ADHERENT CELL THERAPY USING SMART ROBOTICS
INTRODUCING **ACT SMART**

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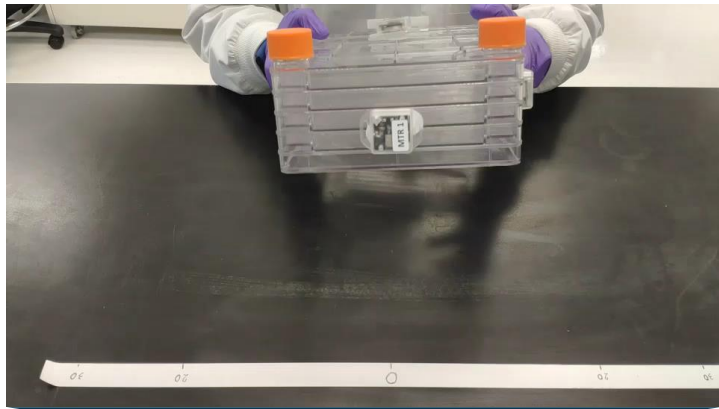RAYA 2023 Finalist Event

What is the use case?

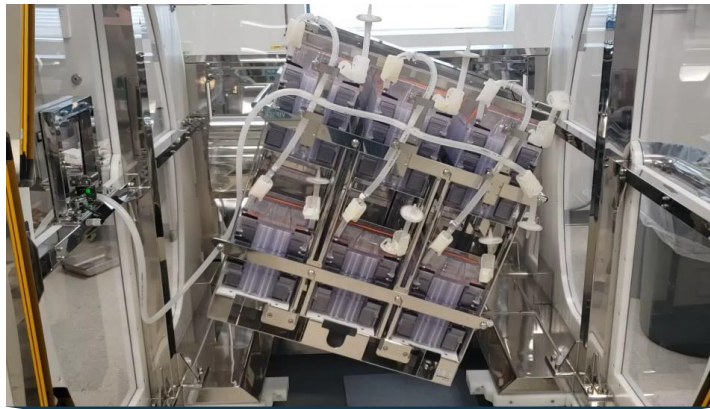## Towards Industrialization of Cell Therapy Manufacturing

1 Manual process	2 Semi-automated	3 Robotized

> Open handling
> Labour intensive
> Fully manual process
> Trained processing with low reproducibility
> Environmental conditions varying

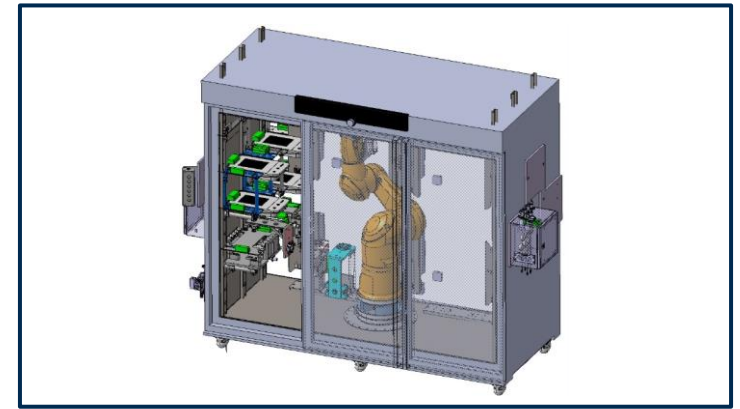> Commercially available semi-automated equipment
> Partly open process
> Many manual steps
> Environmental conditions varying
> Pre-Defined motions

> Next generation automated equipment
> Process fully closed
> Controlled environment throughout process
> Robot-controlled motions
> Digital twin of the operator
> PAT included

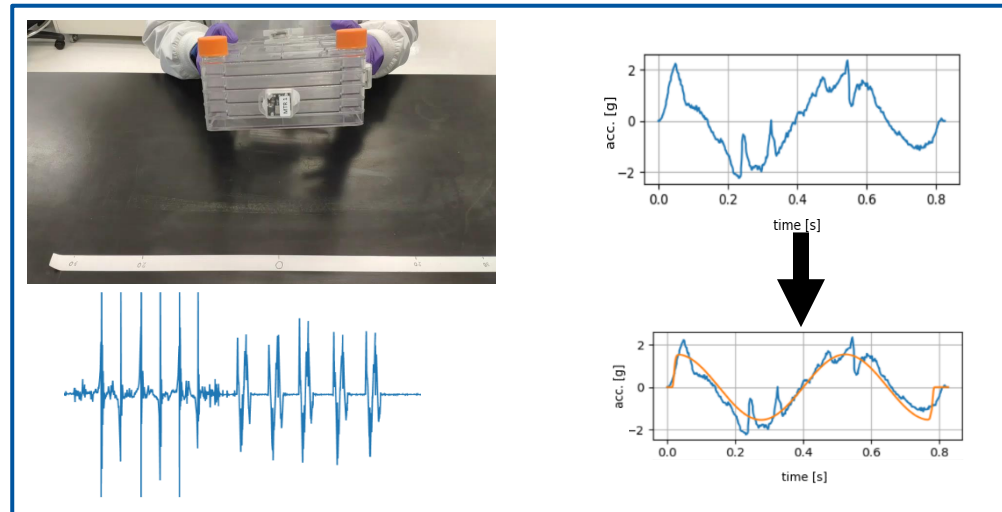# Why is it smart?

Adherent Cell Therapy using Smart Robotics

Human Operator
Manual Cellstack Handling

Robotic Cellstack handling

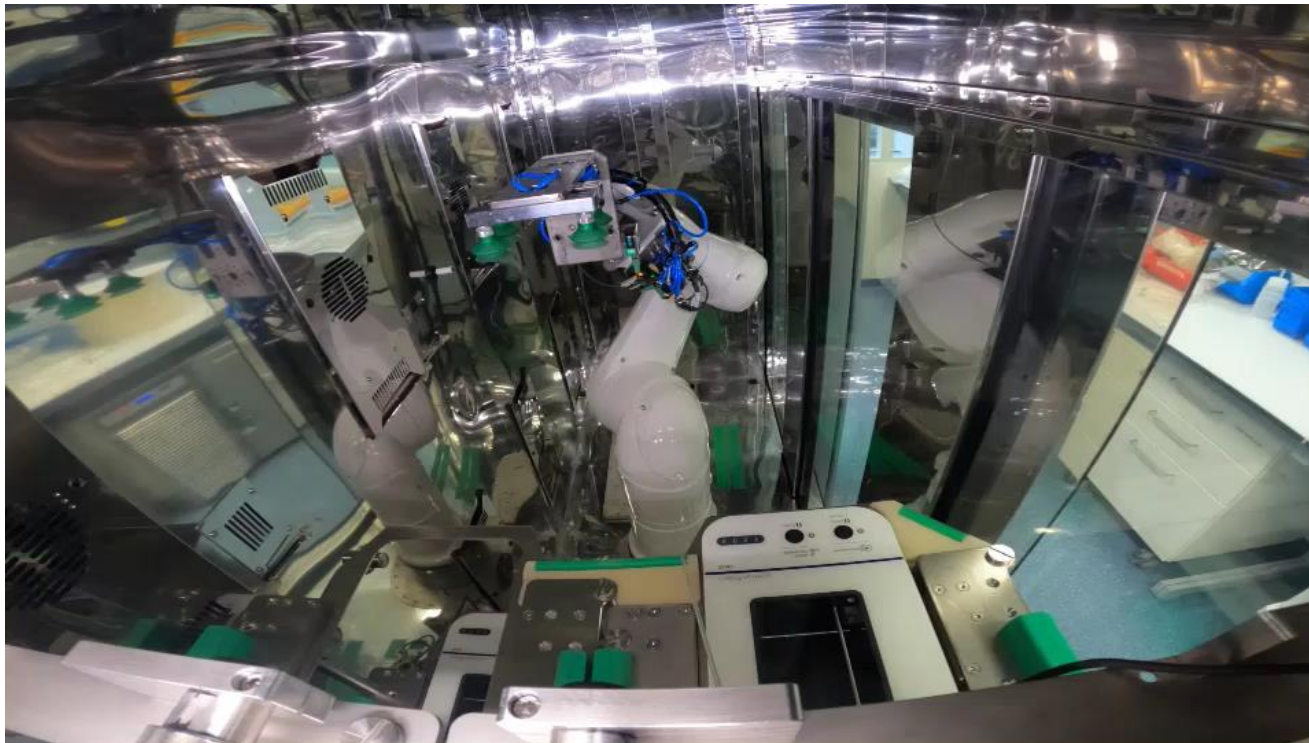mbientlab.com

Sensing and Recording
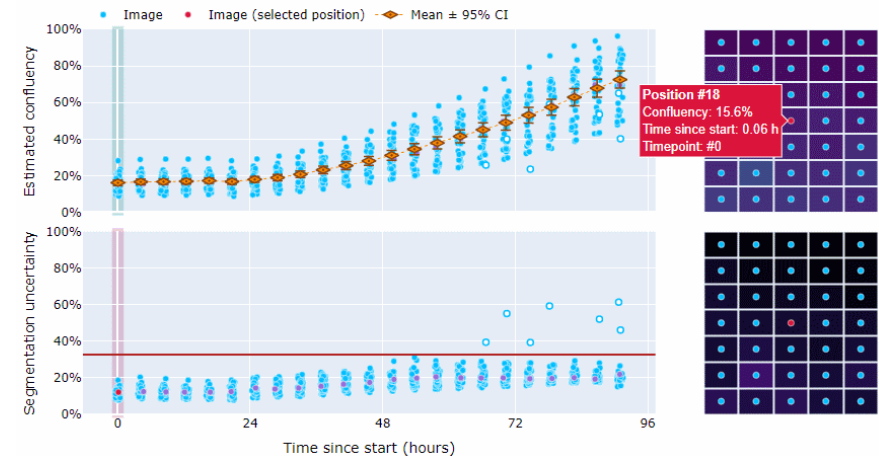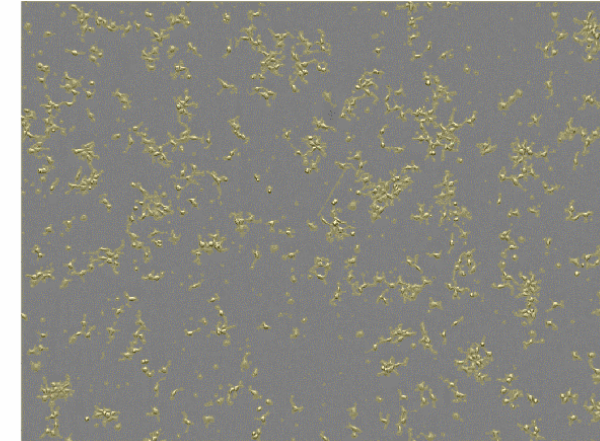
Modeling and Translating

Motion Model Implemented

What is the result?

Adherent Cell Therapy using Smart Robotics

Automated Processing
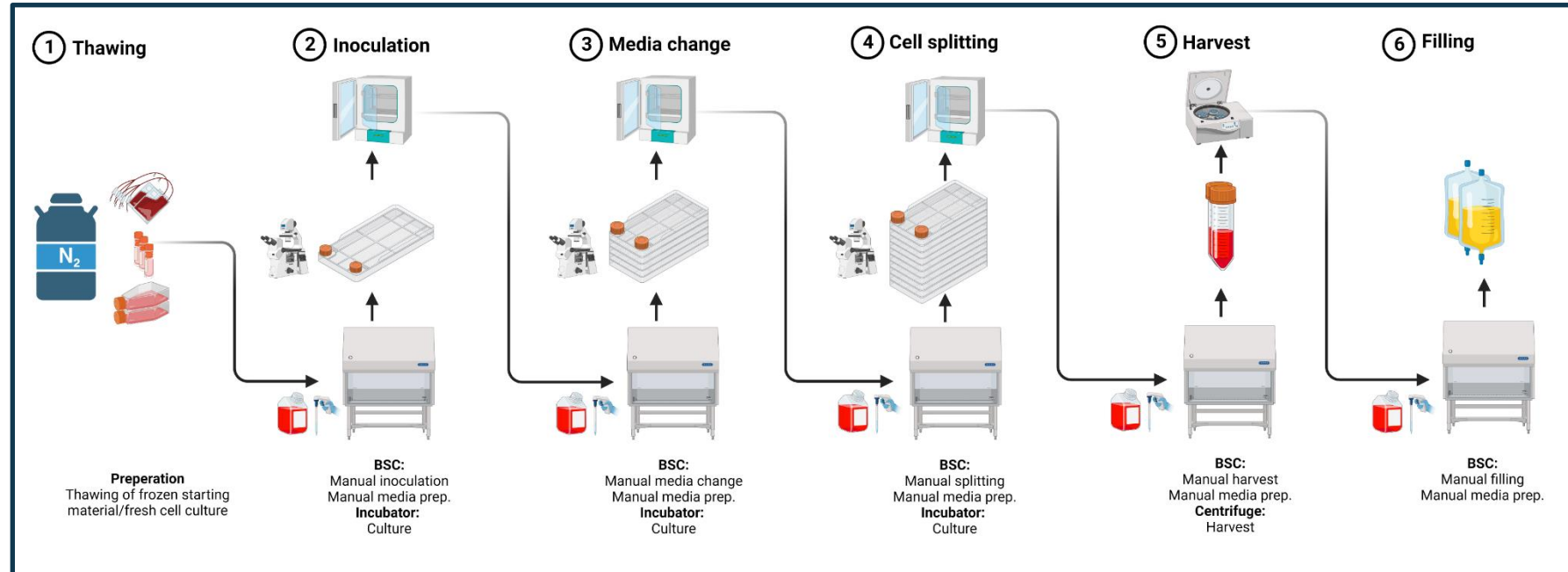

Automated real-time Monitoring

Flexibility, area of application and drivers

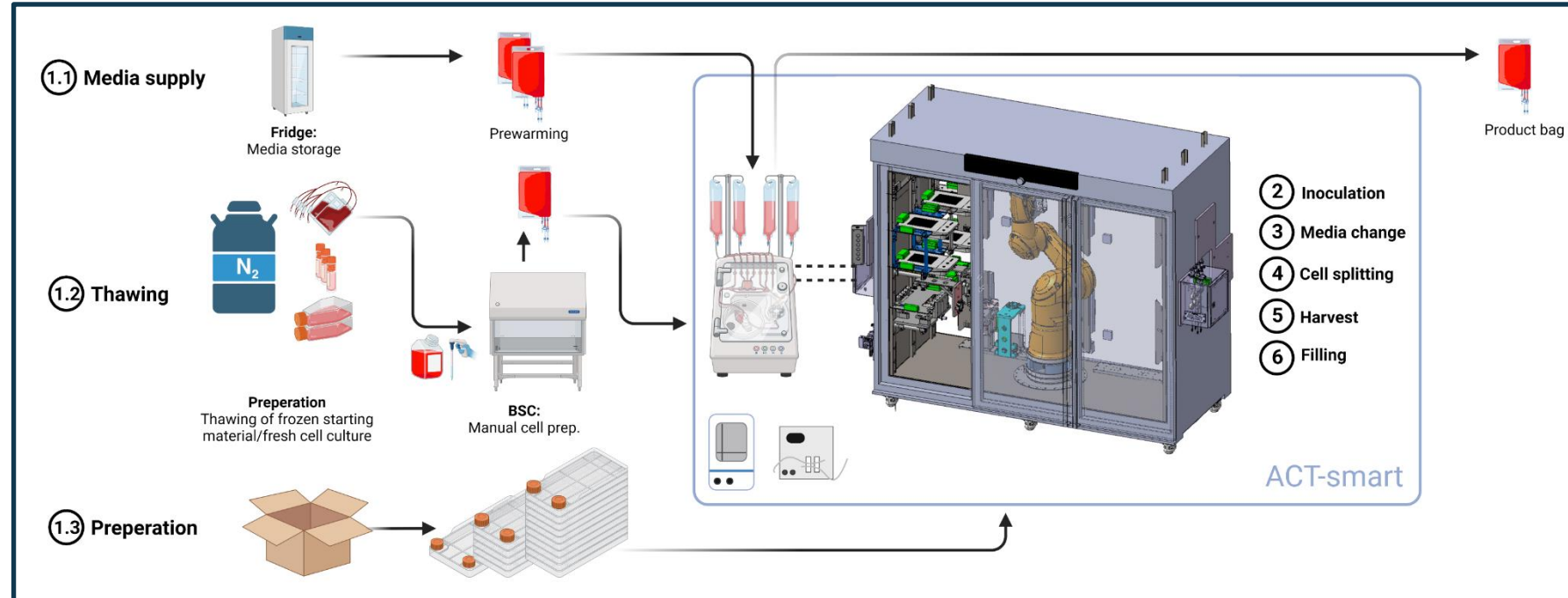## Generic Manual Process for 2D Stem Cell Cultivation & Differentiation

Adherent cell culture processes all have the same general unit operations
→ Differences: Process workflows and parameters within the unit operations

Flexibility, area of application and drivers

Generic Automated Process for 2D Stem Cell Cultivation & Differentiation

> **All products including andherent cell culture**

> **No process changes due to process copy**

> **Single use tubing system**

**Bag-2-Bag, Closed, „Lights-Out" Robotic iPSC/Stem Cell Processing System with Real-Time Monitoring**

~ 50 % reduction of labor time and costs   **~ Failure rate is reduced to 10 % from 25 %**

Connecting   Pharmaceutical   Knowledge

"Power Input" is an Important Parameter for "Clump Passaging"[1,2]

Controlling the forces applied during the cell dissociation process (as a Process Parameter) allows the selection of the right clump size
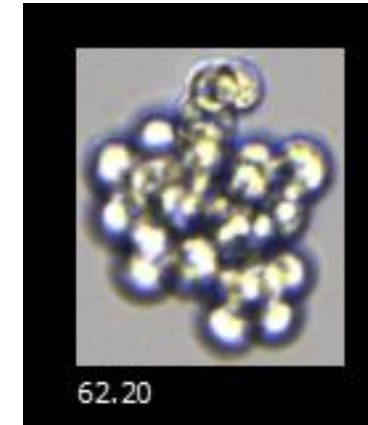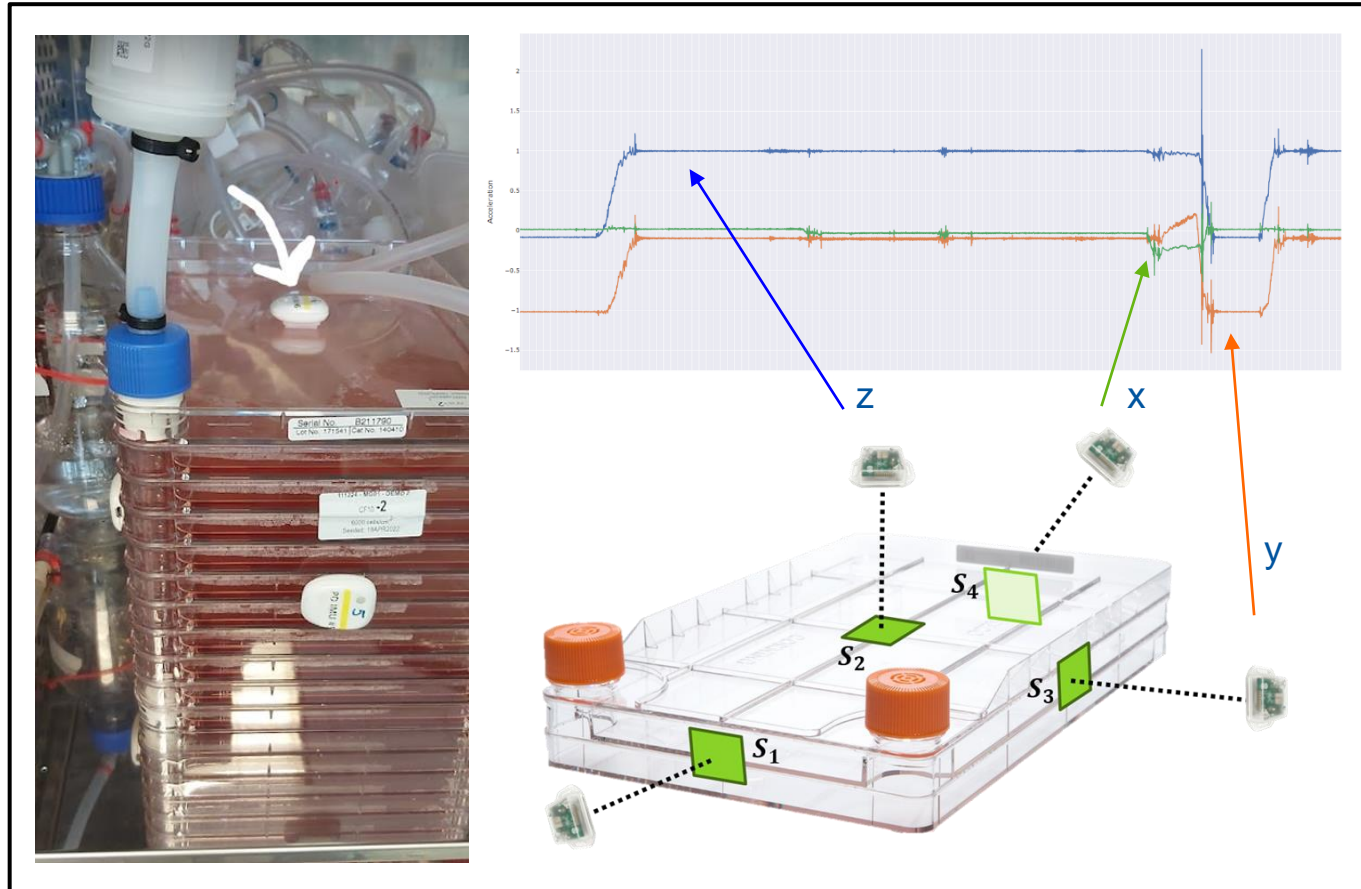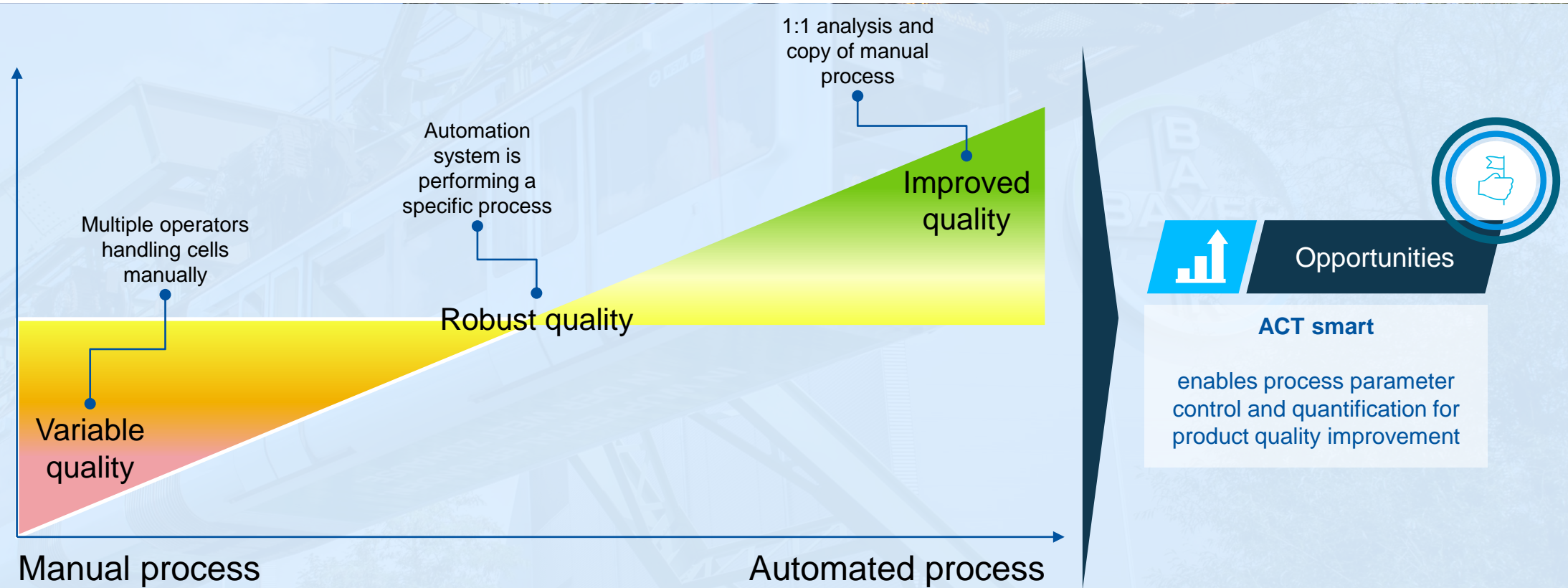

60 µm Aggregate

Significant influence on efficiency in follow-up process

30 µm Aggregate (triplet of cells)

1. Draper et al. (2004). Nat Biotechnol 22(1): 53–4.
2. Buzzard et al. (2004). Nat Biotechnol 22(4): 381–2.

Beyond robustness, automation enables more process control for new modalities from Cell & Gene Therapy

1:1 analysis and copy of manual process

Automation system is performing a specific process

Multiple operators handling cells manually

Improved quality

Robust quality

Variable quality

Manual process

Automated process

Opportunities

ACT smart

enables process parameter control and quantification for product quality improvement

VIELEN DANK!
THANK YOU!

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