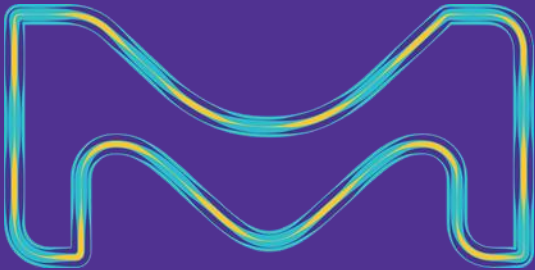


# BOLT

## **The digital transformation journey of CMC Development activities at Merck KGaA**

Alexandre Gilet – wega Breakfast  
22.10.2024



**MERCK**

# Agenda

1	<b>The Context</b>	<b>3</b>
2	<b>The Journey</b>	<b>8</b>
3	<b>The Implementation</b>	<b>18</b>
4	<b>The Solution</b>	<b>20</b>

# The Context

1

# The Context

## Global Healthcare Operations

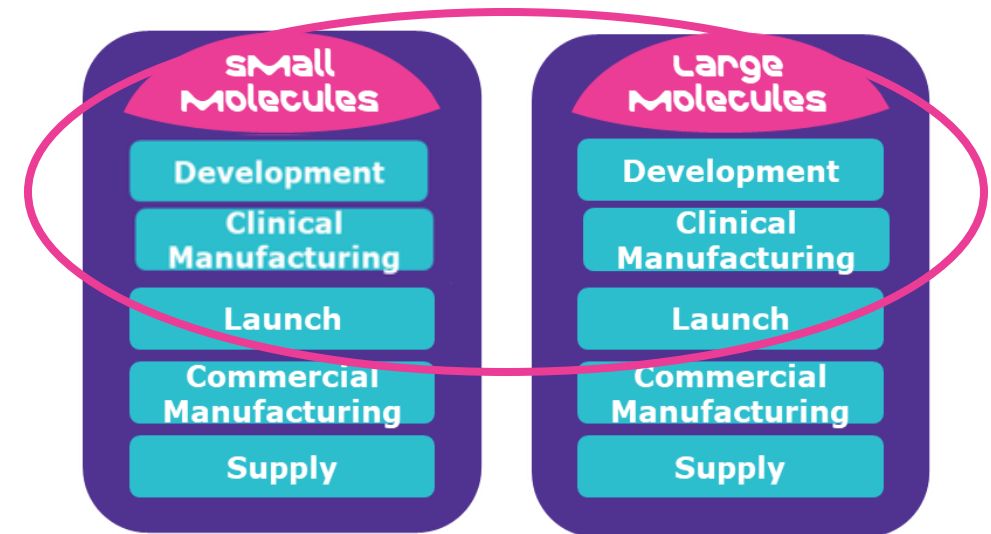


7000 people 160 nationalities  
19 sites +97 CMOs



# We are GCD

Global CMC Development



# The Context

## BDC Vision

### purpose & ambition

The **Merck Biotech Development Center** is our site of **excellence** at Merck in **biotech process development** and **clinical manufacturing**.

Its ambition is to **accelerate development timelines** to serve patients faster with innovative biologics



Corsier-sur-Vevey, Switzerland

### Our success factors



**Dedicated and talented people**, whose expertise and commitment drive our **innovative breakthroughs**.

Gather at the **same place our main CMC development functions** and simplify our operating model for higher efficiency



Leverage **latest development technologies** to serve our performance



Transition to the **next generation of processes**, combining single use bioreactors and continuous DSP, integrating PAT and Digital, offering more agility and even accelerating tech transfer to commercial

## The Context

# BDC as a bridge between Research and Commercial Manufacturing



**Digitally augmented CMC development by bringing data at the forefront of what we do with a product and process centric view**

## GCD / BDC

Digital & Data Vision

-  **Bridge the gap** from discovery research to commercial manufacturing with a digital thread across all phases of development
-  Minimize time and resource to clinic - consequently **maximizing** pipeline throughput and **speed to market**
-  **Automize** First in Human CMC Development workflows
-  **Build** unprecedented insights, **knowledge** and understanding of our molecules and processes

# The Journey

2

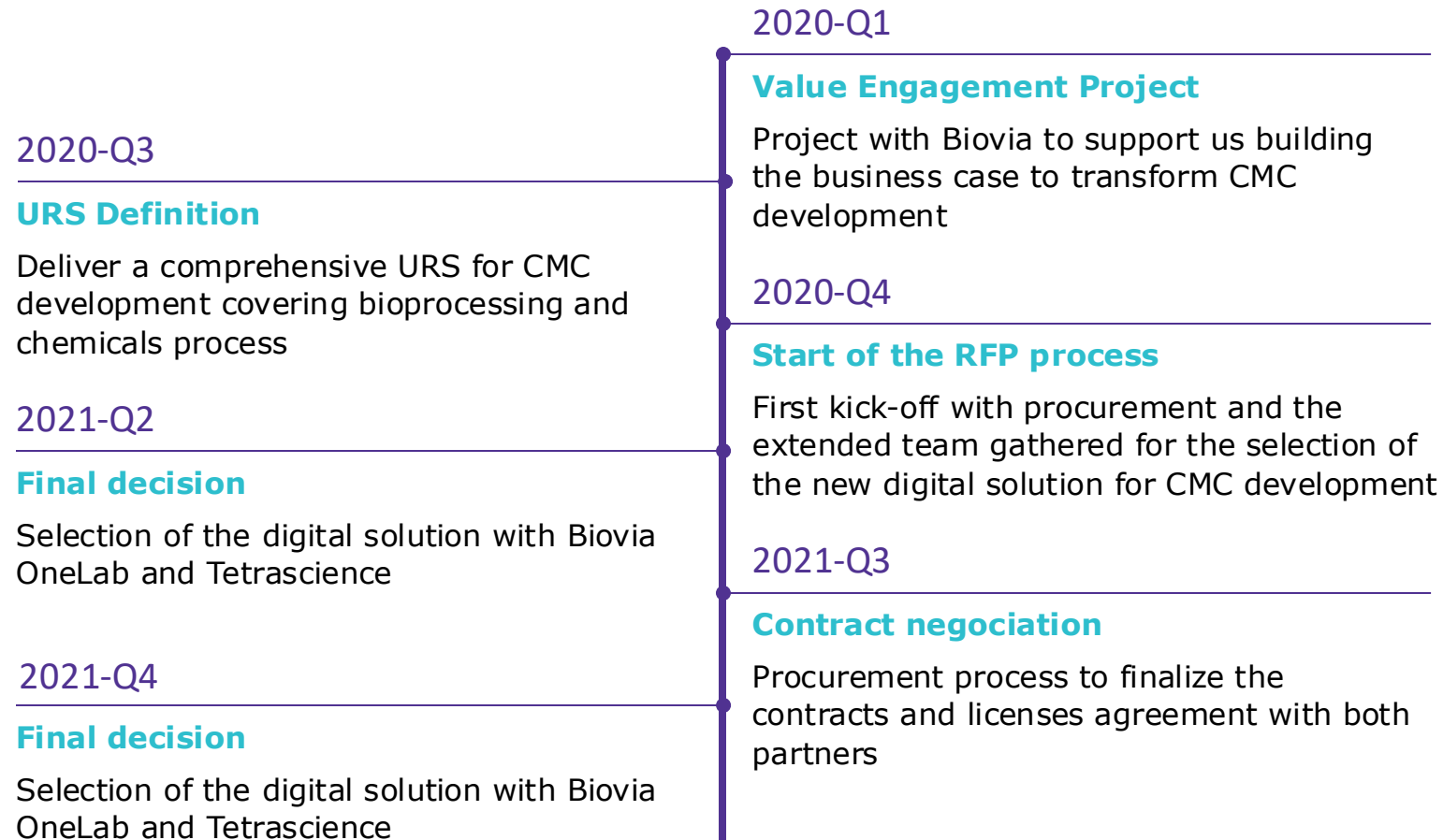




# The Journey

## Significant RFP/RFQ process

From building the business case to final selection of the platform



# BOLT

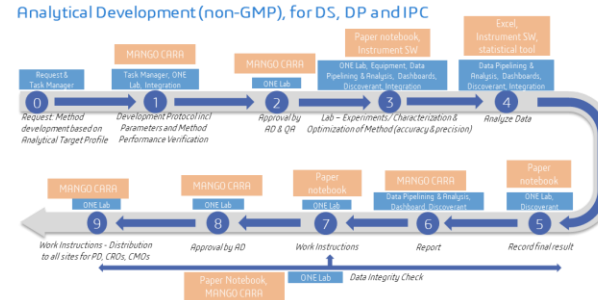
Biovia OneLab &  
Tetrascience

# The Journey Value Engagement Project

5



Days of workshop



~3



Colleagues involved

Guidonia  
Aubonne  
Darmstadt  
Vevey

Clinical Manufacturing  
QC Analytical Development  
DS/DP Development

# The Journey

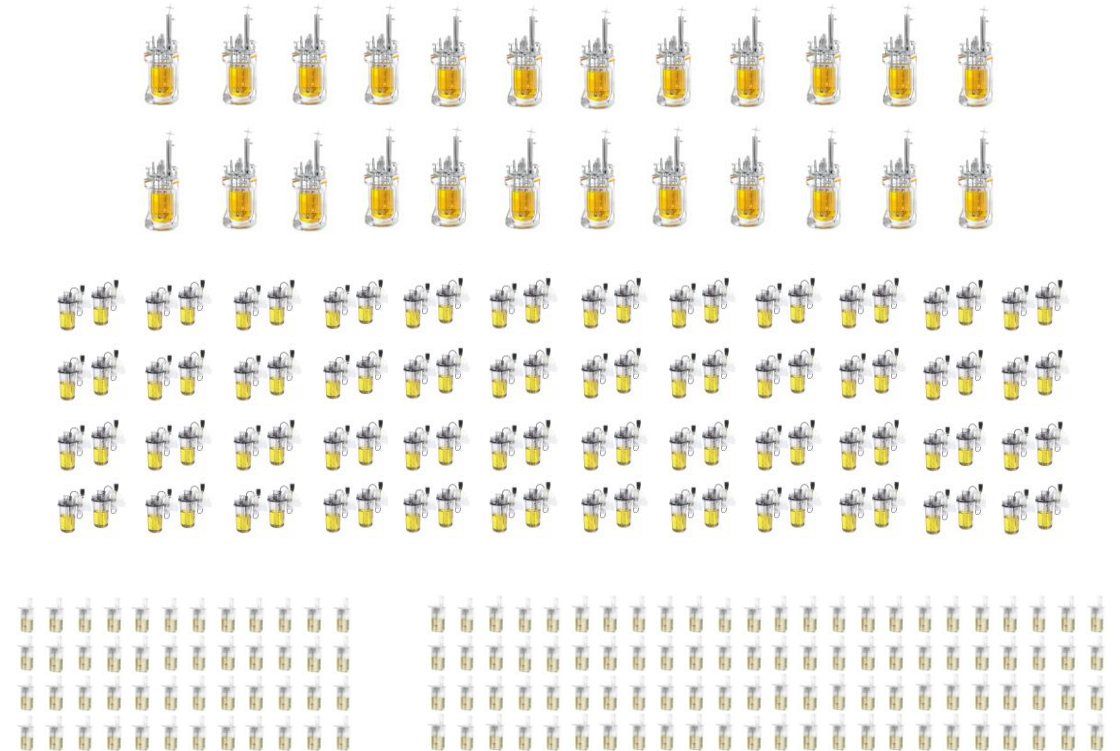
## Capacity comparison between USP Manufacturing and Development

Clinical Manufacturing



2 x 2000L Bioreactor

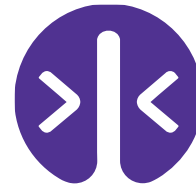
CMC Process development



24 x 3L Bioreactors

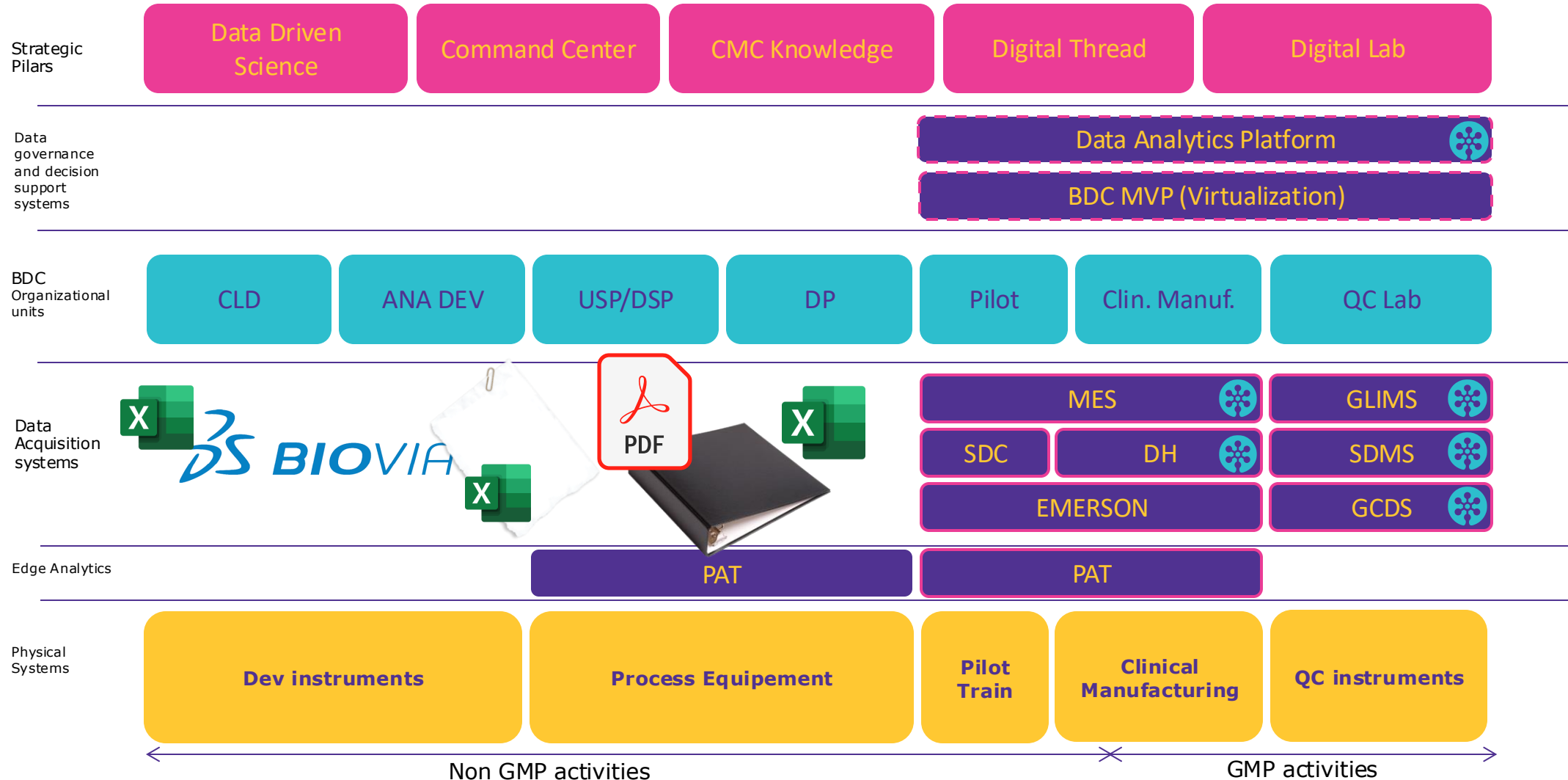
96 x AMBR250 Bioreactors

120 x Ambr15 Bioreactors



# The Journey

## BDC Digital Architecture gap



SARTORIUS

ThermoFisher  
SCIENTIFIC

LabVantage®

PerkinElmer®

Waters

astrix  
TECHNOLOGY GROUP  
STAFFING

DS BIOVIA

GE Healthcare

soladis GROUP

SYNTHACE

BSSN Software

Benchling

Genedata  
solutions in silico

During the discovery phase, we identified and contacted approximately 15 different vendors.

dotmatics  
knowledge solutions

BioBright

These vendors offer a diverse range of laboratory informatics solutions, spanning from classic Electronic Laboratory Notebooks (ELNs) to more data-centric tools.

&lt;LAB FORWARD&gt;

Securecell

Riffyn.

tetrascience

## Vendor Discovery

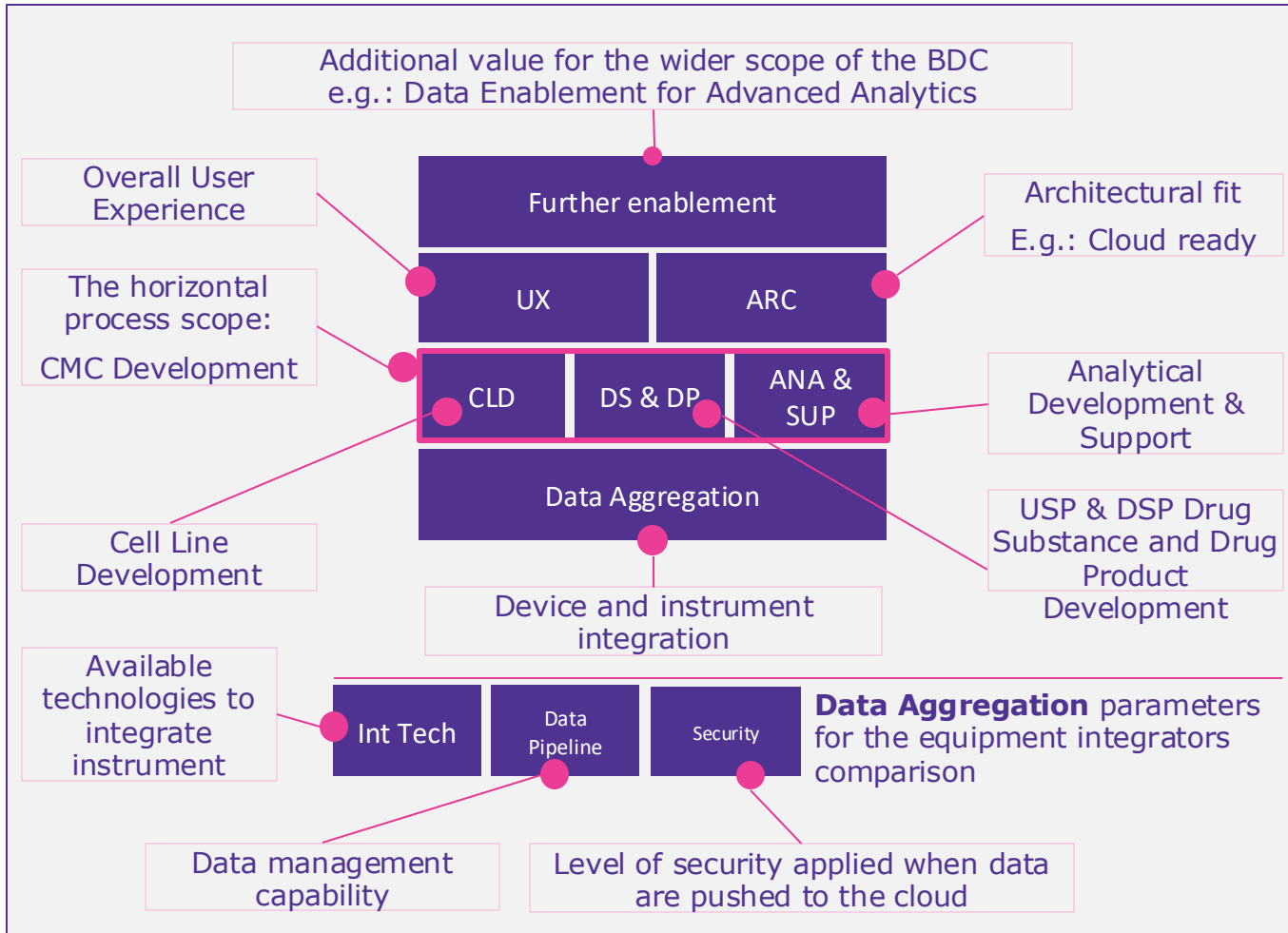
Solutions available early 2021

MERCK

# The Journey

## 14 vendor replies and a multi-modal evaluation matrix

### Capability Matrix



### Evaluated Vendors

★ **Shortlisted for Final Round**



# Selection process



1

Consultant company



5

Days of workshop



30

Colleagues Involved

Phase 1: Value Engagement  
Project + Market analysis

11

Vendors presented

Phase 2: Selection Round one

~29

Hours of proposal presentations

4

Teams working collaboratively  
Across the organization

6

Vendors are proposed

Phase 3: Selection Round Two

~290

Internal Hours spent  
over one week

4

Teams working collaboratively  
across the organization

4

Vendors with 5 scenarios  
evaluated

Phase 4: Final Round

~15

Alignment sessions

1

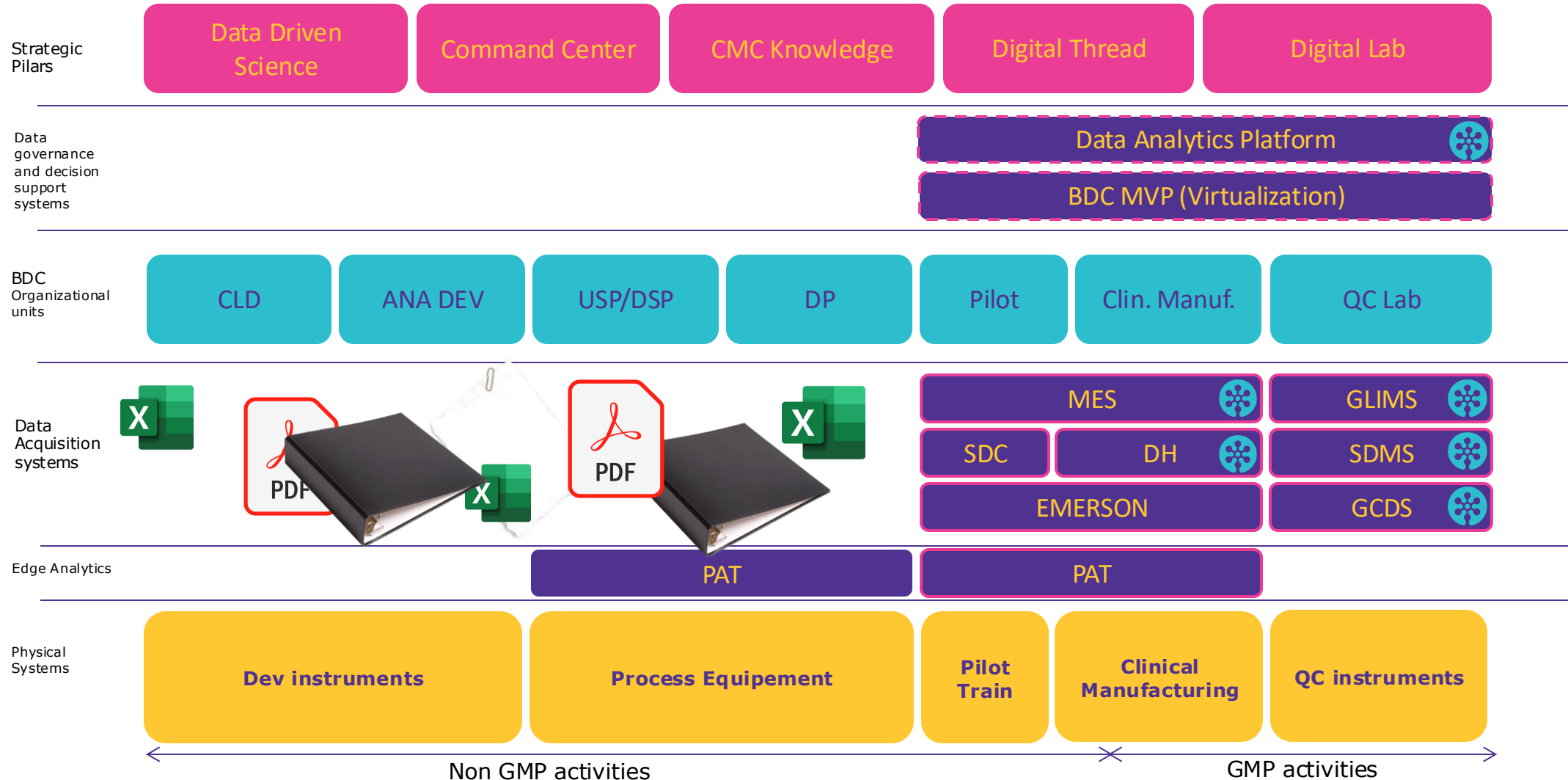
Core team

Recommendation



# The Journey

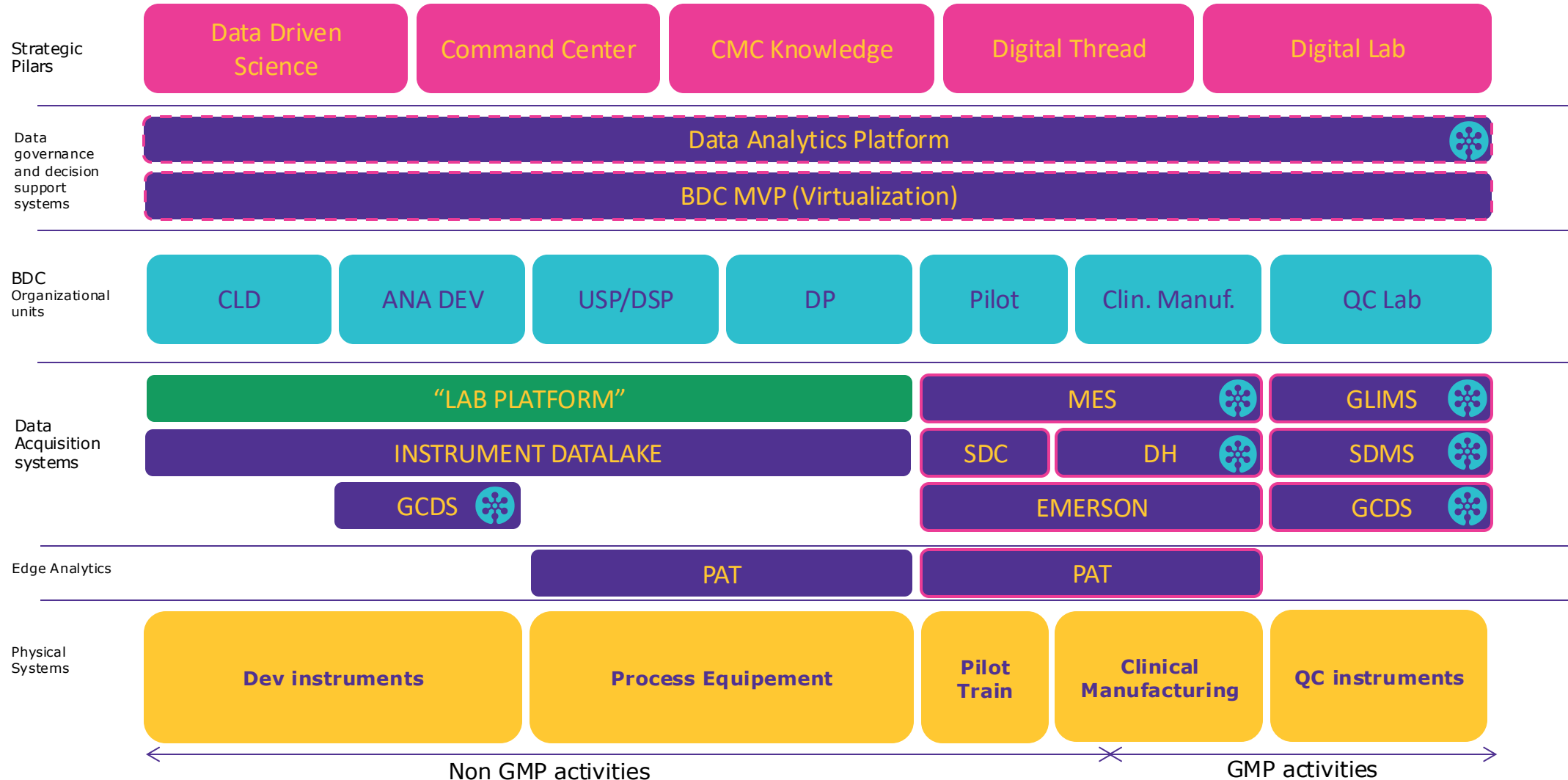
## A new concept integrated in the BDC architecture





# The Journey

## A new concept integrated in the BDC architecture



Global systems



Validated systems

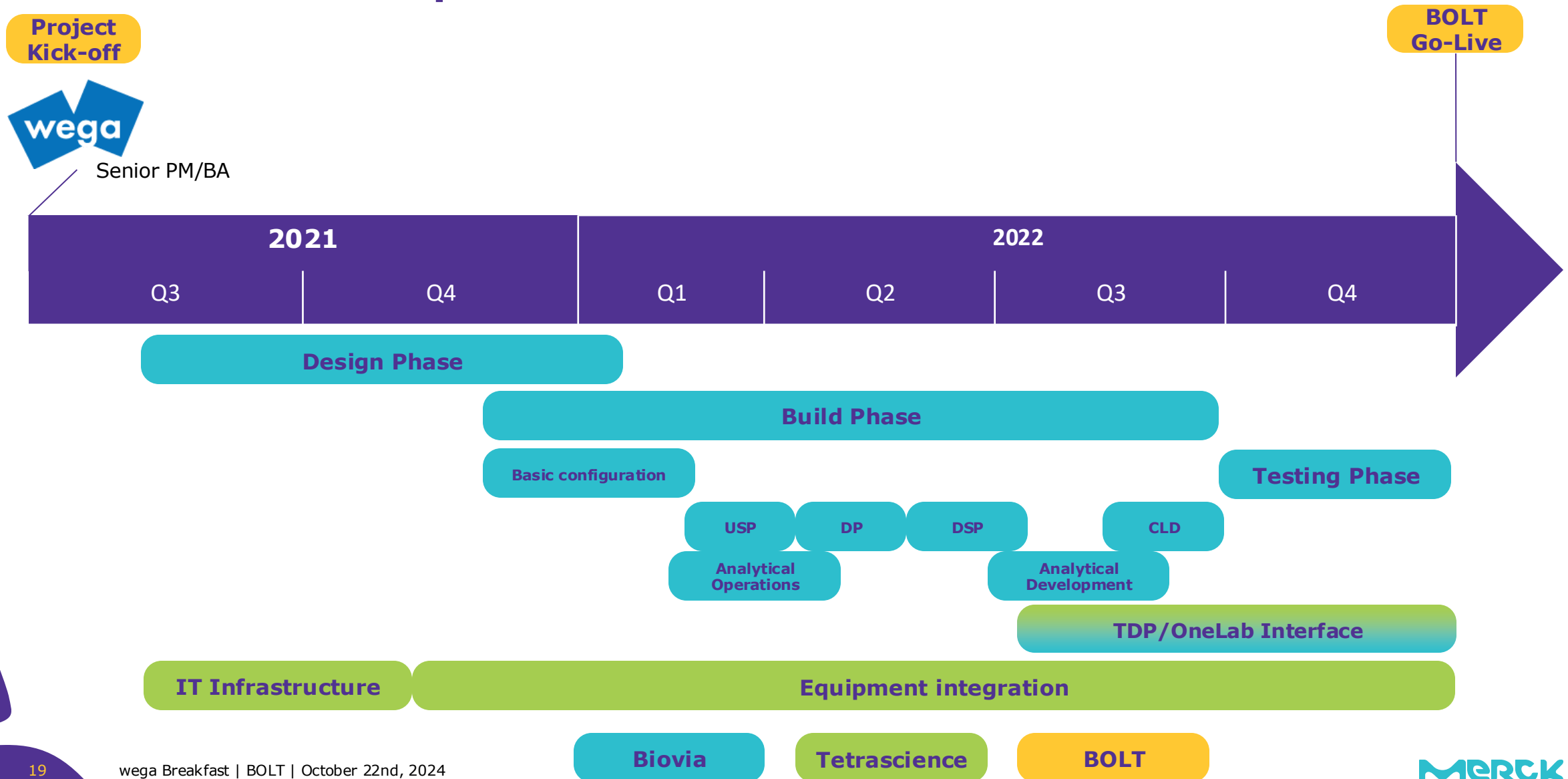


# The Implementation

3

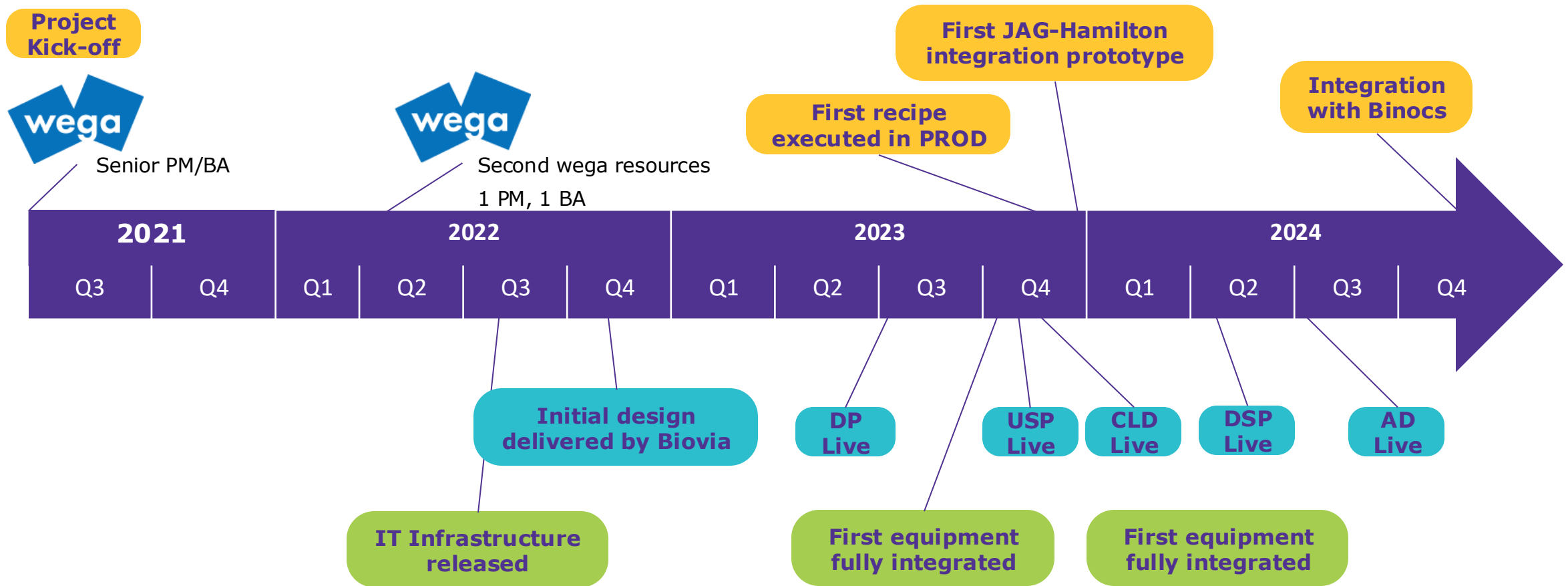
# The Implementation

## Overall timeline – plan at kick-off



# The Implementation

## Overall timeline – retrospective



# The Implementation

## The team

### 2021

Business PM and BA  
Digital Expert  
IT Project Manager  
8 key users

### 2022

Business PM  
Business BA  
2 Digital Expert  
IT Project Manager  
8 key users

### 2023

Business PM  
Business BA  
Digital Expert  
Equipment  
integration expert  
IT Project Manager  
8 key users

### 2024

Business PM  
Business BA  
Digital Expert  
2 Equipment integration  
specialists  
1 Robotic integration  
specialist  
IT Project Manager  
11 key users



# The Implementation 2023 in numbers



3

Labs live on BOLT



2

Equipment  
integration  
delivered



89

Documents approved

12

Experiments logged  
in the ELN



23

Active users

19

Equipment  
integration  
designed



500

Samples created in 2 task plan



# The Implementation

## BOLT in numbers as of October 2024

4



Labs live on BOLT

114

Equipment integrated



29

Equipment integration  
designed

145

Documents approved

233

Experiments logged  
in the ELN

12

ELN Templates



151

Recipe developed  
in Compose

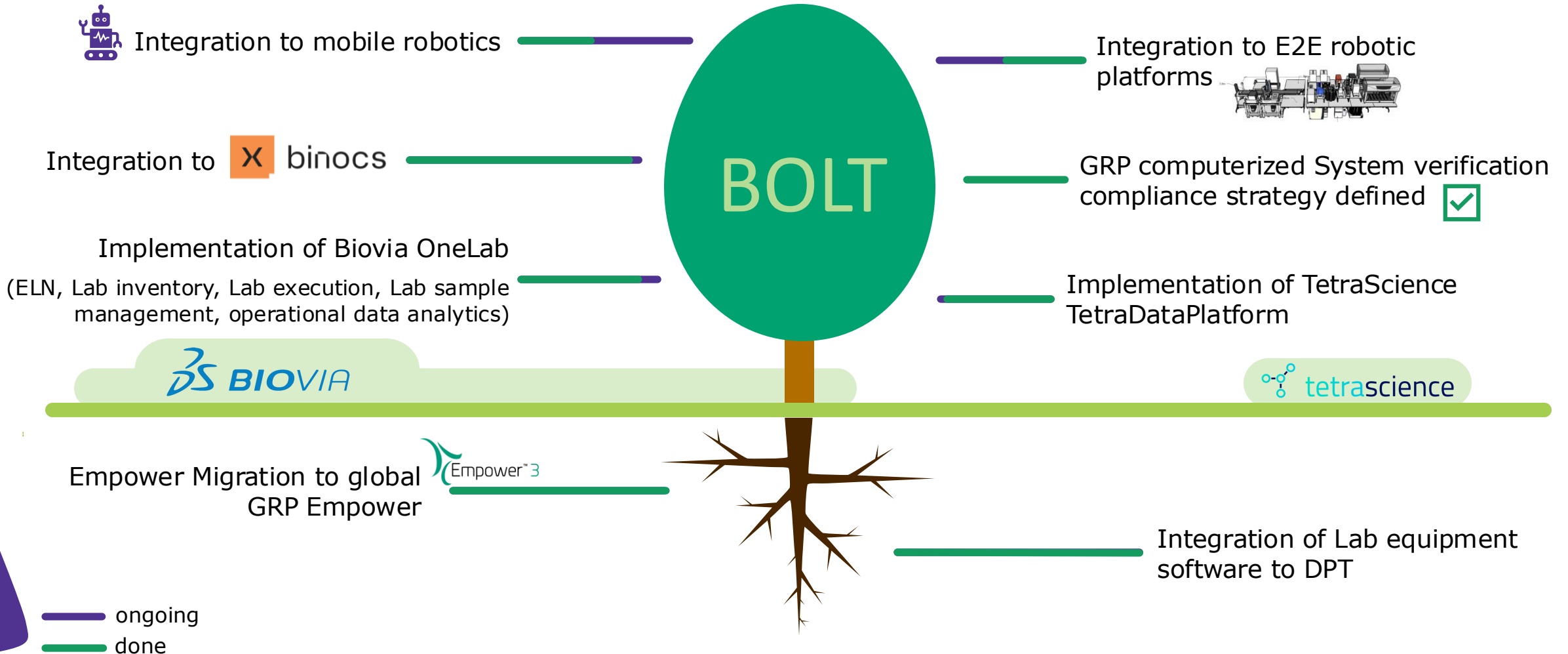
1009

Active users

&gt;10'000

Samples created in &gt;400 task plan

# The Implementation Highlights

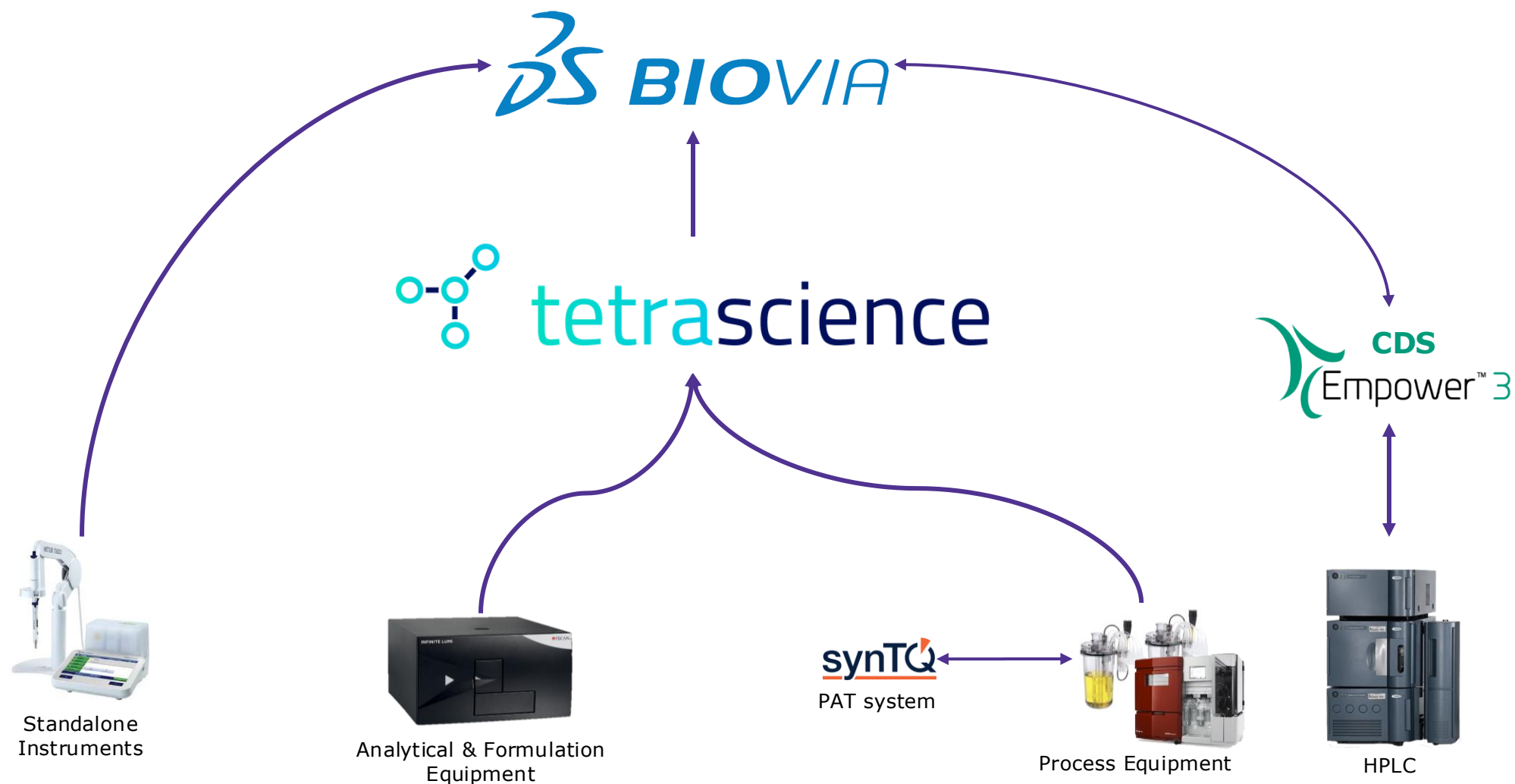




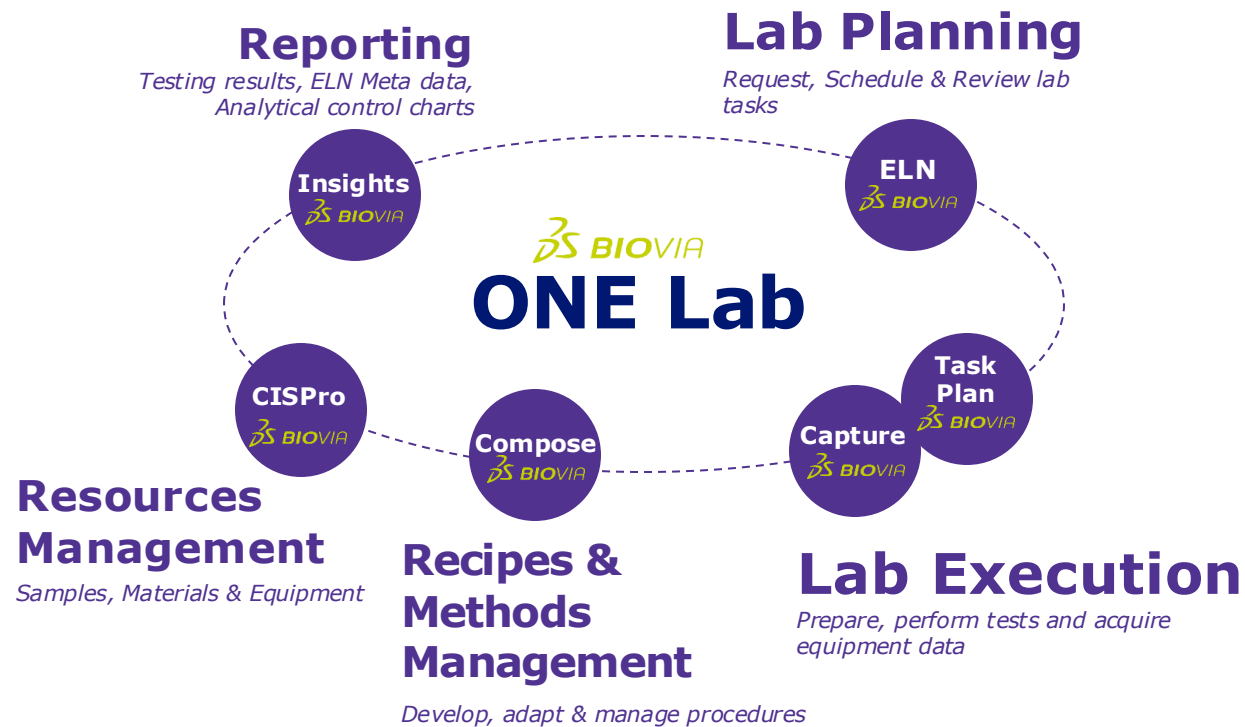
## The Solution

4

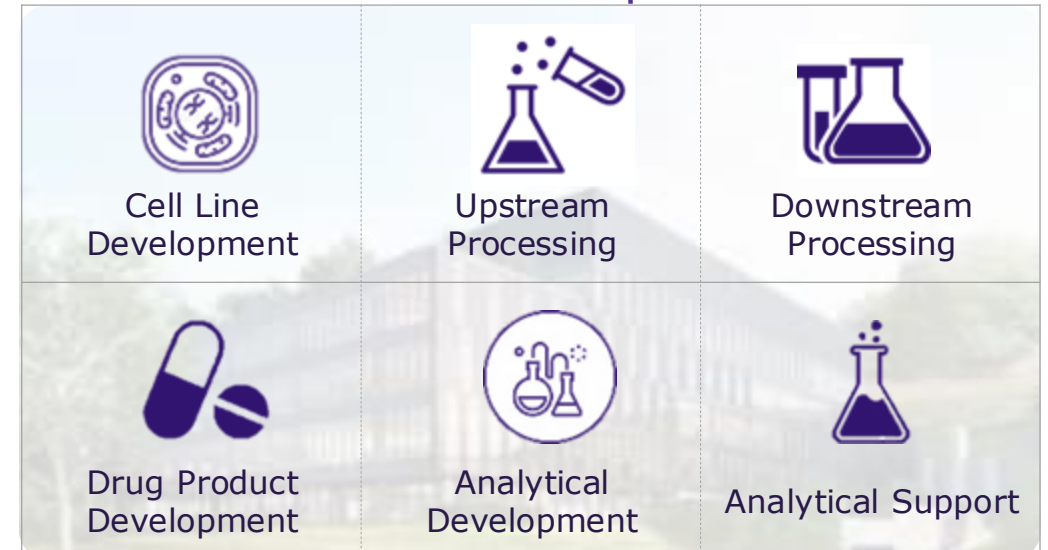
## The Solution

**GRP Systems: CMC Development management**

# The Solution Biovia

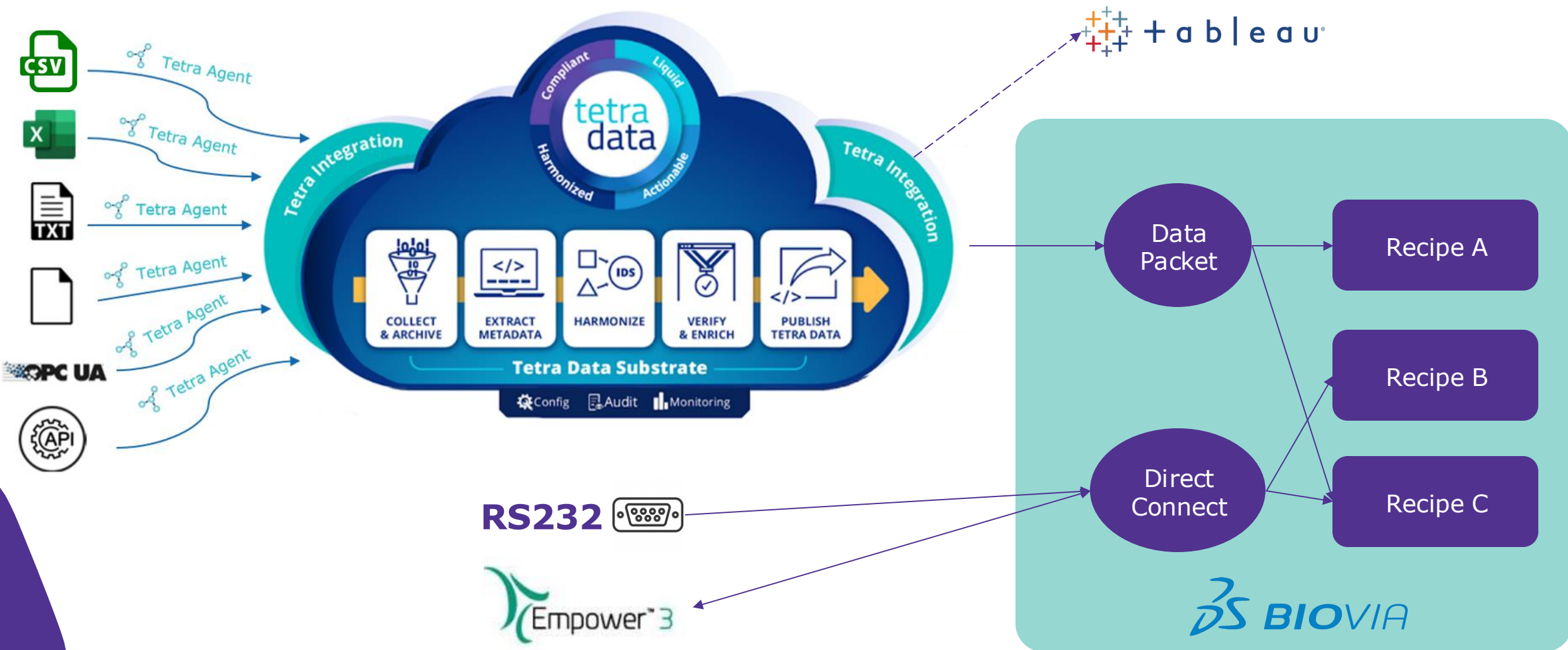


## MERCK Biotech Development Center



# GRP Systems Overview

## Equipment integration architecture



# The Solution

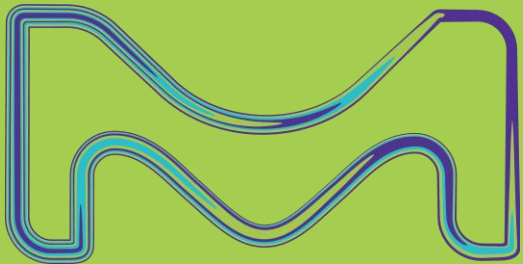
## Equipment integrated

Equipment Class	Manufacturer	Equipment Type	Integrator Confirmed	In use	Number of Equipment
Bioreactor	Sartorius	B-DCU	Tetrascience	Yes	30.00
IPC Analyser	Nova Biomedical	Bioprofile Flex II	Tetrascience	Yes	13.00
Bioreactor	Sartorius	Biostat RM	Tetrascience	Yes	10.00
Incubator	Infors	Multitron	No Integration	Yes	9.00
Process Chromatographic System	Cytivia	ÄKTA Pure System	Tetrascience	Yes	8.00
Balance	Sartorius	Cubis II Precision Balance	Biovia	Yes	7.00
pH/Conductimeter	Mettler Toledo	Seven Excellence S470	Biovia	Yes	6.00
Balance	Sartorius	Cubis II Semi-micro Balance	Biovia	Yes	4.00
Bioreactor	Sartorius	Ambr250-HT	Tetrascience	Yes	4.00
Osmometer	Gonotec	Osmomat 3000	Biovia	Yes	3.00
Turbidimeter	Hach	TL2360	Biovia	Yes	3.00
Bioreactor	Sartorius	Biostat RM Perfusion	Tetrascience	No	2.00
IPC Analyser	Beckman Coulter	ViCell BLU	Tetrascience	Yes	2.00
Process Chromatographic System	Cytivia	ÄKTA Avant System	Tetrascience	Yes	2.00
Spectrophotometer	Unchained Labs	Stunner	Tetrascience	Yes	2.00
Balance	Sartorius	Cubis II High-Capacity Balance	Biovia	Yes	1.00
DNA analyzer	Biorad	QX ONE	Tetrascience	Yes	1.00
Dynamic Light Scattering	Malvern	Zetasizer	Tetrascience	Yes	1.00
Fluorimeter	Jasco	FP-8550	Tetrascience	Yes	1.00
Nucleofector	Lonza	Amixa-4D-Nucleofector	Tetrascience	Yes	1.00
Process Chromatographic System	Cytivia	ÄKTA Pilot System	Tetrascience	Yes	1.00
Spectrophotometer	Unchained Labs	Lunatic	Tetrascience	Yes	1.00
UF/DF System	Merck Life Science	Cogent® µScale TFF system	Biovia	Yes	1.00
<b>Total</b>					<b>113.00</b>

# BOLT

**Training on USP configuration**

MAGRIN Anthony

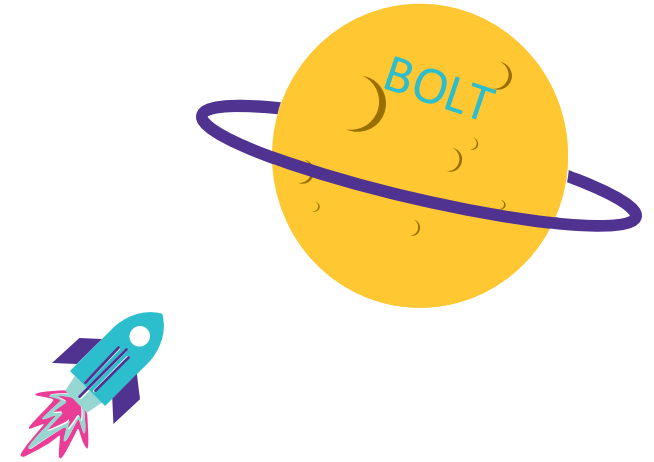


**MERCK**

# BOLT Training session

## Agenda

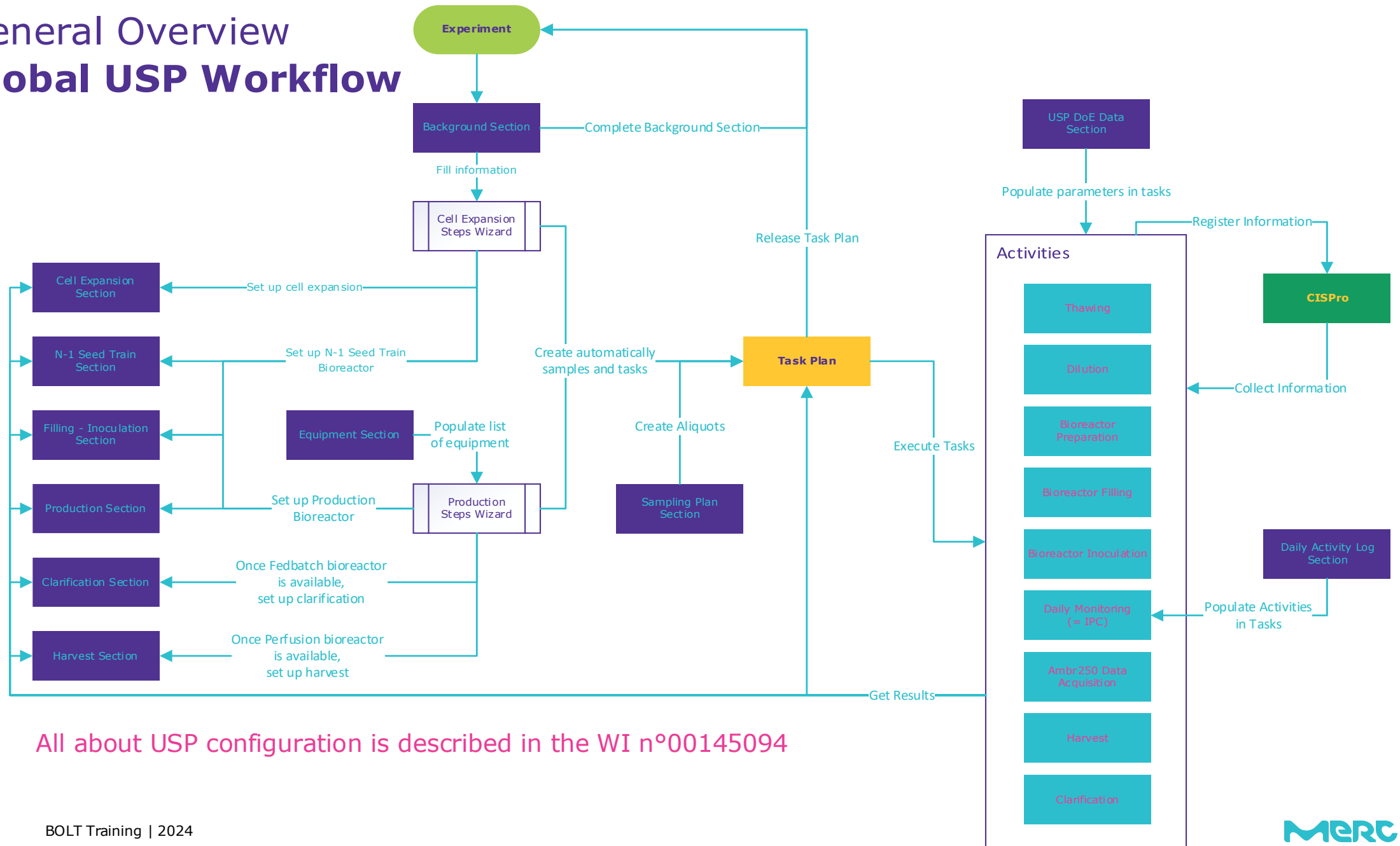
1. Theoretical notions of BOLT (2h)
2. Discovery of an experiment (1h)
3. Creation of an experiment (4h)
4. Exploration of the HUB (1h)
5. Task Plan (1h)
6. Take-off in Task execution (6h)
7. Equipment (1h)
8. CISPro (2h)
9. Landing of Process Results (0.5h)
10. A journey in Analytical Operations workflow (2h)
11. Insight Travelogue (2h)





# General Overview

## Global USP Workflow



All about USP configuration is described in the WI n°00145094



# Thank you Questions?

Thank you to the whole team in Merck for their dedication.

Thank you wega Informatik AG for the continuous support.

Thank you to our partners from Biovia and Tetrascience.