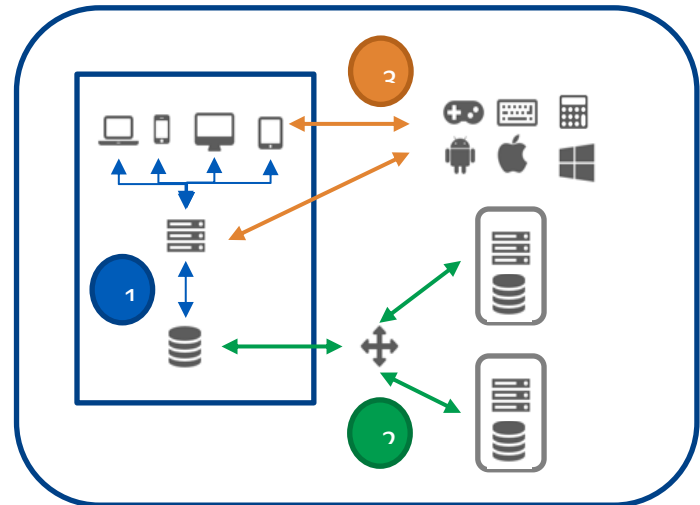


The terms “Integration,” “Interoperability” and “Interfacing” are often used in discussions about procurement and design of Clinical Information Systems (CIS); and how an implemented CIS will work with other health information systems, software and applications.

## Bottom Line: Integration – Interoperability - Interfacing

1. **Integration:**  
Functions united under a common dataset AND codeset.
2. **Interoperability:**  
Standards-based information exchange between discrete systems at the level of datasets (e.g. health information exchange)
3. **Interfacing**  
Information exchange at the level of application or server codeset (e.g., instruments, mobile apps, inputs/outputs, Healthkit, etc.)



It is important that all stakeholders have a clear understanding, from the very beginning, about the degree of integration intended for a CIS and where interoperability and interfacing will be used to fill gaps in function or service. The following terms can help frame conversations about consolidation, applicable to technology, data, processes and measures:

Term	Simple Definition	CIS Definition	CIS Implications
<b>Integrate</b>	<p><i>Integrate</i> refers to the act of uniting separate systems, or replacing them with a new system, such that the result performs all the same functions within a single system and acts as a uniform entity.</p> <p><i>Integration</i> refers to the degree to which a system behaves as if all functions, data and interfaces behave as a cohesive, seamless, entity.</p>	<p>A single seamless CIS performs the same functions previously or otherwise performed by multiple discrete health information systems. Seamless connotes a common code-set interfacing with a common dataset managed by common controls resulting in functional coherence for users.</p>	<p>A fully integrated CIS does not have to have derived from a single software product. It is possible for different components from different development pathways to have been sufficiently integrated that they behave as if working from a common code-set, with unified data management and user interface controls. Integration implies that all parts of the system can reference the same taxonomies, terminologies and</p>

Term	Simple Definition	CIS Definition	CIS Implications
	<p><i>Integrated</i> refers to a system that is or performs as if it is a seamlessly unified whole.</p> <p><i>Synonyms: unify, unite, merge, consolidate.</i></p>		<p>components. An AHS integrated CIS is organized around a single health care record and care plan for each patient using a common application infrastructure based on a common database schema.</p>
<b>Interoperate</b>	<p><i>Interoperate</i> refers to the act of data, function or service exchange between systems such that data and functions retain both meaning and effect without user intervention.</p> <p><i>Interoperability</i> refers to the ability of a system to effectively work with or use the data or functions of another system.</p>	<p>Interoperability describes the extent to which independent software applications interact with a CIS to exchange and interpret data, functions or services. The exchange of information is at the level of granularity and coding sufficient for the receiving system to use all the content for care management, decision support, research quality improvement and analytics.<sup>1</sup></p> <p>At an organizational level, interoperability refers to the ability of health information systems to work together within and across organizational boundaries in order to advance the effective delivery of healthcare for individuals and communities.</p>	<p>For a system to interoperate with an AHS CIS, it must be able to exchange data with the CIS and both systems must be able to present that data, without loss of context or meaning, so that it can be understood by users without any special intervention. Although unique data or service translation schemes may facilitate exchange and interpretation, interoperability is strongest when it is standards based and capable of crossing multiple system-to-system divides. Interoperation presumes systems that can perform their functions independently and only interoperate to facilitate information sharing. A health information exchange (e.g. Netcare) can facilitate.</p>
<b>Interface</b>	<p><i>Interface</i> refers to a part or function of one system that</p>	<p>A CIS interface allows another software system or device to</p>	<p>Medical devices may be optimized for capture of data</p>

<sup>1</sup> *Syntactic interoperability* refers to the ability of two or more systems to exchange data and presumes the existence of commonly understood data formats, communication protocols, encoding and packaging. *Semantic interoperability* additionally requires the ability to transfer data together with meta data such that the meaning, accuracy and providence of the data is understood and used by both systems; presuming a common reference model for interpreting and transposing the data so that it is unambiguously understood and used by both systems.

Term	Simple Definition	CIS Definition	CIS Implications
	<p>allows for exchange of information with another system.</p> <p><i>Interface and Interfacing</i> refer to the ability of one system to complement the functions of another system by consuming or providing information in order to perform or enhance a particular function.</p>	<p>access, and possibly return, information in order to provide a unique user experience, automate information capture or otherwise enhance functionality not already provided by the CIS.</p> <p><i>Interfaced</i> systems or applications may be connected using application program interfaces (API), client-side messaging, middleware, interface brokers, portals and other tools enabling the exchange of transactional information.</p>	<p>that is transferred to the CIS using a standards-based interface. Interfaces can be at the level of data entry or data transformation. The CIS may interface with systems or devices through a middle layer, such as a health data exchange protocol. Apple HealthKit and Google Fit are examples of middle layers allowing multiple applications and devices to share a common data structure applicable to an individual. A CIS capable of interfacing with either could receive personal information from mobile health applications; or possibly publish health data to those applications.</p>

An emphasis on integration during CIS procurement can improve the reliability, sustainability and upgradability of the CIS. On the other hand, an emphasis on interoperability and interfacing can improve the adaptability, flexibility and appeal of a CIS for specific needs, settings and contexts.

A balance is required. That balance may vary for different clinical and operational domains. It may be essential, for example, to have flawless integration of pharmacy, lab and diagnostic imaging functions in order to assure reliable information delivery and prevent errors. It may be more important for clinical documentation functions to support interfaces that allow for a broader range of user input experiences.

Declaring principles guiding integration, interoperation and interface decisions is essential early in CIS design. This will facilitate coherent design and will help manage user expectations. An overall strategy should indicate whether the default approach is integration, interoperation or interfacing.

The AHS Provincial CIS prioritizes integration, such that the majority of needed functionality, and all of mission-critical core functionality, is provided by a seamlessly integrated system. Interoperability will be relied upon for clinically important modules or functions that the CIS does not provide; and to assure standards-based data exchange with the Alberta Netcare Portal. Interfacing will be relied upon, at a minimum, to ensure optimum use of, and contributions to, health care instrumentation and display technologies.