



IIS of the Future: Where Might All This Be Going?

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Context: Environmental Scan

- Long-term IIS market consolidation
- Increasing but unfocused global interest
- Movement away from home-grown systems (with some CDC encouragement)
- Existing IIS products built on aging technologies
- Decoupling of IIS from integrated Agency systems
- Lip service to Open Source but little concrete commitment
- Continuing centralization of IT support along with increasing interest in cloud computing
- Budgets continue to be tight: HITECH ending in 2021 but Congress rumbling about new CDC funding for surveillance systems
- Impact of new leadership at CDC NCIRD IISSB unclear



Context: Broad Assumptions

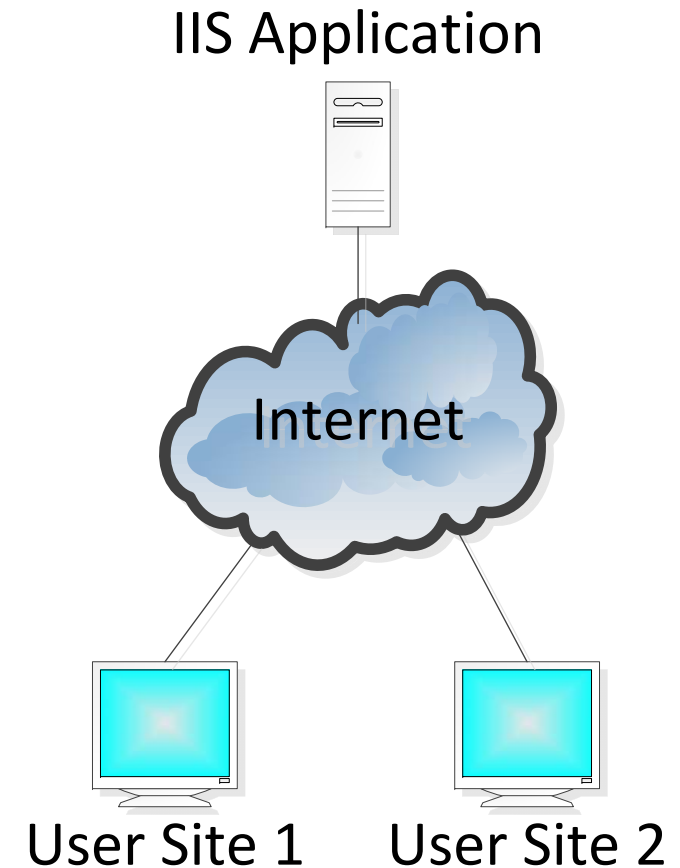
- Limited IIS market will continue consolidation with *possible* loss of one product
- Current vendors struggling to support current technologies and customer base effectively
- No dramatically new sources of IIS funding apparent
- IIS clinical users will continue to migrate away from web interface to their own products and increase reliance on system-to-system interoperability; vaccine ordering will remain as a key *administrative* function
- HHS/ONC initiatives (TEFCA, “hub”) will initially have limited impact on IIS, though the initiative to reduce the admin and regulatory burden to using EHRs and Health IT (21st Century Cures Act) may take on more relevance
- Cloud hosting will continue to gain popularity both to save cost and in some cases bring more independence from central IT
- Full inter-program integrated systems will become a tougher “sell” to central IT and will become harder to maintain.



IIS Models

Traditional Server-based IIS

- IIS web application and associated services run in hosted environment available to users over the Internet.
- Hosted environment may be within the IIS program, jurisdictional data center, or outsourced data center
- Hosting entity manages underlying technology (*e.g.*, network, server(s), operating system, storage) and operations (*e.g.*, backup/restore)
- Jurisdictions may share the same version of commercial software with other jurisdictions or may be using customized implementations





SWOT Analysis: Server-based IIS

Strengths:

- Leverages existing infrastructure.
- Services/applications can easily be isolated from one another for security or other considerations.
- Costs are fixed and easier to predict/budget.
- Servers are easy to control and secure.

Weaknesses:

- Servers are fixed-capacity resources that require periodic capital investment to maintain and expand.
- Highly-skilled staff required 24x7 to operate and secure platforms.
- As needs change the computing environment is often slow to adjust.
- Little opportunity to leverage across programs/systems.
- Outwardly-focused applications put more and more pressure on limited Internet bandwidth.

Threats:

- Industry is moving to cloud-based services more and more.
- This alternative may get more and more expensive to maintain in terms of equipment and skilled labor.

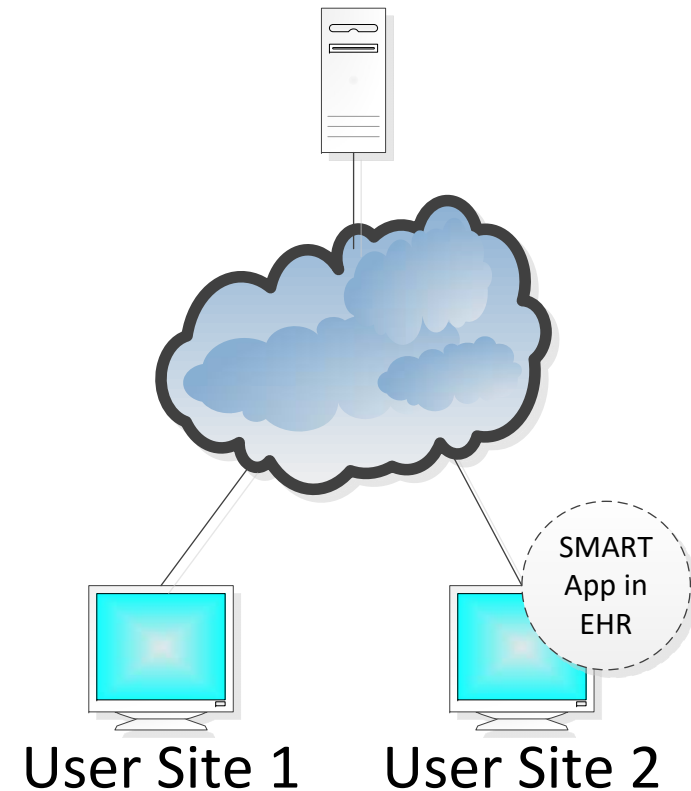
Opportunities:

- Hardware continues to be a commodity item whose price vs performance continues to decline.

Software as a Service (SaaS)

- “Lift and shift” of existing product architectures to the cloud, though some more modern technologies could be used (*e.g.*, SMART)
- Application runs on a cloud platform in a “virtual site” typically accessible through a web browser; no other local requirements
- IIS program does not manage any aspect of the underlying technology (*e.g.*, network, server(s), operating system, storage) or operations (*e.g.*, backup/restore)
- Jurisdictions may share the same version of the software in separated environments with site-specific or may be using customized implementations
- Envision, STC, and DXC all offer this for their IIS products
- STC | One product trying to move clients to standardized version

IIS Application at Vendor Site





SWOT Analysis: Current SaaS IIS

Strengths

- Vendor-supported product which could be shared or forked and customized
- User organization relieved of burden of system operations
- Least costly alternative
- Limited reliance on central IT

Opportunities

- May be only realistic option in the face of shrinking budgets in the long run

Weaknesses

- Perpetuates use of older technologies
- Current system not well documented or in some cases not well understood
- Limited choices for vendor support
- May continue use of expensive commercial RDBMS licenses

Threats

- Economies of scale work best in larger markets
- Does not take into account industry shift to PaaS



New SaaS IIS

- Designed to fully support the IIS Functional Standards and all core requirements captured in CDC and AIRA specifications and documents
- Developed and deployed by a vendor in a public or private cloud environment
- Open source or proprietary license
- Several variations possible



SWOT Analysis: New SaaS IIS

Strengths

- Standardized, vendor-supported product
- User organization relieved of burden of system operations
- Environment can scale as needed
- Limited reliance on central IT
- Shift from capital cost to operating cost

Opportunities

- May be good defense against shrinking budgets in the long run
- Have opportunity to continue to leverage architectural elements that are useful

Weaknesses

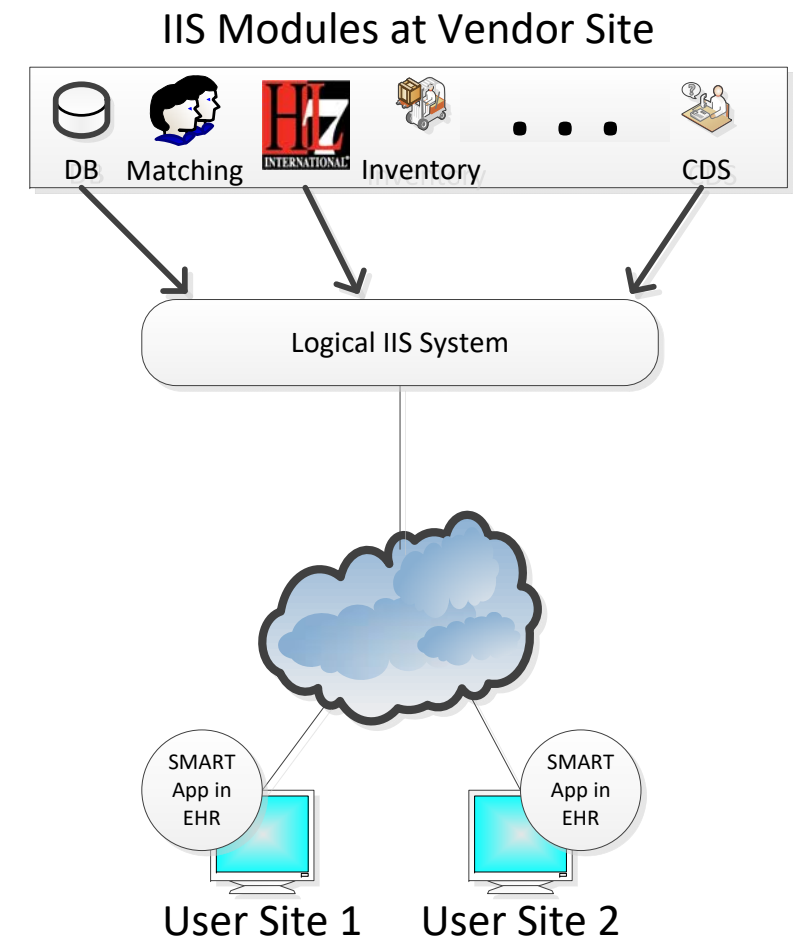
- Less customization typically allowed for each virtual site
- May introduce additional security issues
- May introduce additional policy challenges
- Will likely require significant initial investment

Threats

- Because core underlying technologies are “hidden” from the user (*e.g.*, database, programming languages), older technologies may stay in use beyond their time
- Economies of scale work best in larger markets
- If not open source, license issues may persist

Future: Platform as a Service

- Application runs on a cloud platform in a “virtual site” typically accessible through a web browser; some features may run within local systems
- User organization does not manage any aspect of the underlying technology (*e.g.*, network, server(s), operating system, storage) or operations (*e.g.*, backup/restore)
- Each project assembles modules they desire to use into a functioning “logical system”
- Vendor provides underlying tools and capabilities used by the modules
- APIs are key!





PaaS-based IIS

- Designed to fully support the IIS Functional Standards and all core requirements captured in CDC and AIRA specifications and documents
- Developed and deployed in a public or private cloud environment
- Best of breed modular components designed with clean APIs that allow for them to be replaced without significant effort:
 - Vaccine Evaluation and Forecasting through a standard interface
 - AFIX module and other reminder/recall functionality
 - Data matching/de-duplication capabilities
 - Data Quality tool
 - User interface (UI) for some users, like deployment of SMART on FHIR apps instead of the current IIS web application
 - Vaccine inventory management and ordering
 - CMS Promoting Interoperability (PI) Programs on-boarding, registration, and participation management
 - HL7 integration, with functionality migrating to an interface engine Interoperability with other public health systems within and outside of the agency
 - Though aggressive, database independence



SWOT Analysis: PaaS IIS

Strengths

- Modular, vendor-supported product
- More flexibility for assembling project-specific solutions
- User organization relieved of burden of system operations
- Environment can scale as needed
- Limited reliance on central IT
- Shift from capital cost to operating cost

Opportunities

- May be good defense against shrinking budgets in the long run
- Each site can assemble set of modules that meets their current needs and replace modules when needed
- General trend in application industry

Weaknesses

- May take time for full functionality to be available in modules
- “Some assembly required”: Expertise required to make selected modules work coherently together
- May introduce additional security issues
- May introduce additional policy challenges

Threats

- Economies of scale work best in larger markets
- Need reliable “home” for PaaS offering which may devolve into another proprietary service
- If not open source, license issues may persist



Open Source Success Criteria

- Good candidate for open source community approach
 - Fully open source with no commercial software dependencies
 - Collaboratively developed by an involved community of knowledgeable participants
 - Documented to facilitate replication, deployment, and support
 - Managed by an organization that is accepted by the community, and appropriately skilled and experienced to ensure a unified code base and sensible decisions about functionality and features
 - Funding provided by a community of users and/or one or more “benefactor” organizations



Broader IIS Community Benefits

- While a full conversion of an IIS to a fully-open source solution is not feasible for *everyone*, the project nonetheless can have a positive overall impact on the IIS community by:
 - Providing a software solution for *some*
 - Encouraging vendors to participate in more open, modular software development to everyone's benefit
 - Yielding the development of solid, usable modules (like ICE, SMART Apps, QA Tools) that could be used more broadly and consistently offering more choices for programs based on needs and resources
 - Creating an environment for ongoing experimentation and innovation that will yield products/strategies that can migrate into production use
 - Reducing cost for those agencies willing to accept the products as offered



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