

Business Intelligence for the Business of IT

An ENTERPRISE MANAGEMENT ASSOCIATES® (EMA™) White Paper
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*IT & DATA MANAGEMENT RESEARCH,
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Business Intelligence for the Business of IT

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Executive Summary

The need for better “business management” of large-scale Information Technology (IT) investments and operations is an ongoing industry theme. In general, ENTERPRISE MANAGEMENT ASSOCIATES® (EMA™) analysts believe IT is under-managed relative to peer enterprise functions such as manufacturing operations, supply chain management, and commercial product development. This leads to poor business alignment and performance, and is increasingly problematic as CIOs are challenged with more and more complex decisions such as whether or not to move to Cloud sourcing.

As continuous improvement techniques supported by data warehousing and analytics become dominant influences in today’s business landscape, the idea of applying them to IT is gaining traction. While data warehousing is an IT service, typically applied to domains such as sales, supply chain, and customer relationship management, **it also can be applied to the “business of IT” itself.**

Data warehousing
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“business of IT” itself.

Hewlett-Packard (HP) has brought forth a strong offering in this space, and stands alone among its competitors in fully embracing the potential of Business Intelligence (BI) and applied analytics in improving IT management. IT organizations seeking to create strategic business alignment, establish a performance driven culture, and drive continuous improvement of IT management should evaluate this product as a unique enabler.

Improving IT Performance

IT is a significant and increasing consumer of capital and strategic attention in many enterprises. With such large expenditures and business criticality, one would expect it to be managed using established management techniques comparable to those used for large retail supply chains, complex industrial operations, and so forth.

Unfortunately, this is not the case. IT management is simply immature. Even the largest IT organizations are often heavily reliant on spreadsheets and ad-hoc data collection. In some cases, maturity has even declined as distributed systems replaced mainframes and their relatively mature management approaches. The data required for strategic decisions may be weeks or months in arrears and of questionable quality because it is not sourced from true systems of record.

This is compounded by industry immaturity on what IT performance even is. Service Level Agreement (SLA) adherence? Cost management? Project effectiveness? There are many possible areas of concern. And mere data is not information nor knowledge; what is the overall model of continuous improvement? What is the cultural understanding of “how we get better?” What “value to the customer” is?

Performance management has one common requirement: business intelligence. Data warehousing and analytics have long been essential capabilities for improving business performance. Data warehousing is generally credited with Wal-Mart’s success, along with many other prominent case studies. It continues to be one of the most important areas in IT-led business innovation, leveraging increasing volumes of data, speed of processing, and sophistication of analytic techniques [1].

While IT has been a laggard compared to other industry functions in leveraging business intelligence and data warehousing, it is in fact possible to define a suitable metrics-driven performance management approach for IT [2, 3]. Such an approach might start with the two major aspects of IT management:

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projects and operations, and cover execution and financial questions first. Are the projects on track, and the applications and other services running well and delivering value? Many further data points, trends, and other information of value might be presented as well, perhaps in a hierarchy with lower-level operational metrics rolling up into higher-level indicators.

IT metrics, or metrics in any business area, are useless unless there is some understanding of what is to be done with them. The principles of “continuous improvement” are frequently applied (Figure 1).

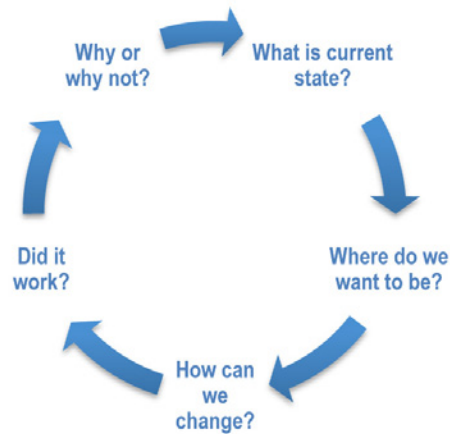


Figure 1. Continuous improvement

Measurements, averages, and trends are often part of such exercises. Deeper correlations and other analytics may also be applied in understanding “why” better. Without a basis in such approaches, the contributions of BI and analytics are limited to activities like operational dashboarding.

Performance is traditionally defined in financial terms, but in recent years nonfinancial performance has received attention, most notably through the concept of the Balanced Scorecard proposed by Kaplan and Norton (Figure 2).

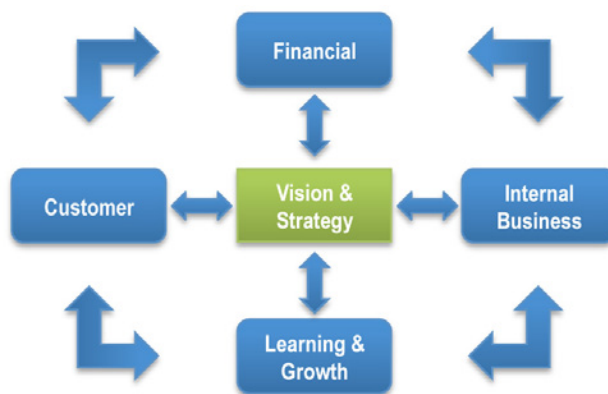


Figure 2. Balanced Scorecard concepts

Data Warehousing Overview

Data warehousing is a large and complex topic, with dedicated professional organizations, prominent thought leaders, and expensive infrastructure and practitioners. A data warehouse is essentially a reporting-oriented, consolidated copy of transactional data; it is “fed” by enterprise transactional systems such as the financial, sales, supply chain, and HR systems.

The basic definition, as established by Bill Inmon over twenty years ago, is that a data warehouse is:

- Subject oriented
- Integrated
- Historical
- Non-volatile

Architecturally the data warehouse is oriented to data “subjects” like Customer and Sale, not to systems like SAP or PeopleSoft, nor to particular reporting implementation projects. It is intended to support multiple requirements, including requirements that haven’t been defined yet. The data must be integrated; one must be able to “join” the data coming from one source to data from other sources. The data is historical; the Sales system may not have the capacity to hold ten-year old sales transactions in its online transactional database, but the data warehouse should. Finally, once the data is in the warehouse, it should not be altered. While there is much debate about implementation, these basic principles remain a good starting point for discussing the IT data warehouse.

Data Warehousing for the “Business of IT”

IT is a significant center of sustained, integrated, operational and economic activity in many businesses, and is an entirely suitable subject for data warehousing. Certainly, there is much data warehousing done on behalf of Human Resources organizations, which occupy a similar back-office, cost center position in enterprises. It is surprising that data warehousing, a capability typically run by a central IT organization, has been so long in coming to the service of the CIO.

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The CMDB versus the IT Data Warehouse

A CIO, if presented with the idea of an “IT data warehouse,” may respond, “I thought we had one of those – the CMDB (Configuration Management Database).” The CMDB (a concept originating with the U.K.’s Information Technology Infrastructure Library) was conceived as a central data store and has been a major topic of industry discussion for the past decade. However, the CMDB does not fit the classic data warehouse definition in important respects.

First, the CMDB, as it is currently evolving, is actually more of a transactional back-end for production operations. The “CMDB” found at the heart of modern IT service desk systems (such as HP’s ServiceCenter) may have extensive integrations, but this is not sufficient to consider it a data warehouse. Often, a CMDB accepts direct updates of its data. The needed reporting “dimensions” may not exist in the CMDB. Although it may have audit trails, it typically is not rigorously historical in the sense of a true data warehouse. If the CMDB is running on the same system supporting high volume Incident and Service Desk processes, long running analytic queries might seriously hamper performance. All in all, the CMDB is a poor analytic platform.

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In data warehousing terms, the CMDB is more akin to what Bill Inmon termed the “Operational Data Store” or ODS [4, 5]. The ODS, while it integrates data, is current state oriented and can be transactional. An ODS may feed an enterprise data warehouse, but should never be confused with one. Similarly, the CMDB may feed the IT data warehouse, but should not be confused with it.

Facts & Dimensions

Data warehousing is characterized by the concepts of “facts” and “dimensions.” A dimension is typically some master or reference data, often grouped in a hierarchy [6]. Examples would be:

- Time/day/week/month/year
- Store/district/region
- Product/subcategory/category/line

A fact is the intersection of dimensions: this product was sold at this time at this store. Powerful reporting and analytics are possible by grouping the facts along the various dimensions.

However, this well known “star schema” retail model takes some interpretation to apply to IT. Dimensions in IT (Figure 3) might include:

- Time dimension
- Organizational dimension (e.g., from the chart of accounts or alternate organizational reporting structure)
- Configuration item dimensions
 - IT Service/Service Family or Package
 - Application Subsystem/Application/Application Family/Application group
 - Virtual Server/Hypervisor/Machine/Rack/Data Center
- Process dimensions
 - Demand, Project, Release, Change, Service Request, Transaction, Incident, Improvement, Retirement, rolled up along various lines such as business sponsor or IT service owner.
 - Events of various kinds

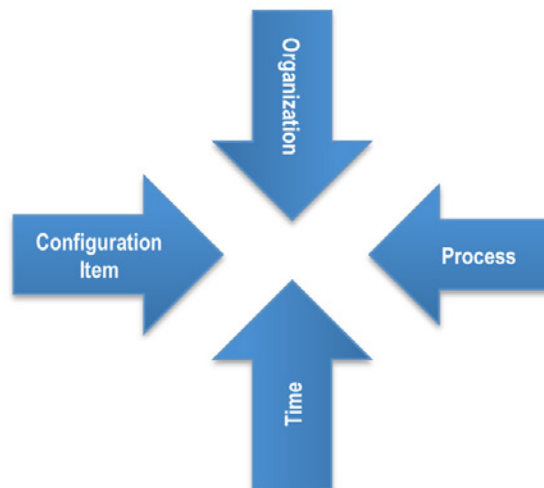


Figure 3. IT Data Warehouse dimensions

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In general these often can be complex dimensions, sometimes not strict hierarchies; for example, the relationship between Configuration Items (CIs) such as applications, virtual servers, hypervisors, and physical machines.

Dimensions require historical tracking, and this in itself can be a challenging technical problem (known as “slowly changing dimensions”). What happens if the organization is changed? Is “point in time” historical reporting required? What about “as-if” reporting? The IT DW team will need to consider these questions and formalize a consistent approach.

Finally, defining a “fact” is not straightforward. Strictly speaking, from a retail data warehousing traditionalist point of view, one might interpret a “fact” as having to include a CI and a process entity, and yes, the relationship of process entities to CI entities is rich and interesting. But relationships among processes, or among CIs, are also interesting. Is the relationship between an application and a server, a “fact?” What about the correlation between Incidents and Changes? The fundamental point is that traditional data warehousing does need some re-interpretation to meet the needs of IT management. The necessary schemas are more likely to be “snowflakes,” not “stars.”

Traditional data warehousing
needs some re-interpretation
to serve IT management.

Data Sources & ETL

Moving data in quantity from source systems to a data warehouse is a nontrivial challenge. While it can be done via scripts and basic DBMS utilities, at scale most production data warehouses rely on dedicated Extract, Transform, and Load (ETL) tools such as those offered by Oracle, SAP/Business Objects, and Informatica. There are a wide variety of data sources that might feed a mature IT data warehouse (Figure 4).

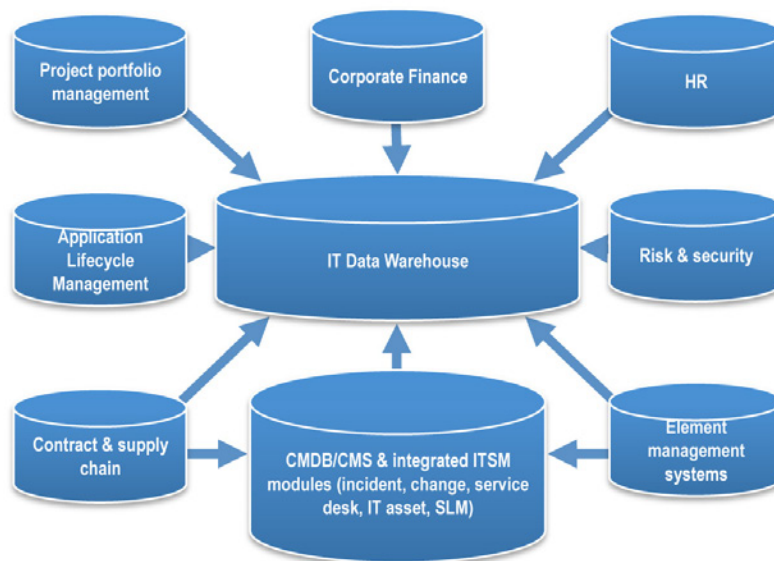


Figure 4. IT data warehouse feeds

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ETL, as a subtype of enterprise application integration [7-10], is a technically challenging area that will need to be evaluated for every candidate data source. In-depth discussions of source system data architectures, technical capabilities, performance considerations, security limitations, and other potentially challenging issues will be necessary.

The scale of the largest IT organizations can challenge even production class ETL infrastructure. A CMDB with millions of CIs, or a service desk containing ten years' of tickets, are not data sets that can be copied every night. While small reference dimensions (e.g., an organizational hierarchy, or an enterprise calendar) can be completely copied every time the data warehouse is refreshed, higher volumes require **delta processing**, that is, moving and updating only those records that have been created, updated, or deleted.

Much implementation risk resides here for any data warehouse effort. Sophisticated data warehouses may find they need to distinguish a data sourcing hub from the final ETL needed to move the data into production. Messaging architectures may be advisable at scale. All in all, integration is a nontrivial, risky engineering area and must be handled with care.

Data Quality

Any data warehouse is only as good as the data going into it. There are many industry stories of data warehouses failing due to data quality, which is usually a process problem. Without clear processes for maintaining source systems (e.g., portfolio and service management), establishing a data warehouse can be hazardous. It's not constructive to insist on 100% clean data before building a data warehouse; sometimes, a warehouse actually can assist with data quality through supporting exception reporting (e.g. by reconciling systems). But if process maturity is low around the source systems, it is probably better to focus on that before attempting a data warehouse.

There is much written on data quality as a continuous improvement discipline [11-15] and Enterprise Management Associates strongly encourages prospective implementers to make data quality a primary objective throughout any data-intensive IT management system effort, such as a CMDB or IT data warehouse. Nothing can spell failure more surely for a system than a bad data quality reputation.

The HP IT Performance Suite

IT provides scorecards, dashboards, and analytics to the rest of the enterprise, but has been slow to reap their benefits internally. Products addressing this need have been available for a number of years, including BMC's IT Business Management solutions, SAS Institute's IT Resource and Charge Management solutions, and (in part) IBM's Tivoli Data Warehouse.

HP has had a "business of IT" analysis suite for some time, essentially a data mart for IT management. The lineage of this offering dates back to the Kintana project portfolio management product, later acquired by Mercury and finally incorporated into the HP Business Technology Optimization suite (BTO). BTO as an HP brand is now being sunset in favor of IT Performance Suite, which covers all of HP's IT management products. In conjunction with the HP Discover industry conference, HP recently released a new version of their dashboarding and decision support product, now branded the HP IT Executive Scorecard.

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The revamped IT Executive Scorecard is based on a predefined data mart or warehouse for the business of IT (Figure 5), encompassing:

- A unified, normalized data model (“data is collected on every aspect of the IT value chain and stored in the industry’s most complete IT data model”)
- Full audit trail on all data, including slowly changing dimension support
- Predefined ETL based on SAP’s Business Objects for certain sources:
 - HP Financial Planning & Analysis
 - HP Project Portfolio Management
 - HP Service Manager
 - HP Business Service Manager
 - HP Asset Center
- Predefined, “persona-oriented” dashboards and reports, based on a hierarchical metrics structure (“the industry’s first cascaded optimization system”)
- Direct support for the IT Financial Planning and Analysis module

The metrics structure reflects the Kaplan-Norton balanced scorecard, translated to the following categories:

- IT Value
- Customer satisfaction
- Operational Excellence
- Future Orientation.

The metrics (i.e., Key Performance Indicators, or KPIs) deliberately reflect a cross-functional approach, pulling from the various areas of the IT Performance Suite, and are based on a combination of work by HP research and industry standards such as ITIL v3. (See [16] for a detailed discussion on applying Balanced Scorecard to IT processes).

The IT Executive Scorecard supports various “personas” optimized for the end user, e.g., senior executive, applications manager, operations manager, and so on, depending on the information the end user requires. The first edition is termed the “CIO Edition Standard” which focuses on financial health (coming from the Financial Planning & Analysis product) as well as project health (coming from the Project and Portfolio Management product).

Finally, HP emphasizes its services offerings related to IT Executive Scorecard. Such products often require a services component, especially when it comes to non-HP source systems. HP also is building a partner ecosystem to develop commercial integration adapters for common non-HP data sources such as the BMC Atrium CMDB.

The HP IT Performance Suite

The HP IT Performance Suite is the first systematic approach to digitizing the sensing, measuring, and instrumentation of the IT-controlled landscape into a consolidated view.

It forms the foundation for customized IT performance systems that deliver the industry’s deepest and broadest understanding and coverage of IT-controlled assets and investments—with the IT Executive Scorecard module giving IT leaders a single pane of glass view into and control over their largest and highest-leverage investments.

This comprehensive suite spans every IT process— starting with strategy, planning, and governance and extending across the management of applications, operations, information, and security.

Professional services, flexible support, and Software-as-a-Service (SaaS) delivery options complete the HP IT Performance Suite.

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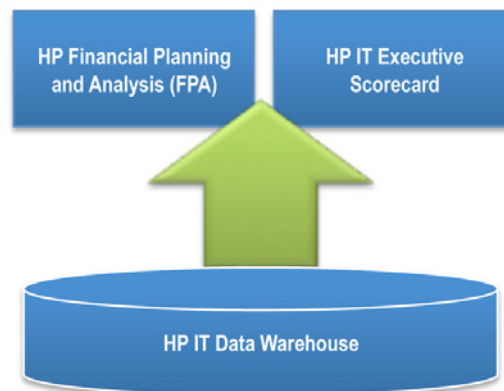


Figure 5. Major modules in the HP solution

Overall Assessment of IT Executive Scorecard

HP's IT Executive Scorecard is a unique and unparalleled industry offering. The term "Scorecard" seems almost limiting considering the actual scope of the product – a full data warehouse for IT management. Coming on the heels of the CMDB concept, it's a bold and visionary alternative to the ongoing problems of IT management data integration. Driven by the goals of IT financial planning and executive transparency, such an integrated repository will doubtless find many other uses throughout an IT organization.

HP's offering is valuable from a data warehouse professional's point of view, since it is bootstrapped with a predefined data model and Extract, Transform, and Load (ETL) scripts for loading the warehouse from HP source systems (project portfolio and IT service management). The model supports robust data architecture requirements such as full history and slowly changing dimensions, capabilities that otherwise require sophisticated professional guidance. These foundational elements are essential to delivering the visible end products of dashboards and metrics. A strong data model provides a platform for agile and responsive reporting.

EMA recommends that internal data warehousing professionals (if available) be consulted on any implementation of the IT Executive Scorecard or similar applications.

Cautions would have less to do with the tool and more with the inherent difficulties of data warehousing, performance management, and business intelligence. The challenges facing **any** data warehousing initiative are myriad: executive sponsorship, scope, requirements, architectural approach, data quality, capacity, expensive vendor licensing, development, testing, and operations, and more. **All of these are risks for the IT data warehouse as well.** Therefore, EMA recommends that internal data warehousing professionals (if available) be consulted on any implementation of the IT Executive Scorecard or similar applications.

The metrics structure chosen by IT Executive Scorecard reflects HP's years of interactions with IT leaders in many industries, but should still be carefully examined for applicability and validity of its assumptions for any particular environment. A metrics structure perceived as irrelevant or alien to an organization's culture will be disregarded, and such lack of uptake will be seen as an overall initiative failure.

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In general, EMA believes that IT performance and value management is still poorly understood, and advises users to think deeply about the behaviors – and potential unintended consequences – that any given metrics structure will start to drive. This calls in turn for organizational change management expertise.

Predefined data warehouses can also be problematic if the data model does not align well with the source systems. EMA would caution organizations who are not running primarily HP source systems that either third-party adapters, HP professional services, or internal resources will be required to write custom ETL. Due diligence and detailed estimation is indicated here.

Basing the IT Financial Planning and Analysis solution on the same data warehouse platform is a strong and visionary move for HP. All IT process areas should draw upon common data as much as possible, and the same IT management data can be used for both operational as well as financial purposes. This contrasts favorably with other scenarios where the IT finance organization builds its own data store, which may turn out to be redundant with solutions also being constructed for risk, portfolio management, asset management, and other functional areas (Figure 6).

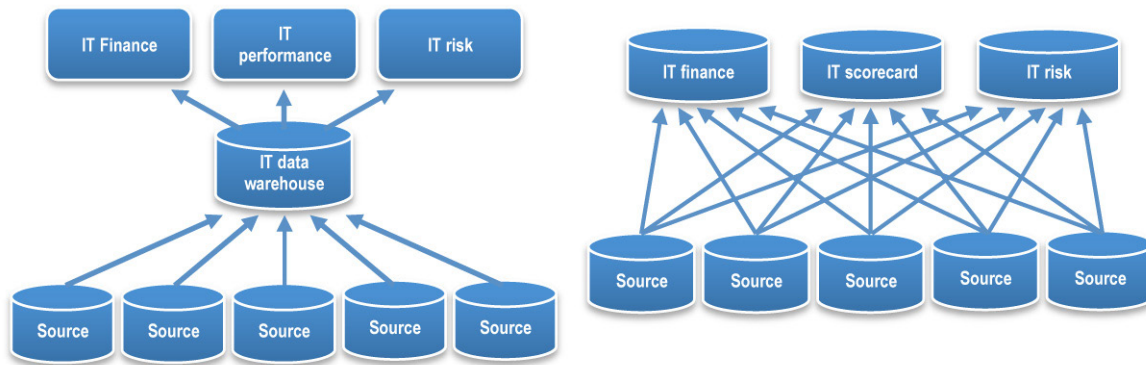


Figure 6. Disparate vs. integrated IT decision support

IT organizations need to apply the same principles of non-redundancy and master data management to themselves that they advocate for their business partners. The combination of HP IT Financial Planning and Analysis, the Executive Scorecard, and their shared data warehouse represents a case of IT taking its own medicine.

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The Value of IT Performance Management

Enterprise IT is a complex, capital-intensive, and mission critical capability for the modern enterprise. It requires all the services that modern business intelligence and analytics can offer. Too many IT organizations struggle with transparency, are challenged in showing value, and are unable to understand the relationship between IT investments and IT outcomes. Data warehousing has demonstrated its assistance to performance management repeatedly in other business domains. It comes with its own set of challenges, and is not something to be undertaken lightly; however, for IT performance management, there is no substitute for having data that is clean, integrated, historical, and optimized. This will increasingly prove essential for the kinds of deep analysis the modern enterprise IT organization requires to provide continuously improving service to its stakeholders.

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Emerging Trends in IT Performance Management

What does the future hold for IT and the customers and vendors of IT data warehousing? The following trends may represent important new horizons for “BI for IT.” All will require a foundation such as the HP IT data warehouse.

Next Generation IT Benchmarking

One clear area for HP to further explore will be benchmarking. Having defined a clear implementation of IT performance metrics, they are in an ideal place to sanitize and aggregate these metrics and offer the results back to industry. Such data could represent a quantum leap in quality and value beyond current IT benchmarking offerings, and HP should move decisively to pursue this opportunity.

Cloud Value Management

Should we go to Cloud? Once there, how do we maintain the value proposition? Similar questions have been asked in telecom management, resulting in the emergence of Telecom Expense Management (TEM) solutions. As Cloud implementations become more commonplace, ensuring that commitments and value are sustained will become a critical area of concern for CIOs, and fully answering such questions will require an integrated view into IT operational and financial management, along with current market intelligence on Cloud providers’ competing offerings. EMA expects the emergence of vendor capabilities along these lines in the next 6-12 months.

Systems Management Predictive Analytics

The amount of data produced by IT element (a.k.a. resource) managers (mainframe, server, storage, network, etc.) is immense, yet true analytic techniques are in their infancy. Vendors such as Prelert are developing specialized pattern recognition analytics for better identifying root cause for incidents, and this remains an area ripe for further investment.

Unstructured Text Analytics

Finally, advanced data analytics increasingly encompass unstructured data, e.g., text mining. EMA predicts that unstructured text analytics will become a critical component for the IT data warehouse, as it begins to absorb more and more data from sources such as social media, service ticket text fields, and even voice to text transcriptions from call centers. Such developments are already in progress from specialized vendors such as Verint and SoftLib, and their integration into generalized IT analytics is only a matter of time. HP’s acquisition of Autonomy will almost certainly be called on to contribute in this area.

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Demand & Execution Management Analytics

Unified IT demand management analytics is an increasingly hot topic lately – gathering an aggregated view of all the different forms of work, of demand for IT resources whether driven by projects, service support, or ongoing improvement. EMA predicts that when the basic gathering of this data is matured, there will emerge a need for analytically-based “execution management” similar to that seen in modern shop floor execution systems.

Conclusion

The phrase “barefoot cobbler’s child” is commonplace in the IT industry, signifying the fact that while IT automates the rest of the enterprise, its own value chain is poorly understood, fragmented, and insufficiently automated. Correctly measuring and managing IT performance has been an elusive goal.

IT transparency relies on the application of data management, and is a very data hungry objective. Best practices in business intelligence and data warehousing are well understood in the industry, but their application to IT management itself – BI for IT – is a leading-edge topic. With the IT Executive Scorecard, HP maintains a leadership position in IT management data warehousing and the broader domain of IT business management.

Author and Research Director Charles Betz spent several years at a major U.S. bank as an architect and application manager for a data warehouse for the “business of IT.”

Best practices in business intelligence and data warehousing are well understood in the industry, but their application to IT management itself – BI for IT – is a leading-edge topic.

About HP

HP creates new possibilities for technology to have a meaningful impact on people, businesses, governments and society. The world’s largest technology company, HP brings together a portfolio that spans printing, personal computing, software, services and IT infrastructure at the convergence of the cloud and connectivity, creating seamless, secure, context-aware experiences for a connected world. More information about HP (NYSE: HPQ) is available at <http://www.hp.com>.

References

1. Davenport, T.H. and J.G. Harris, *Competing on analytics : the new science of winning* 2007, Boston, Mass.: Harvard Business School ; London : McGraw-Hill [distributor]. xv, 218 p.
2. ITSMF International, *Metrics for IT Service Management*. ITSM Library, ed. J. Van Bon 2006, Zaltbommel, The Netherlands: Van Haren.
3. ITSMF International, *Implementing Metrics for IT Service Management*. ITSM Library, ed. J. Van Bon 2008, Zaltbommel, The Netherlands: Van Haren.
4. Inmon, W.H., *Building the Operational Data Store* 1996, New York: John Wiley & Sons.
5. Betz, C. *The CMDB is an Operational Data Store*. The Data Administration Newsletter, 2/1/2009. Accessed 10/4/2011 from: <http://www.tdan.com/view-articles/9607>.

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6. Kimball, R. and M. Ross, *The data warehouse toolkit : the complete guide to dimensional modeling*. 2nd ed 2002, New York: Wiley. xxiv, 436.
7. Hohpe, G. and B. Woolf, *Enterprise integration patterns : designing, building, and deploying messaging solutions* 2005, Boston ; London: Addison-Wesley. li, 683 p.
8. Linticum, D.S., *Enterprise application integration*. Addison-Wesley information technology series. 2000, Reading, Mass.: Addison-Wesley. xvii, 377.
9. Schmidt, J. and D. Lyle, *Integration Competency Center: An Implementation Methodology* 2005: Informatica Corporation.
10. Schmidt, J. and D. Lyle, *Lean Integration: An Integration Factory Approach to Business Agility* 2010, Upper Saddle River, NJ: Addison-Wesley.
11. Brackett, M.H., *Data resource quality : turning bad habits into good practices*. Addison-Wesley information technology series. 2000, Boston: Addison-Wesley. xxviii, 354.
12. English, L.P., *Information quality applied : best practices for improving business information, processes, and systems* 2009, Indianapolis: Wiley. xxxv, 802 p.
13. Huang, K.-T., Y.W. Lee, and R.Y. Wang, *Quality information and knowledge* 1999, Upper Saddle River, N.J.: Prentice Hall PTR. xiv, 209.
14. Loshin, D., *Enterprise knowledge management : the data quality approach* 2001, San Diego, Calif.; London: Morgan Kaufmann ; Academic Press. xviii, 493.
15. Redman, T.C., *Data quality : The Field Guide* 2001, Boston: Digital Press. xviii, 241.
16. Van Grembergen, W., *Strategies for information technology governance* 2004, Hershey, Pa. ; London: Idea Group Publishing. xi, 390 p.

About Enterprise Management Associates, Inc.

Founded in 1996, Enterprise Management Associates (EMA) is a leading industry analyst firm that provides deep insight across the full spectrum of IT and data management technologies. EMA analysts leverage a unique combination of practical experience, insight into industry best practices, and in-depth knowledge of current and planned vendor solutions to help its clients achieve their goals. Learn more about EMA research, analysis, and consulting services for enterprise line of business users, IT professionals and IT vendors at www.enterprisemanagement.com or blogs.enterprisemanagement.com. You can also follow EMA on [Twitter](#) or [Facebook](#).

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