

A circular inset image showing a close-up of a hand wearing an orange nitrile glove, holding a white sample vial. The vial has a label with some text, including "Cell Line: HepG2" and "Date: 12/12/2013". The background of the entire page is a light gray with a large, curved, white shape that frames the title and the inset image.

Selecting Sample Management Software for Biobanking Applications

v1.0

INTRODUCTION

Biobanking is a term widely used to describe the storage of biological entities for a diverse range of applications. 'Biobanks' in the broadest sense exist for samples ranging from proteins, DNA and tissue, to agronomic seed banks and biodiversity species collections (alive or extinct).

Each type of biobank has widely differing requirements, operates under different legislation and has different usage patterns. However, there are some common requirements for storing and tracking this wide variety of samples that a good sample management software or LIMS should manage for you.

COMMON SAMPLE MANAGEMENT NEEDS FOR BIOBANKING

When assessing sample management software, key requirements that should be included are:

Ensuring high quality sample integrity

Samples should be minimally affected by storage and usage, sample identity must be clear and maintained, samples may have expiry dates or require access to be restricted. Software should include integral processes to prevent cross-contamination and mistaken use, plus manage sample access and expiry dates.

Ability to handle diverse sample types

Each sample type has different characteristics so a sample management system must manage different storage and handling conditions. Permissions, safety information, hazard information and ownership may also need to be applied uniquely for each sample.

Tracking sample relationships

Biobanking sample management software should record a sample's heritage, and the sample's division, subsampling or cloning in a comprehensive audit trail.



A full chain of custody from sample collection to sample distribution and analysis

As the number of samples in storage or being handled increases, the risk of errors increases, and the time spent checking or correcting errors increases exponentially. The collection procedure itself may need to be recorded. A sample management system can prevent such errors by tracking samples through defined workflows.

Integrations with common lab automation

Processes such as quantification, QC, preparation, reformatting and storage of samples frequently use lab automation. If it can be linked to the sample management system, then the chain of custody and the capabilities of the biobank are significantly improved.

Managing temperature ranges

Sample management software should understand what samples can be stored under what temperature conditions (usually +20 to -160°C) to maintain sample integrity. It should also record changes in temperature that the sample experiences to indicate the likely quality of the contained substance.

Maintaining sample separation

Some sample types need to be segregated for safety reasons or to avoid cross-contamination. Sample management software should restrict, guide and inform users about the spatial holding of samples and control permissions for usage.

Tracking sample consent

For samples collected from human subjects, there is no common form for consent and there are wide regional variations in legislation. Sample management software should therefore provide access to the consent record and, if possible, automated interpretation of the consent, according to the usage.

Managing diverse container types

Sample management software must be able to easily record different container types and where those containers can be stored, plus present information on the container to the user according to the application, e.g. for hazardous or delicate materials.

Create multiple label types and documentation

The variety of samples, their usage and their distribution requires many different formats. Each location may require different label designs to conform to regional legislation. Sample management software should be able to handle and print a wide range.



HOW DOES MOSAIC SOFTWARE SUPPORT BIOBANKING REQUIREMENTS?

Trusted by small biotech and global pharma, Titan's Mosaic software is a single platform that meets all your sample management needs and helps provide an error-free sample supply chain. It is proven to handle tens of millions of samples of all types throughout their lifetime. This includes recording sample events from creation to disposal, monitoring stock levels, tracking sample locations, movements and expiry dates. Mosaic's detailed audit trail is 21 CFR Part 11 compliant and time stamped, so suitable for use in regulated environments.

Mosaic is particularly well suited to biobanks that have automated sample preparation and either automated or manual storage. It offers existing integrations with lab automation and software from Azenta Life Sciences, Beckman Coulter, BioMicroLab, CDD Vault, Genedata, Hamilton, HighRes Biosolutions, Micronic, PerkinElmer, SPT Labtech, Tecan, ThermoFisher, Ziath and more.

Managing sample inventory

Inventory management is a core feature of Mosaic. Different substance types are managed simultaneously, and each substance type can have a unique set of sample characteristics. These can include comprehensive lot tracking and freeze/thaw cycle tracking.

Tube B000000006

DETAILS

Barcode:	B000000006
Labware Type:	2mL CryoVial
Creation Date:	13/06/2022 15:52:06
Expiry Date:	
Last Picked Date:	13/06/2022 15:52:06
Thaw Count:	0
Comment:	
Set Folder:	\Sets\Orderable
Set Name:	Stock Tubes
Requires Secure Storage:	No
Despatched:	No

LOCATION

Location Path:	\Home\Bld_01\Lab_01\Azenta Store
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SAMPLE

Substance Type:	Mammalian Cells
CompoundBatch:	
Name:	ATCC-BX0116 Human IPS
ID:	S000000001
Amount:	1 mL (Measured)
Available Amount:	0 mL (Measured)
Concentration:	4.6 E6 cells/mL
Total Thaw Count:	0
Filled Date:	13/06/2022 15:52:07
Ignore:	No

ORDERS

Order Id	Next Step
<input type="checkbox"/> 49 Deliver Solutions in Tubes (by Substance)	Despatch
<div>Complete Work</div>	

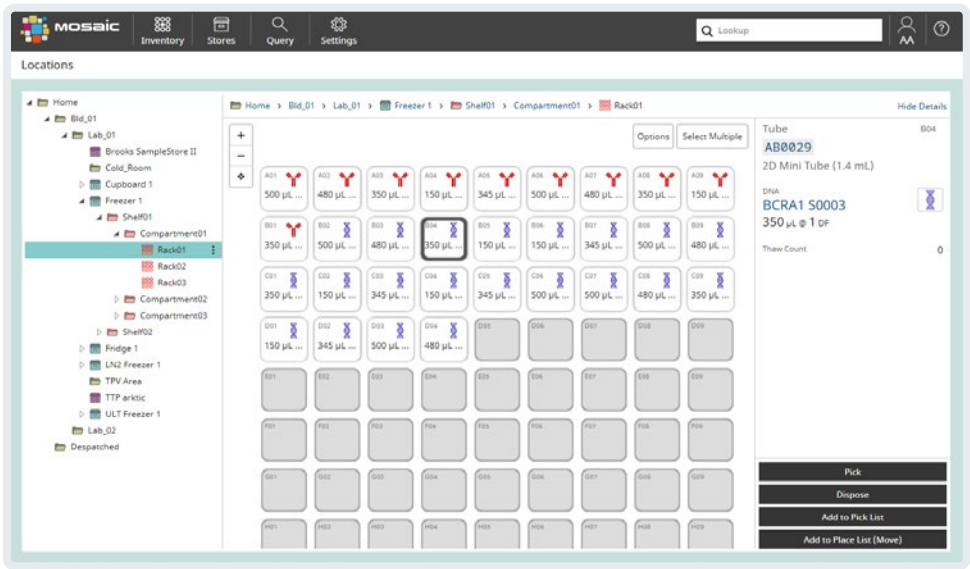


Rules can be set up to assign storage conditions to each sample based upon those characteristics. Sample collection procedures and consent forms can be associated with the samples by means of hyperlinks, so access to the original consent data is maintained. Certificates of Analysis, hazard and safety data or other documentation can also be linked to each sample.

Mosaic tracks expiry dates and, when these are reached or are imminent, there are options to extend them, based on analysis. Lot expiry dates can be automatically adjusted depending on storage temperature or changes in storage conditions.

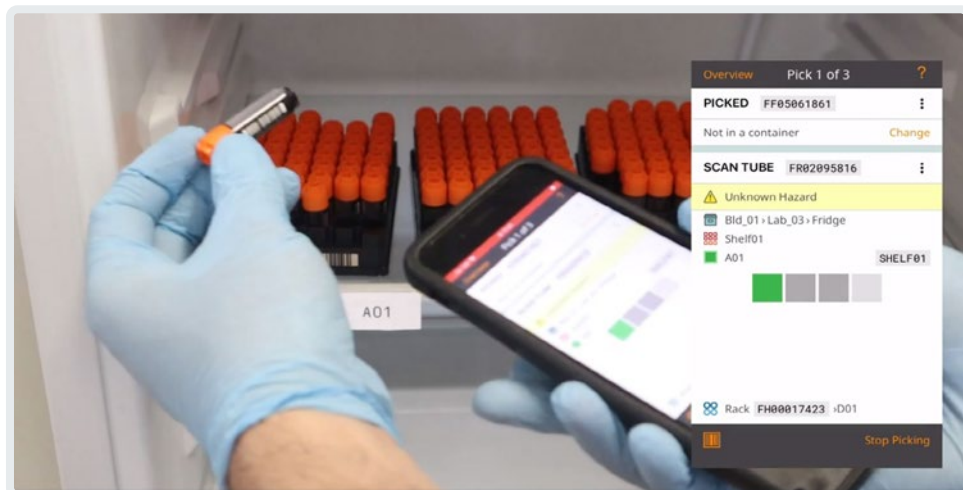
Barcodes are used to positively confirm locations and containers, and barcode ranges can be assigned to differentiate labware types. The container history is also recorded, and the users are informed of any requests or orders that the containers are associated with.

Container storage is represented as a hierarchical tree view of locations, allowing all storage topologies e.g. laboratories, cupboards, shelving, drawers, Dewars, boxes etc. to be included.



Mosaic can seamlessly connect automated stores to your sample tracking, order processing and audit trail to give you a complete history of each sample in one interface.

For manual stores and lab freezers, Titian Software's Mosaic Mobile application helps users to pick and place samples quickly and accurately. It links the manual storage and retrieval of samples to your electronic inventory and automatically updates it in real time – thus making these actions traceable and auditable.



Order samples from remote sites

Mosaic offers sample ordering capabilities as well as sample picking directly from stores. A comprehensive sample requesting/ordering system is by far one of the most critical infrastructure needs of a sample management group [1]. It means organisations can benefit from centralised inventory management and efficient processing. Samples can be ordered by users at other locations, with the samples shipped efficiently to the recipient.

Mosaic's ordering caters for everything from the distribution of pre-aliquoted samples to the generation of complex dose-response deliverables with controls and standards. Sample orders are verified against availability in real time and the amounts required are reserved, so you know that your order is guaranteed.

Sample selection can be prioritised according to rules you set, such as 'oldest batch first', or 'take from room temperature storage'. If samples are restricted, Mosaic ordering automatically triggers and manages the approval process.



Request Protein (Pre-Aliquot)

Submit Order
Clear Order
Show Reports

Priority: Normal
Due Date:
Recipient: Roger Ruskin <Administrator@titian.co.uk>
Comment:

Add substances
Add
Import

Export
Substances: 2
Detail View
Summary View

#		Substance	Orderable Copies	Overrides	
				Copies	Amount (@ Concentration)
1	✓	IgG1 S0001	5	2 of	500 µL @ 5 mg/mL = 5 mg in 1000 µL
2	✓	BCRA1 S0003	2	1 of	480 µL @ 34 mg/mL = 16.32 mg in 480 µL

345 µL @ 34 mg/mL (6 available)
350 µL @ 34 mg/mL (2 available)
480 µL @ 34 mg/mL (2 available)
500 µL @ 34 mg/mL (5 available)

Standardised workflows for common order types can be defined in Mosaic, and then readily initiated by other users. This means the user only needs to specify parameters for useful variations in the sample order. Choices like sample format and intermediate preparation steps are hidden to minimise the likelihood of specifying incorrect requirements.

Ordering
Inventory
Stores
Query
Fulfilment
Shipping
Admin

Create Order

Switch to Advanced View

→ (Whole) Tube Despatch
→ Acoustic Direct Dilution Plate (<=1µL)
→ Cherry Pick Single Point Plate
→ Neat Dispense (Order By Amount)
→ Neat Dispense (Order By Volume/Concentration)
→ Serial Dilution Plate (>1µL)



Once the order is placed, the fulfilment of the order is tracked through the expected workflow, checking the samples identities at each step of the process. A requestor can see the progress of their order through Mosaic's web interface.

Despatch, Shipping and Receiving applications are available. You can generate and email supporting documentation, as well as logging courier details. You can create packages with items from multiple orders, for delivery to the same site. Packages can match the physical container sizes and quantity. Mosaic can also generate documents containing consignment details, which, together with other standard documentation (e.g. hazard declarations), can be printed for the shipping department and emailed to the recipient site.

WHAT SERVICES CAN I EXPECT TO GET UP AND STAY RUNNING WITH MOSAIC?

Mosaic is a single web-based application, with minimal deployment overhead, built on enterprise-strength technologies and available on the cloud or on-premise to suit your needs. You can choose the edition of Mosaic that meets your requirements – FreezerManagement, SampleBank or Enterprise Mosaic – and the number of use licences you need. All starting from a low monthly subscription cost.

Two pre-defined packages offer rapid deployment:

- Mosaic FreezerManagement is an affordable software solution for managing and tracking all types of sample inventory in freezers that goes far beyond other inventory management systems
- Mosaic SampleBank is the ideal solution to manage sample requesting and fulfilment for centralised biobanks, with full inventory tracking and workflow management

Titian Software supports you with:

- Application Consultants who are sample management experts drawn from industry and can help capture the full set of operational requirements a customer may have
- Experienced implementation teams to help you install and configure the software, and provide a choice of training packages
- Support teams (UK, Poland and US based) who are there to keep your system running at its best



ABOUT TITIAN SOFTWARE

Titian Software is the industry leader in providing sample management software for the life sciences. Using Mosaic software, our customers see significant benefits in terms of their throughput, response times, error rates, labour costs as well as in sample conservation. Titian have done this by producing an application that can process multiple requests with varying sources, and labware output formats. It can easily be run by any operators, instead of tying up an automation expert to write new protocols. We also use our extensive experience in interfacing laboratory instrumentation and robotic systems with our software to ensure that customers make best use of their investment in research and development technologies.

Titian's development efforts never stop as we continue to advance Mosaic toward higher levels of efficiency and practicality for the user. The collaborative relationship between Titian and lab automation vendors continues to ensure that new applications are made available on a timely basis, and we pride ourselves on taking into account customer feedback for all Mosaic modules to drive our product to be the best it can be. It is all part of Titian's commitment to providing innovative solutions that make life easier for sample management professionals.

References:

[1]: W Janzen, E Admirand et al, Establishing and Maintaining a Robust Sample Management System, SAGE Journals 2019: <https://journals.sagepub.com/doi/10.1177/2472630319834471>





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