



HAL
open science

How metabolomics is used to support the MetaPath solution through metabolic profiling of cheese fermentation industry ecosystem models?

Amandine Rocher, Annabelle Fernandez, Lindsay Peyriga, Floriant Bellvert

► To cite this version:

Amandine Rocher, Annabelle Fernandez, Lindsay Peyriga, Floriant Bellvert. How metabolomics is used to support the MetaPath solution through metabolic profiling of cheese fermentation industry ecosystem models?. 15èmes Journées Scientifiques du RFMF, May 2023, Perpignan, France. . hal-04168424

HAL Id: hal-04168424

<https://hal.science/hal-04168424v1>

Submitted on 21 Jul 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

How metabolomics is used to support the MetaPath solution through metabolic profiling of cheese fermentation industry ecosystem models ?

Amandine ROCHER^{1,2}, Annabelle FERNANDEZ³, Lindsay PEYRIGA^{1,2}, Floriant BELLVERT^{1,2}

¹ Toulouse Biotechnology Institute, TBI-INSA Toulouse INSA/CNRS 5504-UMR INSA/INRAE 792, Toulouse, France

³ BEL, Département Recherche Appliquée, Equipe Génie Biologique, 41100 Vendôme, France

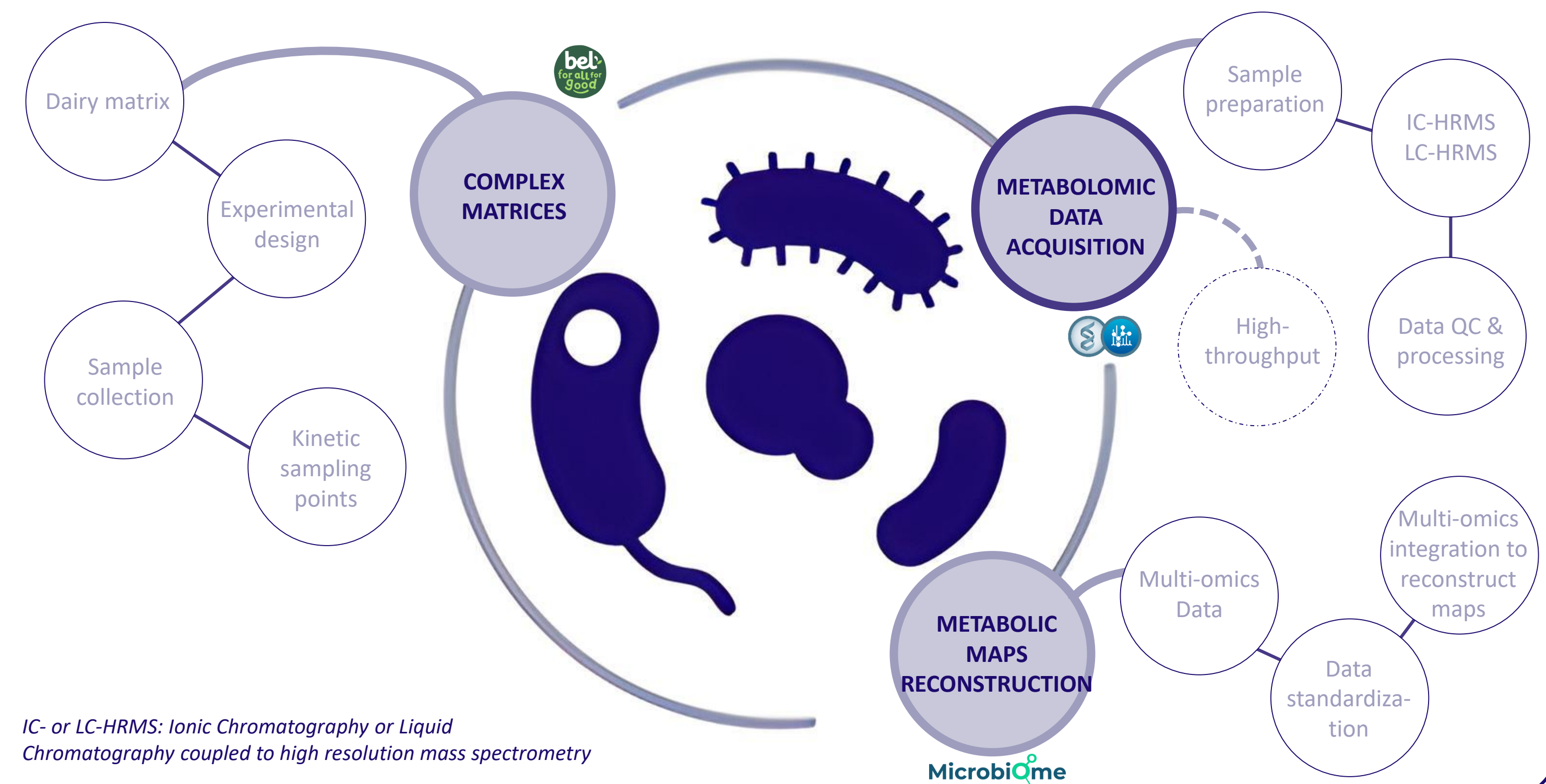
² MetaboHUB-MetaToul, National Infrastructure of Metabolomics and Fluxomics, Toulouse, 31077, France

Introduction

Consumer expectations and societal evolutions are at the heart of the concerns of fermentation professionals. The organoleptic properties of their products are closely correlated to its manufacturing process but also to its composition specifically the microbial ecosystems introduced to produce this fermentation.

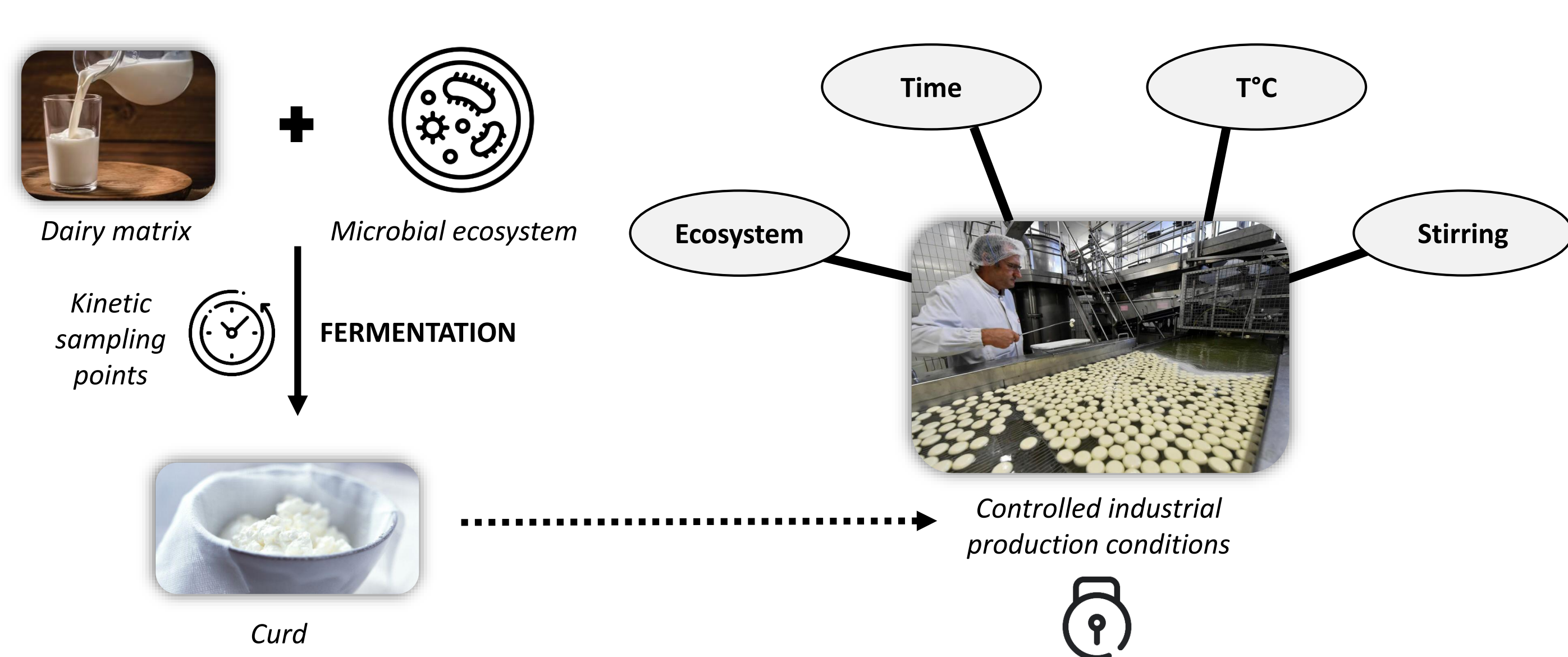
In this context, the Bpifrance MetaPath project aims to reconstruct the metabolic maps of these microbial ecosystems in order to guide the industrialist in the selection of microbial strains at the time of product design. This will enable them to better control and understand the organoleptic properties of finished products in a natural way, in line with consumer expectations. As a partner in the MetaPath project, the MetaToul platform aims to perform metabolic profiling of ecosystems in the cheese model of industrial partner Bel.

Material and methods

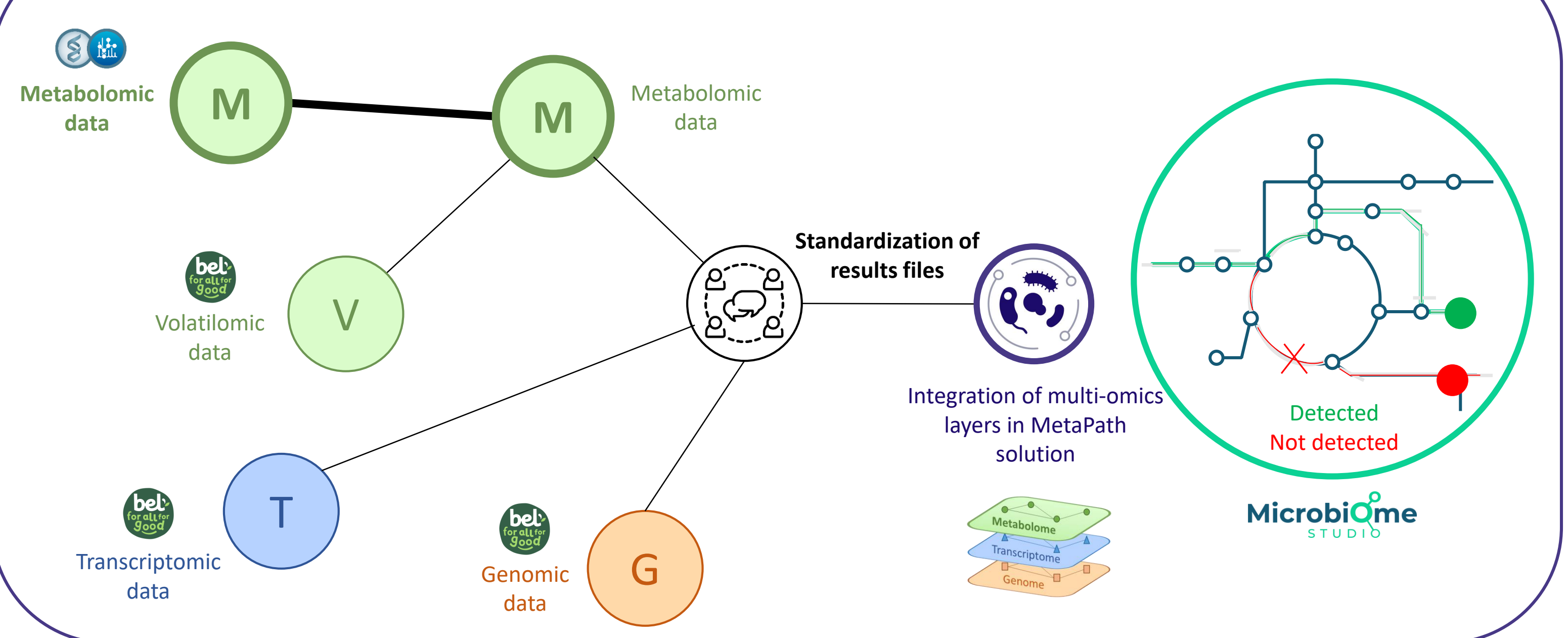


Results and discussion

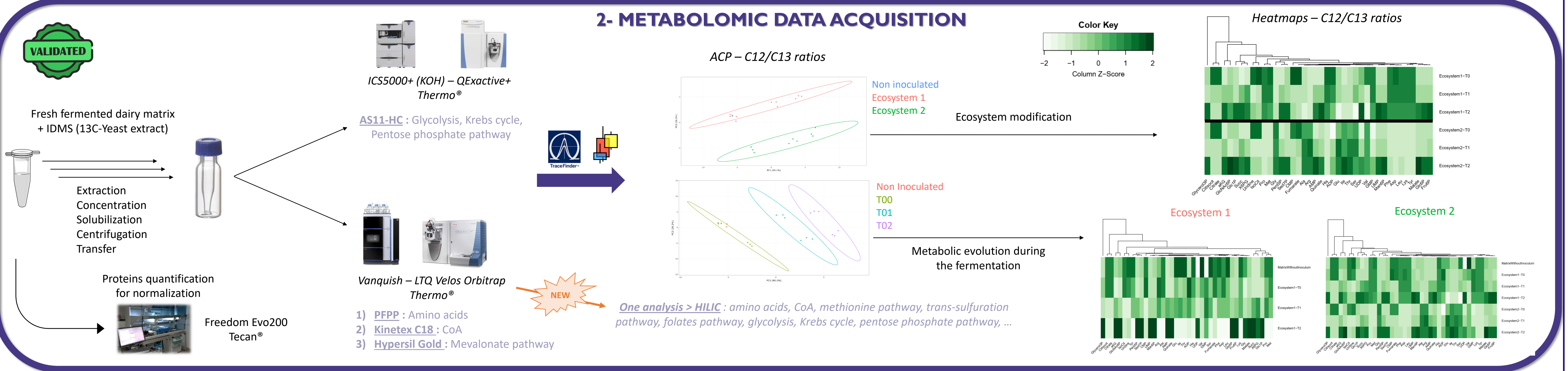
1- COMPLEX MATRICES



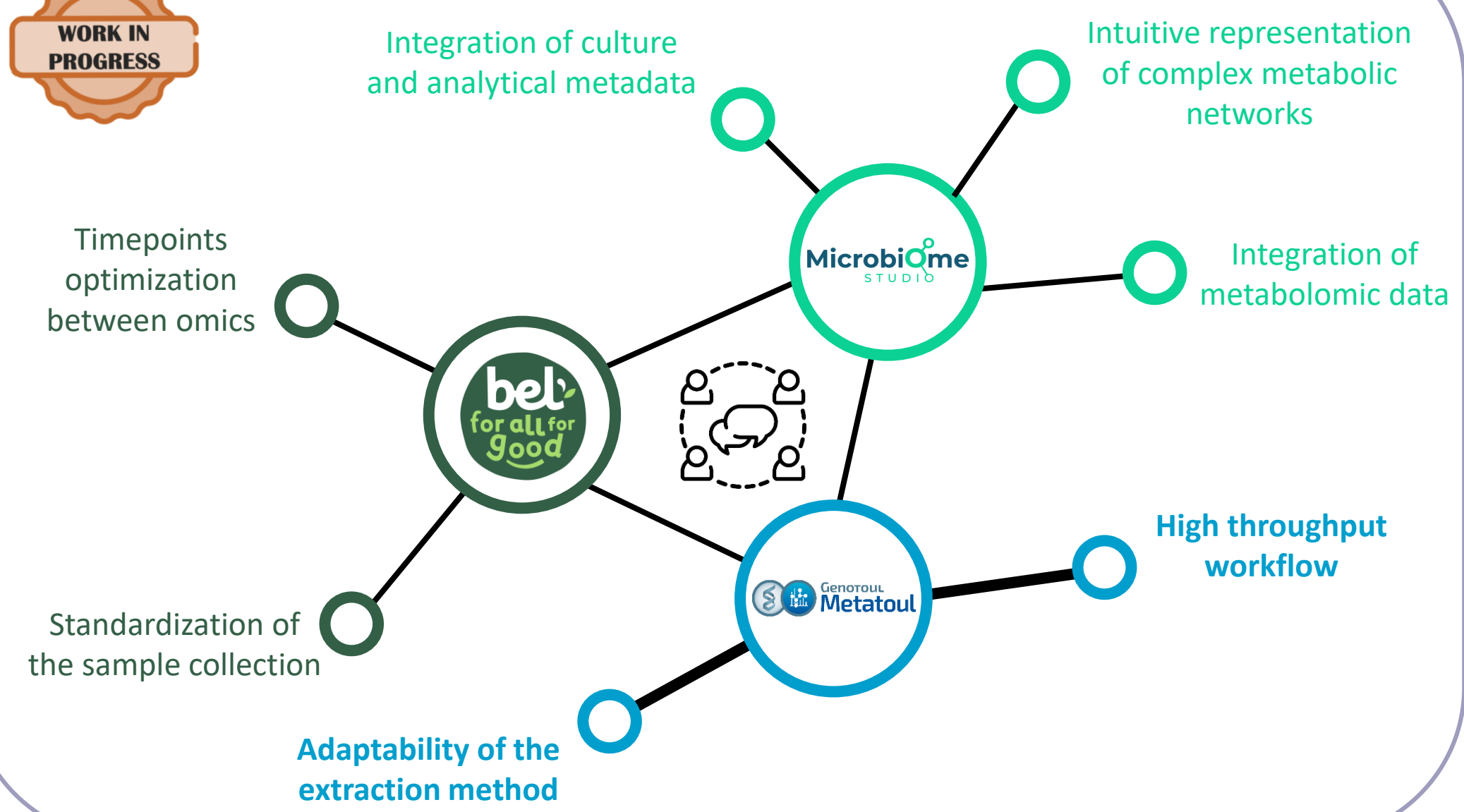
3- METABOLIC MAPS RECONSTRUCTION



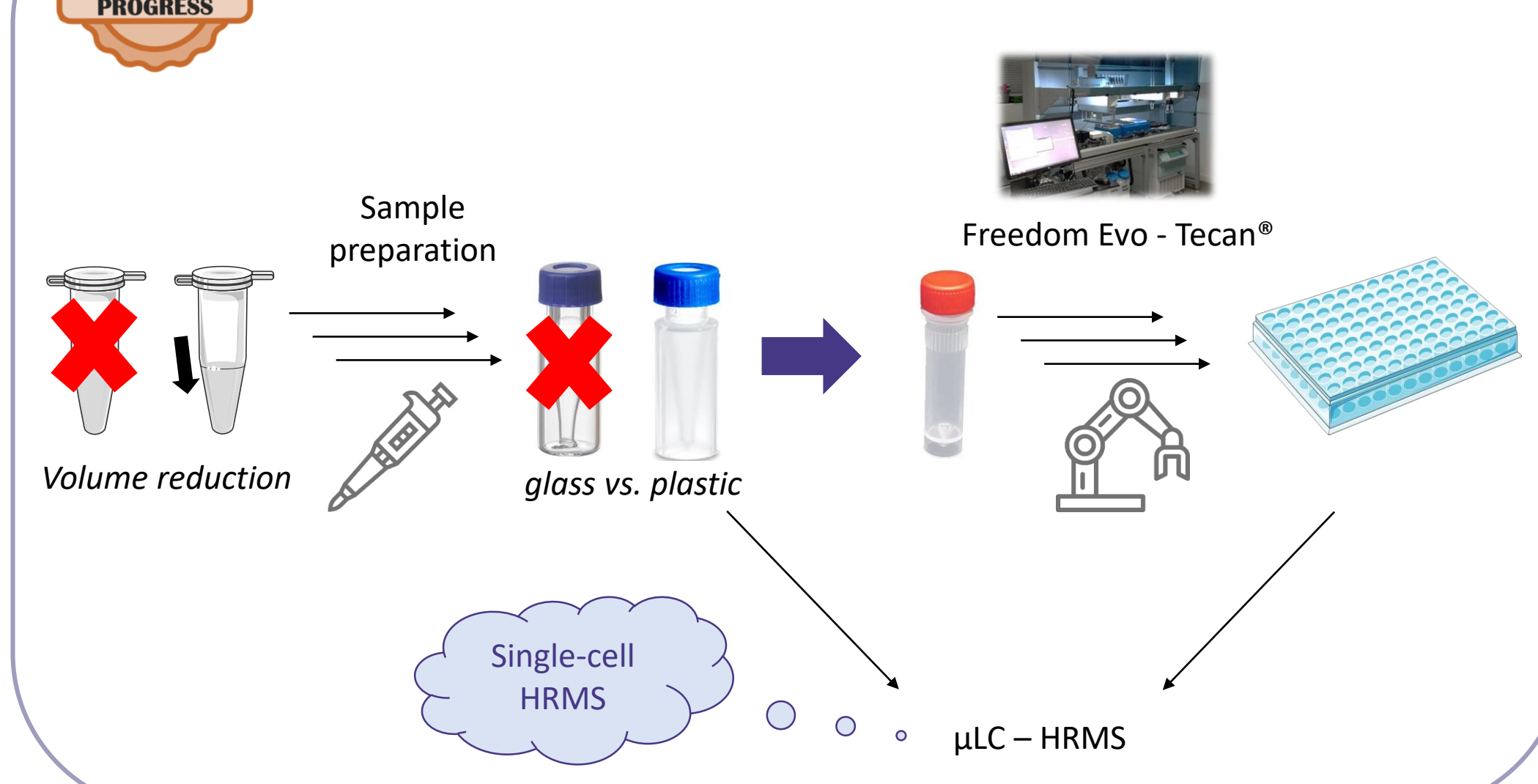
2- METABOLOMIC DATA ACQUISITION



ECOSYSTEMS MODELS EVOLUTION



MINIATURIZATION & AUTOMATIZATION



ECORESPONSABILITY

	Actual	Miniaturized	+ Automated
Sample preparation			
g eCO2 / sample	4.26	3.62	3.33
€ / sample	0.70	0.52	1.14

Analysis **WORK IN PROGRESS**

* Consumables only, without gloves

Conclusions

Different sampling and sample extraction systems have been validated to this day on this complex cheese matrix. It allows the detection of central and energetic metabolism but also of a wider detection. We currently cover the main pathways of the studied microorganisms such as glycolysis, Krebs cycle, pentose phosphate pathway and mevalonate pathway. This system is validated and is used for the reconstruction of metabolic maps of the studied ecosystems by Abolis / Microbiome Studio partner. The planning of the final sampling phase remains to be discussed in order to control the production of high throughput metabolomic data.

Acknowledgments

MetaboHUB (MetaboHUB-ANR-11-INBS-0010)

This collaboration project, METAPATH, is supported by the «Programme d'Investissements d'Avenir» operated by Bpifrance

