



A low footprint vaccine
manufacturing platform for in-
country, for-country production

GVIRF – Incheon, South Korea

Brussels, March 29, 2023



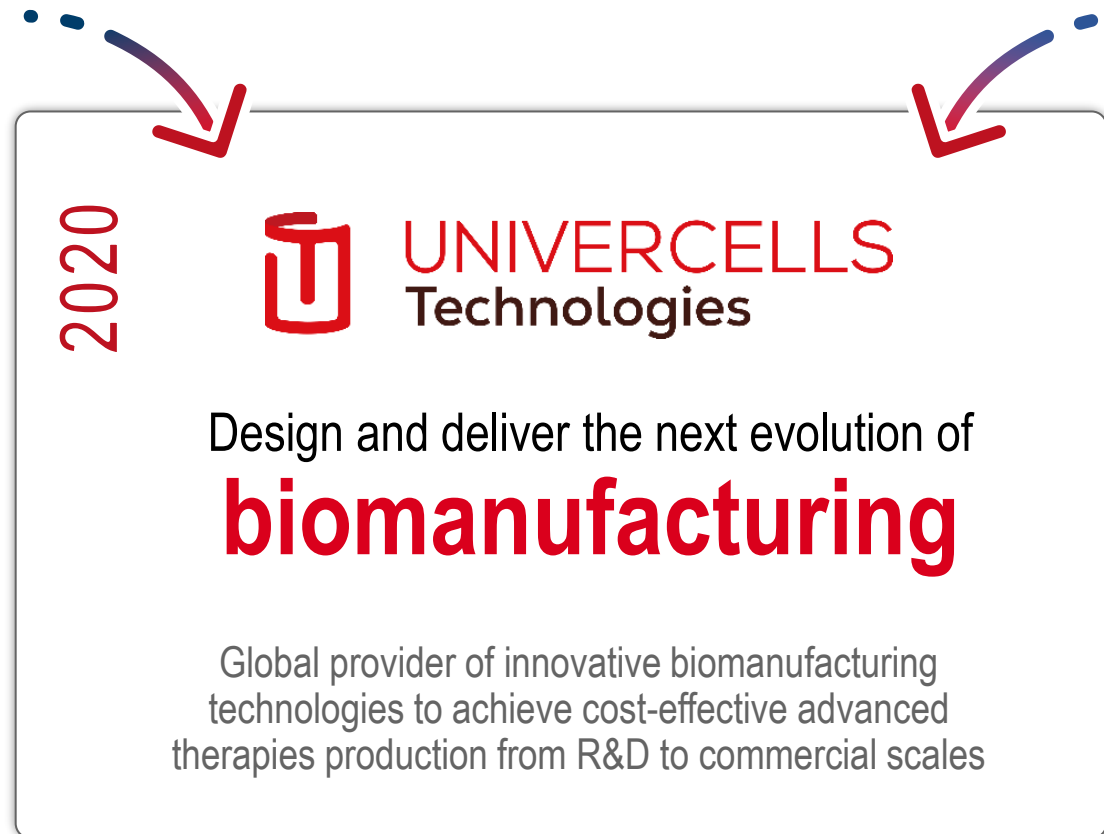
Mathias Garny
CEO

We work to **increase access** to vaccines and advanced therapeutics through **technology innovation**

Univercells Technologies | Genesis



Make biologics
**affordable and
available to all**



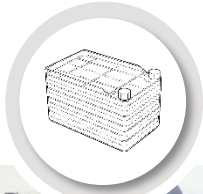
Enabling the promise of
Advanced Therapies

Vaccine production still largely relies on outdated technologies **impacting speed, capacity and cost of manufacturing**

Challenges of traditional vaccine manufacturing

Scale-out

T-Flasks & CFs



Roller Bottles



Eggs



Easy & rapid initial process development



High number **manual operations**; **process inefficiency** requiring scale-out

Risk of failure; **low production** capacity, high **COGs & CAPEX**;

Stirred-tank bioreactor with microcarriers



Packed-bed bioreactors



High production capacity; economies of scale



Microcarriers rely on large bioreactors and facilities with **very high CAPEX**

Packed-bed lead to **process variability**

Scale-up

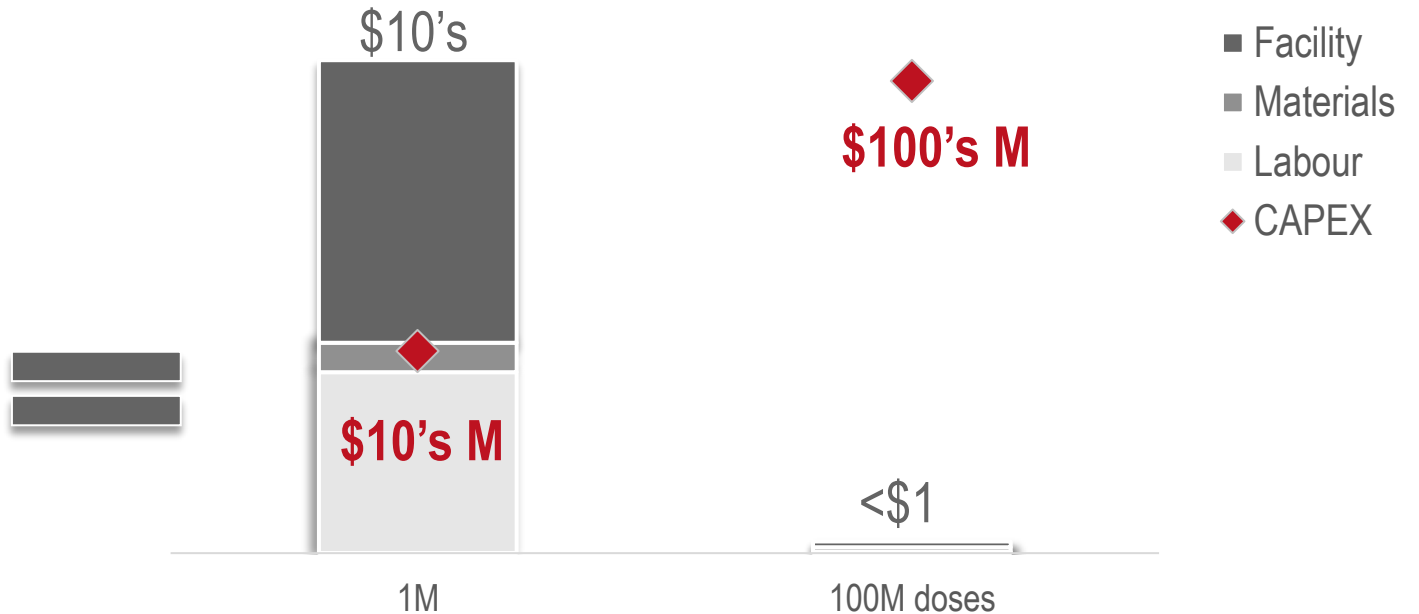
Traditional vaccine manufacturing models rely on scale, which **will not directly apply to decentralized/regional manufacture**

Impact of scale on process economics

Traditional manufacturing models



Cost effectiveness through scale¹⁾



1) Generic adenovirus process is stainless steel STR, 1E14vp/L, 40% DSP yield, 1E11vp/dose

Applying principles of process intensification and integration can redefine capacity and redesign workflows

Process INTENSIFICATION

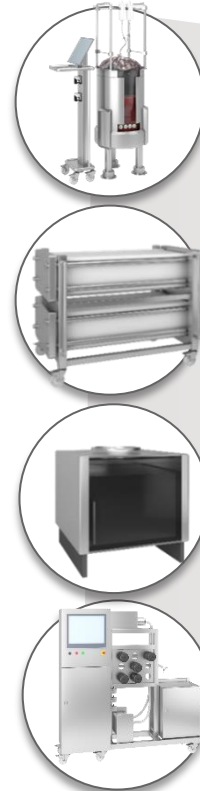
1000's L

10's L

scale-X™ **Redefine capacity**

Volume Cell concentration and productivity

OUR APPROACH



Process INTEGRATION

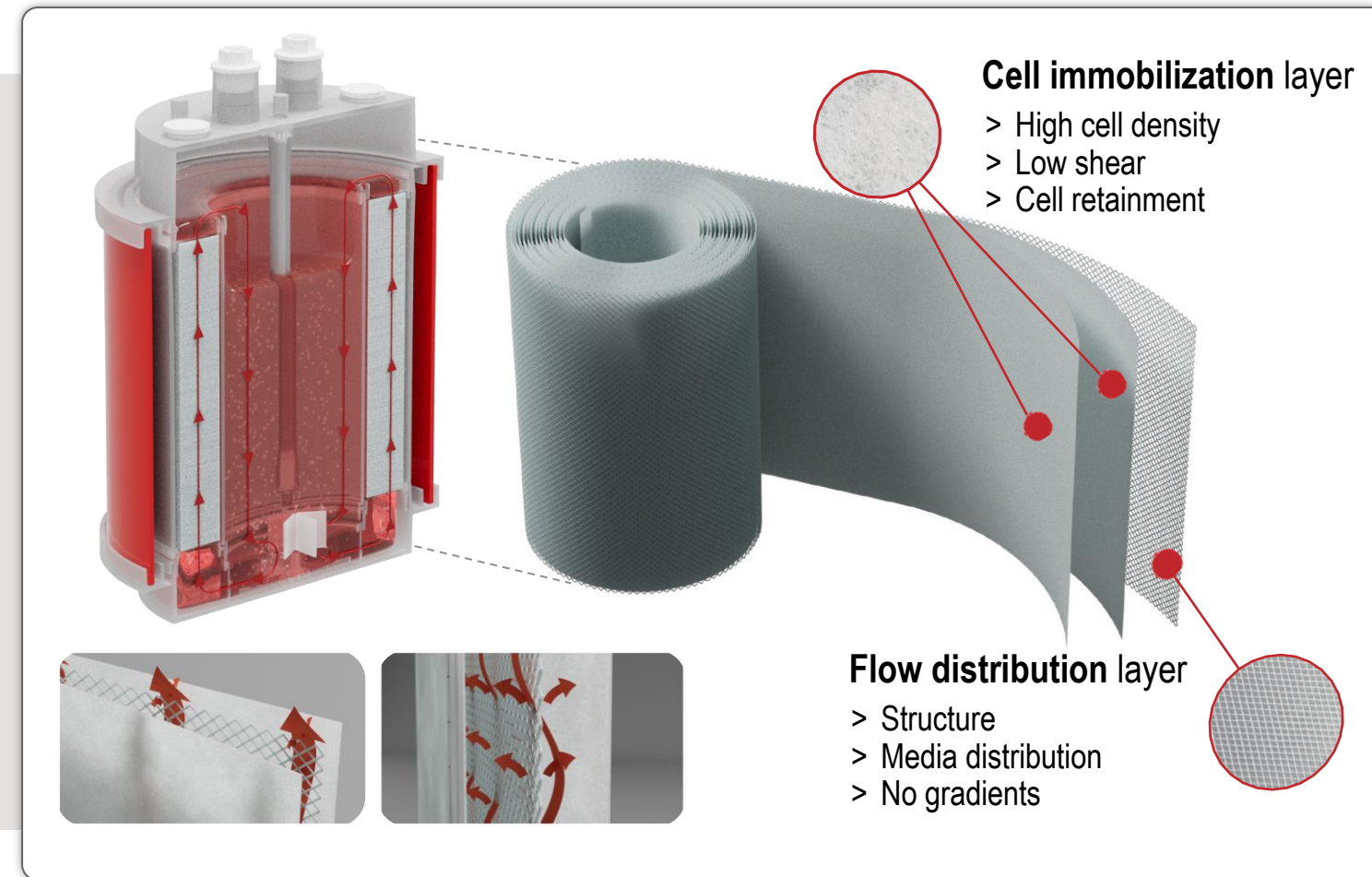
NevoLine™ **Redesign workflows**

Automation

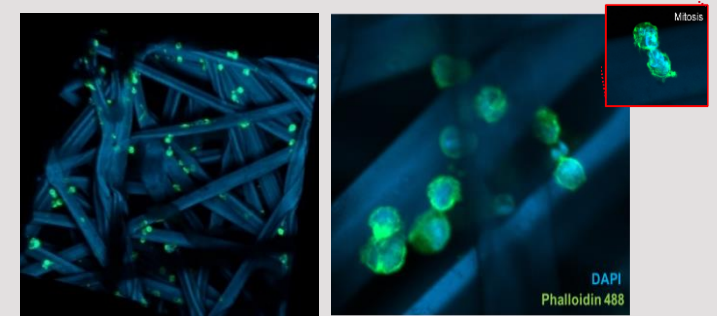
Footprint and Consumables Usage Automation

The scale-X structured fixed-bed bioreactor enables process intensification for adherent and suspension cells with its dual-layer structure

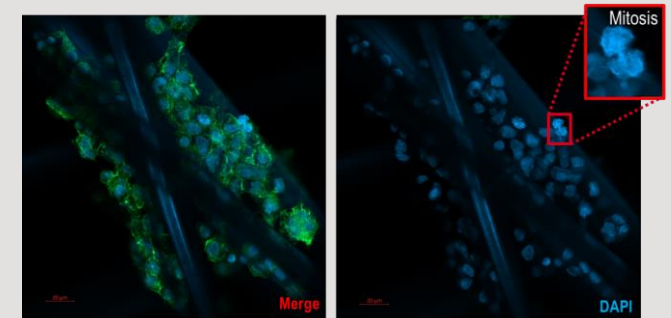
scale-X dual layer design



Suspension adapted cells (HEK293)



Adherent cells (HEK293)

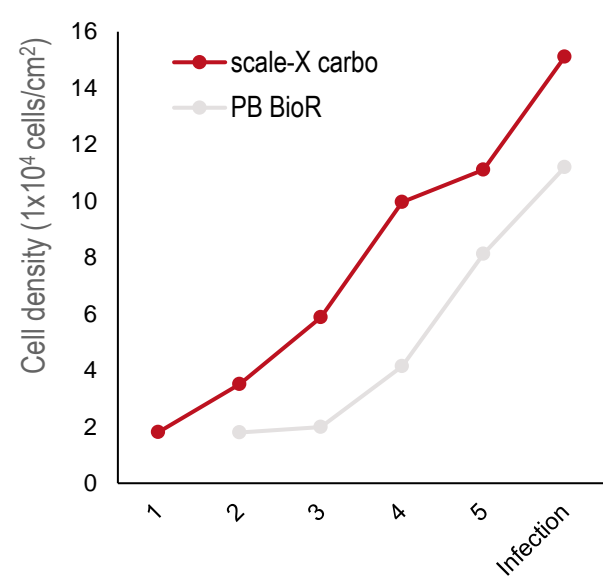


Process intensification can enable over 10 to 100-fold increase in productivity leading to 10's of millions* of doses per batch produced within a 60L reactor

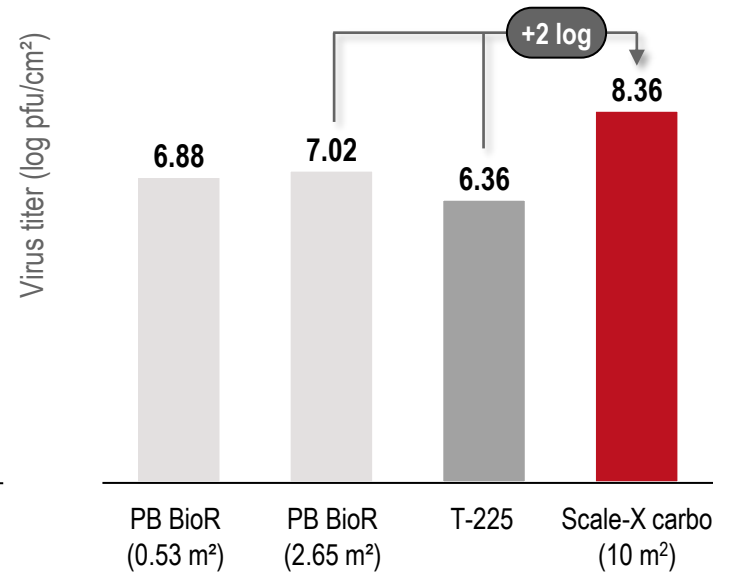
Impact of process intensification on capacity



Cell growth



Virus production



- > Vero cell line
- > Serum-free media
- > MOI = 0.05

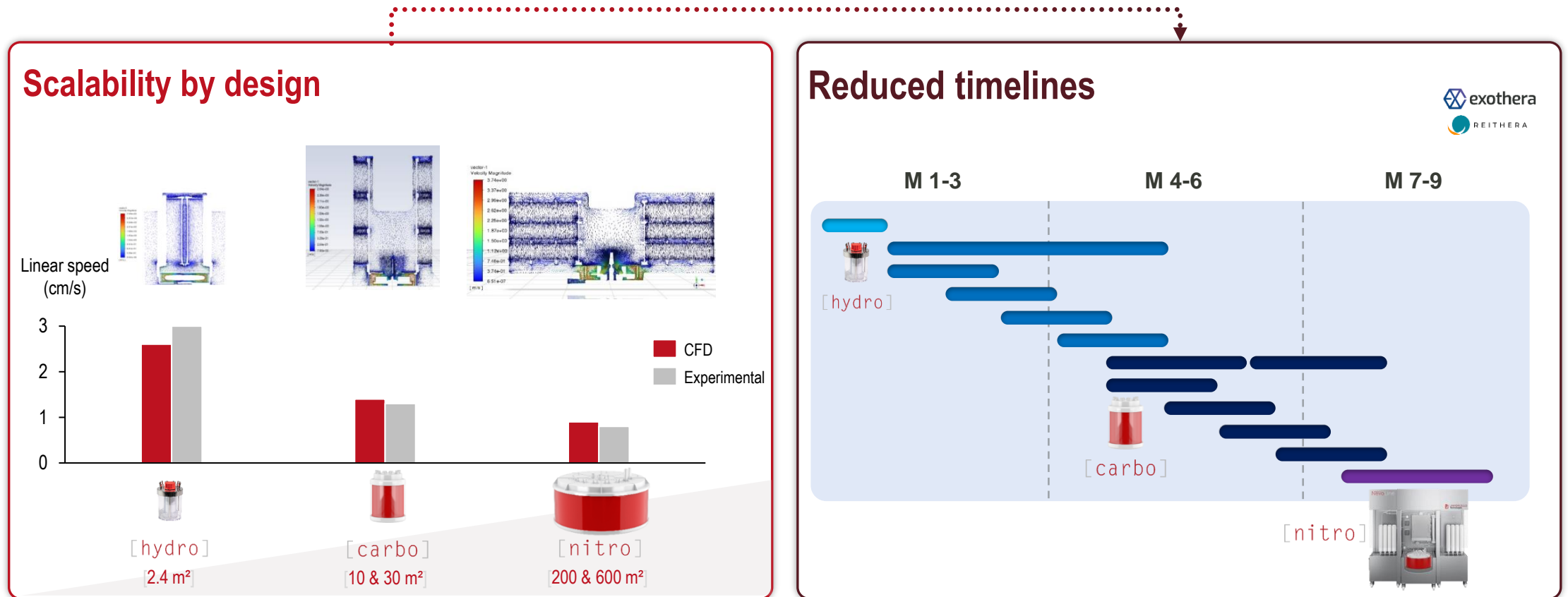
- > Cell growth duration: 5 days
- > Infection duration: 2 – 3 days
- > Inoculation cell density: 10 – 15k cells/cm²

*Productivity = log 8.36 and dose size = 2E7

Source: Berrie et al., 2020, vaccine; Berrie et al., ESGCT poster, 2019

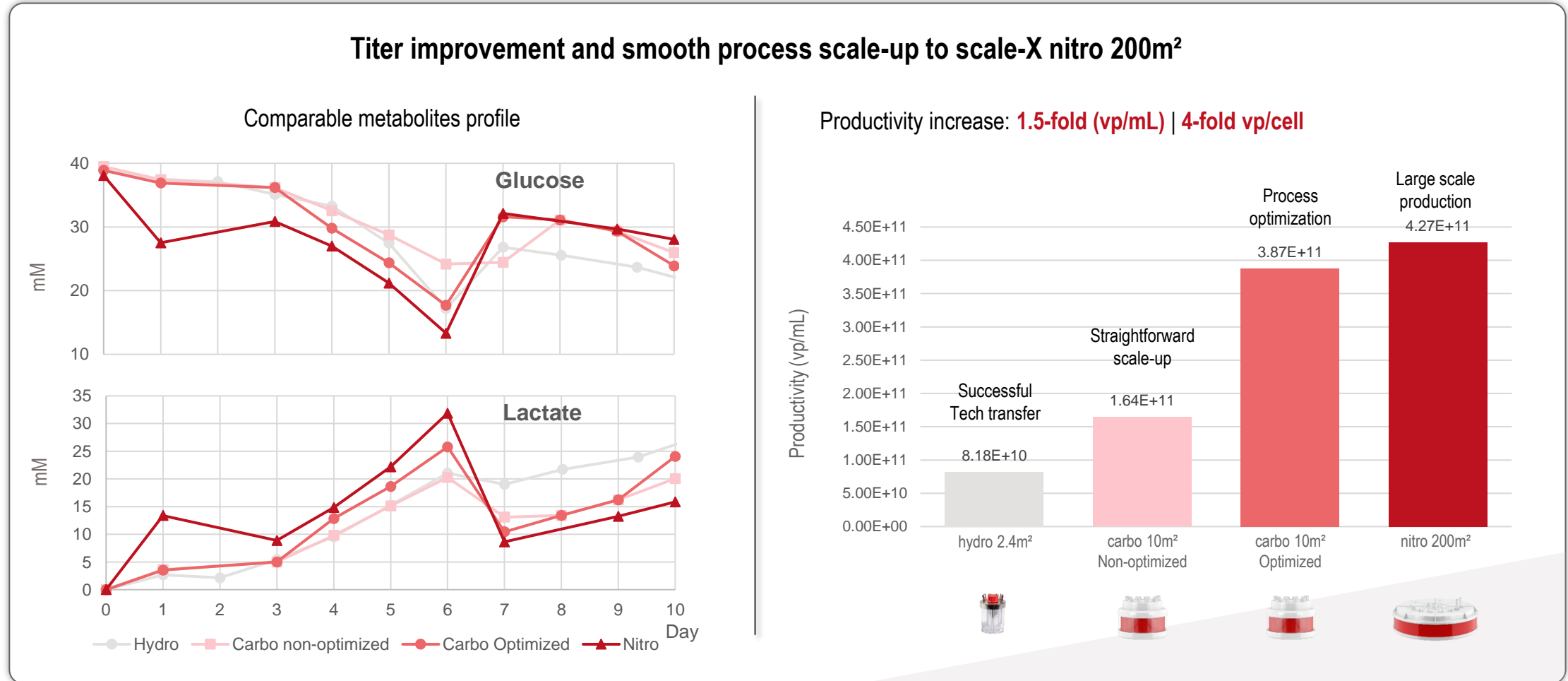
Seamless scalability is enabled by the design of the fixed-bed bioreactors, with a direct impact on development timelines from small to commercial scale

Impact of scalability by design on development timelines



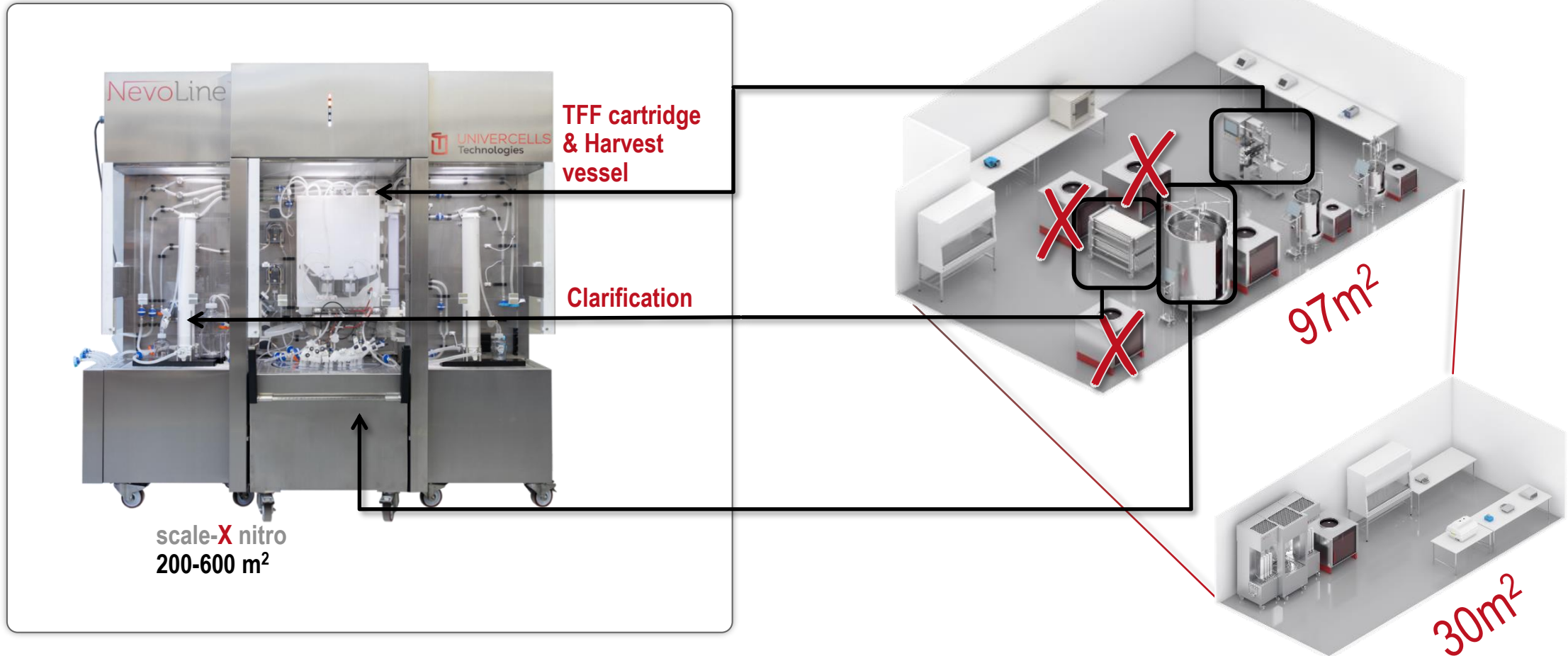
Scalability by design enables cell growth profiles and productivities to be maintained across scales

Scale-up | HEK 293-based cell growth and Adenovirus production



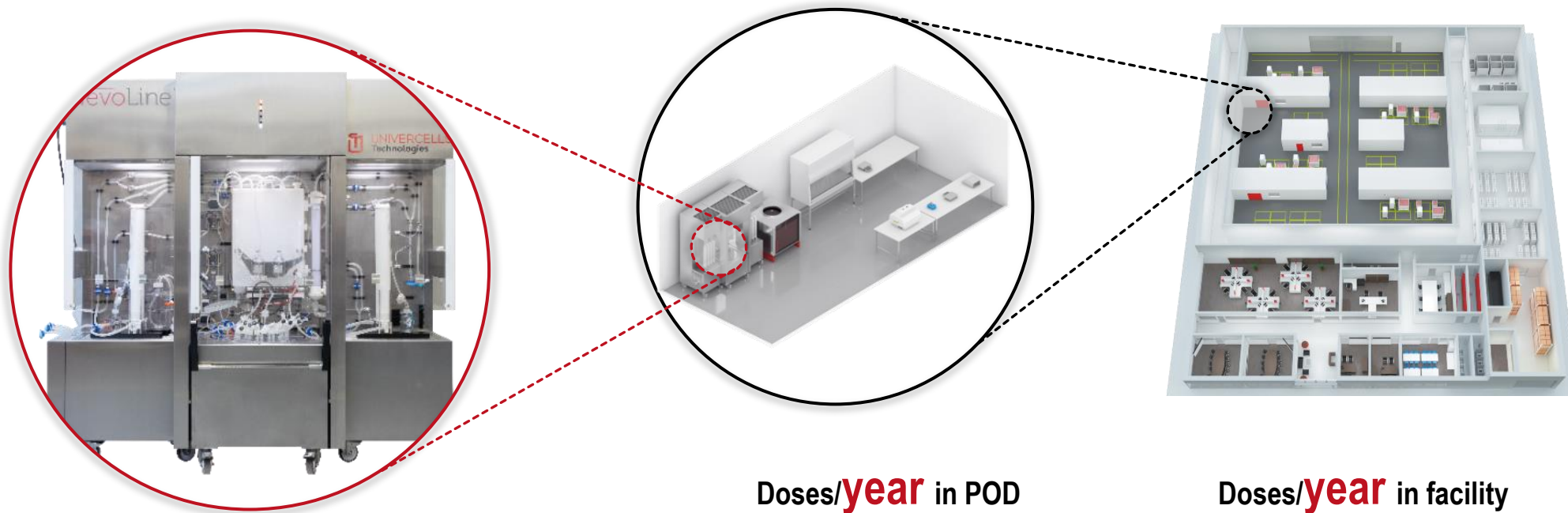
NevoLine redesigns workflows, removing intermediate bags and complex manifolds to shrink manufacturing footprint

Process layout in the NevoLine Upstream vs STRs



Integrated and intensified platforms ease integration into **pre-fabricated facility concepts** for rapid capacity deployment, with **broad applicability to vaccine targets**

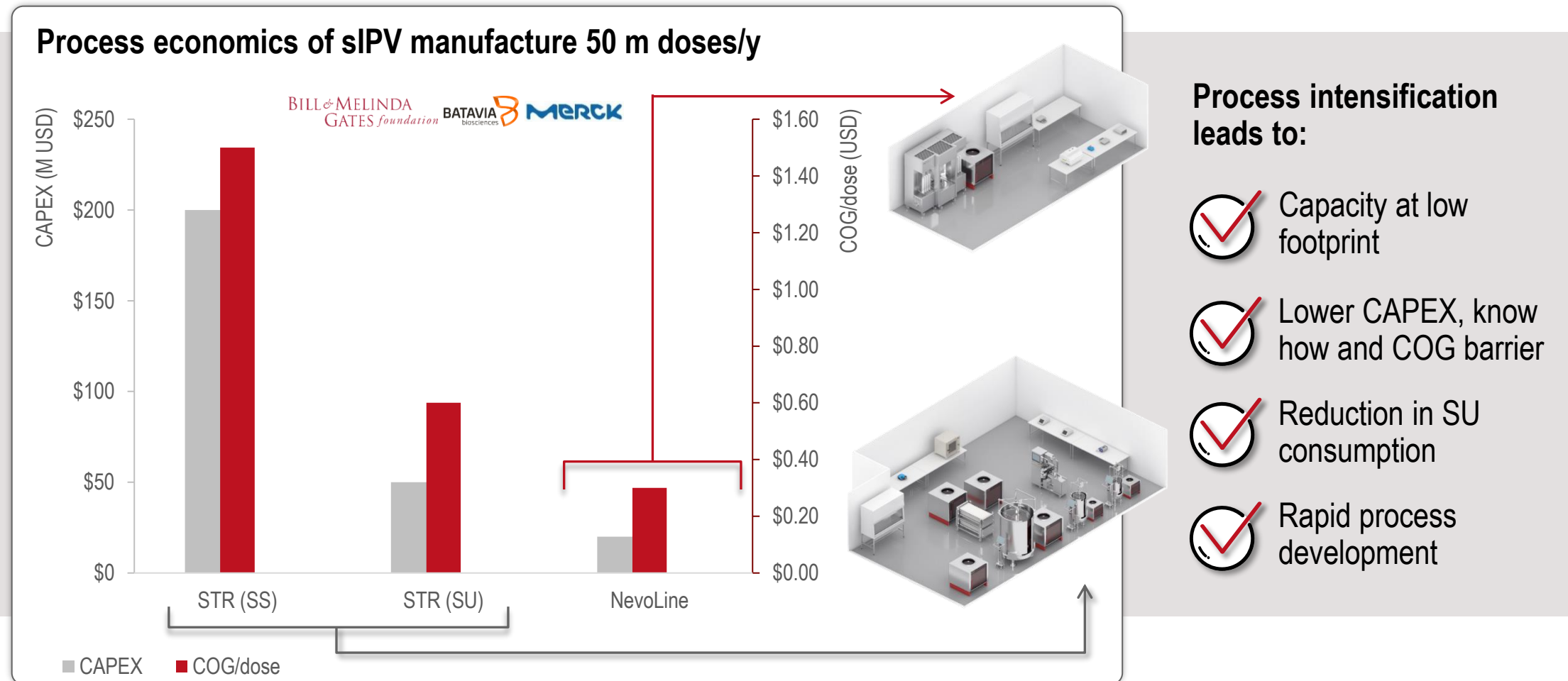
Output of NevoLine @ 600m² scale in various facility concepts



		Doses/ year in POD	Doses/ year in facility
Vero	rVSV-LASV	684 million	2.7 billion
MRC-5	Rubella	300 million	1.2 billion
Vero	sIPV	>10 million	>40 million
Vero	VSV-Ebola	>6 million	>24 million

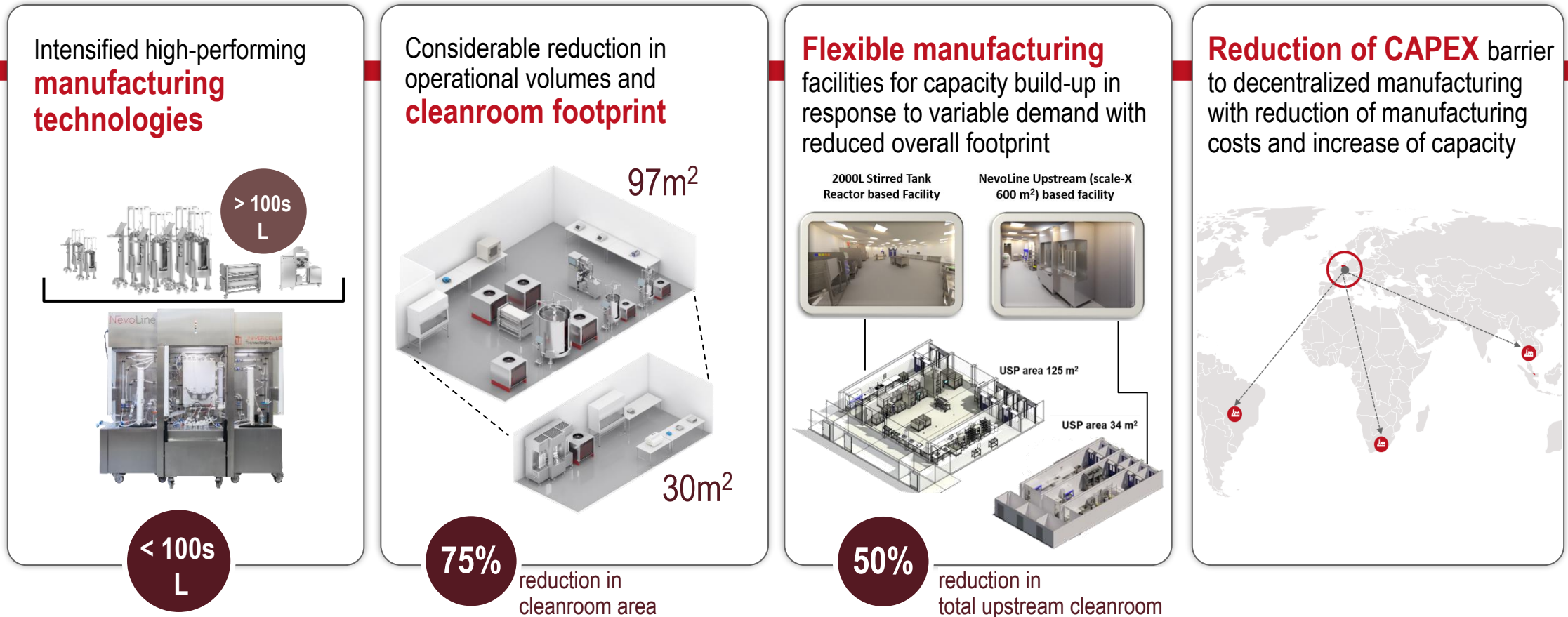
Process intensification is key to overcoming limitations of economics of scale while **reducing CAPEX and know-how barrier** and **simplifying supply chain**

Impact of process integration on decentralized manufacture – sIPV case study



The NevoLine Upstream chains key upstream and midstream unit operations into a compact manufacturing platform

A significant flexibility and footprint reduction





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Technologies



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Thank you
for your attention
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| The next evolution of biomanufacturing

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