Safety | Transparency | Availability | Quality

A Case for Automation
An Outsourcing Facility's Journey

Mark Spiecker – President

Agenda

- Learning Objectives
- STAQ Overview
- Business Case for Automation
- Design Phase
- Validation Life Cycle
  - User Requirements Specification (URS)
  - Factory Acceptance Testing (FAT)
  - Installation Qualification (IQ) / Operations Qualification (OQ)
  - Performance Qualification (PQ)
  - Periodic Re- Qualification (PRQ)
- Lessons Learned

Learning Objectives

A case for automation: An outsourcing facility's journey

- Participants will understand the key items in building a business case for automation.
- Participants will review a use case for advanced automated technology through the lens of the validation life cycle.
- Participants will understand the technology implemented, challenge(s) faced, alternative solutions, advantages and disadvantages of adoption, and outcome of the use of technology.

Background

STAQ Pharma is 503B Outsourcing Facility located in Denver, Colorado

STAQ is in compliance with all relevant 503B cGMP processes and provides a COA that includes Sterility, Potency, Stability and Endotoxin testing.

STAQ's goal from day one has been to help ensure the highest quality compounded medications for children and adults. Built brand new as a 503B, we're poised to do just that.

We are committed to a patient first orientation, high safety standards and collaboration partnership-oriented customer service.

STAQ is

Safety, Transparency, Availability, Quality

STAQ Fundamentals

- STAQ Pharma Design Principles – Why we are different
  - Highly Automated / Minimal # of human touches
  - Designed as a cGMP facility that produces compounded medications – NOT a converted 503A
- Located in Denver, CO – 20 minutes from the airport with direct access to the rest of the country
- 6 Production Rooms
- Non-Sterile to Sterile / Sterile to Sterile
- All API Come from FDA Registered Facilities
- Initial capability to produce 10,000 syringes per day, capability up to 30,000 at full build out
- We have a formalized Product Development Committee to guide our growth
- We plan to grow slow to make sure we do it right

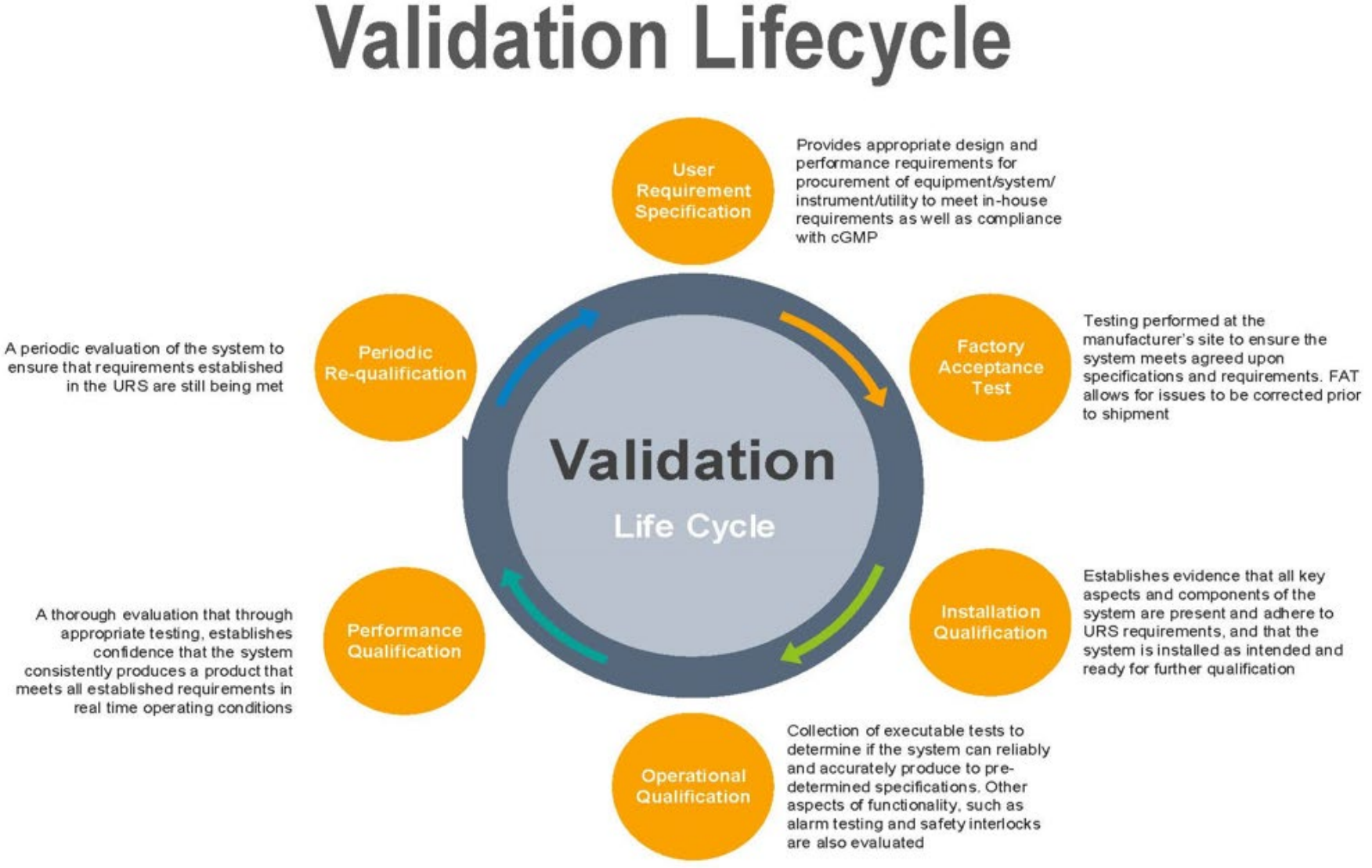
Business Case For Automation

- **Value Proposition** - Automation improves:
  - Batch Release – Reduces Contamination / Sterility failures
  - Operator Performance - Breaking the sterile barrier
  - Variation within and across batches
  - Overall Yield and cost
- **Process** - STAQ Engaged industry experts to take us through a process to vet out technology options appropriate for 503B. We looked at multiple levels of automation from repeater pumps to high capacity production lines. customers feedback to determine if anyone cares about automation.
- **Relevant planning issues** - We were early in the design / build cycle to be able to design rooms to accommodate equipment BEFORE it was purchased
- **Key costs and benefits of the capital project**
  -Identified a budget for equipment, FAT, install, validation packages, validation activities, etc..
  -Ran batch cost and yield projections with and without automation
- **Key project risks** - Delays in delivery and scope of validation
- **Involve stakeholders** -Senior Leadership was present every step of the way

Design & Planning Phase

- **Timeline** – plan 12-24 months
- **Design Phase**
  - -Architect / Facility Planning
    - Space – room
    - Mechanical - air
    - Flow - performance
- **Machine Design**
  - -Off the shelf is not off the shelf
  - -Configuration to specifications

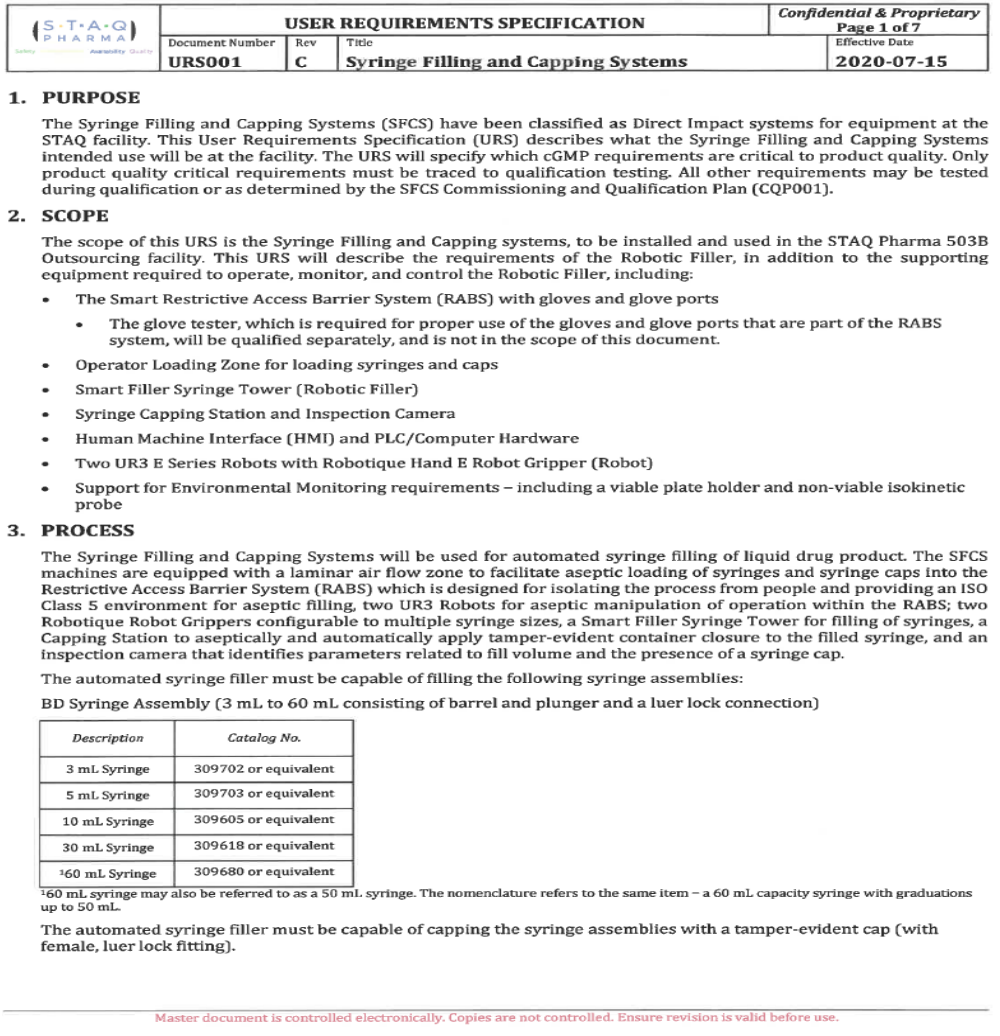
Validation LifeCycle



User Requirement Specification(URS)

Provides appropriate design and performance requirements for procurement of equipment /system/utility to meet in-house requirements as well as compliance with CGMP.

- Objective
- Technical specifications
- Design Data
- Documentation
- Installation and commissioning
- Delivery
- Training
- Commercial Terms
- Approvals



	USER REQUIREMENTS SPECIFICATION			*Confidential & Proprietary* Page 1 of 7
	Document Number	Rev	Title	Effective Date
	URS001	C	Syringe Filling and Capping Systems	2020-07-15

1. PURPOSE

The Syringe Filling and Capping Systems (SFCS) have been classified as Direct Impact systems for equipment at the STAQ facility. This User Requirements Specification (URS) describes what the Syringe Filling and Capping Systems intended use will be at the facility. The URS will specify which cGMP requirements are critical to product quality. Only product quality critical requirements must be traced to qualification testing. All other requirements may be tested during qualification or as determined by the SFCS Commissioning and Qualification Plan (CQP001).

2. SCOPE

The scope of this URS is the Syringe Filling and Capping systems, to be installed and used in the STAQ Pharma 503B Outsourcing facility. This URS will describe the requirements of the Robotic Filler, in addition to the supporting equipment required to operate, monitor, and control the Robotic Filler, including:

- The Smart Restrictive Access Barrier System (RABS) with gloves and glove ports
  - The glove tester, which is required for proper use of the gloves and glove ports that are part of the RABS system, will be qualified separately, and is not in the scope of this document.
- Operator Loading Zone for loading syringes and caps
- Smart Filler Syringe Tower (Robotic Filler)
- Syringe Capping Station and Inspection Camera
- Human Machine Interface (HMI) and PLC/Computer Hardware
- Two UR3 E Series Robots with Robotique Hand E Robot Gripper (Robot)
- Support for Environmental Monitoring requirements – including a viable plate holder and non-viable isokinetic probe

3. PROCESS

The Syringe Filling and Capping Systems will be used for automated syringe filling of liquid drug product. The SFCS machines are equipped with a laminar air flow zone to facilitate aseptic loading of syringes and syringe caps into the Restrictive Access Barrier System (RABS) which is designed for isolating the process from people and providing an ISO Class 5 environment for aseptic filling, two UR3 Robots for aseptic manipulation of operation within the RABS; two Robotique Robot Grippers configurable to multiple syringe sizes, a Smart Filler Syringe Tower for filling of syringes, a Capping Station to aseptically and automatically apply tamper-evident container closure to the filled syringe, and an inspection camera that identifies parameters related to fill volume and the presence of a syringe cap.

The automated syringe filler must be capable of filling the following syringe assemblies:

BD Syringe Assembly (3 mL to 60 mL consisting of barrel and plunger and a luer lock connection)

Description	*Catalog No.*
3 mL Syringe	309702 or equivalent
5 mL Syringe	309703 or equivalent
10 mL Syringe	309605 or equivalent
30 mL Syringe	309618 or equivalent
[1]60 mL Syringe	309680 or equivalent

[1]60 mL syringe may also be referred to as a 50 mL syringe. The nomenclature refers to the same item – a 60 mL capacity syringe with graduations up to 50 mL.

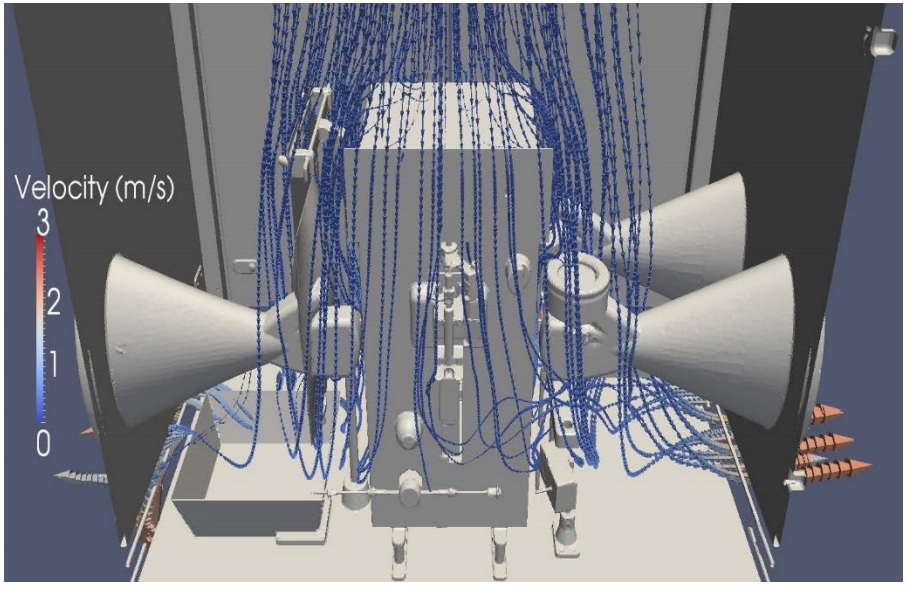
The automated syringe filler must be capable of capping the syringe assemblies with a tamper-evident cap (with female, luer lock fitting).

Master document is controlled electronically. Copies are not controlled. Ensure revision is valid before use.

Factory Acceptance Testing (FAT)

Testing Performed at the manufacturers site to ensure the system meets agreed upon specifications and requirements. FAT allows for issues to be corrected prior to shipment.

- -System/Process Description
- -System Documentation
  - Operator's Manuals
- -Spare Parts/Change Parts Verification
- -Drawings/Wiring Verification
- -Lubricant List (if applicable)
- -Utilities Verification
- -Alarms/Safeguards Verification
- -PLC Operation Verification
- -Security Level Access Verification
- -Operational Verification
  - Sequence of Operation Verification
  - URS Performance
- -Punch List



Installation Qualification (IQ)

Establishes evidence that all key aspects and components of the system are present and adhere to URS requirements and that the system is installed as intended and ready for further qualification

Operational Qualification (OQ) / Performance Qualification (PQ)

OQ - Collection of executable tests to determine if the system can reliably and accurately produce to pre-determined specifications. Other aspects of functionality such as alarm testing and safety interlocks are evaluated

PQ – A thorough evaluation that through appropriate testing establishes confidence that the system consistently produces a product that meets all established requirements in real time operating conditions

VIDEO HERE

Performance Qualification (PQ)

VIDEO HERE

Challenges / Lessons Learned

- Change orders are expensive
  - Ensure URS is complete
- Get everyone's input but don't be afraid to make decisions
- If it is not working at FAT it is going to be much harder to fix at your facility
- Start thinking about training at FAT
- Smoke studies are hard & can be simulated prior to delivery
- Validation is expensive and time consuming. If validation packages are available, purchase them. If they are not, consider if this is the right piece of equipment.
- Time can be your enemy
- Budget 50% - 100% of original equipment price for validation and change orders
- Make sure your staff can maintain your equipment

Learning Objectives & Questions

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Questions?