

# The CDI Institute

## **Customer Data Integration:**

Market Review & Forecast for 2005-2006

A CDI Institute MarketPulse™ In-Depth Report

December 2004

*Corporate master data is a critical asset that must be increasingly managed within and beyond the enterprise - primarily to solve business problems in customer service, sales, and marketing. Master information may be integrated at multiple levels of the software technology stack to materialize a "single customer view" (the same is true for supplier, product, and physician information).*

*Customer data integration (CDI) solutions will vary by industry in terms of tactical approaches taken - e.g., pharmaceutical/life sciences will adopt semi-batch, database-centric approaches for master physician data to be deployed to sales forces, while financial services providers and online retailers will require near real-time, business process-centric solutions to compete in the business-to-consumer online world.*

*During 2005-06, most large enterprises will focus on CDI by deploying a 2<sup>nd</sup>-generation database-centric CDI infrastructure to deliver a cost effective and future-proofed panoramic customer view across multiple channels, business lines, and heterogeneous IT environments.*

*By 2006-07, the majority of Global 2000 size businesses will benefit from business services-centric CDI infrastructure to deliver increasingly accurate, complex, and just-in-time 360° customer views.*

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## Executive Summary

In an August 2004 online survey by CIO Insight magazine, over 77% of the respondents (144 CIOs, CTOs, and VPs of IT from enterprises with more than 1,000 employees) identified "providing a 360 degree view of the customer" as the single most important potential benefit of their enterprise customer relationship management (CRM) application deployment. The report further stated that, "Despite the difficulty of achieving this goal, 64% of the survey respondents who deployed CRM say their system actually gave them a single, comprehensive view of their customers". Furthermore, 59% stated "data integration issues led to CRM project delays and cost overruns".

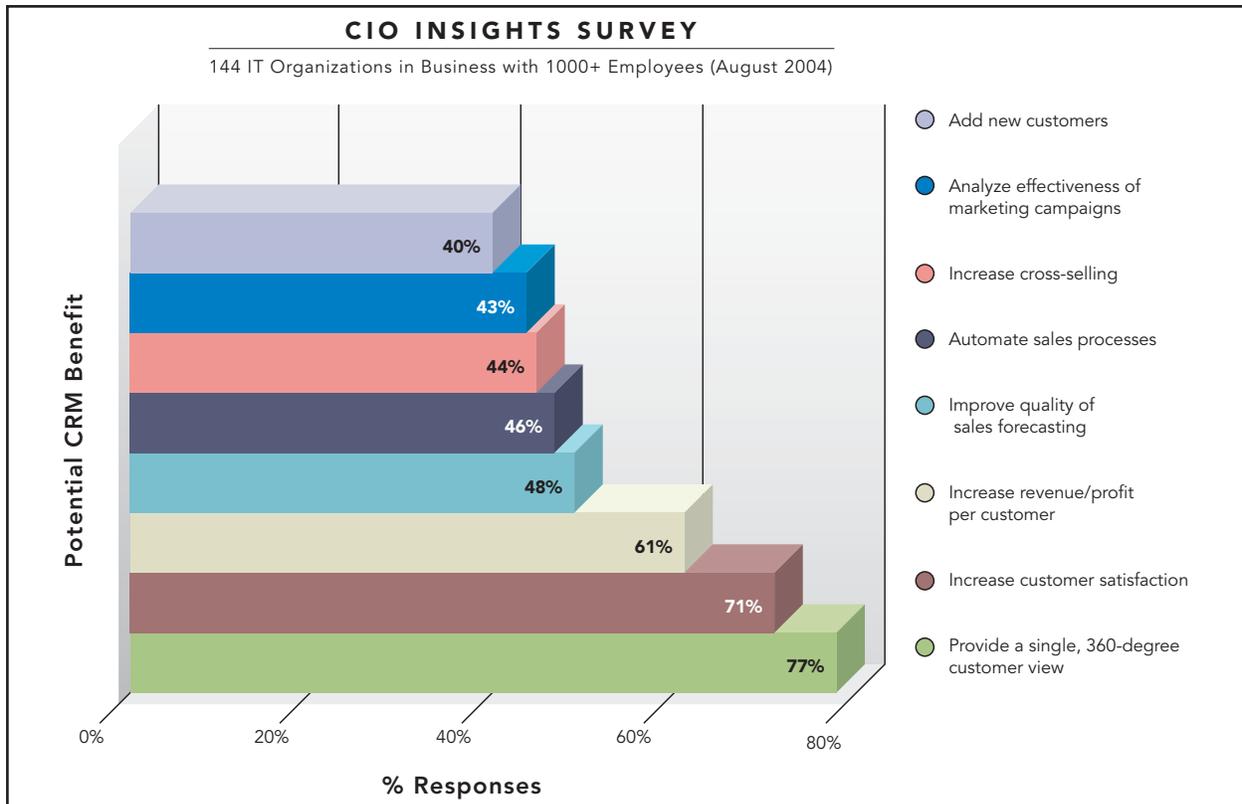


Figure 1 - Potential CRM Benefits (Source: CIO Insights, August 2004)

Additionally, in a survey conducted by D&B in July 2003, the question was asked "What is your biggest challenge in establishing a clean customer master?" The audience validated the notion of a single customer view in stating their prioritized problem areas for customer master data as:

- 44% - Aggregating multiple files from legacy and/or disparate systems
- 32% - Missing or incomplete information
- 14% - Identifying duplicate records (i.e., multiple customer views)
- 8% - Standardizing customer name and address information

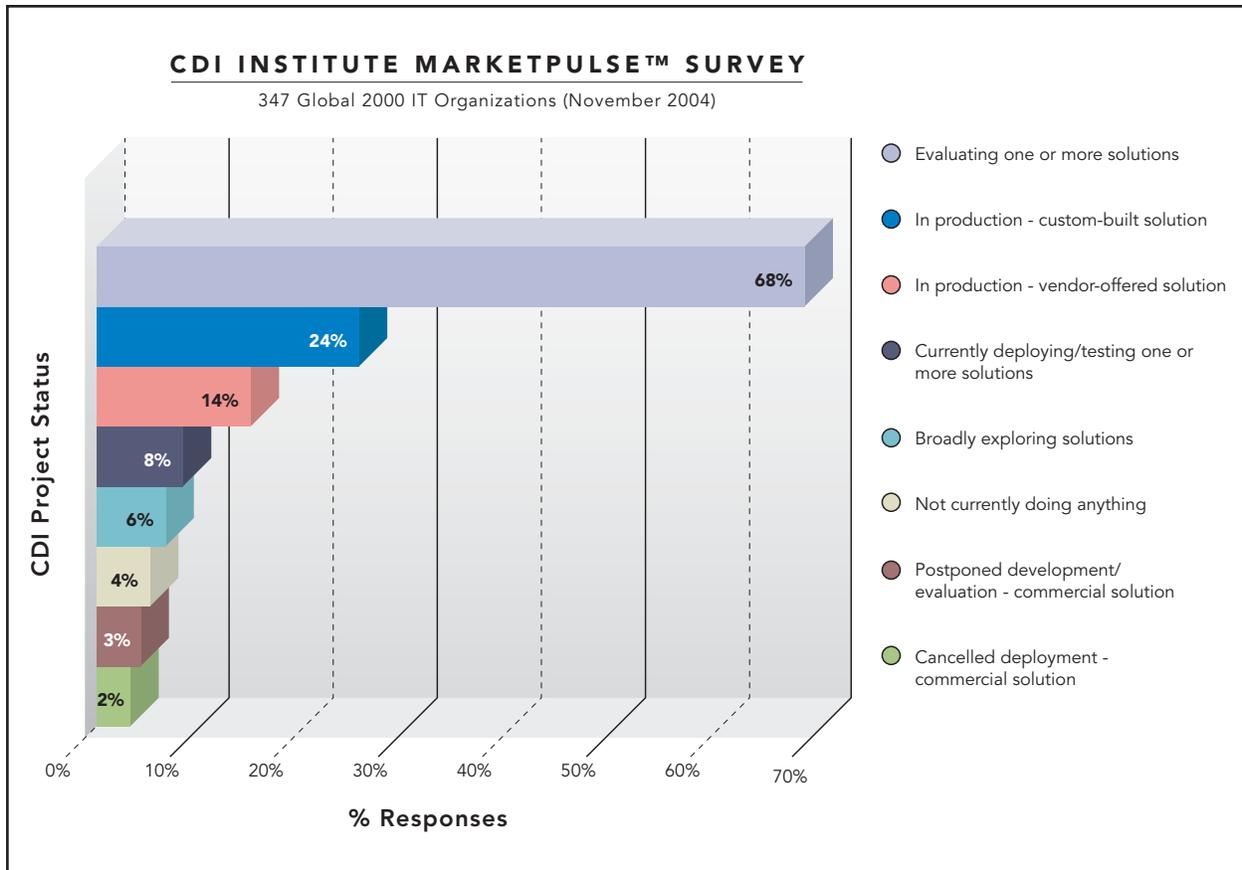


Figure 2 - Status of CDI Projects within Global 2000 Enterprises (Source: CDI Institute, November 2004)

The Fall 2004 CDI Institute MarketPulse™ Survey was conducted from August 1 to November 15, 2004. Three hundred forty-seven IT and business professionals from around the world (primarily Global 2000 IT organizations) participated in the survey through a series of e-mail and teleconference survey sessions. Survey participants were recruited directly from both the CDI Institute's Advisory Council and the CDI Institute's Business Council.

It is vital to note that over two thirds of the Global 2000 (68%) are actively evaluating one or more CDI solutions at this time. Such enterprise-wide IT infrastructure initiatives represent major revamping of the business strategy to become more customer-centric via a "universal customer view" to provide accurate aggregated customer information just-in-time to provide seamless end-to-end customer-facing business processes.

Enterprise CDI is critical because it impacts the ability of companies to generate revenue, reduce costs, and increase quality of service. Global 2000 enterprise IT organizations are looking into CDI trends to preview what will be beneficial for their organizations.

Recent trends include: the movement away from homegrown CDI solutions towards off-the-shelf CDI solutions; the importance of centralized privacy policy management as a business justification; and the importance of customer data models, business services, and identity management as technical evaluation criteria. This survey touched upon those trends, and included specific questions such as:

- Which CDI architectural models are you considering?
- How much do you expect to spend on CDI in the next 12 months?

- What are the business trends that drive CDI investment justification?
- Does your company have plans to migrate away from home-grown CDI solutions?
- Which technical evaluation criteria are most important to your CDI strategy?

Of the 347 IT and business professionals from around the world who participated in the survey, over 87% work at large companies with revenues in excess of US\$2 billion per year. As in other IT sectors, early adopters of CDI technology include: financial services providers (banks, insurance), telecommunications, pharmaceutical/life sciences, high-technology manufacturing, and government (military, intelligence).

- Over 68% of respondents indicated that their businesses have plans to evaluate one or more commercial CDI solutions in the next 12 months.
- The typical Global 2000 enterprise expects to spend in excess of \$1.2 million on CDI solutions in the next 12 months.
- More than 95 percent of Global 2000 size financial services and life sciences enterprises are actively looking to replace homegrown CDI solutions.
- Many IT professionals are clearly looking to CDI as a long-term and large-scale IT initiative to provide 'career longevity insurance' given that such enterprise-scale infrastructure is not amenable to offshore outsourcing.
- More than 75% of IT professionals surveyed by the CDI Institute are actively considering purchases "outside the family" to facilitate connectivity between customer-facing applications and processes despite the enterprises' infrastructure initiatives being captive to technology platforms of strategic IT partners such as Oracle, PeopleSoft, SAP and Siebel.
- Correspondingly, "Type A" IT organizations see 3<sup>rd</sup> generation CDI hubs that utilize web service standard interfaces as insulation for the enterprise's master data and business processes via a layer of granular business services (i.e., Add Customer, Promote Customer, Retire Customer).
- "Ability to centrally manage privacy policies" (92%) was perceived to be the greatest benefit of an enterprise CDI solution, followed closely by "competitive advantage" (92%), and "increased customer satisfaction via end-to-end business processes" (83%).
- The perceived three top technical challenges are: "develop enterprise-wide customer data model" (92%), "manage via federated strategy allowing business unit autonomy" (90%), and "ensure consistent identity management while meeting privacy rules/regulations" (85%).
- Well over half (62%) of the organizations preferred the "hybrid/composite hub" model over "persistent/data hub" (27%) or "registry/process hub" (5%) architectural models.
- The top three technical evaluation criteria were: "customer data model" (98%), "business services layer" (85%), and "customer identity management" (82%).
- The top five CDI solutions being implemented are: DWL Customer™, Initiate Identity Hub™, Oracle Customer Data Hub, Siebel Universal Customer Master, and Siperian Master Reference Manager.

## What is CDI?

Corporate master data is a critical asset that must be increasingly managed within and beyond the enterprise - primarily to solve business problems in customer service, sales, and marketing. Master information may be integrated at multiple levels of the software technology stack to materialize a "single customer view" (the same is true for supplier, product and physician information).

Customer data integration (CDI) solutions will vary by industry in terms of tactical approaches taken - e.g., pharmaceutical/life sciences will adopt semi-batch, database-centric approaches for master physician data to be deployed to sales forces, while financial services providers and online retailers will require near real-time, business process-centric solutions to compete in the business-to-consumer online world.

During 2005-06, most large enterprises will focus on CDI by deploying and evolving a 2<sup>nd</sup>-generation database-centric CDI infrastructure to deliver a cost effective and future-proofed panoramic customer view across multiple channels, business lines, and heterogeneous IT environments.

By 2006-07, the majority of Global 2000 size businesses will benefit from business services-centric CDI infrastructure to deliver increasingly accurate, complex, and up-to-date 360 degree customer views.

The customer data integration (CDI) market is comprised of process and technology solutions for recognizing a customer at any touch-point - while aggregating accurate, up-to-date knowledge about that customer and delivering it in an actionable form 'just in time' to touch-points. Such CDI technology frameworks are based on a service-oriented architecture (SOA) to provide enterprise-wide infrastructure for managing and harmonizing master "customer data" such as: customers, products, suppliers, and employees. However, CDI is much more than a combination of discrete technologies such as: batch-centric master file systems, data warehouse, enterprise application integration (EAI) middleware, metadata management, OLTP, and rules engines. While there are multiple implementation styles of CDI solutions, one of the most compelling is the **enterprise customer hub** that serves as a central master repository of customer information reconciled from multiple data sources - both internal and external.

## Overview of the CDI Institute's MarketPulse™ Survey

The CDI Institute was founded in early 2004 as a research advisory cooperative. The business model focuses on providing free CDI consultation services to IT organizations of Global 2000 size enterprises in return for participation in market research surveys. In turn, this CDI market trend data and analysis is repurposed and provided to paying vendor clients of the CDI Institute. In summary, the business rationale for the CDI Institute is to:

- Assist IT organization clients be more efficient, effective, and timely in their use of customer data integration (CDI) technologies to achieve their customer-centric business goals
- Provide forward-looking insight for CDI vendors into the key drivers of market demand, product definition, vendor differentiation, and the factors that impact successful implementation

To provide feedback on clients' CDI initiatives there are two levels of sponsorship for IT organizations: (1) free membership (by invitation) in the CDI Advisory Council™ providing unlimited CDI consultation by phone, and (2) free membership in the CDI Business Council™ (survey base) which provides bi-weekly updates on key CDI trends and issues via an email newsletter. In summary, the deliverables made available to IT organizations include:

- **CDI Advisory Council™** of fifty organizations who receive unlimited CDI advice to key individuals, e.g. CTOs, CIOs, and CDI project leads.
- **CDI Business Council™** of 250+ Global 2000 IT organizations who receive a limited distribution, bi-weekly newsletter with CDI industry updates.
- **CDI Alert™** bi-weekly newsletter provides IT organizations, CDI vendors, and investors hard-hitting insights into best practices as well as market observations derived from interactions with the CDI Advisory Council™ and the CDI Business Council™. Initially free to qualified individuals, the CDI Alert™ is expected to become a fee-based product mid-2005. The intended audience includes: CDI project managers, CIOs, CTOs, chief customer officers, chief privacy officers, data quality managers, data stewards, market analysts, metadata managers, and project teams responsible for CDI solutions and infrastructure, data quality, data warehousing, customer relationship management (CRM), enterprise resource planning (ERP), product data management (PDM), supply chain management (SCM), partner relationship management (PRM), and business intelligence.
- **CDI MarketPulse™** monthly survey results, e.g. budgets, success/failure rates, mindshare based on ongoing surveys of the CDI Advisory Council™ and the CDI Business Council™.
- **CDI Fast Track™** quarterly 1-day workshop - fee-based™ and rotating through the major North American metropolitan areas.

As part of its business model, the CDI Institute monitors the mindshare and marketshare of key dimensions of the market via a series of ongoing industry-specific surveys (MarketPulse™) targeted at IT budget decision makers. In fall 2004, the CDI Institute undertook a semi-annual update of the combined membership of its CDI Advisory Council™ and CDI Business Council™ to assess the rate of uptake on certain aspects of the CDI solutions marketplace. The sample size was approximately 350 enterprises, with 1,000+ employees who had either begun an enterprise CDI project during 2004 or were in the midst of updating their enterprise CDI infrastructure during the year. These organizations were overwhelmingly centered in North America, and therefore this survey cannot be extrapolated to Europe, the Middle East, and Africa (EMEA) nor Asia-Pacific (AP).

The email-based MarketPulse™ survey is used on a regular basis to capture demand-side data regarding the CDI software and related investments of the CDI Institute customer base. At the highest level, the survey objectives include:

- Confirm that CDI is one of the hottest research topics that Global 2000 enterprises will struggle with during 2005-06
- Focus on user-supplied data ("demand side") rather than CDI vendor-supplied data ("supply side")
- Provide forward-looking insight, tactical advice and best practices for users and vendors into key drivers of market demand, product definition, vendor differentiation, and factors that impact successful CDI implementations

Other industry surveys published in the second half of 2004 validated that CDI is a major topic for IT organizations for 2005-06. For example, CIO Insights magazine undertook an online survey of 144 IT organizations with 1,000+ employees to determine what the market believed to be "CRM Potential Benefits". A resounding 77% of the CRM project-savvy audience reported that "a single 360 degree customer view" was their highest rated benefit.

## Why CDI?

Multiple market forces are driving the emergence of a standalone market for CDI solutions. Industry-leading enterprises must be able to react intelligently and instantly to changing customer information. Contemporary CDI infrastructure currently ranges from semi-batch operational data stores (ODSs or active data warehouses) to near real-time rules engines. However, current IT infrastructure cannot cope with the wide spectrum of dynamic master data requirements across the enterprise as most current solutions were designed to manage low-velocity customer data in a single mode - either batch or online - and are not flexible enough to economically add new channels and sources of customer information.

Key trends noted by the CDI Institute in dealings with its Global 2000 client base include:

- Competition is escalating the focus on customer-centricity and consistent end-to-end business processes across organizational units, contact points and business partners
- Many firms belatedly utilize homegrown CDI solutions to modestly synchronize and integrate customer data across business lines and departments; yet Global 2000 IT organizations are severely challenged with implementing enterprise CDI, and often do not have the stamina to respond to rapidly changing customer and market requirements
- Businesses should focus on improving the integration among customer-facing processes, unifying the corporate response to the customer event (through the use of both structured and unstructured data); this will generally require a fundamental change in the way customer information is handled within the enterprise
- Loose integration between front office and back office application subsystems often exists, reducing organizational ability to move towards customer centricity
- Although many organizations have improved end-to-end business processes through enterprise resource planning (ERP), customer relationship management (CRM), and supply chain management (SCM) implementations, the challenge of developing a single view of the customer (product or supplier) has not been fully addressed by the application suite vendors
- Too many management efforts remain suboptimal, due to the lack of just-in-time customer analytical information; nevertheless, the imperative to drive costs down by increased efficiency demands standardized business services, IT systems consolidation and reduced process duplication concerning customer data
- The heterogeneous nature of large-scale enterprises dictates the provisioning of IT solutions from a broad range of providers. In addition to such broad requirements being painfully beyond the functional scope of a single IT vendor, the "information supply chain" that increasingly constitutes or dramatically supplements the "product" of the corporation requires end-to-end processes that transcend internal organizational (and application package) boundaries. Moreover, a lifecycle-based approach to managing master customer information is needed to support enterprise-wide identification, matching and distribution of customer information across an increasing number and variety of data sources. Clearly, the synchronization and delivery of a single customer view to the diverse corporate stakeholders is a strategic investment.

## Validation of Standalone Market for CDI Solutions

Based on the 3Q2004 survey of the CDI Advisory Council™, over fifty North American businesses have placed CDI on their short list for strategic technology acquisition during 2004-05 with an average planned investment of \$1.2 million. Additionally, the overall CDI software market grew 135 percent from 2003 to 2004 from \$85 million to almost \$220 million. This growth demonstrates the increasing importance of customer data integration as a catalyst for realizing return on investment (ROI) for large enterprises' multi-million dollar customer relationship management (CRM) installations such as Siebel Systems.

Note that the CDI software market is just breaking out of its "early adopter" phase. The CDI Institute's Advisory Council™ members recently discussed their early adopter CDI experiences in a public workshop held in San Francisco as part of Digital Consulting International's CRM Summit during the week of August 30, 2004. As members of the CDI Institute's Advisory Council™, IT executives such as chief technology officers and chief customer officers gain access to research materials, and industry-specific consulting to help ensure the success and ROI of their customer information management initiatives. One of the consensus points is that the CDI market is in the same stage now, as was the data warehouse market 7-8 years ago. At that time, the vast majority of analytical processing was managed by service bureaus offsite. Over the past 10 years, the sea change that swept over the multi-billion dollar "data service provider" market was that businesses could apply data warehouses to these same business problems (as business intelligence software improved and prices fell) such that they moved these applications on site and reduced their spending on external "marketing" services. Today, these same service bureaus account for multi-billions of dollars of "data aggregation" and "customer recognition" investments. Our clients tell us that these large expenditures are being scrutinized as overlapping with internal IT fundamental initiatives and appropriate for "in sourcing" consideration. Additionally, many organizations are increasingly reticent to permit master customer data out of their control for fear of consumer and governmental backlash (and related major public relations fiascos).

The CDI market is comprised of process and technology solutions for recognizing a customer at any touch-point - while aggregating accurate, up-to-date knowledge about that customer and delivering it in an actionable form 'just in time' to touch-points. Both IT vendors and executive IT management at Global 2000 enterprises need guidance in this fast paced, high stakes market which is the convergence of multiple overlapping middleware markets - e.g., customer recognition, data quality, real-time analytics, data warehouse, business process management (BPM), and enterprise application integration (EAI), etc. CDI is a critical technical infrastructure as well as competitive differentiator for the world's largest software vendors including Oracle, SAP, Siebel. A flurry of start-ups such as DWL and Siperian, as well as systems integrators like Accenture and IBM Global Services and established vendors including Acxiom, Experian and ISI are all chasing this market. Early IT adopters in financial services, pharmaceutical, telecommunications, and high-tech manufacturing are leading the way.

While most enterprises have infrastructure initiatives based on the technology platforms of strategic IT partners such as Oracle, PeopleSoft, SAP and Siebel, more than 75 percent of the IT professionals surveyed by the CDI Institute are actively considering purchases "outside the family" to facilitate connectivity between customer-facing applications and processes.

CDI strategies systematize a 360 degree view of the customer by aggregating and analyzing multiple sources of master customer information into a system of record. Such CDI solutions represent the holy grail of CRM products such as Siebel and SAP as they enable a single version of the truth across the enterprise's customer-facing processes.

It is now possible for IT organizations to 'buy' rather than 'build' such infrastructure with more than 95 percent of Global 2000 size financial services and life sciences enterprises actively looking to replace homegrown CDI solutions. Furthermore, many IT professionals are clearly looking to such long-term and large-scale IT initiatives as 'career longevity insurance' given that such enterprise-scale infrastructure is not amenable to offshore outsourcing.

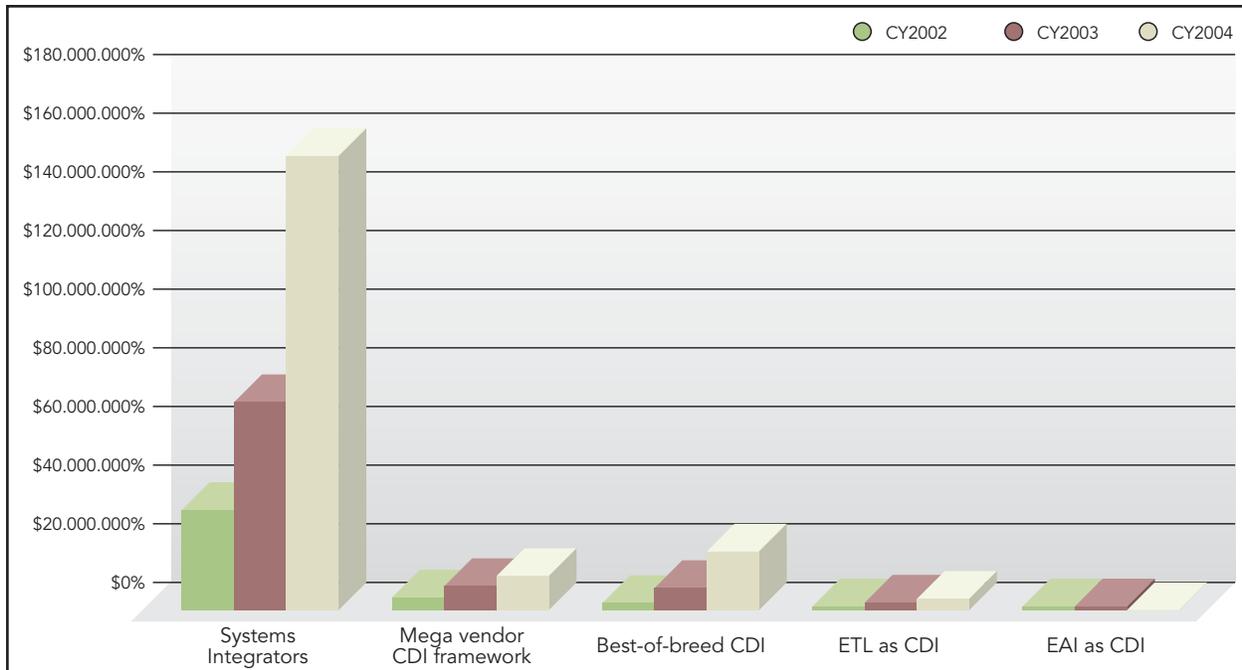


Figure 3 -CDI Vendor Revenues 2002-04(Source: CDI Institute, November 2004)

New CDI product introductions (or major re-launches) during 2004 included Initiate Systems' Identity Hub™ (March 2004), and Oracle Corporations' Customer Data Hub (January 2004) through which these vendors will seek to overtake market leaders DWL, Siebel Systems, and Siperian. In August 2004, SAP also acquired significant CDI technologies via its purchase of the Israeli firm A2i to bolster its own SAP Master Data Management solution for global data synchronization.

Just as the data warehouse software market cannibalized the revenues of database marketing service bureaus, so will CDI software solutions cannibalize the external service provider (ESP) revenues of the likes of Acxiom, Experian, and Harte-Hanks. Currently, more than \$2 billion dollars are annually spent on these data service providers who host "off premises" data aggregation and customer identity management for the Global 2000 size enterprises. During 2005-06, the majority of the Global 2000 businesses are looking to internally host CDI capabilities to increase quality of customer service (and avoid risk of data privacy violations against data not inside the corporate firewall) as well as drive down costs associated with customer data management. Clearly, the billions of dollars in ESP revenue tied to CDI is destined to increasingly move to the CDI software vendors.

Meanwhile, IT spending on CDI solutions (this includes only 2<sup>nd</sup> and 3<sup>rd</sup> generation hub solutions) increased more than 135 percent from 2003 to 2004 with systems integrators being the primary beneficiaries of CDI implementation fees increasing from \$66 million in 2003 to \$155 million in 2004 (see figure 3). Additionally, mega application vendors (Oracle, SAP, Siebel) saw their CDI software revenues grow 35 percent from \$8 million in 2003 to more than \$11.5 million in 2004. Best-of-breed CDI vendors (DWL, Initiate Systems, Siperian) also increased their CDI software license revenues 175% -- from \$7.5 million to \$20.5 million during 2003-04. While these revenue numbers may seem small in comparison to the overall tens of billions in revenues represented by Oracle, SAP and Siebel, it is vital to note that each of these mega vendors has singled out CDI as one of their top five initiatives for 2004-05 (i.e. growth opportunities).

As a further data point, according to analyst firm, Gartner Group, the market for application integration and middleware - including CDI solutions - was \$4.6 billion in 2002 growing to \$8.825 billion in 2006. This figure includes revenues from systems integration providers (ESPs or external service providers as defined by Garter) as well as the database marketing services (MSPs or marketing service providers as defined by Gartner).

## Business Drivers

Numerous market-leading businesses are frustrated with their current CDI processes and are turning to off-the-shelf solutions to assist in dealing with these overarching business trends:

- Increased competition
- Frequent regulation and de-regulation cycles
- Shorter economic cycles
- Ongoing globalization
- Ever increasing customer expectations in quality of service experience

At a more granular level, business unit managers involved in the CDI solution decision-making processes state another set of business needs as fundamental to their CDI initiatives:

- Centrally manage privacy policies
- Achieve competitive advantage via customer behavior insight and predictive modeling
- Forecast and increase customer retention
- Identify and reduce customer fraud
- Realize more accurate marketing campaigns, better service, and more productive sales interactions across business lines(upsell/cross-sell)
- Increase the quality of service/sales/marketing via 360° view of customer to support end-to-end, seamless business processes for call centers, ATM processing, etc.
- Integrate customer & product master databases resulting from M&A
- Provide compliance and transparency for C-level executives concerning 360° product view, financial exposure, risk management, customer census; identify which customers put financial reporting at risk (Sarbanes-Oxley mandate)
- Reduce the IT and business cost of manual customer data management
- Evolve to near "real-time" (just-in-time) enterprise to better compete via new product introduction

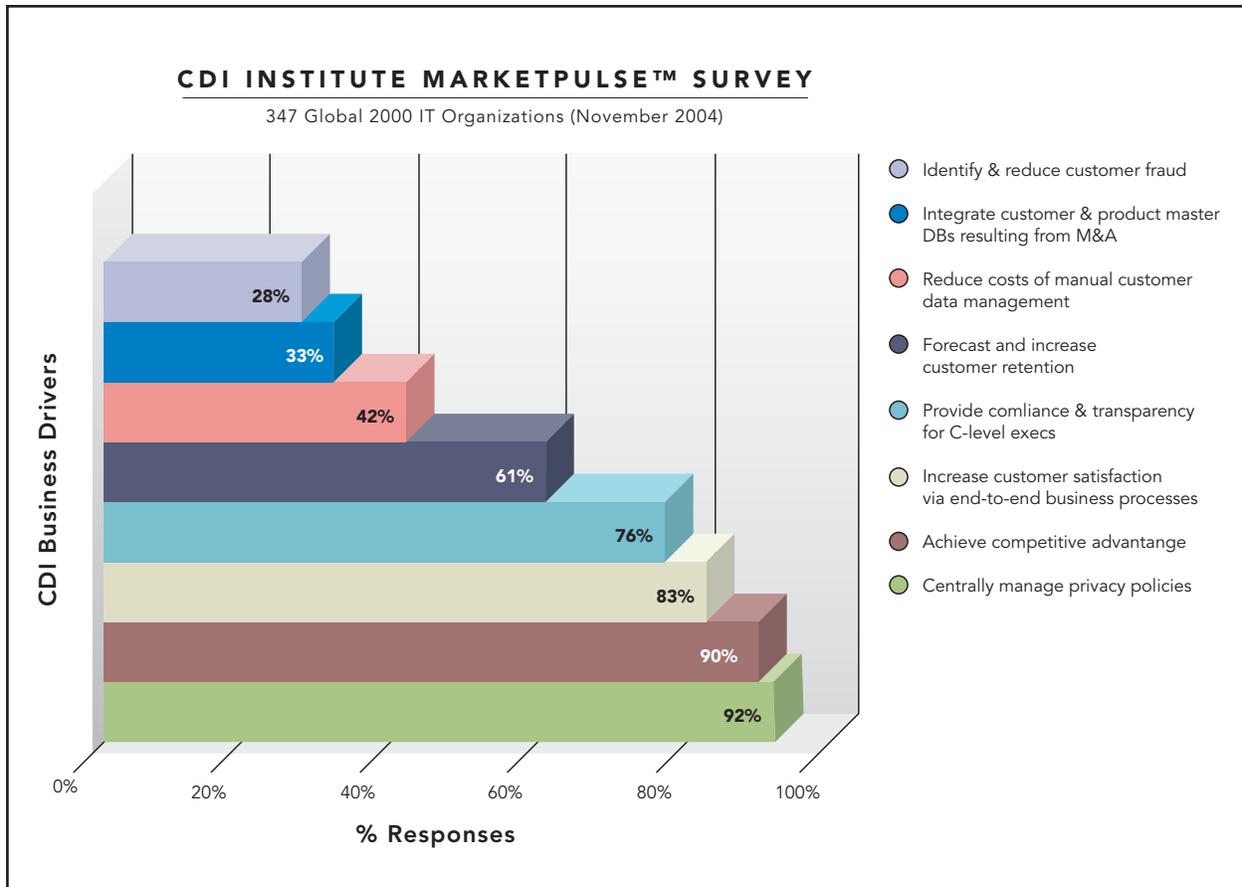


Figure 4 - Top Business Drivers for CDI within Global 2000 Enterprises (Source: CDI Institute, November 2004)

## Technology Challenges

Most enterprises still rely upon homegrown CDI solutions to synchronize and integrate customer data across business units and channels. Until the recent boom in products from both nascent and mega vendors, there were considerable challenges to in-house developed solutions including:

- Need to react intelligently and instantly to changing "customer" information
- Requirement for deep understanding of data quality and reliability issues
- Necessity for a common ("enterprise") data model across disparate sources and applications
- Desire for complete management of master reference data through a console user interface
- Understanding that current integration/middleware infrastructure is not adequate
  - EAI/BPM - real-time tools not adequate for batch
  - ETL tools - not adequate for real-time
  - Applications - no batch capabilities; proprietary APIs.

The often-stated business-driven IT objectives of an enterprise CDI strategy include, but are not limited to:

- Develop an enterprise-wide customer data model suitable to provide a system of record for all master customer data
- Manage the implementation politics and business processes of centralized or federated customer data management while allowing for appropriate autonomy over specific customer information attributes
- Develop supporting technology strategies for business intelligence, data modeling, enterprise application integration, and interoperability
- Ensure consistent and accurate customer identities and organizational hierarchies across the enterprise with full and transparent compliance of regulatory and cultural privacy directives
- Expand use of incumbent application systems (such as CRM and ERP) to manage an enterprise master customer identity (universal key) across all other systems
- Integrate structured and unstructured content to provide maximum panoramic view of master entities such as customer, product, supplier, etc.
- Increase flexibility to add new channels, data sources, touch points, etc. via service-oriented architecture (SOA)
- Deliver rigorous facilities for cleansing, matching, linking and identifying master data

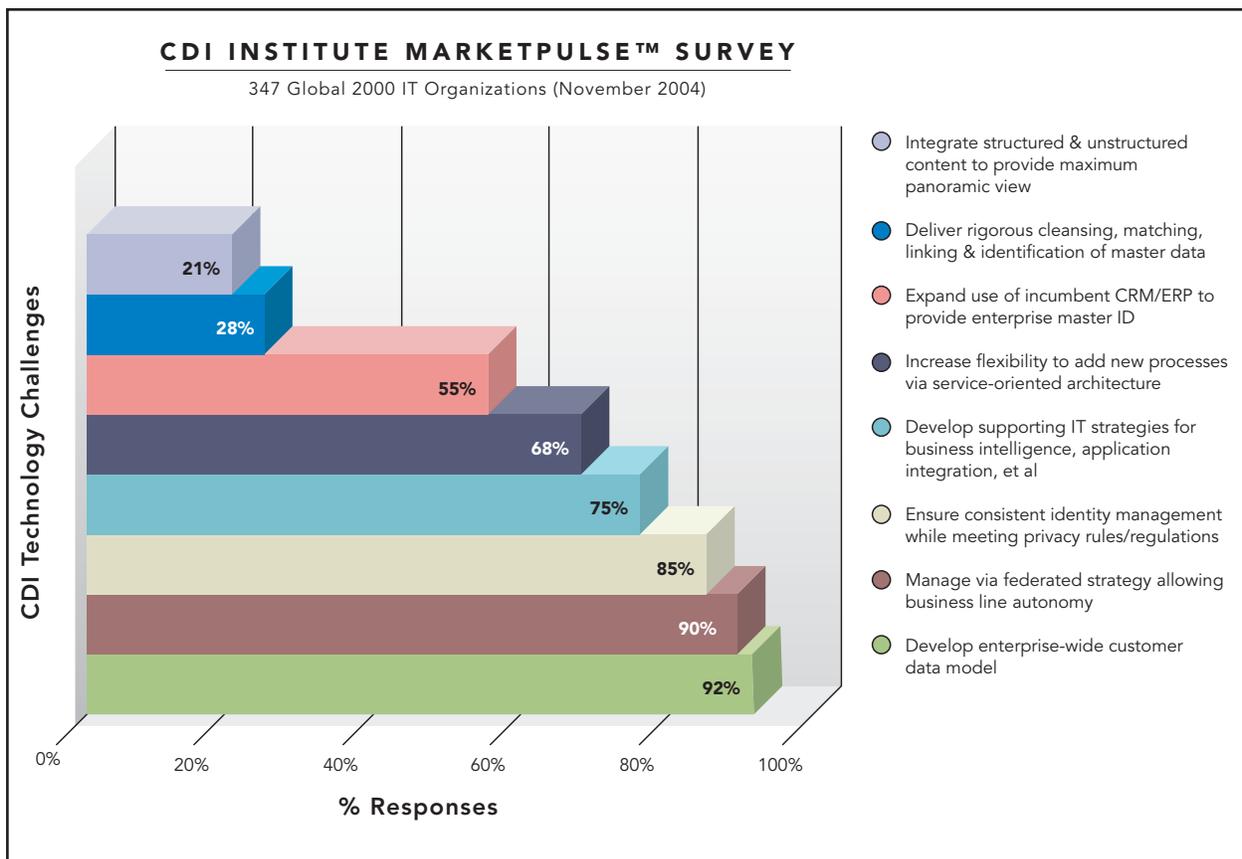


Figure 5 - Top Technology Challenges for CDI within Global 2000 Enterprises (Source: CDI Institute, November 2004)

As highlighted by the graph in figure 5, there are three essential technology capabilities IT organizations turn to as they build out their CDI infrastructure. These include:

- "An enterprise-wide customer data model" which provides a logical model for aggregating and reconciling the various data sources that comprise a master customer record.
- "Federated capabilities" to connect independent data stores with a thin structure while leaving most of the data in their source locations.
- "Identity management" to not only securely identify customers but also centrally manage privacy policies.

### Implementation Styles

The diverse nature of global business models requires variety in CDI implementation approaches or models. Contemporary CDI solutions will vary by industry, for example, in terms of tactical approaches taken:

- Pharmaceutical/life sciences adopt semi-batch, database-centric approaches to deploy master physician data to sales forces
- Financial services providers and online retailers require near real-time, business and process-centric solutions to compete in fast-paced B2C online world
- Governmental organizations are often restricted in the ways they are permitted to merge and analyze data on their citizens are those skewing these architectures towards anonymous entity resolution

Implementation Style	Description
<i>External</i> (Service Provider)	<ul style="list-style-type: none"> <li>• Database marketing providers</li> <li>• Data service providers</li> <li>• Service bureaus</li> </ul>
<i>Persistent</i> (Database)	<ul style="list-style-type: none"> <li>• Master customer information file/database</li> <li>• Operational data store/active data warehouse</li> <li>• Relational DBMS + Extract-Transform-Load (ETL) + Data Quality (DQ)</li> </ul>
<i>Registry</i> (Virtual)	<ul style="list-style-type: none"> <li>• Metadata layer + distributed query (enterprise information integration or EII)</li> <li>• Enterprise application integration (EAI)</li> <li>• Portal</li> </ul>
<i>Composite</i> (Hybrid)	<ul style="list-style-type: none"> <li>• Ability to fine-tune performance and availability by altering amount of master data persisted</li> <li>• XML, web services, service-oriented architecture (SOA)</li> </ul>
<i>"Chernobyl"</i>	<ul style="list-style-type: none"> <li>• <i>Encapsulate legacy applications</i></li> </ul>

Figure 6 - Most Common CDI Implementation Styles (Source: CDI Institute, November 2004)

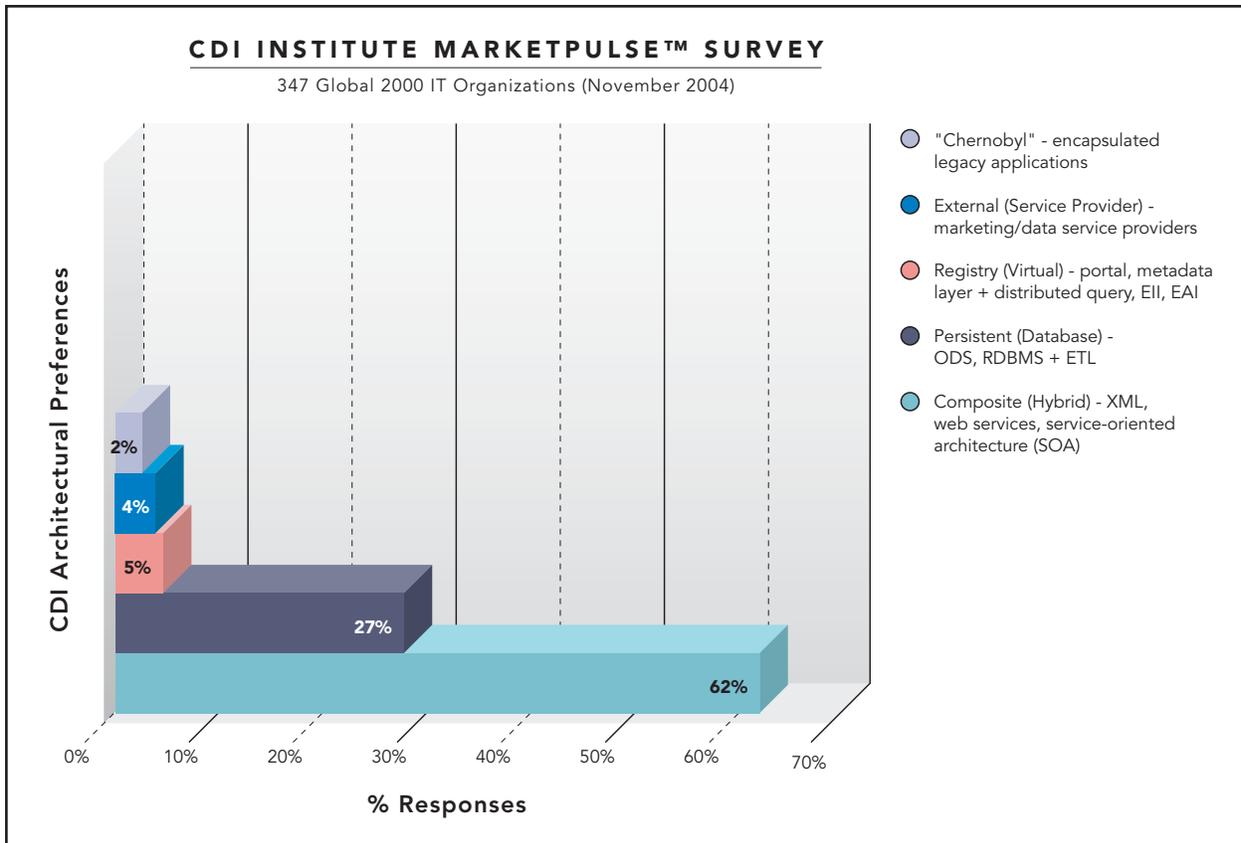


Figure 7 - Top Five CDI Architectural Preferences within Global 2000 Enterprises (Source: CDI Institute, November 2004)

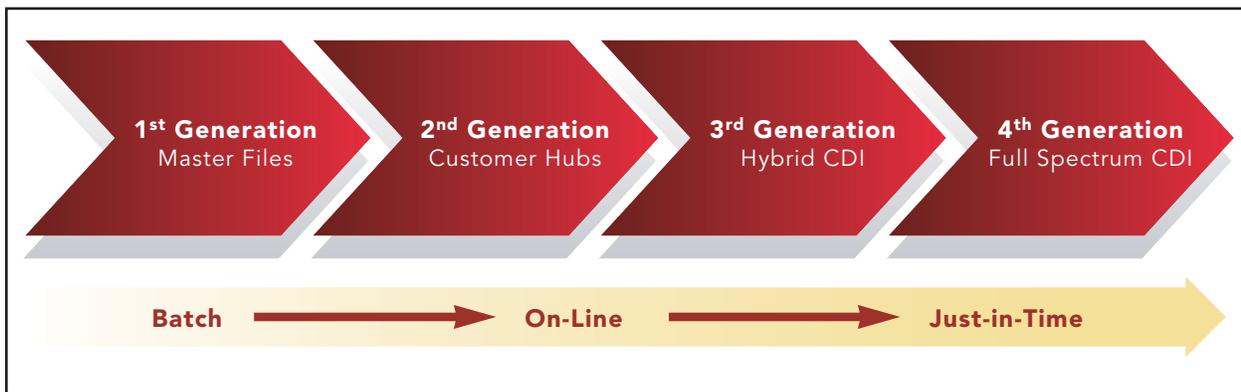


Figure 8 - CDI Solutions Genealogy (Source: CDI Institute)

For planning purposes, it is often important to know "where you came from" as well as "where you are going to". An enterprise CDI strategy is no exception per the marketing mantra often recited by CRM vendors: "CRM is a journey, an ongoing process; not a product or a waystation". In that spirit, we outline the basic roadmap of CDI solutions' evolution:

**"First generation" CDI**. These solutions most often are standalone databases or files that are managed by monolithic applications such as IBM Transaction Processing Facility (used by certain airlines), Computer Sciences' Hogan banking system, or even early generation Siebel Systems' Sales Force Automation installations.

**"Second generation CDI"**. Such solutions are "uni-modal" in that they are specialized for either batch or online updates. These systems are database-centric master customer files frequently participating in bi-directional updates. These solutions also typically are either data-centric in that they use ETL solutions, or they are process-centric in that they depend heavily upon workflow.

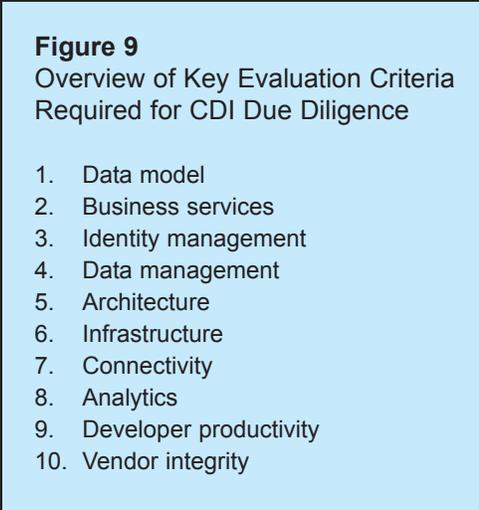
**"Third generation CDI"**. These approaches offer "multi-modality" and are flexible enough to support batch and online performance, loosely- and tightly-coupled application models. Specifically this variation supports a service-oriented architecture (SOA) model in terms of web services for a "business services" approach. This approach also increasingly provides support for the federation model whereby individual business units retain some autonomy in managing their "master" data assets yet participate in a "union" or "confederation". Additionally, a third generation solution must support the tremendous scalability requirements, as well as reliability and availability, associated with mission-critical infrastructure.

**"Fourth Generation CDI"**. These systems provide extreme scalability because they are of the architecture required to support massive numbers of users such as business-to-consumer e-commerce or self-directed service centers. The systems also are designed to support unstructured content such as free form text, video, and audio, etc. in addition to structured data base records.

**Key Vendors**

Acquiring a CDI solution as a means to provide an integrated technology backbone to manage master customer data is becoming increasingly compelling due to rapid market evolution and entrance by both nascent vendors and mega vendors. Solutions range from:

- Mega applications suite vendors such as Oracle (Customer Data Hub), SAP (Master Data Management) and Siebel (Universal Customer Master)
- Best-of-breed solutions such as DWL (DWL Customer™), IBM (Client Information Integration Solution), Initiate (Initiate Identity Hub™), and Siperian (Master Reference Manager)
- Industry-specific solutions such as Dendrite (Nucleus) for life sciences, IBM (Client Information Integration Solution) for insurance, and SPL (CorDaptix) for energy
- Data quality vendors such as SAS/DataFlux, Pitney Bowes/Group 1, and Innovative Systems with Synchronous
- Enterprise application integration (EAI) vendors such as SeeBeyond and Tibco
- Extract-transform-load (ETL) vendors including Ascential (Enterprise Integration Suite) and Informatica (Power Center RT)
- Enterprise information integration (EII) or distributed query/metadata vendors such as BEA (Liquid Data), IBM (DB2 Information Integrator) and MetaMatrix (MetaMatrix Server)
- Data service providers (database marketing service bureaus) such as Acxiom, Experian, and Harte-Hanks.



This report focuses on the CDI solutions that provide "persistence". That is, data is stored centrally and shared among those applications and touch-points that require a portion or all of the unified customer view. To that end, products that are essentially distributed query or federated metadata do not provide the degree of persistence found in the products covered by this report.

## Organizational Challenges

Every enterprise is challenged in reaching consensus among its constituencies as to "who owns which aspect of the customer master data" – even to the point of defining "what" is a customer. The more successful CDI projects dodge that question as there is no one answer - save for "customer information is a strategic asset which belongs to the enterprise". Despite the resurgence of interest in Chief Customer Officer roles, that position tends to be ineffective other than to act as ombudsman for customer service issues.

More commonly, a governance and stewardship type organization is set up as a virtual structure headed by a person from corporate marketing. This structure formulates rules for use of customer data including visibility and traceability, access control and data cleanliness with all major parts of the enterprise represented. Frequently, this organization is also overseen by the Chief Compliance Officer for privacy and compliance policy issues.

In addition to the feudal or parochial corporate attitude as to who dictates data ownership (data entitlements) there arise challenges in determining chargeback strategies for the creation and ongoing management of such enterprise infrastructure or business services. Based on prior organizational experience in large-scale IT projects such as enterprise resource planning (ERP) or customer relationship management (CRM) application deployments, many enterprises find this common set of organizational challenges arise in enterprise CDI initiatives:

- Shared costs
- Survivorship rules
- Corporate "creep" of centralized governance vs. data entitlement perception of semi- autonomous and autonomous business lines

The most significant costs associated with any CRM project are those related to "integration" - both within the CRM component subsystems of marketing, sales and service - as well as between front office (CRM) and back office systems (ERP, order management, supply chain management). Just as the systems integrators made tremendous revenue gains via the SI costs associated with ERP and CRM implementations, so too do the SIs believe that CDI offers similar uptake. In our most recent survey of CDI projects, two SI vendors overwhelmingly stood out as preferred partners: IBM Business Consulting Services and Accenture (see Figure 10 - Top Five Systems Integrators in Mindshare within Global 2000 Enterprises).

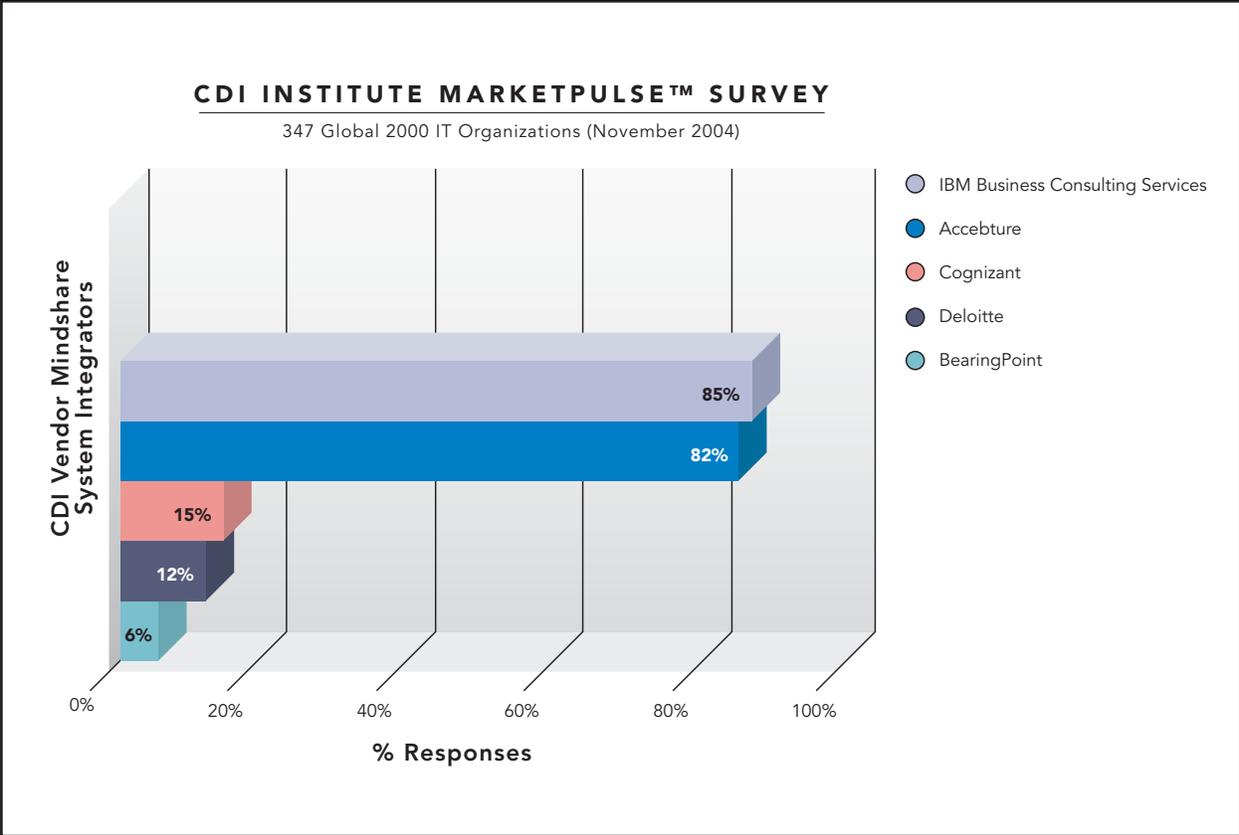


Figure 10 - Top Five Systems Integrators in Mindshare within Global 2000 Enterprises (Source: CDI Institute, November 2004)

## Leading Vendor Profiles & Field Reports

### Evaluation Criteria

Clearly, the infrastructure fracas will escalate as the mega application vendors (Oracle, PeopleSoft, SAP, Siebel) rush to dominate business processes and data models as the "high ground". Additionally, among the options available to CDI leadership teams are: extend existing "status quo" solution (typically an in-house master file system); purchase, install and customize a standalone solution from either the mega application package vendor who is closest to a center of gravity as possible – or – standalone products that purport to agnostically integrate data from multiple packages. Less frequently these days, certain IT organizations elect to build out CDI infrastructure by utilizing either data warehouse tools (ETL extract-transform-load, and data quality). And even less frequently is the decision made to outsource such strategic corporate asset management to a 3<sup>rd</sup> party such as a service bureau or data aggregator (Acxiom, Experian, Harte-Hanks, et al).

Furthermore, different industries often require different CDI solutions (i.e., pharmaceuticals differ dramatically from financial services in terms of modality and throughput), and even within an industry the specific enterprise's needs may vary from its peers. As with any mission-critical infrastructure, IT management should perform a thorough requirements and gap analysis to create an objective, weighted set of CDI solution evaluation criteria – which in turn enables a rigorous, objective rating of vendor solutions.

Our client experience shows that in most cases there are ten key criteria categories that an IT organization needs to focus on during its assessments of CDI solutions, including:

1. Data model
2. Business services

3. Identity management
4. Data management
5. Architecture
6. Infrastructure
7. Connectivity
8. Analytics
9. Developer productivity
10. Vendor integrity

Given that enterprise CDI represents "mission-critical infrastructure" it should come as no surprise that this endeavor is most often lead by (and even championed by) IT management. In the larger enterprises, it is common to outsource the creation of a request for proposal (RFP) that is tailored to the enterprise's specific CDI requirements – often the systems integration vendors such as IBM BCS or Accenture are chosen to lead such requirements gathering and classical gap analysis.

In any case, it has been our experience that the evaluation of CDI technologies is best suited to a tailored and weighted criteria set (both objective and subjective) to find the product(s) that will best meet the enterprise's specific needs - even to the point where in some of the larger enterprises, there are multiple overlapping CDI initiatives due to the complexity of their business.

The objective evaluation criteria include: customer data model, business services layer, identity management, customer data management, architecture basis, infrastructure technology base, connectivity for integration and synchronization, and analytics for customer segmentation. The more subjective evaluation criteria (for the time being) include: developer productivity and vendor integrity.

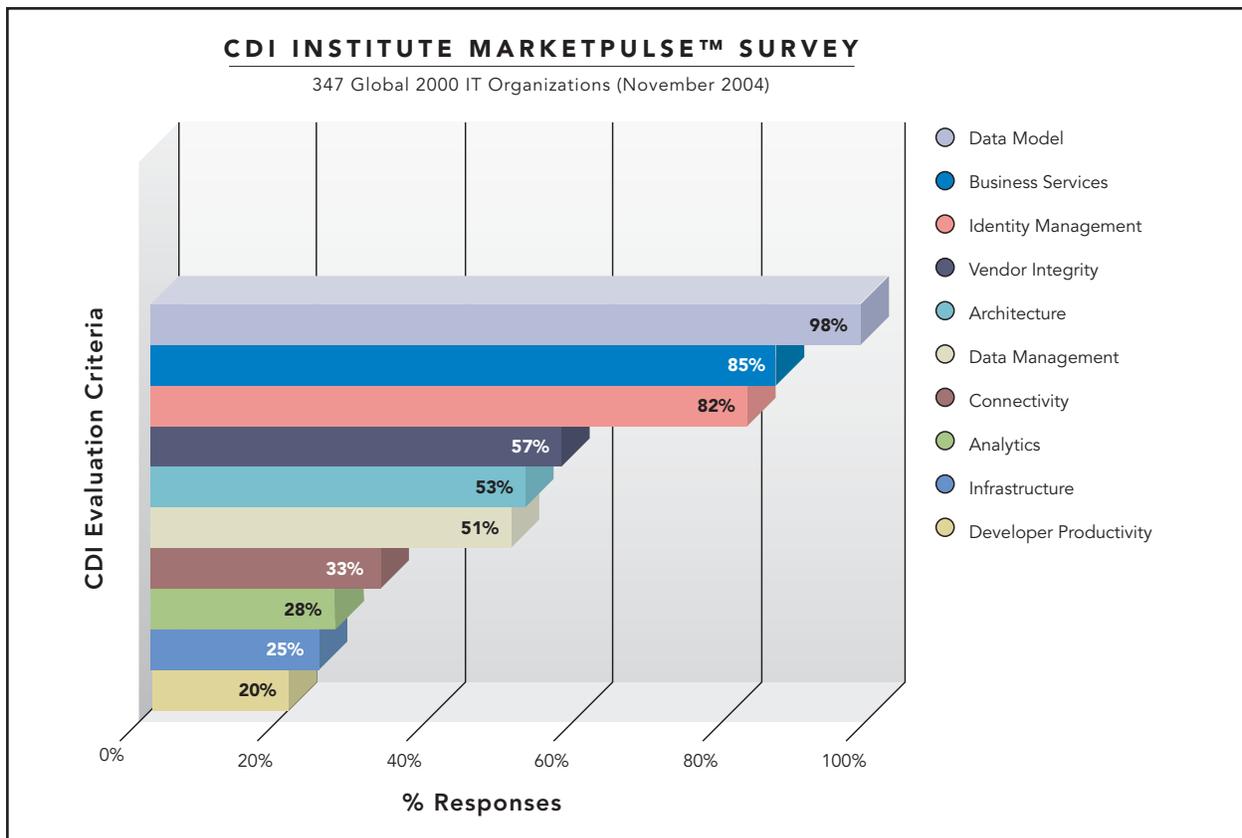


Figure 11 - Top Ten CDI Evaluation Criteria within Global 2000 Enterprises (Source: CDI Institute, November 2004)

In our semi-annual CDI MarketPulse™ poll (November 2004), it is notable that the approximately 350 IT organizations surveyed definitively highlighted three CDI evaluation criteria as most critical to their success: data model, business services, and identity management (reference "Figure 11 - Overview of Key Evaluation Criteria Required for CDI Due Diligence").

### **Data Model**

At least 98% of the Global 2000 organizations ranking their top CDI technical evaluation criteria selected "customer data model" as their number one issue. This is notable, as our research continually finds IT organizations charged with CDI strategies placing "customer data model" as the top evaluation criteria.

The customer data model is required to model the complex many-to-many and hierarchical relationships between the enterprise, its business and consumer customers, as well as any intermediaries and other parties such as suppliers and brokers/distributors. Certain CDI vendors have successfully evangelized their data models ("Oracle Trading Community Architecture" and "Siebel Trusted Customer Information") as an integral aspect of their overall systems software strategy and (more recently) begun to escalate the marketing of such data modeling capability. While at this point it is reasonable to assume parity among the vendors in support of the "multi-party" conceptual model, there are wide degrees of variance in the level of industry-specific data model extensions. It is vital that the CDI vendor supports the data model extensions of the enterprise's specific industry and has experience with the relevant types of customer relationships. It is reasonable to expect that a CDI vendor will provide data model mappings as well import and integrate with the most common sources of industry standard data that need to be aggregated with the enterprise's own data.

### **Business Services**

Increasingly, the battleground among the mega application package vendors is at the "business process model". This higher ground subsumes data models in the sense that "best practice" templates are increasingly marketed by the mega CRM and ERP vendors for end-to-end business processes such as "change customer address". Ideally, enterprises would like to provide internally-standardized business processes for identifying customers, adding new customers, changing customer name (marital status, phone, e-mail, etc.) to drive down costs and provide increased quality of service to the customer.

While "enterprise architecture" had its fits and starts with object-oriented modeling and object request brokers, the current vision of service-oriented architectures (SOAs) is gaining critical mass in acceptance as "the" future-proofed architecture for large-scale enterprises. SOAs consist of discrete application services that support multi-modality invocation (batch, on-line, real-time, loosely-coupled, tightly-coupled). By utilizing web services standard interfaces, third generation CDI hubs insulate the enterprise's master data and business processes via a layer of granular business services (i.e. Add Customer, Promote Customer, Retire Customer).

While mega vendors such as Oracle, SAP and Siebel wrestle with re-architecting their entire application portfolio to the SOA model (Oracle 10g AS, SAP NetWeaver, Siebel UAN respectively), third generation CDI products are increasingly seen as architecturally strategic to provide SOA in both the near term and going forward.

### **Identity Management**

Identity management is consistently listed as one of the top three CDI solution evaluation criteria by Global 2000 organizations (reference figure 11). The three main subcriteria: are: (1) a high-performance matching/search capability, (2) a strong cross-referencing capability including "entity resolution", and (3) the ability to centrally generate and manage "universal" master keys across the various systems using the CDI identity management capability.

The matching/search capability should be configurable to assign "levels of trust" as to how well an incoming data source matches a specific customer master. High-levels of trust provide increased automation of the data cleansing and matching function in real-time, while realistically most organizations will still require domain-knowledgeable "data stewards" to intercede in manual review mode when the rules base is insufficient.

A strong cross-referencing capability should include "entity resolution" that provides for tracking and matching of entities across databases without merging the databases for physically linking the databases. This is important in applications where regulatory or performance restrictions are in force. Such cross-referencing (one-to-many support, enforcement of cross-referencing) is the essence of a "customer data integration" capability.

The capability to centrally generate and manage "universal" master keys across the various customer facing systems is also vital where regulatory or cultural issues do not permit for a national ID number or similar master key to be used for consumers or citizens. Many enterprises already use generic (e.g. Acxiom Abilitec®, D&B D-U-N-S, Experian Truvue) or industry-specific third party master keys (pharma and life sciences use AMA and DEA for physicians).

### **Data Management**

A CDI solution typically supports both operational and analytical processes and must be tightly integrated with both legacy systems and yet-to-be-built customer-facing applications. Clearly, there will be acute demands regarding reliability, availability, and scalability with major infrastructure requirements (application server, database management system, operating system and server hardware).

Furthermore, data management is a very broad topic that includes: scalability issues, consolidation and survivorship rules, definition and management of privacy rules, and data cleansing. Additionally, audit trails are critical to privacy and merge/purge operations. For many businesses, the goal is to create end-to-end data management processes that may be invoked by other major customer facing subsystems in addition to the CRM package. Among the requirements are seamless integration with third party data sources for "watch lists" and "do not call" registries.

The internal infrastructure to support CDI data management has all the requirements of mission-critical applications and must be evaluated so.

### **Architecture**

Given the generational evolution of CDI deployment styles (see Figure 6 - "Most Common CDI Implementation Styles" for a discussion of architectural styles), it is vital to select a CDI solution specifically tuned for a given set of long term CDI requirements. For example, government agencies have severe restrictions regarding their ability to merge data sources and are predisposed towards "registry" architectures which in turn may be substantially satisfied by distributed query and federated metadata solutions – all with a minimum of persisted data.

"Modality" is a key consideration as well when reviewing the architecture of CDI solutions. Certain CDI solutions are best suited for batch updates/matches while others are targeted towards near real-time and even straight-through-processing as required by banks and military command and control applications.

On the planning horizon are new federated capabilities to support more semi-autonomous master data management. Vendors such as SAP and Siebel are at work on next-generation CDI solutions to support global data synchronization via such basic concepts as "horizontal federation" (entity, row or record-level data stewardship distributed among distinct organizations) and "vertical federation" (attribute, column, or field-level autonomy).

### **Infrastructure**

Given that CDI solutions will comprise an increasingly large portion of the infrastructure for contemporary enterprises, it is imperative that manageability of these large scale frameworks be given just consideration – e.g., systems management and monitoring tools. A CDI solution will be one of the predominant features of a business's enterprise architecture and therefore will be a potent long-term fixture. Most IT organizations will favor CDI solutions based on support for multiple Standard Operating Environments -

e.g., J2EE- or .NET-based application servers (e.g., BEA WebLogic, IBM WebSphere, Microsoft .NET server); and relational databases (IBM DB2, Microsoft SQL Server, Oracle). Another window into the impact of infrastructure would be these dimensions:

- Scalability - e.g., in-memory or cache databases; just-in-time aggregation
- Accessibility - e.g., ability to service a wide-range of performance levels
- Availability - e.g., resilience to various failure situations such as hardware and network outages; plus continuous data maintenance/synchronization

### **Connectivity**

The stated objective of most CDI solutions is to connect channels with views of master customer records. This naturally necessitates a wide range of inter-application connectivity styles. CDI solutions should therefore provide rigorous multi-model support for all usage/integration modes:

- Real-time
  - Tightly-coupled (COM, Java, CORBA)
  - Loosely-coupled (IBM MQ Series, XML/HTTP, integration servers)
- Near real-time
  - Loosely-coupled (IBM MQ AMI, XML/HTTP, integration servers)
- Batch
  - EDI, RosettaNet

In addition, pre-packaged integration processes and templates are required for out-of-the-box and customized connectivity to the major application suites (CRM, ERP, SCM). The more adaptable CDI solutions will also provide intelligent routing - e.g., alerts, content-based routing and publish-subscribe capabilities as nuanced via web services contained within a service-oriented architecture.

### **Analytics**

In the quest to better understand and service customers, analytics become increasingly vital. No longer are batch-oriented data marts - or even data mining of massive data warehouses - sufficient to provide the fundamental analytics necessary to drive customer profitability and value assessments (which in turn enable differentiated service). Batch analytics are still necessary but ever important are in-line (integrated) just-in-time analytics to drive customer segmentation and targeting for cross and up-sell. In addition, such in-line analytics enable closed-loop marketing (integration between data marts and front office applications such as sales and marketing). Another segment of required analytics is "data profiling" to manage the "degree of trust" associated with a given master customer data source (e.g., completeness, uniqueness, accuracy, and lineage or history).

### **Developer Productivity**

CDI solutions range from highly technical developer workbenches all the way to standalone packages. And it is clear that CDI solutions will subsume increasingly large portions of an enterprise's application logic as a series of "business services". Therefore it is vital that a CDI solution include productivity tools for the professional IT developer as well as business users. Clearly, ability to customize a CDI solution is necessary, however, the manner in which customization is enabled should fully support the customer management lifecycle (e.g., META Group's CRM lifecycle of Engage/Transact/Fulfill/Service). Such developer productivity tools must be a central aspect of the CDI solution itself (e.g., rules engines, workflow, GUI-based data stewardship). A brief checklist of productivity features should include:

- A single, unified developer environment

- Check-in, check-out capability for team-based development
- Systems management tools for: change management, software distribution, and testing capable of proving the necessary performance and scalability

### **Vendor Integrity**

CDI solutions have been with us for 25+ years (as long as the application package industry itself - remember Cullinet's online applications, Hogan's banking applications, PMSC's insurance applications). The changing of the guard occurred as vendors released second generation CDI solutions (CDI hubs) and is accelerating as third generation CDI products ("hybrid hubs" supporting both process and data) come to market. Furthermore, it might seem that the CDI solutions market is brand new given the confusion arising from new product launches by the mega applications package vendors and the swarming of newly-minted CDI-capable solutions crossing over from various other middleware markets. All of this churn and confusion only underscores the need to perform due diligence on both the vendor and the products in question (not all vendors score homeruns in their mid-to-late-life endeavors). References are essential when determining if the CDI solution can meet the business's mission-critical reliability, availability, and scalability requirements ("production references" not "proof-of-concepts"). A CDI solution is a long term marriage with the solutions vendor unless the IT organization is sufficiently large and talented to take over the evolution of the CDI code base in the event of vendor-failure. Expect that all vendors with exception to the mega application vendors will scurry to cement leadership roles in key industries. Meanwhile, the mega application vendors will focus on breadth rather than depth (in terms of data models and business services).

## DWL Customer™

DWL's strategy is to leverage both its historical strengths in financial services and its well-honed relationship with IBM. Its industry expertise and affinity for IBM products and services has made DWL a natural partner for IBM's Business Consulting Services (IBM BCS). It is notable that IBM BCS organization will typically lead with DWL Customer™ rather than the IBM Client Information Integration Solution (IBM CIIS).

DWL is earnestly making investments to target other industries such as high tech, hospitality, and telecommunications where there is no current dominant CDI solution. To that end, DWL is also forging alliances with systems integrators other than IBM BCS that have expertise in these vertical industries - including Accenture and BearingPoint (for both financial services and telecommunications), Deloitte and Infosys.

DWL is a third generation customer data hub in that it provides the hybrid flexibility of both the virtual (registry) and the physical (fully-persisted database) model. Additionally, DWL has been a thought leader in service-oriented architectures (SOA) and web services in provisioning more than 350 CDI transactions. DWL is also third generation in that it supports multi-modality - batch, online, and publish-subscribe models. Based on its high-end references (Citi Cards, MetLife) and the published IBM RedBook benchmark, DWL has the credibility of a performance leader.

DWL's products work very closely with and are fine tuned for IBM's software such as DB2 and WebSphere and are also well suited for BEA application servers via the J2EE platform. DWL's identity management capabilities provide a modest degree of matching and linking (most often DWL partners with data quality vendors such as Trillium and recognition vendors such as Acxiom).

DWL Customer™ is a good solution when the business requires a master customer data hub to support high volume transaction-processing along with excellent scalability and availability. Such systems are on the high end of CDI implementations required by very large banks and insurance companies and typically require integration similar to "straight through processing".

### Figure 12

#### Vendor Profile: DWL Customer™

##### Strengths

- 3<sup>rd</sup> generation hub architecture
- Financial services expertise
- Public references: CitiGroup, MetLife, Nationwide, UnumProvident
- Robust web services & SOA solution
- High-end transaction capabilities
- IBM BCS channel
- Fast growth curve via new business

##### Weaknesses

- Lacks in-line CDI analytics
- Underinvested in marketing
- Undifferentiated marketing

Source: CDI Institute 4Q2004 Field Report

# IBM Client Information Integration Solution (IBM CIIS)

IBM CIIS was arguably the first CDI product to make it big. As a result of this product's relatively long history (in contrast to other newer CDI products), IBM CIIS is in danger of being outflanked. Originally, IBM CIIS was both product and service, as a result of a partnership between IBM Ireland (software development labs) and IGS (consultancy services). IGS provided the CIIS data models (for financial services/ banking and insurance) either as machine-readable (ERwin) schemas or as a fully functionally master customer database. As of YE2004, we believe that IBM CIIS will be de-prioritized as one of the "Dublin Assets" as it moves into the mainstream IBM software development labs. However, IBM Global Services (IGS) and Business Consulting Services (BCS) will continue to add value to the good number of CIIS installations in addition to deploying the product at risk-averse banks and insurance companies in the newly developing economies (e.g., China especially).

IBM CIIS is most often deployed as a second generation hub, i.e., as an operational data store. CIIS is multi-modal in providing both real-time and batch updates and includes a GUI-based Customization Workbench that allows the maintenance and customization of the CIIS Data Model across the full CDI lifecycle - a capability notably lacking in more recent CDI market entrants. This workbench reduces the level of technical skills required to customize CIIS which opens it up to business analysts and other non-technical staff such as data stewards.

The technology stack is IBM native software, however CIIS includes support for XML APIs and database stored procedures. IGS also uses a wide variety of CDI-related software to flesh out enterprise CDI solutions - including Chordiant and Epiphany for database marketing campaigns, and Ascential DataStage templates to update transactions against both source and target customer data sources.

IBM CIIS will appeal mainly to risk-averse enterprises with strong affinity for IGS's data models in banking and insurance but not requiring high-throughput connectors to ERP and CRM suites such as SAP and Siebel.

**Figure 13**  
Vendor Profile: IBM CIIS

**Strengths**

- Public references: American Express, AXA, CapOne, Industrial Commercial Bank of China (ICBC), Farmers, Old Mutual, Ping-An Insurance Company (PAIC), Winterthur, ...
- Insurance expertise
- Data model expertise
- Sales momentum in Asia

**Weaknesses**

- 2<sup>nd</sup> generation hub architecture
- Aged underpinnings
- Underinvested in marketing
- Underinvested in future R&D
- Sales entropy in North America & Europe

Source: CDI Institute 4Q2004 Field Report

## Initiate Systems Identity Hub™

A major force in the healthcare industry where the registry style of CDI is known as EMPI (Enterprise Master Patient Index), Initiate Systems renamed itself from Madison Technologies during 2003 to focus on expanding into financial services, hospitality, and public sector. Its focus on the U.S. market has served well with major wins in retail pharmacy, insurance payer market and government.

While Initiate Systems' customer recognition technology has them looking to partner to embed this in other vendors' solutions, they also compete directly with the other vendors in this space. With the acquisition of Journeé in July, Initiate Systems added EII federation-type integration to the hub's registry and persistence capabilities making them one of the few vendors to have implementations in every style referenced in this report.

The addition of Journeé's federation technologies promoted Initiate Systems' technology from second generation to third generation style ("hybrid model") and also provided a much needed J2EE deployment platform for their solutions.

The majority of Initiate's 50 production sites are in healthcare and still run the second generation central registry model for managing patient identities. Yet in contrast to the competition, Initiate has considerably more new business in its core CDI markets.

Initiate Systems' Identity Hub will appeal mainly to enterprises with strong requirements for real-time identity management in a centralized hub with strong matching algorithms where the businesses want to take an evolutionary approach to CDI.

### Figure 14

#### Vendor Profile: Initiate Systems Identity Hub™

##### Strengths

- 3<sup>rd</sup> generation hub architecture
- Public references: Catholic Health Care West, Choice Hotels, Empire Financial, Intuit, Naval Criminal Investigative Services, ...
- Healthcare, hospitality & retail pharmacy expertise
- Historical CDI experience
- Real-time performance
- Strong matching algorithms
- Fast growth curve via acquisitions & new business deals, e.g., Journeé

##### Weaknesses

- Suspect deduplication capabilities
- Lack of business services layer
- Lack of in-line CDI analytics
- Lack of strong SI channel
- Under invested in marketing

Source: CDI Institute 4Q2004 Field Report

## Oracle Customer Data Hub (Oracle CDH)

As of 2004, Oracle entered the CDI market with its Customer Data Hub (CDH) as part of a proposed family of master data hubs including Product Data Hub and Citizen Data Hub. Note that any Oracle Data Hub that will revolve around persons or organizations will be part of the Customer Data Hub - i.e., Citizen Hub, Employee Hub, Supplier Hub, Patient Hub, etc. will all be in CDH. CDH is the first of Oracle's planned Enterprise Data Hubs that will materialize and track many master data entities, such as products. These second generation "hubs" are based on Oracle's widely respected Trading Community Architecture (TCA) data model. Like most CDI products, CDH was not developed in a vacuum and is actually descended from a prior incarnation known as Oracle Customers Online (OCO) which in turn was evolved with major guidance from several leading Oracle customers.

CDH provides a native data quality tool called DQM (Data Quality Management) which includes a sophisticated matching engine that is used for Searching, Duplicate Prevention, and Duplicate Identification. DQM is a native tool that comes free with the TCA data model (unlike other CDI vendors who partner with other vendors to use a non-integrated, cost-for-use solution).

Oracle's CDH may operate as a separate instance or as the underpinnings of Oracle's E-Business Suite. As to be expected, CDH takes full advantage of integration with the Oracle software stack including: Oracle Internet Directory and Single Sign-on for LDAP, and, OracleAS 10g InterConnect Adapter for, bi-directional, multi-modal, synchronous and asynchronous connectivity, etc.

We expect Oracle to extend the TCA data model to focus beyond high-technology manufacturing into other vertical markets (e.g., banking, energy, government, and telecommunications). Oracle's CDH is a good solution for enterprises with extensive commitments to Oracle applications and technology.

### Figure 15

#### Vendor Profile: Oracle Customer Data Hub

##### Strengths

- Public references: Cisco, Dell, Emerson, Freudenberg Seals and Vibration Control, Huntington Bank, IHOP, Master Lock, Multicanal, Network Appliance, Sealing Devices, Telecom NZ, University of Ohio
- Telco & high-tech manufacturing expertise
- Executive-level commitment
- Trading community architecture (TCA) multi-party data model
- Integrated scalability, reliability, & security via Oracle software stack
- Integrated data quality
- Support for relevant industry standards (OAG, OASIS CIQ)

##### Weaknesses

- 2<sup>nd</sup> generation hub architecture
- Only supports Oracle Workflow (BPEL on the way)
- Data model best suited for high tech B2B & lacks vertical extensions
- TCA's power is too intricate for most users
- Lacks in-line CDI analytics

Source: CDI Institute 4Q2004 Field Report

## SAP Master Data Management (SAP MDM)

SAP's CDI solution is descended from its product master and supplier master data integration initiatives as joint development with some of its largest customers such as Nestlé and Shell. Although SAP typically only sells outside of its manufacturing core markets in German-speaking countries, we have begun to see banks and insurance companies in North America show interest in SAP's MDM product plans due to tremendous respect for SAP's vision and engineering capabilities - and coincidentally, distrust in Oracle's and Siebel's capabilities in the same area.

MDM was originally closely tied to SAP Business Information Warehouse (SAP BW) and was in fact initially marketed as a classical data warehouse solution ("global spend analysis"). This migration in turn was planned to free up numerous internal SAP development teams to better interoperate via shared application data models and process models. We believe SAP's attention to thoroughness and rigor ultimately pay off in the longer term.

Although MDM v3.0 is still in ramp-up phase, we believe that due to SAP's strategic acquisition of product information management vendor A2i (xCat), there will be a major slowdown in taking MDM into production (other than the 15-20 initial beta sites) while SAP grafts MDM's capabilities onto A2i's higher performance technology stack. Again, SAP has voted with its dollars to tackle product information management challenges in enterprise resource planning (ERP) and supply chain management (SCM), rather than master customer data as have Oracle and Siebel.

MDM is strategic to SAP - no doubt. All master data in MDM is a key enabler of a SOA-style business services for NetWeaver applications. Moreover, the business partner model in MDM is the complete representation of the comprehensive model in mySAP CRM. However, MDM will best suit enterprises with major commitments to SAP applications and technology which require a product master or supplier master solution. It is too immature and suffering from M&A indigestion to be considered for master customer data solutions.

### Figure 16

#### Vendor Profile: SAP Master Data Management

##### Strengths

- Public references: Bombardier, Deutsche Telekom, GE, Nestlé, Nokia, Shell Europe, Tesoro Petroleum
- Supply chain expertise
- Product information management focus
- Global metadata synchronization expertise
- 3<sup>rd</sup> generation hub architecture with near term 4th generation features (image/content management of A2i)

##### Weaknesses

- Batch emphasis with poor on-line capability
- Former beta product (MDM) now undergoing major rewrite to graft onto A2i
- Lack of strong SI channel
- Under invested in marketing
- Overcommitted to product/supplier vs. customer/employee

Source: CDI Institute 4Q2004 Field Report

## Siebel Universal Customer View (Siebel UCM)

Siebel Systems is due credit for evangelizing both the multi-party customer data model as well as pioneering use of service-oriented architectures within its CDI offering. Siebel's competitors like to point out the Trusted Customer Information data model's origination in sales force automation (SFA) and call centers - and thereby tar this data model as inappropriate for other vertical or horizontal applications. There is some truth in its inflexibility for other master data applications but the data model's origination within high-end customer contact centers is a major strength for a CDI solution.

Most customers will also find it positive that the data model found in Siebel UCM is essentially the same as that in Siebel CRM. Like Oracle's CDH, UCM is based on the vendor's latest technology stack and can be deployed either as a stand-alone solution or to complement existing Siebel applications. Unlike Oracle, however, Siebel already has shipped its product master variation.

UCM is a third generation hub given its support for multi-modality (batch, on-line, loosely-coupled, tightly-coupled) and its support for both registry-style and fully-persisted architectures. Like DWL, UCM provides excellent support for the services-oriented architecture (SOA) model as it may be integrated with via 140 Web services or Siebel's Universal Application Network (UAN) with its prepackaged integration processes. The most recent UCM release also integrated data matching and in-line analytical capabilities.

CDI product evaluation teams report that Siebel's overlay sales organizations and product marketing functions (horizontal and vertical groups) regularly get in each other's way and have caused slippage in Siebel's efforts to expand beyond its core CRM install base. Furthermore, Siebel needs to recapture the role of CDI visionary leadership by aggressively embracing the notion of federated CDI services wherein large enterprises can recognize and leverage their corporate culture in assigning "data entitlements" for master customer data ownership, etc.

UCM will appeal to a broad range of industries ranging from energy to financial services to government. Understandably, one of its key advantages is its strong affinity to "all things Siebel".

### Figure 17

#### Vendor Profile: Siebel Universal Customer Master

##### Strengths

- 3<sup>rd</sup> generation hub architecture
- Dedicated sales force
- Retail banking expertise
- Historical expertise in CDI
- IBM BCS & Accenture SI channels
- Fast growth curve via add-on business to Siebel CRM & UAN
- Product master support available
- Integrated, in-line analytics
- Integrated data quality

##### Weaknesses

- Public references: ENI, Fifth Third Bank, Fisher Scientific, South African Revenue Service, Toyota Financial Services, UMB Bank, US Citizenship and Immigration Service... impressive names yet few speaking publicly
- Perceived issues in scaling
- Perceived inflexibility due to Trusted Customer Information data model's origin in SFA & call centers

Source: CDI Institute 4Q2004 Field Report

## Siperian Master Reference Manager (Siperian MRM)

Siperian's early successes have primarily been in pharmaceutical/life sciences where MRM has typically been used in batch mode. In insurance, high-tech and publishing verticals, MRM supports real-time connectivity to EAI tools for access to CRM applications and data. After its 3Q2003 acquisition of Delos, Siperian migrated the Delos CMX product to the J2EE platform and released it as Siperian MRM.

One of Siperian's strengths is its flexible approach to data modeling. MRM physically creates a customer reference database as a "system of record" that can comprise master reference data, relationship/ hierarchy data or transaction data. This approach lends itself to "federated autonomy" of data sources, whereby master data sources remain satisfied that their master copy of the customer data remains the same. MRM users may: (1) use a pre-existing enterprise data model (if available); (2) incorporate an industry standard model (e.g., SWIFT, FIX, ACORD, OASIS CIQ, Siebel CIF); or (3) create a data model with Siperian's template-driven approach.

Siperian is a third generation customer data hub via its hybrid approach to aggregating data. Primarily, only "reference data" (used to uniquely identify an entity) and cross-reference keys are persisted and managed by MRM. Any application can utilize the cross-keys to bring together entity data. "Activity data" is data that can either simply be temporarily cached or optionally persisted in MRM. This includes interaction or transaction data as well as derived data and may be dynamically aggregated with reference data as composite operational objects that are cached for speed (or optionally persisted). "Hierarchy/relationship data" is aggregated across multiple sources (expected GA in 1Q2005). EII-based integration is strongly supported and is represented by a strong partnership with IBM's for DB2 Information Integrator (note - DB2II primarily figures in pharmaceutical applications). A key differentiation of Siperian is its metadata-driven, configurable rules framework which facilitates adding data sources or changing match/merge logic.

MRM will best suit enterprises with complex or homegrown enterprise data models which require data model flexibility to "support high relationship complexity but not require high volume throughput" - such as pharmaceutical/life sciences and financial services wealth management - with number of customers in the millions rather than the tens of millions.

### Figure 18

#### Vendor Profile: Siperian Master Reference Manager

##### Strengths

- 3<sup>rd</sup> generation hub architecture
- Public references: Berlex, Lexis Nexis, Forest Lab, Sanlam Insurance & EMC/Documentum...
- Hybrid approach with metadata-driven configurable rules engine
- Pharma & high-tech expertise
- Fast growth curve via acquisitions & new business deals, e.g., Delos

##### Weaknesses

- Lack of strong SI channel
- Under invested in marketing
- Lack of proven OLTP scalability

Source: CDI Institute 4Q2004 Field Report

## Additional CDI-Capable Vendors

### **Activiti**

### **Actuate/Nimble Technology**

(Data Lens, Nimble Integration Suite)

### **Acxiom** (AbiliTec)

### **Apama** (Apama Engine)

### **AptSoft** (AptSoft Director)

### **Ascential** (Enterprise Integration Suite)

### **Avaki**

### **BEA** (Liquid Data/Enosys)

### **Blackrock Solutions**

### **Business Objects** (Data Integrator)

### **Celequest** (Activity Suite)

### **Centerboard**

### **Choicepoint**

### **Chordiant** (Chordiant 5 Enterprise Platform)

### **Composite Software Inc.**

### **Contivo**

### **Customer Evolution**

### **DataMirror** (Constellar Hub/ Transformation Server)

### **D&B**

### **E.Intelligence**

### **eConvergent** (eMerge)

### **Enkata** (Enterprise Insight Suite)

### **Epiphany** (Customer Relationship Backbone)

### **Experian** Information Solutions (Truvue)

### **Fair Isaac** (Triad, and unannounced)

### **FirstLogic**

### **GoldenGate Software** (Global Data Synchronization)

### **Grand Central Communications**

### **Harte-Hanks** (Trillium)

### **IBM** (DB2 Information Integrator)

### **InfoUSA/Donnelley Marketing** (InfoConnect)

### **Innovative Systems Inc.** (Synchronous)

### **Intelligent Results**

### **Kalido** (Master Data Manager)

### **KnowNow** (LiveServer, LiveConnectors)

### **MetaMatrix** (MetaMatrix Server)

### **MetaTomix** (Real-Time Visibility Suite)

### **Modulant** (Contextia&trade; Connection Server)

### **Nimaya**

### **Novell** (Customer OneView)

### **ObjectStar** (Enterprise CDI)

### **PeopleSoft** (Integration Broker)

### **Pervasive/Data Junction**

### **Pitney Bowes/Group 1** (Sagent Centrus)

### **Polk**

### **SAS Institute** (DataFlux)

### **Sedona** (Intarsia)

### **SeeBeyond** (Business Integration Suite)

### **SPL** (CorDaptix)

### **Sunopsis**

### **Vitria** (Businessware)

### **Xoriant**

### **Xtegra/Callixa** (Enterprise Integration Server)

## Justification of Enterprise CDI Solutions

The initial CDI business case for many enterprises is based on operational efficiencies regarding maintenance of master customer data such as address, preferences, and compliance in addition to cross-sell/upsell potential. As a first stage, many IT organizations obtain funding to do proof of concepts on address maintenance across the enterprise.

Technical and budgetary challenges often impede CDI infrastructure upgrades (i.e., from home-grown master file systems) despite economic and competitive advantages to be gained from consolidation of integrated customer information from both back office and front office systems.

Most businesses are currently managing multiple "master" customer databases segmented by product or division lines with resultant manual process redundancies and IT inefficiencies. This in turn leads to an inability to cross sell and effectively compete on increased customer service levels which would otherwise be enabled by corporate-wide, cross-product sharing of vital customer data.

A short list of enterprise-wide, non-industry specific ROI benefits should include:

- Minimizing architectural complexity to simplify application solution design, deployment, and maintenance
- Reducing the number of interfaces between applications and increasing the reuse factor to save substantial integration costs
- Improving infrastructure flexibility and control to enhance overall system performance
- Accelerating the ROI of CRM solutions
- Reducing overall project risk through increased flexibility and centrally managed architecture

## Financial Services Providers

Industry-leading banks realize they must transform retail branches from per transaction operational centers into customer-centric sales and service centers that work seamlessly with other channels. To do so is more than just a shot of botox, as such aged systems require major face lifts - e.g., next-generation CDI technology to not only replace outdated teller systems, but to leverage CRM and business intelligence tools to improve employee productivity, reduce operational costs, and support seamless, end-to-end business processes needed to cement resilient customer relationships.

Insurance companies must evolve from traditional insurance business models to become integrated financial services providers while leveraging their financial assets and large customer bases to gain increasing economies of scale. Large scale customer management processing must be migrated to a unified enterprise CDI hub to ensure consistent and differentiated customer service across all channels. In addition to driving costs out of customer-facing processes (self-directed web portals, name/address change), enterprise CDI hubs help identify cross and up-sell opportunities.

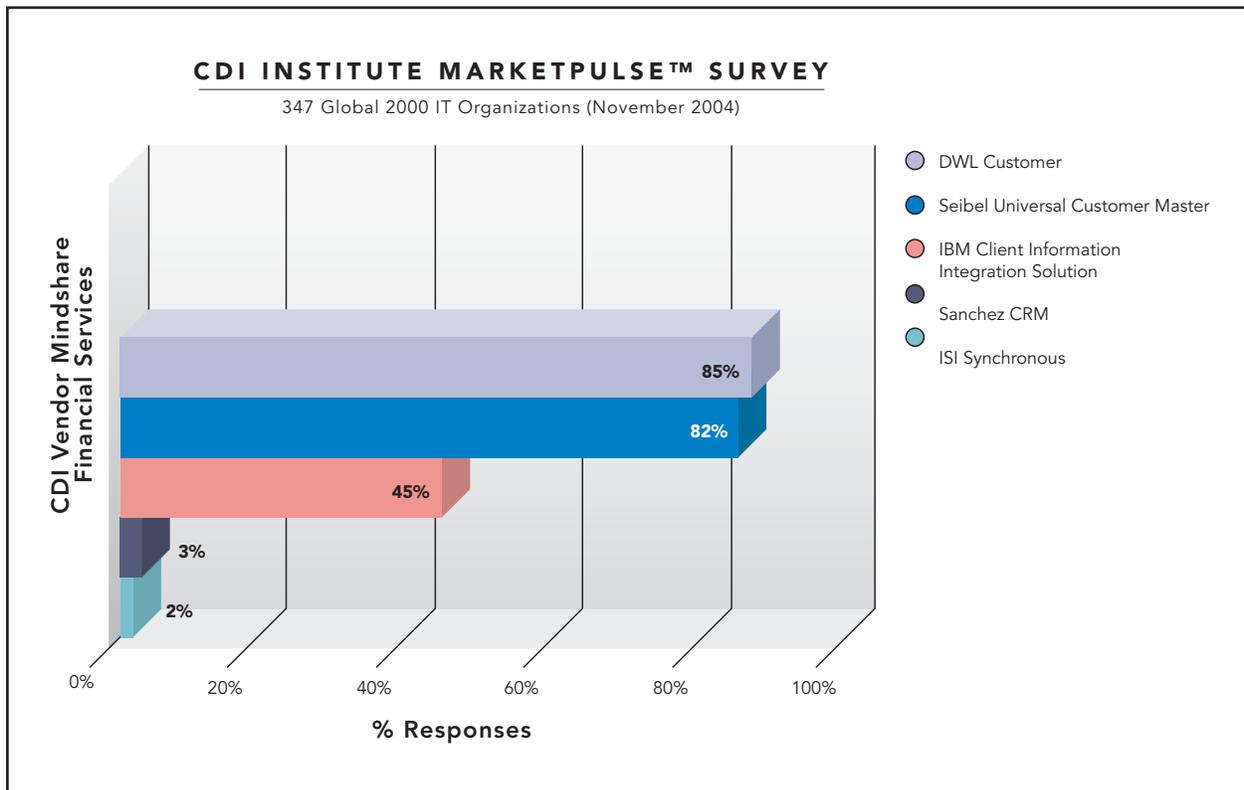


Figure 19 - Top Five CDI Vendors' Mindshare within Financial Services (Source: CDI Institute, November 2004)

## Pharmaceutical/Life Sciences

Market-leading pharmaceutical and life sciences firms must unify physician/customer information from multiple systems and business units in a robust data model specific to their industry.

Among the business and technology challenges associated with customer management, our pharma clients highlight these ongoing CDI-related needs:

- Improve productivity of pharma sales reps
- Coordinate sales and operations planning via common infrastructure and goals/metrics
- Increase customer/physician acquisition, retention and profitability
- Reduce information management overload/costs
- Reconcile dis-intermediated data sources (IMS, NDC, AMA) and industry standard identifiers (IMS, DEA, state licensing)

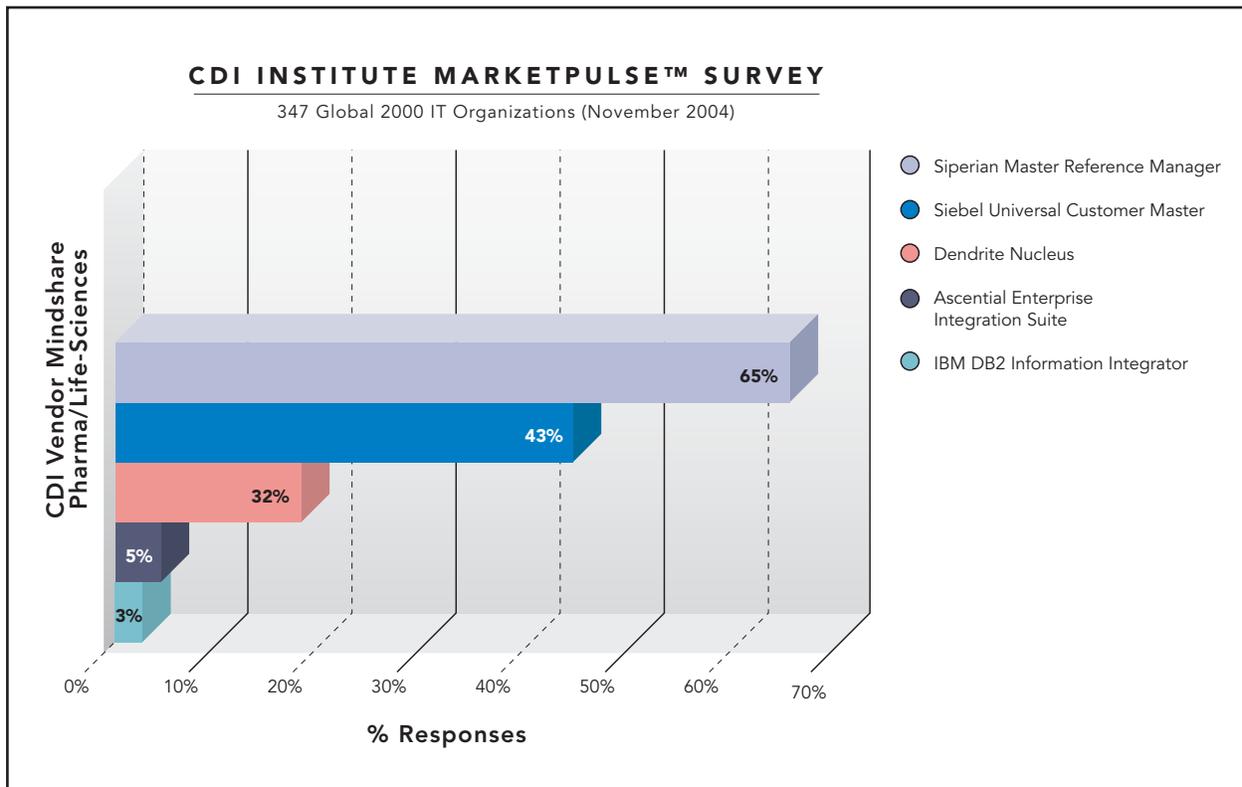


Figure 20 - Top Five CDI Vendors' Mindshare within Life Sciences (Source: CDI Institute, November 2004)

# High Technology Manufacturing

It is quite common for high technology manufacturers (chips, consumer electronics, software, systems) to desire a single source of truth for customer, customer site and contact - for both distributors and end-user customers. Additionally, many of the more successful high tech manufacturers also increasingly grow via acquisitions more so than via organic growth. Such strings of acquisitions to expand product lines and services bring additional customer install bases (and supporting technology infrastructure) to the already hectic pace of IT build-out in a successful high tech firm.

Clearly, a well-executed CDI strategy can help such companies dramatically improve their relationships with the customer while significantly reducing marketing costs. In particular, a CDI solution can help the business to leverage the full value of their CRM investments by efficiently integrating customer data across the enterprise.

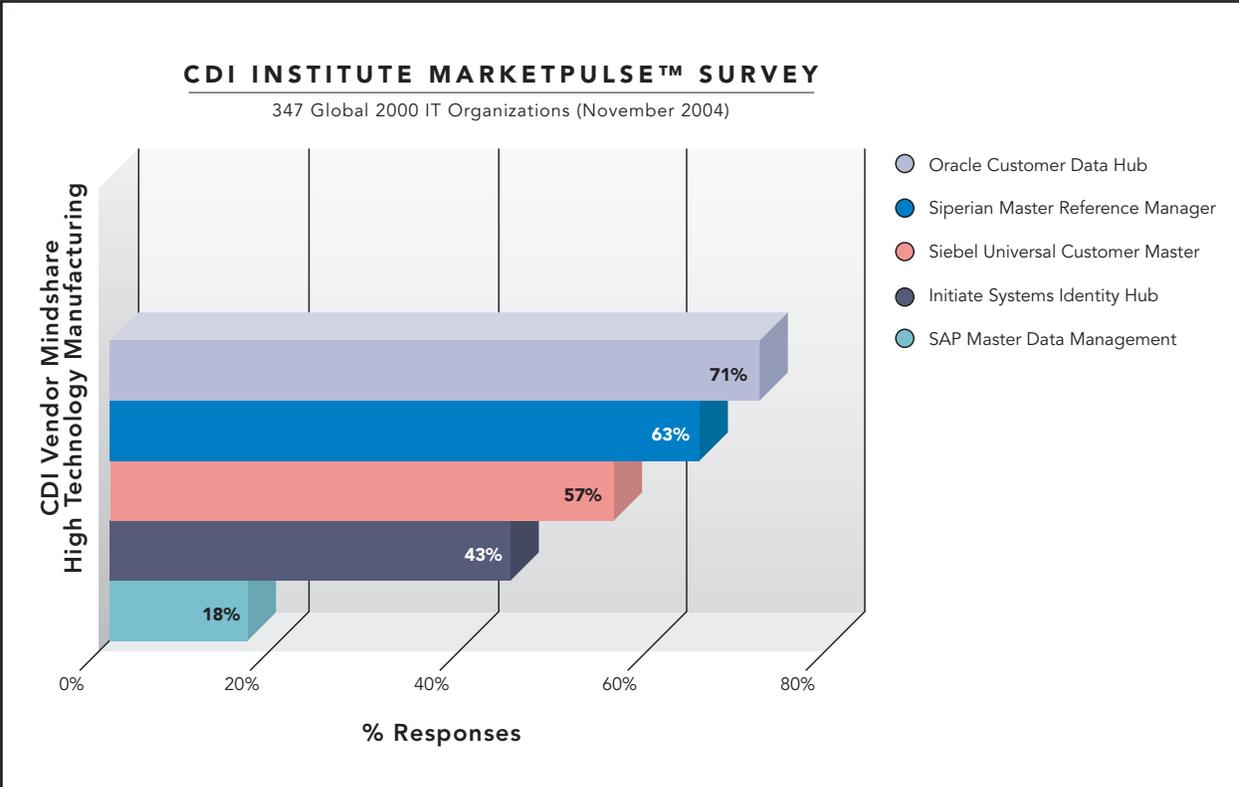


Figure 21 - Top Five CDI Vendors' Mindshare within High Technology Manufacturing (Source: CDI Institute, November 2004)

# Telecommunications

The evolution of the telecommunications industry will be radical as intense competition in wireless, long distance, Internet, and local service commoditizes products and slashes profits - not to mention VoIP further cannibalizing heretofore protected revenue streams.

Among the business and technology challenges associated with customer management, our telco clients highlight these ongoing CDI-related needs:

- Self-service to drive down customer service costs
- Real-time marketing
- Integrated campaign management using predictive analytics
- Fraud detection
- Bill presentation
- Effective management of IT infrastructure mergers driven by M&A

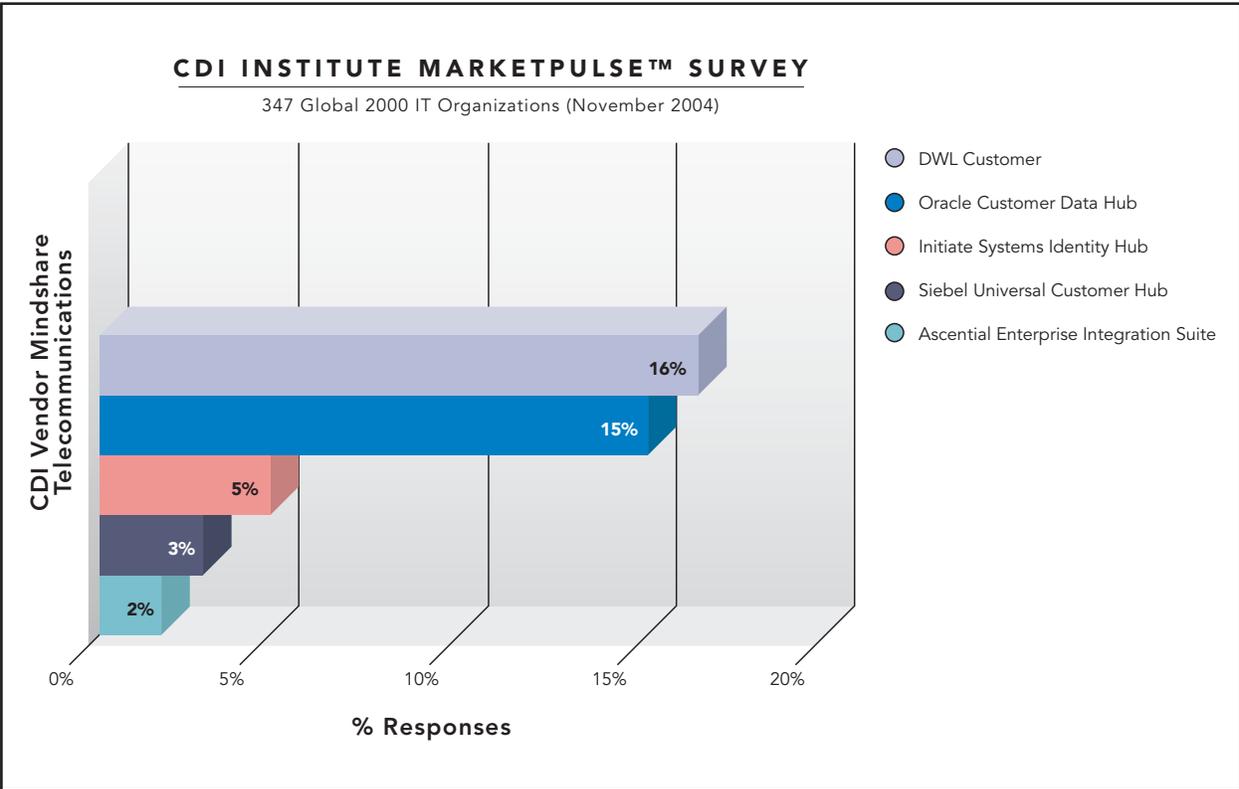


Figure 22 - Top Five CDI Vendors' Mindshare within Telecommunications (Source: CDI Institute, November 2004)

## Government/Public Sector

Among the business and technology challenges associated with customer management, our public sector clients highlight these ongoing CDI-related needs:

- Self-service to drive down customer service costs
- Integration of transactional, unstructured, geospatial, and demographic data to optimize public services (and national security)
- Imperative placed on most government agencies to collaborate and share info
- Newly-created enhanced knowledge repositories, tools, and processes critically needed for meeting new public policy requirements
- Need to positively identify and track individuals across languages and cultures

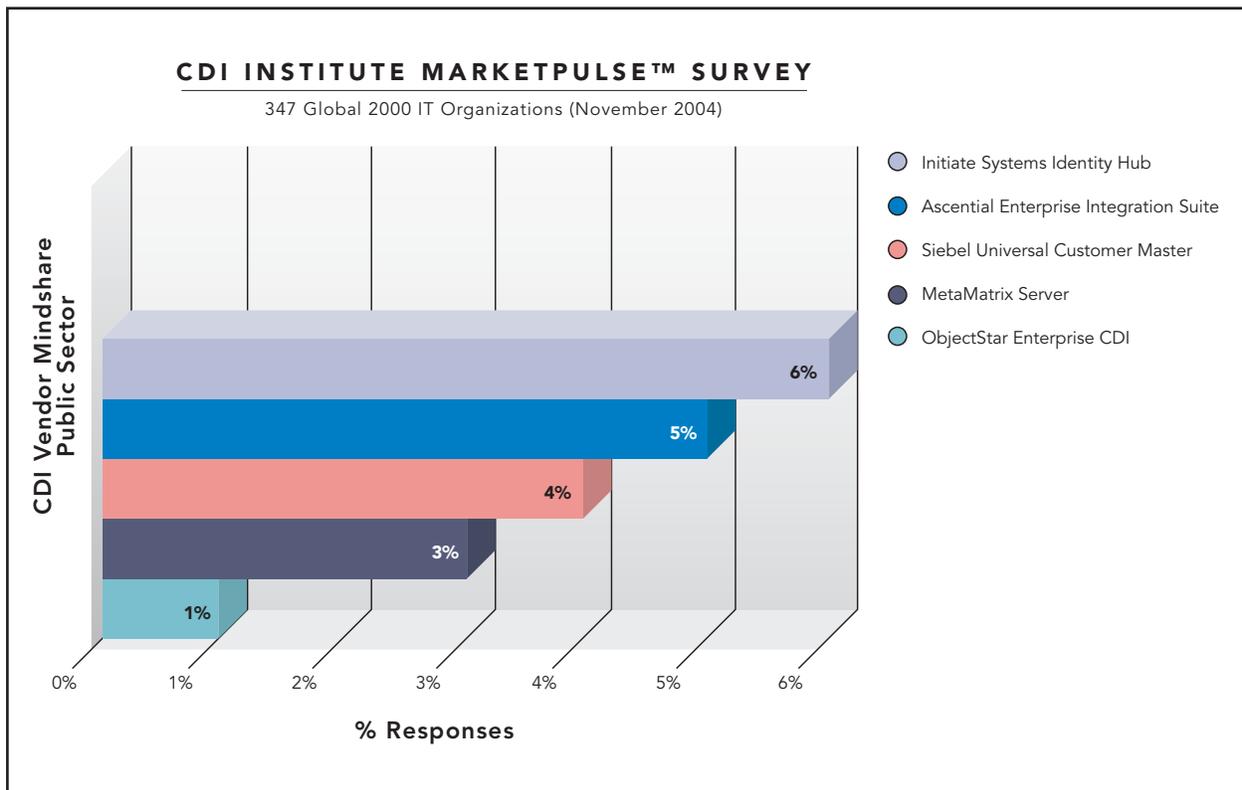


Figure 23 - Top Five CDI Vendor's Mindshare within Government/Public Sector (Source: CDI Institute, November 2004)

## Case Study: High Technology Manufacturing

A Silicon Valley software vendor had experienced typical growth pains from both organic and M&A growth. This vendor has tens of millions of customers, thousands of which interact with the company every day via multiple call centers, web sites and service/support e-mail accounts. The homegrown CDI solution had exhausted its lifespan even though it was quite sophisticated in its matching algorithms. Therefore, the IT organization championed the need for real-time identity management capable of scaling to 100 million customers with sub-second response times for customer-facing applications. As is quite common, internal politics favored a "federated" approach wherein the individual business lines and discrete enterprise applications (ERP, CRM, datawarehouse, eCommerce) kept ownership of their local private customer data and subscribed to data feeds from the central system. Core business services were subsequently developed by corporate IT to support centralized data quality and identity management via a service-oriented architecture.

Prior to undertaking this enterprise-wide CDI rollout, this manufacturer was painfully aware of the considerable overlap between its customers across product lines and other diverse sources - with many hidden opportunities hiding within the various master customer databases. By implementing an enterprise CDI solution, the manufacturer will not only increase cross-sell and up-sell levels but also discover "key influencers" in the various customer databases who could become important business partners if promoted to value-added resellers (VARs) of the vendor's products. An additional key customer benefit centered on better customer experiences as the vendor was no longer "mixing them up" due to much better matching capabilities than before.

Among the technical challenges, getting "trustworthy" data was considered the most significant. This vendor had to pull customer data from six separate systems into a single registry, and then scrub and merge the data while maintaining already recognized existing relationships. A loosely-coupled architecture comprised of "real-time customer identity hub" business services allowed for distributed autonomy across the lines of business while centrally maintaining "trustworthy" data.

Among the key business outcomes, this manufacturer of consumer software products achieved these metrics:

- Reduced software costs for data standardization because they can now verify against one source instead of six
- Reduced direct marketing costs by due to elimination of duplicate and redundant customer records
- Increased cross-sell and up-sell revenue by having a complete picture of the customer's account at the various points of service
- Reduced customer churn by materializing more accurate records "on demand" and "just in time" to resolve more billing and support issues faster
- Increased customer privacy compliance by applying privacy preferences from two existing systems to four additional systems
- Reduced hardware and software fees by reducing the volume of master customer records under management and thus all related storage, maintenance and development costs (this is offset somewhat by new software costs associated with the enterprise CDI Solution).

Bottom Line: By customizing a commercially available CDI solution over a period of 6+ months, this major high technology manufacturing concern reengineered entire end-to-end customer processes to enable it to better serve its customers and grow its business. Another major benefit is that the business now has a common "lingua franca" for exchanging customer data between enterprise systems by utilizing a single corporate identifier for syncing up data between such systems.

Dimension	Description
Number of customers	50 million parties/customers
Primary Application Vendors	Siebel call center, Oracle financials
Number of business units sharing master customer data	Six business lines; now additional strategic "outlier" databases to yet be integrated
Peak match/merge rate	150 transactions per second against 150 million call center records
3rd party data sources to aggregate	D&B, Experian, marketing data providers
Business partner data sources to integrate	D&B, Verisign, Wells Fargo
Unique fields kept in central customer master	Customer privacy preferences, email and contact addresses, housekeeping data
New or enhanced positions arising from CDI	Data custodian, data quality steward
Next stage in CDI evolution	More robust fail-over capabilities; increased administrative capabilities for exception handling

Figure 24 - CDI Implementation Characteristics (Source: CDI Institute, November 2004)

## Bottom Line

Industry-leading enterprises have been implementing CDI for a number of years. The CDI Institute has interviewed almost 350 of these companies and has analyzed the market to extract lessons learned which point the way to the most effective "best practices" for success implementation - especially those implementations which demonstrate positive ROI or competitive advantage as business outcomes.

Most Global 2000 enterprises will not consolidate around a single strategic IT solutions provider and therefore customer data persists across multiple heterogeneous customer-facing systems - e.g., Amdocs call centers, Siebel sales force automation and Unica marketing automation. Furthermore, many industries have multiple customer types that must co-exist - e. g, pharma companies require a prescriber master, organization master, and patient master.

This report has highlighted some of the most representative experiences and lessons learned. To summarize these as prescriptions, the CDI Institute recommends:

- Evaluate CDI infrastructure as mission-critical
- Focus on extensibility of the customer data model
- Evaluate functionality and extensibility of the business services layer
- Mandate third generation CDI hub flexibility to fine-tune the degree of persistence
- Insist on industry-specific references that are more than proof-of-concepts and secure commitment from the CDI vendor for future federated capabilities and embedded analytics

The first step for most IT organizations is to identify the business benefits and ROI of CDI programs, and look to corporate sponsors tied to either: (a) "big bang" strategic re-engineering of customer-facing processes or (b) identify quick wins (more likely) via cost reduction in name and address process fine-tuning.

Given the marketing ramp up by the likes of Oracle, SAP and Siebel, we believe it will quickly become boardroom-level knowledge that CDI is a "strategic" initiative that deserves serious scrutiny - and soon.

*Aaron Zornes is chief research officer of The CDI Institute. For additional information on this topic or other CDI Institute offerings, please contact [info@tcdii.com](mailto:info@tcdii.com).*

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## About The CDI Institute

*Independent. Authoritative. Relevant.<sup>SM</sup>*

The CDI Institute's mission is to help IT organizations be more efficient, effective, and timely in their use of "customer data integration" (CDI) technologies to achieve their customer-centric business goals. Visit [www.The-CDI-Institute.com](http://www.The-CDI-Institute.com) for more details on our high-value approach to strategic consulting on CDI initiatives.