



Impacting Circularity by Fleet Management and Modularity

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“The goal of circularity is to extend the life cycle of products, reduce waste to a minimum, and make the most of resources (...). It also includes the adoption of equipment and processes that are energy-efficient, reduce waste, and can be repurposed or recycled at the end of their life cycle.”

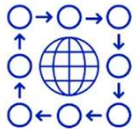
ChatGPT

Where are we now?

Current state in equipment design



Site-specific, project-specific requirements and varied machine design



Site specific processes



Significant material needs for development, testing and commissioning
Buy / Use / Discard



Traditional, non-sustainable materials used



Standardization difficult to implement, highly customized systems, no off-the-shelf

GO BACK TO START



DO NOT COLLECT

\$200

Standardization

URS + Docu pack

SOPs

Maintenance & calibration procedures

Commissioning & Qualification Documentation & Templates



Spares

Design / Testing / C&Q Materials

Standardization

System 1

SOPs URS + Docu pack



Spares

Maintenance & calibration procedures C&Q Docu & Templates

Design / Testing / C&Q Materials

Machine 2

SOPs URS + Docu pack



Spares

Maintenance & calibration procedures C&Q Docu & Templates

Design / Testing / C&Q Materials

Machine 3

SOPs URS + Docu pack



Spares

Maintenance & calibration procedures C&Q Docu & Templates

Design / Testing / C&Q Materials

Is equipment standardization a solution?



Economy of scale



May reduce workload



Improves training and process robustness



Improves compliance



Simplifies decommissioning



Equipment may (will) change over time



Let's go a step further

Fleet and Modularity

URS + Docu pack

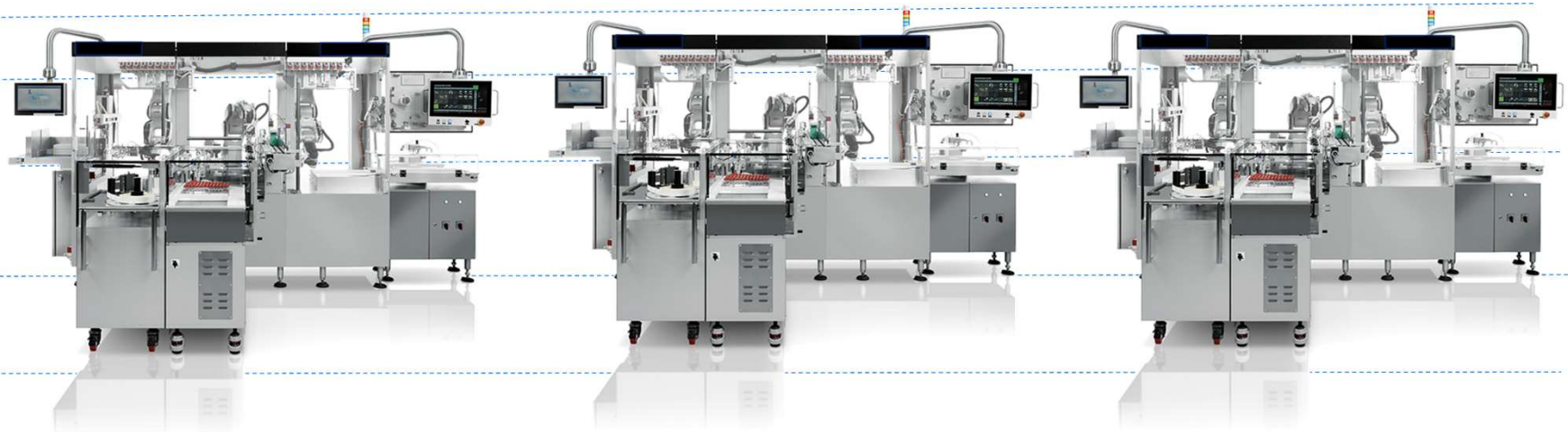
SOPs

Maintenance & calibration procedures

C&Q
Docu & Templates

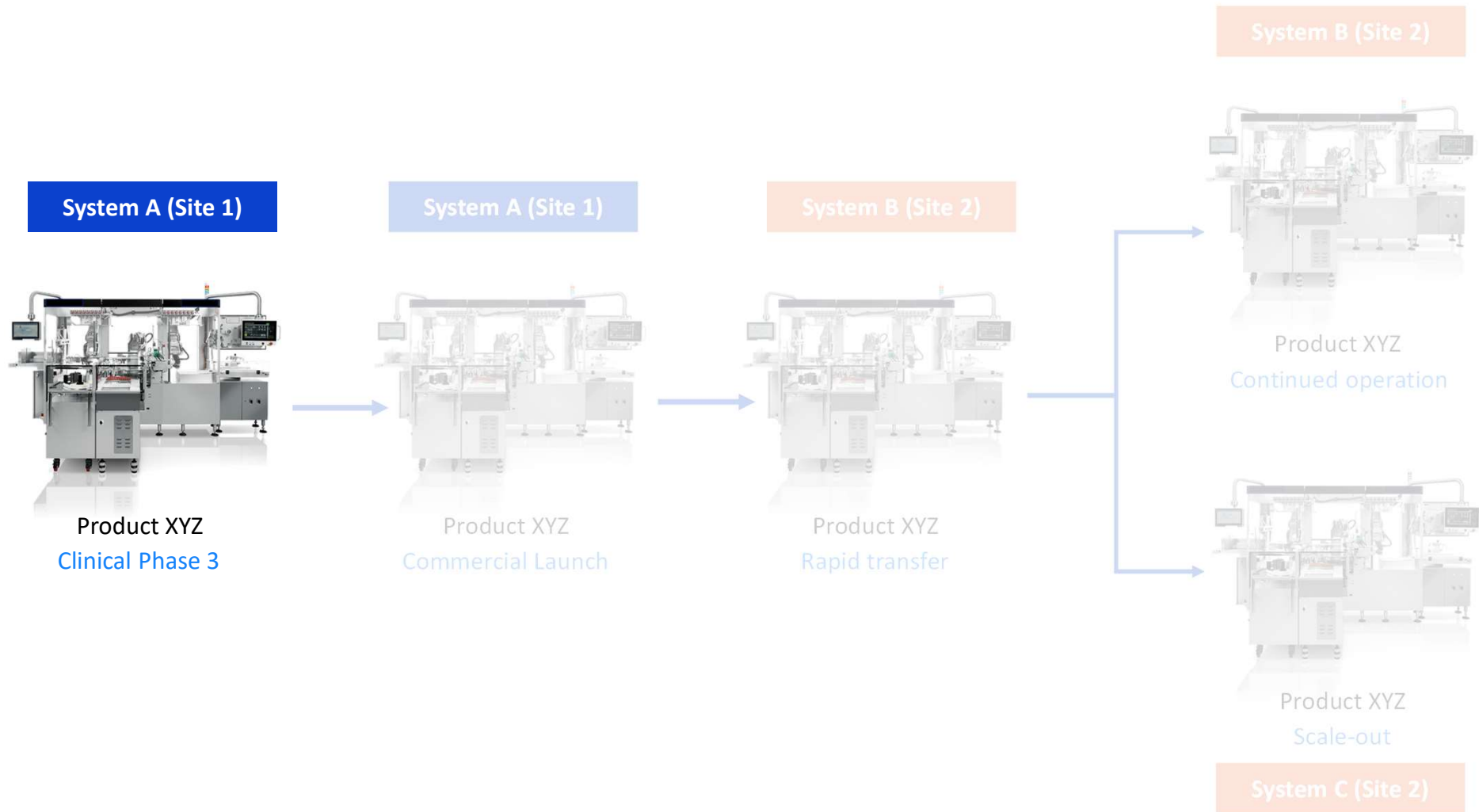
Spares Management

Design / Testing /
C&Q Materials

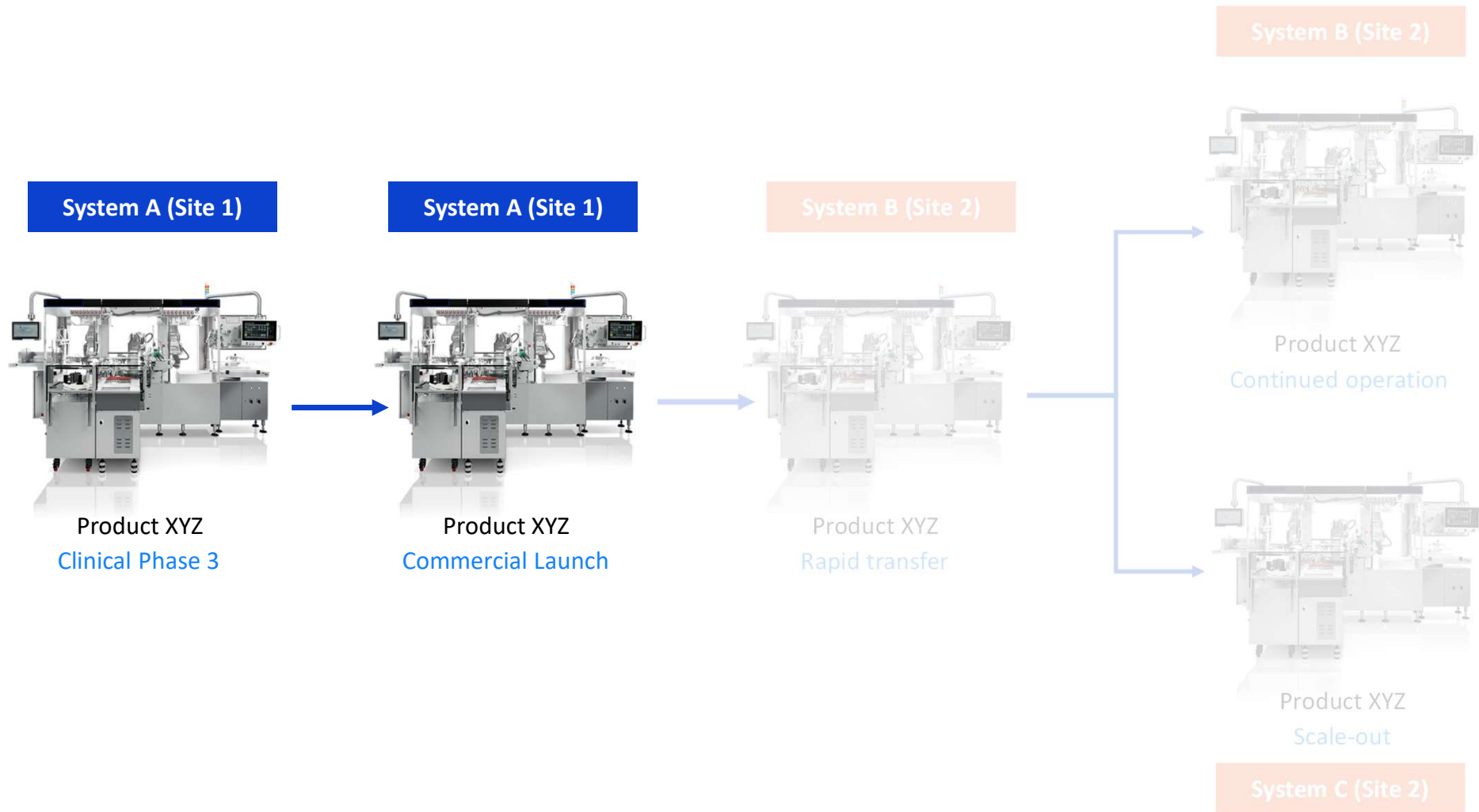


Fleet of equivalent machines

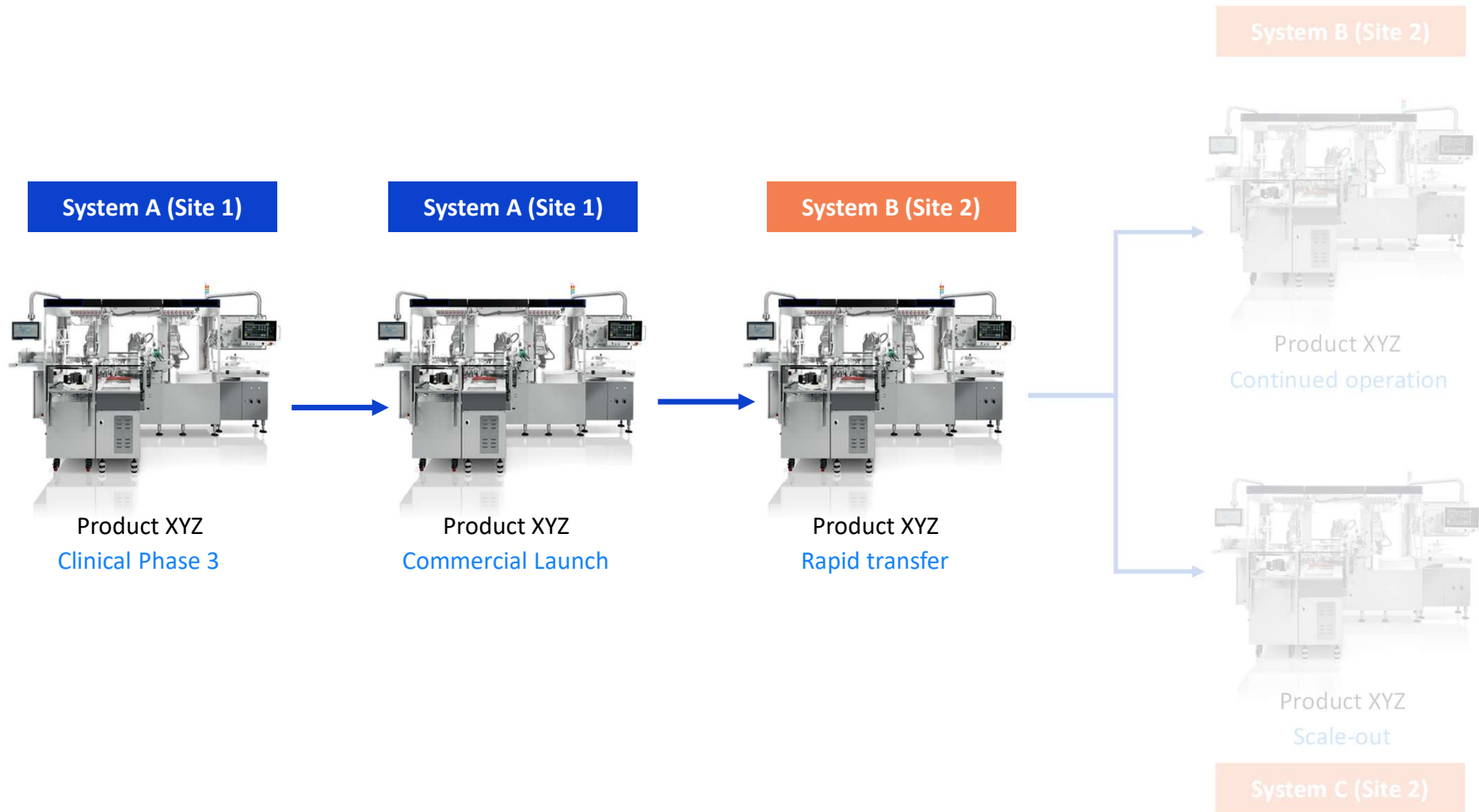
Roche's Fleet concept



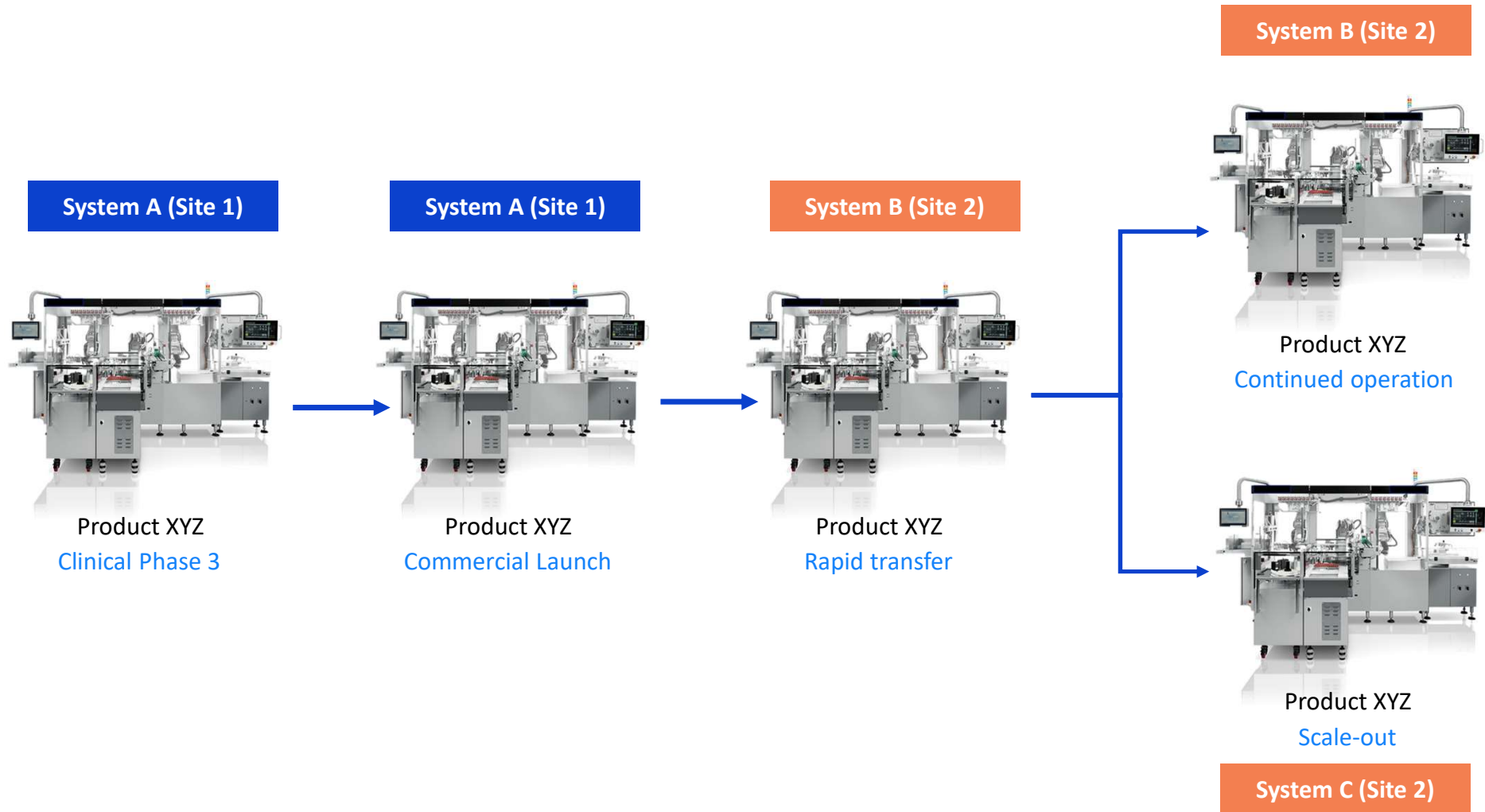
Roche's Fleet concept



Roche's Fleet concept



Roche's Fleet concept



Fleet & Modular Equipment

Impact on Circularity



Leveraging Commissioning & Qualification efforts

Fewer materials consumed



Faster product transfer



Targeted design to increase efficiency and reduce waste/energy needs



Consistent global quality



Facilitated upgrades



Modular = adaptable

Community Chest

**ADVANCE TO GO
(COLLECT \$200)**



Challenges to introducing Fleet



Global change control: maintaining the equivalency of fleet equipment during the lifecycle of the system



Supplier's collaboration needed



Shorter technology life cycle



Unexpected errors may have global impact



No clear position from Health Authorities yet

*“It's important to note that the implementation of circularity in the pharmaceutical industry requires **collaboration** between various stakeholders, including **pharmaceutical companies, regulatory bodies, healthcare providers, and patients**. By leveraging technology effectively, the industry can make significant progress towards achieving a more sustainable and circular approach.”*

ChatGPT

Doing now what patients need next