
Automation of compound management at Schering-Plough Research Institute (SPRI)

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Laboratory Robotics Interest Group

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Agenda

- Project background and overview
- Automation system components
- Current status/Request processing capabilities
- Future plans



Role of compound management at SPRI

- Responsible for the Storage, Retrieval and Distribution of the SPRI Proprietary Compound Collection
 - in-house synthesized compounds
 - compound purchases/exchanges/collaborations
- Provide plate production and solid sample distribution in support of drug discovery therapy area and high throughput screening efforts



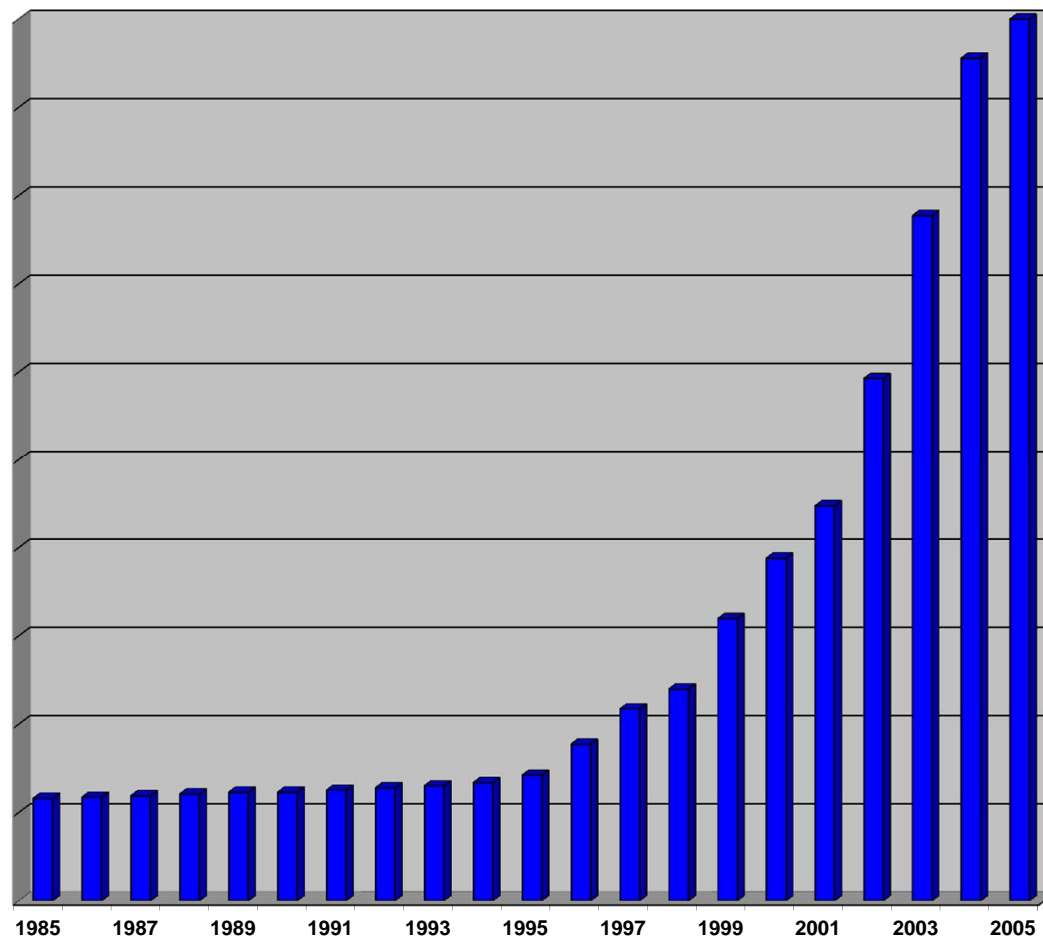
Critical Issues for SPRI Compound Management prior to automation

- Significant Growth in Compound Collection
 - need for centralized, standardized storage of liquid samples
- Significant growth in the number of Assay Targets
 - need for improved ability to cherry pick compounds for follow up for both HTS and therapy area follow up
 - need for high throughput plate production



Compound collection growth

Schering-Plough Research Institute
Compound Collection
1985-2005

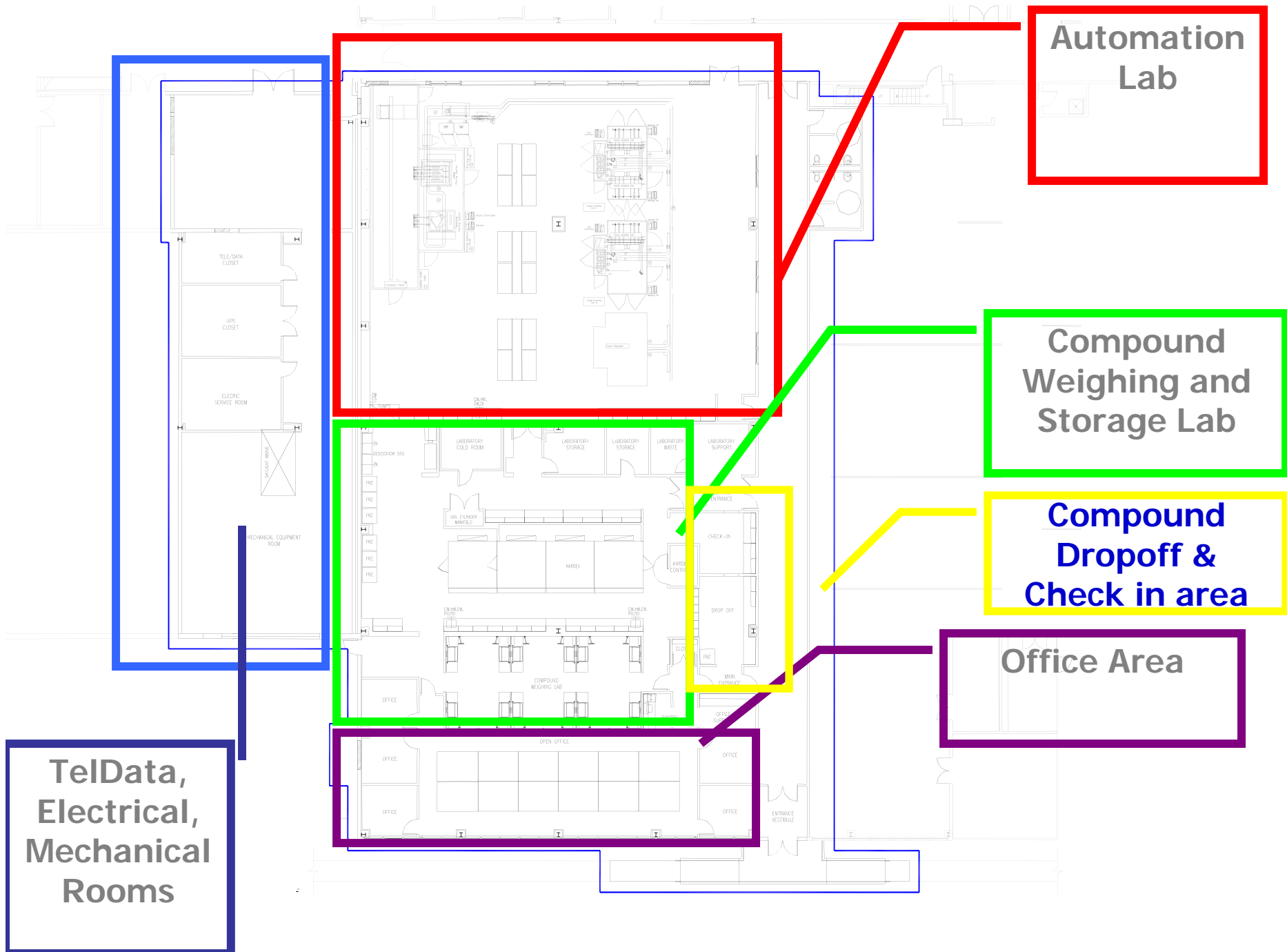


Project Overview

- Goals:
 - Renovate an existing facility to accommodate automation system, associated laboratory and office spaces
 - Purchase and install a compound storage system with integrated compound picking and plate production capabilities
 - Integrate automation system database with existing inventory management databases

Facilities Renovations

- Identified an available 17,000 square ft space at the Summit, NJ site with ample ceiling height for robotics installation
- Demolition started in April 2003 and renovations completed by October 2003



**Automation
Lab**

**Compound
Weighing and
Storage Lab**

**Compound
Dropoff &
Check in area**

Office Area

**TelData,
Electrical,
Mechanical
Rooms**



4/10/03 – Future location of
Compound Store



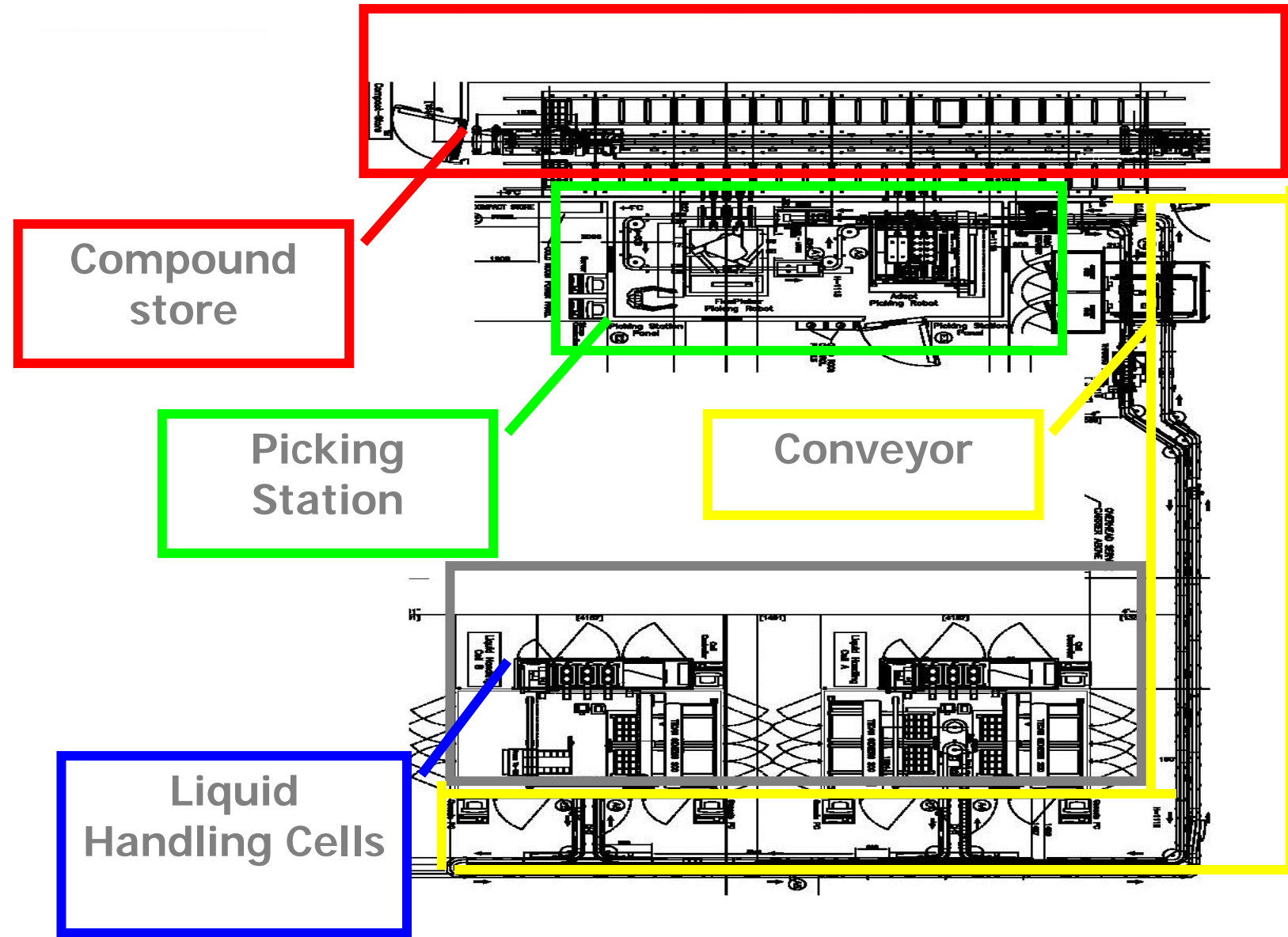
10/31/03 - Compound Store
Ready for Robot Delivery

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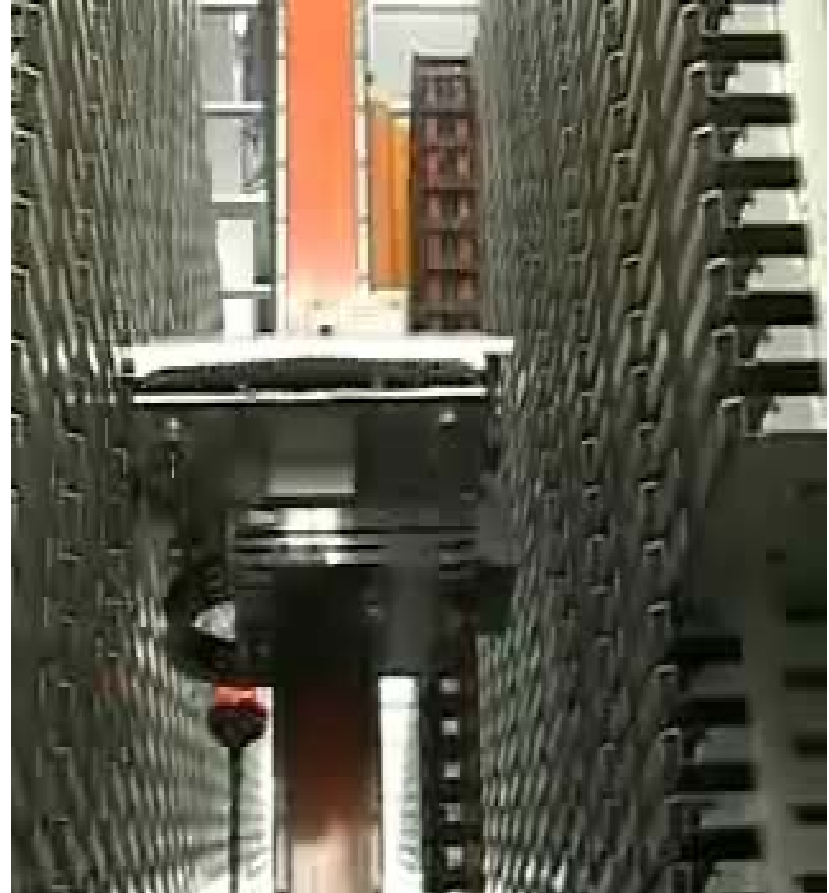


System Layout



Compound Store

- RTS Compact Store
- 4.3 million microtube capacity
- 4 degrees C, maximum 50% relative humidity
- Supports “tube on tray” and “rack on tray” storage configurations
- Gudel robot used to move trays of compounds to the picking station



Picking station

- Two picking robots
 - ABB Flexpicker
 - primary function
 - tube retrieval for therapy area custom plates, HTS confirmation plates
 - Adept Picking Robot
 - primary functions
 - rack retrieval for replication of HTS screening set(s)
 - additional tube picking capability for custom plate production

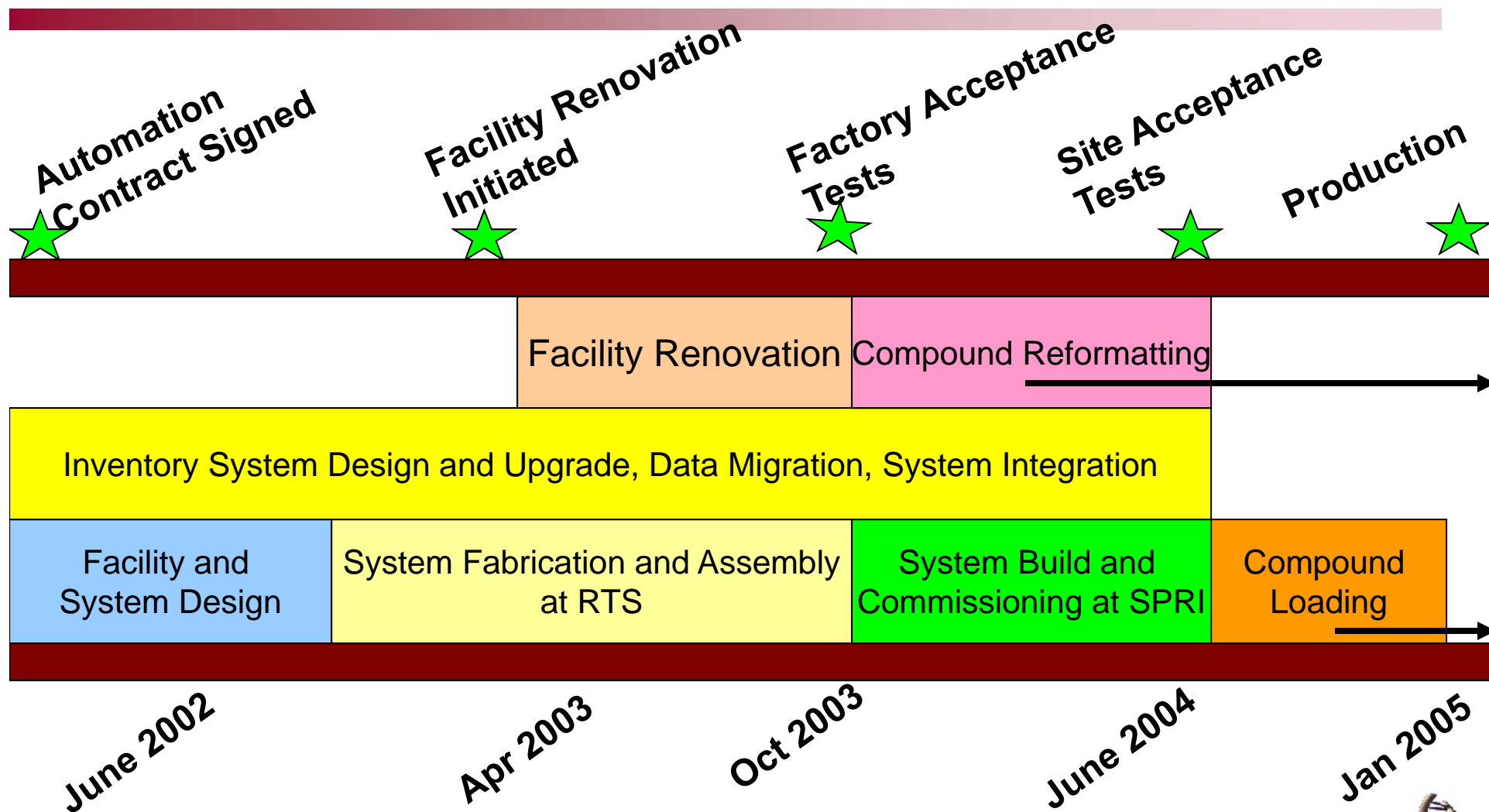


Liquid Handling Cells (LHCs)

- LHC A and LHC B
 - System components
 - 3 Tecan Genesis 200 units
 - 1 Perkin Elmer Evolution P3 unit
 - 2 Adept Picking Robots
 - 12 Plate Stackers
 - 2 Heraeus Hotels
 - Primary functions
 - solubilization and loading
 - new samples
 - plate production
 - HTS mixture plates
 - HTS confirmation plates
 - Therapy area custom plates
 - 96- and 384-well format supported
 - sample replenishment



Automation System Implementation Timeline



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- **Current status/Request processing capabilities**
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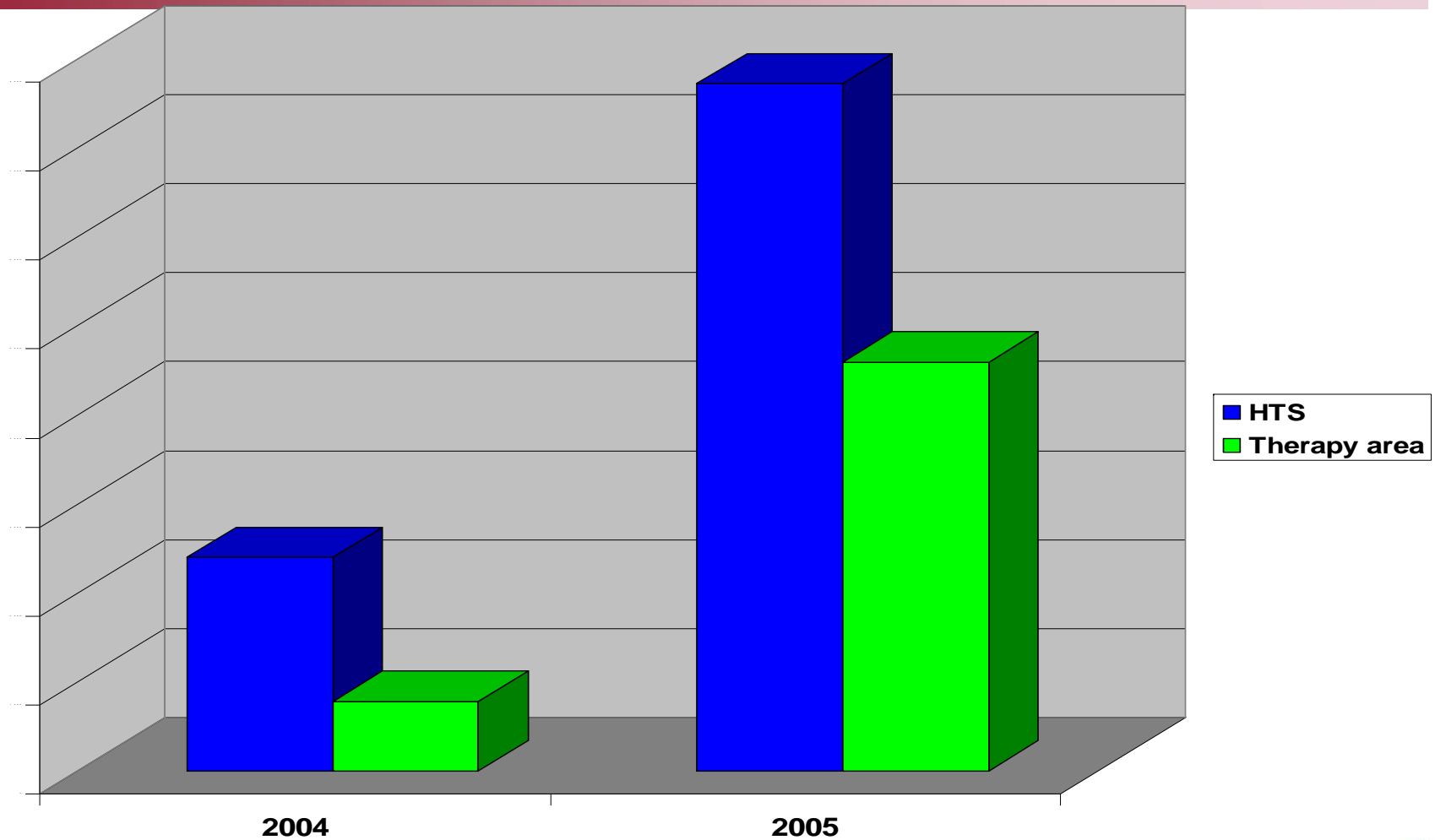
Compound Management at SPRI – Current Status

- Two-site operation
 - 12 colleagues on rotating schedule
 - Kenilworth K-15
 - solid sample storage and processing
 - sample drop-off and pickup
 - Summit S-6
 - solution sample processing and storage
 - solid sample backup storage
 - sample shipment to and from KW

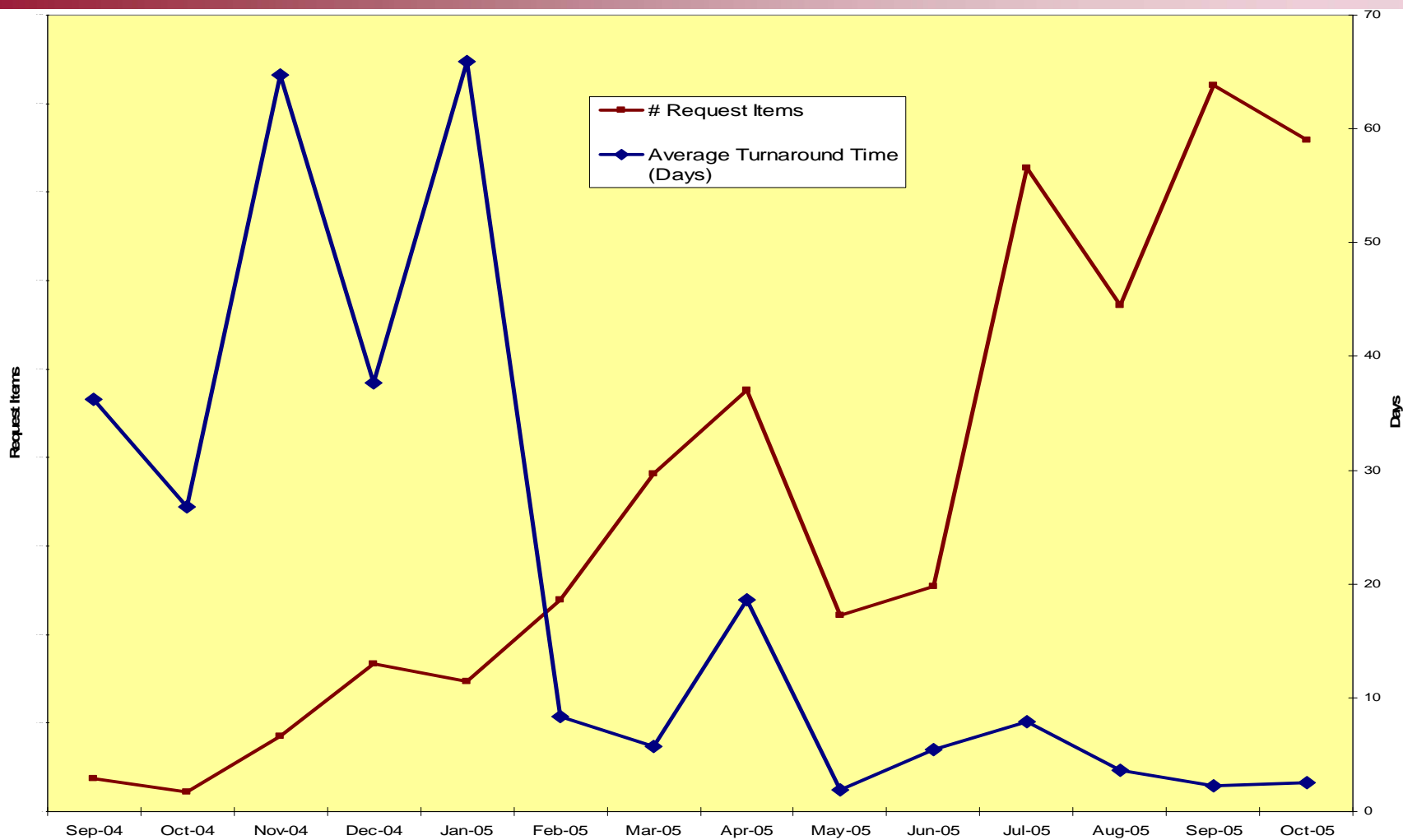


Throughput statistics – Plate production

Average Request Items Processed Per Month



Throughput statistics – solution sample distribution



Summary

Has automation implementation met our basic project requirements?

- ☑ centralized, environmentally controlled, high density storage with capacity to accommodate growing compound collection
- ☑ high-speed cherry picking with integrated liquid handling to improve plate production throughput and cycle time
- ☑ integrated database systems
- ☑ state-of-the-art facility for compound management

What other benefits have we seen during our first full year of production?

- ability to take on new projects
 - production of a subset of the screening file in several formats for both HTS and therapy area use
 - request fulfillment support for pilot studies for new screening paradigms
- ability to re-deploy in-house resources for previously outsourced tasks (e.g. compound reformatting)



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Future Plans

- Compound collection quality monitoring
 - incorporation of LC/MS capabilities within compound management group
 - monitor compound stability in DMSO over time
 - monitor impact of freeze/thaw cycles on compound stability
 - remove impure compounds from screening sets
- Production of custom screening libraries
 - use of chemoinformatic tools for compound selection
 - use of high-speed cherry picking for plate preparation
- Support for novel screening paradigms and initiatives as required



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