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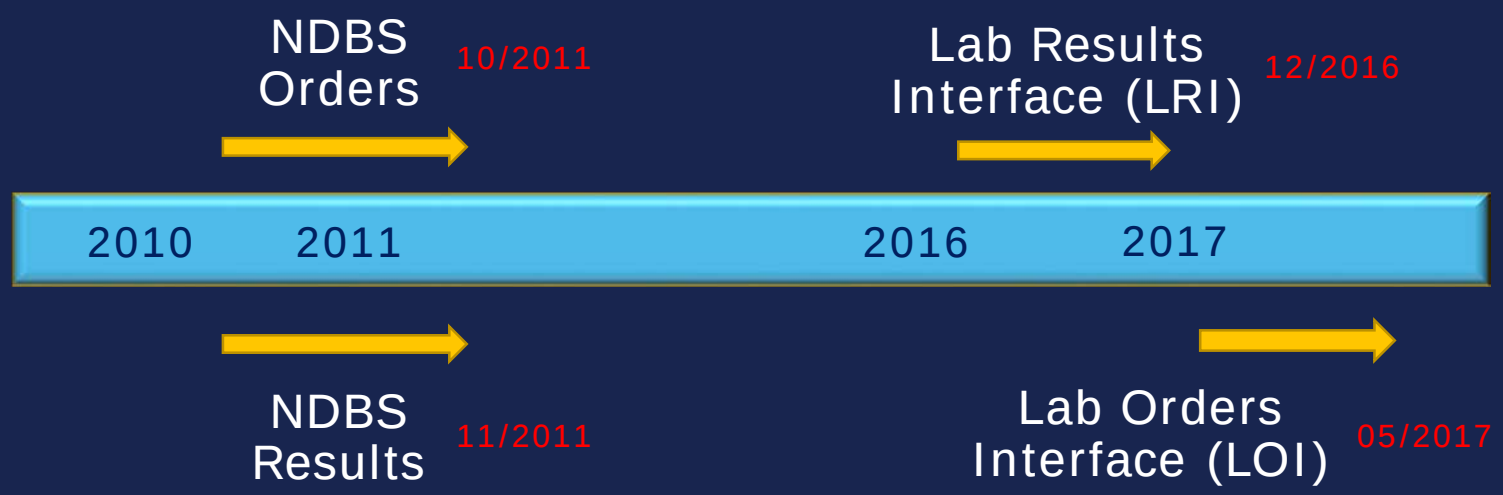
Understanding an HL7 Implementation Guide

A Primer on IT Nerd-dom for Newborn Screening Nerds

NBS HL7 Guides



Public Health Informatics Institute

NewSTEPs

NBS HL7 Guides

Expert???!

NBS HL7 Guides

Expert!!!

Riki Merrick, MPH
HL7 Expert

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What exactly is this HL7 stuff again?

HL7 = Healthcare Esperanto

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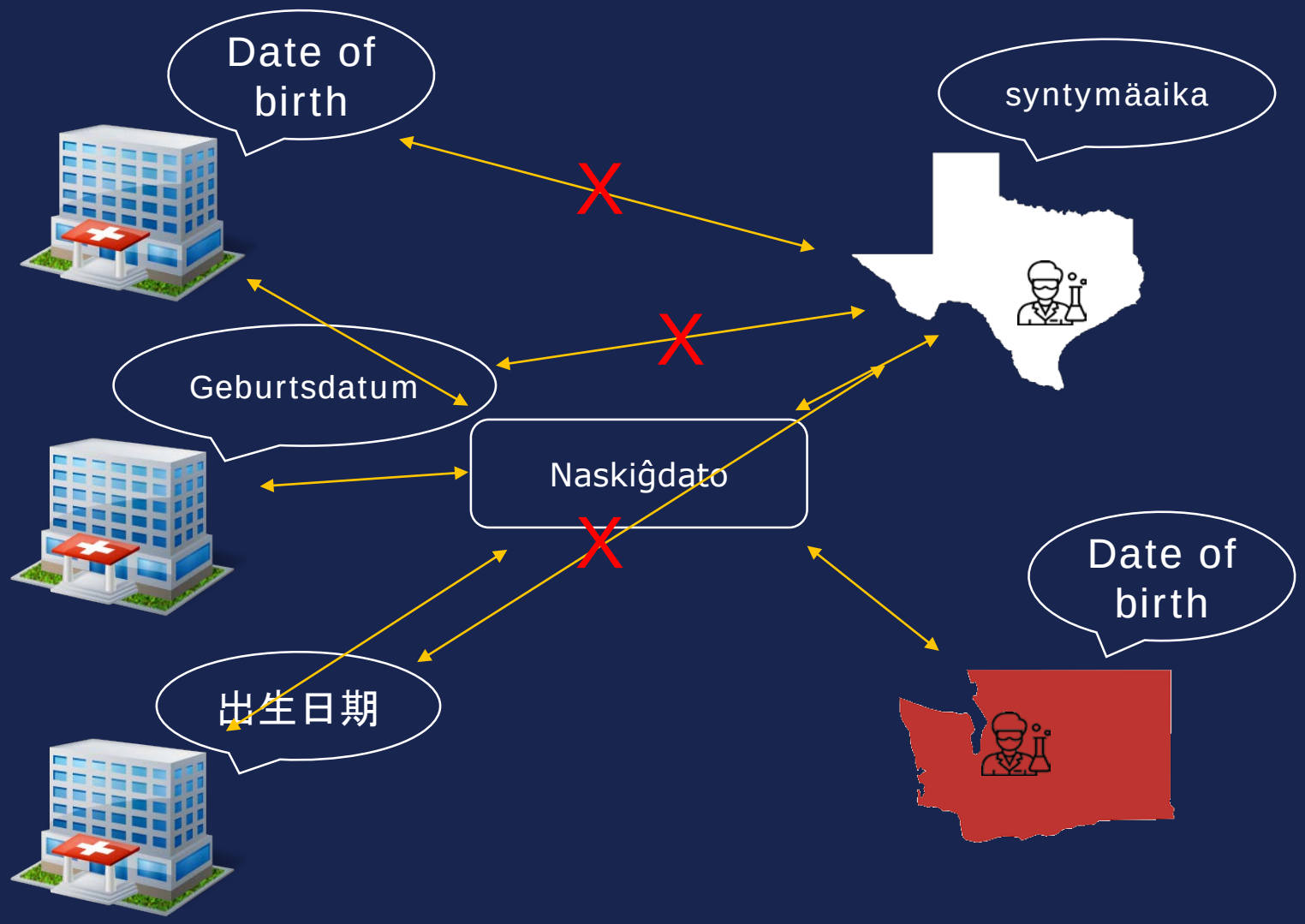

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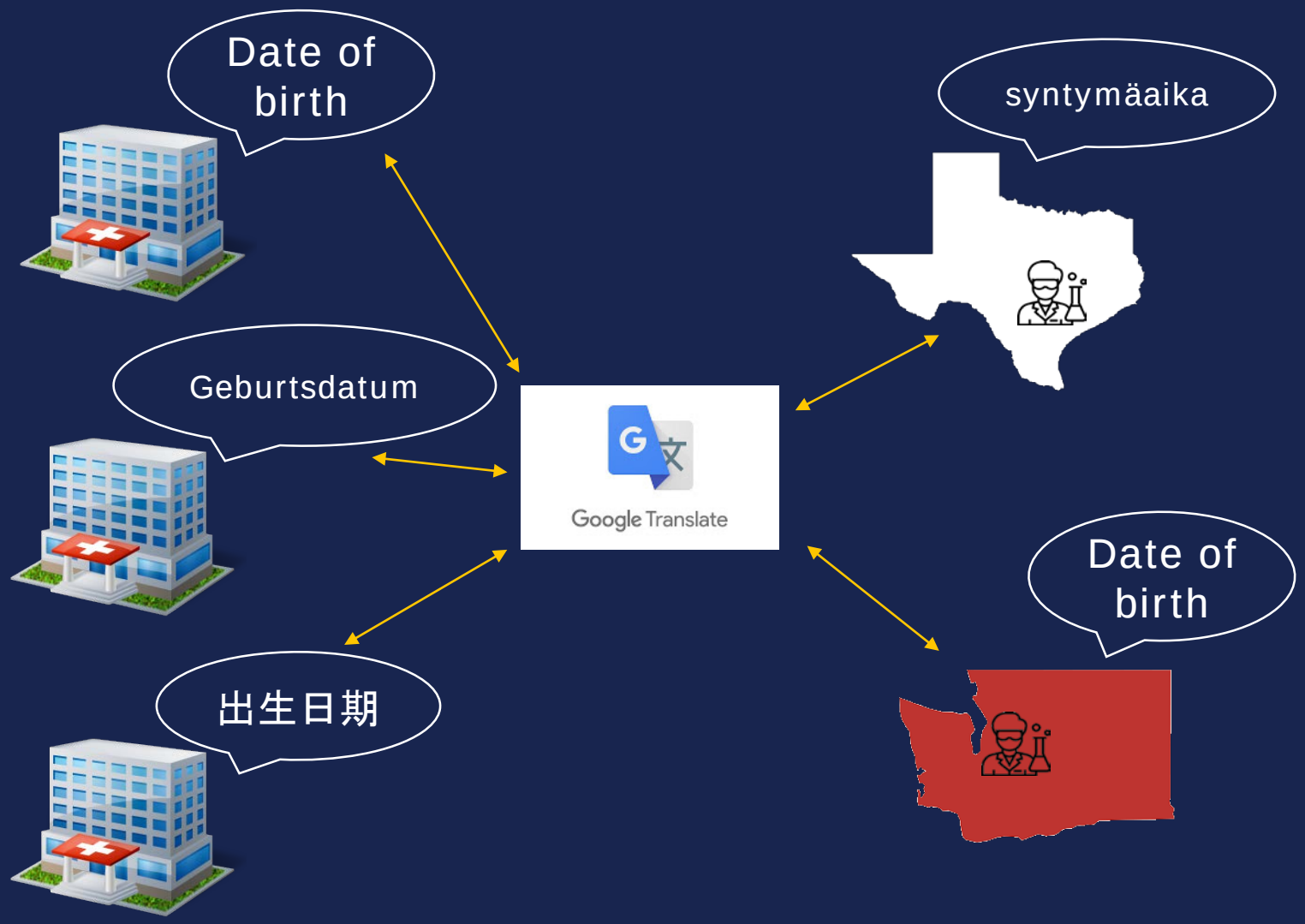

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Will an Implementation Guide tell me everything I need to start exchanging HL7 messages?

HL7 Project

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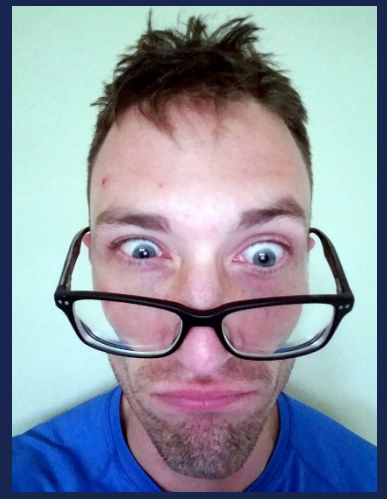
- Hardware and Software Solution
- Laboratory Workflows
- HL7 Message Specifications
- Technical and Security Documentation
- Test Plans and Testing
- Partner Recruiting
- More Testing
- Maintenance

Building Blocks Toolkit

- Hardware and Software Solution
- Laboratory Workflows
- HL7 Message Specifications
- Technical and Security Documentation
- Test Plans and Testing
- Partner Recruiting
- More Testing
- Maintenance

Willie Andrews, BSMT
Evil Genius



Joshua Miller, MPH
Evil Genius

Building Blocks Toolkit

- Hardware and Software Solution
- Laboratory Workflows
- HL7 Message Specifications
- Technical and Security Documentation
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- Partner Recruiting
- More Testing
- Maintenance

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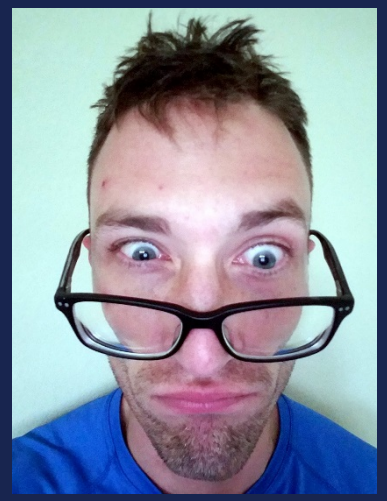

Joshua Miller, MPH
Evil Genius

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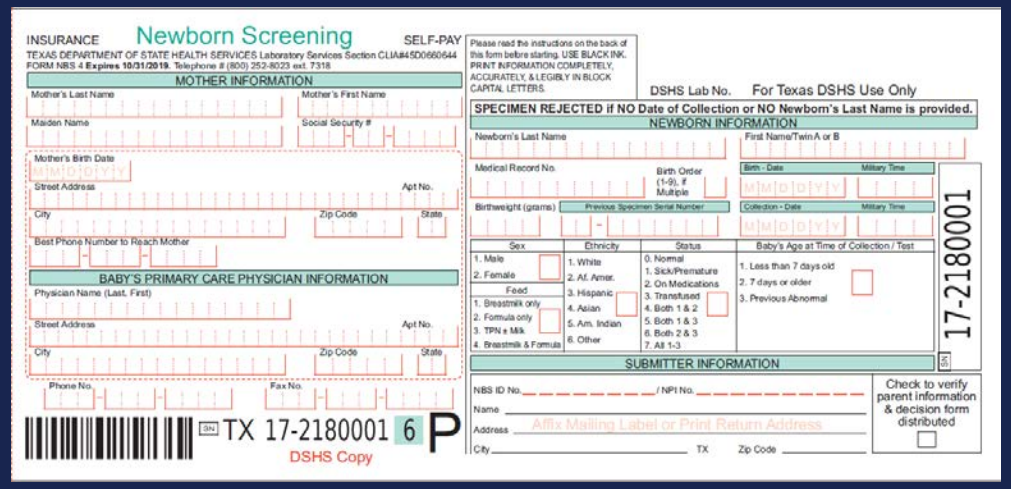
What will the LOI and LRI Implementation Guides tell me?

HL7 Message Specifications



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NK1|1|Black^Walburga|MTH|12 Grimmauld Place^^CEDAR PARK^TX^78613^|^^PH^^^402^4955652|||||||
|||19760514||||||||||||||||123456^^^^MA~^^^^SS|||||
OBR|1||20170710085000|54089-8^Newborn screening panel AHIC^LN|||20170710085000||||||
|20170710085000||05723062||||||||F|
ORC|NW||||||||||||||||||||DSHS TEST UAT FACILITY^^^^^^^^^^05723062|123 Street^Suite ABC^Austin^TX^74321^^^^^^^^^^|^PH^555^5555555^|
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OBX|2|ST|57723-9^Unique bar code number of Current sample^LN||169105199||||||F|||20170719152202|
OBX|3|CE|57721-3^Reason for lab test in Dried blood spot^LN||LA12425-7^Screen - required by law^LN||||||F|||20170719152202|
OBX|4|ST|57711-4^Unique bar code number of Initial sample^LN||160105174||||||F|||20170719152202|

HL7 Message Specifications

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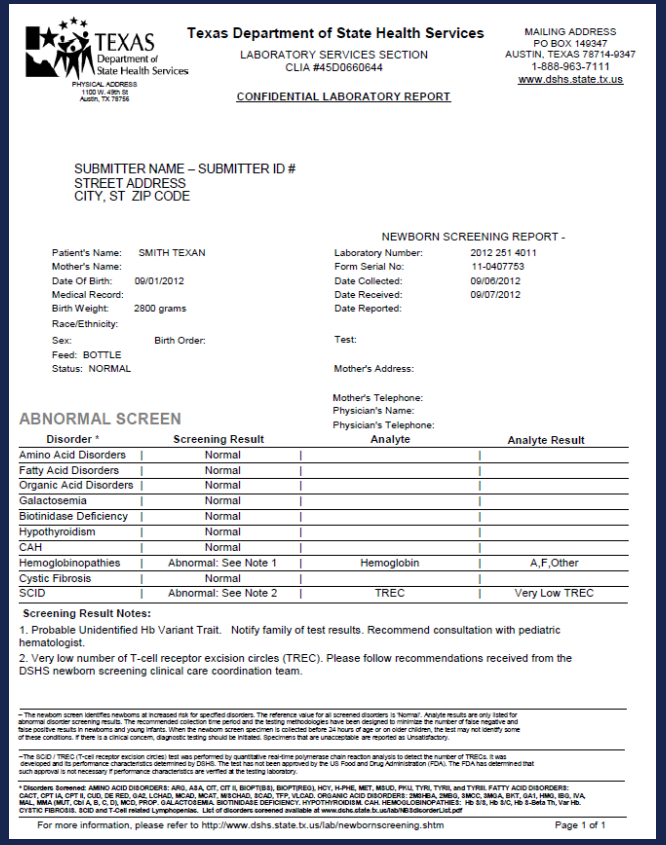

TEXAS Department of State Health Services
PHYSICAL ADDRESS
1100 W. 49th St
Austin, TX 78756

Texas Department of State Health Services
LABORATORY SERVICES SECTION
CLIA #45D0660644

MAILING ADDRESS
PO BOX 149347
AUSTIN, TEXAS 78714-9347
1-888-963-7111
www.dshs.state.tx.us

CONFIDENTIAL LABORATORY REPORT

SUBMITTER NAME – SUBMITTER ID #
STREET ADDRESS
CITY, ST ZIP CODE

NEWBORN SCREENING REPORT -

Patient's Name: SMITH TEXAN
Mother's Name:
Date Of Birth: 09/01/2012
Medical Record:
Birth Weight: 2800 grams
Race/Ethnicity:
Sex: Birth Order:
Feed: BOTTLE
Status: NORMAL

Laboratory Number: 2012 251 4011
Form Serial No: 11-0407753
Date Collected: 09/06/2012
Date Received: 09/07/2012
Date Reported:

Test:

Mother's Address:

Mother's Telephone:
Physician's Name:
Physician's Telephone:

ABNORMAL SCREEN

Disorder *	Screening Result	Analyte	Analyte Result
Amino Acid Disorders	Normal		
Fatty Acid Disorders	Normal		
Organic Acid Disorders	Normal		
Galactosemia	Normal		
Biotinidase Deficiency	Normal		
Hypothyroidism	Normal		
CAH	Normal		
Hemoglobinopathies	Abnormal: See Note 1	Hemoglobin	A,F,Other
Cystic Fibrosis	Normal		
SCID	Abnormal: See Note 2	TREC	Very Low TREC

Screening Result Notes:

1. Probable Unidentified Hb Variant Trait. Notify family of test results. Recommend consultation with pediatric hematologist.

2. Very low number of T-cell receptor excision circles (TREC). Please follow recommendations received from the DSHS newborn screening clinical care coordination team.

~ The newborn screen identifies newborns at increased risk for specified disorders. The reference value for all screened disorders is 'Normal'. Analyte results are only listed for abnormal disorder screening results. The recommended collection time period and the testing methodologies have been designed to minimize the number of false negative and false positive results in newborns and young infants. When the newborn screen specimen is collected before 24 hours of age or on older children, the test may not identify some of these conditions. If there is a clinical concern, diagnostic testing should be initiated. Specimens that are unacceptable are reported as Unsatisfactory.

~The SCID / TREC (T-cell receptor excision circles) test was performed by quantitative real-time polymerase chain reaction analysis to detect the number of TRECs. It was developed and its performance characteristics determined by DSHS. The test has not been approved by the US Food and Drug Administration (FDA). The FDA has determined that such approval is not necessary if performance characteristics are verified at the testing laboratory.

* Disorders Screened: AMINO ACID DISORDERS: ARG, ASA, CIT, CIT II, BIOPTIB1, BIOPTIREQ1, HCY, HUPHE, MET, MSUD, PHU, TYR1, TYRII, and TYRIII. FATTY ACID DISORDERS: CACT, CPT IA, CPT II, CUD, DE RED, GAS, LCHAD, MCAD, MCAT, MSCHAD, SCAD, TFP, VLCAD. ORGANIC ACID DISORDERS: 2MB1+B4, 2MB0, 3MCC, 3MGA, BKT, GA1, HMG, IBG, IVA, MAL, MMA (MUT, Cbl A, B, C, D), MCD, PROP. GALACTOSEMIA. BIOTINIDASE DEFICIENCY. HYPOTHYRODISM. CAH. HEMOGLOBINOPATHIES: Hb S/S, Hb S/C, Hb S-Beta Th, Var Hb. CYSTIC FIBROSIS. SCID and T-Cell related Lymphopenias. List of disorders screened available at www.dshs.state.tx.us/lab/NBSdisordersList.pdf

For more information, please refer to http://www.dshs.state.tx.us/lab/newbornscreening.shtm

Page 1 of 1

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Place^^CEDAR
PARK^TX^78613^|^^PH^^^402^4955652||||||||
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panel AHIC^LN|||20170710085000||||||
|20170710085000||05723062||||||||F|
ORC|NW||||||||||||||||||DSHS TEST UAT
FACILITY^^^^^^^^^05723062|123 Street^Suite
ABC^Austin^TX^74321^^^^^^^^^^|^PH^555^555555
5^|
OBX|1|ST|57716-3^State printed on filter paper card
[Identifier] in NBS card^LN|1|TX||||||O
OBX|2|ST|57723-9^Unique bar code number of Current
sample^LN||169105199|||||F|||20170719152202|
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OBX|4|ST|57711-4^Unique bar code number of Initial
sample^LN||160105174|||||F|||20170719152202|
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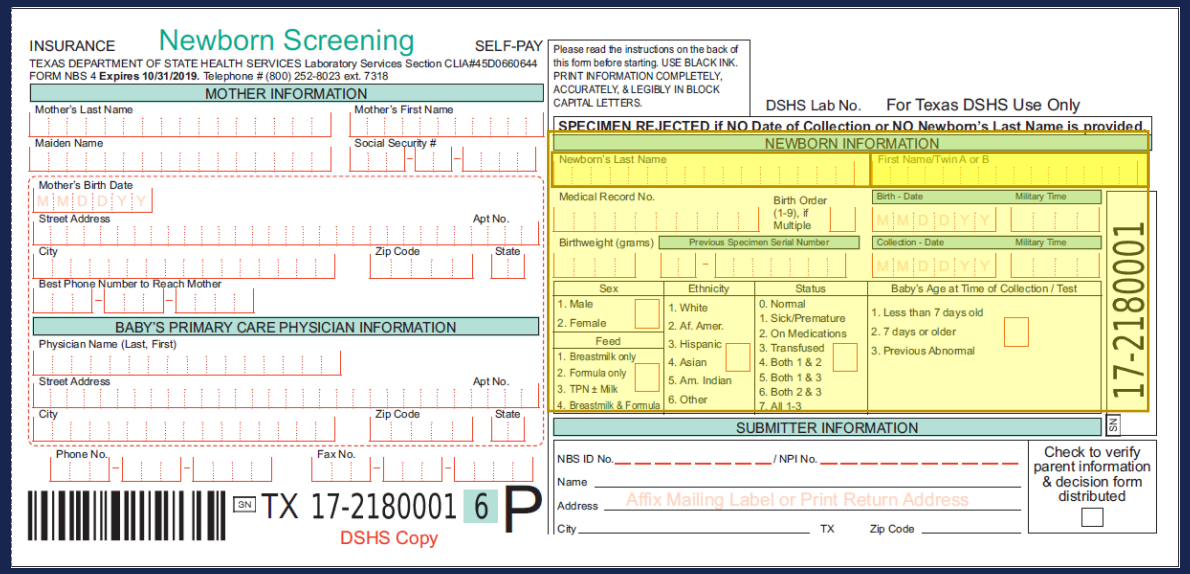
What are the basics of an HL7 message?

NBS HL7 Basics


INSURANCE Newborn Screening SELF-PAY

TEXAS DEPARTMENT OF STATE HEALTH SERVICES Laboratory Services Section CLIA#45D0660644
FORM NBS 4 **Expires 10/31/2019.** Telephone # (800) 252-8023 ext. 7318

MOTHER INFORMATION

Mother's Last Name | Mother's First Name
Maiden Name | Social Security #
Mother's Birth Date M M D D Y Y
Street Address | Apt No.
City | Zip Code | State
Best Phone Number to Reach Mother

BABY'S PRIMARY CARE PHYSICIAN INFORMATION

Physician Name (Last, First)
Street Address | Apt No.
City | Zip Code | State
Phone No. | Fax No.

3N TX 17-2180001 6 P
DSHS Copy

Please read the instructions on the back of this form before starting. USE BLACK INK. PRINT INFORMATION COMPLETELY, ACCURATELY, & LEGIBLY IN BLOCK CAPITAL LETTERS.

DSHS Lab No. For Texas DSHS Use Only

SPECIMEN REJECTED if NO Date of Collection or NO Newborn's Last Name is provided.

NEWBORN INFORMATION

Newborn's Last Name | First Name/Twin A or B
Medical Record No. | Birth Order (1-9), if Multiple | Birth - Date M M D D Y Y | Military Time
Birthweight (grams) | Previous Specimen Serial Number | Collection - Date M M D D Y Y | Military Time

Sex	Ethnicity	Status	Baby's Age at Time of Collection / Test
1. Male 2. Female	1. White 2. Af. Amer. 3. Hispanic 4. Asian 5. Am. Indian 6. Other	0. Normal 1. Sick/Premature 2. On Medications 3. Transfused 4. Both 1 & 2 5. Both 1 & 3 6. Both 2 & 3 7. All 1-3	1. Less than 7 days old 2. 7 days or older 3. Previous Abnormal
Feed 1. Breastmilk only 2. Formula only 3. TPN ± Milk 4. Breastmilk & Formula			

17-2180001 3N

SUBMITTER INFORMATION

NBS ID No. / NPI No.
Name
Address Affix Mailing Label or Print Return Address
City TX Zip Code

Check to verify parent information & decision form distributed

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MSH|^~\&|NBS|DSHS TEST UAT FACILITY^05723062^|||20170719152202||OML^O21^OML_O21|2F719C80-9372-4D26-
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PID|1|5858045|M111114^^^DSHS TEST UAT FACILITY&05723062&^MR||Black^Sirius|20170701120300|M| |1002-
5^American Indian^HL70005^American Indian||||||||||||||Y|1||
NK1|1|Black^Walburga|MTH|12 Grimmauld Place^^CEDAR PARK^TX^78613^|^^PH^^^402^4955652|||||||
|||19760514||||||||||||||||123456^^^^MA~^^^^SS|||||
OBR|1||20170710085000|54089-8^Newborn screening panel AHIC^LN|||20170710085000||||||
|20170710085000||05723062||||||||F|
ORC|NW||||||||||||||||||||DSHS TEST UAT FACILITY^^^^^^^^^^05723062|123 Street^Suite
ABC^Austin^TX^74321^^^^^^^^^^|^PH^555^5555555^|
OBX|1|ST|57716-3^State printed on filter paper card [Identifier] in NBS card^LN|1|TX||||||O
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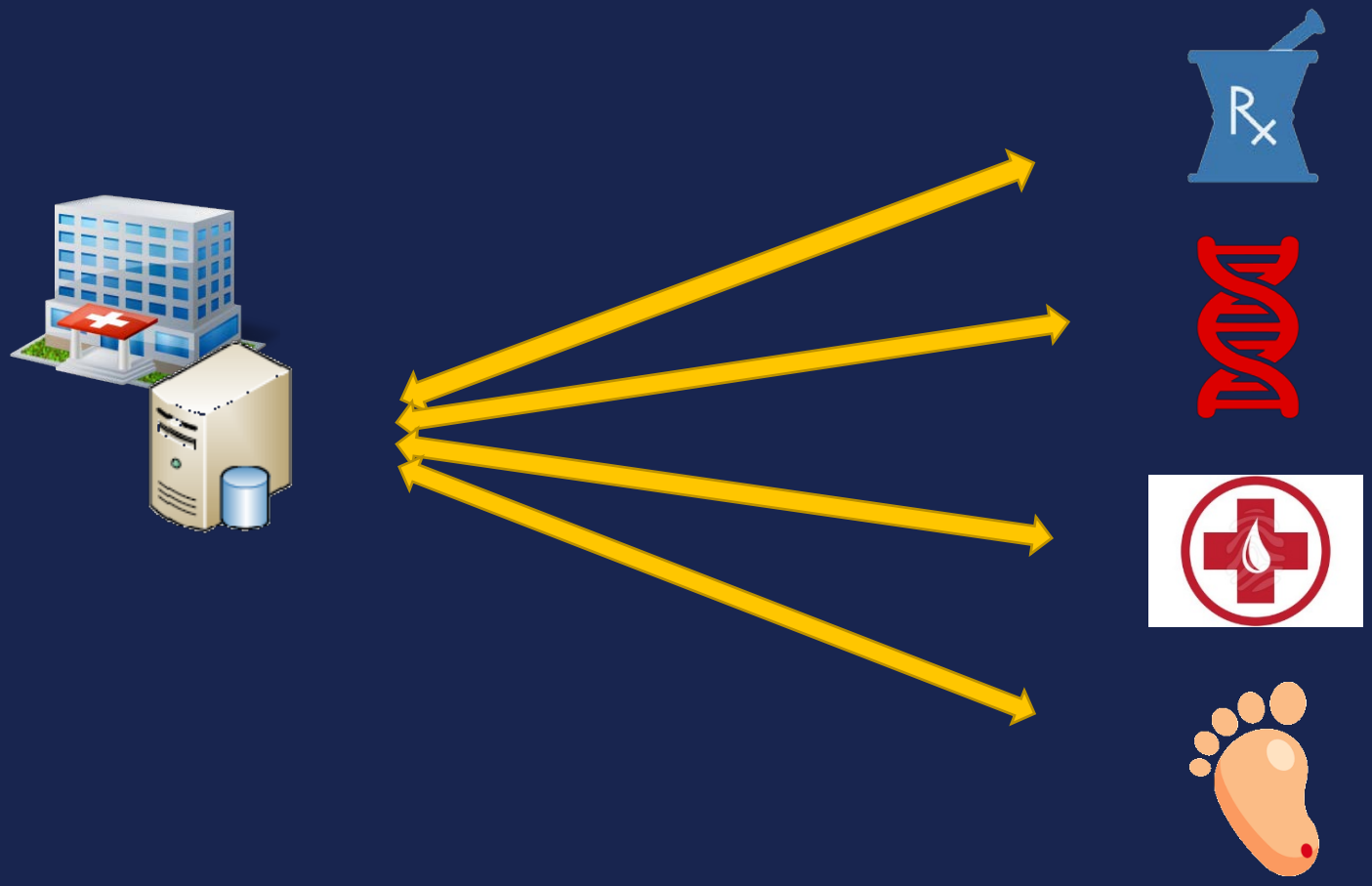
HL7 defines this stuff. Why do we need LOI / LRI?

Why do we need guides?



Why do we need guides?

Optionality → No Optionality

DB1	Disability
DG1	Diagnosis
DRG	Diagnosis Related Group
DSC	Continuation Pointer
DSP	Display Data
EED	Equipment Command
EER	Equipment Command Response
EDU	Educational Detail
EQL	Embedded Query Language
EQP	Equipment/log Service
EQU	Equipment Detail
ERQ	Event replay query
ERR	Error
EVN	Event Type
FAC	Facility
FT1	Financial Transaction
GOL	Goal Detail
GP1	Grouping/Reimbursement - Visit
GP2	Grouping/Reimbursement - Procedure Line Item
GT1	Guarantor
IAM	Patient Adverse Reaction Information
IIM	Inventory Item Master
IN1	Insurance
IN2	Insurance Additional Information
IN3	Insurance Additional Information, Certification
INV	Inventory Detail
IPC	Imaging Procedure Control Segment
ISD	Interaction Status Detail
LAN	Language Detail
LCC	Location Charge Code
LCH	Location Characteristic
LDP	Location Department
LOC	Location Identification
LRL	Location Relationship
MFA	Master File Acknowledgment
MFE	Master File Entry
MFI	Master File Identification
MRG	Merge Patient Information
MSA	Message Acknowledgment
MSH	Message Header
NCK	System Clock
NDS	Notification Detail
NK1	Next of Kin / Associated Parties
NPU	Bed Status Update
NSC	Application Status Change
NST	Application control level statistics
NTE	Notes and Comments
OBR	Observation Request
OBX	Observation/Result
ODS	Dietary Orders, Supplements, and Preferences
ODT	Diet Tray Instructions
OM1	General Segment
OM2	Numeric Observation
OM3	Categorical Service/Test/Observation
OM4	Observations that Require Specimens
OM5	Observation Batteries (Sets
OM6	Observations that are Calculated from Other Observations
OM7	Additional Basic Attributes
ORC	Common Order
ORG	Practitioner Organization Unit
OVR	Override Segment
PCR	Possible Causal Relationship
PD1	Patient Additional Demographic
PDA	Patient Death and Autopsy
PDC	Product Detail Country
PEO	Product Experience Observation
PES	Product Experience Sender
PID	Patient Identification
PR1	Procedures
PRA	Practitioner Detail
PRB	Problem Details
PRC	Pricing
PRD	Provider Data
PSH	Product Summary Header
PTH	Pathway
PV1	Patient Visit
PV2	Patient Visit - Additional Information
QAK	Query Acknowledgment
QID	Query Identification
QPD	Query Parameter Definition
QRD	Original-Style Query Definition
QRF	Original-style query filter
QRI	Query Response Instance
RCP	Response Control Parameter
RDF	Table Row Definition
RDT	Table Row Data
RF1	Referral Information
RGS	Resource Group
RMI	Risk Management Incident
ROL	Role
RQ1	Requisition Detail-1
RQD	Requisition Detail
RXA	Pharmacy/Treatment Administration
RXC	Pharmacy/Treatment Component Order
RXD	Pharmacy/Treatment Dispense
RXE	Pharmacy/Treatment Encoded Order
RXG	Pharmacy/Treatment Give
RXO	Pharmacy/Treatment Order
RXR	Pharmacy/Treatment Route
SAC	Specimen Container detail
SCH	Scheduling Activity Information
SFT	Software Segment
SID	Substance Identifier
SPM	Specimen
SPR	Stored Procedure Request Definition
STF	Staff Identification
TCC	Test Code Configuration
TCD	Test Code Detail
TQ1	Timing/Quantity
TQ2	Timing/Quantity Relationship

HL7

DG1	Diagnosis
ERR	Error
GT1	Guarantor
IN1	Insurance
MSA	Message Acknowledgment
MSH	Message Header
NK1	Next of Kin / Associated Parties
NTE	Notes and Comments
OBR	Observation Request
OBX	Observation/Result
ORC	Common Order
PID	Patient Identification
PV1	Patient Visit
SPM	Specimen
TQ1	Timing/Quantity

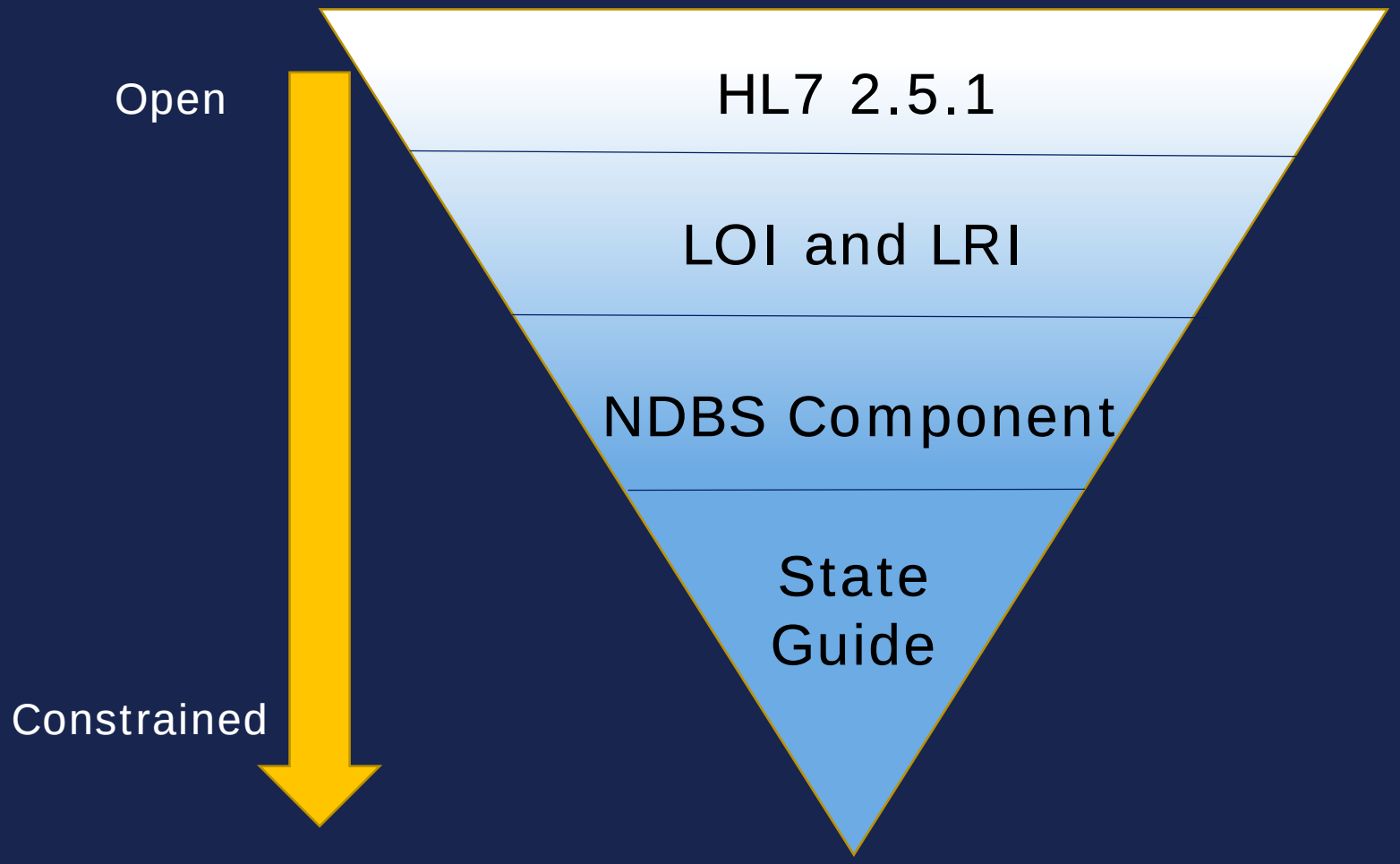
LOI NDBS

ODT	Diet Tray Instructions

DG1	Diagnosis
ERR	Error
MSA	Message Acknowledgment
MSH	Message Header
NK1	Next of Kin / Associated Parties
OBR	Observation Request
OBX	Observation/Result
ORC	Common Order
PID	Patient Identification
SPM	Specimen

State Guide

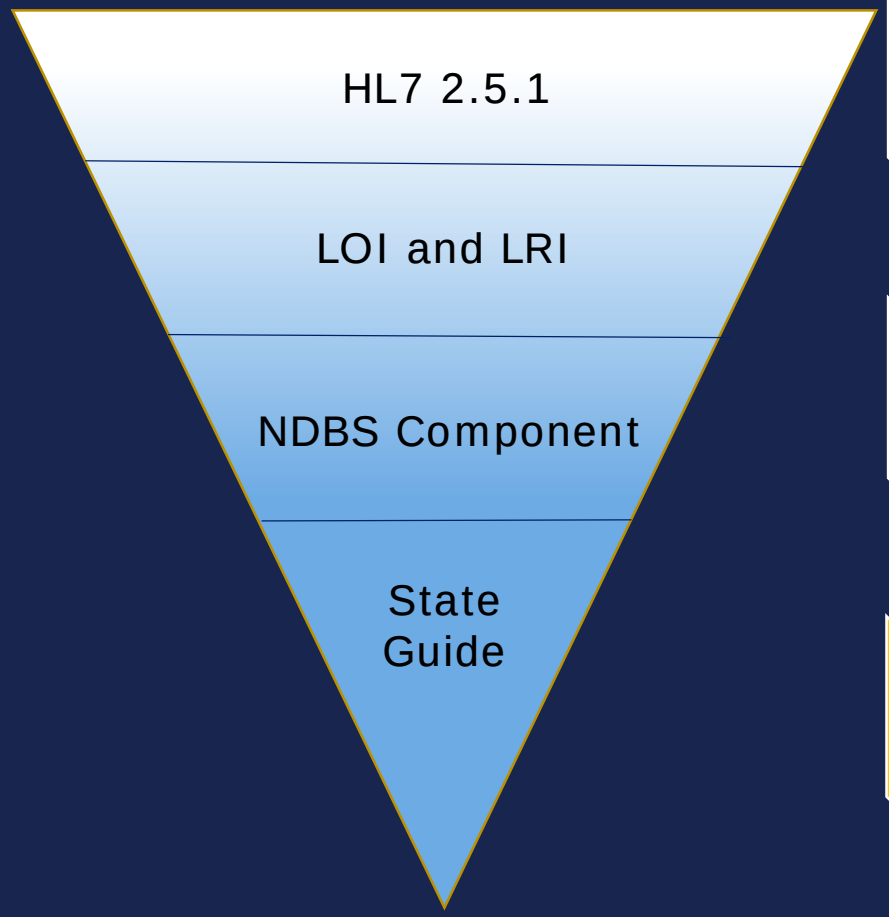
Constraining the Standard



Data Attributes

Attribute	Examples / Definition
Usage	R - Required RE - Required but can be Empty O - Optional C - Conditional
Data Type	Numeric Alphanumeric Standard Code
Cardinality	# of allowable repeats of the element
Value Set	HL7 LOINC SNOMED

Constraining Usage



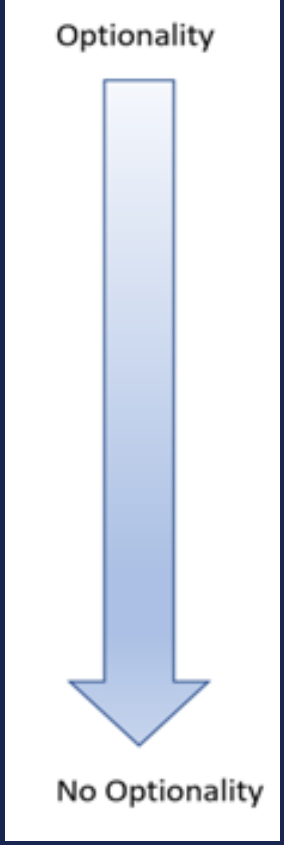
O — Optional

RE — Required but can be Empty

R — Required

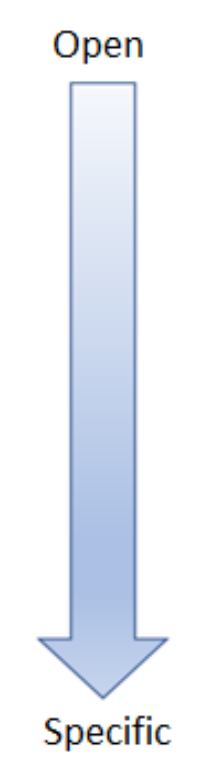
C — Conditional

Constraining Usage



Standard Level	Collection Date	Analyte Result
HL7 2.5.1	O	O
LRI	R	O
NDBS	R	O
State	R	R

Constraining Data Types



Standard Level	DOB
HL7 2.5.1	Varies
LOI	YYYY – R MMDD - RE
NDBS	YYYYMMDD – R MMSS - RE
State	YYYYMMDD – R MMSS - R +/- ZZZZ - R

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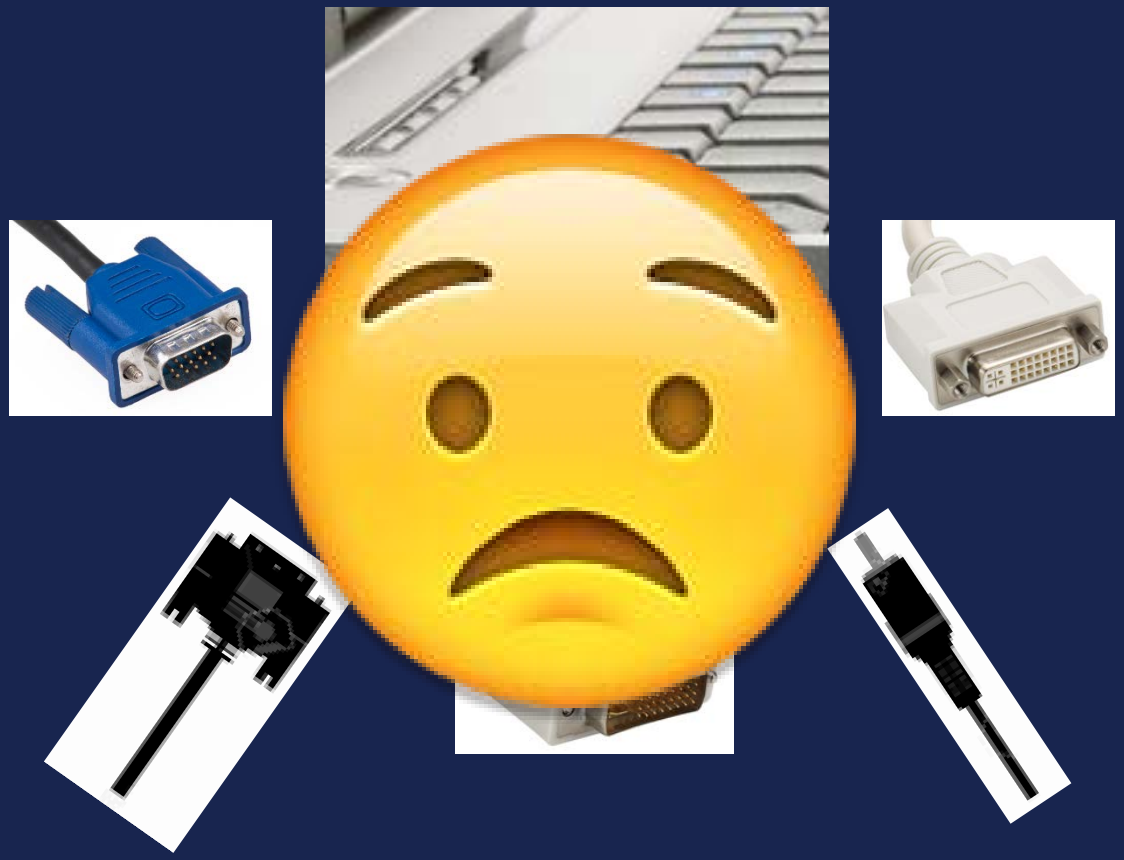
Why conform?



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Why conform?

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Takeaways

- Need an informaticist
- Eliminate differences in data
- Retain program autonomy
- Do it all

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Thank you

Brendan Reilly

Brendan.Reilly@dshs.texas.gov