

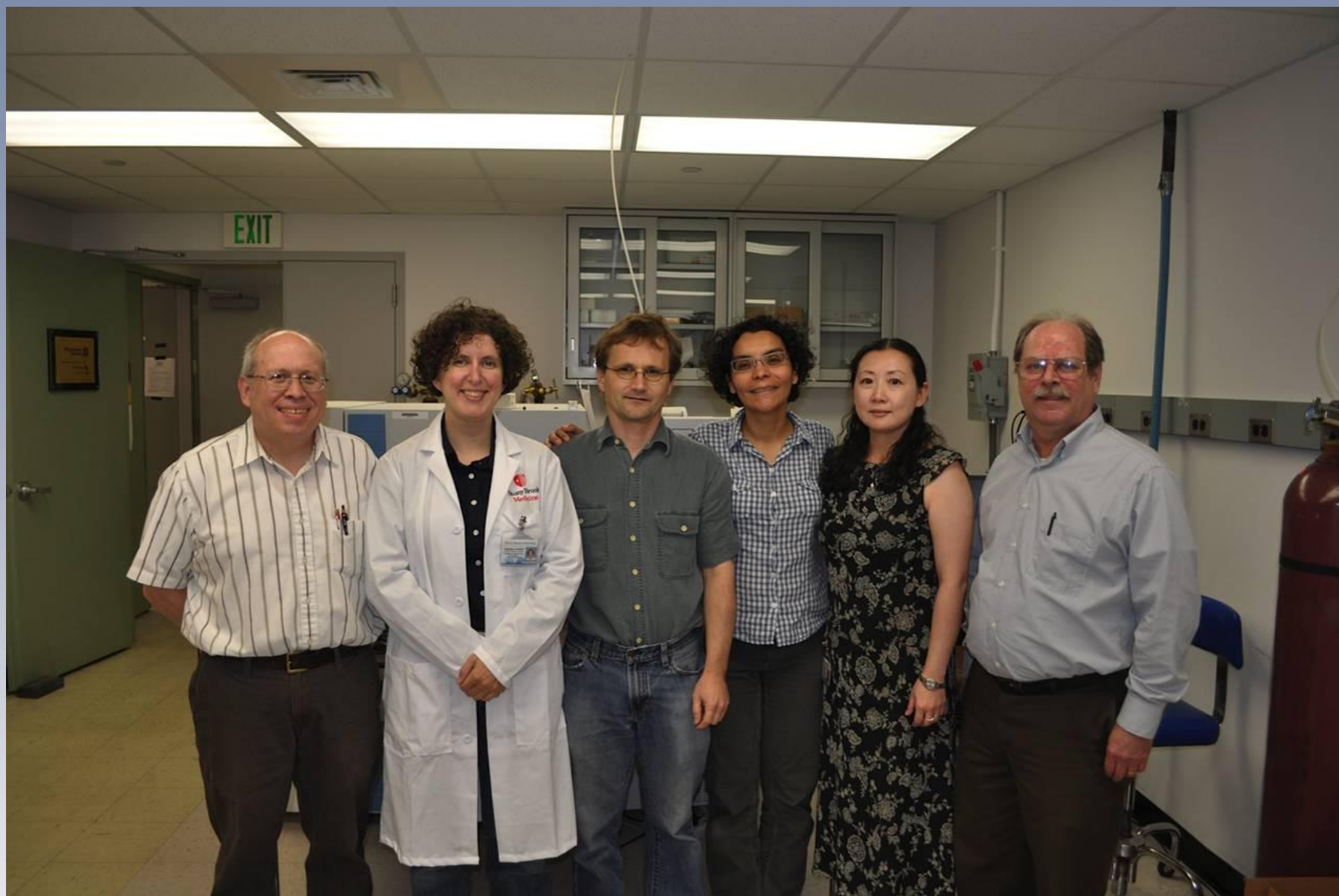


Freezerworks

Sample Management Software

Configurable Software Advantage
for Managing Today's Biobank

The Freezerworks Advantage



Stony Brook Medicine

Dr. Angelique Corthals

Scientific Director of the BioBank

Stony Brook University (SUNY) School of Medicine (Present)

American Museum of Natural History Tissue Bank (AMCC) 2000-2006

Biobanking: What?

- Document the sample's present



- Validate its past



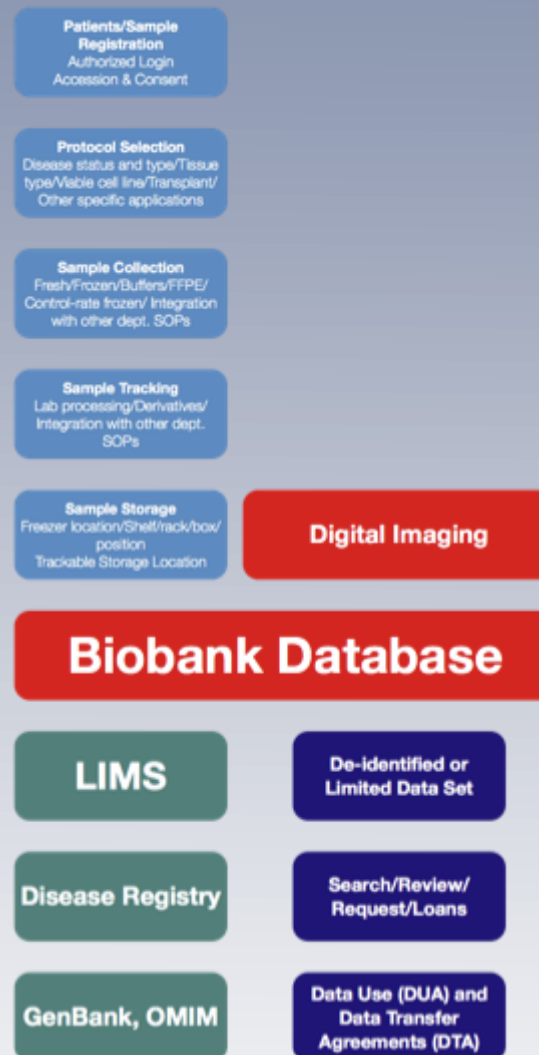
- Make it available for the future



HOW?



Cryogenics

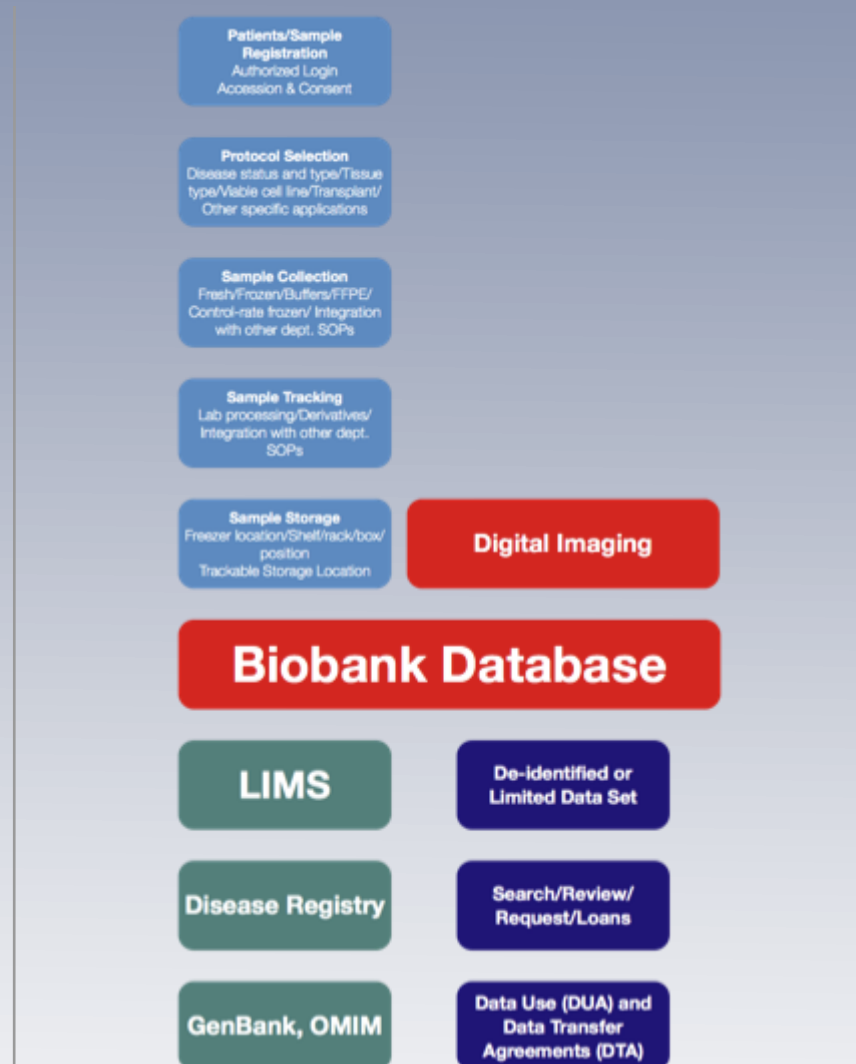


Informatics



Ethics

HOW?



Informatics





Search Samples: # 14 of 192

Admin Data | Taxonomy | Field Data | Aliquots | Phys. char | Notes | Transit | Audit Trail

101693

AMNH Register # Dept/Partner Dept/Partner #

ISIS # Studbook # Field Catalogue #

Other ID# Live book 1230A eVoucher # Gel Pic #

Voucher # Donor Date of Accession

Collected By Expedition

Data Source Disposition Availability

Restrictions

Permission

Notification

Accession # Death #

Administrative Notes

Contact: Charles J. Cole - American Museum of Natural History (AMNH), Vertebrate Zoology, Division of Herpetology (212)769-5853

Specimen was lab bred and has no AMNH register #

Sample ID

Previous Next Save Cancel

American Museum of Natural History Tissue Bank (AMCC) 2000-2006

Corthals, A. and R. Desalle. 2005. An Application of Tissue and DNA banking for Genomics and Conservation: The Ambrose Monell Cryo-Collection.

Systematic Biology. 54(5):819–823, 2005

Savolainen, V., G. Reeves, K. Davis, M.P. Powell and A. Corthals (eds). 2006. ***DNA Banking for Biodiversity and Conservation***.

Kew Publishing & IUCN

The Problem of most Biobanks

- No or little IT resource
- either Get a programmer (\$\$\$,\$\$\$ or €€.€€€)
- or Get an easily customizable and flexible software solution



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Search Samples: # 14 of 192

Admin Data | Taxonomy | Field Data | Aliquots | Phys. char | Notes | Transact | Aud Trail

AMNH Registrar # Dept/Partner: Dept/Partner #

ISIS # Studbook # Field Catalogue #

Other ID # eVoucher # Gel Pic #

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Previous Next Save Cancel

Admin Data | Taxonomy | Field Data | Aliquots | Phys. char | Notes | Transact | Aud Trail

Dept/Partner Sample ID

Other ID # Genus Species

Common name

Positions | Results | Protocol | Medium | Preserve

of Aliquots Freezer Total Current Amount is 0.220L Initial Current Thaw

Aliquot	Vial	VF 8-VI 56	Rack	Box	Position	Initial	Current	Thaw
1	1	VF 8-VI 56	1	2	32	0.220L	0.220L	0

Auto Assign

Previous Next Save Cancel



Freezerworks Unlimited at the AMNH

Keeps track of the biomaterial and their aliquots with a unique barcode ID recording not only all basic sample data, the physical location of the sample but also all the “cradle to grave” history of the sample with several levels of security and audits. It is also highly compatible with most DB platforms.

Admin. Data	Taxonomy Data	Field Data	Physical Characteristic Data	Aliquot data
AMNH Registrar #	Kingdom	Collect. Date 1	Sex	Aliquot Type
Dept/Partner	Phylum	Collect. Date 2	Age	Storage Medium
Dept/Partner #	Class	Time of Collection	Height	Preservation History
ISIS #	Order	Season of Collection	Weight	
Studbook #	Suborder	Continent	Length	
Field Catalogue #	Family	Body of Water	Molt status	
Other ID #	Subfamily	Country	Reproductive Conditions	
eVoucher #	Genus	Geo. Division 1	Date of Birth	
Voucher #	Species	Geo. Division 2	Birth Place	
Gel Pic #	Subspecies	Specific Locale	Birth Type	
Donor	Type	UTM	Date of Death	
Date of Accession	Determined By	Latitude Degree	Cause of Death	
Collected by	Authority	Latitude Minutes	Institution of Origin	
Expedition	Questionable ID	Latitude Seconds	Sire ID	
Data Source	Common Name	Latitude North/South	Dam ID	
Disposition	Genbank/EMBL #	Longitude Degree	Sire Institution	
Availability	NCBI #	Longitude Minutes	Dam Institution	
Restrictions	Diagnostic reference	Longitude Seconds	Preservation type	
Permissions	Taxonomic History	Longitude West/East	Phys. Char. Notes	
Notification	Taxonomic History reference	Elevation		
Accession #	Reprints	Depth		
Death #		CPI		
Admin notes		Site/Survey		
Sample ID		Prepared by		
		Ancillary Collection		
		Purpose of Storage		
		Field Prep Method		
		Storage Method		
		Field Notes		
		Habitat Description		

Freezerworks Unlimited fields at the AMNH

The challenge of tracking ALL data



101 c 85 g 119 t

```
ctggatcg tattgacaat cctgctgcca ttgct
acagttac cttctatccc tatgatgta ccace
aaaacaat tttcgctcag ctcaaaactg ttgat
gatgatca tcagattgag agaaccattg cagtc
accgccat tttggacttc tgggataagc gtaag
attggttc actgaccggt ttcaatgcca tttac
gcagctgt tgtagcttc actcaatcca ttgcc
```



Admin Data | Taxonomy | Field Data | Aliquots | Phys. char | Notes | Transact | Aud Trail | 103710

Dept/Partner: WCS Sample ID: PDSA 2

Other ID#: SC001 27 Genus: Carcharias Species: obscurus

Common name: Dusky

Positions | Results | Protocol | Medium | Preservati

of Aliquots: 1 Freezer Total Current Amount is 0.2201 Initial Current Thaws

Vial	VF 8 - V1 S6	Rack	Box	Position	Initial	Current	Thaws
1		1	2	32	0.2201	0.2201	0

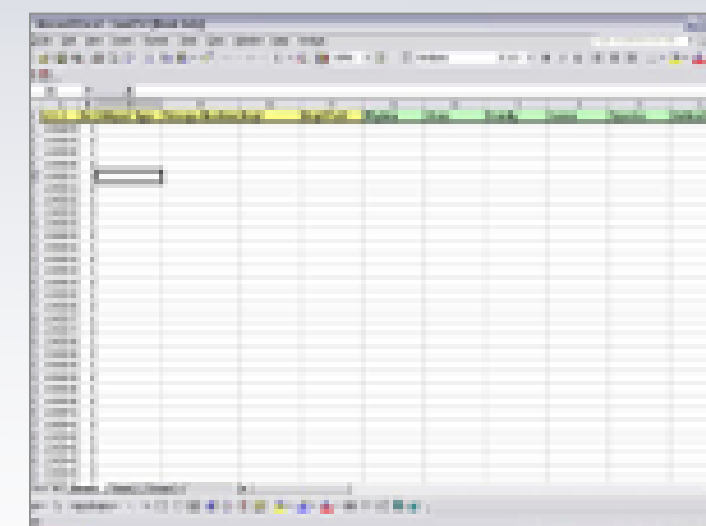
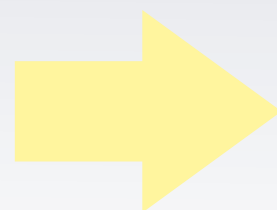
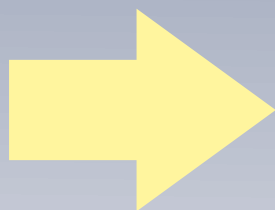
Manual Add Auto Assign Modify Delete

Previous Next Save Cancel



Freezerworks Unlimited ® at the AMNH

The challenge of tracking ALL data



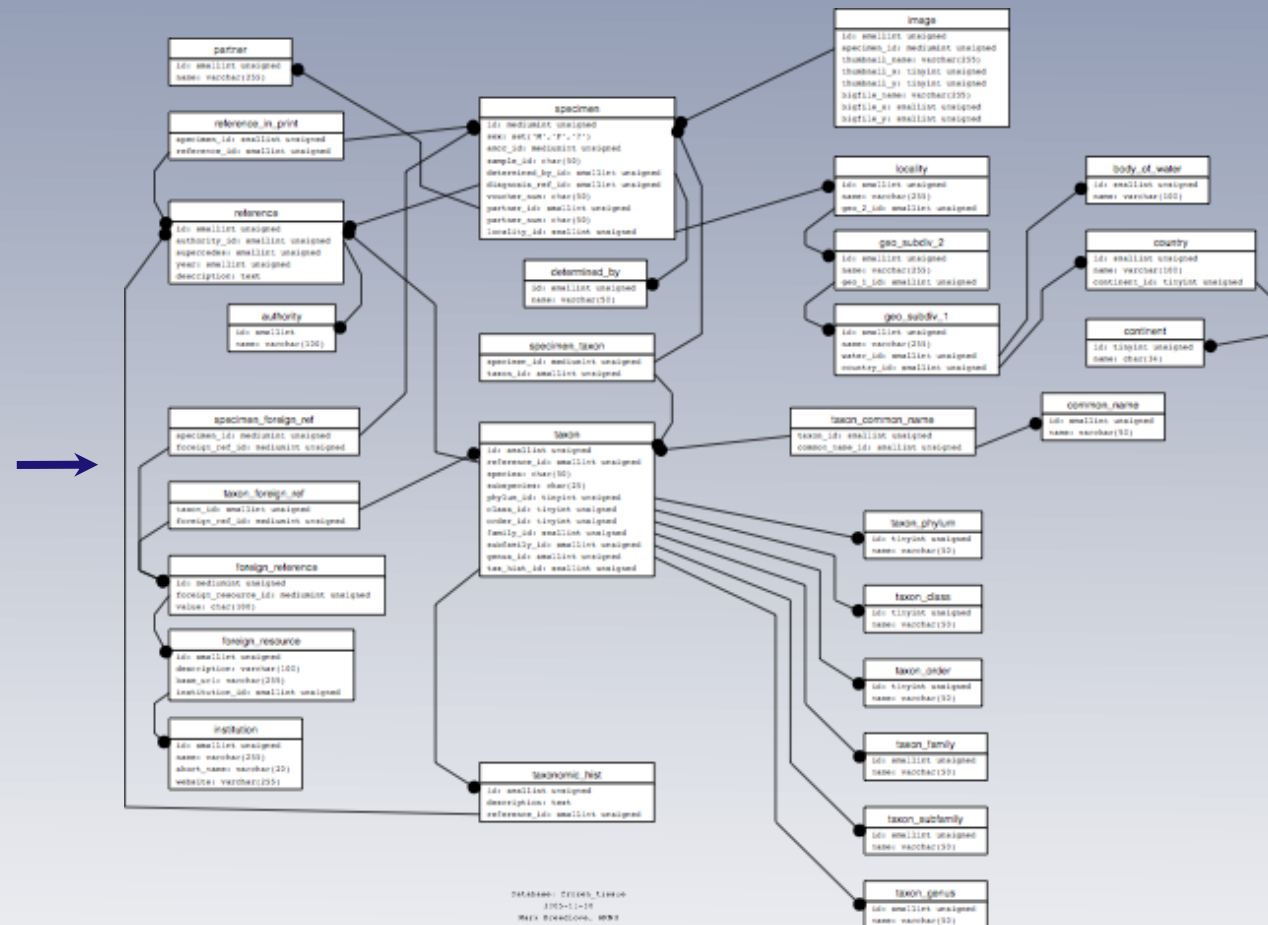
Freezerworks Unlimited in the field



De-identified or Limited Data Set

**Search/Review/
Request/Loans**

Data Use (DUA) and Data Transfer Agreements (DTA)



An online database is crucial to providing the scientific community in-house and externally with knowledge of the biobank's holdings and to foster collaboration

From Freezerworks to a MySQL database management system:

- Allows to restrict data access (Ethics)
- Allows unlimited addition of ancillary data
- Allows to LinkOut to other databases (GenBank, OMIM, SwissProt)

AMNH
Barcode
Number
100310

Ambrose Monelli Cryo Collection Database

[back to search / AM-CC home](#) / [back to specimen list](#) / [research home](#)

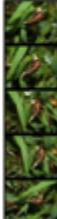
AMNH
Barcode
Number
100310

Specimen details

Photuris sp.	
Phylum	Arthropoda
Class	Insecta
Order	Coleoptera
Suborder	Polyphaga
Family	Lampyridae
Subfamily	[no subfamily data]
NCBI taxonomy #	41215 (click to view NCBI's record)

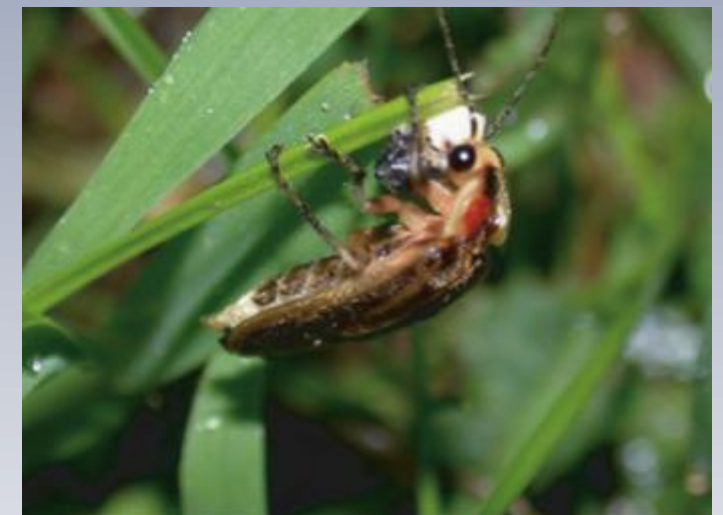
Determined by	[no determined-by data]
Taxonomic history	varicolor grp.
AMCC Barcode #	100310
GenBank #	

click for
full-size
image



* Not all species names are currently represented in the NCBI Taxonomy Database. In such cases, the NCBI Taxonomy number of an AM-CC specimen reflects the lowest taxonomy category in the NCBI Database that can be associated with the specimen.

[back to search / AM-CC home](#) / [back to specimen list](#) / [research home](#)



[+] AP043634 Drosophila meg. [g3170340]		<div> Links Related Sequences Protein PubMed Taxonomy Go/Ref </div>	
LOCUS	AP043124	401 bp	SSA Linear DBT 01-09-2009
DEFINITION	Drosophila melanogaster strain 1462-0462, F. alcohol dehydrogenase (Adh) gene, exon2 and partial cds.		
ACCESSION	AP043124		
VERSION	AP043124.1 01/11/2010		
KEYWORDS	-		
SOURCE	Drosophila melanogaster		
ORGANISM	Drosophila melanogaster		
	Eukaryota; Metazoa; Arthropoda; Insecta; Diptera; Pterygota; Neoptera; Endopterygota; Sigaria; Brachycera; Muscophora; Ephyraeidae; Drosophilidae; Drosophila.		
REFERENCE	1 Chaves I to 405		
AUTHORS	O'Grady, P.R., Clark, J.B. and Kidwell, M.G.		
TITLE	Phylogeny of the Drosophila saltator species group based on combined analysis of nuclear and mitochondrial DNA sequences		
JOURNAL	Mol. Syst. Evol. 13 (6), 656-664 (1998)		
REFERENCE	2 Chaves I to 405		
AUTHORS	O'Grady, P.R., Clark, J.B. and Kidwell, M.G.		
TITLE	Drosophila melanogaster		
BASE COUNT	100 a	101 c	85 g 119 t
ORIGIN	1 aacttggtga tcttggtatc tattgcaact cctgctgcca ttgctgaact gaagggcaac 61 atctcccaag tgacagttac ctctctatccc tatgatgtta ccacaccctt gccctgagact 121 accaaattgc tgaasaacat ttctgctcag ctcaaaactg ttgatgtttc gatcaatgga 181 cgttgcttcc ttgatgatca cagattgag agaaccttgc cagtgaactt cactggtttc 241 gtaaatacca ccaaccgcat ctgtggacct tgggaataag gtaaggytgg tccaggttgt 301 gccacttgta acattgtgtc actgaccgtg tccaatgcca ttcaacaagt gccctgtcac 361 tctgcttcca aggcagctgt tgttatgttc attcaatcca ttgccc		

AMERICAN MUSEUM OF NATURAL HISTORY

Ambrose Monell Cryo Collection Database

research home | AM-CC home

Database Search Form

phylum

class

order

family

subfamily

genus

species

subspecies

common name keyword

determined by

dept/partner

continent

country

geographic subdiv.

locale keyword

body of water

go

Phylum:

- [Annelida](#)
- [Arthropoda](#)
- [Basidiomycota](#)
- [Brachiopoda](#)
- [Bryozoa](#)
- [Chordata](#)
- [Cnidaria](#)
- [Ctenophora](#)
- [Echinodermata](#)
- [Embryophyta](#)
- [Isoptera](#)
- [Mollusca](#)
- [Nemertea](#)
- [Platyhelminthes](#)
- [Porifera](#)
- [Priapulida](#)
- [Proteobacteria](#)
- [\[no data\]](#)

Important information

- [How to request a loan](#)
- [How to use & cite](#)
- [Glossary](#)

AMNH department sites

- [Invertebrate Zoology](#)
- [Mammalogy](#)
- [Herpetology](#)
- [Ichthyology](#)
- [Ornithology](#)

AMCC #

Voucher #

Dept/Partner #

NCBI taxonomy #

GenBank #

go

Taxonomic hist. keyword

go

Subset of Freezerworks Unlimited in MySQL online Database

Developed by M. Breedlove and A. Corthals

Ambrose Monell Cryo Collection Database


back to search | AM-CC home | back to specimen list | research home

Specimen details

Photuris sp.

Phylum	Arthropoda
Class	Insecta
Order	Coleoptera
Suborder	Polyphega
Family	Leopryidae
Subfamily	[no subfamily data]
NCBI taxonomy #	41715 (click to view NCBI's record)

click for full-size image



Determined by

Taxonomic history

AMCC Barcode #

GenBank #

[no determined-by data]

vesicolosa grp.

108218

* Not all species names are currently represented in the NCBI Taxonomy Database. In such cases, the NCBI Taxonomy number of an AM-CC specimen reflects the lowest taxonomy category in the NCBI Database that can be associated with the specimen.

back to search | AM-CC home | back to specimen list | research home



AP04124

401 bp

284

2000

2000

2000

DEFINITION

Photuris sp. (401 bp) (284 bp) (2000 bp) (2000 bp) (2000 bp)

ACCESSION

AP04124

VERSION

AP04124.1

KEYWORDS

SOURCE

Photuris sp.

ORGANISM

Photuris sp.

REFERENCE

1. (Chen 1 to 401)

AUTHORS

1. Chen 1 to 401

TITLE

Photuris sp.

JOURNAL

Photuris sp.

REMARKS

Photuris sp.

FORMED

Photuris sp.

REFERENCE

1. Chen 1 to 401

AUTHORS

1. Chen 1 to 401

TITLE

Photuris sp.

BASE COUNT

100 a 101 c 85 g 119 t

ORIGIN

1 aacttggtga tcttggtcg tattgacaat cctggtgca ttgctgaact gaaggcaac

61 aatcccaag tgcagttac cttctatccc tatgatgta ccacacccct gcccgagact

121 accaattgc tgaacacat tttctgctcg ctcacacctg ttgatgttct gatcaatga

181 gctggcattc ttgatgata ctcagattga agaacacctg cagtgaactt cactggtttg

241 gtaatacca ccacccgat tttgacttc tgggataagc gtaaggggtg tccaggttgt

301 gccatctgta acattggtc actgacgggt ttcaatgca ttacacaggt gcccgctac

361 tctgtttcca aggcagctgt ttttagcttc actcaatca ttgac

//



Stony Brook University Medical Center - Development of a new BioBank
New Challenges

Biobanking: Of Time and Technology

- How long should the material accessioned in biobanks be preserved? **Forever** (or as close to it as possible)
- Therefore, the software solution should accommodate “forever”
- The software should be flexible enough to evolve with technology and computer power



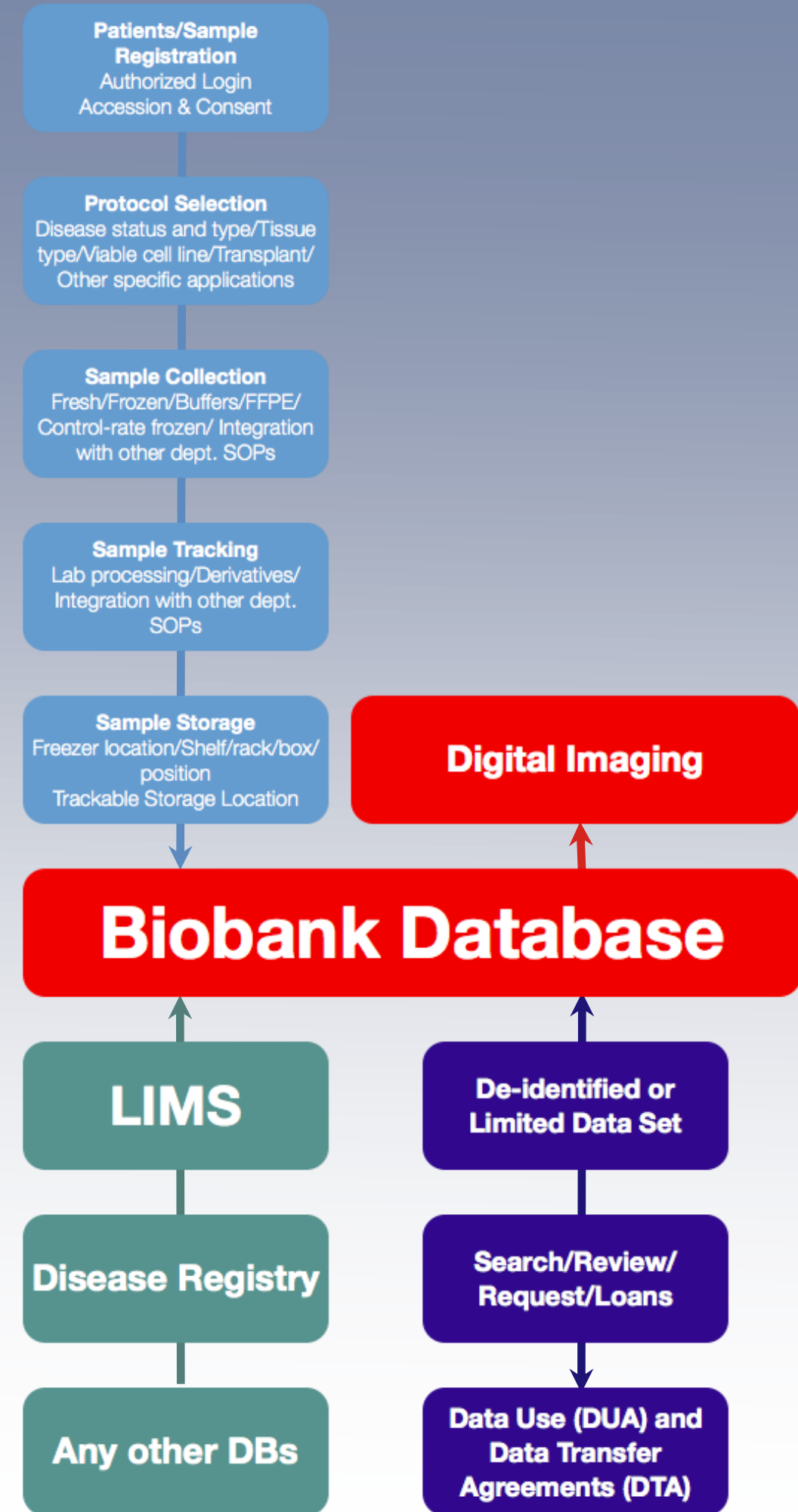
Biobanking: How much to record?

- Choose the bioinformatics to enable us to combine data from research studies with clinical information
- High quality data is required to support studies as well as clinical and translation research
- How much data? **ALL**
 - Patient clinical data
 - Demographic/Epidemiology data
 - Pathology data
 - Treatment data
 - Outcome and follow-up data
 - Biochemical, genomic, cell and tissue level data
 - E-Vouchers (Imaging, etc)



Biobanking: How much to record?

- 2 interfaces controlled by the biobank:
 - Day-to-day, biobank-based database
 - Customized online version of data holdings (security and ethics)
- External interface compatibility/Data transfer:
 - LIMS
 - Registries
 - Other databases (such as NCBI Genbank, OMIM, etc)



Patients/Sample Registration

Authorized Login
Accession & Consent

Protocol Selection

Disease status and type/Tissue
type/Viable cell line/Transplant/
Other specific applications

Sample Collection

Fresh/Frozen/Buffers/FFPE/
Control-rate frozen/ Integration
with other dept. SOPs

Sample Tracking

Lab processing/Derivatives/
Integration with other dept.
SOPs

Sample Storage

Freezer location/Shelf/rack/box/
position
Trackable Storage Location

Search Samples: # 14 of 192

Admin Data | Taxonomy | Field Data | Aliquots | Phys. char | Notes | Transact | Aud Trail

AMNH Register #: [] Dept/Partner: [Hesperiology] Dept/Partner #: [R-133365]

ISIS #: [] Studbook #: [] Field Catalogue #: [FT 1545]

Other ID#: [Live book 1230A] eVoucher #: [] Gel Pic #: []

Voucher #: [] Donor: [Cole, C] Date of Accession: [10/19/2001]

Collected By: [Zweifel, RIG] Expedition: []

Data Source: [FTC Binder 011] Disposition: [AMNH] Availability: [Yes]

Restrictions: []

Permission: [Yes-Cole, C]

Notification: []

Accession #: [] Death #: []

Administrative Notes

Contact: Charles J. Cole - American Museum of Natural History (AMNH), Vertebrate Zoology, Division of Herpetology (212) 759-5853
Specimen was lab bred and has no AMNH register #

Sample ID: [FT 1545]

Previous Next Save Cancel

Freezerworks Unlimited ®



Admin Data | Taxonomy | Field Data | Aliquots | Phys. char | Notes | Transact | Aud Trail

Dept/Partner: [wCS] Sample ID: [PCSA 2]

Other ID#: [ICD 05 27] Genus: [Carcharias] Species: [Baculus]

Common name: [Dulky]

Positions | Results | Protocol | Medium | Preserve

of Aliquots: [1] Freezer: [] Total Current Amount is 0.220L

Initial	Current	Thaw
0.220L	0.220L	0

Previous Next Save Cancel



Keeps track of the biomaterial and their aliquots with a unique barcode ID recording not only all basic sample data, the physical location of the sample but also all the “cradle to grave” history of the sample with several levels of security and audits. It is also highly compatible with most DB platforms.

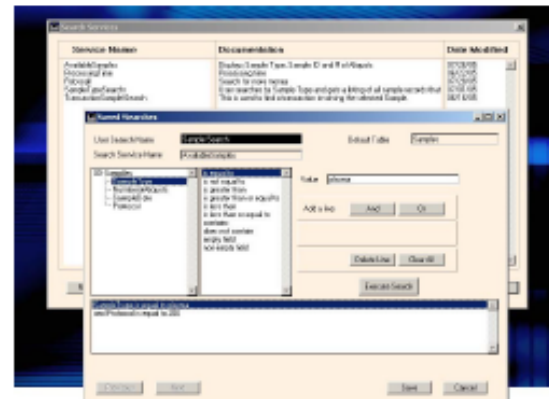
LIMS

Disease Registry

GenBank, OMIM

Add to your Freezerworks Database:

- Remote access to data via the internet
- Application integration using SOAP commands
- API for application development for PDA, handheld devices



SOAP Server services in the background, with the FROST search tool in the foreground

SOAP Server for Freezerworks Unlimited

If you need to go beyond the client/server architecture of Freezerworks Unlimited, take a look at what the SOAP Server module can do for you.

The SOAP (Simple Object Access Protocol) Server module provides the power to execute remote searches and updates on your Freezerworks Unlimited data via the Internet.

Flexible

Search Services: Create and save Search Services to specify the fields the user can search by and the fields returned by the SOAP Server in the search results. Post your results on a web browser, a separate application, or even a hand held PDA, wireless scanner or other data collection device.

For example, create a Search Service to allow remote users to find available and useful samples for research or testing.

Update Services: Create Update Services to add new samples and aliquots to Freezerworks, or update existing records.

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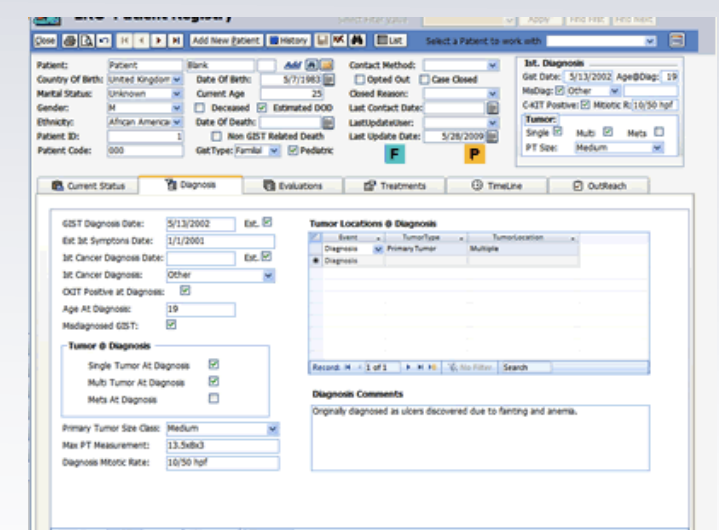
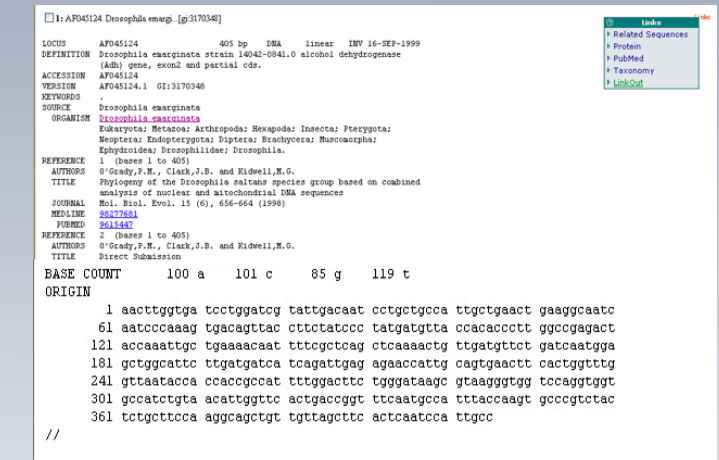
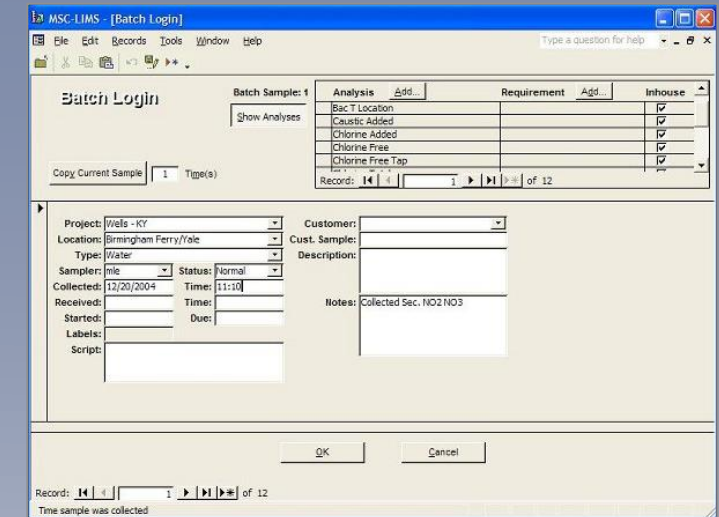
Secure

SOAP Server utilizes user authentication to enforce the powerful security features of Freezerworks Unlimited. This ensures that remote users cannot gain unauthorized access to confidential data. As you configure access for users and groups through the powerful Freezerworks Security interface, the SOAP Server follows your rules, ensuring that users can only access those records you allow. It also comes ready to be SSL enabled, for added security.

Connectivity

The SOAP Server Module provides a flexible API that allows your developers to create fully functional remote applications to access Freezerworks Unlimited data. Any device that can connect to an IP address can be programmed to enter or retrieve Freezerworks Unlimited data.

SOAP Server is available for both client/server and standalone versions.

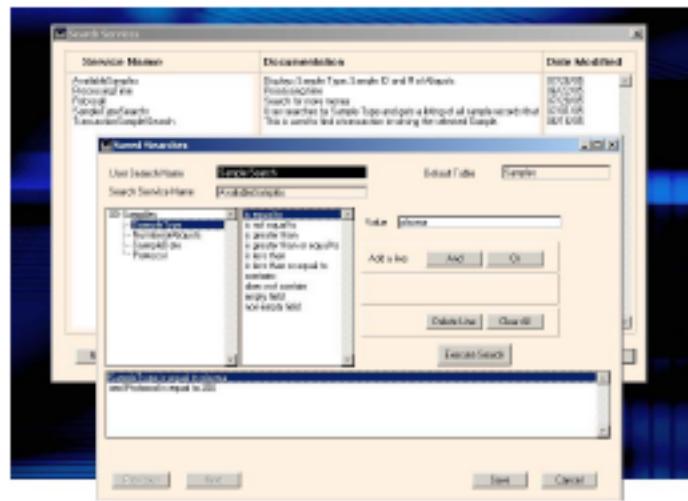


Talking to other databases is crucial.

- Issues of compatibility and data transfer
- Issues of ethics

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There's an App for that

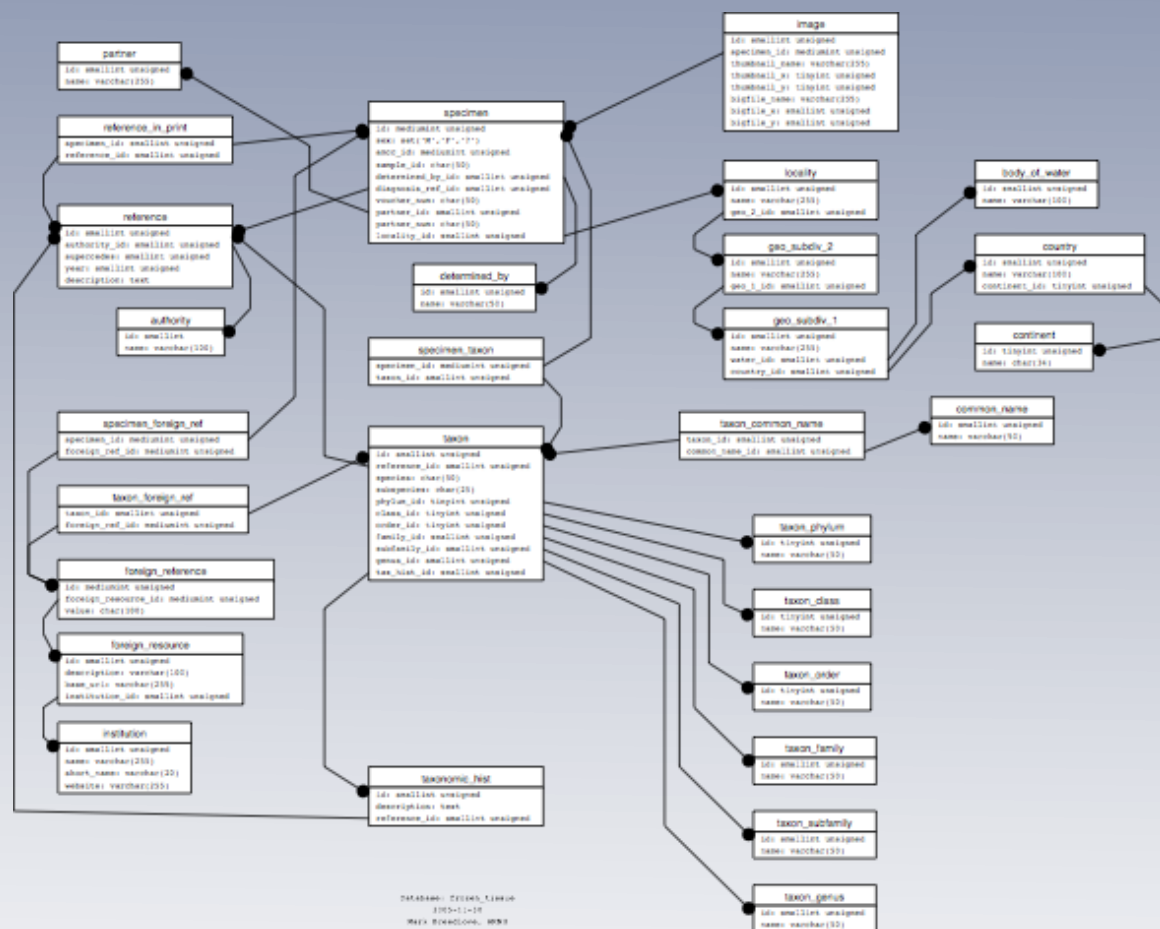
Link the Freezerworks database via an App using the SOAP protocol for easy location and identification of samples *in situ*



De-identified or Limited Data Set

Search/Review/Request/Loans

Data Use (DUA) and Data Transfer Agreements (DTA)



[1] AP041124 Drosophila melanogaster (g31704)							<div><div>Links</div><div><div><div><div><div></div></div><div>Related Sequences</div></div><div><div><div></div></div><div>Protein</div></div><div><div><div></div></div><div>Published</div></div><div><div><div></div></div><div>Taxonomy</div></div><div><div><div></div></div><div>LinkOut</div></div></div></div></div>
LOCUS	AP041124	401 bp	DNA	linear	10X	16-DEC-2009	
DEFINITION	Drosophila melanogaster strain 16440/1644.0 whole genome shotgun (WGS) contig, contig and partial cds.						
ACCESSION	AP041124						
VERSION	AP041124.1	GI:3170340					
KEYWORDS	-						
SOURCE	Drosophila melanogaster						
ORGANISM	<i>Drosophila melanogaster</i>						
	<i>Drosophila melanogaster</i>						
	Escherichia coli DH5alpha; Escherichia coli DH5alpha						



De-identified or Limited Data Set

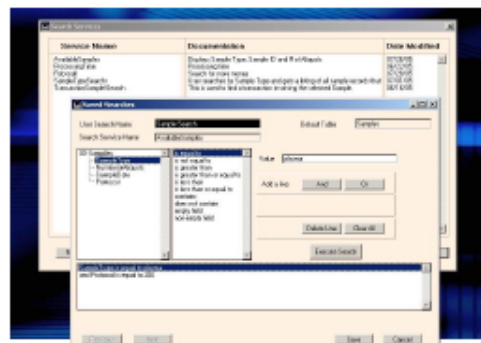
Search/Review/Request/Loans

Data Use (DUA) and Data Transfer Agreements (DTA)



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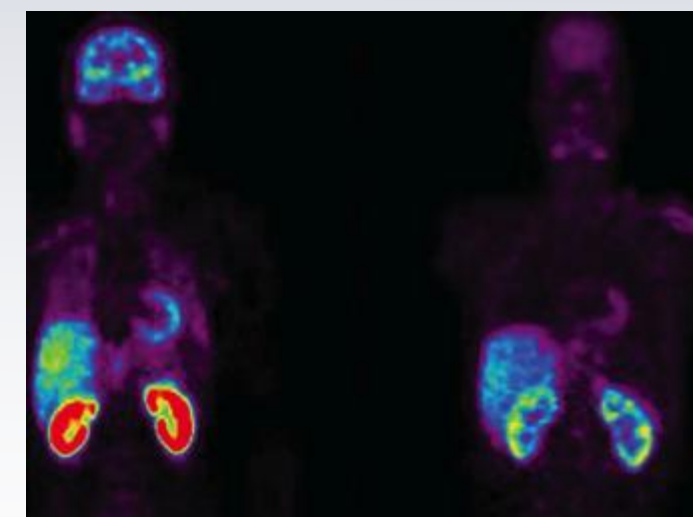
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The SOAP Server Module provides a flexible API that allows your developers to create fully functional remote applications to access Freezerworks Unlimited data. Any device that can connect to an IP address can be programmed to enter or retrieve Freezerworks Unlimited data.

SOAP Server is available for both client/server and standalone versions.



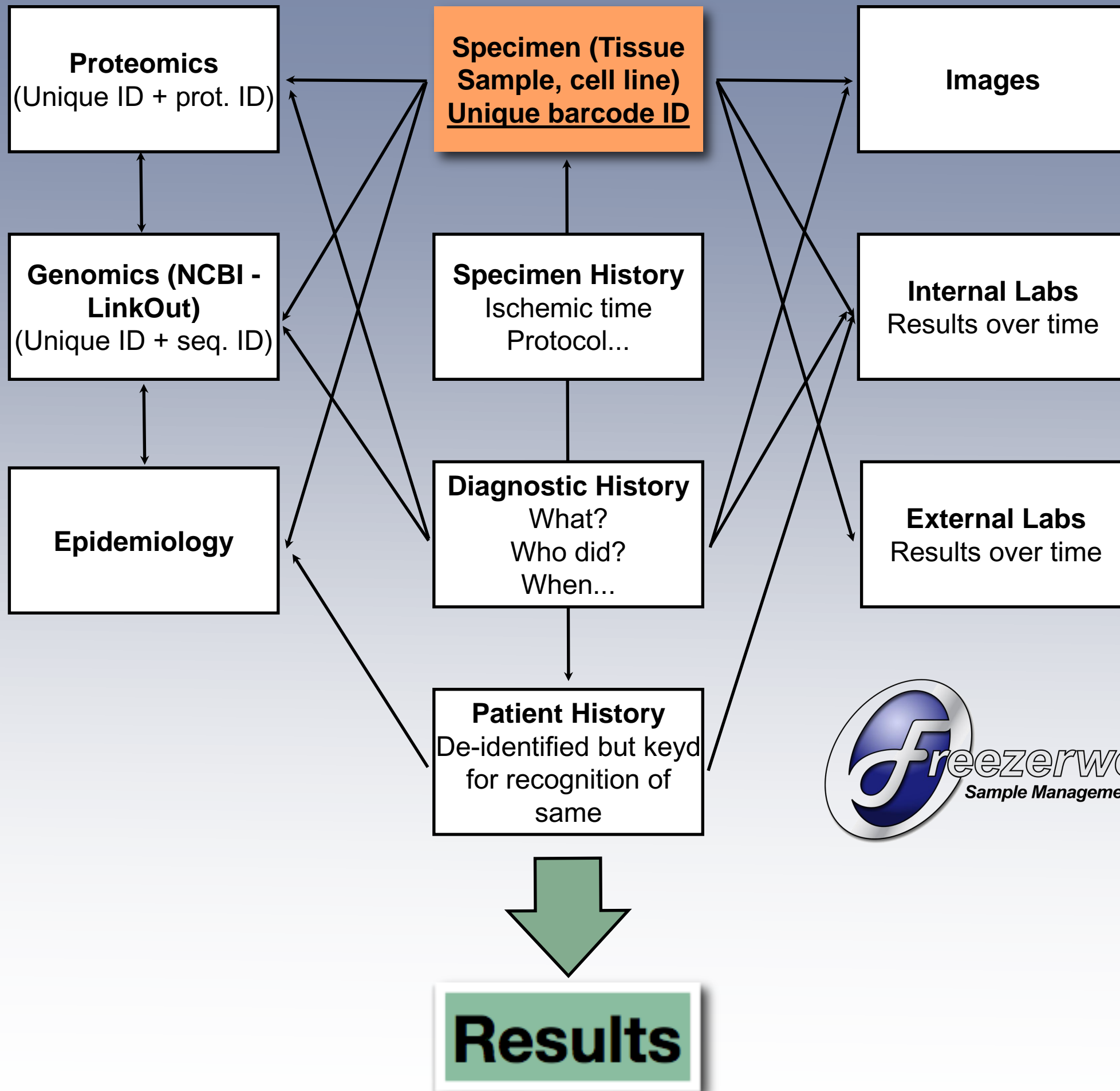
1: AP04124 Streptococcus sp. (J17046)	
LOCUS	AP04124 401 bp DNA linear 16-DEC-1999
DEFINITION	Streptococcus sanguinis strain J17046, 16S rRNA gene, partial cds.
ACCESSION	AP04124
VERSION	AP04124.1 GI:167046
KEYWORDS	
SOURCE	Streptococcus sanguinis
ORGANISM	Streptococcus sanguinis
REFERENCE	1 (bases 1 to 401)
AUTHORS	O'Leary, P.M., Clark, J.B. and Edwells, R.S.
TITLE	Sequencing of the Streptococcus sanguinis group based on combined analysis of nuclear and mitochondrial DNA sequences
JOURNAL	Mol. Biol. Evol. 15 (6), 656-664 (1998)
PMID	9627362
FEATURES	1 (bases 1 to 401)
REFERENCE	2 (bases 1 to 401)
AUTHORS	O'Leary, P.M., Clark, J.B. and Edwells, R.S.
TITLE	Streptococcus
BASE COUNT	100 a 101 c 85 g 119 t
ORIGIN	
1	aacttgggtg tctgggacg tttggacac cttgtgcca ttgtgaaat gaaggaact
61	aattcccaag tgacagttc cttctatcc tatgatgta ccacacccc ggcgagact
121	accacattgc tgaaacact tttcgtctcg ctcaaacctg ttgatgttt gatcaatga
181	gtcggcattc ttgatgaca ttcgattgag agaacattg cagtgaact cactggttg
241	gttaatacca caacggcat ttgggactc tgggataag gtaaggttg tccagtggt
301	gcacattgta acattggtc actgacggt ttaaatgca tttaacagt gccctctac
361	tctgtttcca aggcagctgt ttttagctt actcaatca ttgcc
//	

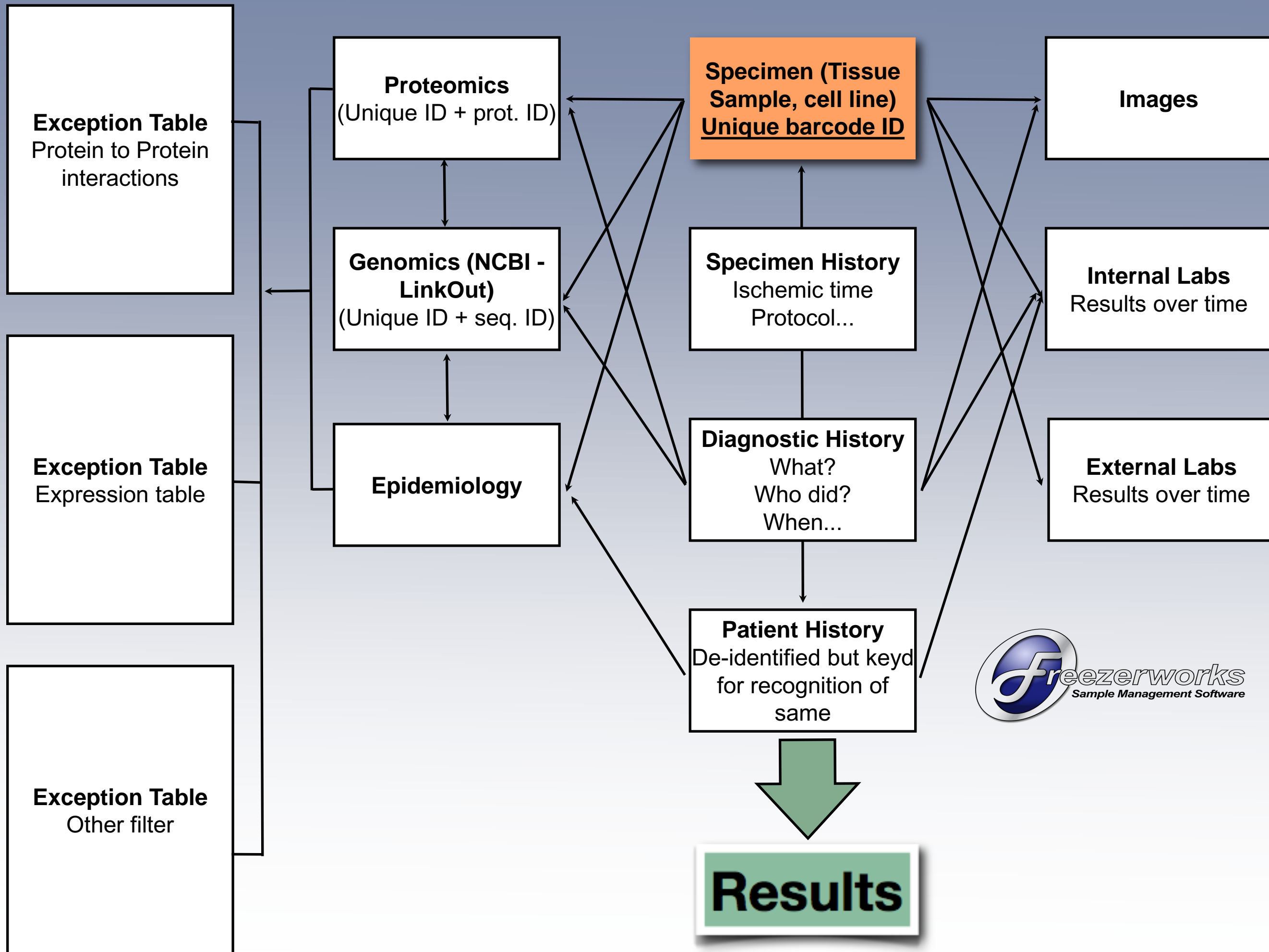


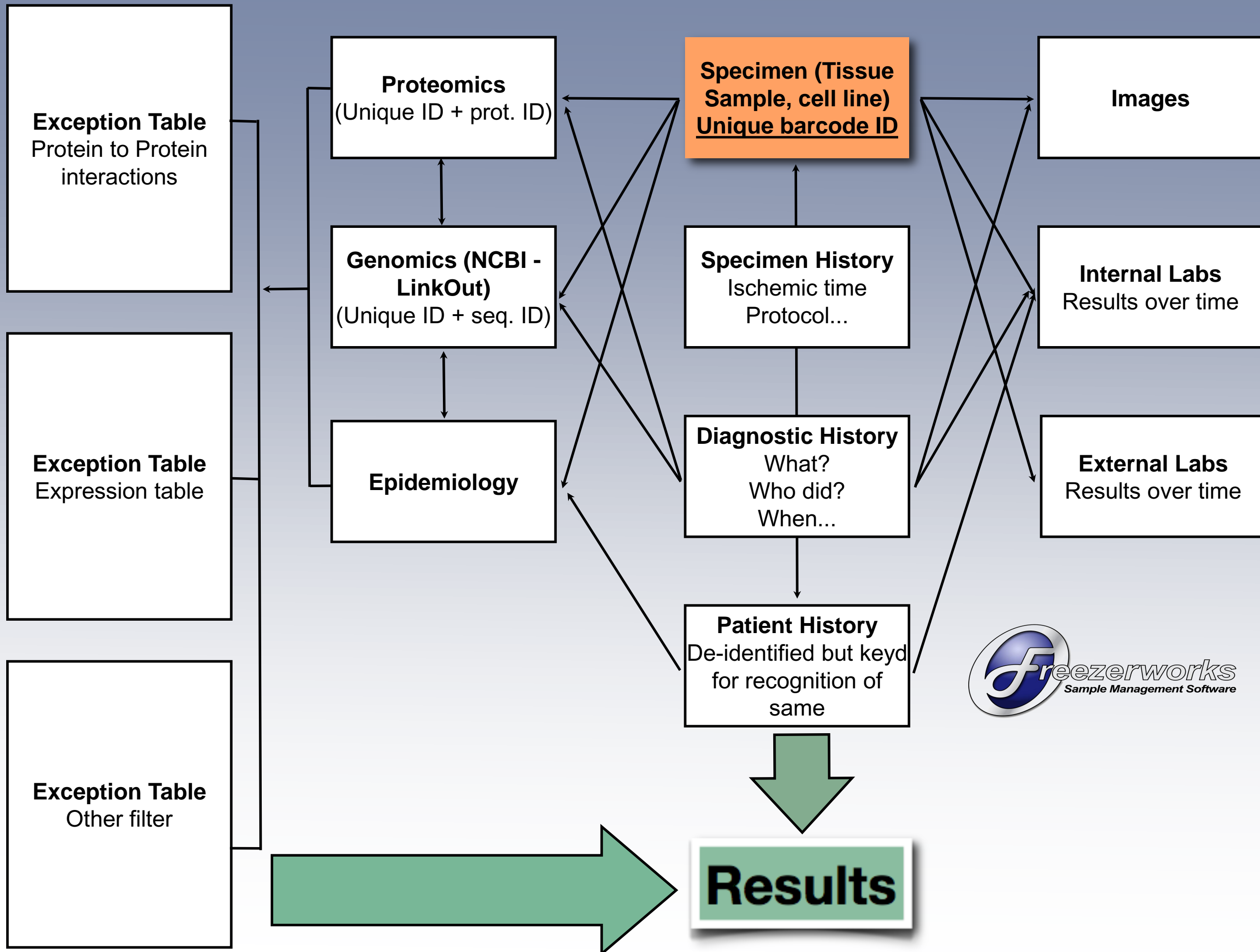
An online database is crucial to provide the scientific community in house and externally with knowledge of the biobank's holdings and to foster collaboration

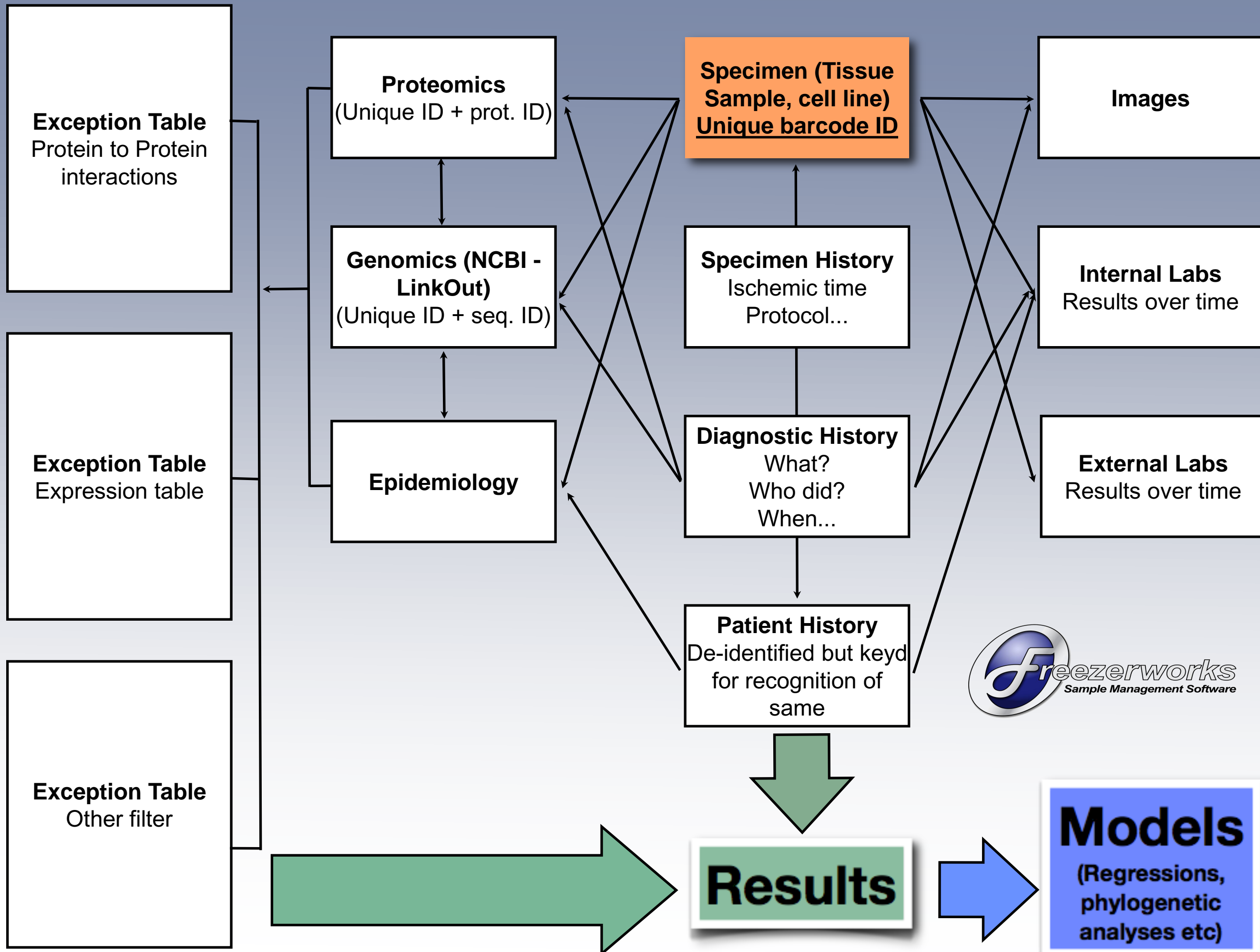
From Freezerworks to a MySQL database management system:

- Allows to restrict data access (Ethics)
- Allows unlimited addition of ancillary data
- Allows to LinkOut to other databases (GenBank, OMIM, SwissProt)











Dr. Angelique Corthals

Angelique.Corthals@stonybrookmedicine.edu

aspcorthals@gmail.com



Stony Brook Medicine

Any Questions?

sales@freezerworks.com

support@freezerworks.com