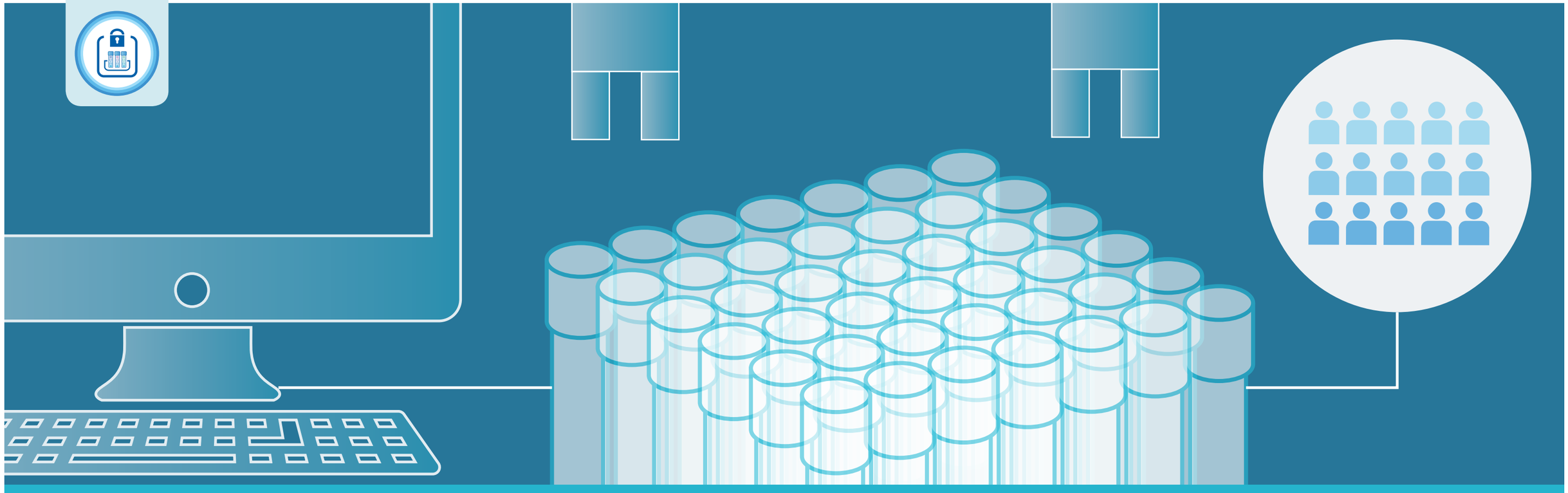


Automating Your Sample Collection for Biobanking : 10 Things to Consider

By Kathleen Groover, Ph.D., Project Director;
Karon Drew, Manager of Project Planning;
Skip Lewandowski, IT Manager

Fisher BioServices

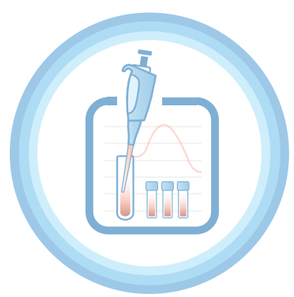
this "eBook"

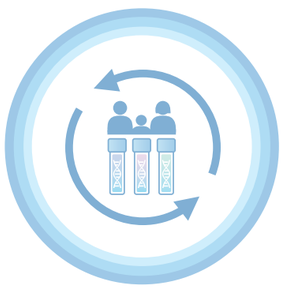
Biobanking &
Biorepository

Cell Therapy
Solutions

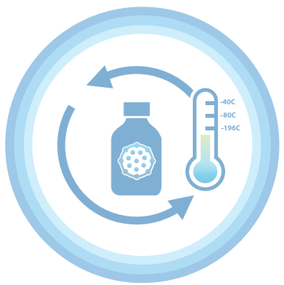
Clinical Trial
Kit Production

Laboratory
Processing





Clinical Trial
Sample Management



Biologic-API
Management

Qualification /
Validation Services

Cold-Chain
Logistics

About the Authors

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Skip Lewandowski

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Karon Drew is the Fisher BioServices Project Planner/Study Manager for the National Cancer Institute - Frederick Central Repository located at the Frederick National Laboratory. Ms. Drew has been serving as a Local Administrator for various inventory databases for the past 13 years. Her experience also includes 19 years in biorepository settings and over 28 years of biological specimen management and handling.

Kathleen Groover is the Fisher BioServices Project Director for the National Cancer Institute - Frederick Central Repository located at the Frederick National Laboratory. She received her PhD in Chemistry at Duke University. Dr. Groover has over 26 years of experience in managing chemical and biological repositories. During her tenure she implemented automation solutions including a robotic system for weighing vials and liquid handling systems. She is also a Certified Industrial Hygienist.

Skip Lewandowski serves as the Fisher BioServices Information Technology Manager for the National Cancer Institute - Frederick Central Repository located at the Frederick National Laboratory. Mr. Lewandowski's background includes 20+ years of system integration and database management the finance, marketing and healthcare industries.

Overview

Introduction—Do you want to automate your biobank?

1. Automation is faster than humans, right?
2. What sizes are your primary containers?
3. Are the lids uniform?
4. Do your origination and destination boxes/racks stack up?
5. What about your barcodes?
6. Is the labeling consistent?
7. Remember, the vendor doesn't know your system.
8. Your best chance for success? Planning!
9. What to do first?
10. Success! (What does it look like?)

Introduction:

Do you want to automate your biobank?

Introduction— Do you want to automate your biobank?

How do you determine if your inventory is automation-friendly? Chances are, if you didn't launch your biobank with automation in mind, or if a large percentage of your inventory is legacy collections, you've got some serious challenges ahead of you.

If your focus is managing labor costs, automation may or may not be all or part of the answer. As a starting point, give considerable thought to the issues presented here.

1

Automation is faster than humans, right?

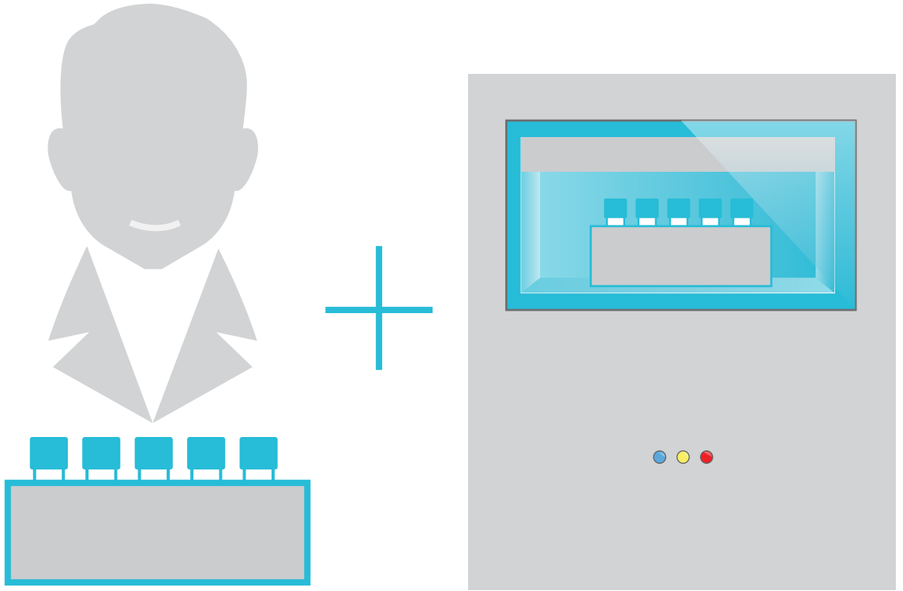
Automation is faster than humans, right?

Surprisingly, humans are just as fast—if not faster—than automation for workflows that require a series of complicated movements or are separated by significant floor space. Robots are faster performing highly precise movements with very few variables: additional decision points or variations in movement costs precious time, every time. Many, if not most, tasks can be done by people much more quickly than by robots.

The benefit of automation is in the accuracy of picking and pulling, and the fact that robots can work day and night. If your collection is not automation-friendly, robotic assistants are not the answer to managing labor costs.

Be realistic and don't assume anything. As with personal computers, robots are literal. They are only as successful as we, the humans, are at programming what we want done, and in what order. Accept that compromises will be needed to achieve the intended results. Variables in your process, in the materials to be handled, and in the intended outcome can halt your progress toward implementation of robotic processes and leave you wondering where it all went wrong. However, with good planning, the best balance between human physical intervention and automation advances can be found.

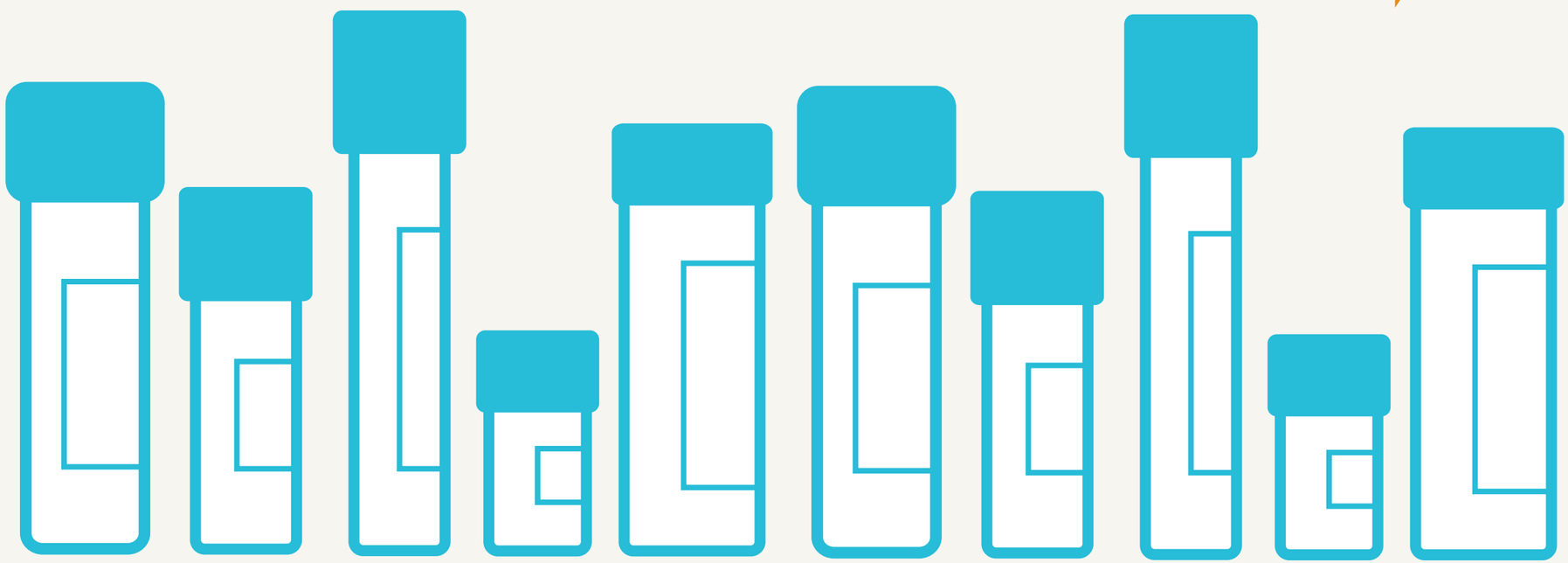
Best balance between human physical intervention and automation advances can be found.



2

What sizes are your primary containers?

If you're beginning to make a list of all your vial sizes in your mind, you've identified your first hurdle. Variety in vial sizes and types requires a flexible automation platform that includes multiple handling arms, grippers, and sizes of destination containers. Before you know it, your automated equipment needs have doubled or tripled.

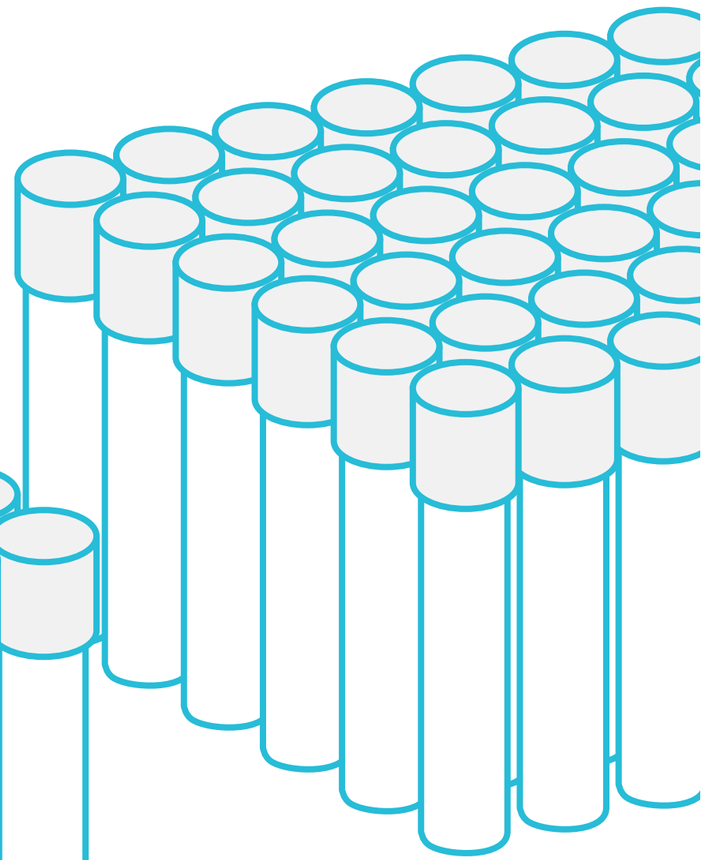


3

Are the lids uniform?

Are the lids uniform?

Do your vials have the same type of lid? If not, you may need to plan to have the robot grip somewhere other than the lid in moving it from point A to point B. Perhaps thawing and moving materials into more uniform containers before trying to automate is the way to go—but now we're getting ahead of ourselves. Before thinking about different types of grippers, put some additional thought into the basics of your collection.



4

Do your origination and destination boxes/racks stack up?

Do your origination and destination boxes/racks stack up?

Automation works better with rigid materials and easily defined X, Y and Z coordinates. Rigid plastic boxes and grids are more automation-ready. Even better are vials in an origination rack that is in SBS format. This is the basic automation footprint and is standardized across many platforms. If your collection is currently configured in SBS format, you will not have to reconfigure to accept output destination racks in this format.

If your vials are in less expensive cardboard boxes and grids, then you used good cost control measures at the onset of your biobank, but making these containers automation-ready will require some modification. You may need to consider moving tubes into more automation-ready boxes and whether that is best achieved robotically or with human intervention up front.

5

What about your barcodes?

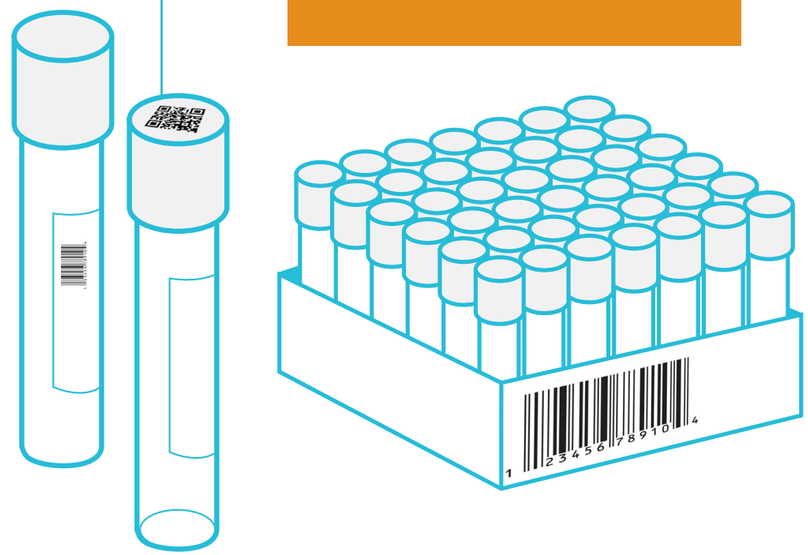
What about your barcodes?

Barcodes present a number of issues. For instance:

- Are there barcodes on the boxes and is the origination container defined in your inventory system? If the containers have embedded barcodes you may be good to go.
- Do all your labels have the same type of barcode or do you have a mix of linear and 2D barcodes?
- Do you have the same number of barcodes on all your materials and are the formats of the ID the same? Is the barcode in the same place on each container?
- Does the barcode content link to a unique identifier in your inventory database?

Barcode content linked to a unique identifier in your inventory database

Labeled with same type of barcode and placement?



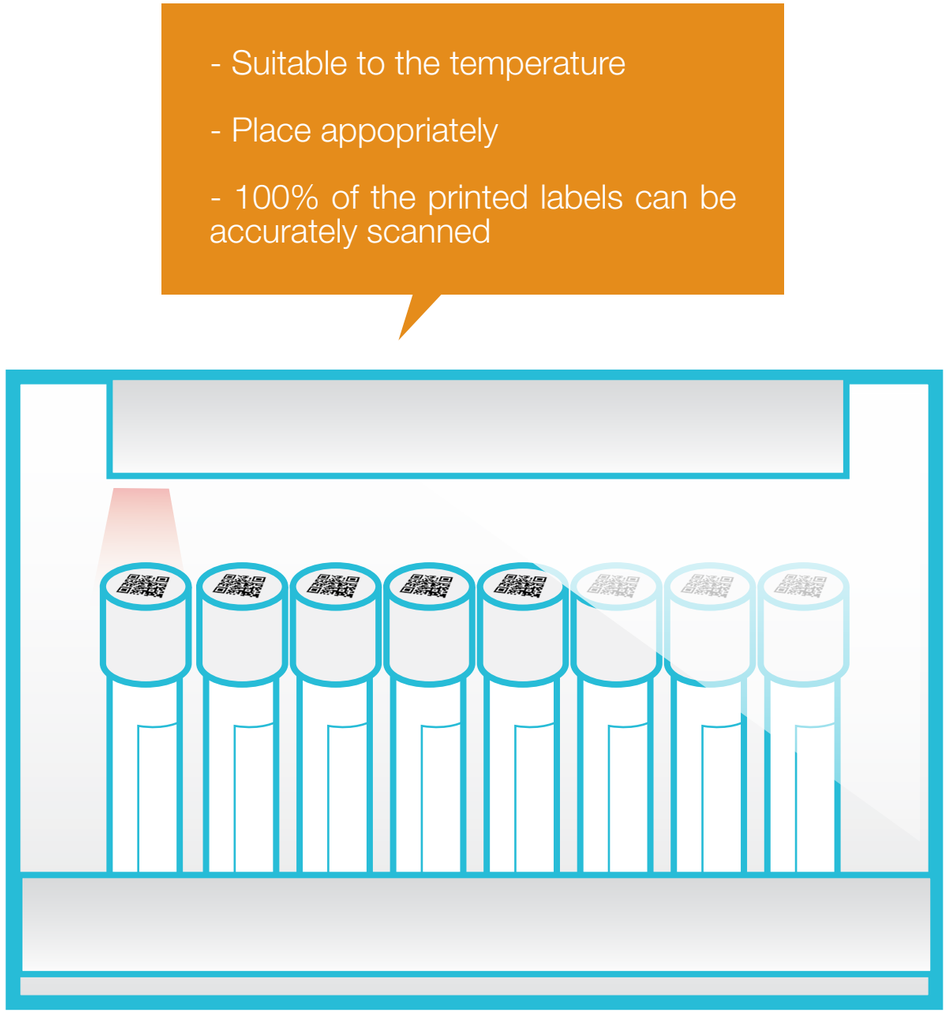
6

Is the labeling consistent?

Is the labeling consistent?

Can the labels be read with automated barcoding equipment, optical character recognition, or imaging products? If so, to what level of accuracy and consistency? If some of your vials have barcodes and some do not, consider re-labeling your material before you begin.

If you decide to re-label, be sure that your new label stock is suitable to the temperature of the vials you are re-labeling, placed appropriately, and that 100 percent of the printed labels can be accurately scanned. All these initial issues need to be considered, as well as the effort involved in applying new labels. You can use automated equipment to re-label vials, although identifying equipment that can apply labels to frozen vials may present some challenges.



7

Remember, the vendor doesn't know your system.

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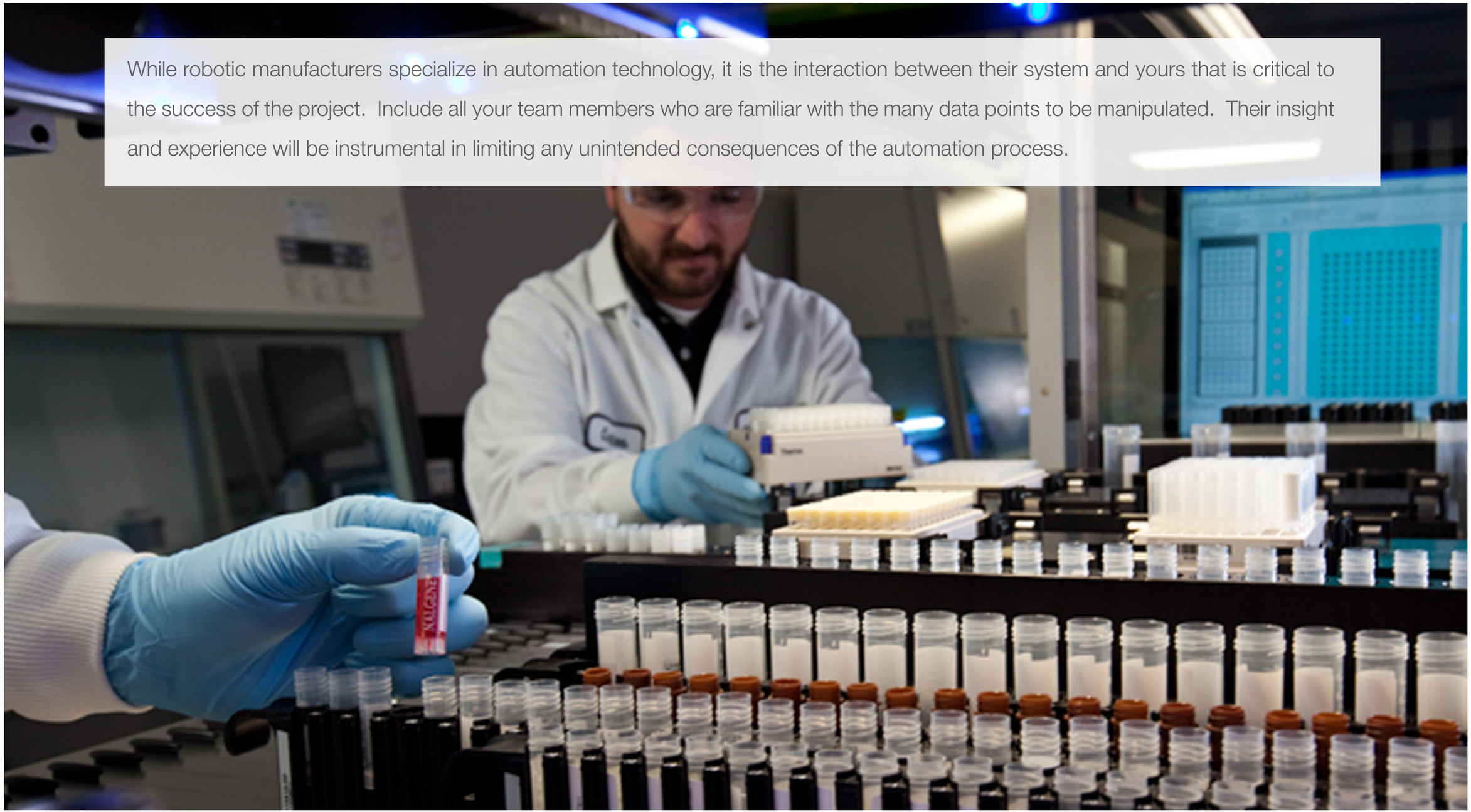


While robotic manufacturers specialize in automation technology, it is the interaction between their system and yours that is critical to the success of the project. Include all your team members who are familiar with the many data points to be manipulated. Their insight and experience will be instrumental in limiting any unintended consequences of the automation process.

8

Your best chance for success? Planning!

Your best chance for success? Planning!

You already know that planning is important. To begin planning for automation, first map out the entire process, independently, for every variable. For instance, if you have two tube sizes, map the process first with the most common size, and then repeat the process with the secondary size. This may seem like unnecessary work, but it will bring to light critical issues such as the need to reload the robot platform with the right size destination racks.

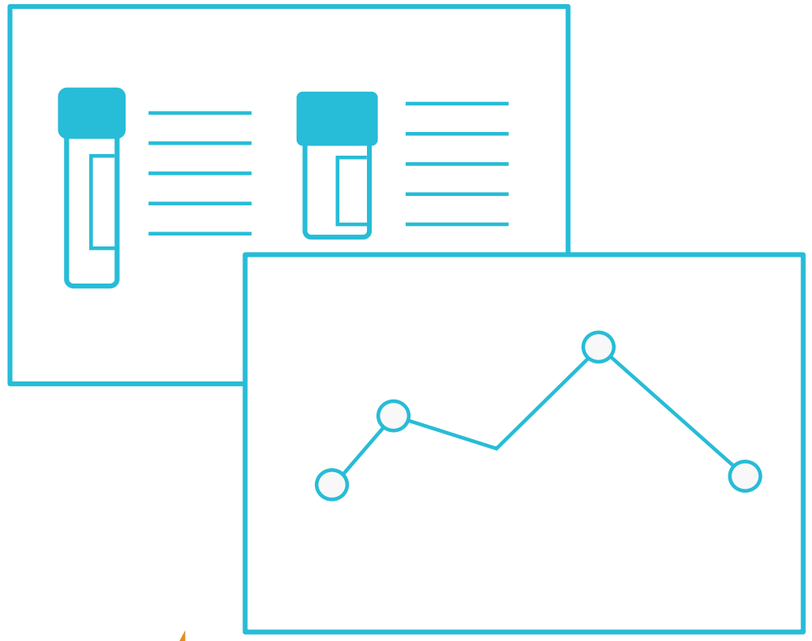
This may seem like a simple matter, but if not considered, this glitch in planning can severely hamper your intended timeline. Proceed with mapping the process for other variables (labeling, data, etc.) as well.

Next, consider what could go wrong and how the process will handle failure points such as:

- Did a label come loose or is it missing?
- What if one of the vials has a round bottom instead of a skirted bottom?

If the failure point impacts the automated process, the computer will need to know what to do when the unusual occurs.

You should plan for *everything* to go wrong, plan for *when* it does, and also plan to *tell the computer what to do.*



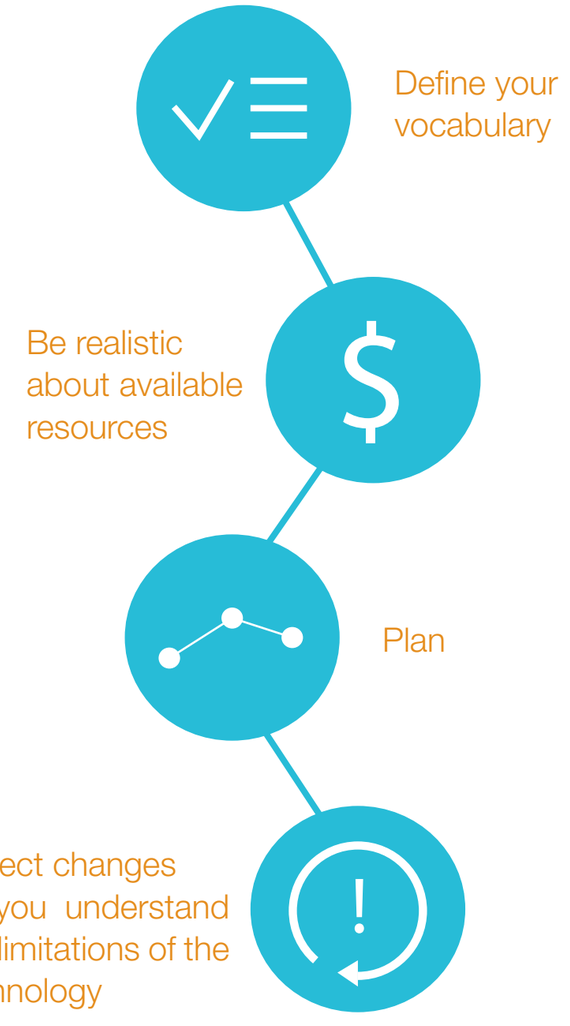
Map the process for every variable

9

Your order of action – What to do first?

Your order of action – What to do first?

First, consider everything you just read in sections 1 through 9, above. Once you have determined which parts of your work flow can or should be automated, then you'll also have an idea of the system requirements you will need to share with prospective vendors. The more detailed you can be up front, the better. More details will allow designers to better meet your needs and also be more realistic about what they can offer. Don't leave it to chance. You're the expert on your collection. What is obvious to you will not be obvious to others.



Here are some more items to consider as the process unfolds:

- Ensure the vocabulary you use is defined for the entire project team.
- Know what financial and labor resources are available to you for the project. Upfront planning will really save on downstream costs. It doesn't take much consulting time to blow through a budget, so be prepared.
- Keep planning meetings focused and on target.
- Expect that the limitations of automation technology will require you to go back and rethink at least some of the aspects of your project.

10

Success! (What does it look like?)

Success! (What does it look like?)

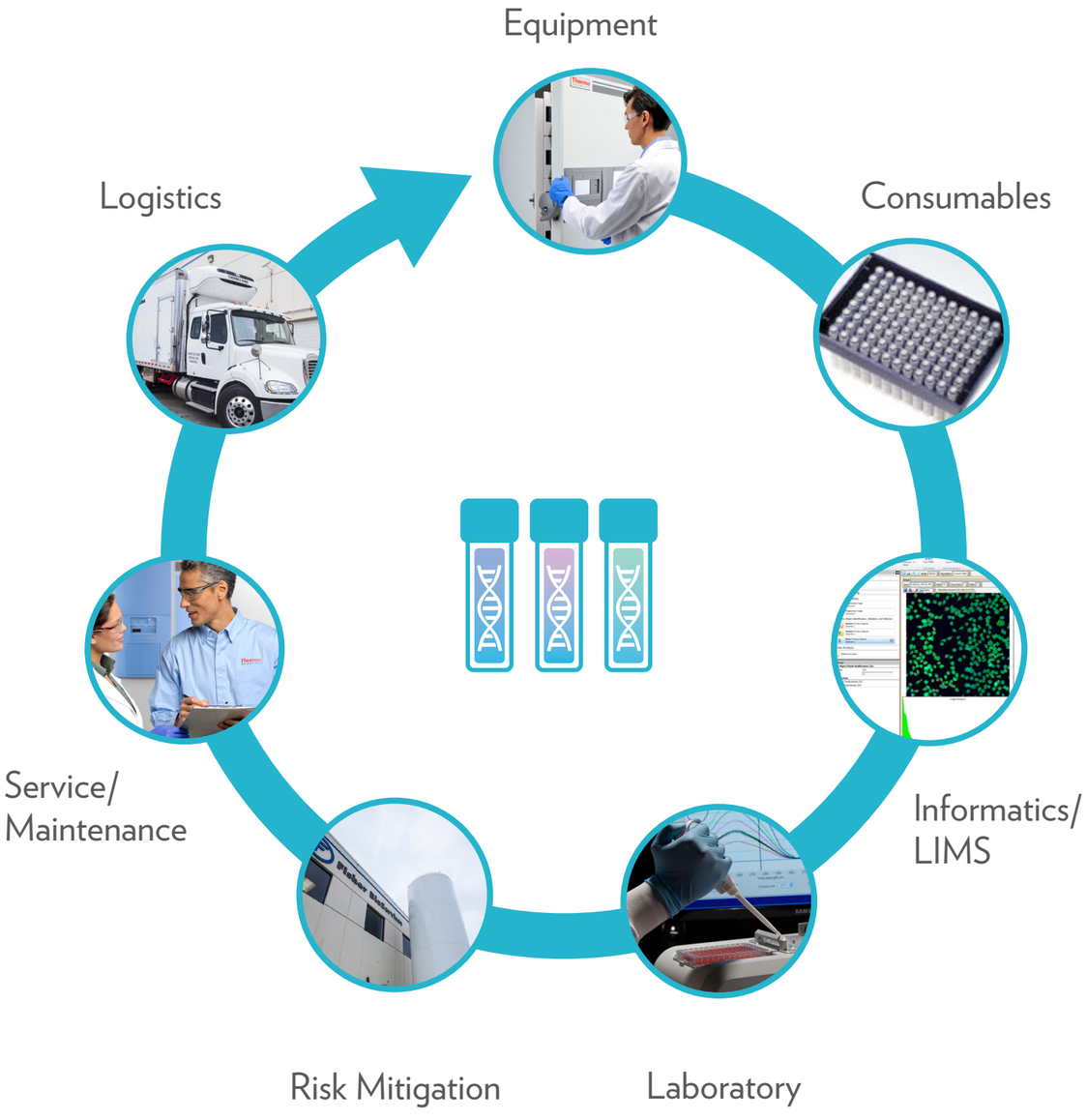
Once you've thoughtfully worked your way through the process, given your specifications to your chosen vendor, and successfully funded, tested and implemented your new system, you'll be glad you took the time to do it right.

You will be able to enjoy the satisfaction and rewards of a more efficient, modern and cost-effective biobanking solution. And others will want to know how you accomplished it and they will want you to do it again—that is what success looks like.

Additional Resources

Every phase of your sample lifecycle is critical to the success of your biobank. Explore additional resources to learn how you can support every step of your biobanking workflow.

▶ Comprehensive Biobank Resources



Additional Resources

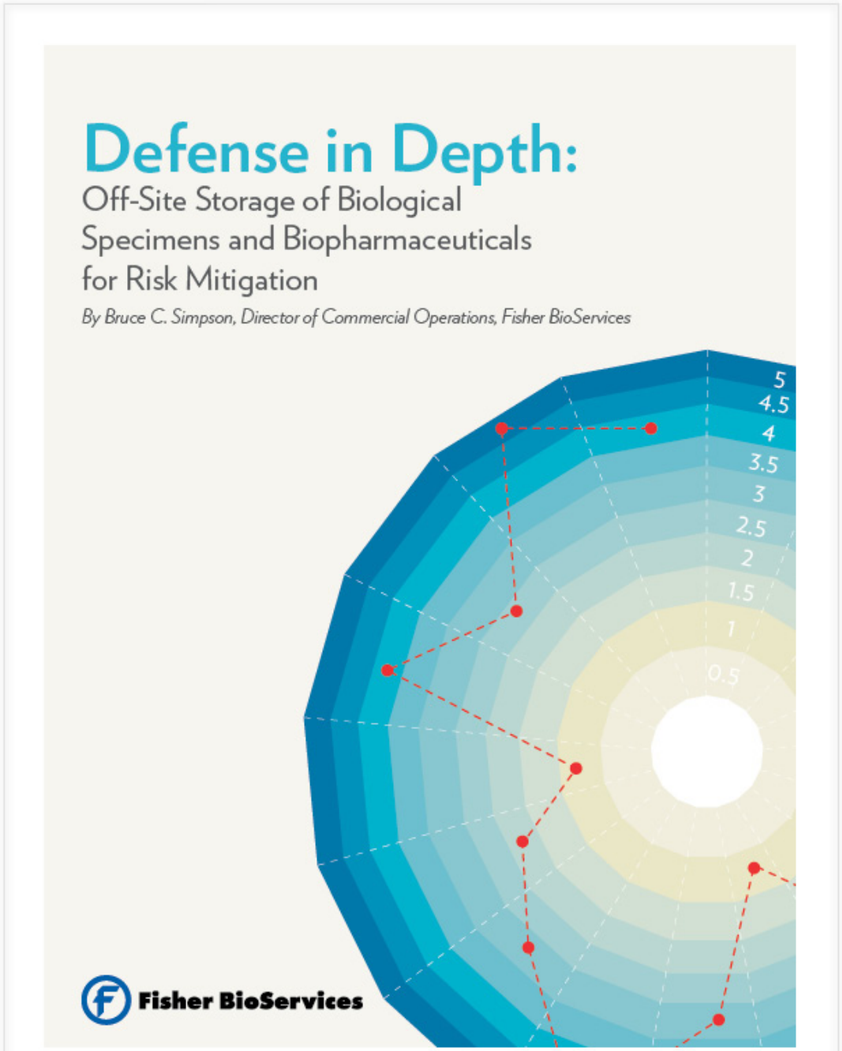
You can also consider using a biobank service provider to help you develop and manage your biobank, or just outsource some of your biobanking needs from redundant off-site storage, laboratory processing, sample collection kit production, to cold chain sample transportation/relocation.

- Professional Staffing Services
- Information Technology Systems
- Biobank Equipment Validation

▶ Outsourcing Solutions

Additional Resources

You may also like our ebook **Defense in Depth:** Off-Site Storage of Biological Specimens and Biopharmaceuticals for Risk Mitigation



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