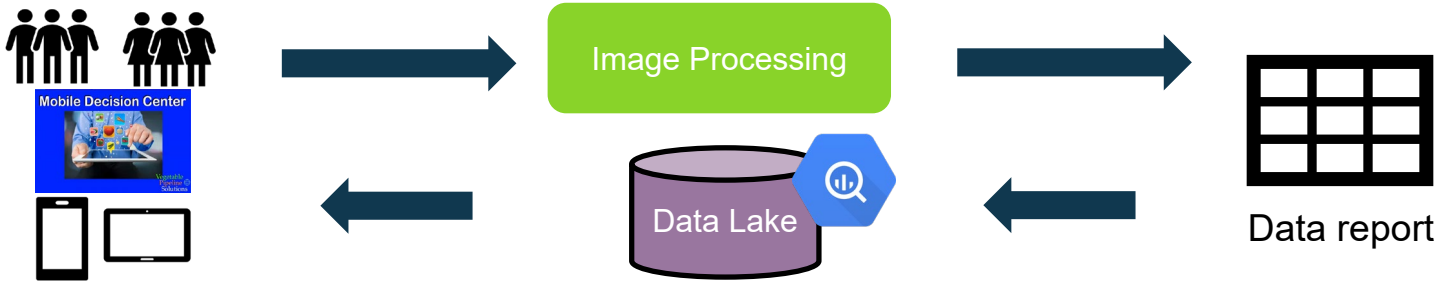
Project Objective

Digital phenotyping for product characterization

Input Image

Detected Peppers

After Removing Background



Our Vegetable Seeds Organization

Delivering value to, on and beyond the farm

Vegetables by Bayer

Helping Vegetable Growers Meet Diverse Needs of the Value Chain

- 22-crop portfolio of 2,000+ varieties marketed under our Seminis® and De Ruiter ® brands
- Serving customers across open field, protected, smallholder and processing environments to deliver:
  - Choices & nutritional value
  - Year-round access to fresh, sustainably grown foods
  - Contribute to food security, food quality & convenience

Thank You

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