JOHNS HOPKINS
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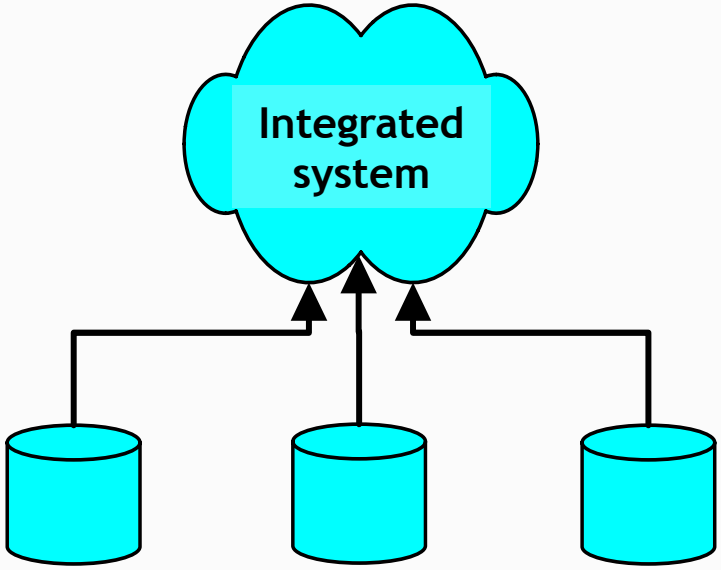
Section B

Systems and Systems Integration

Two Types of Integration

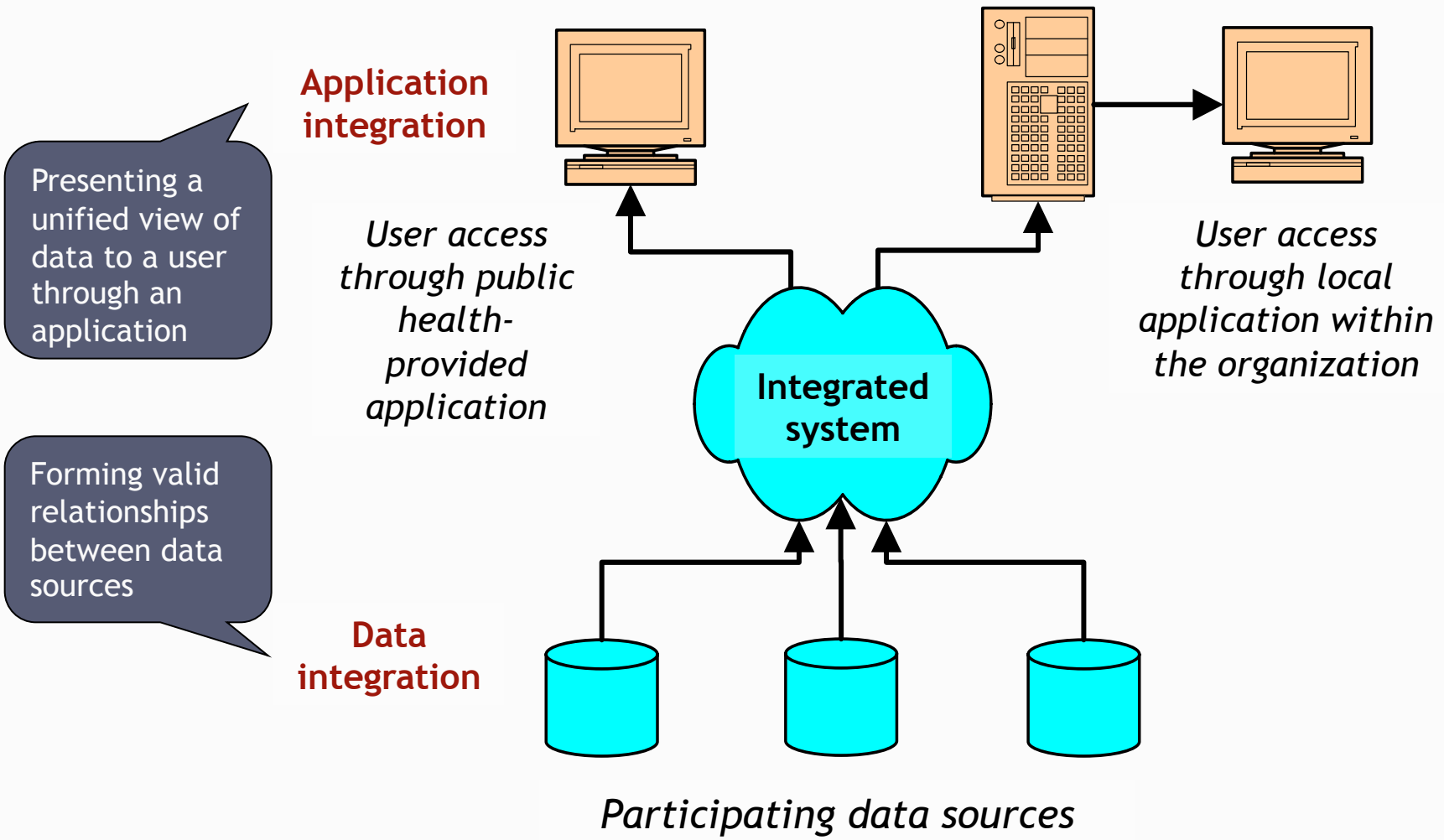
Forming valid relationships between data sources

Data integration

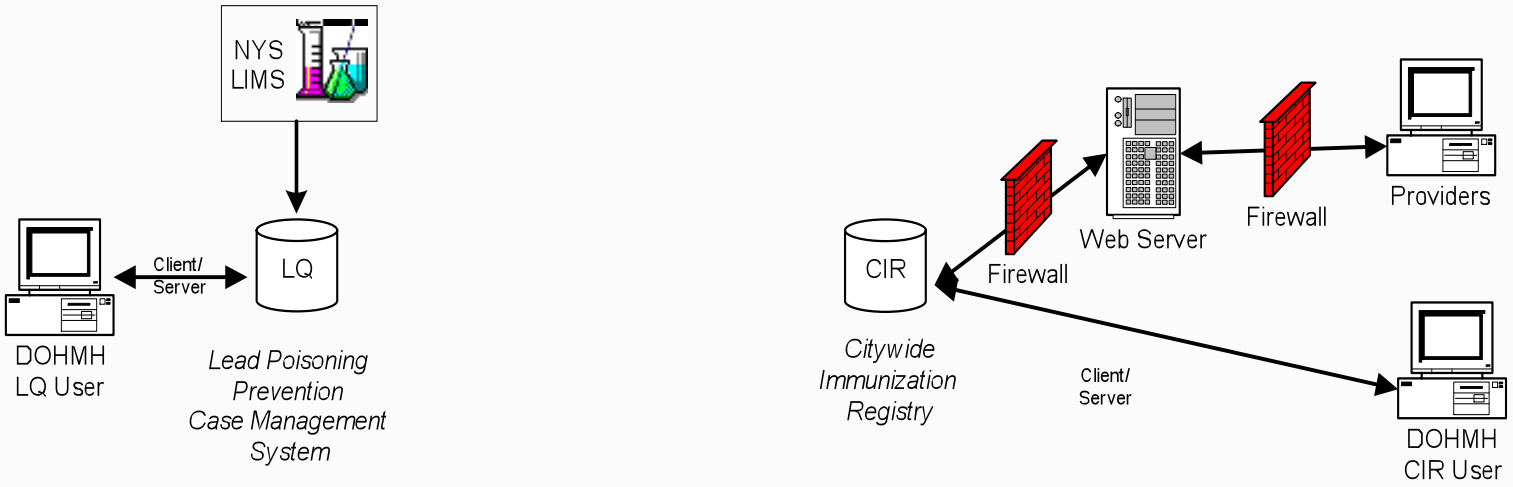


Participating data sources

Two Types of Integration

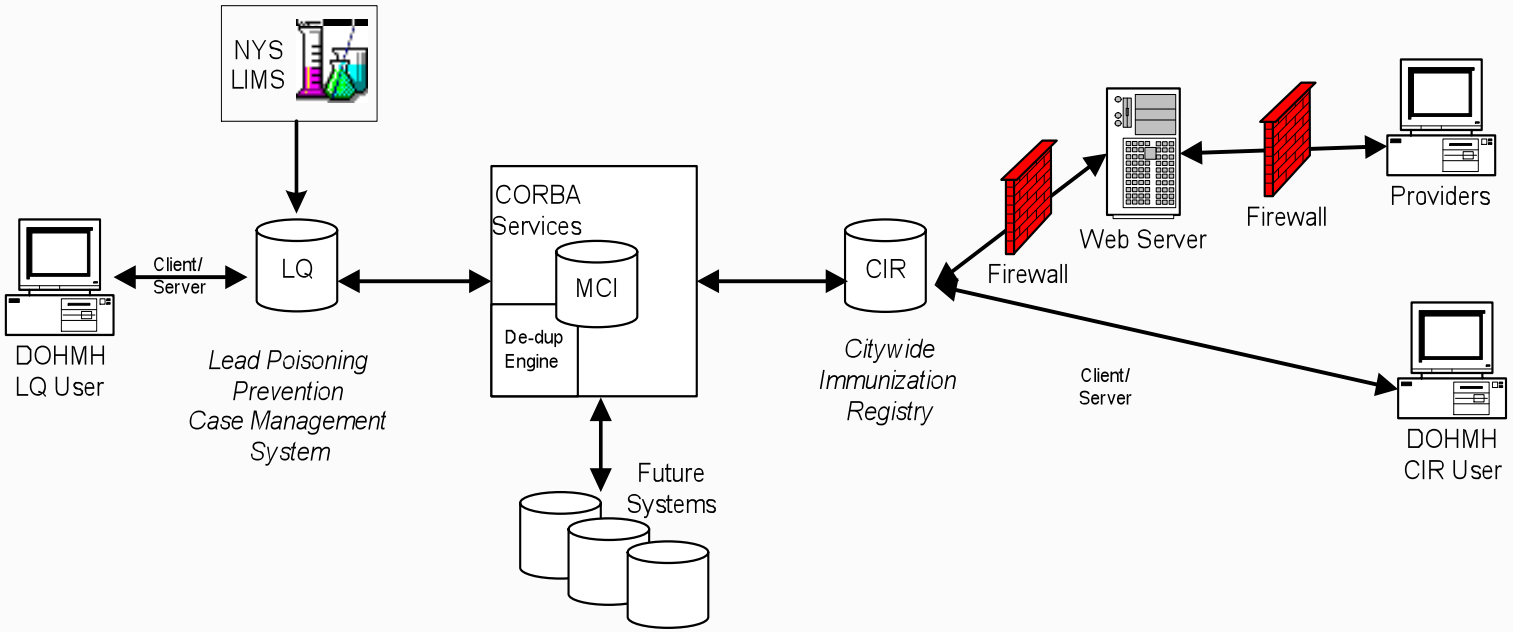


Case Study #1: NYC MCI



- LeadQuest and CIR developed independently
- Integrated by sharing a Master Patient Index
- Other systems may join in the future
- Both data and application integration

Case Study #1: NYC MCI



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Improvement in NYC

Table 1. Matching results of the "initial load" data by system

	Within System CIR	Within System LQ	Between System MCI	Within & Between System CIR, LQ, & MCI
Pre-MCI, *N*	2,426,369	2,184,216	4,086,865	4,610,585
Post-MCI, *N*	2,065,230	2,021,635	2,977,290	2,977,290
Merged, *N*	361,139	162,581	1,109,575	1,633,295
Merged, %	14.9%	7.4%	27.1%	35.4%
Human review, *N*	74,798.0	56,747.0	95,886.0	227,431.0
Human review, *N*	3.1%	2.6%	2.3%	4.9%

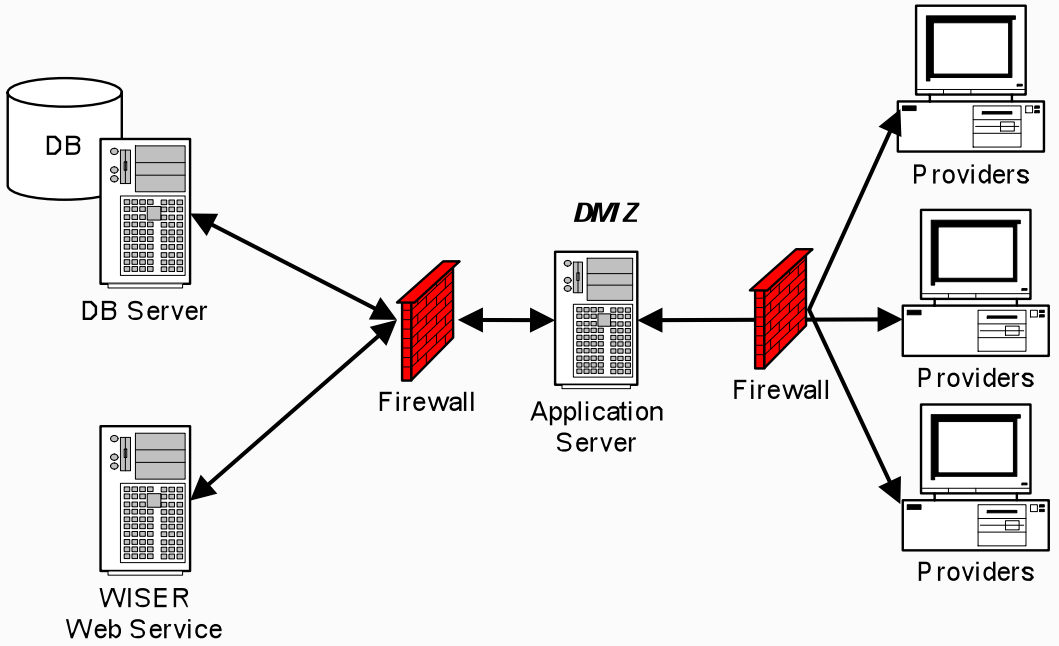
Table 2. LQ records merged with CIR or vital records

Birth cohort	CIR	LQ	Integration merges	LQ records merged with CIR records, %
<1996	851,460	1,235,734	494,595	40.0%
1996	157,818	133,368	105,280	78.9%
1997	159,194	126,373	100,336	79.4%
1998	154,415	124,180	99,236	79.9%
1999	146,339	116,795	94,532	80.9%
2000	150,899	107,048	87,802	82.0%
2001	151,601	95,044	79,979	84.1%
2002	148,015	74,892	63,228	84.4%
2003	142,675	7,985	6,437	80.6%
1996-2003	1,210,956	785,685	636,830	81.1%

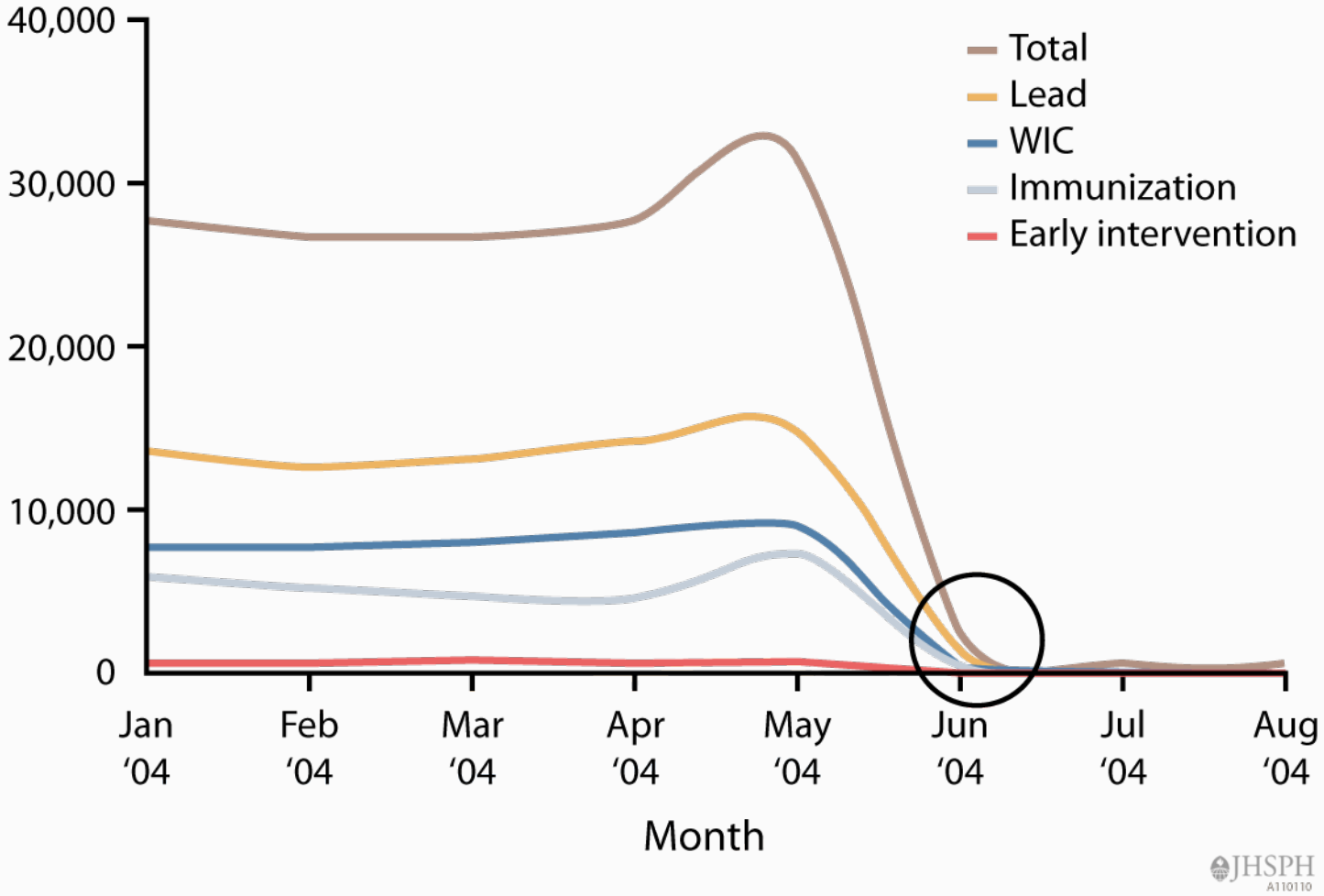
Source: Tables are from Papadouka, Vikki et al, "Integrating the New York Citywide Immunization Registry and the Childhood Blood Lead Registry, Journal of Public Health Management and Practice, November 2004 (Supplement), p. S77.

Case Study #2: RI KIDSNET

- 10+ public health programs share system
- Primary system for some; others submit data
- Unified interface (terminal-based → WWW)
- Replaced simple person matching algorithm



Improvements in RI



Adapted by CTLT from Rhode Island Department of Health, http://cdc.confex.com/cdc/irc2004/techprogram/paper_5997.htm.

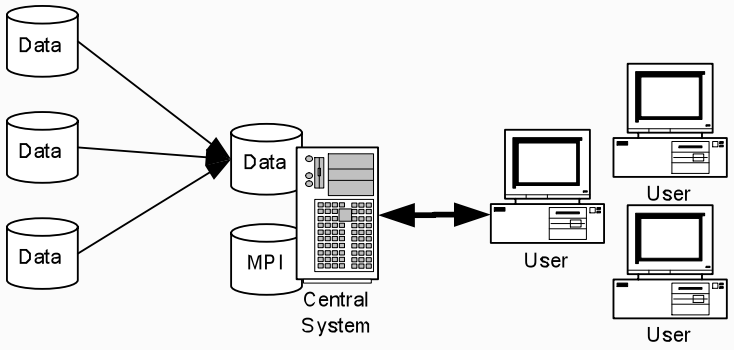
Enterprise-Wide Integration in Public Health

- Three models:
  1. Centralized (RI, MO)
  2. Cooperative (NYC, UT)
  3. Distributed (de facto for most)

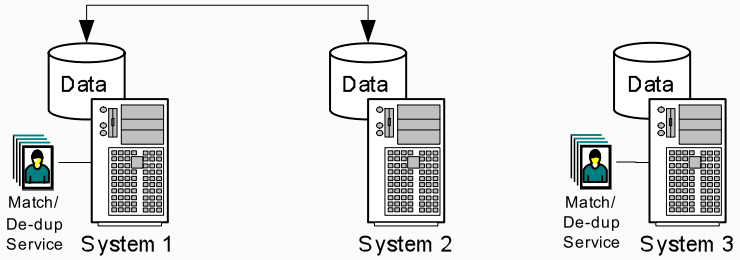
- Can be implemented agency-wide or on a sub-organizational level

- Success will vary by organizational, technical, and process attributes

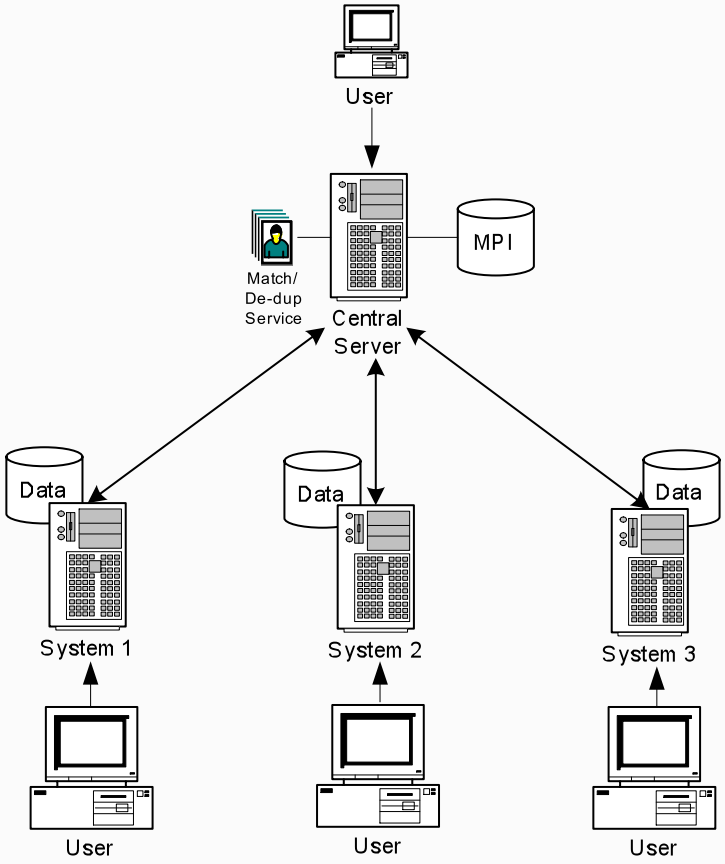
Models of Enterprise-Wide Integration



Centralized model



Distributed model



Cooperative model

Model Comparison: System Features

Factor	Centralized/ Warehouse	Cooperative	Distributed
Use of MPI	Strong; COTS or custom-developed	Not mandated but may be present	Not usually a strong feature
Record de-duplication strategy	Embedded in MPI and its services	Embedded in MPI and its services or offered separately	At best offered in individual participating systems
Security	Easier to maintain given centralization of services	More challenging given loosely coupled nature, > interfaces	In the hands of the individual system managers
System acquisition style	COTS or custom-developed	Interfaces tend to be custom-developed	Interfaces tend to be custom-developed
Support for analysis	Centralized, planned	Mixed, but agency-wide coordination	Little central coordination

Model Comparison: Organizational Factors

Factor	Centralized/ Warehouse	Cooperative	Distributed
Political sponsorship	Strong	Conceptual support Less commitment	Passive at best
IT leadership	Strong CIO and mandate	Strong CIO but less mandate over apps	Central IT primarily concerned with infrastructure
IT staff	Strong centralized staff	Centralized and distributed staff	Centralized staff primarily concerned with infrastructure
Formal PMO	Essential	Formal method-ology essential; PMO less so	PMO has little authority if there at all
Strategy	Centralized, planned	Mixed, but agency-wide coordination	Little central coordination
Data sharing laws and privacy	Must support data consolidation	Must support selective consol-idation at least	Model can tolerate less permissive laws

Model Comparison: Process-Related Attributes

Factor	Centralized/ Warehouse	Cooperative	Distributed
Service delivery	More centralized delivery model	Either centralized or distributed	More distributed delivery model
Technical standards enforcement	Easier, as more effort is central	Moderate, as compliance enables interoperability	Harder, as systems are largely stand-alone
System requirements	More stable and clear	Moderately stable and clear	Less stable and often unclear
System development coordination	Very coordinated	More independent but can be coordinated	Largely independent and uncoordinated
Technical Innovation	Less interested	Moderately interested	Not very interested

Model Comparison: Process-Related Attributes

Factor	Centralized/ Warehouse	Cooperative	Distributed
Technical risk	Fairly high, but so is potential gain	Moderate	Fairly low, but so are potential gains
Deployment timetable	Incremental, but requires critical mass to activate	Incremental, but coordinated	Incremental, little coordination
System deployment style	Tightly-coupled	Loosely coupled	Uncoupled; usually replicated services
Cost	Higher up-front, though overall cost may be lower; software license cost may benefit from centralized approach	Moderate up-front cost, though overall cost usually higher	Cost widely distributed so difficult to track and understand; software costs can be higher though coordinated purchasing can help

Key Challenges

- Central model: security, privacy, and ownership concerns
- Distributed model: technical readiness and data use limitations