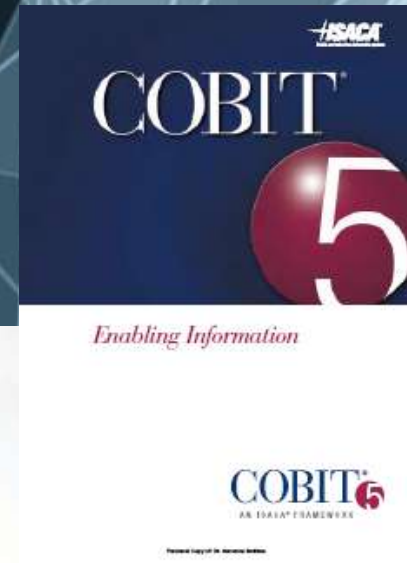


Manage and Assurance 'Big Data' *Using COBIT® 5 for Enabling Information*

Presented by
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- Director of Certification – CRISC & CGEIT, ISACA Indonesia Chapter
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- SME for Information Security Standard for ISO at ISACA HQ
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- Plt Direktur Operasi Sistem PPAK (Indonesia Financial Transaction Reports and Analysis Center, INTRAC), April 2009 – May 2011

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- Professional Engineering (PE), the Principles and Practice of Electrical Engineering, College of Engineering, the University of Texas at Austin. 2000
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- ISACA Certified Information System Auditor (CISA). CISA Number: 0540859, 2005
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- (ISC)² Certified Information Systems Security Professional (CISSP), No: 118113, 2007
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- **(ISC)² Asia Pacific Information Security Leadership Achievements (ISLA) 2011** award in category **Senior Information Security Professional**. <http://isc2.org/ISLA>

Agenda

- What is Big Data
- Big Data Refinery
- Informasi
- Risiko
- Kontrol
- Information Governance/Management Issues:
 - Demand Side of Information
 - Big Data Dimension 1: Variety of Information
 - Big Data Dimension 2: Velocity of Information
 - Big Data Dimension 3: Volume of Information
 - Master and Reference Data Management
 - End-user Computing
 - Disintermediation
- Discussion

What is Big Data?

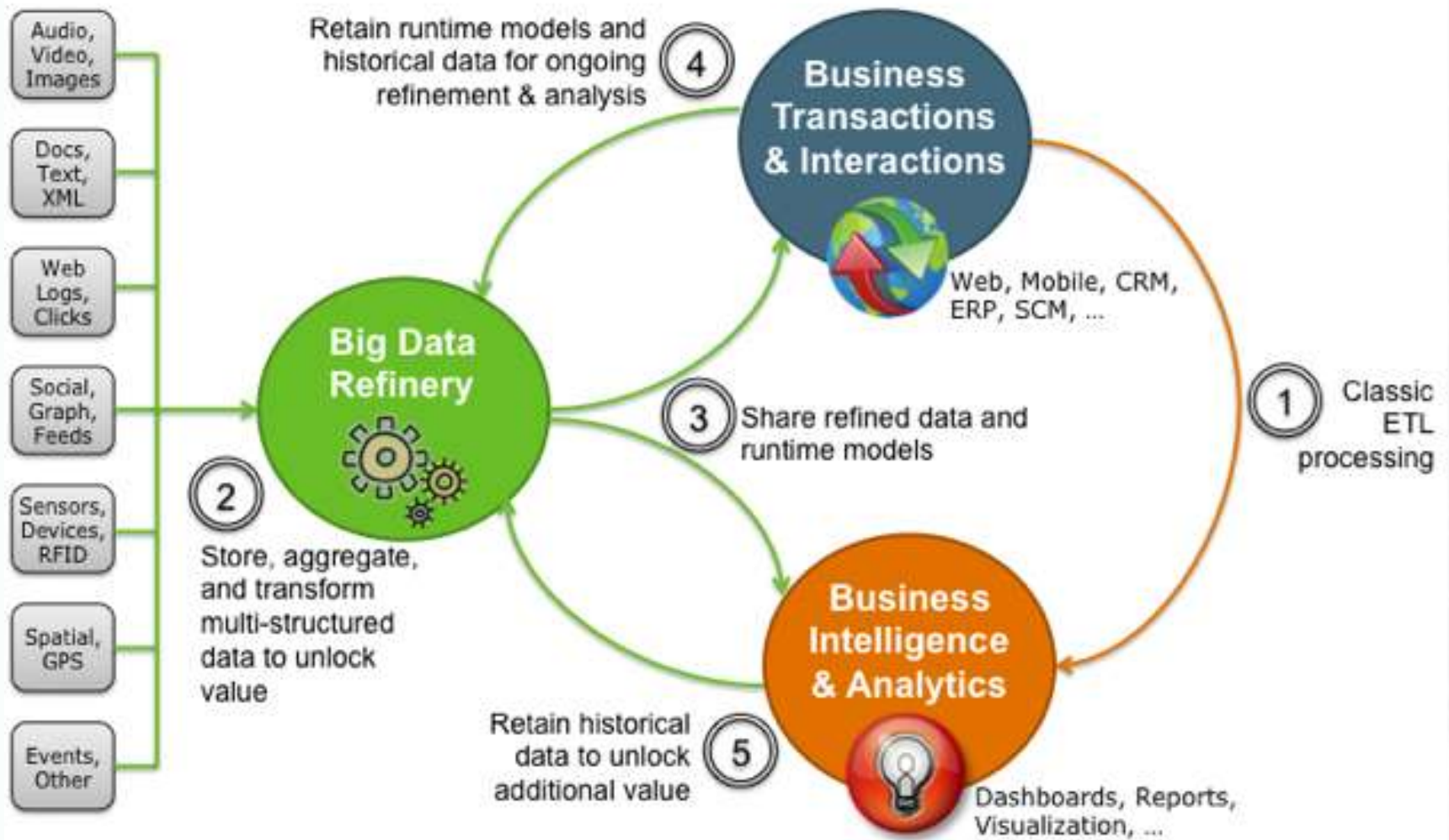
Simply put, it is data sets that—due to their size (**Volume**), the speed they are created with (**Velocity**), and the type of information they contain (**Variety**)—are pushing the existing infrastructure to its limits.

Other “Vs” can also be used to discuss Big Data, such as **Variability** and **Value**.

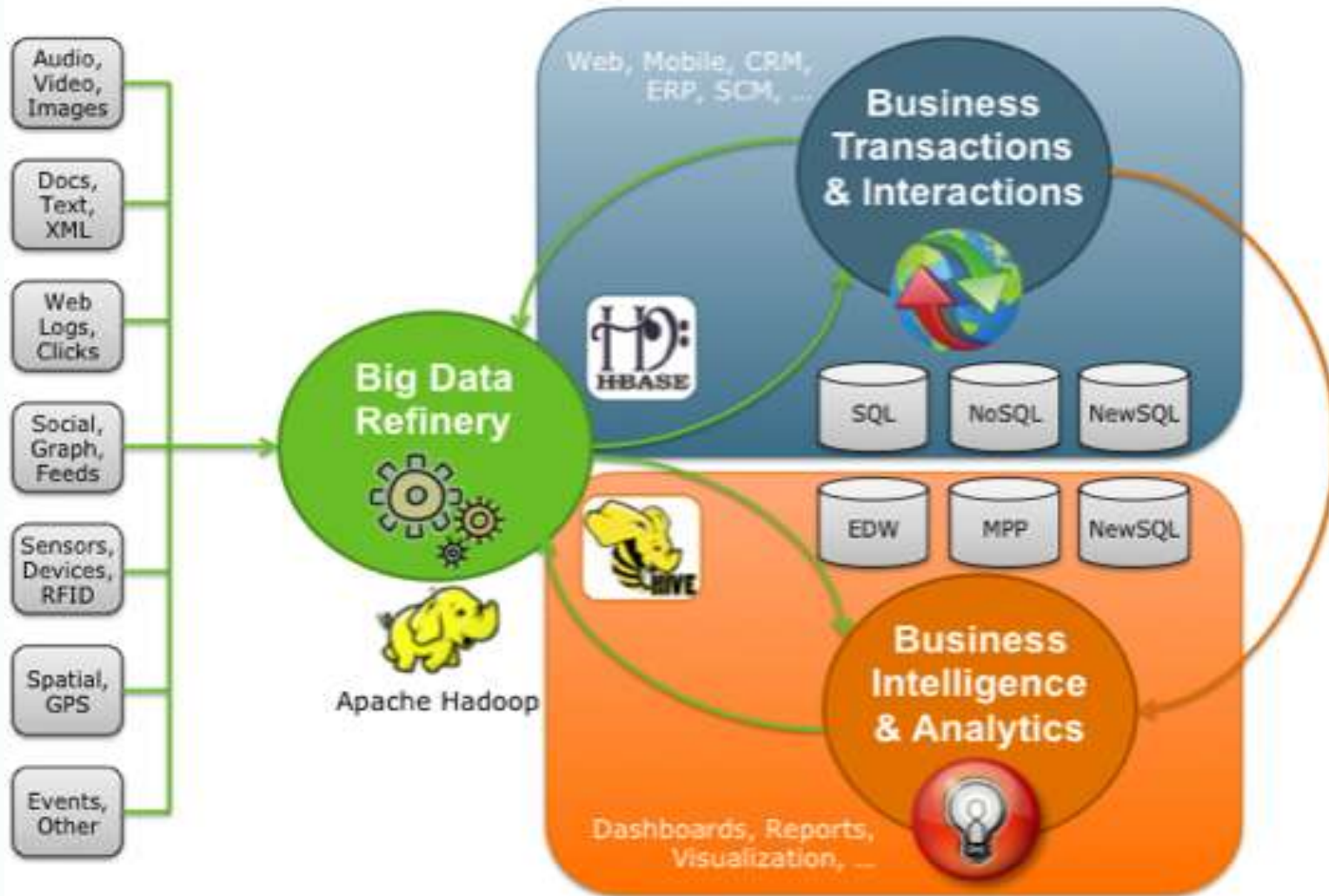


Volume	Velocity	Variety
• 90% of the worlds data was created in the last 2 years • 1 EB = 1000000000000000000 Bytes • 2.5 EB's are created every day • Gigabyte (GB) - 1,024MB • Terabyte (TB) - 1,024GB • Petabyte (PB) - 1,024TB • Exabyte (EB) - 1,024PB	• Business Transactions • Security / Fraud • Marketing • Customer Relationship Management (CRM) • Machine / Device • Social Media	• Structured • Semi-structured • Semi-unstructured • Poly-structured • Unstructured data

Connecting Big Data Refinery with Classic Systems Maximizes the Value from ALL of your Data



Next-Generation Data Architecture



Facebook Profiles Predict Job Performance

by Chad Brooks, BusinessNewsDaily Contributor | April 09, 2014 10:52am ET

More ▾



If you want to get a good idea of how job candidates will perform after they're hired, check out

Old Dominion University in V

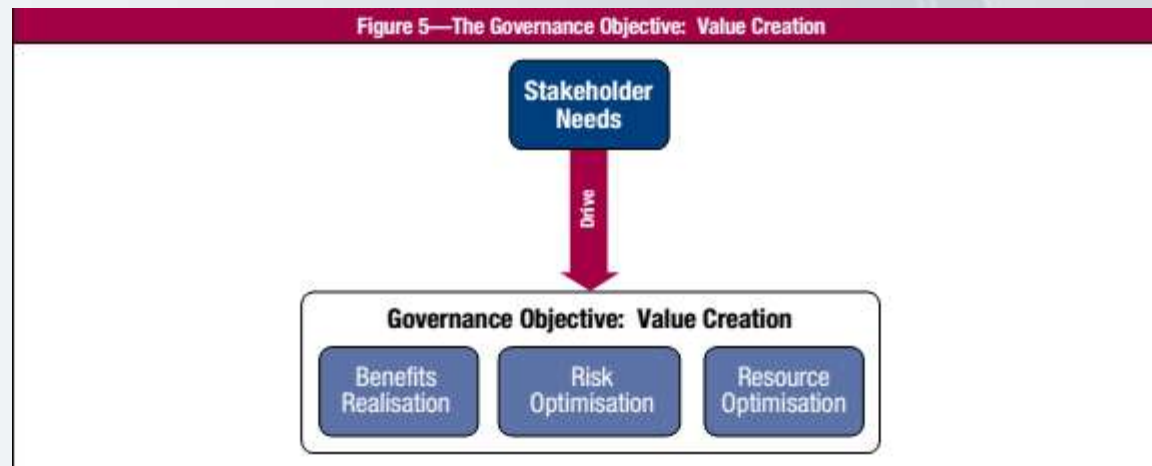


Detection

Identification

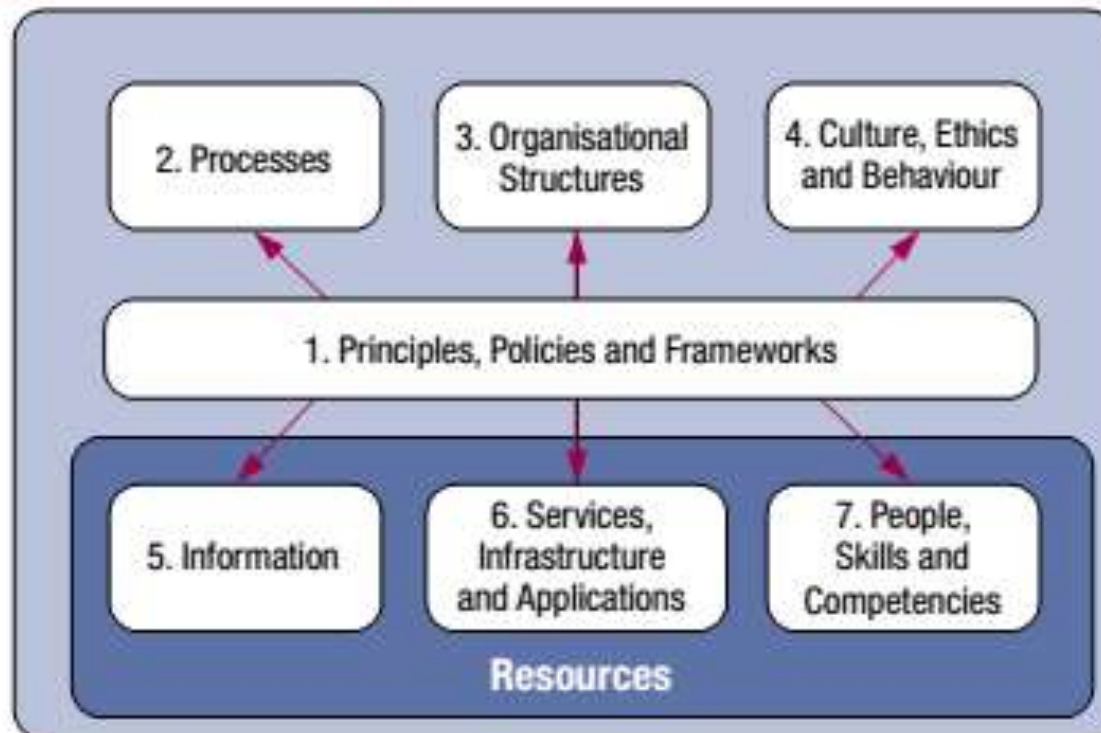
Convergence

Information Governance

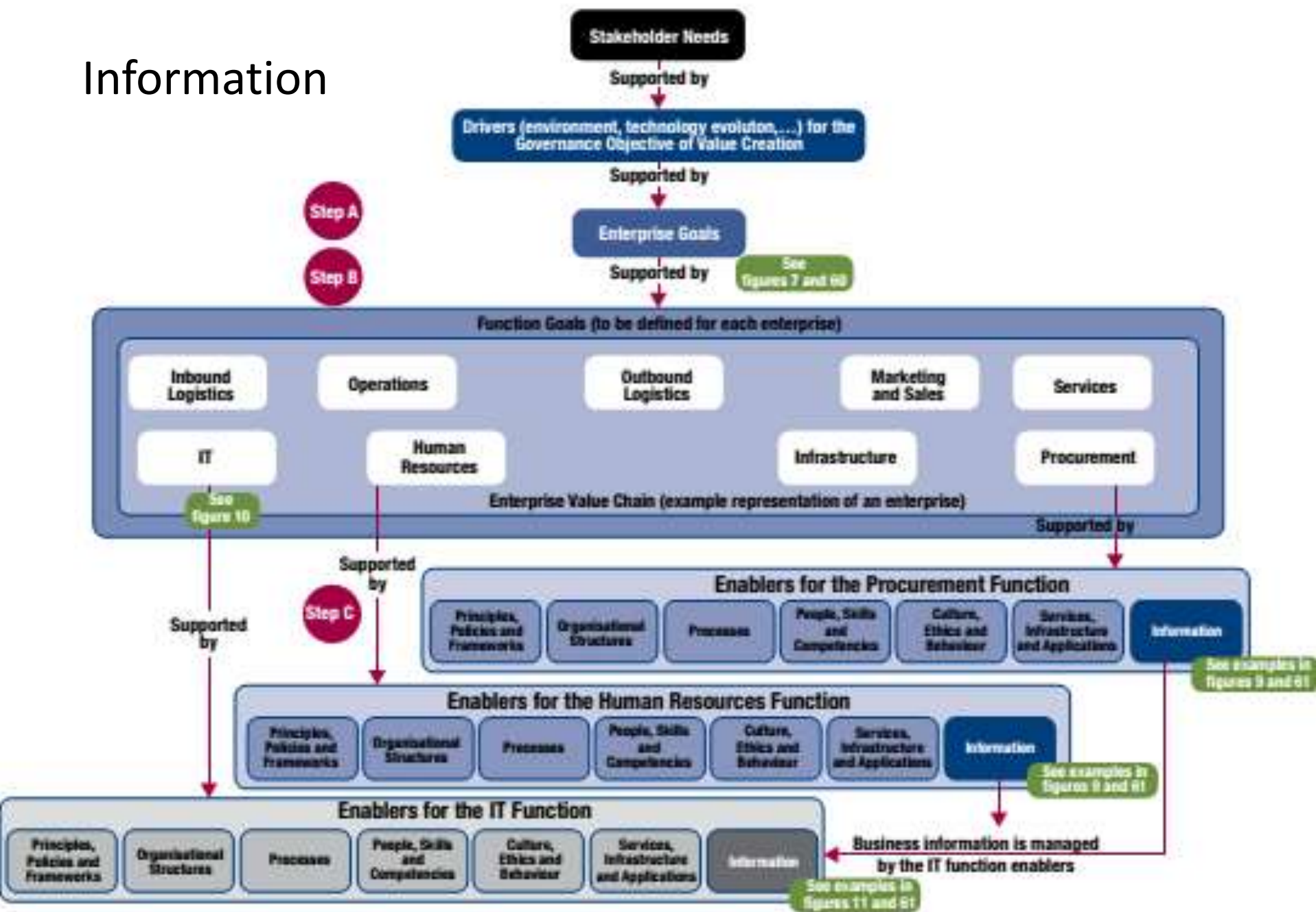


COBIT 5 Enabler

Figure 12—COBIT 5 Enablers



Information



Information Flow

Figure 8—Key Information Flows in an Enterprise



COBIT 5 Information Model

Figure 15—The COBIT 5 Information Model

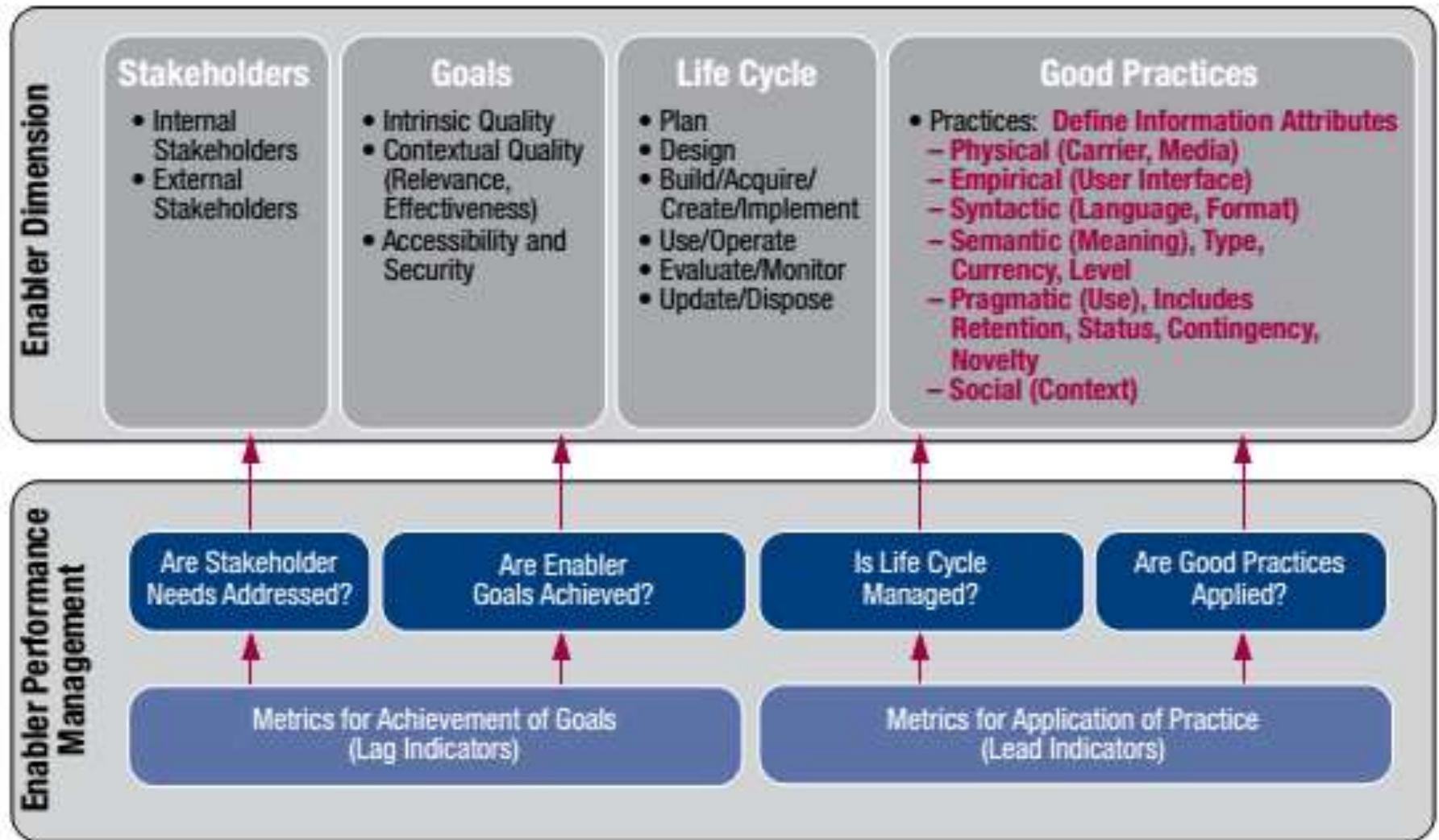
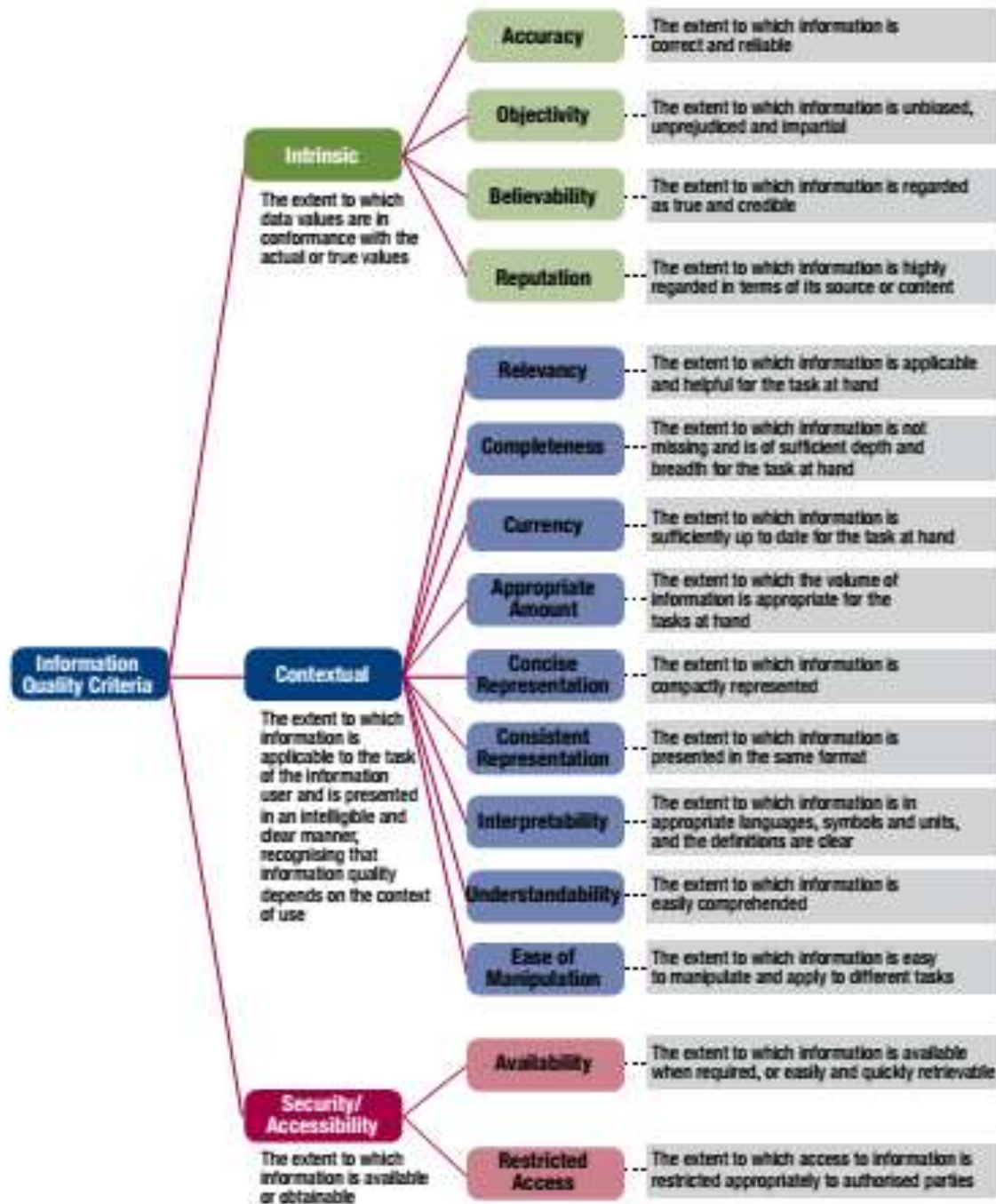


Figure 20—Information Goals/Quality Criteria



Risk

Figure 5—IT Risk Categories

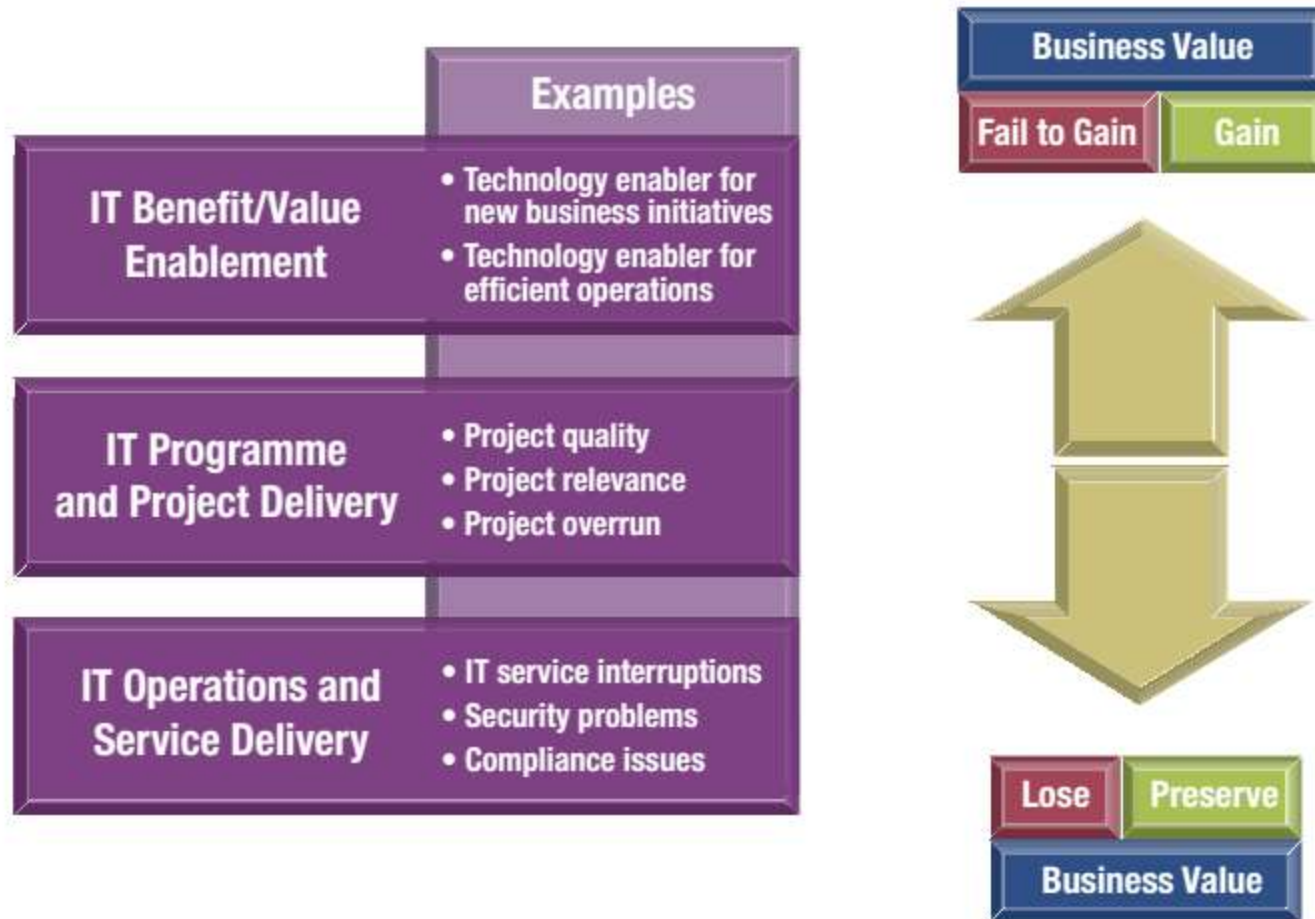
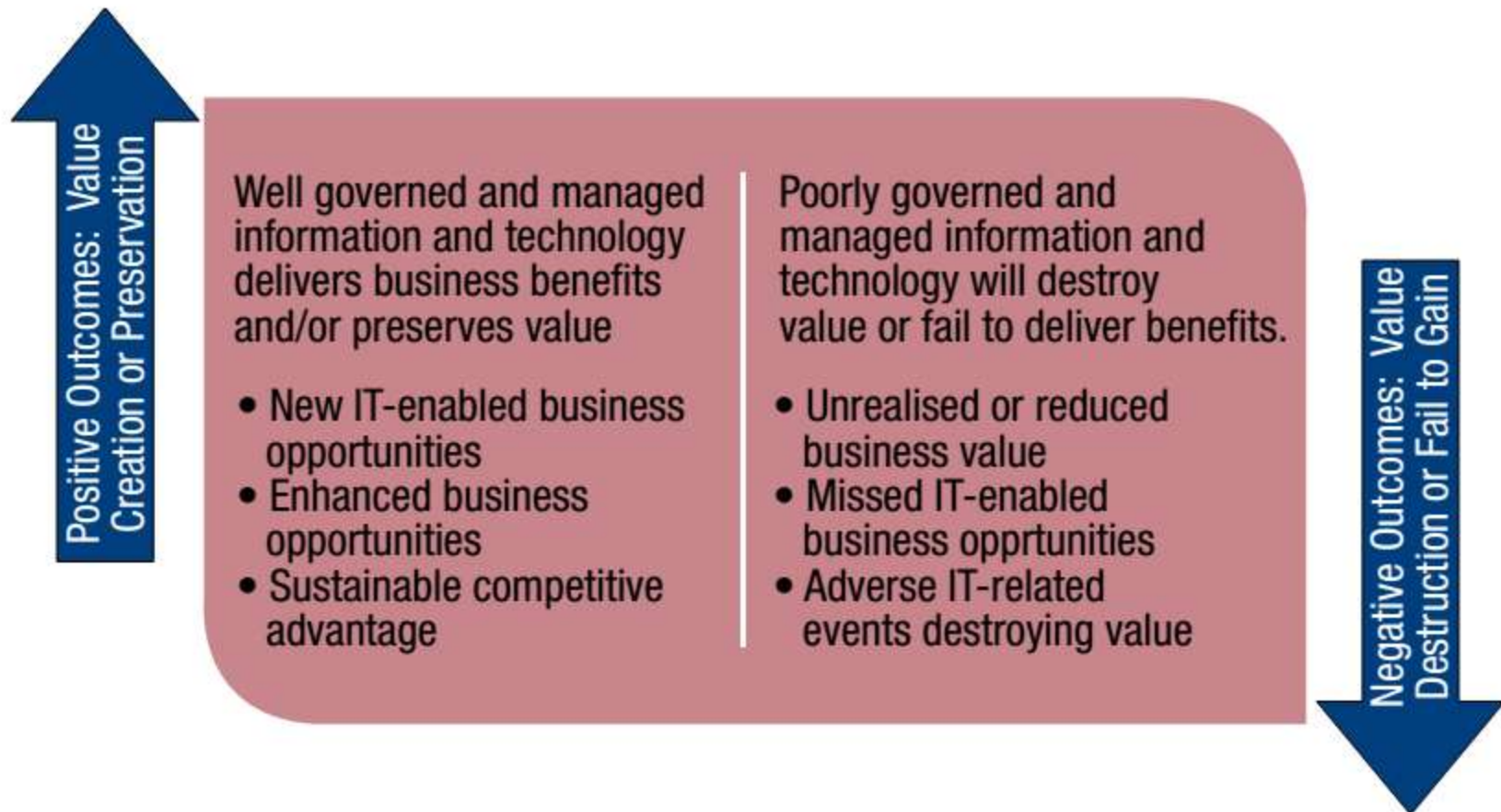


Figure 6—Risk Duality



Control categorization

Organizational Controls

- Design and structure
- Compliance and control
- Culture (organizational)

Social Controls

- People
- Culture (individual)
- Human factors
- Emergence

Technical Controls

- Architecture
- Apps/operating systems
- Infrastructure
- Technical infrastructure

Process Controls

- Technical processes
- Man-machine interfaces
- Infrastructural life cycle
- Etc.

Information Governance and Management Issues

Information Governance/ Management Issue

4.2 Demand Side/Use
of Information

4.3 Big Data: Marketing
Situational Awareness

4.4 Big Data:
Fraud Detection

4.5 Big Data:
IT Predictive Analytics

4.6 Master and Reference
Data Management

4.7 End-user
Computing

4.8 Disintermediation

4.9 Regulatory
Compliance

4.10 Data Privacy

Description and business context of the issue

Description of typical information items/groups affected,
information quality dimensions that are relevant to the
issue and the information quality goals

Description of affected function goals (IT and business
functions) and enterprise goals that are related to the issue

COBIT 5 Enablers to Address the Information Governance/Management Issue

Principles,
Policies and
Frameworks

Organisational
Structures

Processes

People, Skills
and
Competencies

Culture,
Ethics and
Behaviour

Services,
Infrastructure
and Applications

Information

Demand Side of Information

Figure 39—Illustrative Set of Enablers for Information Demand Side

Enabler	How Can This Enabler Help to Address the Issue?
Principles, Policies and Frameworks	Providing rules/guidance in capturing, implementing and reviewing business user needs, and ensuring effective and efficient use of information and related technology, including: • The use of a well-defined and managed software development life cycle • Proper guidance regarding demand management, change and requirements management, use management, user support and relationship management • The defined implementation of a business governance and management framework that includes responsibilities for IT, relationship management, requirements management, etc. • A useful reference framework to consult for more detailed management of demand and use of information is Business Information Services Library (BISL[®]) (www.usbisfoundation.org)
Processes	A number of governance and management processes (from COBIT 5: Enabling Processes) are relevant in the context of lacking capacity to grasp user needs, and can be used to define a set of management practices capable of dealing with this issue: • EDM02 Ensure benefits delivery. • APO01 Manage the IT management framework. • APO07 Manage human resources. • APO08 Manage relationships. • APO09 Manage service agreements. • APO11 Manage quality. • BA02 Manage requirements definition. • BA05 Manage changes. These processes allow an organisation to diminish the mismatch between the user and IT by clarifying each party's responsibility in the relationship.
Organisational Structures	Key responsibility to overcome this issue lies with: • CIO: Accountable to manage the relationship between IT and the business • Business executives • Business process owners Other related functions can include: • Head development • Head IT operations • Service manager • Business relationship manager • Information manager • Key user

	responsibility in the relationship.
Organisational Structures	Key responsibility to overcome this issue lies with: • CIO: Accountable to manage the relationship between IT and the business • Business executives • Business process owners Other related functions can include: • Head development • Head IT operations • Service manager • Business relationship manager • Information manager • Key user
Culture, Ethics and Behaviour	The following behaviours are important for improving the relationship between IT and the business: • Openness and interest in both business and IT activities • "Continuous improvement" is promoted and executed. • Transparent and participative culture is an important focus point.
Information	A number of information items are essential for improving the relation between IT and the business: • Documented requirements • Documented change requests • Business expectations • Satisfaction analysis • Requirements development template • Business process architecture documentation • Information strategy (related to business strategy) • Impact of business needs in terms of understandable benefits, costs and risk • Business expectations and agreements (e.g., service level agreement [SLA])
Services, Infrastructure and Applications	A number of services and tools (usually to be provided by the IT function) are relevant to overcome the mismatch between IT and the business: • Business process modelling and simulation tools • Systems dynamics modelling tools • Repository-based structured enterprise architecture tools • Free form and templated diagramming tools (e.g., Microsoft® Visio®) • Computer assisted software engineering (CASE) tools, including Unified Modeling Language (UML™) and older approaches • Requirements management tools • System mockup tools • Enterprise architecture (modelling tools)
People, Skills and Competencies	Skills and competencies requirements for improving the relationship between IT and the business include some affinity of IT staff with the business. In addition, training must be foreseen for both IT and the business: • IT: to improve their knowledge of business processes • Business process owners and related staff members: several user-friendly solutions exist that empower the business user to structure the information required. • Training for end users

Information Governance/Management Issue:

Big Data Dimension 1: Variety of Information

Figure 42—Illustrative Set of Enablers for Marketing Situational Awareness

Enabler	How Can This Enabler Help to Address the Issue?
Principles, Policies and Frameworks	Providing rules/guidance in capturing, implementing and reviewing business user needs, including: • Policies specifying the use of social media by staff and by the enterprise, both as input and output of information • Privacy policy • Data protection policy • Managing knowledge throughout the enterprise • Policies for big data governance
Processes	A number of governance and management processes (from COBIT 5: Enabling Processes) are relevant in the context of the suboptimal use of a large variety of information sources, and can be used to define a set of management practices capable of dealing with this issue: • EDM04 Ensure resource optimisation. • APC04 Manage innovation. • APO13 Manage security. • BAID8 Manage knowledge. • MEA01 Monitor, evaluate and assess performance and conformance.
Organisational Structures	Key responsibility to overcome this issue lies with: • Marketing department, which should identify the many sources of information • Group responsible for managing the BI systems to assist in understanding, capturing and storing the information • CIO Other related functions can include: • Head development • Head IT operations
Culture, Ethics and Behaviour	The following behaviours are important for optimally using a large variety of information: • A critical mindset towards the: – Current way of working – Investment required to analyse information compared to the added value of this effort • A no-blame culture is required when mistakes are made regarding tendencies and evolutions • A strong lessons learned culture
Information	A number of information items are essential for optimally using a large variety of information to obtain customer insight: • Customer communication: – Enterprise has a complete stream of customer and market reactions/interactions, including old and new media and

	• Marketing department, which should identify the many sources of information • Group responsible for managing the BI systems to assist in understanding, capturing and storing the information • CIO Other related functions can include: • Head development • Head IT operations
Culture, Ethics and Behaviour	The following behaviours are important for optimally using a large variety of information: • A critical mindset towards the: – Current way of working – Investment required to analyse information compared to the added value of this effort • A no-blame culture is required when mistakes are made regarding tendencies and evolutions • A strong lessons learned culture
Information	A number of information items are essential for optimally using a large variety of information to obtain customer insight: • Customer communication: – Enterprise has a complete stream of customer and market reactions/interactions, including old and new media and customer service communications. For example, audio is converted to text; unstructured text is analysed with natural language processing; semantic and sentiment models are developed. • Customer sentiment (satisfaction/dissatisfaction): – Customer sentiment is structured and quantified along appropriate dimensions. – Trends are tracked and reported. • Sentiment/sales correlation: – Correlation between sentiment and sales is understood. – Marketing can usefully leverage sentiment/sales analytics to generate new, testable strategies. • Identified public relations issues and adequate advice to react: – Important negative trends are identified and escalated on an urgent basis to corporate communications and executive leadership. – False negatives and positives are avoided.
Services, Infrastructure and Applications	A number of services and tools (usually to be provided by the IT function) are relevant to effectively understand, capture and store information: • BI solutions • Automated data analysis tools • Forensic research tools • The proper infrastructure to support the storing of large amounts of raw and analysed information • Automated speech-to-text transcription • Semantic analysis tools (e.g., IBM Watson) • Workstation-based statistical tools (IBM SPSS, SAS)
People, Skills and Competencies	In addition to marketing skills that are required to identify and understand the sources of information, a strong analytic IT capability is needed as well. A strong product knowledge of the IT analytical systems (BI, forensic research, etc.) are completed with a business mindset and an openness to change.

Information Governance/Management Issue:

Big Data Dimension 2: Velocity of Information

Figure 48—Illustrative Set of Enablers for Fraud Detection

Enabler	How Can This Enabler Help to Address the Issue?
Principles, Policies and Frameworks	Providing rules/guidance in fraud prevention and detection includes: • Regulatory compliance policy • Data protection policy • Internal control framework • Information security principles and policy • Business continuity and disaster recovery policy • Fraud risk policy
Processes	A number of governance and management processes (from COBIT 5: Enabling Processes) are relevant in the context of fraud prevention and detection and can be used to define a set of management practices capable of dealing with this issue: • EDM03 Ensure risk optimisation. • APO12 Manage risk. • APO13 Manage security. • BAI03 Manage solutions identification and build. • BAI08 Manage knowledge. • BAI09 Manage assets. • DSS05 Manage security services. • MEA01 Monitor, evaluate and assess performance and conformance.
Organisational Structures	Key responsibility to overcome this issue lies with: • CFO • Legal representation • Chief information security officer (CISO) • Information security steering committee • Information security manager • Risk function • CIO • Business process owner Other related functions can include: • Head development • Head IT operations
Culture, Ethics	The following behaviours are important for detecting fraud efficiently:

	• APO12 Manage risk. • APO13 Manage security. • BAI03 Manage solutions identification and build. • BAI08 Manage knowledge. • BAI09 Manage assets. • DSS05 Manage security services. • MEA01 Monitor, evaluate and assess performance and conformance.
Organisational Structures	Key responsibility to overcome this issue lies with: • CFO • Legal representation • Chief information security officer (CISO) • Information security steering committee • Information security manager • Risk function • COO • Business process owner Other related functions can include: • Head development • Head IT operations
Culture, Ethics and Behaviour	The following behaviours are important for detecting fraud efficiently: • People respect the importance of information security policies and principles. • 'Continuous Improvement' is promoted and executed. • Positive behaviour towards raising issues or negative outcomes
Information	A number of information items are essential for detecting fraud given the velocity of modifying information: • Transaction data • Client information • Insights in fraud patterns using camera images • Information released by regulators and local authorities • Insights in trends from specialist interest groups or analysts • Information security and system configuration documentation
Services, Infrastructure and Applications	A number of services and tools (usually to be provided by the IT function) are relevant to efficiently prevent and detect fraud: • Fraud detection systems • Other security measures • Continuous stream query processing
People, Skills and Competencies	Technical skills are required to set up the required security and perform the required fraud detection. Analytical skills are required to perceive fraud trends.

Information Governance/Management Issue:

Big Data Dimension 3: Volume of Information

Figure 48—Illustrative Set of Enablers for IT Predictive Analytics

Enabler	How Can This Enabler Help to Address the Issue?
Principles, Policies and Frameworks	Providing rules/guidance for efficiently processing large volumes of system information includes: • Policies for big data governance, including privacy policy if appropriate • Internal control framework, operational control practices • Governance, risk, and compliance (GRC) framework for monitoring adherence to these operational control practices • CRM policy that requires the deletion of this data on a periodic basis to maintain customer privacy policy requirements Useful reference frameworks to consult are: • DMBOK • ISO/IEC 11179 Metadata Registry
Processes	A number of governance and management processes (taken from COBIT 5: Enabling Processes) are relevant in the context of efficiently processing large volumes of system information and can be used to define a set of governance and management practices capable of dealing with this issue: • EDM04 Ensure resource optimisation. • APO02 Manage strategy. • APO03 Manage enterprise architecture. • APO11 Manage quality. • APO13 Manage security. • BAI03 Manage solutions identification and build. • BAI04 Manage availability and capacity. • BAI08 Manage knowledge. • BAI09 Manage assets. • BAI10 Manage configuration. • DSS04 Manage continuity. • DSS05 Manage security services. • MEA01 Monitor, evaluate and assess performance and conformance.
Organisational Structures	Key responsibility to overcome this issue lies with: • Head IT operations • Information security manager • CIO Other related functions can include: • Head architect

	• BA110 Manage configuration. • DSS04 Manage continuity. • DSS05 Manage security services. • MEA01 Monitor, evaluate and assess performance and conformance.
Organisational Structures	Key responsibility to overcome this issue lies with: • Head IT operations • Information security manager • CIO Other related functions can include: • Head architect • Head development • Head IT operations
Culture, Ethics and Behaviour	The following behaviours are important for efficiently processing large volumes of system information: • Learning culture • Sense of ownership
Information	A number of information items are essential for efficiently processing large volumes of system information: • Architecture principles • Data classification guidelines • Defined scope of architecture • Guiding principles for enterprise architecture • Information architecture model • Process architecture model • Transition architectures
Services, Infrastructure and Applications	A number of services and tools (usually to be provided by the IT function) are relevant to efficiently process large volumes of system information: • Analytical tools • Mechanism for storage and retrieval of data, e.g., NoSQL repositories • Enterprise architecture may be a key means to reduce the creation of data silos.
People, Skills and Competencies	Skills required to efficiently process large volumes of system information: • Technical expertise • Curiosity: a desire to go beneath the surface and discover and distill a problem down into a very clear set of hypotheses that can be tested • Storytelling: the ability to use data to tell a story and to be able to communicate it effectively • Cleverness: the ability to look at a problem in different, creative ways • The far-reaching nature of big data analytics projects can have uncomfortable aspects: data must be broken out of silos to be mined, and the organisation must learn how to communicate and interpret the results of analysis. The skills of storytelling and cleverness are the gateway factors that ultimately dictate whether the benefits of analytical labours are absorbed by an organisation.

Information Governance/Management Issue: Master and Reference Data Management

Figure B1—Illustrative Set of Enablers for Master and Reference Data Management

Enabler	How Can This Enabler Help to Address the Issue?
Principles, Policies and Frameworks	Providing rules/guidance for reference and master data management includes: • Establishing principles for reference and master data management, such as:¹⁾ – Shared reference and master data belongs to the enterprise, not to a particular application or department – Reference and master data management is an ongoing data quality improvement programme; its goals cannot be achieved by one project alone. – Accountability for managing reference data values lies with ‘data stewards’ who, in larger enterprises, are information architects or other similar information-centric roles and, in smaller enterprises, generally belong to an IT-function data management role. – Golden data records represent the enterprise’s best efforts at determining the most accurate, current and relevant data. – Replicate master data values only from the database of record. • There must be a set of data classification guidelines, information model guidelines, data integrity policies, data security, and governance and management practice guidelines. • Establishing accountability for data-related decisions, across the enterprise and not only within IT
Processes	A number of governance and management processes (from COBIT 5: Enabling Processes) are relevant in the context of master and reference data management and can be used to define a set of governance and management practices that are capable of dealing with this issue: • EDM02 Ensure benefits delivery. • EDM03 Ensure risk optimisation. • EDM04 Ensure resource optimisation. • APC01 Manage the IT management framework. • APC03 Manage enterprise architecture. (e.g., manage the data integration architecture) • APC05 Manage portfolio. • APO11 Manage quality. • APO12 Manage risk. • BA02 Manage requirements definition. (e.g., understand integration needs for reference data²⁾) • BA03 Manage solutions identification and build. For example: – Identify reference data sources and contributors. – Implement reference and master data management solutions. – Maintain match rules. – Establish golden records. • BA05 Manage organisational change enablement. • BA06 Manage changes. • BA08 Manage knowledge.

master and reference data management and can be used to define a set of governance and management practices that are capable of dealing with this issue:

- EDM02 Ensure benefits delivery.
- EDM03 Ensure risk optimisation.
- EDM04 Ensure resource optimisation.
- APC01 Manage the IT management framework.
- APC03 Manage enterprise architecture. (e.g., manage the data integration architecture)
- APC05 Manage portfolio.
- APC11 Manage quality.
- APC12 Manage risk.
- BA02 Manage requirements definition. (e.g., understand integration needs for reference data²²)
- BA03 Manage solutions identification and build. For example:
 - Identify reference data sources and contributors.
 - Implement reference and master data management solutions.
 - Maintain match rules.
 - Establish golden records.
- BA05 Manage organisational change enablement.
- BA06 Manage changes.
- BA08 Manage knowledge.
- DSS06 Manage business process controls.
- MEA01 Monitor, evaluate and assess performance and conformance.

The processes identified here are not the exclusive responsibility of the IT function; rather, if a business decides to use a master data management approach, it should address the processes (and related practices) identified here to do so efficiently and effectively.

Organisational Structures

The following information-centric organisational structures/roles are key in supporting master and reference data management activities (Note: These are not current COBIT 5 RACI roles.):

- Enterprise architecture committee
- Business data stewards
- Data/information architects
- Application architects
- Data providers
- Data integration architects and developers
- Data consumers, for example:
 - Application users
 - BI and reporting users
 - Application developers

Culture, Ethics and Behaviour

The following behaviours are important for maintaining control over master data management:

- People focus—Stakeholders have different data needs.
- Negotiating skills—Data architects/stewards need to be able to negotiate amongst different stakeholders to gradually progress.
- Ability to think outside of silos and consider enterprise perspective

Information Governance/Management Issue:

End-user Computing

Figure 54—Illustrative Set of Enablers for End-user Computing

Enabler	How Can This Enabler Help to Address the Issue?
Principles, Policies and Frameworks	Provides rules/guidance of adoption, use, sharing and disposal of information in the context of end-user computing, including: • Defining what is expected from end users in terms appropriate use and custodianship of allocated assets and privileges • Communicating what the enterprise is going to govern and manage regarding end-user computing concerns and how it will accomplish this • Treatment of information on edge devices • Continuous education of accountable end-user professionals Useful reference frameworks to consult are: • The Institute for End User Computing, Inc. (www.ieuc.org) • ITIL® (www.itil-officialsite.com) • COBIT 5 (www.isaca.org/COBIT) • The Help Desk Institute (HDI®) (www.thinkhdi.com)
Processes	A number of governance and management processes (from COBIT 5: Enabling Processes) are relevant in the context of end-user computing, and can be used to define a set of governance and management practices capable of dealing with end-user computing issues. The processes identified here are not the exclusive responsibility of the IT function; rather, if a business function decides to use end-user computing, it should at least participate in the following processes or put in place its own processes: • EDM02 Ensure benefits delivery. • EDM03 Ensure risk optimisation. • EDM04 Ensure resource optimisation. • APO03 Manage enterprise architecture. • APO08 Manage relationships. • APO09 Manage service agreements. • APO10 Manage suppliers (when end-user applications and infrastructure is outsourced). • APO11 Manage quality. • APO13 Manage security. • BA03 Manage solutions identification and build. • BA08 Manage knowledge. • BA09 Manage assets. • BA10 Manage configuration.

	The processes identified here are not the exclusive responsibility of the IT function; rather, if a business function decides to use end-user computing, it should at least participate in the following processes or put in place its own processes: • EDM02 Ensure benefits delivery. • EDM03 Ensure risk optimisation. • EDM04 Ensure resource optimisation. • APO03 Manage enterprise architecture. • APO08 Manage relationships. • APO09 Manage service agreements. • APO10 Manage suppliers (when end-user applications and infrastructure is outsourced). • APO11 Manage quality. • APO13 Manage security. • BA03 Manage solutions identification and build. • BA08 Manage knowledge. • BA09 Manage assets. • BA10 Manage configuration. • DSS02 Manage service request and incidents. • DSS05 Manage security services. • DSS06 Manage business process controls. • MEA01 Monitor, evaluate and assess performance and conformance. • MEA02 Monitor, evaluate and assess the system of internal control. End-user computing applications should also be subject to management assessment and to internal audits.
Organisational Structures	Key responsibility in end-user computing: • Business process owners End-user services support function: • Help desk function • Training Other related functions can include: • Architecture • Security • Business continuity management • Quality assurance
Culture, Ethics and Behaviour	The following behaviours are important for maintaining control over end-user computing: • Guard against unauthorised use of privileged information by companies and individuals. • Guard against misuse of corporate assets. • Guard against security breaches. • Ensure due diligence and accountability in knowledge work and corporate reporting, for example, supported by spreadsheets (i.e., testing and quality assurance is not required only in the classical 'IT development' process).

Information Governance/Management Issue:

Disintermediation

Figure 57—Illustrative Set of Enablers for Disintermediation

Enabler	How Can This Enabler Help to Address the Issue?
Principles, Policies and Frameworks	Provides rules/guidance of adoption, use, sharing, disposal of information in the context of disintermediation, including: • Setting expectation to what is expected from departmental users in terms of appropriate use and custodianship of allocated assets and privileges • Communicating what and how the organisation is going to manage and govern disintermediated solution concerns • Treatment of information on edge devices • Continuous education of accountable end-user professionals Useful reference frameworks to consult are: • COBIT 5 • ITIL
Processes	A number of governance and management processes (from <i>COBIT 5: Enabling Processes</i>) are relevant in the context of disintermediation and can be used to define a set of governance and management practices for disintermediation: • EDM02 Ensure benefits delivery. • EDM03 Ensure risk optimisation. • EDM04 Ensure resource optimisation. • APC03 Manage enterprise architecture. • APC08 Manage relationships. • APC09 Manage service agreements. • APD10 Manage suppliers (when end-user applications and infrastructure is outsourced). • APD13 Manage security. • BAI03 Manage solutions identification and build. • BAI10 Manage configuration. • DSS02 Manage service request and incidents. • DSS05 Manage security services. • DSS06 Manage business process controls. • MEA01 Monitor, evaluate and assess performance and conformance. • MEA02 Monitor, evaluate and assess the system of internal control. Disintermediated applications should be subject to management assessment and to internal audits. The processes identified here are not the exclusive responsibility of the IT function; rather, if a business function decides to disintermediate, it should at least participate in the processes identified above or put in place its own processes, based on those listed here.

Information Governance/Management Issue:

Disintermediation

Figure 57—Illustrative Set of Enablers for Disintermediation (cont.)

Enabler	How Can This Enabler Help to Address the Issue?
Organisational Structures	Key responsibility in disintermediation belongs to: • Business process owners End-user services support functions: • Help desk function • Training Other related functions can include: • Architecture • Security • Business continuity management • Vendor management
Culture, Ethics and Behaviour	The following behaviours are important for maintaining control over disintermediated solutions: • Objectivity and fairness in decisions on business cases for disintermediation • Balanced view on value, considering benefits but also risk and resource use; take into account the entire enterprise, i.e., the benefits and the burden for the entire enterprise • Sense of responsibility for protecting the enterprise information assets • Compensation practices aligned with the above described behaviours
Information	Information items are essential for managing disintermediation initiatives: • SLAs • Vendor performance (process and systems) data/dashboard • Security and incident related data • Legal and regulatory requirements
Services, Infrastructure and Applications	A number of services (usually to be provided by the IT function) are relevant in a disintermediation context: • Mobile device management (MDM) • Encryption • Service desk workflow and knowledge management • Cloud services
People, Skills and Competencies	Some skills and competencies requirements for disintermediation include: • Adequate skills in technologies used by service providers • Relationship management and negotiation skills • Basic quality management and software development skills • Knowledge management (documentation) to reduce overdependence on single individuals

Discussion