Aurabox: The Next-Generation Medical Imaging Interoperability Platform

Aurabox is a next-generation medical imaging Interoperability-as-a-Service platform, designed to bridge gaps, enhance accessibility, and place control back into the hands of patients and clinicians alike. This white paper explores the limitations of current systems, the innovative approach of Aurabox, and how it redefines the landscape of medical imaging interoperability.

1. The Problem: Interoperability in Medical Imaging

For imaging data to be truly effective in clinical settings, it must possess what can be termed as **Presence**. This concept encompasses three critical attributes:

1. **Discoverability**: Clinicians must be aware of the existence of relevant imaging studies. Without this awareness, crucial information may remain unused, potentially impacting patient care.
2. **Obtainability**: Once discovered, accessing the imaging data should be straight- forward and efficient. Barriers to obtaining images can lead to delays in diagnosis or treatment.
3. **Pre-emptability:** The data must be able to be obtained in advance of when it is required, preferably without intervention.

The three critical aspects of **Presence** imply that the systems which make imaging available have certain capabilities, for example *Discoverability* implies that the imaging is searchable by patient, *Obtainable* that the imaging can be retrieved electronically, and *Preemptable* that these actions can occur automatically and without human intervention.

Beyond Presence, imaging data must also adhere to stringent standards of:

- **Security**: Protecting patient data from unauthorised access is paramount. Security breaches can have severe legal and ethical ramifications.
- **Consistency**: The imaging and its metadata should be accurate, verifiable, and complete.
- **Consent**: Requesting, sharing or moving imaging between organisations should be auditable and consent-driven, such that every interaction is bound by a consent.

2. Available options for imaging interoperability

The available solutions for networking or sharing medical imaging can be reduced to 1st, 2nd and 3rd generation interoperability platforms, and link sharing/portals.

A. First-Generation Imaging Networks: DICOM router-based/VNA networks

The initial response to interoperability challenges was the establishment of DICOM networks, representing the first generation of imaging connectivity solutions. These networks allowed for the digital transmission of images between devices and systems within a single institution or network of institutions, usually via a DICOM router.

1st Generation networks offer at best a minimal, DICOM way to transact imaging, however that's where the benefits end. They suffer from scalability issues, are **insecure**, **lack authentication** and **authorisation** controls, are **technically complex**, and have a **terrible experience** for discoverability and obtaining imaging (often falling back on fax systems).

Procurement model
Usually, these networks are established by individual hospitals or hospital systems and are built and managed in-house.

B. Second-Generation Imaging Networks: IHE-based networks

As the need for solutions grew, the second generation of imaging networks emerged. These networks are based on the various interoperability protocols established by the Integrating the Healthcare Alliance (IHE) profiles. They can contain cross-organisational patient discovery mechanisms, as well as methods to transit imaging, however they still suffer many of the issues of 1st Generation networks.

2nd Generation Networks **added discoverability** and **some access controls** to 1st Generation networks. They are able to operate at **larger scales** and in complex environments. However, they still carry **many of the downsides of 1st Generation networks**, and their **hugely increased complexity** makes them very **costly and time consuming** to implement.

Procurement model
Usually, these networks are established as shared entities across hospital systems (e.g. Commonwell). They are extremely expensive and complex to operate.

C. What about File & Link Sharing Platforms and Imaging Portals?

As **a workaround** for complex imaging networks, a significant number of sharing products were developed. These are almost entirely designed to publish or share imaging from within an organisation, as a workaround for a lack of real interoperability.

While these tools offered better accessibility and **simplified sharing** as a workaround for the limitations of 1st and 2nd Generation networks, they are **fragmented** and lack workflow integration or discoverability. They also frequently have **poor security controls.** However, their major limitation is that they do not support the transfer of imaging between organisations. Thus an organisation needs both a DICOM-enabled network AND a sharing tool to cover their basic requirements.

D. Third-Generation Imaging Networks

3rd Generation networks overcome most of the issues with 1st and 2nd generation networks and portals.

Unlike earlier networks, 3rd generation networks operate as platforms, delivering connectivity and features independently of DICOM, allowing them to adapt across technology stacks.

These networks allow end users to connect using whatever technology is appropriate, then manage the discovery, request, sharing and configuration services for the client. By abstracting functions such as indexing, querying, and data transfer away from the earlier model of basic data services into platform services, end users no longer need to determine and implement business logic as local services just to get access to basic features. This moves the majority of the operational, security and compliance risk to the network and makes the end users implementation tasks and user experience vastly superior. In fact, with a third generation network, the only implementation tasks are some internal change management and a VPN.

Procurement model
3rd gen networks are delivered as software platforms, generally software-as-a-service

	1st Generation DICOM Router networks	**2nd Generation** IHE-driven networks	**Portals and link-sharing**	**Aurabox** 3rd Generation
Discoverability	Yes, but only by exposing the entire network, otherwise **none**	**Yes**, across systems connected to the network	**None**	**Yes**, across systems connected to the network, and future national HIE compatibility
Obtainability	Yes, but only by exposing the entire network, otherwise **none**	*Varies* by network, however imaging can be retrieved on demand	*Varies*, requires manual download	**Yes**, imaging is pulled automatically when required
Pre-emptability	**None**	**None**, but depends on EMR implementations	**None**	**Yes**, searches can be run automatically based on new patient information (1)
Connectivity options	DICOM only	DICOM, however DICOMWeb is technically supported in some cases	Proxy, HL7v2, or Manual	DICOM, DICOMWeb, Proxy, and Manual FHIR coming soon
Procurement model	Self-build or connect to existing	Self-build or connect to existing	Buy	Software-as-a-Service
Deployment model	Self-hosted	Self-hosted	Self-hosted	Software-as-a-Service

(1) Coming in 2025

3. Aurabox: A Third-Generation Imaging Network

Aurabox represents a revolution in imaging interoperability. It is designed to meet the complex needs of modern healthcare through innovation, integration, and interoperability.

As a 3rd generation network and Interoperability-as-a-Service platform, Aurabox enables discoverability, obtainability and pre-emptability through a set of connected features which together form a set of powerful tools for imaging providers and consumers.

Seamless Integration and Connectivity

Build your own network of connected imaging requesters and senders, or leverage ours.

- **Request, share, and collaborate:** Aurabox fully supports managing incoming requests, sending requests, and sharing patient imaging externally.
- **Control third-party access**: Limit who can request access to patient records externally by organisation
- **Add new providers seamlessly:** Access a directory of other imaging providers connected to the Aurabox Network
- **Flexible Integration**: Works with existing systems without the need for extensive modifications.

Simplification Over Complexity

While second-generation networks have made strides toward interoperability, their complexity often hinders widespread adoption and usability. Aurabox takes a different approach:

- **User-Friendly Design**: Prioritises ease of use for both technical and non-technical users, reducing the learning curve and promoting adoption.
- **Minimal Configuration**: Requires less technical expertise to implement, making it accessible to organisations of all sizes.
- **Easy fallbacks**: Web uploaders, email sharing, and online imaging viewers are available when dealing with organisations or specialists that don't have deep integration capabilities.

Fully Consent-Driven

At the heart of Aurabox is a commitment to patient autonomy. The platform is designed to be fully consent-driven, offering:

- **Auditable history:** Every request sent by or through the platform includes metadata describing the basis of use (e.g. primary treatment) and the consent provided (e.g. Implied, Written or Verbally captured).
- **Compliance**: Meets or exceeds regulatory requirements for patient privacy and data protection.

Advanced DICOM integration, Sharing, and Discoverability

The platform enhances collaboration and data utilisation through:

- **PACS-compatible:** Pull imaging directly from your PACS into shareable patient profiles. Imaging is not transferred until the end user triggers it.
- **Shared patient profiles**: Once a patient is shared, imaging history from sharing parties is merged into a single record and kept up-to-date.
- **Discoverability:** Aurabox can enable patient discoverability across PACS systems without exposing that data to end users (coming in 2025)
- **Preemptable:** Searching begins automatically as soon as a patient is added (coming in 2025)

Aurabox builds upon the foundational elements of DICOM networks and the accessibility of web-based platforms. By incorporating the strengths of both, Aurabox ensures compatibility with existing systems while introducing advanced features that provide for the clinical requirements of **Presence.**

Why Aurabox is different

Aurabox stands out through advanced technology, patient-centric design, and a holistic approach to interoperability.

Aurabox is the only 3rd generation network in Australia.

All other medical imaging interoperability solutions on the market are 1st or 2nd generation networks, or portals/link sharing tools.

A Unified Solution

Aurabox provides a comprehensive platform addressing all aspects of imaging interoperability. It seamlessly integrates with existing systems while introducing new capabilities that enhance overall performance.

Empowering Clinical Teams

With Aurabox, clinical teams no longer need to rely on imaging teams to locate and transfer patient imaging. Clinicians and administrative staff can manage, request, and share patient imaging safely and securely, freeing imaging teams for more critical tasks.

Enhanced Security and Compliance

By centering consent in data control, Aurabox aligns with modern healthcare's shift toward patient-centric care. The consent-driven model complies with regulations and builds trust between patients and providers. Security is ingrained in Aurabox's architecture, ensuring patient data remains protected through advanced encryption, access controls, and compliance with international standards.

Scalability and Future-Proofing

Aurabox's cloud-based, decoupled connectivity adapts to the evolving needs of healthcare organisations. Its support for modern standards like DICOMweb ensures compatibility with future technologies while maintaining connectivity with original DICOM services.

Improved Clinical Outcomes

By making imaging data discoverable, obtainable, and preemptible, Aurabox directly

	1st Generation DICOM Router networks	2nd Generation IHE-driven networks	Portals and link-sharing	Aurabox 3rd Generation
Audit trails	No	No	Some	Yes
Auditable consent history	No	No	No	Yes
Per-request consent validation	No	No	No	Yes
Supports secondary-use consents	No	No	No	Yes
Requester and patient identity verification	No	No	Weak requester validation	Yes
Share or request from outside the network	No	No	Yes	Yes
Delegate sharing and requesting to clinical teams	No	No	Minimal	Yes
Request from outside the network	No	No	n/a	Yes
Automatic de-identification and research features	Minimal	Minimal	Minimal	Yes
Built in MDT management	No	No	No	Yes

contributes to better clinical outcomes. Clinicians have timely access to the information they need, leading to more accurate diagnoses and effective treatments.

Operational Efficiency

Automation and workflow integration reduce administrative burdens, allowing healthcare professionals to focus on patient care. The platform minimises errors and redundancies, leading to cost savings and better resource allocation.

Organisational Benefits

Aurabox reduces the cycle time for onboarding patient imaging, decreasing time spent searching for, retrieving, and managing imaging. This efficiency may translate into reduced costs, more patients onboarded, and more imaging brought in-house.

Clinical Benefits

By making imaging discoverable, obtainable, and preemptible, Aurabox offers a range of benefits for clinicians beyond organisational efficiencies. These include improved clinical efficiency, more patients reviewed at multidisciplinary team meetings (MDTs), fewer delays due to missing imaging, reduced clinician workload, and seamless cross-organizational collaboration within a controlled environment.

Conclusion

The challenges of medical imaging interoperability have long hindered the full realisation of imaging's potential in healthcare. **Aurabox** addresses these challenges head-on, offering a next-generation platform that not only solves current issues but also anticipates future needs.

By integrating the strengths of previous solutions and introducing innovative features, Aurabox redefines what is possible in medical imaging. Its patient-centric approach, combined with technological excellence, positions it as a leader in the field.

In embracing Aurabox, healthcare organisations can expect to see enhanced collaboration, improved patient outcomes, and streamlined operations. Most importantly, they will be part of a movement toward a more connected, efficient, and patient-focused healthcare system.

Aurabox is dedicated to transforming medical imaging interoperability through innovation and a commitment to excellence. Our team of experts in healthcare technology, data security, and patient engagement works tirelessly to develop solutions that meet the complex needs of modern healthcare.

For more information about Aurabox and how it can benefit your organisation, please visit our website or contact us directly.

https://aurabox.cloud