



RADIANT[®]

Microwave-Assisted Extraction
of Value-Added Ingredients from Natural Biomass

About Radiant Technologies

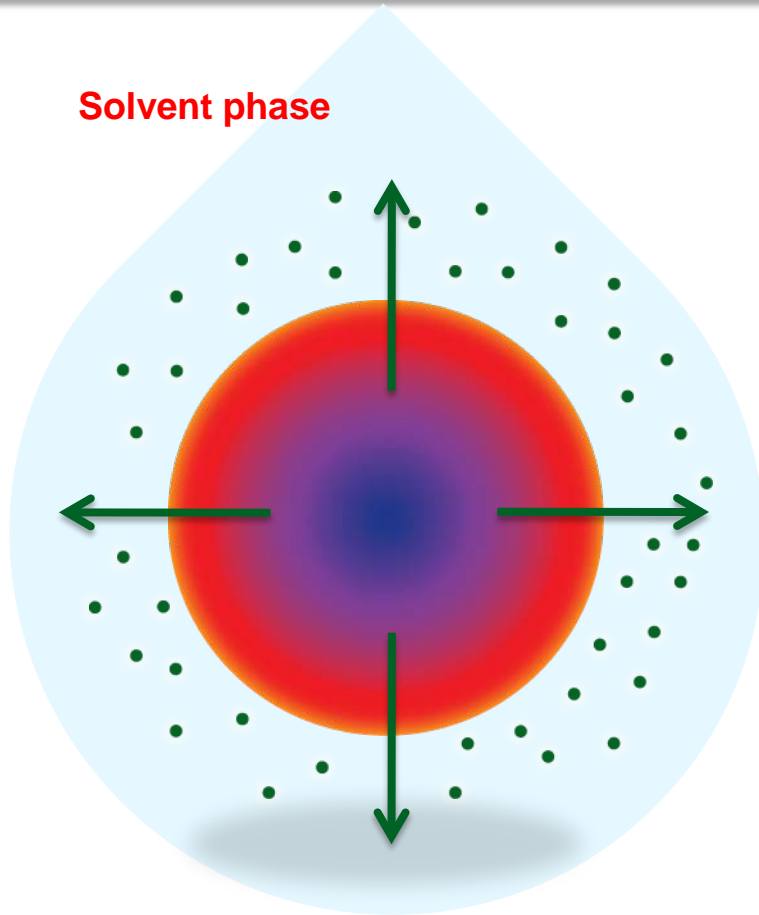


- Experts in extraction and purification of value-added ingredients from natural biomass using “**Microwave-Assisted Processing**” (**MAP™**) technology
- Public Company listed on the TSX Venture
- Contract Manufacturing Services or Licensing Agreements
- Applications in multiple industries
 - Food, Cosmetic, Supplement, Pharmaceutical, Petrochemistry, Bioprocessing
- 5 Tonnes per day MAP™ processing facility in Alberta, Canada

The Core Radiant Solution

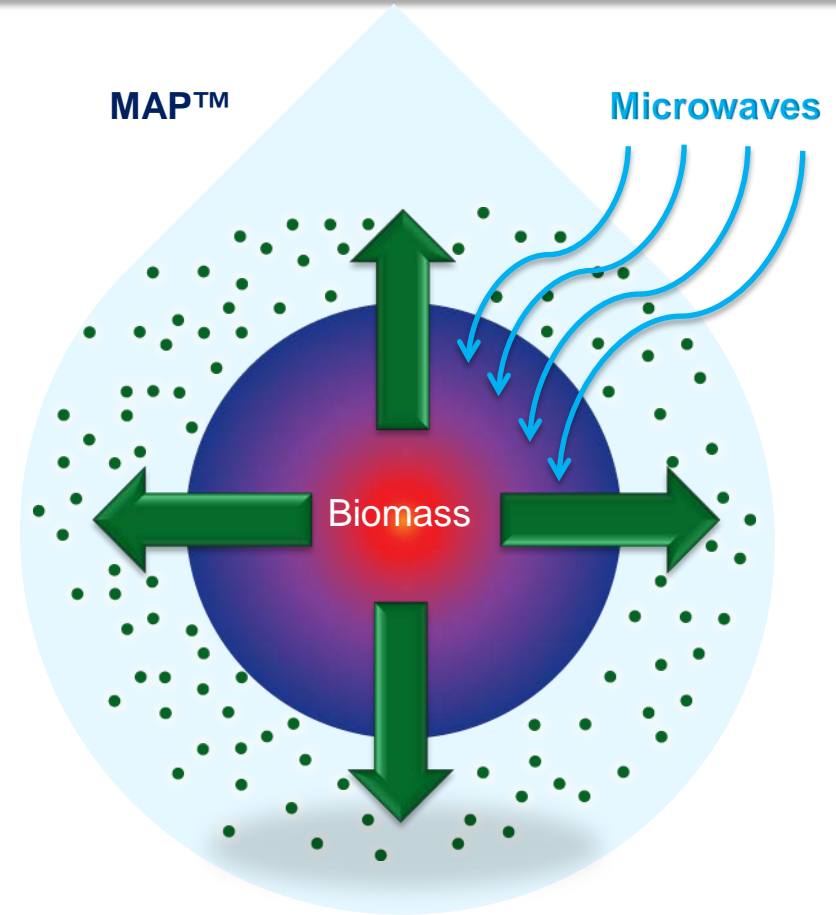
Microwave Assisted Processing

Solvent phase



Conventional solvent extraction is a diffusion-driven process: relies on concentration gradients

MAP[™]



MAP[™] causes instant in-core heating creating a pressure-driven process

MAP™ Extraction



Conventional Extraction

Mechanism is **diffusion**

Concentration gradient of active in biomass vs in the solvent is the driving force

Diffusion is **slow**, particularly as the active becomes more concentrated in the solvent

Eventually reach an **equilibrium point**

Requires **high solvent** ratios and **multiple extraction** stages to achieve reasonable recovery of actives



MAP™

“**Pressure-enhanced**” mass transfer

Microwave energy is selectively absorbed by the residual water present in the biomass cells

Results in **rapid** pressure buildup within cells leading to a pressure-driven mass transfer of actives

Extraction is very fast and not limited by an equilibrium state – transfer continues as long as energy is applied

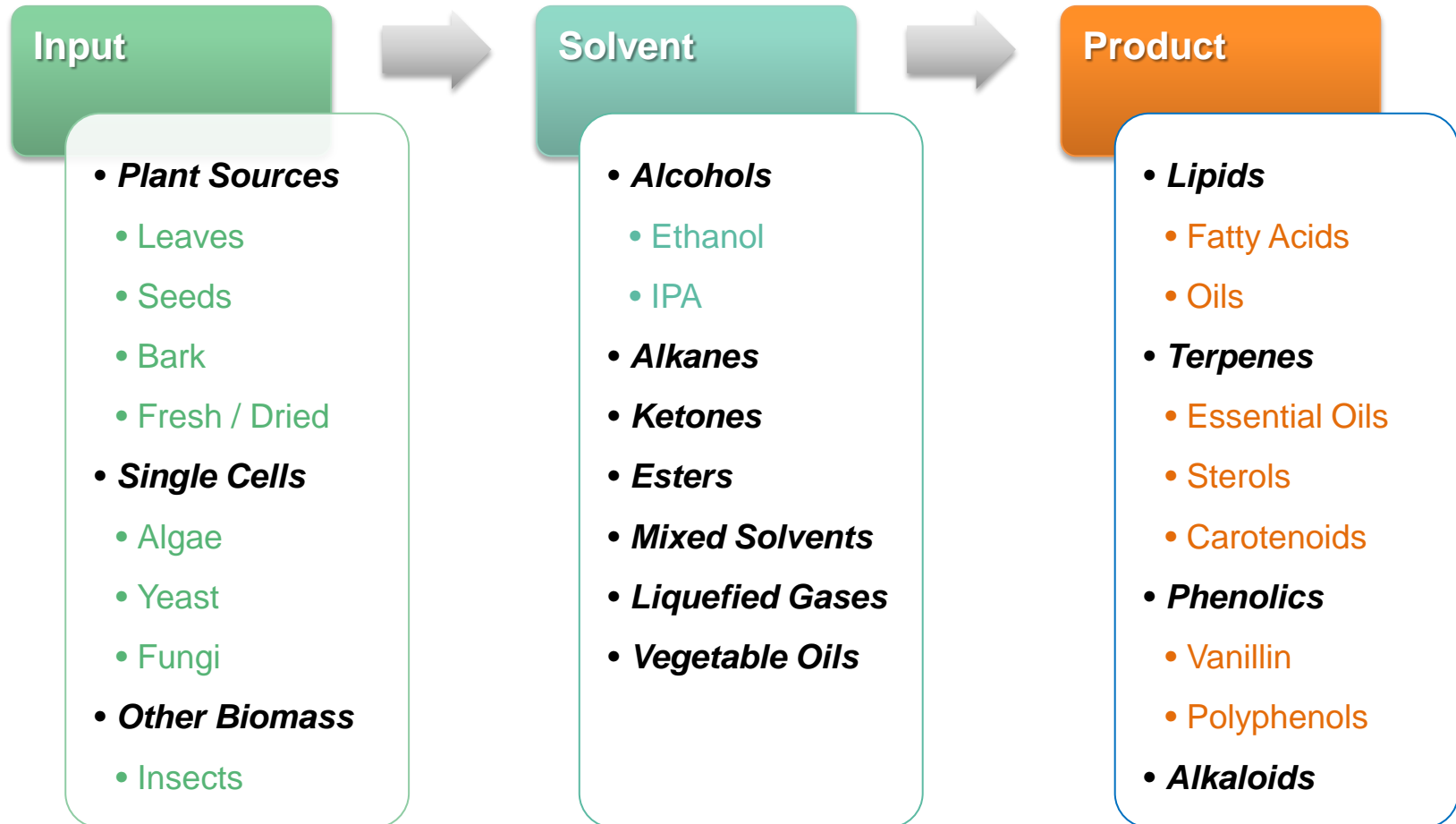
Result in short extraction times, **reduced solvent** requirements and **fewer extraction** stages

Competitive Advantages



- Much faster extraction rates leading to
 - reduced processing time, increased throughput and reduced processing costs and capital costs;
- Efficient “single stage” extraction leading to
 - increased overall recovery / yield of valuable active compounds and reduced solvent and energy usage;
- Improved extraction selectivity and purity leading to
 - novel, differentiated products;
- Ease of commercial scalability; and
- Improved customer acceptance of products made through “cleaner, greener” technology.

Proven Technology

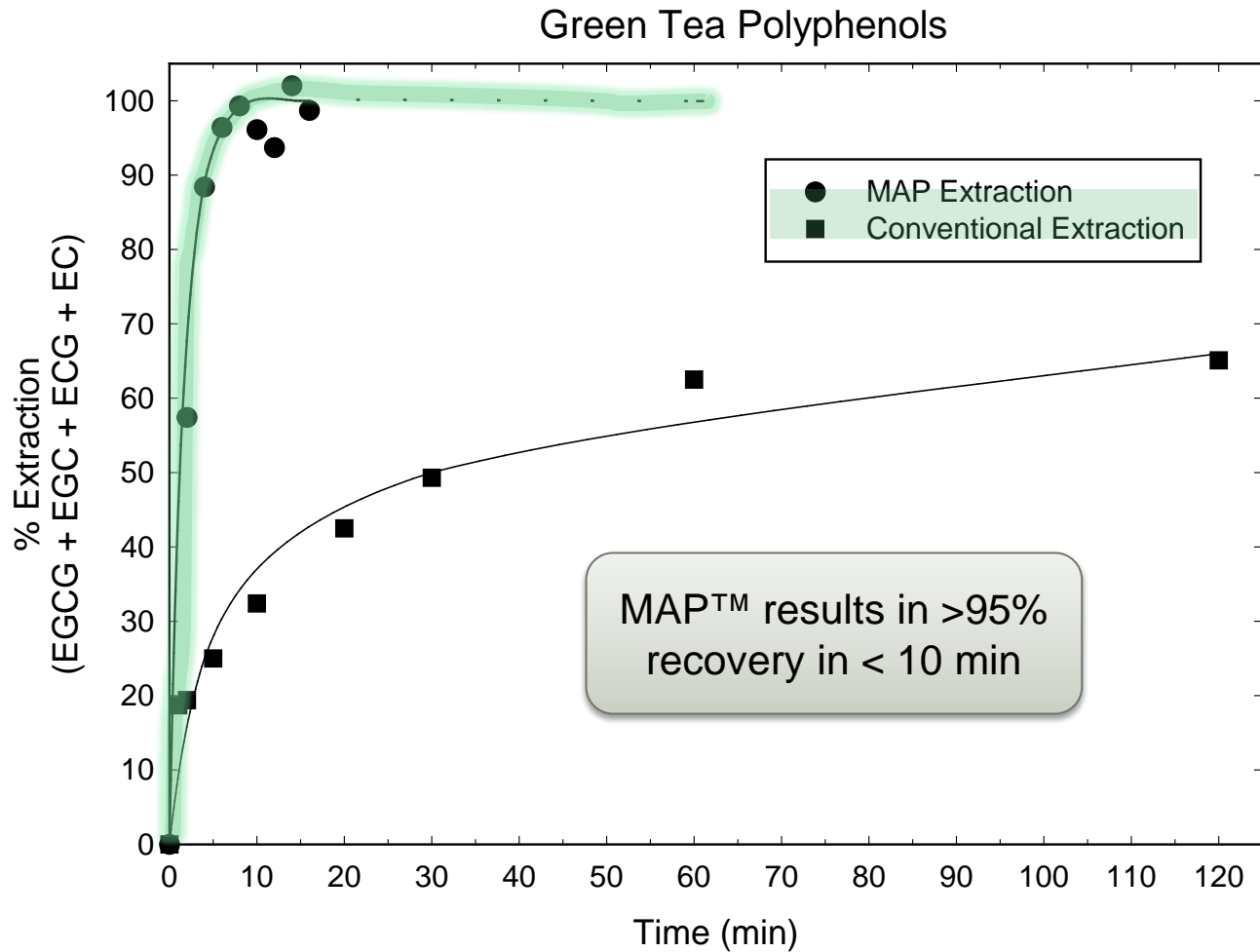


= the majority of industrially relevant natural products

Examples of MAP™ Results

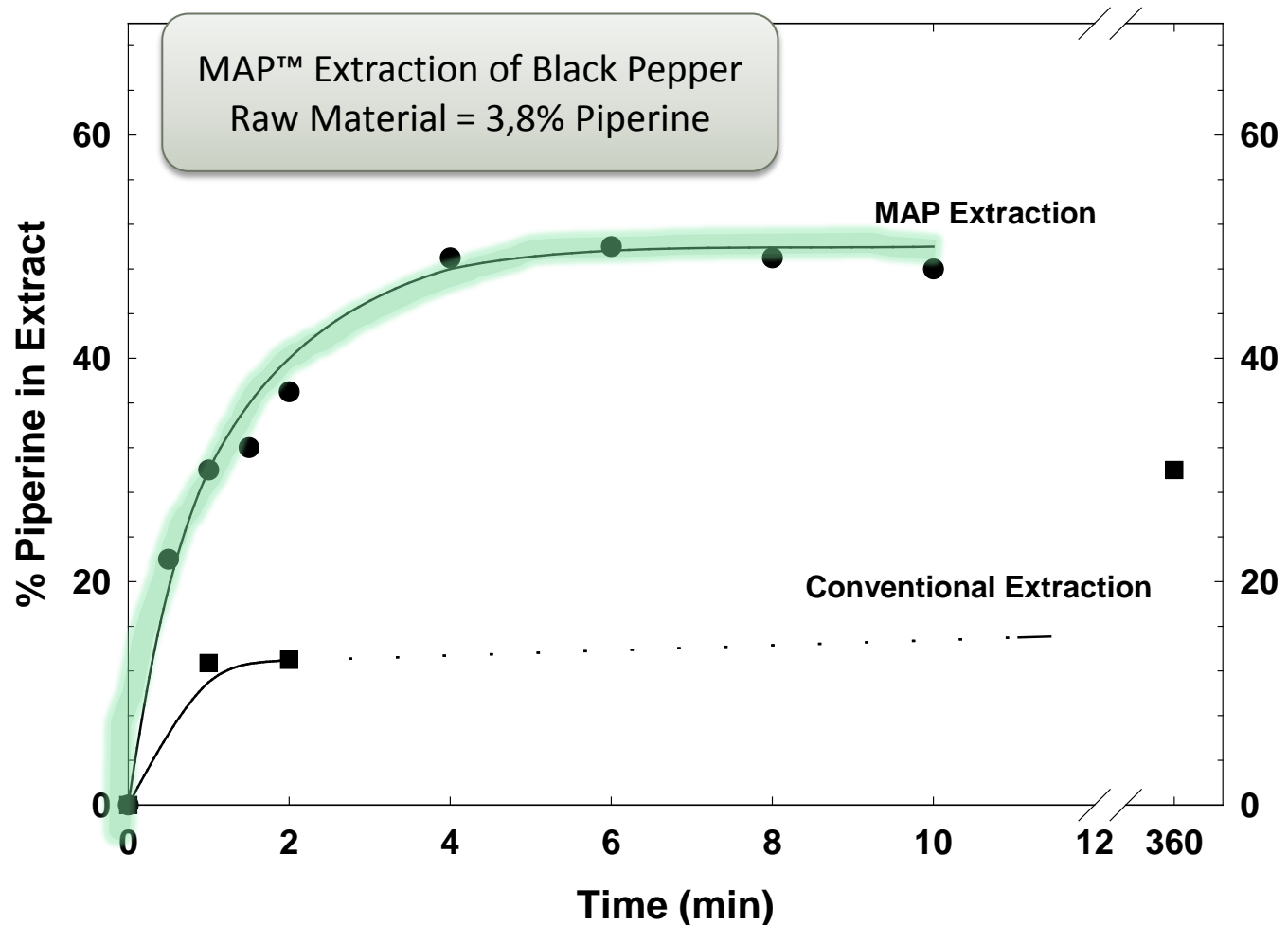
Example: Phenolics

Polyphenols from Green Tea



Example: Alkaloids

Piperine from Black Pepper



Many More Examples ...

Examples of successful feasibility in every commercially-relevant class of natural products*

- Essential Fatty Acids (borage oil)
- PUFAs
- Saw palmetto
- Edible vegetables oils (flax, canola, soybean)
- Algae Oils

Lipids



- Flax → Lignans (SDG)
- Sennosides
- Rosavins
- Terpene acid glycosides
- Pregnane glycosides

Glycosides



- Cyclopamine
- Black pepper → Piperine
- Opiates

Alkaloids



- Green tea → Polyphenols
- Rosemary herb → Carnosic acid
- Blueberries → Anthocyanins
- Seaweed → Polyphenols
- Vanilla beans → Vanillin
- Grape polyphenols

Phenolics



- Microalgae → Carotenoid
- Taxus → Paclitaxel
- Paprika → Carotenoid
- Marigold → Carotenoid
- Cubebol → Sesquiterpene

Terpenes



- Rice protein → Residual oil

Proteins



Radiant Facilities: *Edmonton, Canada*



Head Office / Process Development Laboratory
(16,000 sq. ft.)



Manufacturing: 4035-101 St. NW
(20,000 sq. ft.)

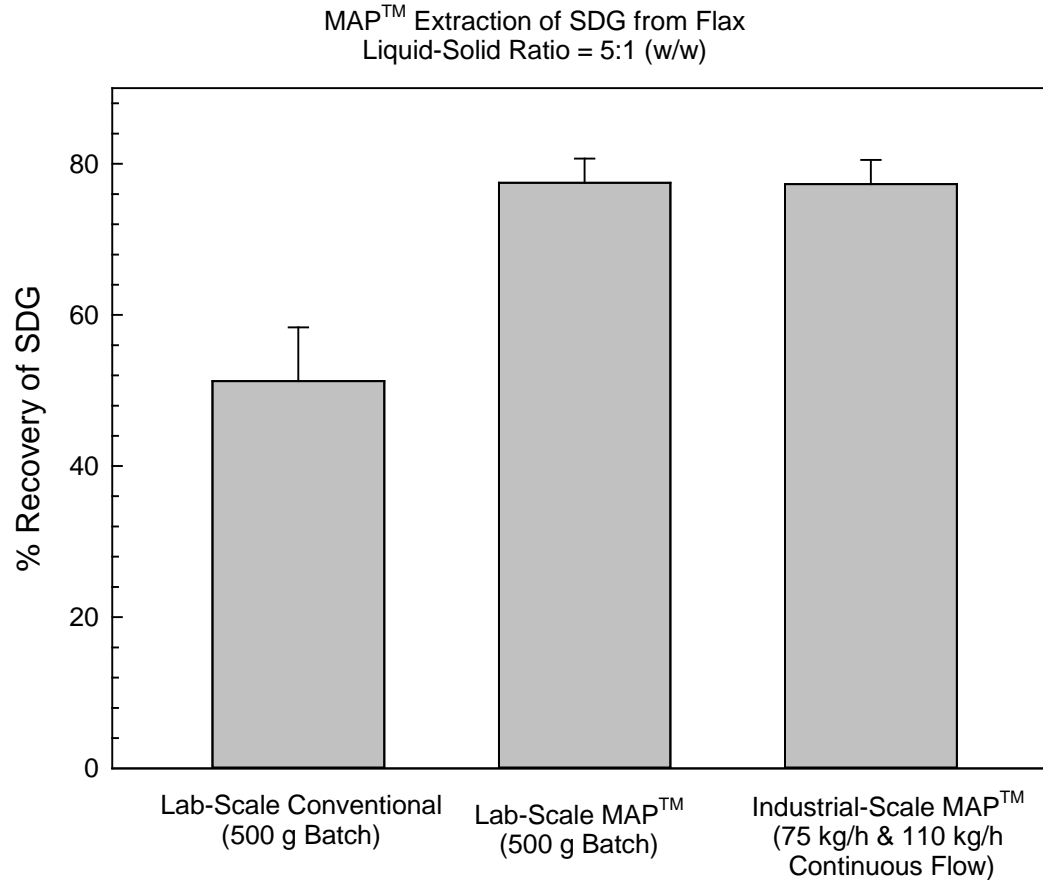


Industrial-Scale MAP™ Extractor



200 kg/h Continuous Flow

Industrial-Scale MAP™ Extractor

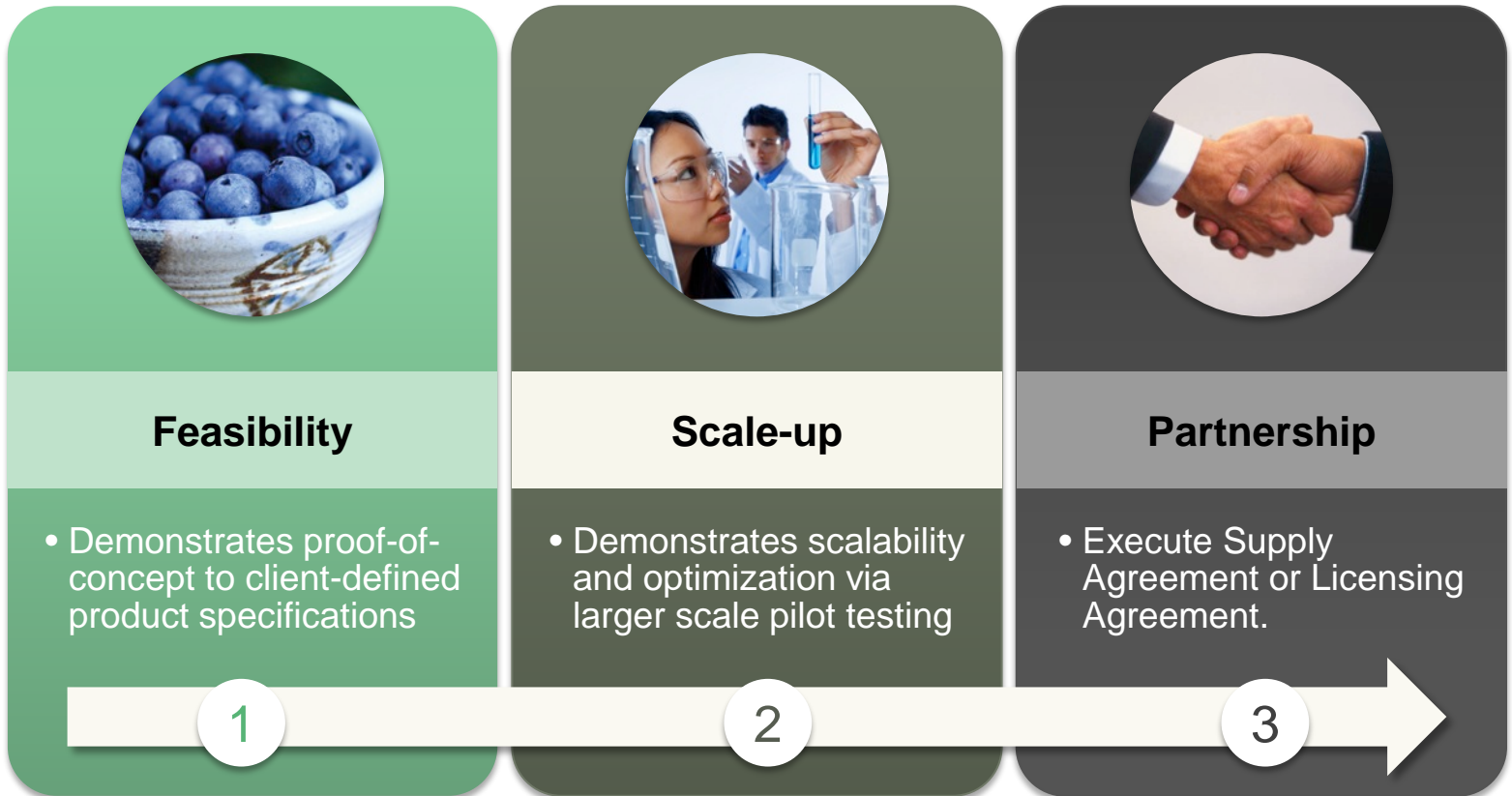


Replication of laboratory-scale MAP™ extraction results at commercial-scale confirmed

Development Process



Radiant reduces risk to its clients through the application of a proven three stage phased business development process:



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