



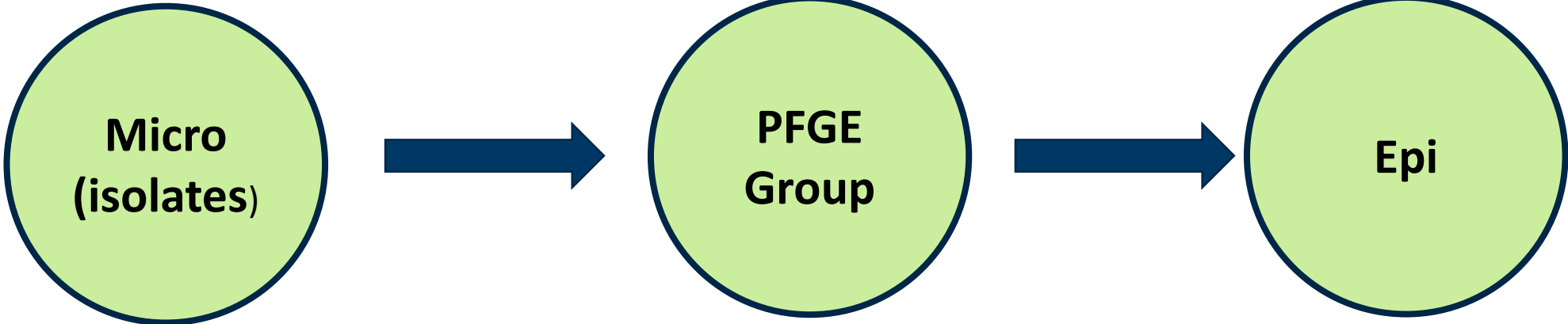
Adapting Workflows for WGS-Minnesota

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Minnesota Department of Health

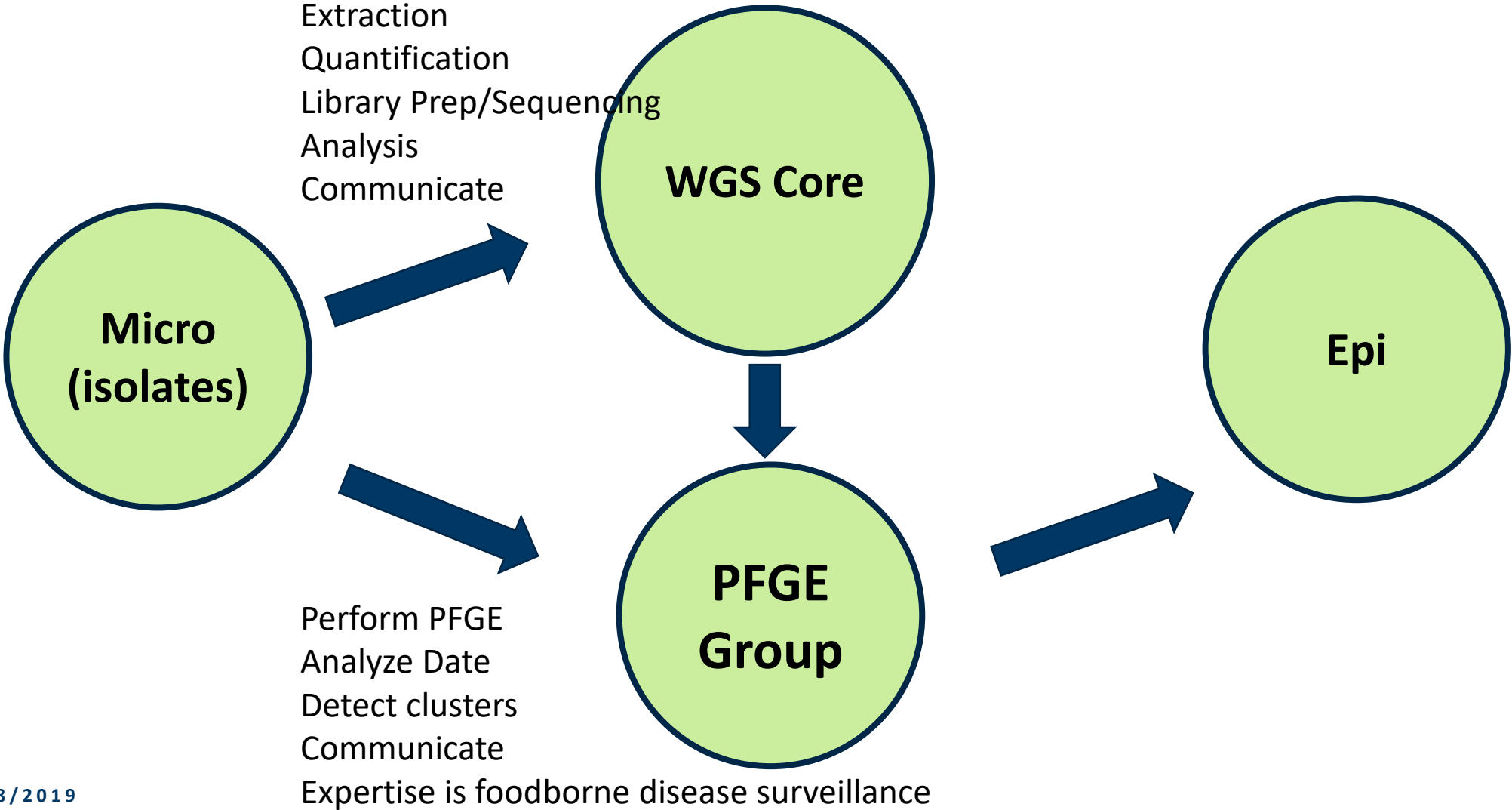
- Current organization structure of PulseNet and WGS
- Future organization structure
- New tools

PulseNet Traditional

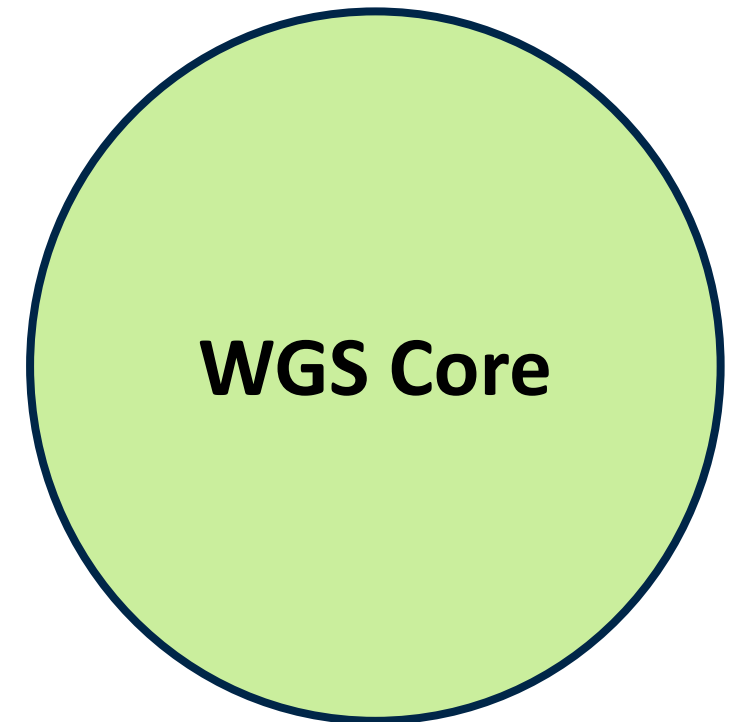


Perform PFGE
Analyze Data
Detect clusters
Communicate
Expertise is foodborne disease surveillance

PulseNet Current (PFGE + WGS)



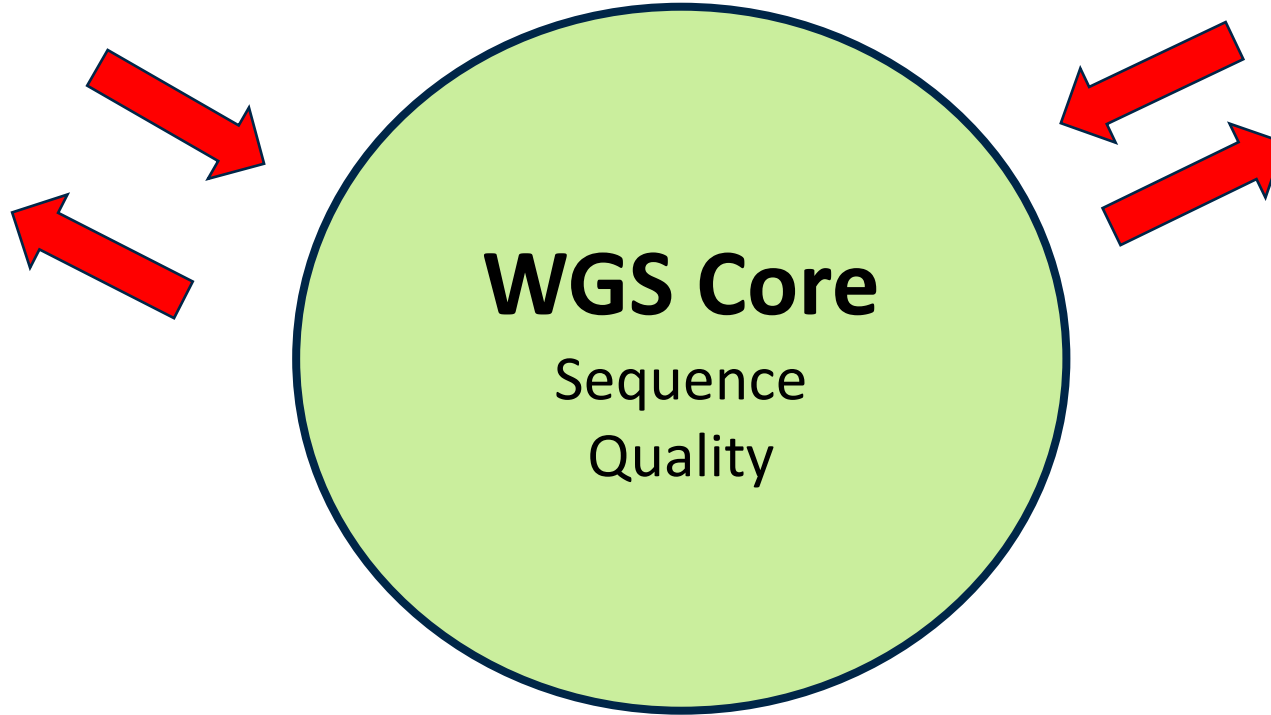
- Standardized processes for multiple pathogens
- Ensure quality, evaluate metrics
- Efficiently use resources
- Reduce TAT
- Provide training
- Prioritize sequencing projects



Extract
Quantitate
Request WGS
Priority

PulseNet

Analysis
Results
Communication



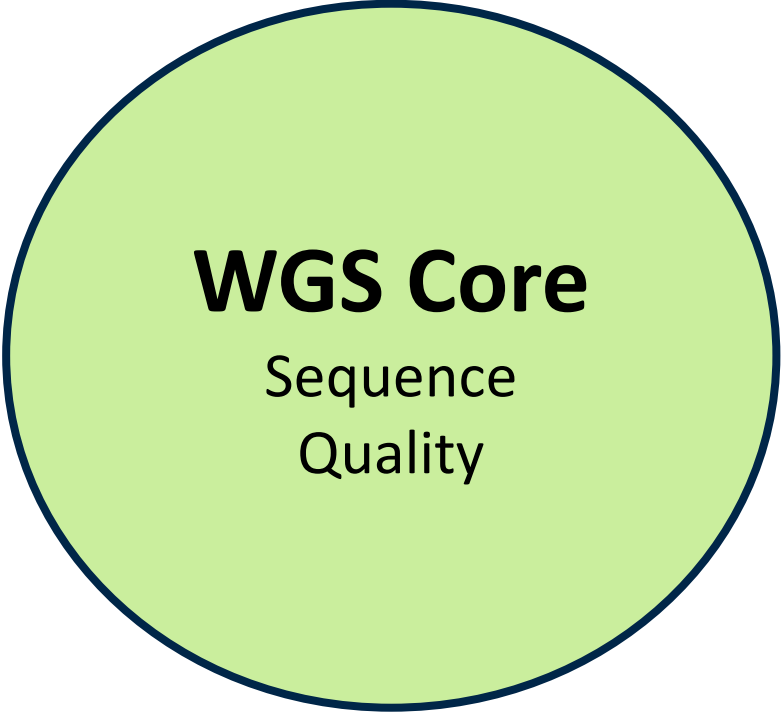
New Project

Meet with WGS Core
Determine needs
Priority
Analysis

PulseNet

Viruses

GAS



Legionella

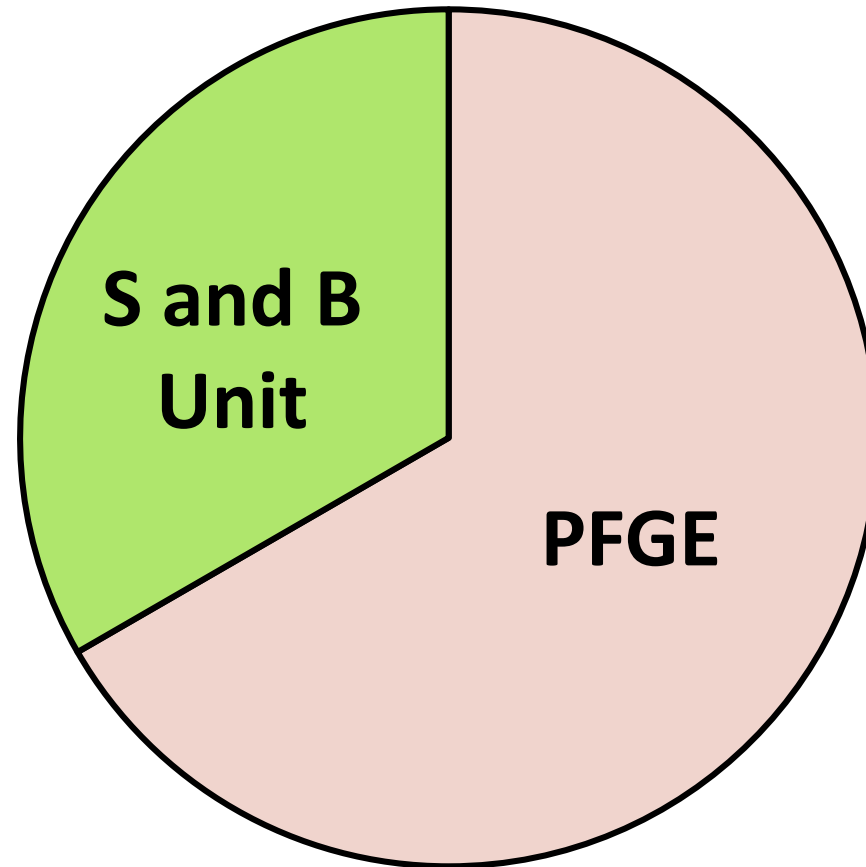
Strep. pneumo

C. difficile

CRE

GenomeTrakr

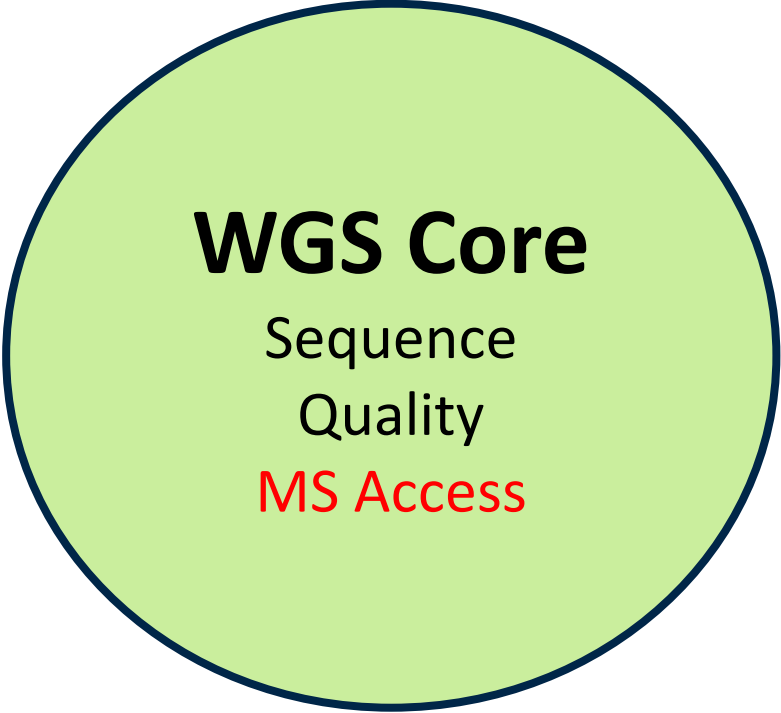
Post-PFGE WGS Core Composition



PulseNet

Viruses

GAS



Legionella

Strep. pneumo

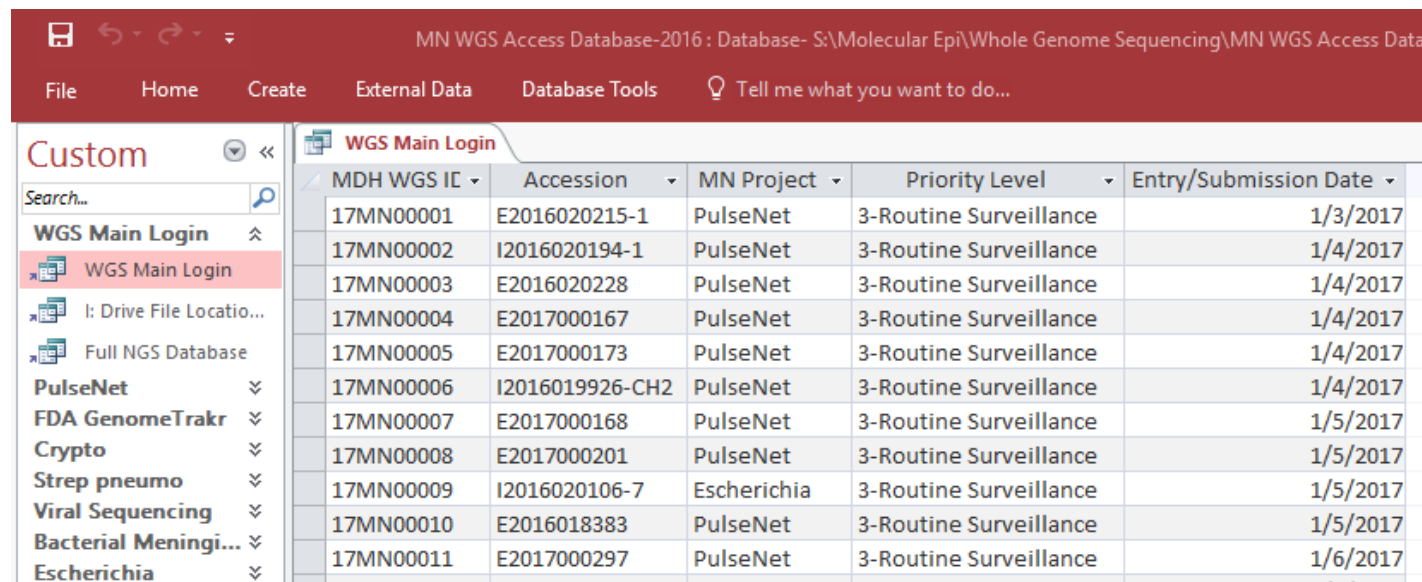
C. difficile

CRE

GenomeTrakr

NGS Access Database

- Current MN LIMS cannot provide sample tracking needed for NGS
- MS Access database for NGS sample tracking
 - Contains all sample info needed to perform library prep, sequencing, and sequence data QC
 - Separated by NGS project



The screenshot shows a Microsoft Access database window titled 'MN WGS Access Database-2016 : Database- S:\Molecular Epi\Whole Genome Sequencing\MN WGS Access Data'. The 'WGS Main Login' table is displayed with the following data:

MDH WGS ID	Accession	MN Project	Priority Level	Entry/Submission Date
17MN00001	E2016020215-1	PulseNet	3-Routine Surveillance	1/3/2017
17MN00002	I2016020194-1	PulseNet	3-Routine Surveillance	1/4/2017
17MN00003	E2016020228	PulseNet	3-Routine Surveillance	1/4/2017
17MN00004	E2017000167	PulseNet	3-Routine Surveillance	1/4/2017
17MN00005	E2017000173	PulseNet	3-Routine Surveillance	1/4/2017
17MN00006	I2016019926-CH2	PulseNet	3-Routine Surveillance	1/4/2017
17MN00007	E2017000168	PulseNet	3-Routine Surveillance	1/5/2017
17MN00008	E2017000201	PulseNet	3-Routine Surveillance	1/5/2017
17MN00009	I2016020106-7	Escherichia	3-Routine Surveillance	1/5/2017
17MN00010	E2016018383	PulseNet	3-Routine Surveillance	1/5/2017
17MN00011	E2017000297	PulseNet	3-Routine Surveillance	1/6/2017

NGS Access Database

- Within projects, queries filter isolates for specific tasks
 - For example, the 'PulseNet WGS ID Request' query shows only those isolates that are PulseNet and need a WGS ID assigned

The screenshot shows a Microsoft Access database window titled 'MN WGS Access Database-2016'. The interface includes a ribbon with 'File', 'Home', 'Create', 'External Data', and 'Database Tools'. On the left, a 'Custom' pane lists various queries, with 'PulseNet WGS ID Request' selected. The main window displays a table with the following data:

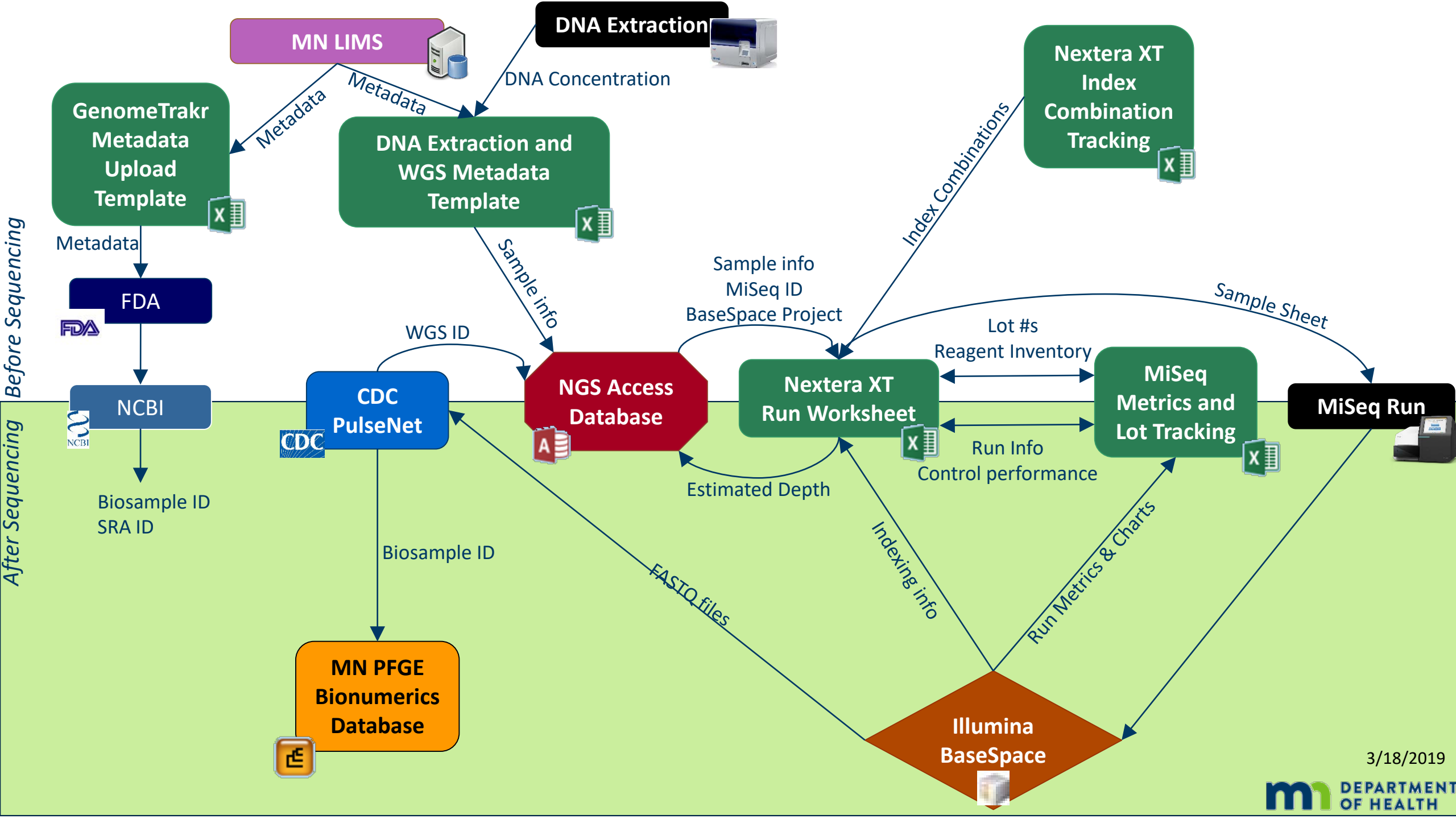
PN WGS ID	Accession	Entry/Submi	MDH WGS ID	CDC SRA Organism	Genus
	E2017001451	3/8/2017	17MN00558	Campylobacter jejuni	Campylobacter
	I2017001945	3/8/2017	17MN00559	Campylobacter spp.	Campylobacter
	I2017002782	3/8/2017	17MN00557	Campylobacter jejuni	Campylobacter
	I2017002917	3/16/2017	17MN00612	Campylobacter spp.	Campylobacter

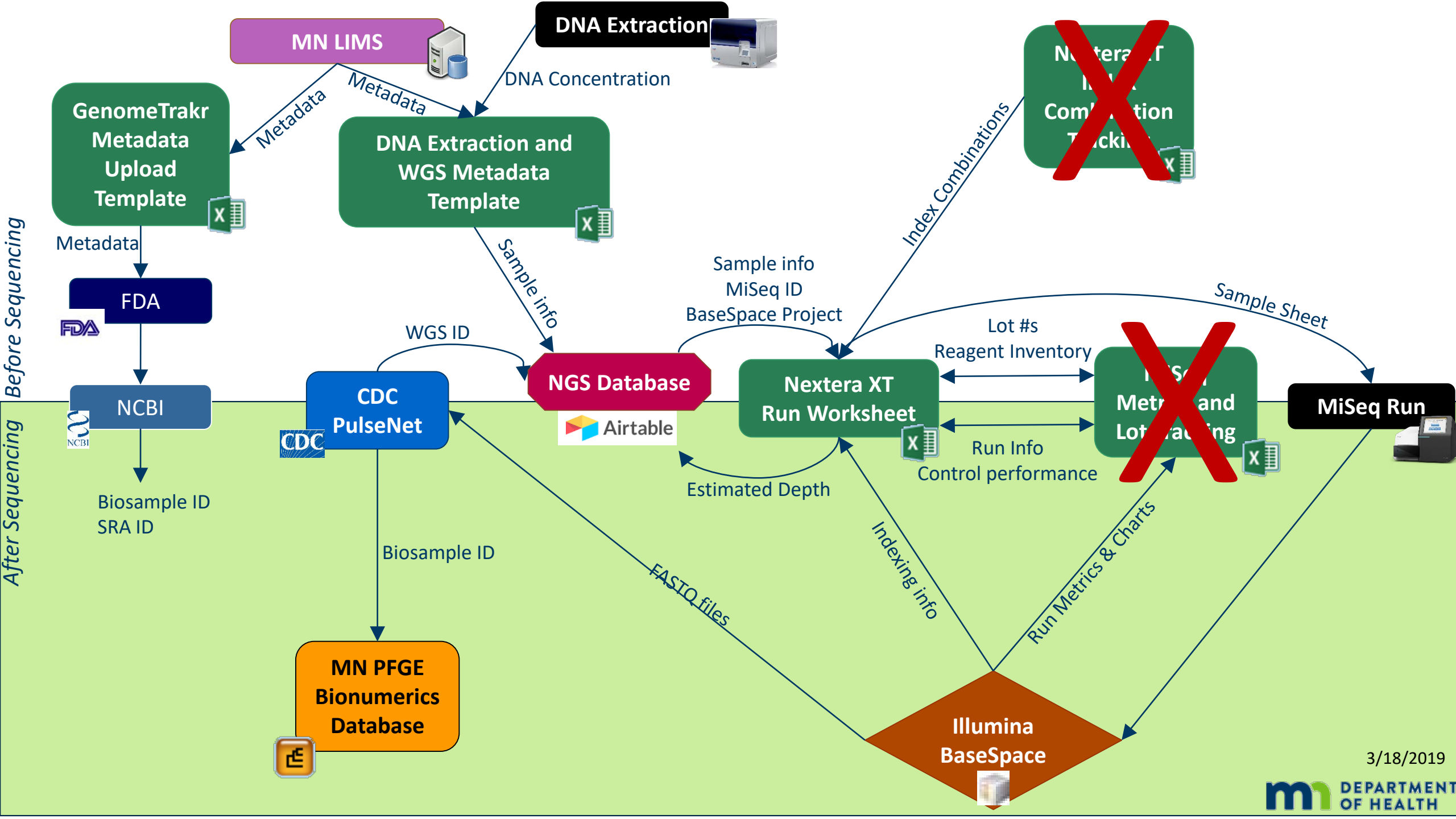
NGS Access Database

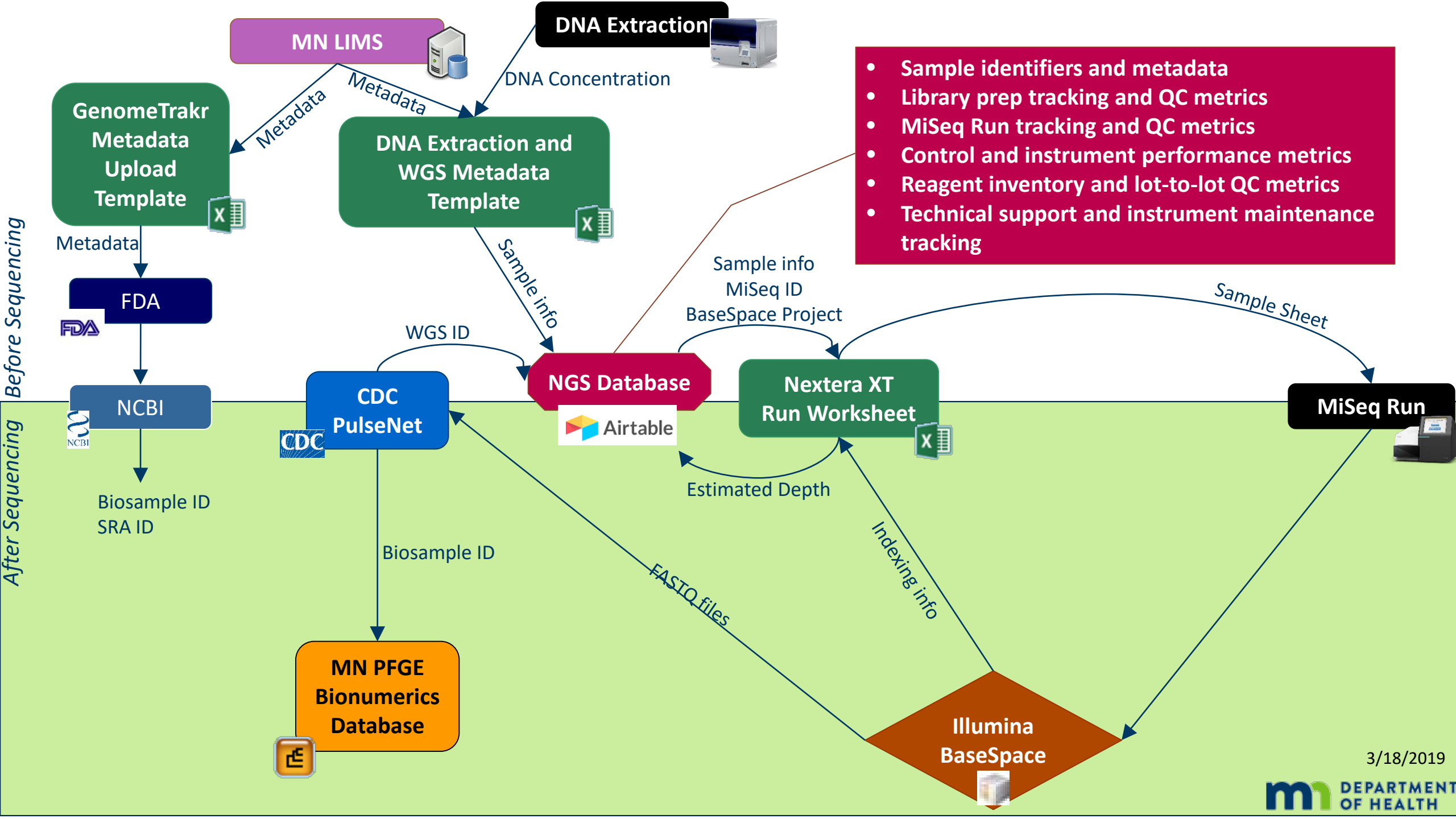
- Those performing library prep can see and select all isolates ready to be sequenced
 - Samples sorted by priority level
 - Sample data can be copy/pasted to library prep run worksheet
 - Post sequencing-track basic coverage and repeat info

The screenshot shows a web application window titled "MN WGS Access Database-2016". The interface includes a navigation menu on the left with categories like "WGS Main Login", "PulseNet", "FDA GenomeTrakr", "Crypto", "Strep pneumo", "Viral Sequencing", "Bacterial Meningi...", "Escherichia", "Clostridium diffi...", "Research", and "WGS Core". The "To Be Sequenced" option is selected. The main area displays a table with columns for "Add to Sample Sheet?", "Accession", "Priority Level", "MN Projec", "Entry/Subn", "Origina", "Extraction I", "Qubit c", and "BaseSpace Project".

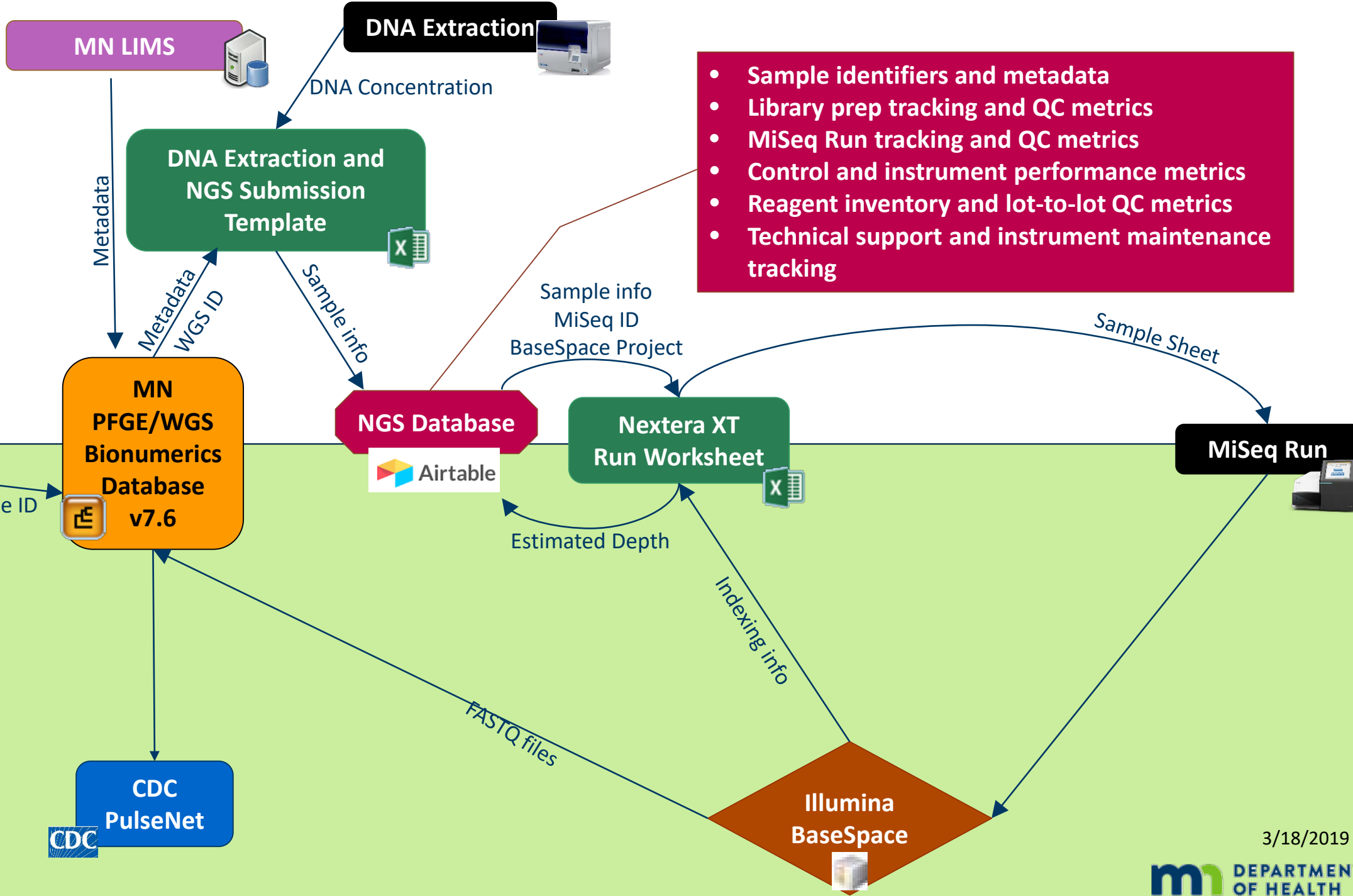
Add to Sample Sheet?	Accession	Priority Level	MN Projec	Entry/Subn	Origina	Extraction I	Qubit c	BaseSpace Project
<input type="checkbox"/>	MN_CDC03-98JG	1-Urgent (ASAP)	PulseNet	3/14/2017				MN_PRJNA218110_E.coli_Shigella_spp._PulseNe
<input type="checkbox"/>	MN_C6472JG	1-Urgent (ASAP)	PulseNet	3/14/2017				MN_PRJNA230403_Salmonella_spp._PulseNet
<input type="checkbox"/>	MN_CDC#H8394JG	1-Urgent (ASAP)	PulseNet	3/14/2017				MN_PRJNA212117_Listeria_monocytogenes_Puls
<input type="checkbox"/>	MN_D5480JG	1-Urgent (ASAP)	PulseNet	3/14/2017		8/11/2016		MN_PRJNA239251_Campylobacter_spp._PulseNe
<input type="checkbox"/>	M2009030142	2-High Importance (~1 week)	C. diff	3/7/2017		3/3/2017	23	MN_Clostridium_difficile
<input type="checkbox"/>	M2010002439	2-High Importance (~1 week)	C. diff	3/7/2017		3/3/2017	20.9	MN_Clostridium_difficile
<input type="checkbox"/>	M2010015613	2-High Importance (~1 week)	C. diff	3/7/2017		3/3/2017	21.6	MN_Clostridium_difficile
<input type="checkbox"/>	M2010018968	2-High Importance (~1 week)	C. diff	3/7/2017		3/3/2017	20.9	MN_Clostridium_difficile
<input type="checkbox"/>	M2010025948	2-High Importance (~1 week)	C. diff	3/7/2017		3/3/2017	29.3	MN_Clostridium_difficile
<input type="checkbox"/>	M2010030909	2-High Importance (~1 week)	C. diff	3/7/2017		3/3/2017	15.8	MN_Clostridium_difficile
<input type="checkbox"/>	E2017003240	2-High Importance (~1 week)	PulseNet	3/13/2017		3/13/2017	83.8	MN_PRJNA230403_Salmonella_spp._PulseNet
<input type="checkbox"/>	I2017003237	2-High Importance (~1 week)	PulseNet	3/13/2017		3/13/2017	35.4	MN_PRJNA230403_Salmonella_spp._PulseNet
<input type="checkbox"/>	I2017003278	2-High Importance (~1 week)	PulseNet	3/13/2017		3/13/2017	56.6	MN_PRJNA230403_Salmonella_spp._PulseNet
<input type="checkbox"/>	I2017002286-CH1	3-Routine Surveillance	PulseNet	2/15/2017		2/15/2017	17.9	MN_PRJNA218110_E.coli_Shigella_spp._PulseNe
<input type="checkbox"/>	E2017002476	3-Routine Surveillance	PulseNet	2/16/2017		2/16/2017	62.4	MN_PRJNA230403_Salmonella_spp._PulseNet
<input type="checkbox"/>	I2017002380-CH2	3-Routine Surveillance	PulseNet	2/16/2017		2/16/2017	22.2	MN_PRJNA218110_E.coli_Shigella_spp._PulseNe
<input type="checkbox"/>	I2017002458-2	3-Routine Surveillance	PulseNet	2/23/2017		2/23/2017	32.6	MN_PRJNA218110_E.coli_Shigella_spp._PulseNe
<input type="checkbox"/>	I2017002521-CH1	3-Routine Surveillance	PulseNet	2/23/2017		2/23/2017	18.1	MN_PRJNA218110_E.coli_Shigella_spp._PulseNe



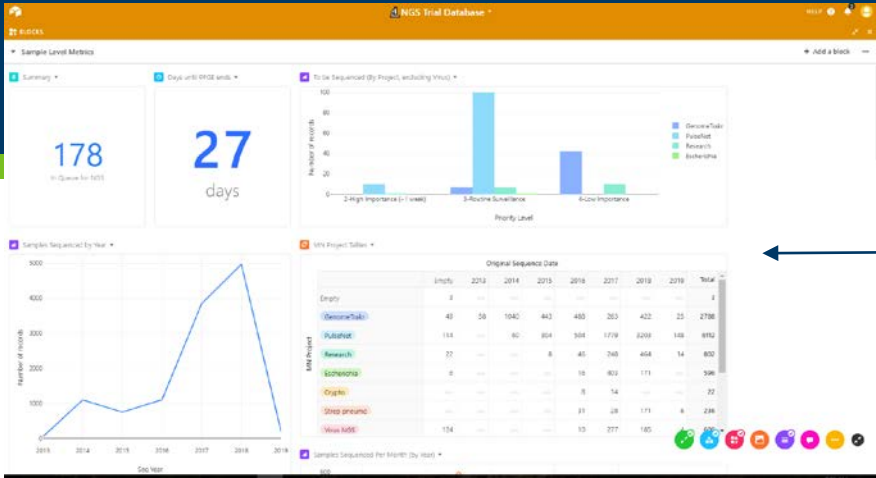




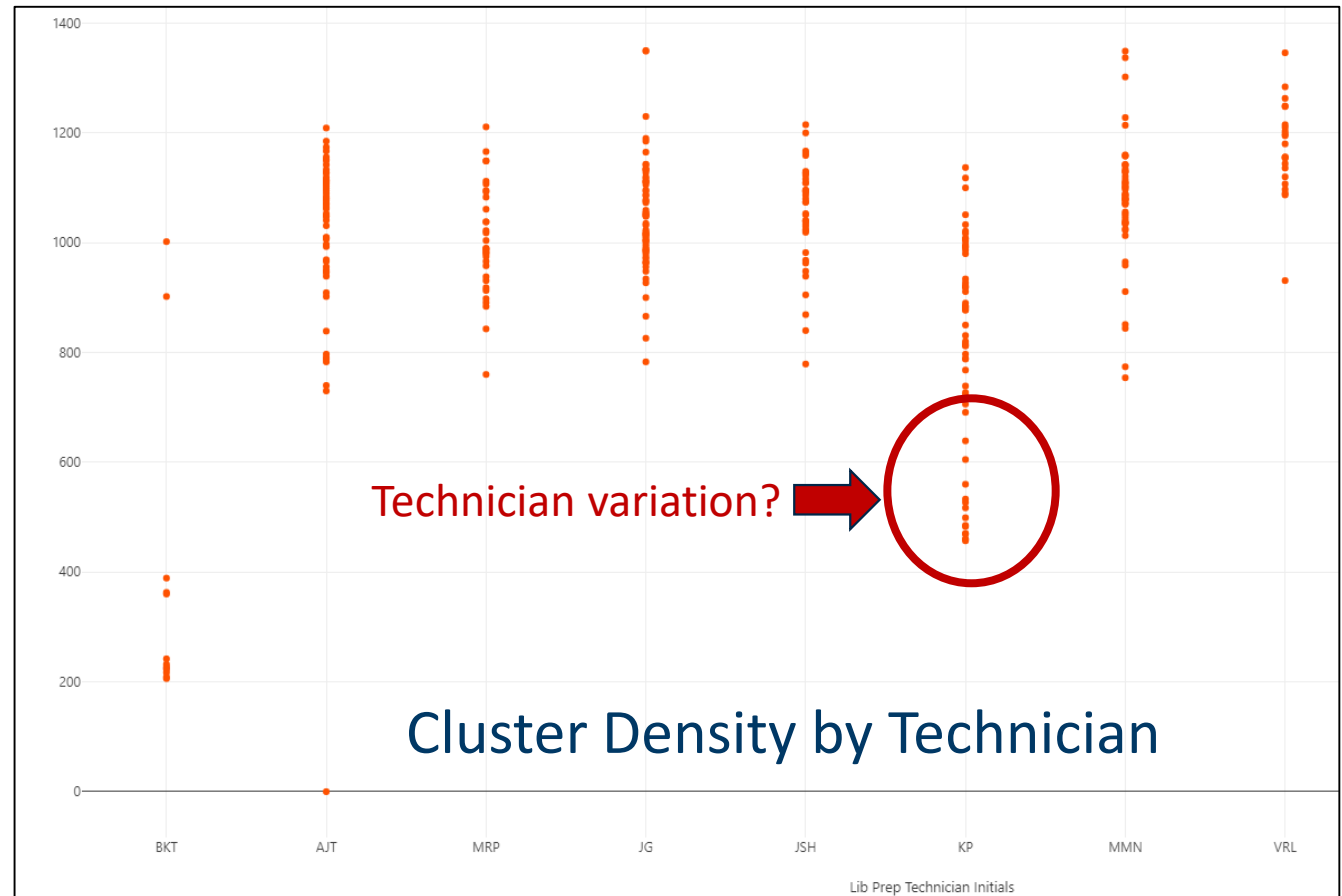
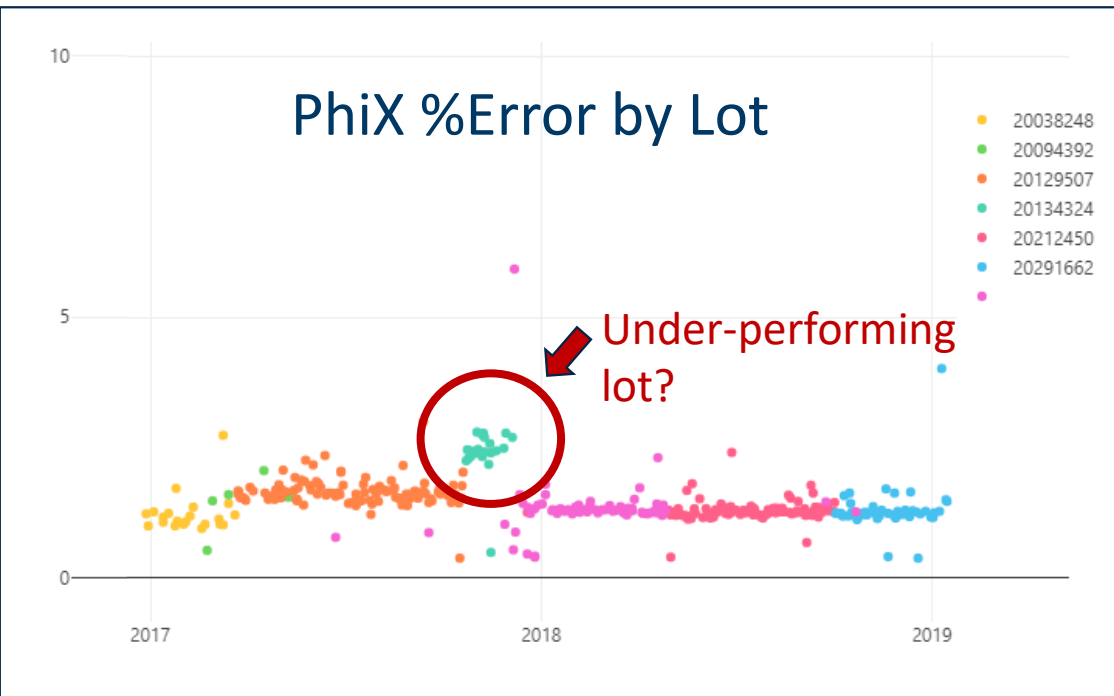
Before Sequencing
After Sequencing



3/18/2019



Data visualization dashboards update in real-time



Additional Future Considerations

- Liquid handlers
- Nextera DNA Flex
- Identify ways to bring down costs
- New LIMS at MDH

Thank you.

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Special thanks to:

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MDH Enterics Unit

MDH Sequencing and Bioinformatics Unit