

# Implementing a Vendor Developed System for the Virginia State Newborn Screening Program

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Once upon a time, in  
Virginia's  
Consolidated  
Laboratories ...

# It was the year 2000...

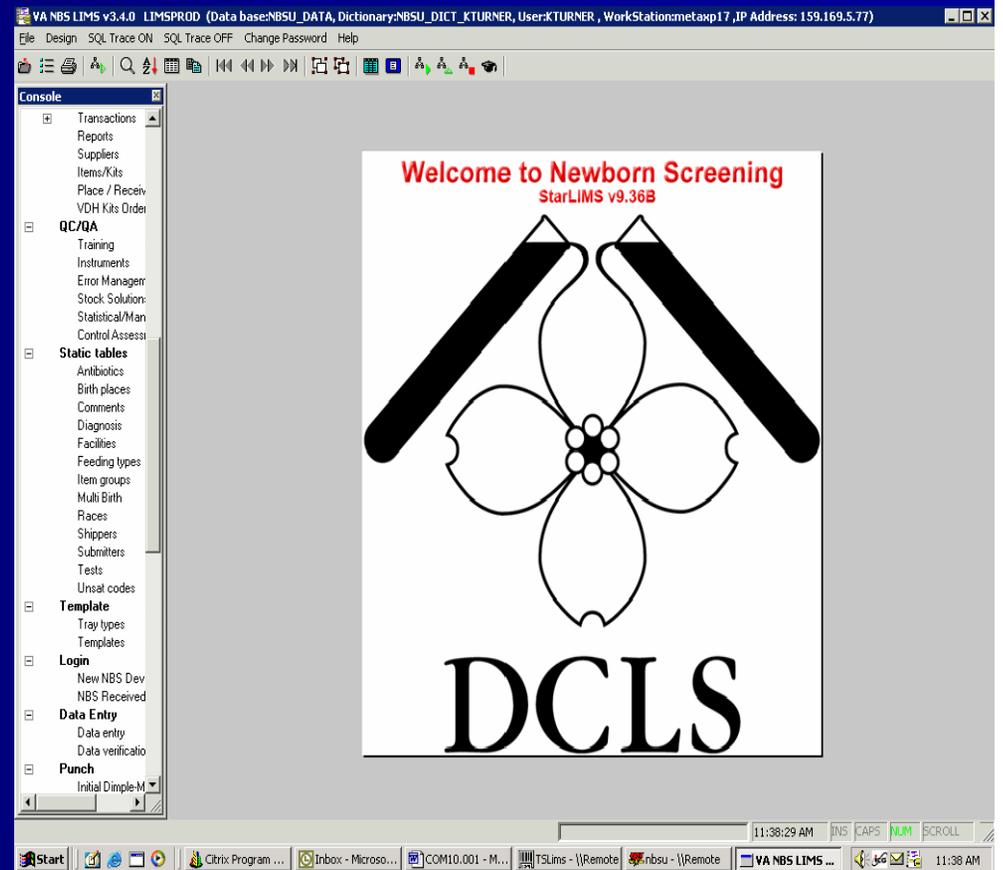
- VA's NBS laboratory was still operating a "home-brewed" DOS-based system implemented in 1989
- Application was written in Cobol. The database was not supported locally. The system was difficult to modify and expensive to maintain
- The system ran on an HP mini-computer. Parts were no longer available and HP no longer provided maintenance support

# Procurement of A New LIMS -

- In January of 2000, an RFP went out to solicit bids for an NBS LIMS
- DCLS needed a product that had the flexibility to grow as the NBS program grows
- DCLS wanted a product that could be expanded for use beyond newborn screening

# A Vendor was Selected -

- In April of 2000, **STARLiMS**, known then as LIMS(USA), was contracted to develop a LIMS to support all Newborn Screening Laboratory and Follow-up activities



# Implementation Timeline -

- 6/2000 – STARLiMS site visit
- 9/2000 – Development/training held at STARLiMS headquarters in Florida
- 1/2001 – Received Alpha release
- 5/2001 – Received Beta release
- 7/2001 – Received Acceptance system
- 8/2001 – Received user training
- 9/2001 – Performed data conversion
- 9/2001 – Moved STARLiMS into production

# Benefits of the New LIMS

## ■ Improved functionality:

- Instrument interfacing for direct result capture into LIMS
- Point and click data capture
- Monitor kit distribution and receipt
- On-line instrument maintenance logs with alerts for routine maintenance
- Automatic notification to NBS Follow-up Nurses for all abnormal samples
- Case management functions for all diagnosed cases

VA NBS LIMS v3.4.0 LIMSPROD (Data base:NBSU\_DATA, Dictionary:NBSU\_DICT\_VBROWN, User:VBROWN, WorkStation:metasp17\_IP Address: 159.163.5.77)

File Standard Curve Control Curve

Console Test GALT Tray number 06041421201A QC was Accepted!

Tools  
Check NBS De  
Devices status  
Print tray label  
Print Tray Map  
Query Screen  
Response log  
Relests report  
Show Control C  
Show Standard  
Statistics  
Tray Results

Inventory  
Items/Kits  
Place / Receiv

QC/QA  
Instruments  
Error Managem  
Stock Solutions  
Control Assess

Punch  
Initial Dimple-M  
Relests BIOT  
Relests CAH  
Relests GALT  
Relests GALH  
Relests HGB  
Initial MET  
Relests MET  
Relests - T4  
Relests - TSH

Results Entry  
Tray Entry  
Input from file  
MET data impc

Results Review  
Tray Review

Mailing

Results

>> 1	2	3	4	5	6	
			Control			
0414220229 - Pass	0414220230 - Pass	0414220231 - Pass	Control	0414220232 - Pass	0414220233 - Pass	
0414220234 - Pass	0414220235 - Pass	0414220236 - Pass	Control	0414220237 - Pass	0414220238 - Fail	
0414220239 - Pass	0414220240 - Pass	0414220241 - Pass	Control	0414220242 - Pass	0414220243 - Pass	
0414220244 - Pass	0414220245 - Pass	0414220246 - Pass	Control	0414220247 - Pass	0414220248 - Pass	
0414220249 - Pass	0414220250 - Pass	0414220251 - Pass	Control	0414220252 - Pass	0414220253 - Pass	
0414220254 - Pass	0414220255 - Pass	0414220256 - Pass	Control	0414220257 - Pass	0414220258 - Pass	
0414220259 - Hold	0414220260 - Pass	0414220261 - Pass	Control	0414220262 - Pass	0414220263 - Pass	
0414220264 - Pass	0414220265 - Pass	0414220266 - Pass	Control	0414220267 - Pass	0414220268 - Pass	
0414220269 - Pass	0414220270 - Pass	0414220271 - Pass	Control	0414220272 - Pass	0414220273 - Pass	
0414220274 - Pass	0414220275 - Pass	0414220276 - Pass	Control	0414220277 - Pass	0414220278 - Pass	
0414220279 - Pass	0414220280 - Pass	0414220281 - Pass	Control	0414220282 - Pass	0414220283 - Pass	

03:35:56 PM INS CAPS NUM SCROLL

Start TS Lims - \Rem... nbsu - \Rem... VA NBS LIM... Product Catalog... QVC.com Shop... Citrix Program N... Document1 - MI... 3:40 PM

# Benefits of the New LIMS -

## ■ Improved efficiency:

- Use of bar-coding throughout kits, sample receiving and analytical processes
- Result entry/ result approval by sample or batch
- Automated QC tracking/charting
- Speed of printing reports (from hours to minutes)
- Robust search/query capabilities
- Quick and easy sample linking/unlinking process
- Static tables that are easily updated

# Benefits of the New LIMS -

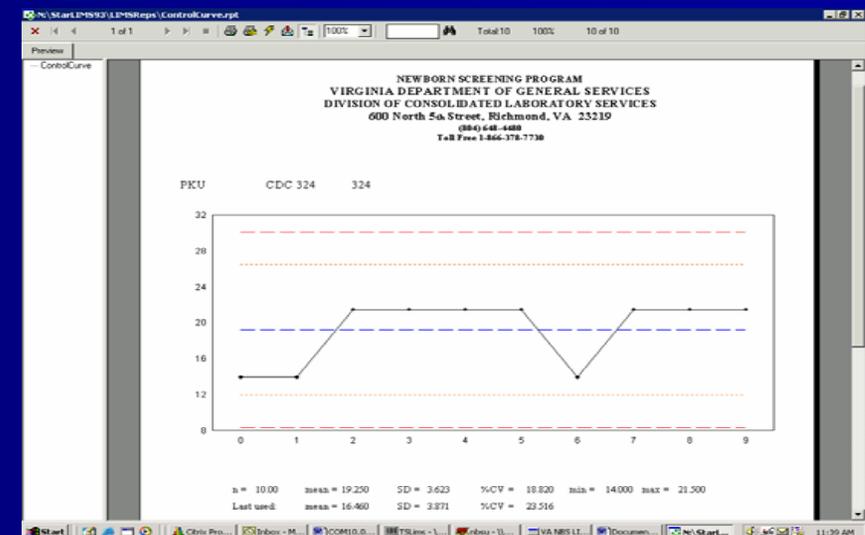
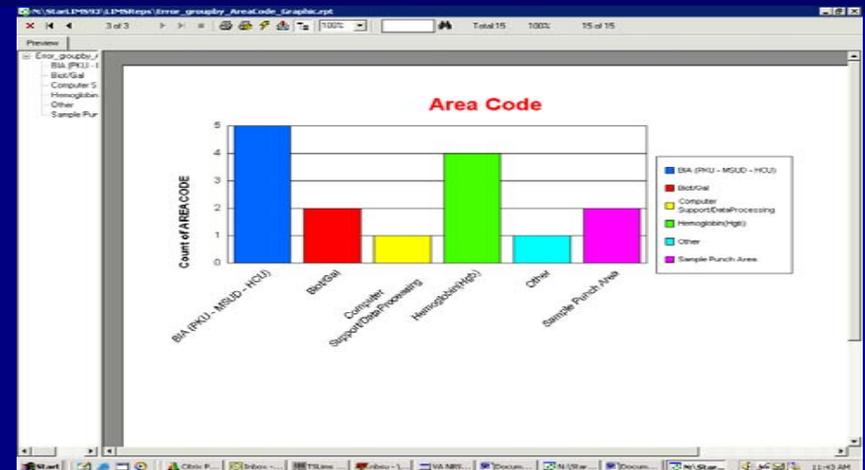
- Improved Data Quality:

- Double data entry for all essential demographic data
- Delta checks incorporated to identify possible discrepancies in results
- Automation of sample prep
- Reduced risk of transcription errors through instrument downloads and point and click result data entry.

# Benefits of the New LIMS -

## ■ Electronic Management of the NBS Quality Assurance Program:

- Audit trail
- Staff training & competency records
- Corrective Actions
- Kit/Inventory tracking
- QC/proficiency tracking
- Electronic phone logs
- Management/statistical reports on demand



# Benefits of the New LIMS -

## ■ Technical Improvements:

- Run under Citrix Metaframe Environment. Citrix enables remote access by NBS laboratory and follow-up personnel over secure 128 bit encryption
- Utilize Oracle Database which allows NBS to keep 10 years of data (currently storing over 10 gig of patient data)
- Uses Crystal Report Writer which enables laboratory staff to create and update reports (currently utilize 178 reports in STARLiMS)
- Uses current application languages
- Does not require full-time IT support to maintain

# Why was the Implementation a Success?

- Commitment of the project team
- Support of a strong steering committee
- Constant, effective communication between DCLS and STARLiMS
- Effort put into implementation planning
  - Preparing for/conducting acceptance testing, stress testing, parallel testing, etc.
- STARLiMS on-site at critical intervals, including the move to production

# Lessons Learned -

- NBS LIMS Requirements Documentation too general for development purposes
- More time spent on support functions - ex. kit prep staff and Follow-up staff
- Full time System Analyst on vendor side – lead developer served as both
- More vendor emphasis on training and documentation
- Completion of full disaster recovery plan prior to going live

# Since Implementation -

- Two additional disorders have been added to Virginia's mandated newborn screening panel:
  - Congenital Adrenal Hyperplasia (CAH) in 1/02
  - Medium Chain Acyl-CoA Dehydrogenase Deficiency (MCADD) in 3/04
- STARLiMS was integrated with the DCLS Environmental LIMS for creation and tracking of drinking water test kits (7/02)

# But this is not the end of the story...

What lies ahead for the NBS LIMS:

- Electronic data exchange with the Virginia Department of Health
- Electronic data exchange with NBS customers
- Scanning of devices
- Expansion of screening services

# And as we begin the next Chapter...

- In collaboration with KY, AR and IA, DCLS is currently working with STARLiMS to expand LIMS functionality by implementing the "Sunrise" PH application for all environmental and "clinical" testing.
- As we enter this phase of LIMS implementation, the use of standardized messaging and reporting vocabulary will be an integral part of the LIMS development.