

Agile Development Techniques in Cryotrax

The application of agile techniques in a biological inventory management system.

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This whitepaper chronicles the use of agile techniques in the development of a biological inventory management system. From concept to deployment, development concentrates on embracing change, reducing complexity, and providing real business value.



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Background

Founded in 2002, CryoGene processes and manages biological samples for the educational, medical, and pharmaceutical communities. In 2003, they faced the challenge of competing for a major outsourcing contract with M.D. Anderson Medical Center. As a start-up, and apparent underdog, CryoGene realized their proposal would have to excel against more established players.



“Information technology will differentiate us from our competition. Having a system designed, developed and implemented for the sole purpose of reliably and securely storing and retrieving large volumes of samples gives us the necessary advantage required to service our world class clients.” – Marshall Griswold, CEO CryoGene.

From the beginning, CryoGene faced many challenges. By engaging Llamawerx, they gained a consulting firm ready to share *risks* and *rewards*. Not only could Llamawerx provide custom software development services and database experience, but they brought business analysis, systems engineering, project management, and communications skills to the partnership.



“Llamawerx is ready to go the extra mile to make our clients a success. We understand that success requires teamwork, and as team members we will do our best.” – Judy Gerard, President Llamawerx.

From concept to deployment, CryoGene and Llamawerx worked to develop a biological inventory management system. Mixing software and operating procedures, the system must meet CryoGene's current needs and position them for future growth. Together, they would adapt to changing requirements as CryoGene refined their business concept and discovered their true customer needs.

Client Profile

Founded in 2003, CryoGene’s mission is to provide a state-of-the-science facility specializing in secure storage and processing of biological specimens.

In 2003, CryoGene competed for a multi-year contract providing archived sample and freezer management for the prestigious M.D. Anderson Cancer Center at the University of Texas Medical Center.

After months of communication, negotiation, and education, CryoGene was awarded the contract. Locating a new facility in the Houston area enabled them to establish a greenfield operation choosing best-in-class components.

CryoGene at a Glance	
2002	Founded
2003	Awarded M.D. Anderson Contract
2004	Completed Houston, Texas Facility
2004	Cryotrax Live



“There was a tremendous amount of education that had to take place in order to secure this contract. Many researchers were skeptical about the security of their samples. We understood that, and working with Llamawerx we established policies, procedures, and a tracking system to exceed their expectations.” – Marshall Griswold, CEO CryoGene

In February 2004, CryoGene completed its new facility in Houston, Texas and began operations. Within days, the first samples arrived, and within 4 months CryoGene had processed over 60,000 samples and relocated over 30 freezers into the facility.

Business Issues

In order to succeed, CryoGene decided to position their company as the leader in secure storage of biological samples. The cornerstone of this strategy would be the development of a custom inventory management system. During the competition phase of the M.D. Anderson contract, CryoGene and Llamawerx worked to define the scope, identify the risks, and understand the business/technology interactions. Close collaboration led to the winning proposal. Together, key process areas were identified forming the IT system foundation.

- Biological inventory tracking
- Automated standard operating procedures
- Validated, extensive audit trail
- Security

Past experience with complex licensing agreements, recurring fees, and rigid off-the-shelf solutions weighed heavily on CryoGene's decision to pursue a custom solution. By establishing an agile business methodology, Llamawerx committed to:

- Agile plan – first things first mentality
- Low recurring costs
- Positioning for growth
- Flexible compensation agreement



“The success of this venture depends on the flexibility of the team” – Marshall Griswold, CEO CryoGene

Solution

From day one, Llamawerx immersed itself in CryoGene's business model. By participating in the contract competition, Llamawerx gained a customer view of the system. Together, a shared vision of the IT system emerged.

- Storing and retrieving samples
- Tracking accessioner actions
- Simplifying workflow interaction

→ *"The goal was simple, a working system enforcing the business rules required to store and retrieve cryovials" – Judy Gerard, President Llamawerx*

To keep the project scope in check, the team developed and applied a set of decision questions.

What is the business value?

Is it critical to our goal of a working system?

Is the design overly complex?

Does this improve the user experience?

By consistently asking these questions, the team effectively managed business requirements, features, and cost. Changes passing these questions were incorporated into phase 1; others were tabled for future consideration.

Technical Viewpoint

Cryotrax uses a three-tier architecture built on Java and open source tools.

- Rich-client Java interface
- Java business layer
- Relational database
- Network centric

Open Source Foundation

- Linux
- Apache Tomcat
- Apache Struts, Log4j, Ant
- JUnit
- OpenLDAP
- PostgreSQL

Decision Questions

Project Delivery

From the beginning, Llamawerx employed an iterative development model. Distributed development and continuous integration minimized integration headaches. Llamawerx built and deployed functional milestones every two weeks. CryoGene accessed these milestones for review and interactive system walkthroughs.

From the first delivery, development established automatic build and deployment processes along with tools to build and populate the database. Late in the project cycle, the team decided to deploy the application at a hosting facility

instead of on-site in Houston. With automated processes in place, Llamawerx configured and deployed the application in one day.

As phase 1 neared completion, Llamawerx engaged an independent verification service to validate the system. After executing two validation iterations, a complete verification report was prepared and delivered. Finally, CryoGene performed an acceptance test combining the software, database, security, and managed hosting service.

In February, Llamawerx created and deployed the final system. The next day, CryoGene stored the first samples. By June, CryoGene accessioners had inventoried over 60,000 samples.

Project Timeline	
Jul 2003	Kickoff
Aug 2003	Basic storage & retrieval
Oct 2003	Barcode printing & scanning
Nov 2003	SSL & reporting
Jan 2004	Independent validation
Feb 2004	Release 1.0

Benefits

By drilling down and addressing key functionality early on, a fully operational system was available when CryoGene opened their Houston facility. The first weeks of operation uncovered new concepts and features which were immediately fed back into the project.

Consciously employing decision questions focusing on business value minimized wasted development and put a working system in the hands of CryoGene on time.

Postponing decisions may seem counterintuitive, but it is very effective. This should not be confused this with procrastination. The advantage of the former lies in improved understanding. In several instances, perceived requirements disappeared or changed dramatically before they were implemented saving time and money.

It's important to balance simplicity and complexity. By anticipating the need for new container types, Llamawerx designed a system in which container definitions, along with the hierarchy structure, reside in the database. While more complex than a fixed set of containers, changes to the configuration are available instantly.

Agile Success Factors

- Embrace Change
- Postpone Decision Making
- Concentrate on Business Value
- Iterative Development
- Concurrent Development and Continuous Integration

Summary

By concentrating on delivering key business value and maintaining an agile approach, Llamawerx and CryoGene successfully developed and deployed a mission-critical component of CryoGene's business strategy. Both sides recognized that the keys to success lie in developing a solution meeting current business needs rather than supposed needs. Streamlining the development using shared decision questions enabled the team to stay on track. By focusing on real business value, not perceived value, a successful deployment was achieved.

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More Information

For the latest information about our products and services, please visit:

<http://www.llamawerx.com>

<http://www.llamawerx.com/cryotrax.htm>

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