Chapter Contents

Chapter Overview

*This database ain't big enough for the two of us*

— Bumpersticker seen on an automobile in Texas

The bumpersticker should really have stated "There is no database big enough for two bosses." Importantly, 1) this has always been true, and 2) it means absolutely nothing to most of the public or much of IT. Let's address each of these separately.

Just as in any situation where coordination, integration, and information are required, there must be one and only one individual implementing decisions to maintain integrity, continuity, and operational capabilities. Required minimally from a change management perspective, this can always be used to justify DG in general. Ask the skeptical: how can any complex adaptive system function with multiple Chiefs?

The public and unfortunately too many in business and IT do not understand this sort of basic law of (data) nature. Because they are not data literate, when someone proposes having multiple chiefs for database operation, or that group X should 'own' dataset Y, or that the DG group should report to the CIO–they do not know these are not a workable concepts!

DG is not focused primarily on databases, clouds, or other technological ephemera. Instead the DG framework must be understood identically by business users, systems personnel, and the systems themselves (as shown to the right).   This essential, metadata-based communication is at the heart of any enterprise operation. DG removes barriers to data efficiencies, allowing organizations to function more effectively and efficiently. Resources consumed by bad data practices can now be used to support the mission.
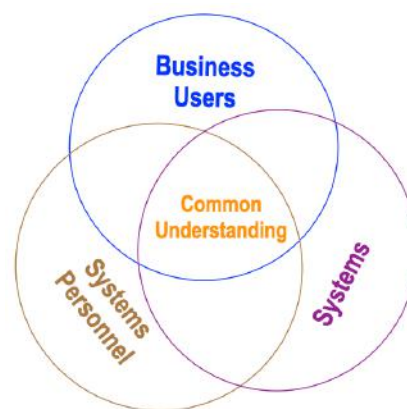
Increasingly organizations are attempting to do 'more' with data. This represents the other strategic dimension, innovation. By definition, most attempts to innovate will fail–so the lessons learned by becoming more effective and efficient, will also help in this innovation dimension. Innovating with data requires programmatic support for the efforts–well supported by data infrastructure and mature organizational data practices.

It is the responsibility of DG programs to manage this and other delicate balancing acts required to successfully contribute to better organizational use of data. DG is a comparatively new, certainly unstandardized, and under-studied topic. While some excellent DG programs are maturing, the majority have not. This leaves individuals and organizations the sequential tasks of:

1. learning about data (and then)
2. learning about their data (next)
3. developing plans to increase the data literacy of their executive leadership (then)
4. their knowledge worker population (before expecting to)
5. make progress faster and further with data.

This chapter takes you through the who, what, where, when, why, and how of DG. It provides a common-basis for building individual and organizational knowledge of this topic–starting with the **why**–the motivation for DG–followed by the **who**, **when**, and **where**. The **how** section is a bit longer and the bulk of the remaining material concentrates on the **what**–a way to successfully start to govern subsets of your data.

Most organizations should not attempt to govern <u>all</u> of their data. Successful DG program goals include subsetting their data into essential and non-essential data. Governing the essential subset and ignoring (or better still removing) the rest reduces the size of the challenge. Since the definition of an organization's essential data will differ from organization to organization, the governed data will also differ among organizations.

One quick word about the use of the term **bespoke** in the title. It is of course deliberate. The only way that **your** organization can use data to better support organizational strategy, is to use **your** data in support of **your** strategy using the capabilities that **you** currently have. Cookie cutter methods will not help **your** organization learn about **your** data!

Why does data need to be governed?

A friend was speaking with an organization on data matters and noticed that the urinals in the restrooms all had unique numbers. Presumably this was in case of malfunction so that the specific instance could be more rapidly identified. Of course my friend used a suitable-for-work (as opposed to not-suitable-for-work) photograph to make a point to leadership that (at least for this organization) it was worthwhile to keep

maintenance histories of this equipment type.   Ironically, it was noted that the substance of the discussion for which my friend had been invited was whether the organization should maintain similar information about their organizational data assets. The photo provoked a nice motivational discussion with a decision to proceed with DG as the outcome.   After all, if we are going to govern our restroom facilities, shouldn't we also govern our data assets?

Writing as a deeply, industry-immersed university professor, I can say that the academic community has failed its customers with respect to integrated data knowledge. For generations we have graduated students who have become leaders in business and IT. The only class taught about data was really about database development. Smart students who placed their trust in the educational system, were educated that the only concept they needed to learn about data was *how to build new relational databases!* No one should be surprised that one of the major DG challenges is that far too many poorly designed databases clutter most organizations or (more increasingly) their clouds.   As Abraham Maslow stated: "**If the only tool you know is a hammer, every problem looks like a nail**."

When considering the asset itself, data has a unique collection of properties including the following from Doug Laney. Data:

- Does not obey all of the laws of physics
- Is not really visible
- Is non rivalrous (many can use it at once)
- Costs of providing an additional copy are zero
- Is non depleting
- Does not require replenishment
- Is regenerative
- Has low inventory and transportation/transmission costs
- Is more difficult to control and own that other assets
- Can be eco friendly
- Is impossible to clean-up if you spill it.[1]

When considering career fields and learning experiences, not all data professionals take similar paths. For example, data scientists often **discover** useful data maintenance utilities instead of **learning** that various classes of tools exist and when to apply each as part of their educational programs. For many, data is like the story of the blind men and the elephant and collectively it is DG responsibility to shape this understanding into an organization-wide perspective.

For these and other reasons there continues to be questions as to whether data processing should continue to be part of IT or of the business or o special operations

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[1] See **Datanomics** by Doug Laney Routledge Publishing 2017 ISBN 1138090387

such as finance and risk? While the Federal Government resolved this issue correctly with new FEPA legislation, the jury is still out on the rest of the world. Currently it is comprised of ⅓ of each type: one-third reporting to CIOs; ⅓ reporting to CEOs; and ⅓ reporting to CFOs/CROs.

Long lasting consequences of poor data decisions?

Unfortunately, short-term application-centric thinking[2] has dominated, relegating development of data products to subsets of ERPs, digitization initiatives, or cloud hosted projects (to name just a few types). Virtually none of the popular software integration packages from the major vendors have escaped the long-term consequences of inadequate data Design (big 'D' is used to emphasize the entire lifecycle). These well documented imperfections are locked in for life-wrapped as they are, in a dense set of application constructs interwoven with the imperfect data model. Worse still, the corrections to the organization's data and processing are layered on as additional code–complicating the apps still further. The vast majority of database functionality is not used beyond table-handling. In this manner, developers restrict any subsequent data investment benefits and decrease data leverage potentials. At the very least, DG must illustrate and resolve the 20-40% of IT budgets that are devoted to data evolvution:

- Data migration (Changing the data location)
- Data conversion (Changing data form, state, or product)
- Data improving (Inspecting and manipulating, or re-keying
  data to prepare it for subsequent use)

None of these are accounted for in the usual (and very important) **data storage costs–measure**. DG must also articulate these various costs and tradeoffs associated with increased data rigor (or the risks of not doing so) to the rest of the organization.

Mounting data debt

The failure to do any of this has caused organizations to pay to accumulate large amounts of data debt.   (Yes, the indignity that your own organization is creating data pollution that is directly harmful to its operation should be professionally embarrassing!) It is not easy to visualize the cost of data debt but the phrase *many many many unnecessary paper cuts* describes the situation well. Data debt slows DG efforts making everything slower, of lower quality, cost more, or present increased risks.

Data debt is like quicksand that mires down all efforts. Defined simply, data debt is: the time and effort it will take to return your data to a governed state from its likely current state of ungoverned. A quick back of envelope calculation of data debit can be

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[2] See **The Data-Centric Revolution: Restoring Sanity to Enterprise Information Systems** by Dave McComb Technics Publications ISBN 1634625404

done using the data storage costs that are perhaps the most tangible and objective data measure. At least 20% of that data is redundant, obsolete or trivial (or ROT).

The good news about finding and eliminating data debt is that things can get faster, better, or cheaper. The bad news is that new skillsets are required of the DG team and that diagnostic and analytical systems thinking still requires annual proof of value. The knowledge-base of grey-beards who know how to apply these skills is shrinking as these individuals are judged expensive and encouraged to retire.

In summary, data needs to be governed because society was not taught that it required specific treatment until it was too late. Because individuals do not know that they do not know, it has been difficult to educate them to the need. By focusing on concrete results, organizations have better success making the case that an investment in DG will benefit the organization in specific measurable ways.

Who needs to be involved in DG?

Unfortunately at many organizations, **everyone** has been responsible for data quality and this approach has produced the current unsatisfactory state. It is critical to start DG educational efforts with executives because 1) they are willing to invest in learning and 2) their data decisions have the greatest impact on the organizational data practices. The next goal for all DG programs is to also increase the data literacy of all organizational knowledge workers.

As illustrated, DG efforts are generally built on an IT provided support/foundation/ infrastructure. A leadership component provides resources and clears barriers for the effort. Primary functions are (ideally full-time) data stewards who provide guidance and design/implement decisions. Typically these two groups form the basis for DG organizations. Also, highly

involved (and incorporated) are various SME or subject matter experts who know the required data and processing details. Then of course there is everyone else. As noted, DG efforts need to be integrated with both organizational and IT governance.
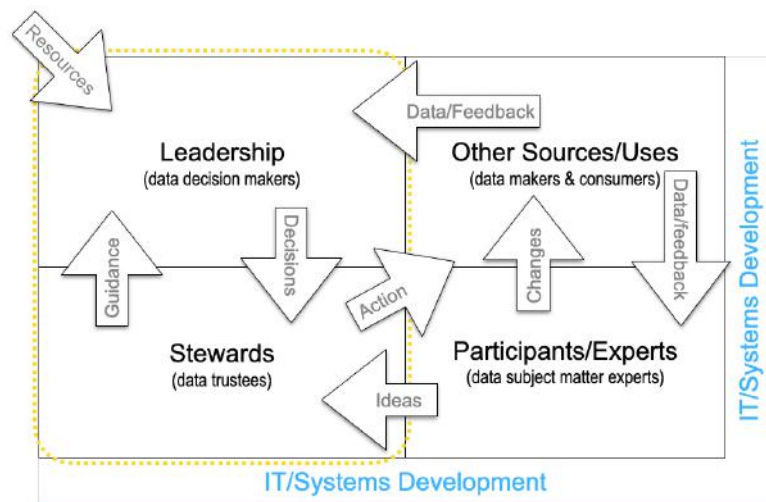
When is it appropriate for organizations to invest in DG?

By now I hope that you agree this is a silly question. The 20-40% of IT costs (referenced previously) is easily gauged. As the maturity of the DG practice matures,

processes can be optimized for key operations. By keeping disciplined measures, organizations have developed expertise in these practices. Keeping the focus on a integrated full time team permits the case to more easily be made when timing investment in a second or third DG team.

Digital and data are dependent on high speed automation/data processing that requires significant amounts of organizational data literacy, data standards use and quality data supplies. Continue to evaluate and evolve DG frameworks to refine the organizational focus. Over time this approach should evolve into the standard Deming plan, do, check, act (PDCA) cycle.[3] An incomplete list of potentially useful standards that can be created with the required measurable controls is listed below.

- Access standards
- Change management
- Security
- Storage
- Reporting

- Classifications
  - ➡ Secure
  - ➡ PII
  - ➡ Competitive advantaged
  - ➡ Public

Where should organizations get started with DG?

DG is a rare triple benefit capability that helps refine data strategy, improve the quality of the players, and improves data used to support the mission. However, getting started with DG can be and has been accomplished by a moras of ill-defined and vendor specific methodologies–most of which have no reported research results.

An easily understood model (the theory of constraints[4] or TOC) views programmatic data support as a manageable system. The system is limited in achieving more of its goals by a small number of constraints. There is always at least one constraint, and TOC uses a focusing process to identify the greatest constraint and restructure the rest of the organization to address it. TOC adopts the idiom that "a chain is no stronger than its weakest link," and processes, organizations, etc., are vulnerable because the weakest component can damage or break them and adversely affect the outcome.

Key is to visualize the various data flows through the organization and understand the value of controls in relation to various processes, risks, outcomes, and performance. The costs of various blockages can be ranked and estimated. What changes made at the data level could most help the organization achieve its strategic goals?

Iterative problem solving provide additional benefits beyond challenge solutions. Team problem solving enables increased organizational data literacy and some go as

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[3] https://en.wikipedia.org/wiki/W._Edwards_Deming#PDCA_myth

[4] https://en.wikipedia.org/wiki/Theory_of_constraints

far as considering these capabilities their 'secret sauce.' It just makes sense to support a group of individuals who possess knowledge of your data and its uses.

Focus first on organizational strategy. Understanding intricately, the data flow supporting increasing performance, decreasing costs, impacting times, and better managing risks. Identify the various types of organizational challenges sharing the same data or (better still) data errors. These become the focus of the first iteration of a data strategy cycle. It is overseen by the DG program and coordinated to be most collectively helpful to organizational as well as IT strategy. Ensure you complete a full cycle to include feedback/improvement/lessons learned/organizational memory/ change cycle components. Heavily incorporate the use of 'branded' data checklists and standard control development.

And then (as it says on the shower bottle) lather, rinse and repeat. This is really to only way to escape the bad data cycle. IT and business decision makers are not knowledgeable about data and good data practices. They make poor decisions about data that result in poor treatment of organizational data assets and poor quality data. Both of these lead to poor organizational outcomes.
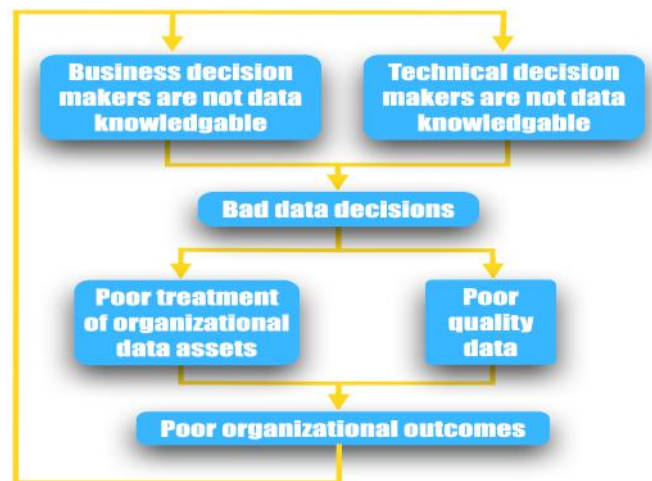

How should organizations apportion their DG efforts over time?

Data debt's impact

Over time, organizational data debt clogs value-adding pathways in a manner similar to the 40% of the internet that is now clogged with malware. Data debt is responsible for inflicting uncounted tiny hidden data factories[5] on organizational performance-making everything cost more, take longer, deliver less, and at increased risk. Eliminating data debt requires a team with specialized skills deployed to create a repeatable process and develop sustained organizational skillsets.

A major motivation for increasing the data literacy of all knowledge workers comes from the fact that most organizational challenges come filtered through various IT and business practice combinations. The reason for multitude of paper cuts, is that the DG challenges are filtered through various business processes and IT systems. As a result, common challenges go unrecognized with each instance requiring treatment instead of correcting the underlying data challenge.

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[5] https://hbr.org/2016/09/bad-data-costs-the-u-s-3-trillion-per-year
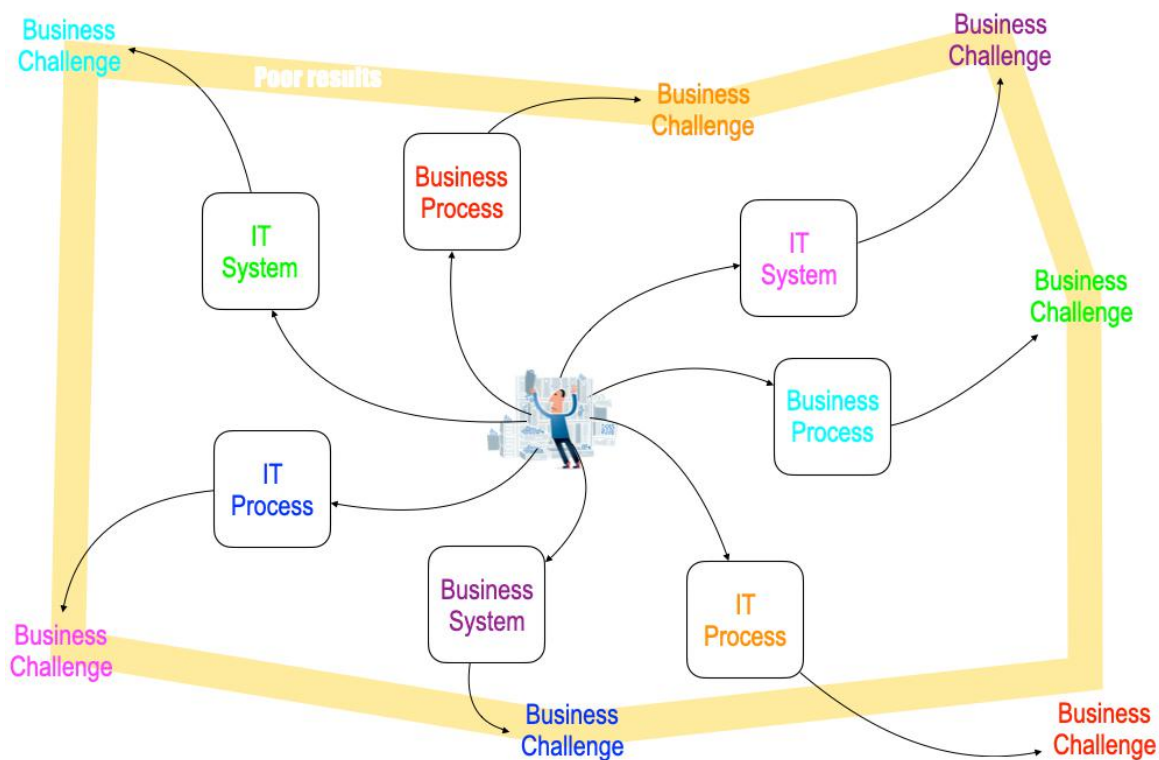
A key aspect is to evaluate your architectural abilities to build/evolve towards organizational data capabilities in a 3-step process. First, you need to improve the quality of existing organizational data. Too many organizations do not have enough information about the quality of their existing data. These data quality challenges fall into two categories: practice-related data quality challenges and structure-related data quality challenges. Second, the framework must support your efforts to increase the data literacy of literally your entire executive team and knowledge worker population and especially those who already practice data. Finally, only when you have improved your data and your organization's ability to work with data, can you hope to improve the way that data supports your organizational strategy.

Proactive versus reactive DG

One rather traditional realization (almost a rite of passage) is that what ever changes are made to the organizational data practices might take literally years to be able to exploit it. In CIO terms, it can often be a successors, successors, successor that will benefit from DG initiatives. As this realization sets in (that time equals years), DG initiatives come under pressure to 'do something more quickly.' As illustrated, a secondary capability is established to more effectively produce results as a result of direct intervention or Data Improvement Projects (DIPs).
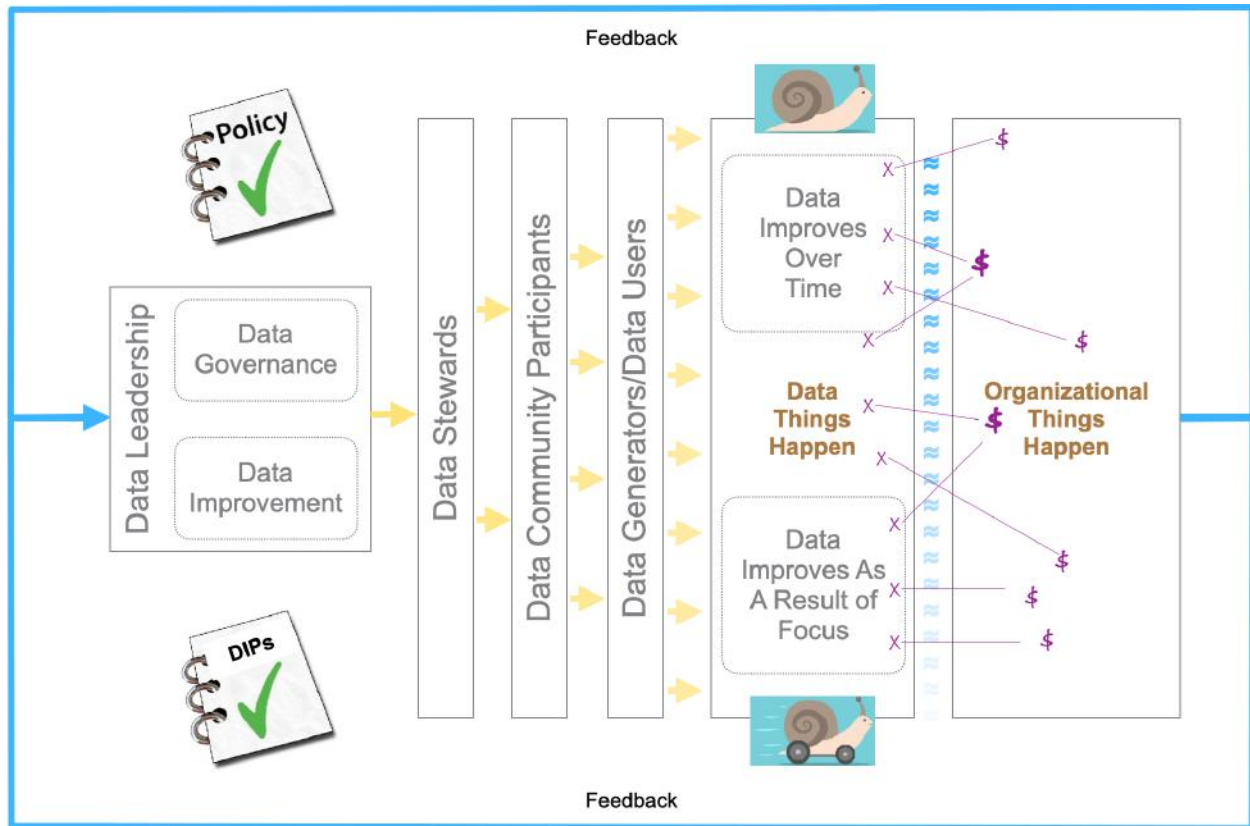
MacGyver abilities

While perhaps not widely acclaimed, the 1980's TV series MacGyver became shorthand for an non-traditional and innovative problem solver who always carried a Swiss Army knife.[6] In the same manner, the DG program must imagine itself as the 'help desk' for organizational data. Literally all data challenge solutions should be minimally coordinated and, in many instances, led by DG. The key is to develop new data capabilities within a dedicated group focused on organizational data governance. Have this group focus on and conquer a series of DG challenges, producing positive ROI numbers.

What organizational needs does DG fill?

It is useful to describe the organizational needs that DG fills. These include:

- Improving the way that data is treated as an asset
- Available but not widely known research results
- Using data to better to support the organizational mission
- Using data strategically

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[6] https://en.wikipedia.org/wiki/MacGyver

Improving the ways that data is treated as an asset?

One of the primary challenges for organizations is to learn how data requires specific considerations. If you consider data as an asset (and currently most business leaders do not yet do so) then one should expect that it would be treated as other organizational assets. I use a series of questions developed by my colleague Dr. Christopher Bradley to help organizations determine whether their data is maintained as an asset. They are:

1. Do you have executive positions to support data as an asset?
2. Does the organization track usage of this asset?
3. Are organizational or fiscal controls in place to manage this asset?
4. By and large, are these controls actually executed?
5. Is there general acceptance of the need to manage this asset?
    (i.e., do people "get it"?)
6. Do serious discussions about this asset feature on the agenda of senior management meetings?

Using this rather obvious set of criteria, it is easy to determine that most organizations are not treating data as an asset but so far we do not survey results on this particular measurement.

Available but not widely known research results

As referenced above, there is a dearth of knowledge about data much less data governance. On that note however, we do have access to two solid lines of research to which I will refer through out this chapter. The first is in the form of the annual (2013-today) data practices surveys conducted by New Vantage Partnerships and are reference able at: https://www.newvantage.com/thoughtleadership. Annually several thousand of the same or similar organizations have been asked the same questions repeatedly providing pictures of how issues are considered over time. Results reproduced here will be referred to as **New Vantage**.   A second set of research results come from the collaboration (called the Data Literacy Project) between Accenture and Clique. These results will be referenced as **Data Literacy Project** and are reference-able at: https://thedataliteracyproject.org/. These two efforts have provided a good framework that can be used to dive further into research in this area.

One of the New Vantage results has been: *what percentage of your data challenges are people/process related versus technology challenges?* The consistent answer (see figure) continues to surprise: not once since 2018, has the percentage of technology challenges risen to above 20%. This means that for more than six years, **everyone** should have known that the people/process dimension of DG represents the largest challenge. Yet very little organized research beyond surveys has been conducted into this area.
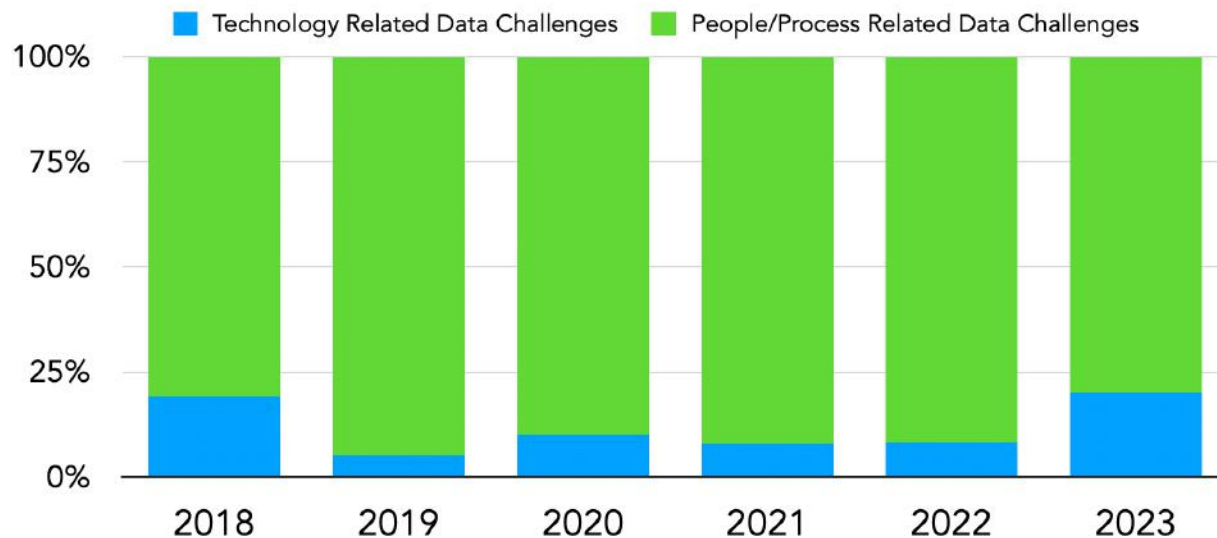
Consider please, what group in your organization is charged with decreasing the number and impact of people and process-oriented data challenges? This is precisely the role that your DG organization must address in your organization. **If not DG then whom** in your organization is responsible for improving the people and process aspects of your data operations?

It is crucial that DGs provide a wholistic view of minimally the above detail but also include data's role in the organization, how individuals can assist, and where to go for more information.

Using data to better to support the organizational mission

This section's title: **using data to better to support the organizational mission** must be the mission of any DG program. But first a specific word about data ownership (bad concept) and Data requirements ownership (good concept).

Avoid a first (and always a major) misstep: trying to assign data 'ownership.' While it is tempting to "establish data owners" as a goal of data governance–it is usually a bad idea. However, many are familiar with the process architecture practice. It correctly embraces and leverages the term "process owner" as the single individual responsible for the integrity of the process design, implementation, and improvement.

While it makes intuitive sense, the concept of data ownership has caused more DG effort to fail than any other. As soon as you allow an under-informed individual (or group) to 'own' any data items, they begin to make decisions about the data that optimize it from their local perspective. If your organization does not formally manage a process architect, skip to the next paragraph. If it does, careful analysis will yield maintainable, high level process/data interaction matrix called a CRUD matrix–showing data/process interaction by access type. (CRUD matrices such as the one illustrated

show business processes and their activity type **C**reating, **R**eading, **U**pdating, and **D**eleting various data items–example also courtesy of Dr. Christopher Bradley).

Major Entities / Data Subject Areas	Product development	Marketing & Sales	Industrial preparation	Order management	Manufacturing	Logistics	Invoicing	
Product	C	R	U	U	U			
Product Part	C	R	R	U	U			
Manufacturing Plant	U		C	R	R	U		
Customer	R	C		U	R	U	U	
Sales Item	C	C	C	U		U	U	1
Assembly Structure	U		C		U			
Sales Order		U		R	U	U	U	2
Production Order			U	C	U	U	U	
Individual Product					C	R	U	
Shipping						C		3
Customer's Invoice		U					C	

If nothing else, these maintainable metadata collections show the interdependencies: data exist only to be consumed by various business processes and only purpose for a business process to exist is to produce data to be consumed by another business process. If you do not have an organization CRUD matrix hand and need to shut down any data ownership conversations, ask the question: "*To whom does the data that accounting stewards belong?*" Since accounting processes data from across the organization, a case could be made that accounting 'owns' much organizational data.

The reason data ownership is such problematic concept is that data persists across business functions. Ownership would only apply to a specific data processing stage. Instead of asking the question, "who are the data owners?" the statement should be that all data belongs to the organization! At best, ownership could only be limited to specific lifecycle phases.

If the organizational culture requires use of the word ownership, then allow ownership of the **data requirements**! Local expertise should be used to specify the size and shape of the specific data items required to perform organizational functions at various stages of data at it is processed.

The role of DG frameworks

All evidence to-date points to frameworks has being useful as:

- System of ideas for guiding subsequent analyses

- Means of organizing measures, project data, and then assessing progress
- Evaluating priorities for data decision making
- Assessing overall functionality
- Moving towards a determination of ROI[7]

For example, a building construction conceptual framework would incorporate bits of wisdom such as:

- Don't put up walls until foundation inspection is passed
- Put the roof on ASAP so that work can proceed in inclement weather
- Make it each construction phase dependent upon continued funding by passing a series of checkpoints

Much has been written about data governance frameworks. I have seen research proposals that anticipate evaluating one type of framework against another. It is far to early to start to 'type' DG frameworks. Non-standard understanding of terms and data concepts lead to 'results' of the sort that were popular at the start of the CDO movement. (Note: researchers have tried and failed to establish correlations between having a CDO and organizational financial performance–similar specious results can be expected until the entire DG profession matures.)

Use the existing DG frameworks to envision what your program should look like given your organizational needs. 'Try each of them on' conceptually and discuss the suitability of each for your organization. Since no two organizations are alike, each organizational DG program must be custom fitted to the organization rather like getting fitted for a suit. The word "bespoke" well describes the design of DG programs that provide good returns on organizational DG investments.

It is quite useful to view representations of various approaches to DG in the same manner that an architect presents sketches of a future building to prospective funders. The utility of DG frameworks generally stops at this point. There are essentially few types of DG frameworks in popular use. (Note: you can see representations of many these at: https://anythingawesome.com/DataGovernanceFrameworksCollection.html) All subsequent are theme and variations on these. Pay no attention to 'proprietary' methods. The goal is to give you something to compare, contrast and consider when designing the first version of your DG organization. (Note: This first version will evolve to a second and third as the organization; DG practices should mature and evolve over time.)

This is where the concepts of stewardship and fiduciary responsibilities come into play. **Stewardship** in this concept is derived from the definition: a person employed to manage another's property. **Fiduciary** is used to describe the nature of the relationship

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[7] Interestingly, ROI means risk of incarceration to most DG professionals.

as involving trust, especially with regard to the relationship between a trustee and a beneficiary. This is accompanied by specific duties.

RELATED TERM DEFINITIONS

It is now time to introduce a few terms to show both the evolution/etymology of the term DG and the most useful definition of DG.

Let's start with the term **governance**: "Governance is the process of interactions through the laws, norms, power or language of an organized society over a social system (family, tribe, formal or informal organization, a territory or across territories). It is done by the government of a state, by a market, or by a network. It is the decision-making among the actors involved in a collective problem that leads to the creation, reinforcement, or reproduction of social norms and institutions" (https://en.wikipedia.org/wiki/Governance)

Corporate governance is next. Below are three good definitions highlighting different aspects of this evolving concept.

- "Corporate governance - can be defined narrowly as the relationship of a company to its shareholders or, more broadly, as its relationship to society….", Financial Times, 1997.
- "Corporate governance deals with the ways in which suppliers
  of finance to corporations assure themselves of getting a return
  on their investment", The Journal of Finance, Shleifer and Vishnu, 1997.
- "Corporate governance is about promoting corporate fairness,
  transparency and accountability" James Wolfensohn, World Bank, President Financial Times, June 1999.

Note that the concept of corporate governance is evolving. Just before the pandemic, Jamie Dimon (then head of Chase), led a group of CEOs to proclaim "Maximizing shareholder value can no longer be a company's main purpose."[8] Similarly, the concept of DG continue to evolve.

Well if corporate governance exists then certainly **IT governance** should be a useful concept? It is and is defined as "Putting structure around how organizations align IT strategy with business strategy, ensuring that companies stay on track to achieve their strategies and goals, and implementing good ways to measure IT's performance. It makes sure that all stakeholders' interests are taken into account and that processes provide measurable results. (https://en.wikipedia.org/wiki/Corporate_governance_of_information_technology)

IT governance frameworks should answer some key questions, such as how the IT department is functioning overall, what key metrics management needs and what return IT is giving back to the business from the investment it's making. Included are typically foci on:

- Strategic Alignment
- Value Delivery

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[8] https://www.marketwatch.com/story/maximizing-shareholder-value-can-no-longer-be-a-companys-main-purpose-business-roundtable-2019-08-19

- • Resource Management
- • Risk Management
- • Performance Measures

IT governance is an established discipline with common vocabulary and understanding among those who participate.[9] Of note is the fact that data practices are not typically included as a topic under IT governance or are lightly treated. This may account for or reflect the current slowly maturing state of DG practices.

Data governance has suffered from both too many definitions and inaccessible (by the business) terminology. However, auditors easily get the concepts. Below are some standard definitions of DG.

- • The formal orchestration of people, process, and technology to enable an organization to leverage data as an enterprise asset – The MDM Institute
- • A convergence of data quality, data management, business process management, and risk management surrounding the handling of data in an organization – Wikipedia
- • A system of decision rights and accountabilities for information-related processes, executed according to agreed-upon models which describe who can take what actions with what information, and when, under what circumstances, using what methods – Data Governance Institute
- • The execution and enforcement of authority over the management of data assets and the performance of data functions – KiK Consulting
- • A quality control discipline for assessing, managing, using, improving, monitoring, maintaining, and protecting organizational information – IBM Data Governance Council
- • Data governance is the formulation of policy to optimize, secure, and leverage information as an enterprise asset by aligning the objectives of multiple functions – Sunil Soares
- • The exercise of authority and control over the management of data assets – DM BoK

Technically they are all correct but imagine the following scenario. Stepping onto an elevator for a minute-long ride and an executive enters the car. As the doors close the executive turns and says, "I've heard you are working on DG. Can you tell me what it is - I'm confused?" Imagine responding with "DG is the exercise of authority and control over the management of data assets." Do you think the executive would 1) find the answer useful and 2) think well of your ability to communicate this concept?

I think the answer no to both questions. A better response to the executive is: "**DG is about managing data with guidance.**" Short and to the point, this definition incorporates self explanatory motivation. When I provide this information (the definition of DG) to most executives, their first question to me is: "So we have not been managing our data with guidance?" The answer usually is: "Only recently have we been managing our data with guidance." Of course the eternal hope is that the executive will be curious to learn more and present an opportunity to become more data literate. Subsequent conversation topics could include:

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[9] https://en.wikipedia.org/wiki/Corporate_governance_of_information_technology

- Why is it generally not a good idea to govern all of your data.
- Why DG will never be complete at our organization.
- Why some decisions that involve data are not considered as such.

The Data Literacy Project reports that four out of five executives surveyed were willing to invest time resources in improving data skillsets. This represents a once in a generation opportunity to reach these executives with good DG education.   (Note that anyone offering to improve your organization with DG **training** should be ignored–the process requires **education**, not training.)

A Small concentrated team is preferred over distributed (dissipated) knowledge

The next item to consider is what format DG should take. Remember, asking **everyone** to be responsible for (data, data quality, data governance …) has produced the current state of affairs. Organizations assigning new DG duties to existing personnel have two options: 1) incorporate the new duties along with existing duties or 2) assign these DG duties to full time individuals.

When considering this, it is useful to ask: how long will the need to manage data with guidance exist? The answer turns out the be: **you will need your data program as long as your organization needs to have its finance, HR, and planning operations.** Think about it-in the future: Will more or less data exist? Will data collection modes increase or decrease?   Will data be found in fewer or more formats?   A solid recommendation is to staff with full-time team members dedicated fully to DG. Data literacy and organizational data practice maturity are generally low. Dedicated personnel with interact with each other more–greatly stimulating their individual learning curves. It also makes tracking DG program costs clearer. It is critical to begin to build organizational DG capabilities. This can best be started with dedicated teams with a clear ROI. Against these, results can be evaluated.

Using data strategically

The next question is **on what** do we focus these DG efforts? In regulated environments, these efforts are often compliance driven. Key is to approach these efforts in the same manner. Do we think that regulations will increase or decrease in the future? If increasing, then it seems useful to 'get good' at implementing compliance driven changes. If nothing else, you may gain an implementation advantage over the competition subject to the same data regulations but perhaps not able to implement as efficiently or effectively. Data regulation compliance can become an valued organizational capability with an easily determined ROI.

Outside of compliance, organizations strive to use data strategically with either efficiency/effectiveness or innovation goals. Personal interaction with more than 1,000 organizations indicates that about ½ have clearly articulated strategic goals and

objective measures supporting goal achievement at the organizational level. Absent these, it is not possible to improve the manner in which data supports this Jell-O strategy. I also find universal distain for 3-5 year plans, most of which fell apart rapidly with the onset of the Covid-19 pandemic. So just a word of caution, check your organizational strategy to ensure it has clear objective and measures before attempting to improve how data can support it.

STRATEGY IS ABOUT WHY

*…it's not **what** you do, it's **why** you do it…*

Among many great TED Talks, Simon Sinek's "How Great Leaders Inspire Action" is a favorite. Recorded in 2009, Sinek's talk has enjoyed more than twenty-five million views. His point is quite simple: most of us are very good at describing what we do, and some of us are good at describing how we do things. Not as many of us are good at describing why we do things.

Strategy is the highest-level guidance available to an organization, focusing activities on articulated goal achievement and providing direction and specific guidance when faced with a stream of decisions or uncertainties. More succinctly, strategy is a pattern in a stream of decisions. This pattern must be supported by data or it will not be possible to determine if the strategy is correct or working.

WHAT IS DATA STRATEGY?

Data strategy is the highest level guidance available to an organization, focusing data-related activities on articulated data program goal achievements and providing directional and specific guidance when faced with a stream of decisions or uncertainties about organizational data assets and their application toward business objectives. The data strategy must be understood and supported at the organizational level. Only with this level of scrutiny and involvement can a true systems view be applied to the challenge of improving how data can support strategy.

WORKING TOGETHER: DATA AND ORGANIZATIONAL STRATEGY?
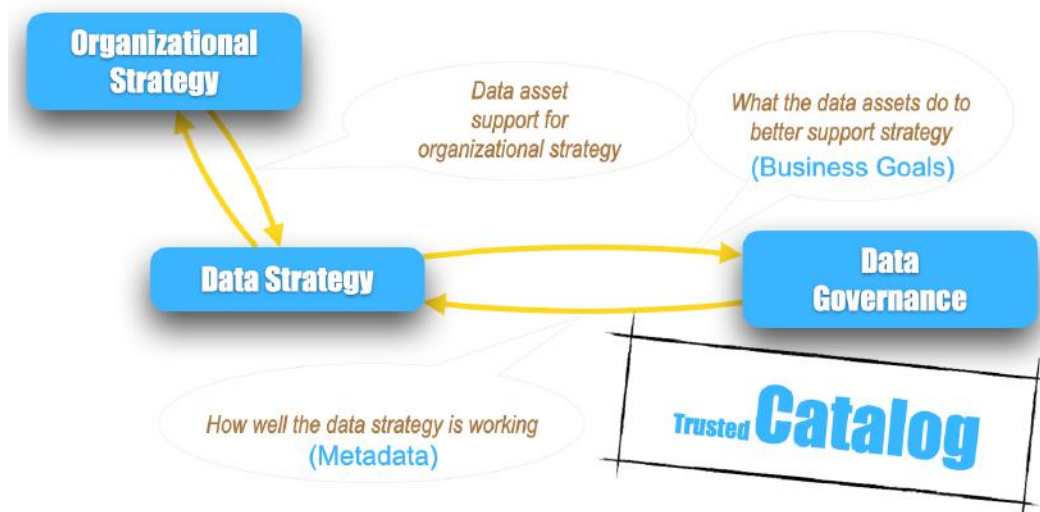


The figure indicate the close relationship among organizational strategy, data strategy, and data governance. Two key aspects of the interaction are: 1) express the data strategy in terms of specific business goals, and 2) ensure that the language of DG is metadata.

STRATEGIC COMMITTMENT: PROGRAM VERSUS PROJECT FOCUS

A commonly asked question is: when will you be done? This is a warning that the individual considers DG a **project**. Organizations failing to implement DG at the program level (as a program) are unable to view the totality of their data challenges holistically and the solutions fail. Many organizations require a second or increasingly a third DG 'reset.'

DIGITIZATIONING

One of the more important areas that DG can be focused to support is 'going digital.' Once again, many vendors have offerings and expertise in these areas. DG sets the standards required to support digitization because, you cannot 'digitize' without a good data capabilities foundation. Garbage in, garbage out is always true. At this point, effective DG is a requirement for digitization, otherwise you can will be unable to trust any digital system outputs.
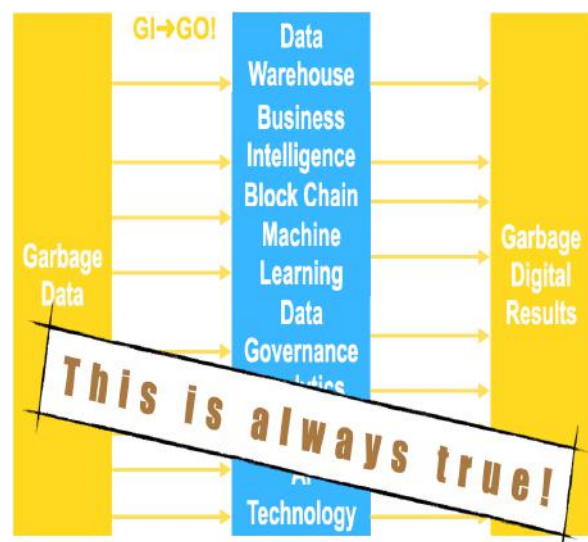
A WATCHFUL EYE TOWARD THE US FEDERAL GOVERNMENT (FEPA)

Finally on the **what** question (yes–we are still in **what**), it will be useful to observe the progress being made in the US Federal Government. As part of my service as a DoD employee, our group was often sent to 'learn from the private sector.' Now the situation has been reversed. In 2019 the **F**oundations for **E**vidence-Based **P**olicymaking **A**ct was signed into law. Three specific aspects of the law make this especially interesting to aspect of DG to follow. They are:

- Explicitly non-political CDOs must be established separate from CIO roles. From a DG perspective, organizations have been slower to adopt CDOs with non-CIO reporting role.
- Government data is now open by default, and must maintained using open standards. In just a few years, the Federal agencies will have developed a great deal of expertise in these areas.
- Use of open data and open models is required in policy evolution. Policy changes are only permitted with both models and datasets specified prior to the analyses and decisions.

Collectively these efforts, if fully implemented, will improve governmental decision-making and overall effectiveness. More importantly, all impacted Federal organizations are also rapidly, developing and implementing DG as compliance activities still further increasing the pool of DG professionals world-wide.

Breaking through the Barriers of Data Governance

There are a host of barriers to implementing DG. This include the usual failures to include change management and cultural refocusing as key dependencies. While the accounting profession has had literally millennia to develop GAAP, no such guidance exists for DG. There is a vast tendency to depend on technologies that are incapable of acting as silver bullets.

An example of these difficulties was illustrated in 2020 when Forbes ran an article on airline valuations.[10] It purported to show how the airlines were monetizing the data in their frequent flyer programs. However, the buried lede was that in 2020, both United and American Airlines were valued at 10s of billions of dollars less than the anticipated value of the data in these programs. You had better believe that if airline leadership could have unlocked that value during the time most were avoiding flying (the pandemic), they would have unlocked it asap! The fact that they were unable to do so highlights the uphill climb that poorly fitting DG efforts face.

Some basic DG execution principles follow:

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[10] https://www.forbes.com/sites/advisor/2020/07/15/how-airlines-make-billions-from-monetizing-frequent-flyer-programs/?sh=66da87a614e9

- Ensure that the organization's data strategy in properly aligned with the business strategy. Implement a regular processes with key stakeholders to ensure proper alignment.
- Ensure that data debt is properly being managed and the process is under statistical control.
- Perform a capability maturity assessment or 'reassessment' to determine the required maturity. If the maturity levels are not meeting expectations, ensure that there is a remediation plan with a properly monitored work arounds.
- Consider refresher training for your knowledge workers and data professionals, e.g., Data Stewards, Architects and Engineers as a feedback mechanism for determining needed improvements and remediations.

Based on the organization's strategy, the DG group must determine are they to initially follow a model primarily focused as a:

- Utility–back office, efficiency goal
- Steward–more asset focused, quality goal
- Enabler-strategic partner, innovation goal

This should be determined through the building of the data strategy. If an organization striving toward a modernization transformation, DG should trend to an 'enabler.' To measure the effectiveness of an enabler, DG standards should be repeatable and statistically stable. The focus can be changed at a later stage but can usefully focus effort and discussions during initial phases.

Hopefully your organization will be spared major data catastrophes. It is more likely you will experience one or more in the future. In this event, attempt to learn as much as possible from the event. Take for example, the story of two major banks in the process of consummating an arranged marriage. The deal came down to a single spreadsheet containing many rows, each representing an asset. If an asset on the spreadsheet was to not be transfered, that row was hidden with agreement by both parties. After final agreement was reached, the spreadsheet was handed to a junior associate who was told to 'make is look nice for the Judge tomorrow." Unfortunately late in the evening junior accidentally unhid hundreds of rows and did not notice! Presented to the Judge as the golden copy, the judge would not reverse-even on appeal.[11] As you might imagine, DG practices around the use of spreadsheets is quite extensive. I assisted one organization with the elimination of more than 400,000 legacy systems of a certain type. The list of preventable spending continues.

Unfortunately, the conversations have been generally unsatisfactory. Key to getting started with **data valuation** is to add up 'at least' instead of attempting to master the entire costs. I justified an investment into an organizational repository at one

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[11] https://www.businessinsider.com/2008/10/barclays-excel-error-results-in-lehman-chaos

organization with a business case built on the premise of saving everyone in IT **1 hour annually**. The organization conducted surveys asking if the one hour savings was achieved. It was!

When determining the internal and external value of data two prerequisites exist: first, business and data strategies must support data monetization and second, DG must be effective and properly measured. Components of data value can include:

Internal
- Properly managed data debt
- Efficient usage of cataloging and master data management
- Hight trust in supplier and customer data integration
- Measured positive ROI

External
- Organizational data monetized in a public market or exchange
- Organizational data becomes a profit center
- Organizational data becomes a band-aid of adhesive strips

Sometimes it is easier to highlight the value with unfortunate examples with clear costs to society. Early COVID monitoring was inhibited because health care workers did not know to save MS Excel data sheet and workbooks as .xlsx instead of .xls files. The difference, unknown to the users, was that the older .xls files dropped all rows beyond the 16,000th or so row without warning. We will likely never know how much better performing the early monitoring systems were because all the errors are in one direction.

On a more cheery note, an agency charged with home evaluation/intervention, discovered that 40 questions on its evaluation assessment were immaterial. This shortened each interview by half and ultimately shifted more than $1 million from overhead to service delivery.

In terms of execution, DG should be viewed as an iterative process that the organization is striving to **get better at!** Each cycle focuses on aspects of the various data challenges with a goal of eliminating or reducing the impact of a specific constraint. To understand the important of this shift in thinking about DG, consider the circumstances where a plan was the goal. It was former President and General Eisenhower who said:

> "*In preparing for battle I have always found that plans are useless, but planning is indispensable*"[12]

Mike Tyson's version is that *everyone has a plan until they get punched in the face*. A team knows how to react to unforeseen challenges and efficiently address the ones they have planned for. The PDCA cycle provides operational context.

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[12] https://quoteinvestigator.com/2017/11/18/planning/

Chapter Summary

> The word **bespoke** has evolved from a verb meaning 'to speak for something', to its contemporary usage as an adjective. Originally, the adjective bespoke described tailor-made suits and shoes. Later, it described anything commissioned to a particular specification. Wikipedia

The difference between data analysis capabilities and data requiring analysis is increasing. DG will continue as a maturing and growing field and can only be assisted by increased research into the various challenges outlined. Practice standardization and improvement are clearly the next steps on this industry's maturity curve. As a new discipline, DG works best directly addressing the manner in which data is used to support achievement of organizations strategy. There is no one best way and right now there isn't agreement on terminology, hence anything. Consequently, the only way to obtain a positive ROI on investments in DG is to ensure that **your** data is successfully leveraged using methods (**your** data strategy) that **your** knowledge workers and **your** executives understand.

The goal is to improve DG effectiveness and efficiencies (and the data itself) over time. The more data literate the organization, the easier the transformation. Perhaps now is more understood about the phrase quoted at the beginning of the chapter:

This database ain't big enough for the two of us

— Bumpersticker seen on an automobile in Texas

Acknowledgement

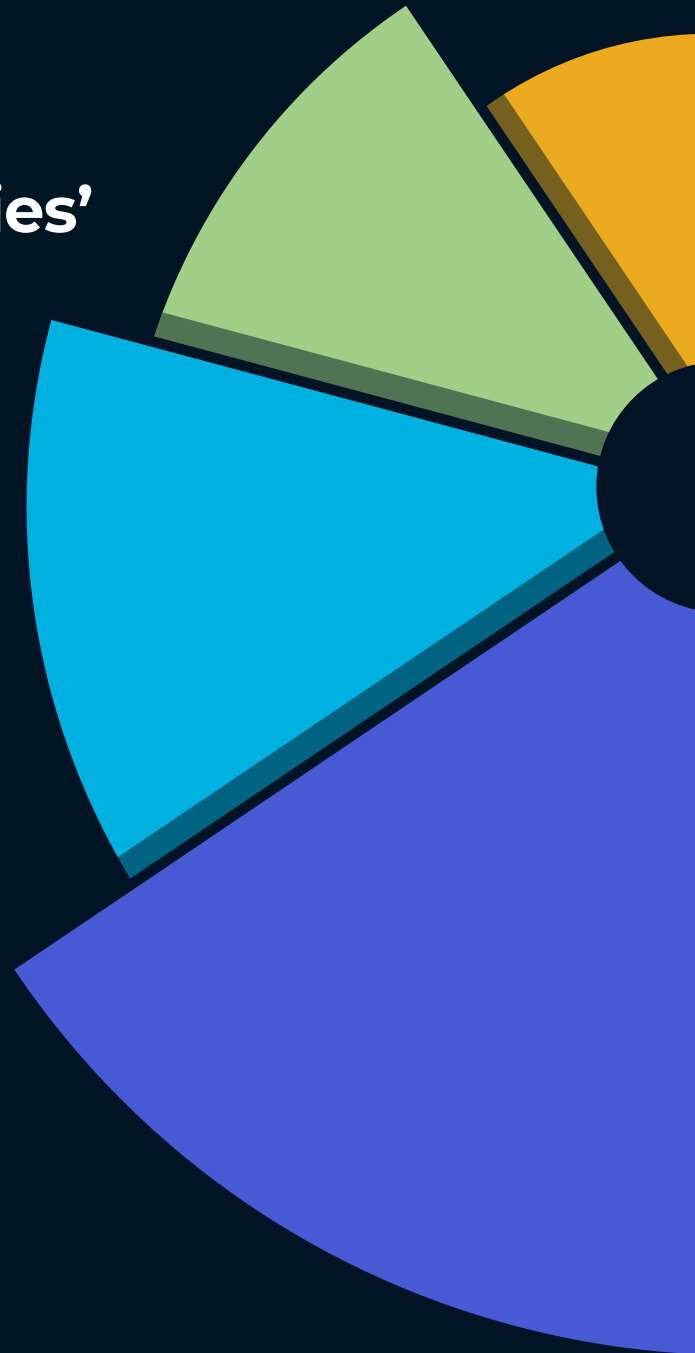My colleague Rob Greaves made many helpful suggestions that were incorporated into this chapter.

I appreciate Dr. Christopher Bradley granting me use of the two concepts note herein.
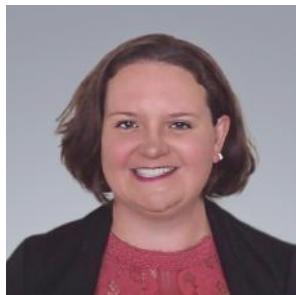
The Growth and Challenges of the

Chief Data Officer

(CDO) Role and Agencies' Data Maturity

A 2022 SURVEY OF FEDERAL CDOs

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Disclaimer

Executive Summary

The Foundations for Evidence-Based Policymaking Act of 2018 (Evidence Act) requires agency heads to designate a nonpolitical official as Chief Data Officer (CDO). This new capability in government specifically calls for officials who have qualifications and training in data governance, privacy, data collection, data management, data analysis, and data dissemination to perform tasks that build capacity, infrastructure, and the use of data to inform decision-making.

CDOs are instrumental in moving their agencies along the data maturity ladder, which culminates in the agency using data and engaging in evidence-based decision-making. The Data Foundation's three annual surveys of federal CDOs show that while CDOs are making commendable progress implementing the Evidence Act and the Federal Data Strategy, there are understandable challenges to achieving the CDO mission that can be addressed with more support.

The Data Foundation 2022 CDO Survey, conducted in partnership with Guidehouse, adds additional context and new questions to better understand these challenges, along with themes related to equity and customer service. The Data Foundation combined its survey results this year with information from the CDO Council's 2022 survey to develop a more complete view of the CDO office and to help shape recommendations.

Key Findings

- **A majority of CDOs are making progress on the 2021 Federal Data Strategy priority action items, but they need additional support.** Progress on the Action items is steady with a majority (63%) of responding CDOs reporting that they had started or completed implementation of at least 5 of the 6 priority Agency Action Items that were detailed in the 2021 Action Plan for CDOs. However, last year's survey showed a greater percentage of CDOs (75%) having started or completed 5 of the 6 items.

- **The typical CDO has significant federal experience and occupies a leadership position in their agencies.** The CDO role is a senior level position and, as such, requires an extensive background in federal government. A vast majority of CDOs (92%) worked for the federal government for 5 or more years and 80% worked for the federal government for 10 or more years. CDOs also report long tenures with their organizations with 96% having more than one year of experience and half with 6 or more years of experience.

- **CDOs play a key role in their organization's data culture.** A majority (70%) very much or completely view their role as CDO as being someone who influences their organization's data culture. CDOs are change agents, engaging with stakeholders across their organization to improve the quality and use of data.

- **CDOs play a key role in their organization's customer service experience.** This survey found that most CDOs view their role in improving data quality and making data accessible and usable as being critical to the customer service experience. CDOs use two primary methods of engagement: public presentations and making available public facing data products.

- **Challenges to CDOs' success remain.** CDOs have a clear understanding of their CDO mission and the challenges they face. Key priorities for success identified by CDOs include improved infrastructure and practices that support data governance, the need for more staff, improved data literacy, increased support from OMB with frequent check-ins and follow-ups, funding to support the CDO mission, and, finally, greater clarity about the CDO role in general and the different expectations of CDOs versus CIOs.

Recommendations

Based on the survey results in 2022, there are several opportunities to support CDOs in their implementation of the Evidence Act and other priorities over the next year:

- **Recommendation 1 – Congress should increase CDO funding flexibilities and provide more direct resources to CDOs.** Most CDOs (83%) do not have adequate resources to fulfill their statutory responsibilities and support agency missions. CDOs need sustained, predictable, and adequate resources to implement data priorities. Congress should authorize CDOs to use additional funding flexibilities and set-aside authorities, as well as provide increased direct appropriations for CDOs to ensure they can succeed in their mission. This longer-term resourcing plan aligns with the congressional intent in establishing the CDO role through the Evidence Act, which created the position indefinitely rather than for a short-term period. OMB should also include such requests in the FY 2024 President's Budget Request to Congress.

- **Recommendation 2 – OMB should issue required guidance to CDOs to clarify responsibilities and to enable full implementation of the OPEN Government Data Act.** CDOs are operating under the general framework of the Evidence Act, the Federal Data Strategy, and their peer community of practice. CDOs need clarifying guidance regarding

the data governance function in government, open data and tiered access, and better-defined roles and recognition among senior leaders in their agencies. This guidance was required by the OPEN Government Data Act, Title II of the Evidence Act, but has not yet been issued by OMB. Without this guidance agencies will apply implementation inconsistently. Issuing the guidance would greatly improve and accelerate implementation activities for CDOs.

- **Recommendation 3 – Congress should create a federal CDO at OMB as a Senior Executive-Level Position.** While the CDO community has grown with the establishment of the CDO Council and CDOs across government, CDOs describe that the lack of guidance and support from OMB is something that could be improved. Three-in-five responding CDOs would like to see a federal CDO position created. The establishment of a single federal CDO at OMB would bolster this capability, the visibility of the CDO community, and provide a singular coordinator within the Executive Office of the President to work alongside the component offices of the White House and other relevant councils in supporting the maturing and growing CDO community.

- **Recommendation 4 – Congress should remove the statutory sunset for the CDO Council.** The CDO Council was established by the Evidence Act and serves as a community and valuable resource for federal CDOs. The CDO Council has demonstrated its value to the CDO community and any sunset period should be removed in statute to ensure CDOs continue to collaborate and coordinate in the years ahead.

The results from the Data Foundation's third annual survey of federal CDOs and the CDO Council's second annual survey show that CDOs are focused on their missions but that they could be more successful if steps are taken to support their office. It is imperative for the maturing CDO community that Congress, leaders in the Executive Branch, and external partners continue to find ways to support and encourage federal CDOs.
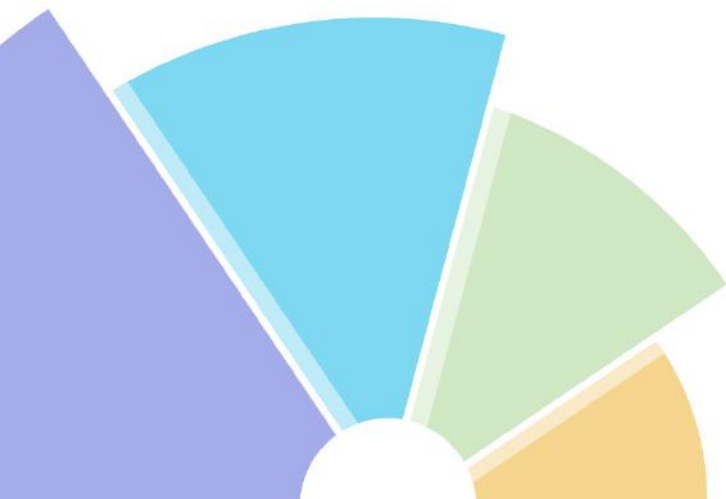
Introduction

The OPEN Government Data Act, or Title II of the Foundations for Evidence-Based Policymaking Act of 2018 (Evidence Act), established Chief Data Officer (CDO) positions in federal agencies.[1] CDOs are responsible for agencies' data governance, for fulfilling the expectations of the Federal Data Strategy, and for meeting the requirements of the OPEN Government Data Act. CDOs are envisioned by the Evidence Act to better organize government data to ultimately support decision-makers' ability to use data to make impactful decisions. The Evidence Act also established a CDO Council–a community that supports best practices and provides information to support CDOs as they develop data-driven organizations.

In 2019, the Executive Branch published the Federal Data Strategy, which outlined a 10-year strategic plan to leverage the use of data as a strategic asset, coordinated by the White House's Office of Management and Budget (OMB).[2,3] It was soon followed by the first government-wide action plan with the goal of moving agencies through four steps to achieve data and evidence use maturity:

| 1	Foundational activities of governance, planning, and infrastructure
2	Enterprise activities of standards, budgeting, and coordination
3	Optimized activities of self-service analytics
4	Data-driven activities of proactive evidence-based decisions and automated data improvements

The Federal Data Strategy also calls for an annual action plan that prioritizes and outlines actions that agencies should undertake to implement the Federal Data Strategy and provides a timeframe for achieving the actions. In December 2019, the first Federal Data Strategy Action Plan was released and included 20 specific action items across three categories to be completed within one year. The Data Foundation began measuring and tracking CDO office maturity soon after and, in 2020, conducted its first survey of federal CDOs.[4] A second survey and report was developed in partnership with Grant Thornton Public Sector LLC, now Guidehouse, in 2021.[5, 6]

The second Federal Data Strategy Action Plan was released in late October 2021.[7] The Action Plan recognized that agencies had not yet fully completed the 2020 action items and allowed them flexibility to either complete those, or for more mature agencies, to move forward on their foundational activities. The Action Plan included 11 total actions, with 6 priority agency actions and 5 other communities of practice or shared solutions actions.

The following table summarizes the actions:

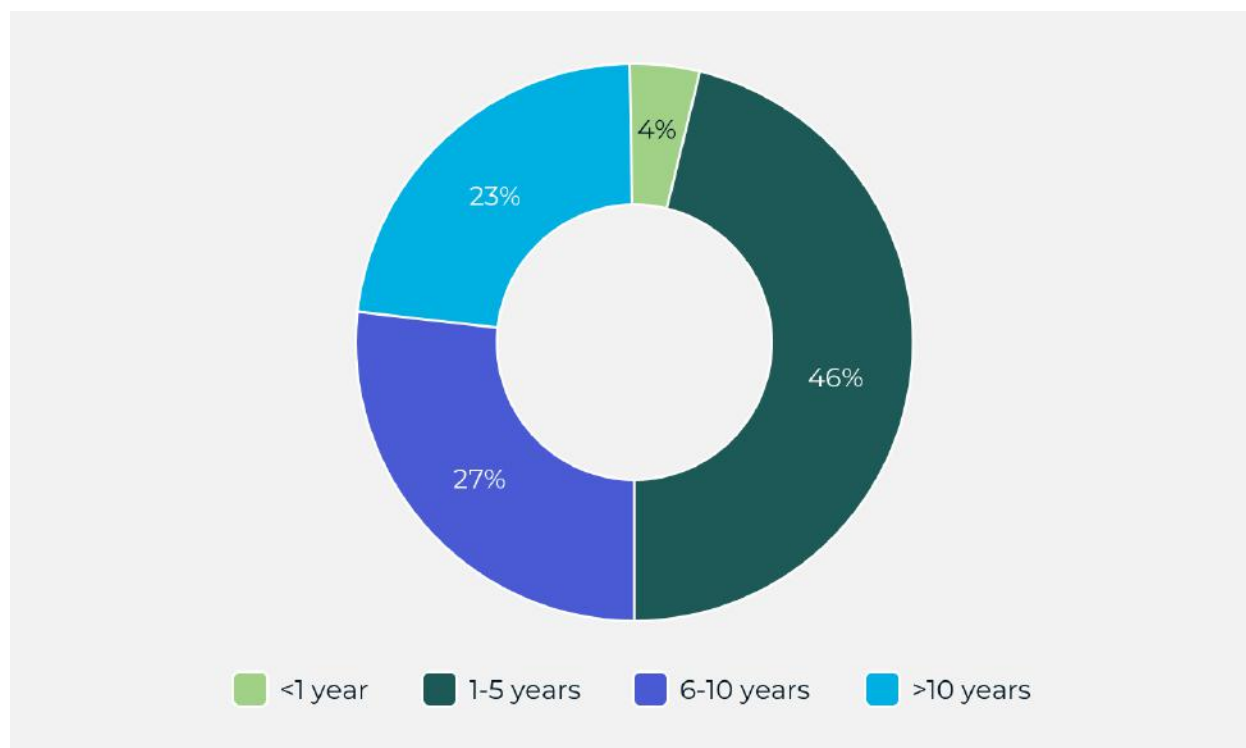| Agency Actions	Community of Practice or Shared Solutions Actions
→ Gather and Assess Data Identified for Priority Agency Questions → Mature Data Governance → Data and Infrastructure Maturity → Increase Staff Data Skills → Publish Agency Open Data Plans → Improve Data Inventories	→ Artificial Intelligence and Automation → Government-Wide Dashboards and Infrastructure → Data Skills Workforce Development → Interagency Wildland Fire Fuels Data Management → Geospatial Data Practices

Data Foundation Survey Findings
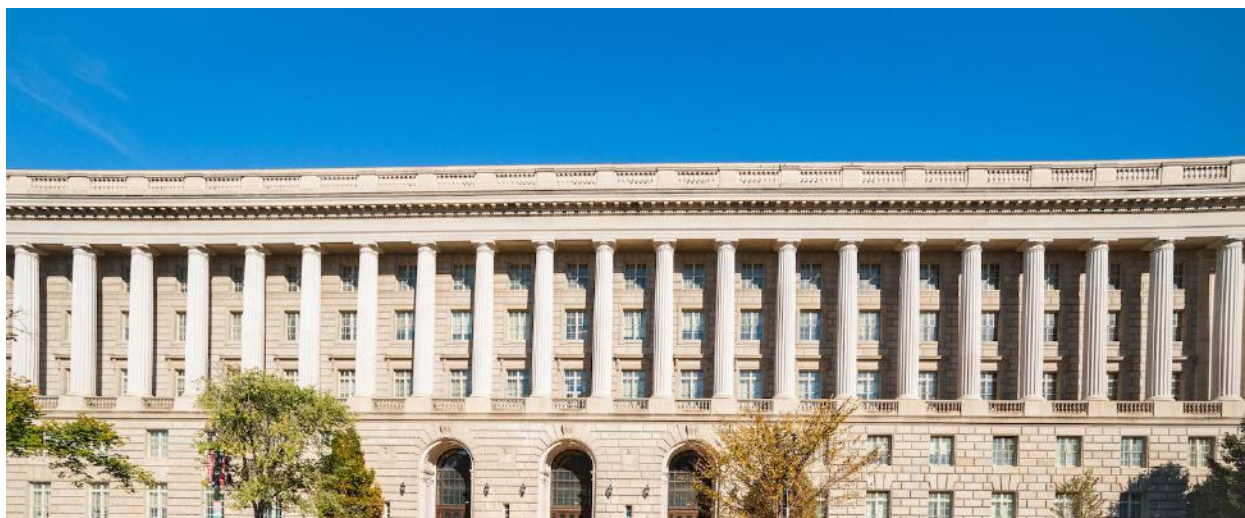
Similar to previous Data Foundation CDO surveys, the 2022 survey collected data from federal agency, bureau, and operating division CDOs and Statistical Officials about the CDO role, mission, Federal Data Strategy successes, and OMB guidance. This year's survey added new questions, including ones related to equity, customer service, whether there should be a federal CDO, and questions about the working relationship between the CDO and Chief Information Officer (CIO). This section summarizes the results of this year's CDO survey and key findings.

CDOs Have Years of Federal Experience

Most CDOs have lengthy careers in the federal government, giving them a good understanding of how government functions. Similar to the 2020 and 2021 survey results, this year's results show that a majority of responding CDOs (92%) have worked for the federal government for 5 or more years and that 80% have worked for the federal government for 10 or more years. Similar to prior surveys, CDOs also report lengthy tenure with their respective organizations, with 96% having more than one year, and half having 6 or more years. These findings demonstrate that CDOs are familiar with the workings of government and have a good understanding of their organizations' data and the business function/mission that is served.

CDOs have Lengthy Experience in Federal Government

Pie chart showing: 4% <1 year, 46% 1-5 years, 27% 6-10 years, 23% >10 years

Legend: <1 year | 1-5 years | 6-10 years | >10 years

# There is No Uniform Reporting Structure for CDOs

While the Evidence Act formally establishes the role of CDO within agencies, it did not prescribe a formal reporting structure. How the CDO reporting structure should be most effectively organized within agencies is still unclear, as it has shifted over time.[8] For example, the most common direct report for CDOs in the 2020 survey was to a CIO (33%). In 2021, the most common direct report was to a Chief Executive Officer (30%), a Chief Operating Officer (COO; 20%), and a CIO (15%). This year, a majority of CDOs reported directly to a CIO (60%), followed by the CEO (40%). Notably, no CDOs in the 2022 sample reported to a COO.

CDOs Report to Either the CIO or the CEO
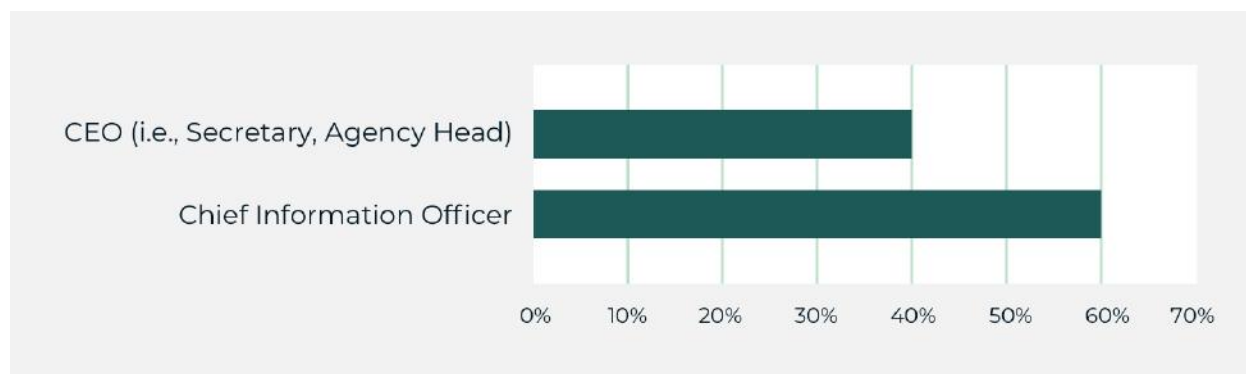
With the CIO being a significant direct report, this year's survey included two questions designed to better understand the dynamics of the CDO-CIO reporting structure. The first question asked, "To what degree do you think the CDO-CIO relationship in your organization is complementary to achieving your CDO Mission?" Over 65% of CDOs viewed their CDO-CIO relationship as being "very" or "completely" complementary to achieving their CDO mission.

## The CIO-CDO Relationship is Beneficial to Achieving the CDO Mission
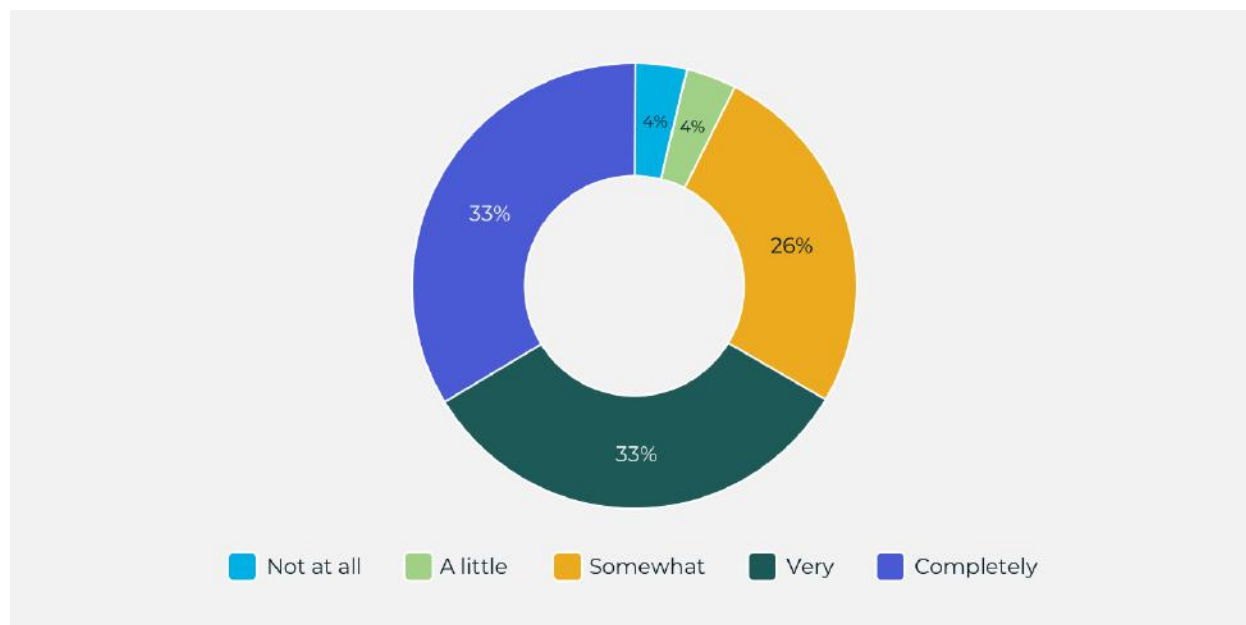
To gain further insight into the CDO-CIO relationship, a second question was asked of only CDOs who reported directly to the CIO, "In general, do you consider the CDO reporting to the CIO to be beneficial or challenging, relative to alternative reporting structures?" Several respondents

indicated that reporting to the CIO is beneficial, such as having better access to their resources, especially in the early stages of building data infrastructures. Others responded that reporting to the CIO was neither beneficial nor challenging. Still others said that reporting to a CIO may create challenges in the long run.

A smaller percentage of CDOs (52%) this year reported that their responsibilities within their organization are "very" or "completely" clear compared to last year (75%). This indicates that some agencies could improve communicating CDO responsibilities.

About Half of CDOs Report that their Responsibilities are Clear

Legend: Not at all, Somewhat, Very, Completely
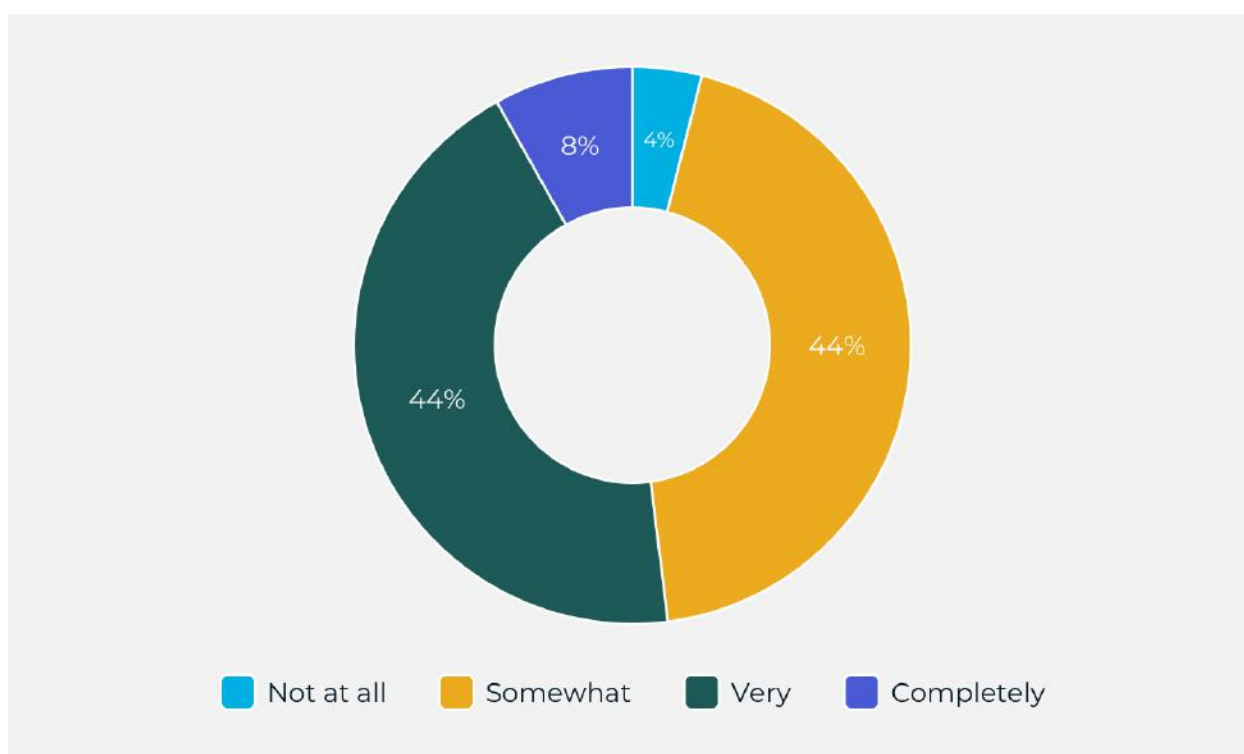
The proportion of CDO offices with 10 or fewer full-time equivalent employees (FTEs) has remained at 50% across 2020, 2021, and 2022. While there was significant growth in CDO offices having more than 25 FTEs between 2020 and 2021, the 2022 survey's proportion of large CDO offices has declined to 2020 levels. Mid-sized CDO offices (11-25 FTE) nearly doubled from almost 10% in 2021 to almost 20% in 2022. Possible explanations include staffing disruptions due to the COVID-19 pandemic or reduced budgeting for staffing across government.

Half of CDO Offices Have 10 or Fewer FTEs

CDOs' Missions

Less than half of respondents (46%) said that they are "very" or "completely" successful in achieving their CDO mission, down from 55% in 2021. Yet, a majority clearly communicated their mission, especially regarding data governance, data literacy, and promoting the use of information for evidence-based policymaking.
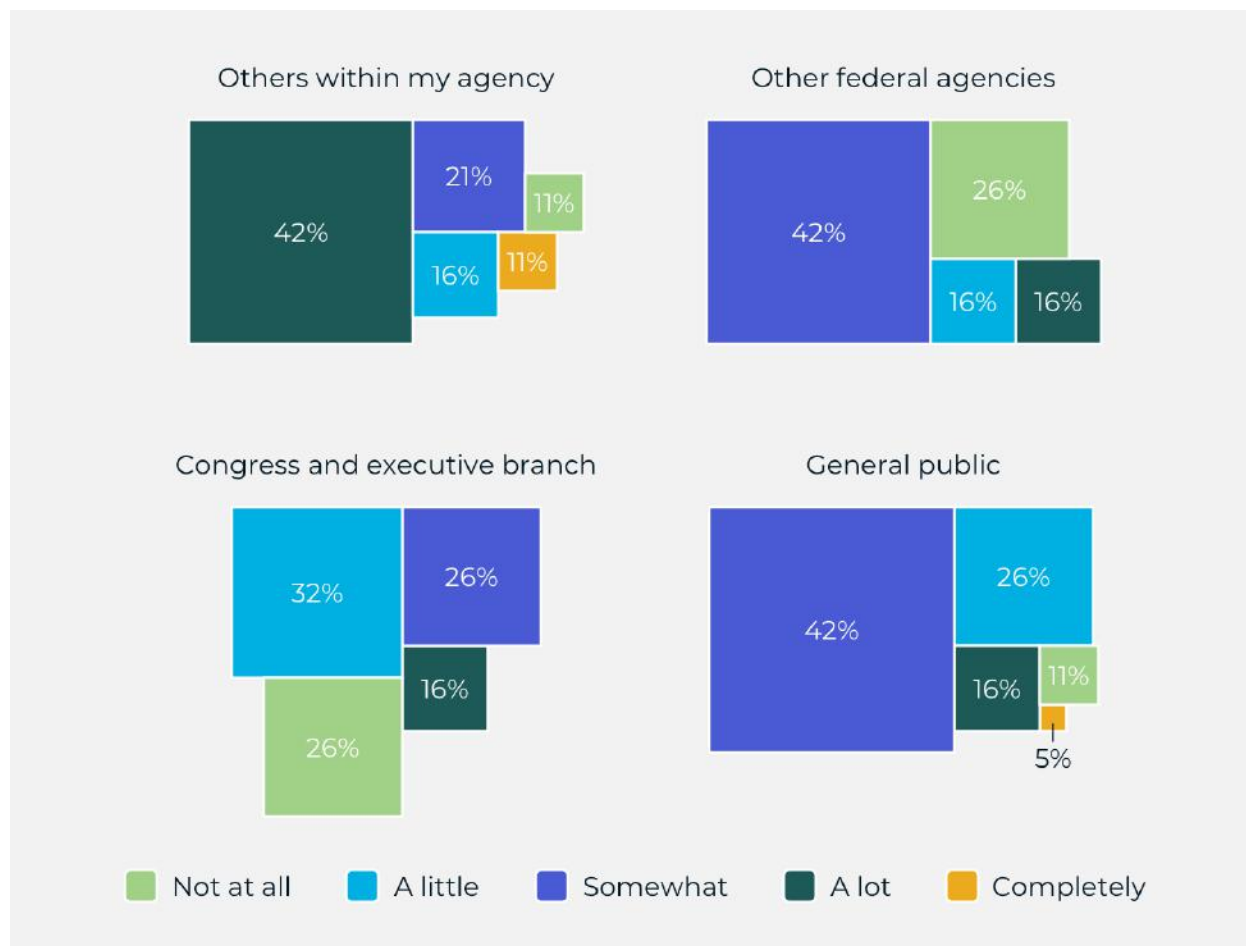
CDOs identified several key functions as being "very" or "completely" important to achieving their CDO missions. Almost 65% of CDOs, for example, responded that developing and implementing data strategy or governance was "very" important to achieving the CDO mission. Over half (55%) of CDOs responded that improving data infrastructure is key. Interestingly, and contrary to requirements of the Evidence Act, only 27% of CDOs indicated that contributing to their agencies' learning agendas and evaluation plans were of key importance to their mission, and only 23% responded that it was "very" important. These findings could be reflective of the tendency of some agencies to develop learning agendas before they establish the CDO role, or suggest the need for further collaboration between the CDO and agency Evaluation Officers.

CDOs Identified Several Key Functions for Success

Chart categories with Very (dark green) and Completely (light green) bars:

- Developing and implementing data strategy or governance
- Facilitating data-driven decision making at all levels
- Developing a strong cadre of analysts and data scientists
- Contributing to agency's learning agenda and evaluation plan
- Facilitating data sharing
- Improving data infrastructure (e.g., data catalog/inventory data architecture)

X-axis: 0% 10% 20% 30% 40% 50% 60% 70%

Legend: ■ Very   ■ Completely

Collaboration between CDO offices and other functional areas and officials both within their own agency and across other agencies is also key to achieving their CDO mission. Most CDOs (88%) reported collaborating with business partners on a daily or weekly basis. A majority also collaborated with their CIO (77%) and officials in other organizations (85%). This year's survey included the probing question, "What would improve collaboration in your organization?" Several CDOs responded that their agency is not required to have Chief Evaluation Officers or Statistical Officials because they are not CFO Act agencies, or that those positions are relatively new or unfilled. Other CDOs responded that there needs to be a more formal structure and that roles need to be more clearly defined to facilitate collaboration. CDOs in smaller agencies report better collaboration.

CDOs Collaborate with Many Stakeholders

Others within my agency
- 42% A lot
- 21% Somewhat
- 11% A little
- 16% A little
- 11% Completely

Other federal agencies
- 42% Somewhat
- 26% Not at all
- 16% A little
- 16% A lot

Congress and executive branch
- 32% A little
- 26% Somewhat
- 16% A lot
- 26% Not at all

General public
- 42% Somewhat
- 26% A little
- 16% A lot
- 11% Not at all
- 5% Completely

Legend: Not at all | A little | Somewhat | A lot | Completely

CDOs are also responsible for changing their agency's data culture from one that never or rarely uses data to develop insights to one that consistently leverages data to solve problems. A new question this year taps into how CDOs view themselves as change agents. Over 70% of CDOs responded that they "very much" or "completely" view their role as CDO as being someone who influences change to their organization's data culture.

CDOs View their Roles as Data Culture Agents
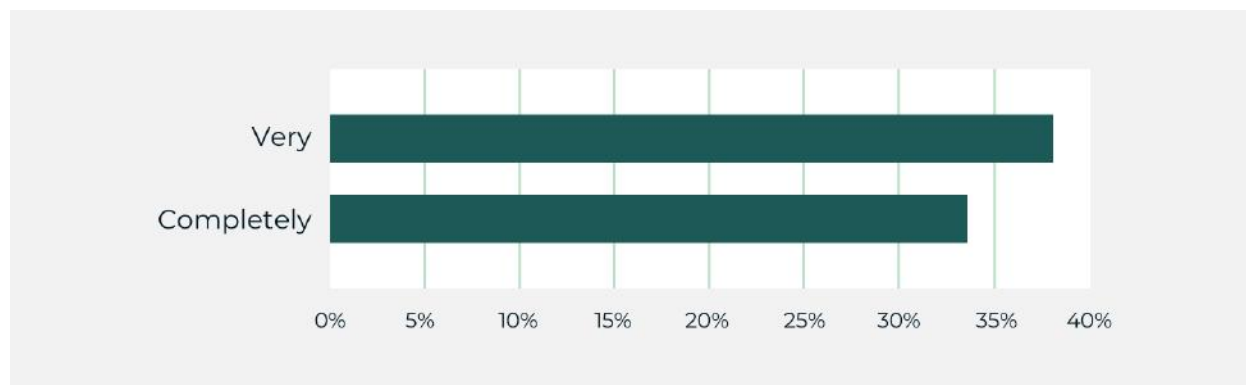
The "Executive Order on Transforming Federal Customer Experience and Service Delivery" stated expectations for improving the federal government customer experience with increased use of data, data sharing, improved processes across federal, state, and local agencies, and involving the CDO Council as part of an interagency-OMB collaboration to develop guidelines.[9] CDOs provide customer service to several stakeholders, with over half of CDOs (53%) responding that others within their agency depended "a lot" or "completely" on their CDO office. This year's survey added a question about the CDO role in customer experience that asked, "In thinking about the customer experience at your organization, what role (if any) should the CDO play?" Most of the responding CDOs view their role as being critical to the customer service experience, particularly as it relates to data quality and making data accessible and usable. Another new question, "What practices have you used to engage stakeholders and the general public about your organization's data assets?" tapped into specific practices that the CDO office uses to engage stakeholders and the public about their organization's data assets. CDOs mostly responded that they use two primary methods of engagement: (1) public presentations including conferences, town halls, external user groups and social media, and (2) making public-facing products available, such as data inventories, visualizations, and statistical aggregates of data holdings. These findings indicate that CDOs understand their role regarding the federal government customer experience and that they are engaging in practices that facilitate it.

Progress and the Federal Data Strategy 2021 Action Plan

The Federal Data Strategy 2021 Action Plan contained 6 priority actions for agencies to focus on to improve the effectiveness of foundational governance, planning, and infrastructure activities:

- Gather and Assess Data Identified for Priority Agency Questions
- Mature Data Governance
- Data and Infrastructure Maturity
- Increase Staff Data Skills
- Publish Agency Open Data Plans
- Improve Data Inventories

Because agencies were not able to fully implement the 2020 strategy evenly, they were given flexibility to address actions that best serve their agency's mission, with some agencies focusing on producing quality assessments of their data infrastructure, skills, and assets.[10] None of the responding CDOs reported completing 5 or 6 priority action items, but 63% reported having at least 5 of the items "in progress" or "completed," down from 75% who reported completing at 5 of the items in last year's survey. The most frequently implemented Action Items were "Gather and Assess Data Identified for Priority Agency Questions" (22%) and "Improve Data Inventories" (22%).

## Progress is Being Made on the Federal Data Strategy 2021 Action Plan
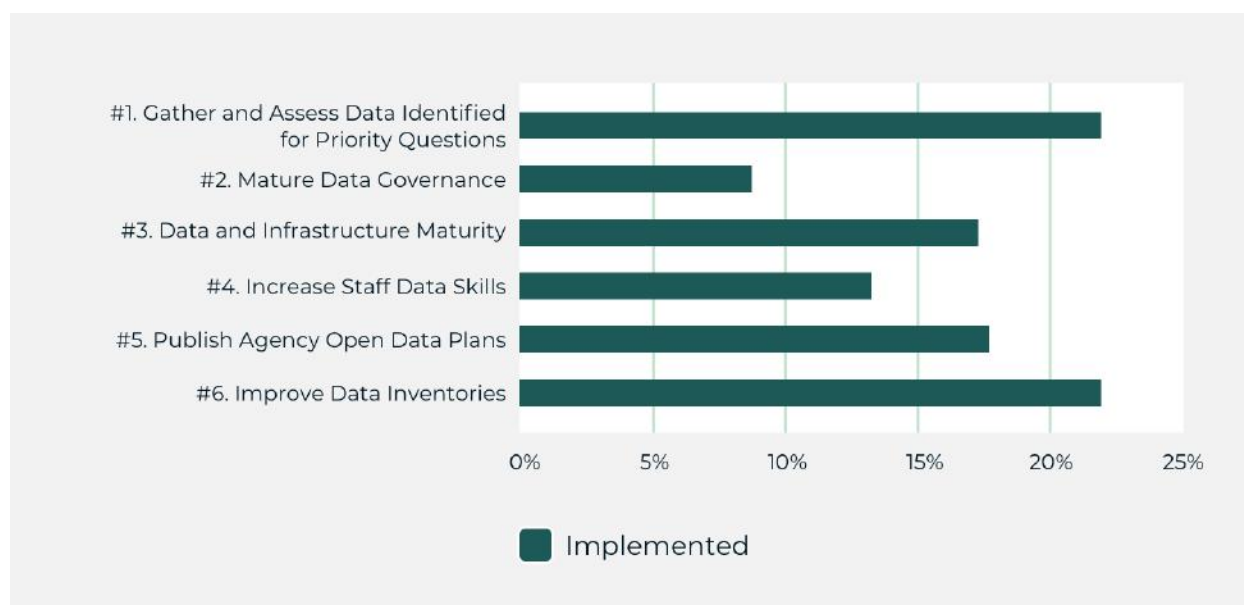
Over half (58%) of agencies completed none or 1 action item, greater than the 30% of agencies in last year's survey. Thirty-seven percent of agencies completed 2 or 3 action items, and 5 percent of agencies reported completing 4 action items. No agencies reported completing 5 or 6 of the priority actions.

Number of Action Items Completed by the Agency
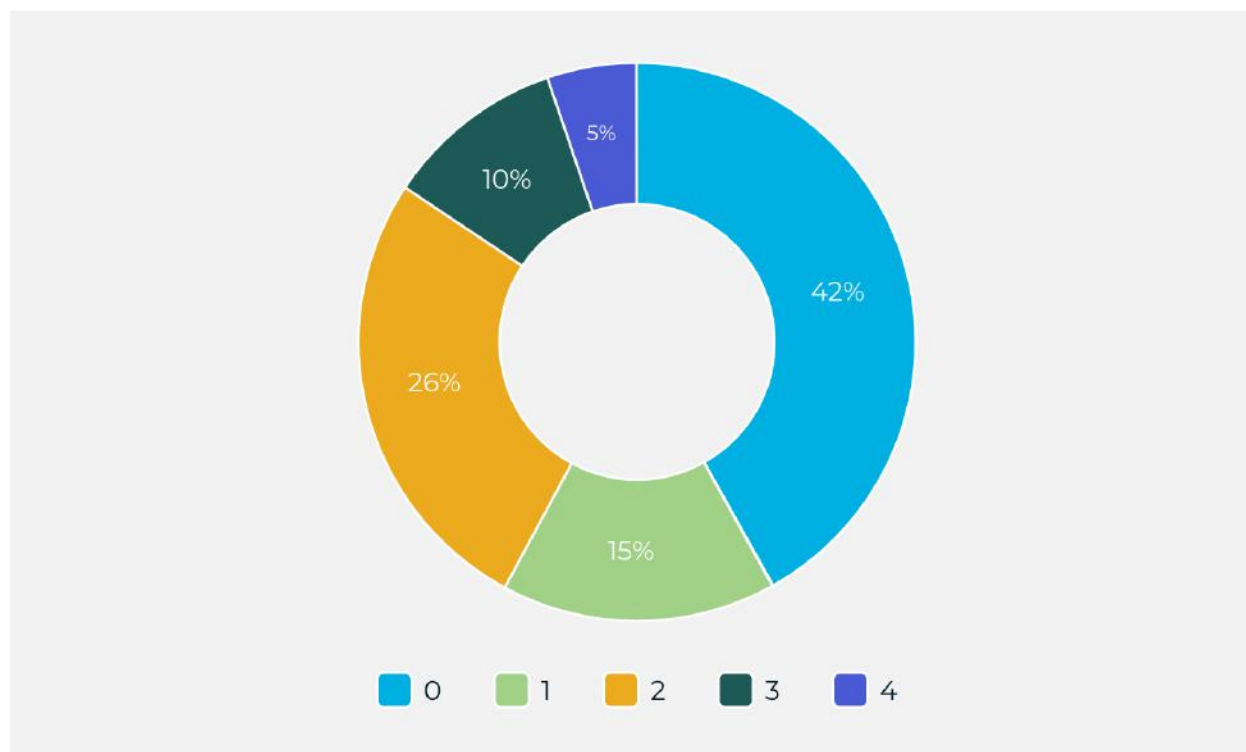
CDOs reported that Action Item #2 "Mature Data Governance" and Action Item #5 "Publish Agency Open Data Plans" were the most challenging (42% of CDOs for each item). Thirty-two percent of CDOs reported that Action Items #2 "Mature Data Governance" and #3 "Data and Infrastructure Maturity" were "Challenging." Action Item #4 "Increase Staff Data Skills" also stands out with 74% of CDOs who said that its implementation was "Challenging" or "Somewhat Challenging."

Maturing Data Governance and Publishing Agency Open Data Plans were Challenging
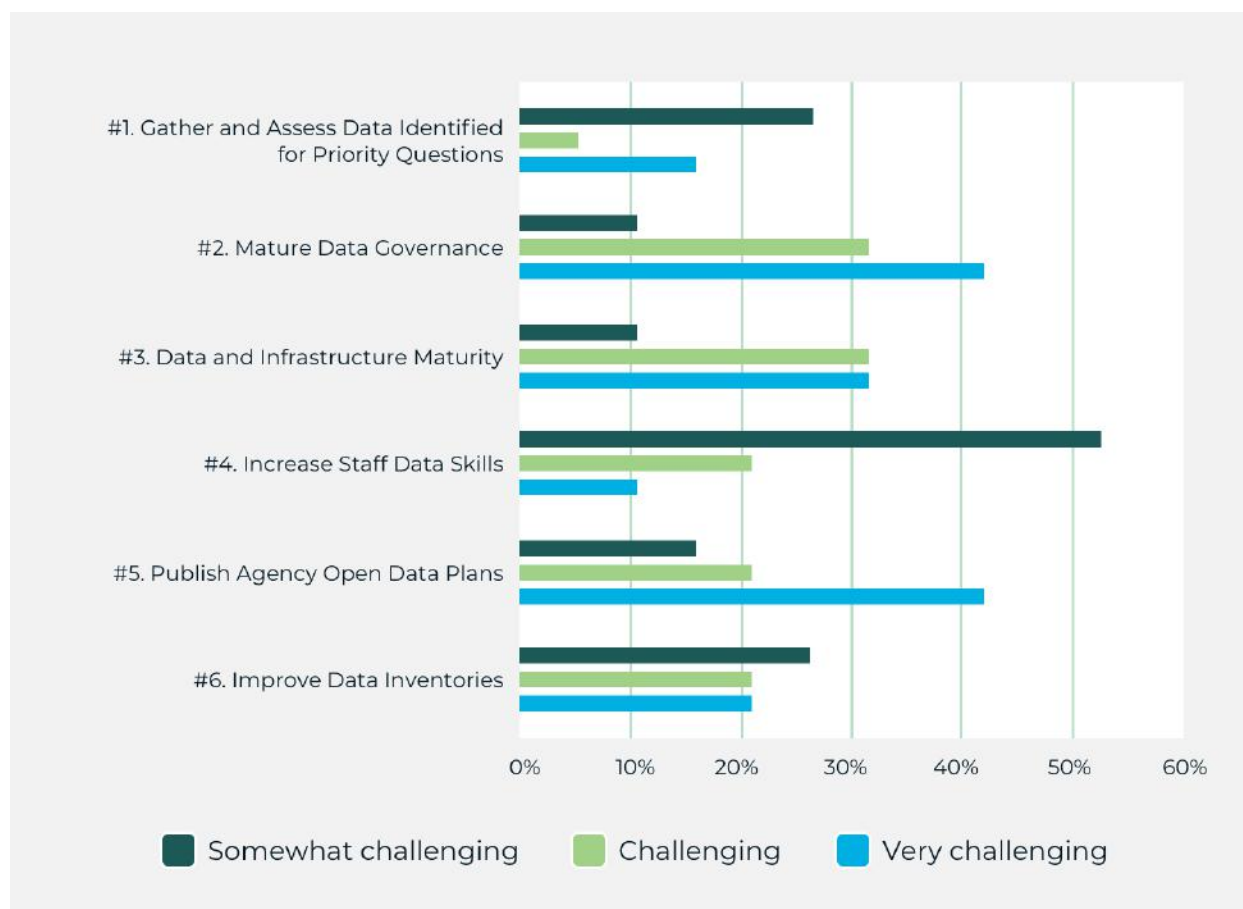
A majority of CDOs reported that Action Item #1 "Gather and Assess Data Identified for Priority Agency Questions" was "A Little Challenging" (32%) or "Not at all Challenging" (21%) and that Action Item #6 "Improve Data Inventories" was "A Little Challenging" (26%) or "Not at all Challenging" (5%).

Gathering and Assessing Data Identified for Priority Agency Questions Presented Few Challenges for CDOs

Bar chart: Challenge ratings for CDO priority areas

- **#1. Gather and Assess Data Identified for Priority Questions** — Not at all challenging: ~21%; Somewhat challenging: ~31%
- **#2. Mature Data Governance** — Somewhat challenging: ~16%
- **#3. Data and Infrastructure Maturity** — Not at all challenging: ~5%; Somewhat challenging: ~21%
- **#4. Increase Staff Data Skills** — Somewhat challenging: ~16%
- **#5. Publish Agency Open Data Plans** — Not at all challenging: ~5%; Somewhat challenging: ~16%
- **#6. Improve Data Inventories** — Not at all challenging: ~5%; Somewhat challenging: ~26%

Legend: ■ Not at all challenging ■ Somewhat challenging

X-axis: 0% 5% 10% 15% 20% 25% 30% 35%

Other CDO Achievements in 2021

When asked about their office's successes in 2021, most CDOs responded that they had taken data governance actions, such as actions focused on setting policies for data sharing, setting data standards, creating a data warehouse, or creating an agency-wide analytics platform. Many also responded that there were successful improvements in their organization's workforce, such as increasing the number of staff and improving the data literacy of existing staff. Another common success was the development of both internal and public facing data visualizations and dashboards. Success in influencing the culture around data emerged as an important gain in 2021 for several CDOs.

CDOs Continue to Face Challenges

Responding CDOs acknowledged multiple barriers and challenges that impede their progress and success. The lack of resources, as in past survey years, remains a key obstacle to achieving the CDO mission. When responding to whether they have the resources necessary to achieve their CDO mission, 22% responded "not at all." Sixty-one percent said that they "somewhat" have the resources needed. Less than 20% of CDOs had most or all of the resources needed to fulfill their CDO mission.

> *Twenty-two percent of CDOs indicated that they do not have the resources necessary to achieve their CDO mission.*

Most CDOs Do Not Have the Resources Needed to be Successful
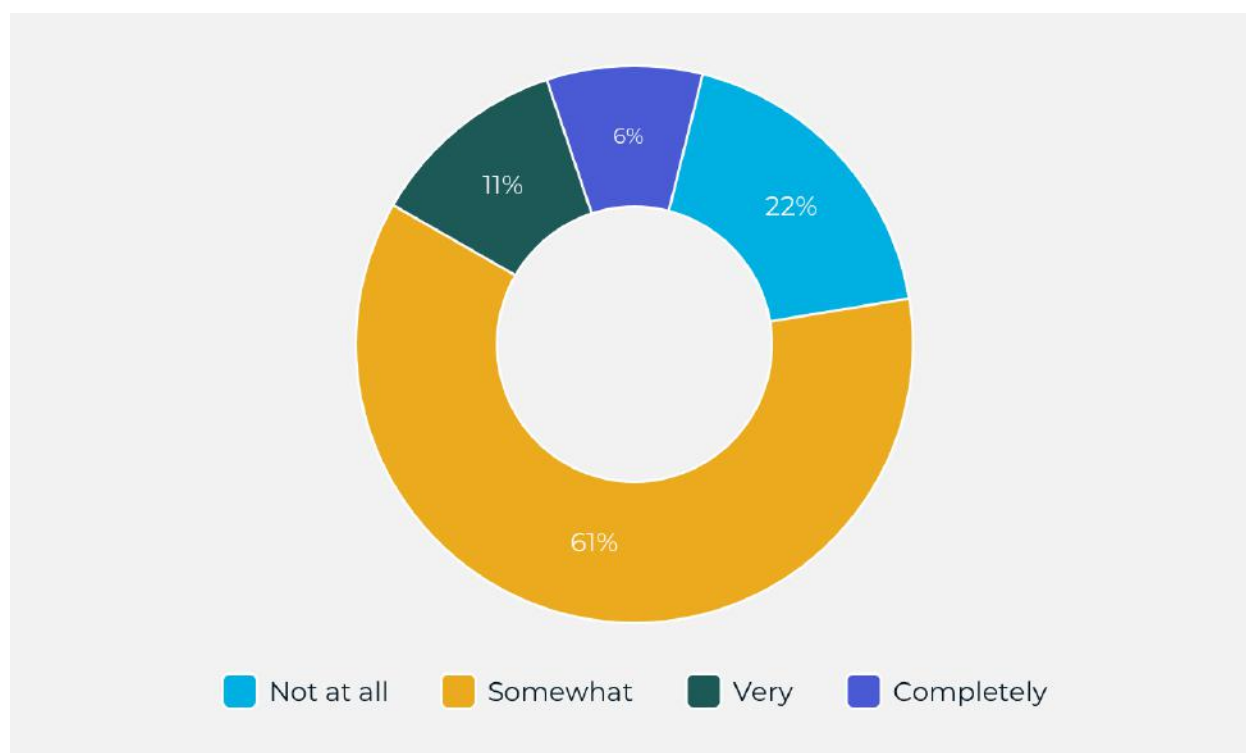
CDOs identified several main areas where they needed more support to be successful:

- Better infrastructure and practices that support data governance
- More FTEs and improved data literacy for the current workforce

- More support from OMB with frequent check-ins
- More funding to support the CDO mission
- Greater clarity about the CDO role and the different expectations of CDOs versus CIOs

Timely Release of Federal Data Strategy Action Plans and Phase II Guidance is Needed

Similar to the 2020 and 2021 survey results, over half of CDOs report that they do not have adequate guidance from OMB. This year's survey asked two additional questions to gain insight into how to improve OMB support of the CDO role. The first question asked, "Should there be a federal CDO position created and established at OMB to provide coordinated leadership across the CDO community?" A majority of CDOs (58%) responded "yes." The second question asked, "What additional guidance in particular would be helpful?" The most common response was that it would be beneficial for developing plans to meet goals and for budgeting purposes if the Federal Data Strategy Action plans were released earlier–ideally allowing a full year for implementation. In a similar vein, CDOs noted that guidance for Title II of the Evidence Act has yet to be released. CDOs responded that OMB prioritization of goals and better communication between OMB and agencies would facilitate their ability to perform their roles. Still others responded that they have not received much guidance at all from OMB, or that they were able to perform their roles without it.

When asked about the need for additional guidance from OMB on privacy (new to this year's survey), several CDOs stated that there needs to be greater clarification in policies and directives and that there is a need for agencies to have privacy officers who are familiar with privacy policy and implications.

## The CDO Council's Survey of Members

The CDO Council conducted its annual survey of members in early 2022.[11] The results and analysis were released on July 17, 2022, with 38 responding CDOs. Although some of the questions overlapped with this year's Data Foundation survey of CDOs, there was additional information to explore in learning about the current status and future opportunities for the federal CDO community as well as some differences in the survey population. The CDO Council limited its survey to its members who are the top-level CDOs in federal agencies, while the Data Foundation survey frame included top-level, bureau, and operating division CDOs.

Characteristics, Roles, and Responsibilities of CDO Council Members

CDOs from large agencies made up over 60% of the respondents, compared to 24% of CDOs from medium agencies and 16% of CDOs in small agencies. A much higher proportion of CFO Act agency CDOs reported that being CDO is their primary role (87%), compared to the non-CFO Act agency CDOs (39%). Over half of respondents in large or medium agencies said that they have been CDOs for 3 or more years of their careers, compared to 33% of those in small agencies. Similar to findings in the Data Foundation's CDO survey, the CDO Council survey found that most CDOs are reporting to the senior-most leaders in their organizations: CIOs, CEOs and COOs. There were differences in the CDO Council's survey regarding the reporting structure with almost a third of large agency CDOs reporting to a CIO and CDOs in small agencies being more likely to report to a COO, Head or Deputy Head of an Agency, or Chief of Staff.

The CDO Council survey asked respondents about their office's current goals. Most CDOs (92%) selected the goal, "To Better Inform Strategic Priorities" followed by "To Ensure Regulatory/Legal Compliance" (73%) and "To Ensure Data Quality/Accuracy" (73%). This indicates that CDOs are focused on solving problems that would hinder their mission and success but that they are also concerned about compliance.

CDOs Identified their Offices' Current Goals
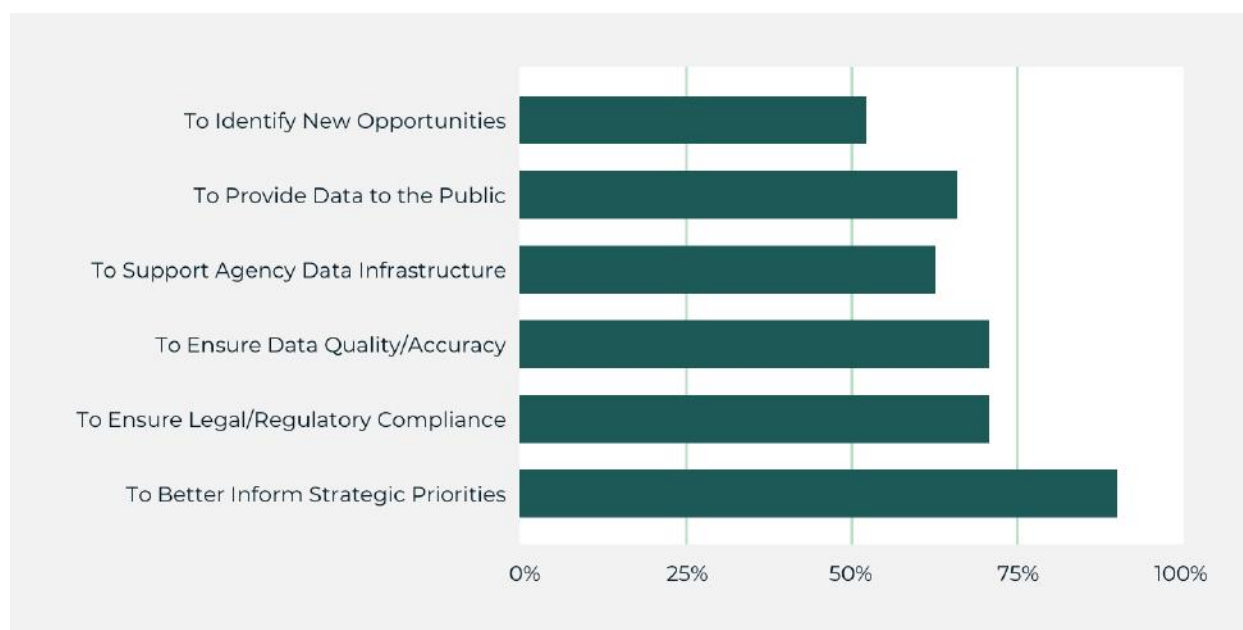
CDOs were asked about their level of responsibility in 28 areas, including data analytics, data strategy, eDiscovery, and information security. The most commonly reported "Primary Accountability" level was for Data Strategy and Open Data in 2022. Between 2021 and 2022, CDOs reported that their level of responsibility for Data Strategy and Data Analytics had increased. In many of the other areas, CDOs' level of responsibility declined including in open data, the Paperwork Reduction Act, data architecture, data integration, data engineering, records management, data manipulation, data evangelism, geospatial data, eDiscovery, information security, research, data visualization, privacy, Freedom of Information Act, and operations research.

The 2021 Federal Data Strategy added a new Action Item on artificial intelligence (AI), with two milestones targeted for agencies. Reflective of this change, this year's CDO Council survey asked respondents about their level of responsibility with AI. About 45% of CDOs responded that they have no practical responsibility with AI, compared to 25% who are partners, 5% who have manager responsibility, and 25% who are the primary accountable officials. This signifies that about half of the agencies surveyed were already likely making some progress on the AI Action Item.

CDOs are Making Progress on Artificial Intelligence
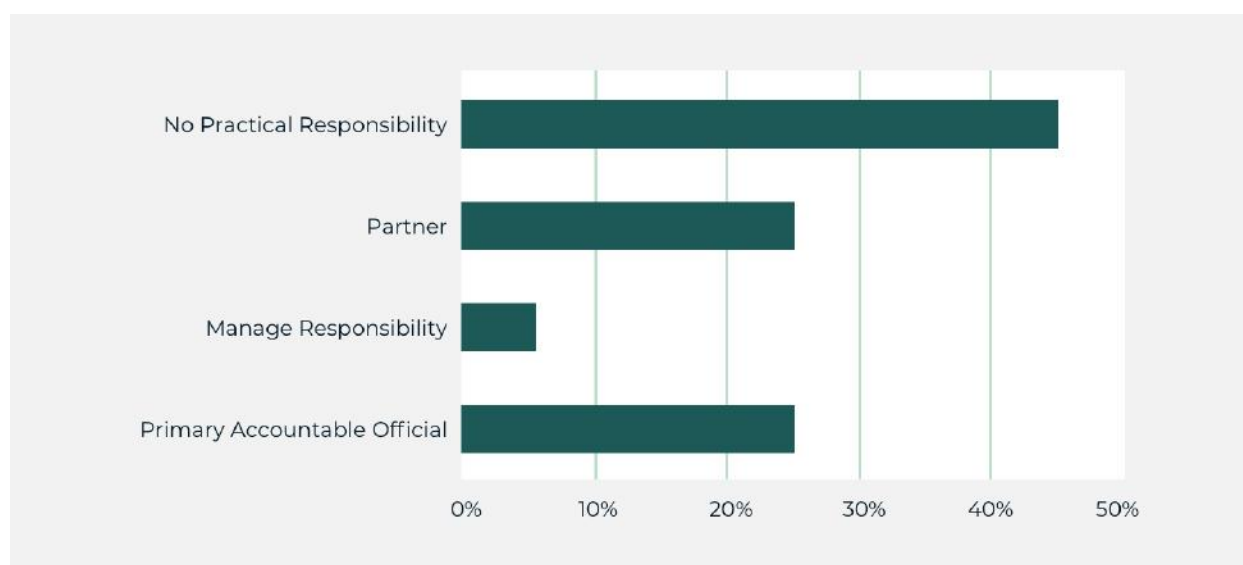
There were differences in the size of the CDO office in the CDO Council's and Data Foundation's surveys. For example, there was a greater proportion of CDO offices with 10 or fewer FTEs in the CDO Council's survey (75%) compared to the Data Foundation's (56%). There was a smaller proportion of CDO offices with 11-25 FTEs in the CDO Council's survey (12%) compared to the Data Foundation's (19%). Similarly, a smaller proportion of offices with more than 25 FTEs were in the CDO Council's sample (12%), compared to the Data Foundation's (26%) sample.

CDOs Experience Varying Levels of Difficulty Filling Positions

When it comes to the need to hire additional talent and workforce, some CDOs are recruiting to fill vacancies. Thirty-nine percent reported having between 1 and 5 unfilled data talent roles to support the CDO role positions and 7% reported having 5-10 unfilled positions. More than half (54%) of CDOs in the CDO Council surveyreported having zero unfilled positions. Many of the CDOs who are hiring are the offices that existed prior to passage of the Evidence Act.

CDOs used contractors to support operational needs, with 63% who reported hiring contractors to perform certain technical tasks. A much higher proportion of CDOs at large agencies (82%) reported hiring contractors than at smaller agencies (30%).

Challenges for CDO Council Members in Achieving their Missions

Like the Data Foundation's survey, the CDO Council asked respondents about the challenges they face with achieving their CDO mission. The most common responses were, "Lack of Direct Funding," "Limited Staff Skills or Workforce Hiring Challenges," and "Data Governance Challenges." CDOs also identified these three as their top challenges in the 2021 CDO Council survey, indicating that they are persistent obstacles and that addressing them would significantly help to support the success of the CDO's mission. Limited funding, especially for long-term projects that support the CDO's goals, creates barriers that could be alleviated with funding predictability and flexibility for multiple years. Issues with staffing could be addressed with better aligned hiring and staffing authorities. Lastly, data governance challenges cover a wide swath of issues, meaning that addressing them will take multi-pronged efforts involving everything from human resources to reducing technological challenges.

Regardless of the challenges CDOs face, CDOs were overwhelmingly positive in their CDO Council survey responses about fulfilling key goals on their road to success. Again, the top three goals were "To Better Inform Strategic Priorities" (92%), followed by "To Ensure Regulatory/Legal Compliance," (73%) and "To Ensure Data Quality/Accuracy" (73%). All three of these goals tie into the larger purpose of the Evidence Act: improving the use of agency information in evidence-based policymaking.

How CDOs Play a Role in Increasing Equity

The "Executive Order on Advancing Racial Equity and Support for Underserved Communities through the Federal Government" was released on January 20, 2021[10] requiring each agency to identify and address inequities in their policies and programs. Agencies were required to submit initial reviews and equity plans to OMB in August 2021, including an assessment of any potential barriers underserved communities may face in participating in federal services, agency contracting, and procurement opportunities. Each agency was required to produce a plan to address any barriers found by January 2022.

To gauge their involvement in equity, this year's survey asked CDOs about their level of involvement in their agency's equity plan. Almost 30% of CDOs said that they were "not at all" involved in preparing their agency's Equity Plan, compared to 70% who responded that they were "a little" or "somewhat" involved. Only 6% of CDOs responded that they were involved "completely" in the preparation of their agency's Equity Plan.

## Most CDOs Have Some Level of Involvement in Equity Plans
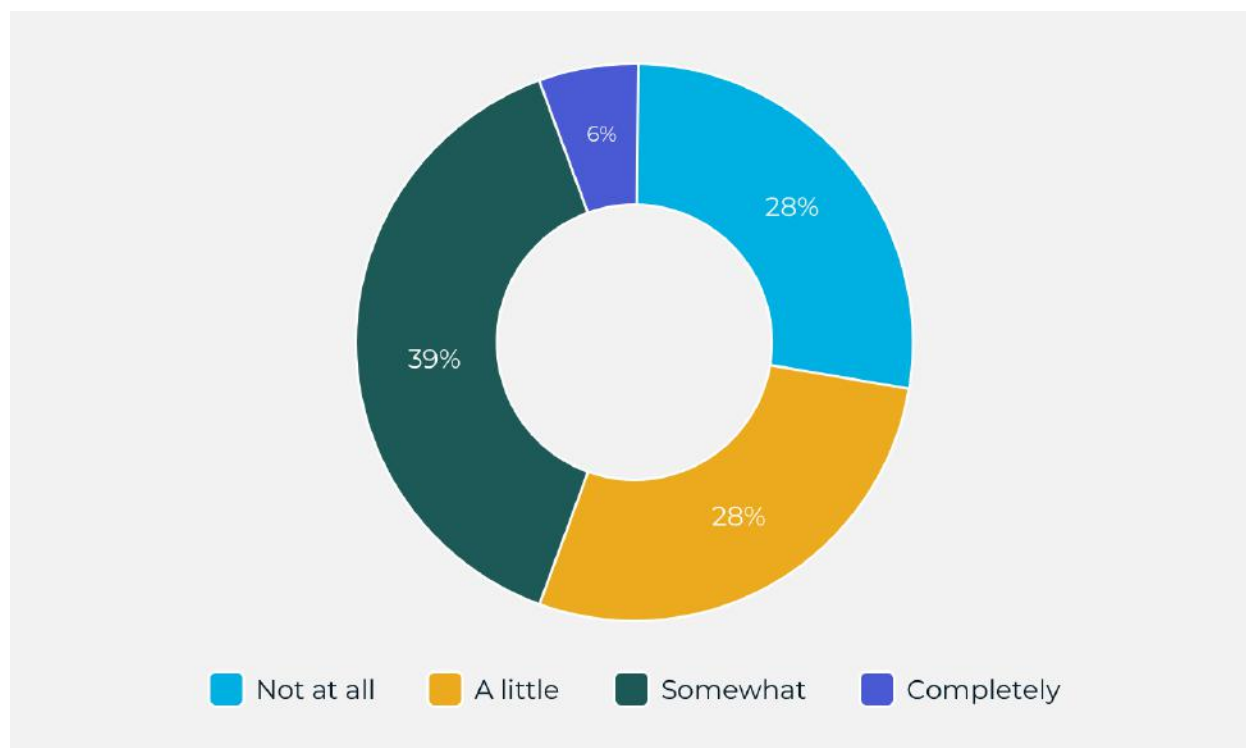
When asked about their organization's strategy for equity in hiring, CDOs largely responded that there were several efforts underway, including job postings and recruitment efforts targeted to

increase diversity, holding job fairs at institutions with large minority populations, and posting multilingual job ads.

CDOs reported efforts aimed at improving the collection and use of equity data. These included imputing missing data, sending missing data rates to field staff to emphasize the importance of more complete data, and cataloging and improving the quality of existing data, noting new elements that should be collected in the future.
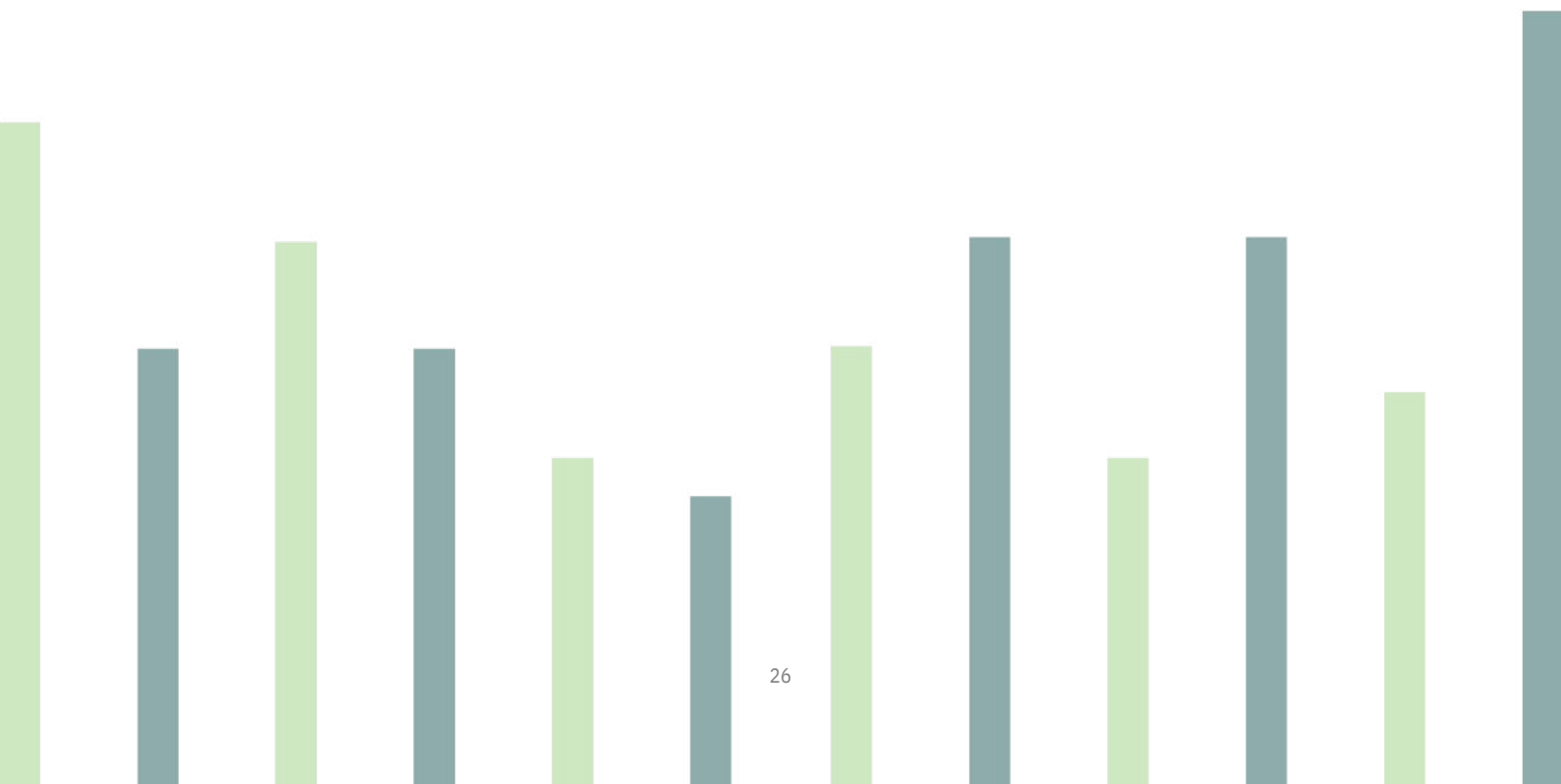
Key Federal CDO Insights in 2022

The third annual Data Foundation 2022 CDO survey and the CDO Council survey offer some key observations about the roles, challenges, and successes of the federal CDO community. They present an opportunity to provide recommendations to strengthen the support for the ongoing efforts of the community and its members. Some key findings and insights include:

- **A majority of CDOs are making progress on the 2021 Federal Data Strategy priority action items but they need additional support.** Progress on the Action items is steady with a majority (63%) of responding CDOs reporting that they have started or completed implementation of at least 5 of the 6 priority Agency Action Items that were detailed in the 2021 Action Plan for CDOs. However, last year's survey showed a greater percentage of CDOs (75%) having started or completed 5 of the 6 items, which is likely a result of the survey sample.

- **The typical CDO has significant federal experience and occupies a leadership position in their agencies.** The CDO role is a senior level position and, as such, requires an extensive background in federal government. A vast majority of CDOs (92%) worked for the federal government for 5 or more years and 80% worked for the federal government for 10 or more years. CDOs also report long tenures with their organizations with 96% having more than one year of experience and half with 6 or more years of experience.

- **CDOs play a key role in their organization's data culture.** A majority (70%) very much or completely view their role as CDO as being someone who influences their organization's data culture. CDOs are change agents, engaging with stakeholders across their organization to improve the quality and use of data.

- **CDOs play a key role in their organization's customer service experience.** This survey found that most CDOs view their role in improving data quality and making data accessible and usable as being critical to the customer service experience. CDOs use two primary methods of engagement: public presentations and making available public facing data products.

- **Challenges to CDOs' success remain.** CDOs have a clear understanding of their CDO mission and the challenges they face. Key priorities for success identified by CDOs include improved infrastructure and practices that support data governance, the need for more staff, improved data literacy, increased support from OMB with frequent check-ins and follow-ups, funding to support the CDO mission, and, finally, greater clarity about the CDO role in general and the different expectations of CDOs versus CIOs.

Recommendations, Next Steps, and Conclusion

To be successful in their roles–ultimately culminating in a robust data infrastructure where government data are an asset used for operational decision-making and evidence-based policymaking capabilities–CDOs need support in several areas. These areas identified in the survey include the following:

- **Recommendation 1 – Congress should increase CDO funding flexibilities and provide more direct resources to CDOs.** Most CDOs (83%) do not have adequate resources to fulfill their statutory responsibilities and support agency missions. CDOs need sustained, predictable, and adequate resources to implement data priorities. Congress should authorize CDOs to use additional funding flexibilities and set-aside authorities, as well as provide increased direct appropriations for CDOs to ensure they can succeed in their mission. This longer-term resourcing plan aligns with the congressional intent in establishing the CDO role through the Evidence Act, which created the position indefinitely rather than for a short-term period. OMB should also include such requests in the FY 2024 President's Budget request to Congress.

- **Recommendation 2 – OMB should issue required guidance to CDOs to clarify responsibilities and to enable full implementation of the OPEN Government Data Act.** CDOs are operating under the general framework of the Evidence Act, the Federal Data Strategy, and their peer community of practice. CDOs need clarifying guidance regarding the data governance function in government, open data and tiered access, and better-defined roles and recognition among senior leaders in their agencies. This guidance was required by the OPEN Government Data Act, Title II of the Evidence Act, but has not yet been issued by OMB. Without this guidance, agencies will apply implementation inconsistently. Issuing the guidance would greatly improve and accelerate implementation activities for CDOs.

- **Recommendation 3 – Congress should create a federal CDO at OMB as a Senior Executive-Level Position.** While the CDO community has grown with the establishment of the CDO Council and CDOs across government, CDOs describe that the lack of guidance and support from OMB is something that could be improved. Three-in-five responding CDOS would like to see a federal CDO position created. The establishment of a single federal CDO at OMB would bolster this capability, the visibility of the CDO community, and provide a

singular coordinator within the Executive Office of the President to work alongside the component offices of the White House and other relevant councils in supporting the maturing and growing CDO community.

- **Recommendation 4 – Congress should remove the statutory sunset for the CDO Council.** The CDO Council was established by the Evidence Act and serves as a community and valuable resource for federal CDOs. The CDO Council has demonstrated its value to the CDO community and any sunset period should be removed in statute to ensure CDOs continue to collaborate and coordinate in the years ahead.

The results from the Data Foundation's third annual survey of federal CDOs and the CDO Council's second annual survey show that CDOs are focused on their missions but that they could be more successful if steps are taken to support their office. This year's Data Foundation survey showed that while the majority of CDOs are making good progress on the 2021 Federal Data Strategy Action Items, fewer reported having at least 5 of the items "in progress" or "completed" compared to last year's survey. Agencies were granted some flexibility in prioritizing action items that are important to their agency, which could be influencing the survey results, although it is likely that some progress has been stalled by inadequate resources. CDOs are senior level professionals who are able to tackle complex problems if they are given the tools they need to be successful. It is imperative for the maturing CDO community that Congress, leaders in the Executive Branch, and external partners continue to find ways to support and encourage federal CDOs.

Appendix and Survey Methods

The findings presented in this report come from the Data Foundation's third government-wide survey of federal CDOs and the CDO Council's second survey of its members. The Data Foundation compiled an inventory of all known federal Chief Data Officers, including those recognized on federal agency websites, through social media, news reports, and Leadership Connect–a directory of federal employees. Additional insights and research conducted by report authors and Data Foundation staff supplemented the survey findings. The Data Foundation invited CDOs and designated Statistical Officials to participate by email, requesting them to complete a web-based survey in June and July of 2022. Data Foundation re-invited CDOs by email three times to those non-responding. Following the fourth invitation, Data Foundation staff contacted CDOs by phone for a non-response follow up and then again for a final non-response follow up. Additionally, the Data Foundation was granted time during one of their membership meetings to appeal to its members to complete the survey. The response rate for the survey was nearly 18%. The sample for the CDO Council survey was its membership, which consists of approximately 90 CDOs at the top-level of their agency. With a total of 38 responses, their completion rate was 43%.

Endnotes

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Chief Data Officer survey 2023
October 2023

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01 Executive summary

Context

In recent years, there has been an explosive proliferation of new artificial intelligence (AI), analytics and data use cases globally. Digital transformation continues at pace, and the most highly data-enabled organisations continue to set new standards of performance.

The future of data is more exciting than ever with vast opportunities, however, these new use cases pose fresh risks and are stretching traditional governance approaches.

The role of the Chief Data Officer (CDO) is firmly on the agenda for most, perhaps all, organisations. Your organisation may already have appointed a CDO, may be considering doing so, or may not have explored this option yet. In any case, there is a need to understand how CDOs should contribute – by leading, catalysing, or supporting across data initiatives. Clearly, an organisation's success is not the sole responsibility of the CDO – but the CDO plays a key role, which is increasing in importance and scope.

Objectives

We are excited to present our second annual CDO survey following the launch of the inaugural report in 2022.

Our objective of the survey, and this report, is to identify insights into the CDO role, and enable data leaders to draw comparisons, for example, where CDOs spend their time and budget, and what their key priorities and challenges are.

New additions to the survey this year include data on the diversity of the CDO role, an initial look at developing trends over time, and additional details on pre-existing areas of insight, such as CDOs' budgets. We look forward to continuing to explore and investigate these trends in future years.

01 Executive summary

Key insight

We believe that a CDO's success at delivering a positive impact on business performance is driven by three key factors:

01.   having a vision aligned to the business strategy

02.   having significant control over how data is gathered, managed and delivered to the organisation

03.   having a material influence over those data aspects they don't control, through relationships.

On the next page, we summarise the key observations related to these three elements. In the following sections, we will explore each area in more detail.

Vision

A CDO's clarity of purpose, exemplified by clear vision and goals (i.e., a 'data strategy' aligned to the business strategy).

Control

A CDO's ability to control their domain (i.e., the data function, but also use of data within the wider organisation).

Influence

A CDO's ability to influence and enable others to set data firmly on the agenda for wider teams and functions.

CDO success

4

01 Executive summary

Conclusions

We believe that the evidence gathered from the survey points us at several important conclusions about the future of this developing C-suite role:

- the CDO role is not going away, with the remit and size of the CDO team continuing to grow at pace
- CDOs are increasing in seniority and leverage, with significant movement towards improved relationships with CxOs and greater presence on the executive board.

The survey reconfirms that CDOs benefit from reflecting on their:

Vision and goals: established and effective CDOs have a defined strategy that is aligned to the business and communicated with their wider organisation. A clear vision helps CDOs to achieve this successfully.

Control: established and effective CDOs are strengthening their control by building bigger teams or establishing better engagement through federated models, to cover a broader scope of data capabilities.

Influence: established and effective CDOs have influence over all other aspects of the organisation that impact on their purpose, ranging from C-suite to more junior employees.

Variations in the role and focus areas of the CDO across industry groups are important. For example, the relative weightings amongst the three identified core objectives vary dramatically: the data shows a focus on driving value in Corporates*, compliance in Government & Public Sector, and a balanced agenda in Financial Services.

*Note: Corporates refers to Private Sector companies including (but not limited to) the Consumer, Energy, Resources and Industrials (ER&I), Telecommunications, Media and Technology (TMT) and Life Sciences and Health Care (LSHC) industries.

5

01 Executive summary

Data continues to be a key topic for organisations across industry groups and geographies, making the role of the CDO ever more important.

We hope that this report supports you in your role as a senior data leader, to frame your thinking on the key opportunities and challenges of the role. Please contact a member of our team to discuss your organisation's needs.

Thank you for reading and supporting us with this research.

Tony King
Data, Privacy & Analytics Partner

Andy Whitton
Data, Privacy & Analytics Partner

Iris de Jongh
Responsible Data & Analytics Partner

01

Executive summary

02

Key observations

Vision & goals
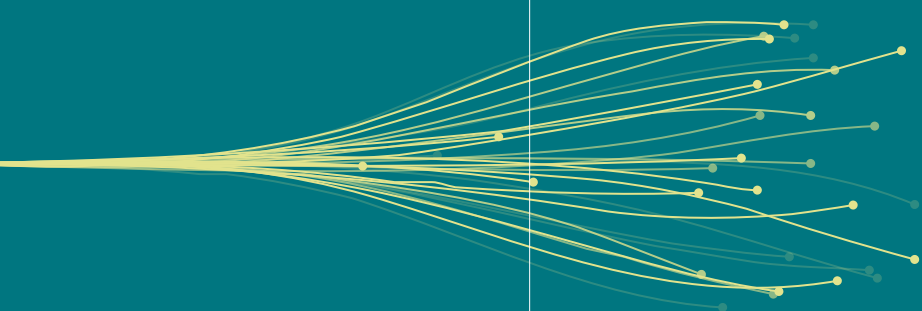
Control

Influence

03

Focus areas

Organisation & operations

Value to enterprise

Influence of the CDO

The four faces of the CDO

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CDO programme

02 Key observations: vision & goals

Vision & goals
Our perspective

A clear data strategy is a critical enabler of a modern, data-driven organisation. Enterprises that have defined, shared, and aligned their data strategy with their organisational strategy will be able to drive value and extract insights from their data more effectively. Established and effective CDOs with a clear vision are more focused and successful at communicating this with the wider organisation.

We believe that strategy is a critical part of the CDO's role. A CDO who is focused on strategy and change, as well as technology and operations, is more likely to maximise their impact.

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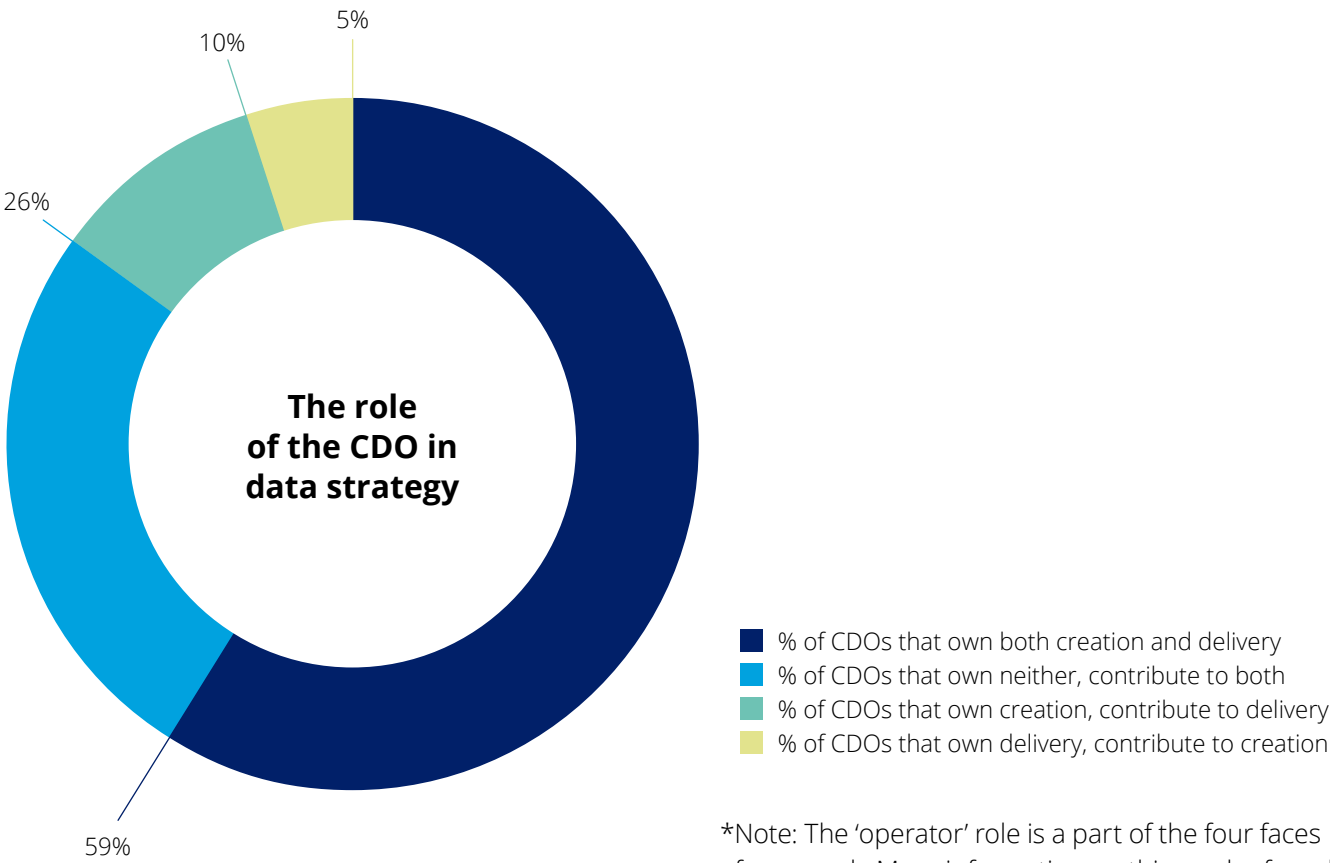**02 Key observations: vision & goals**

Vision & goals

CDOs enable their organisations to become insight-driven through data strategy.

61% of CDOs said creating, updating, or implementing their data strategy was one of their top priorities over the next year.

59% of CDOs own both the creation and delivery of their organisation's data strategy.

CDOs whose remit extends across the whole organisation are **40%** more likely to have defined and implemented their own strategy.

69% of CDOs want to spend more of their time providing leadership for data activities and less time assessing and designing data technology platforms. See further details on **page 66**.

The role of the CDO in data strategy

- 5%
- 10%
- 26%
- 59%

Legend:
- ■ % of CDOs that own both creation and delivery
- ■ % of CDOs that own neither, contribute to both
- ■ % of CDOs that own creation, contribute to delivery
- ■ % of CDOs that own delivery, contribute to creation

*Note: The 'operator' role is a part of the four faces framework. More information on this can be found in the 'four faces of the CDO' section.

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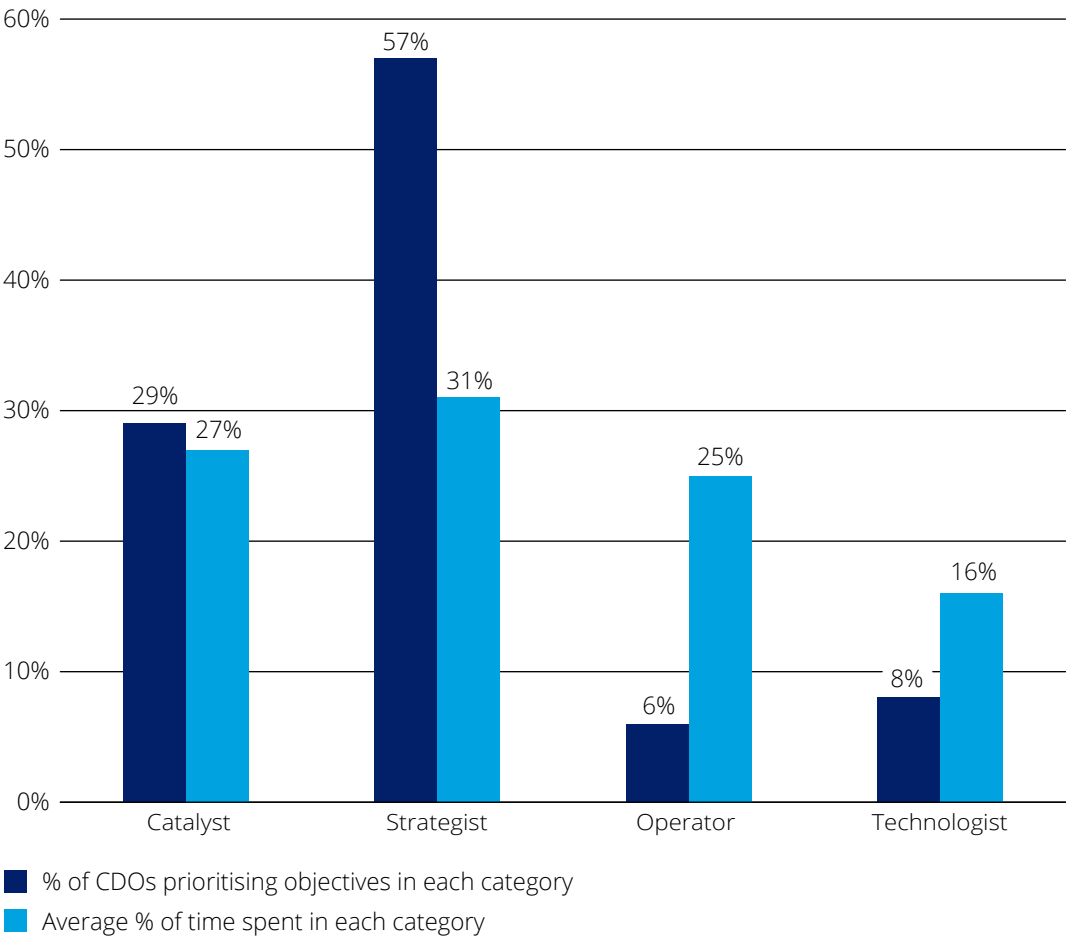**02 Key observations: vision & goals**

CDOs need to work to align their activities with their strategies.

CDOs spend **25%** of their time in the 'operator*' role. However, only 6% of CDOs state 'operator' type objectives as a priority.

CDOs generally spend more time in technologist and operational roles than in strategic ones, which have been identified as a priority for **57%** of CDOs.

CDOs spend a disproportionate amount of time in the operator and technologist roles (**25%** and **16%** respectively) and not enough time in the strategist role, when compared against their top objectives.

CDOs' time is not aligned to their top objectives

Bar chart — "CDOs' time is not aligned to their top objectives"

Category	% of CDOs prioritising objectives in each category	Average % of time spent in each category
Catalyst	29%	27%
Strategist	57%	31%
Operator	6%	25%
Technologist	8%	16%

■ % of CDOs prioritising objectives in each category
■ Average % of time spent in each category

*Note: The 'operator' role is a part of the four faces framework. More information on this can be found on **page 60** onwards.

10

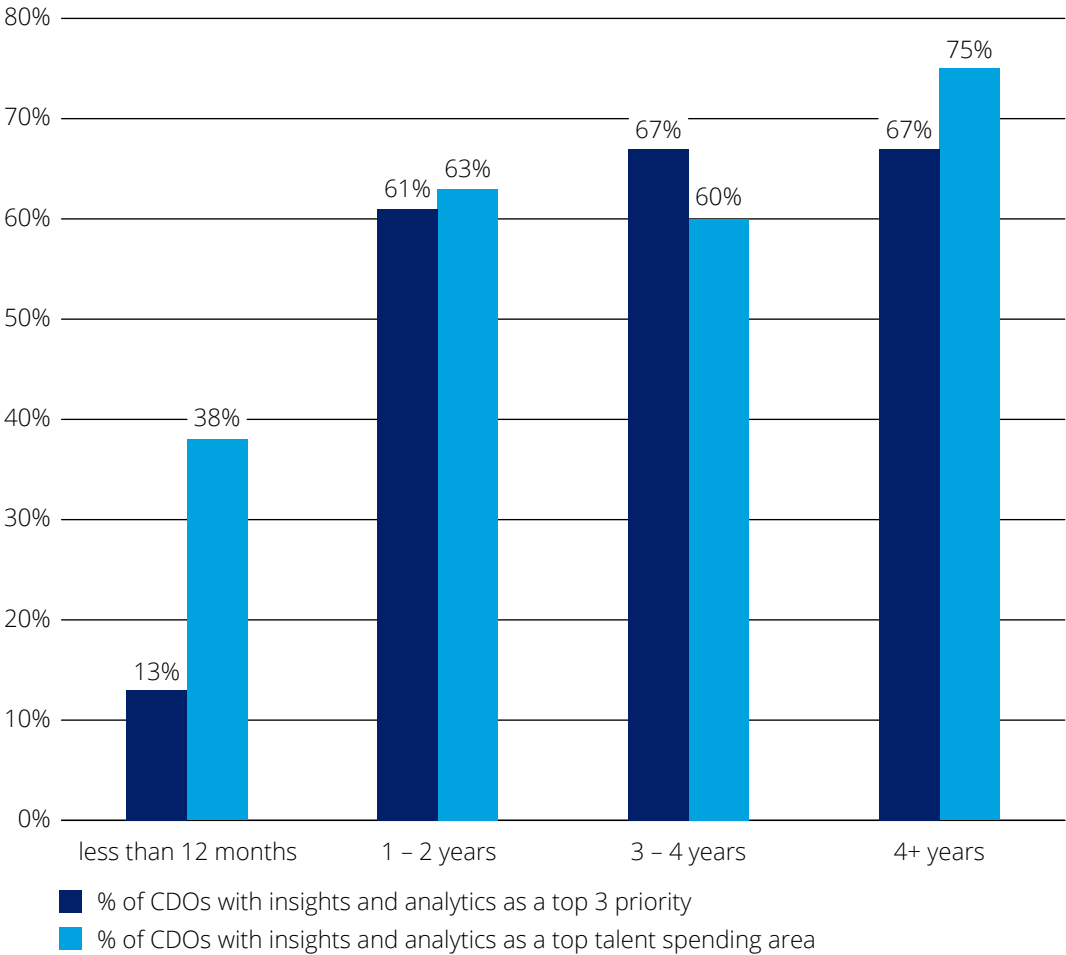**02 Key observations: vision & goals**

CDOs that are well established in their role are more likely to focus on insights and analytics.

67% of CDOs with a tenure of over three years flagged improving the usage and availability of insights and analytics as one of their priorities, compared to 53% of all CDOs.

67% of CDOs with a tenure of over three years have analytics and insights as one of their largest areas of talent spending, compared to 60% of all CDOs.

76% of Corporates are focusing on insights and analytics compared to 40% in Government & Public Sector and Financial Services.

CDOs' focus on insights and analytics

Legend:
- % of CDOs with insights and analytics as a top 3 priority
- % of CDOs with insights and analytics as a top talent spending area

Data:
Tenure	Top 3 priority	Top talent spending area
less than 12 months	13%	38%
1 – 2 years	61%	63%
3 – 4 years	67%	60%
4+ years	67%	75%

02 Key observations: control

Control
Our perspective

We believe that CDOs must have control over the data function, or have a wide influence over the usage of data across the enterprise through a federated model. This will help CDOs to drive value for their organisation fully and effectively.

The CDO plays a key role in the I.T. systems' change process to ensure that infrastructure aligns with the business' ambitions and broader data objectives.

The bilateral relationship between the CDO and the I.T. team is extremely important. The CDO needs to influence I.T. activities to align with their ambitions, and the I.T. department can influence the CDO by helping them achieve their objectives, development, and delivery.

12
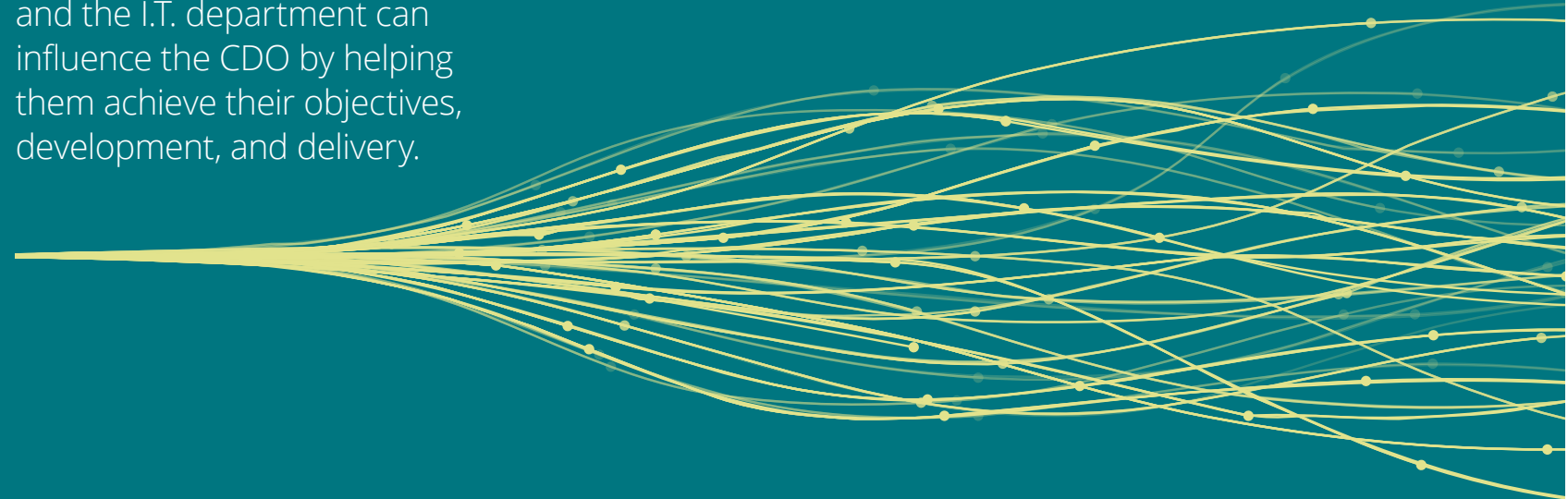
02 Key observations: control

Control

CDOs do not control a significant proportion of data-related spend (yet).

Relative to the size of the I.T. budget*, spending controlled by CDOs is smaller than we would expect at **12%**. This is less than their desired percentage, which is **17%**.

37% of CDOs have seen an increase in their budgets in the past 12 months: we expect to see a continued upwards trend over the next 12 months, with CDO budgets increasing towards the desired 17% of overall I.T. budget.

The majority of CDOs are responsible for their own budgets. This trend can be seen across all industry groups: **86%** from Corporate, **77%** from Financial Services and **76%** from Government & Public Sector.
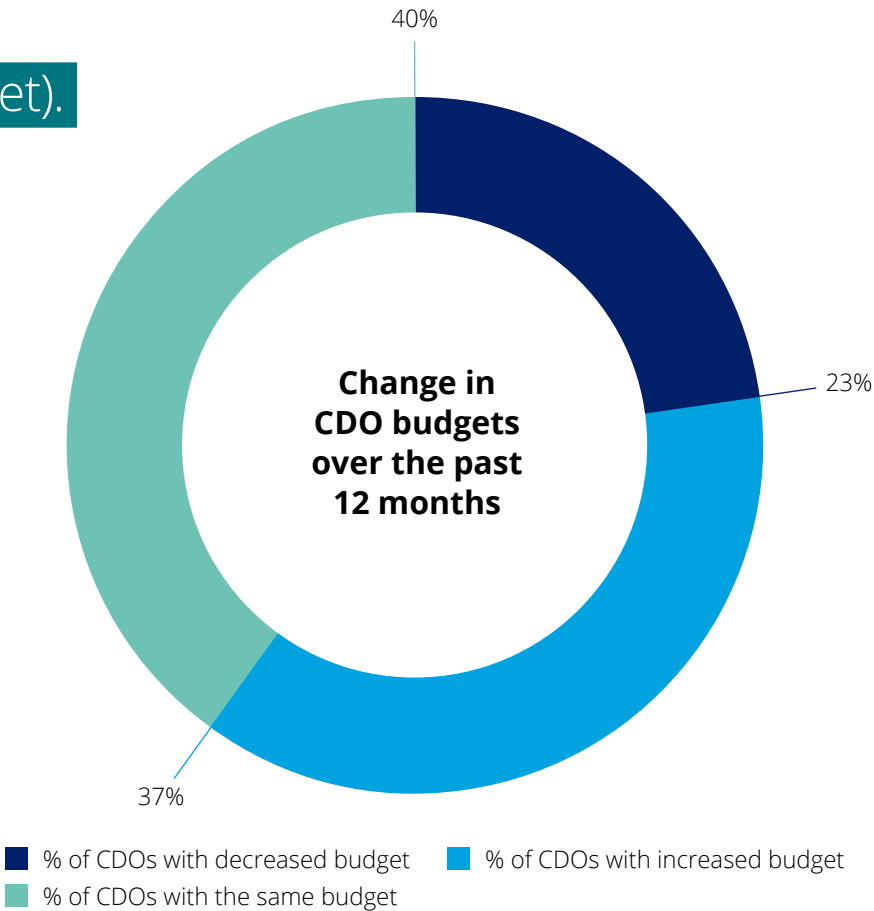
Change in CDO budgets over the past 12 months

40%

23%

37%

■ % of CDOs with decreased budget   ■ % of CDOs with increased budget
■ % of CDOs with the same budget

*I.T. is used here as a cross-industry comparator only. In this report, I.T. may refer to I.T., digital and technology teams.
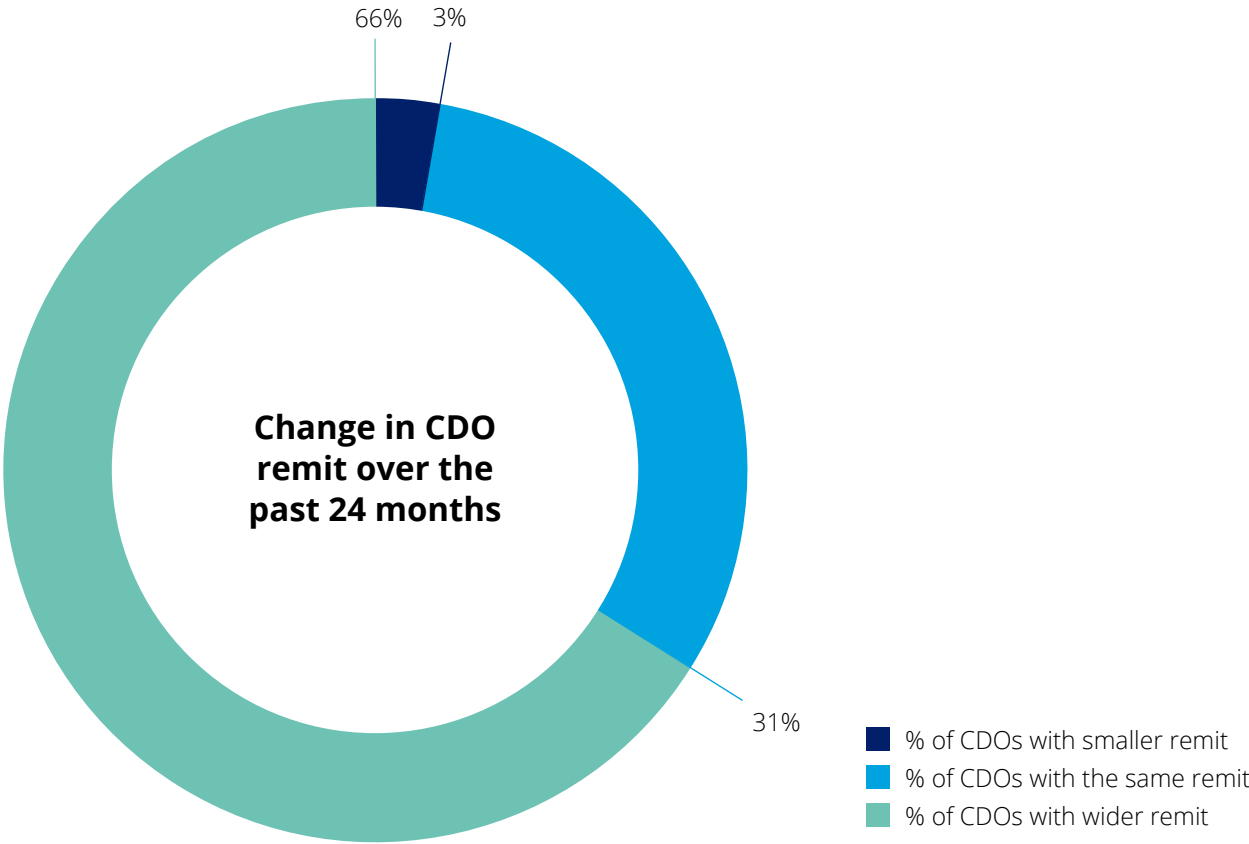
02 Key observations: control

CDOs are expanding their teams and working across a wider remit.

39% of CDOs said that recruiting more staff into their data function is a key priority this year. This is consistent with the CDOs widening remit - **97%** noted their remit has increased or remained consistent in the past 24 months.

49% of CDOs are expecting the size of their team to increase more than **20%** in the next year.

The size of CDOs' domains (relative to the organisation) is also growing, with **1.6%** of an organisation's headcount now in a data function.

66% of CDOs reported that their remit has grown in the past 24 months.

66%   3%

Change in CDO remit over the past 24 months

31%

- % of CDOs with smaller remit
- % of CDOs with the same remit
- % of CDOs with wider remit

14

02 Key observations: influence

Influence
Our perspective

A CDO can influence their organisation to become more insight-driven by driving awareness and engagement through personal connection, and building an internal network of professionals. Senior leaders will be able to learn and develop from the CDO's experiences, white the CDO can benefit from listening to different perspectives and feedback.

The CDO should ensure that their work is supporting CxOs' objectives and the overall business strategy, creating a unified approach.
The CDO should also look to build a strong relationship with the CEO, as it will help to secure buy-in and funding for transformation change projects that help to unlock the benefits of data.

Ultimately, building stronger relationships helps to create a more collaborative environment, which results in higher potential value from data and an increased understanding of the benefits that can be delivered using data.
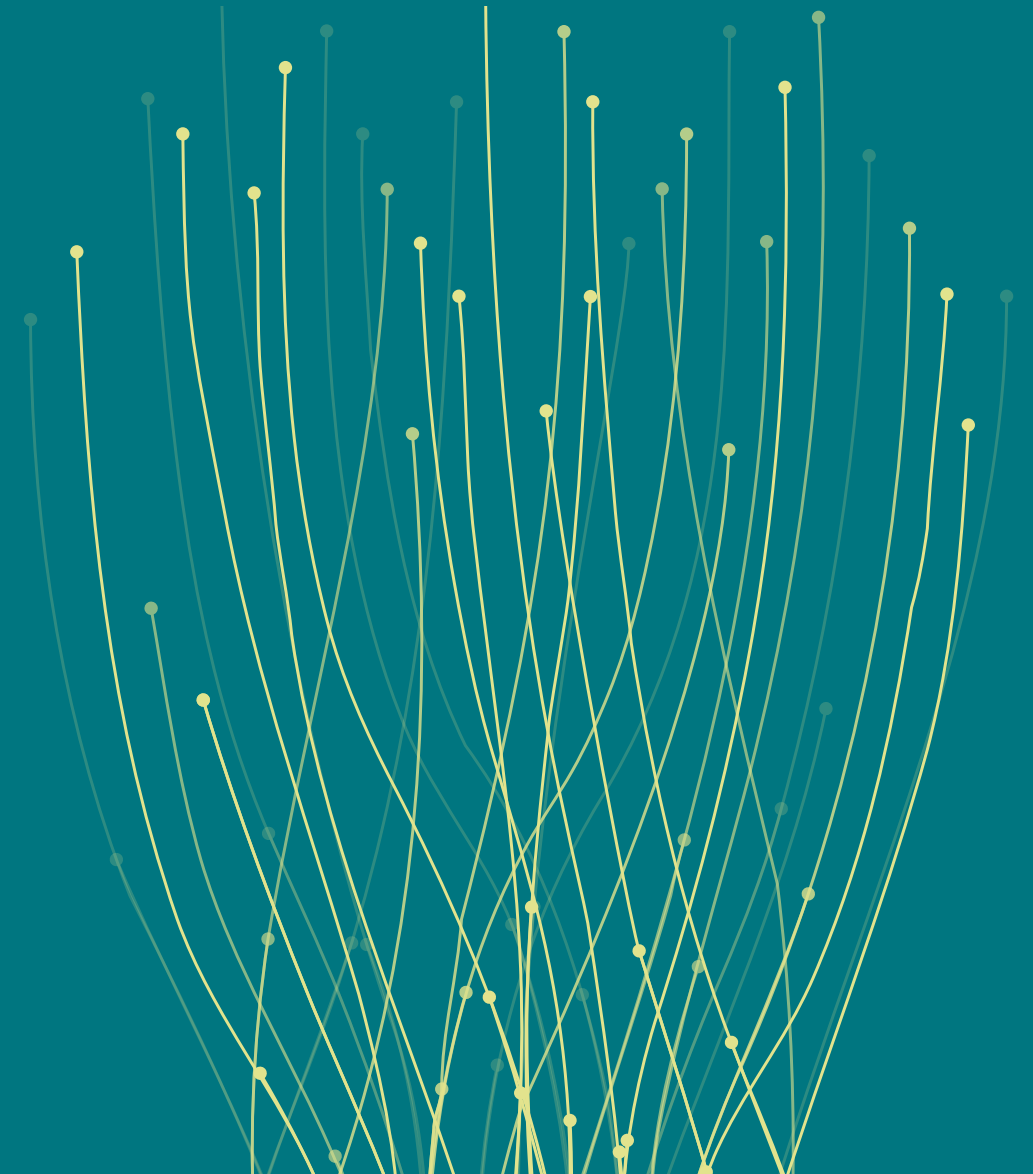
02 Key observations: influence

Influence

> ## CDOs are becoming increasingly influential but need to continue to build their internal networks.

76% of CDOs have a remit across the whole enterprise, and **66%** of CDOs reported that their remit has grown in the past 24 months.

The percentage of CDOs sitting on the executive committee, or board, has increased from 9% in 2022 to **17%** in 2023. We would expect this to increase further over the next 12 months.

Whilst the CTO link is strong with **77%** of CDOs, it is far less common with the other C-Suite members, and lowest of all with the CEO, at **44%**.

23% of CDOs said they had no relationship with their CEO. Only **7%** report directly into the CEO.

49% of CDOs are looking to improve their relationships with key data stakeholders as a priority.

CDOs across all industries are focusing on improving internal relationships. **53%** of Corporates flagged it as a key area of focus, compared to **52%** of Financial Services and **40%** of Government & Public Sector.

CxO relationship with the CDO

CEO 44%
CFO 52%
CTO 77%
DPO 52%
COO 58%

Stronger relationship
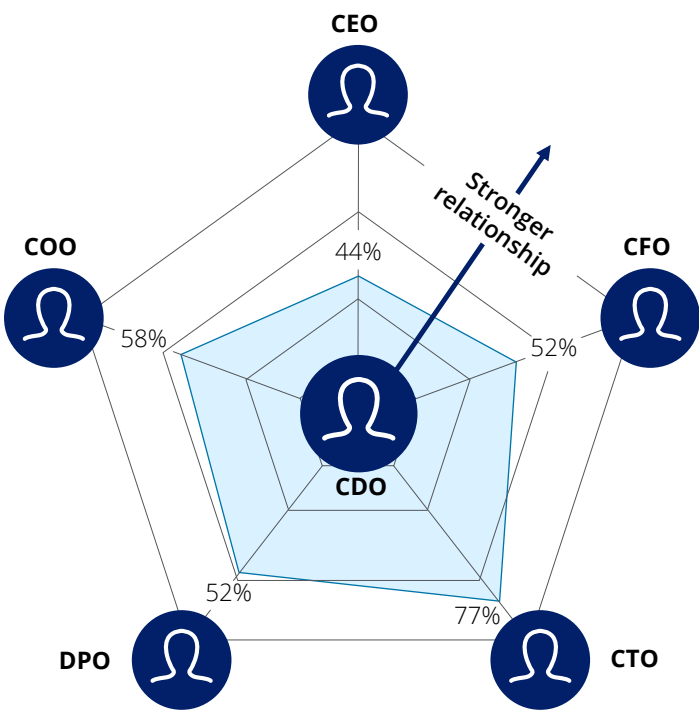
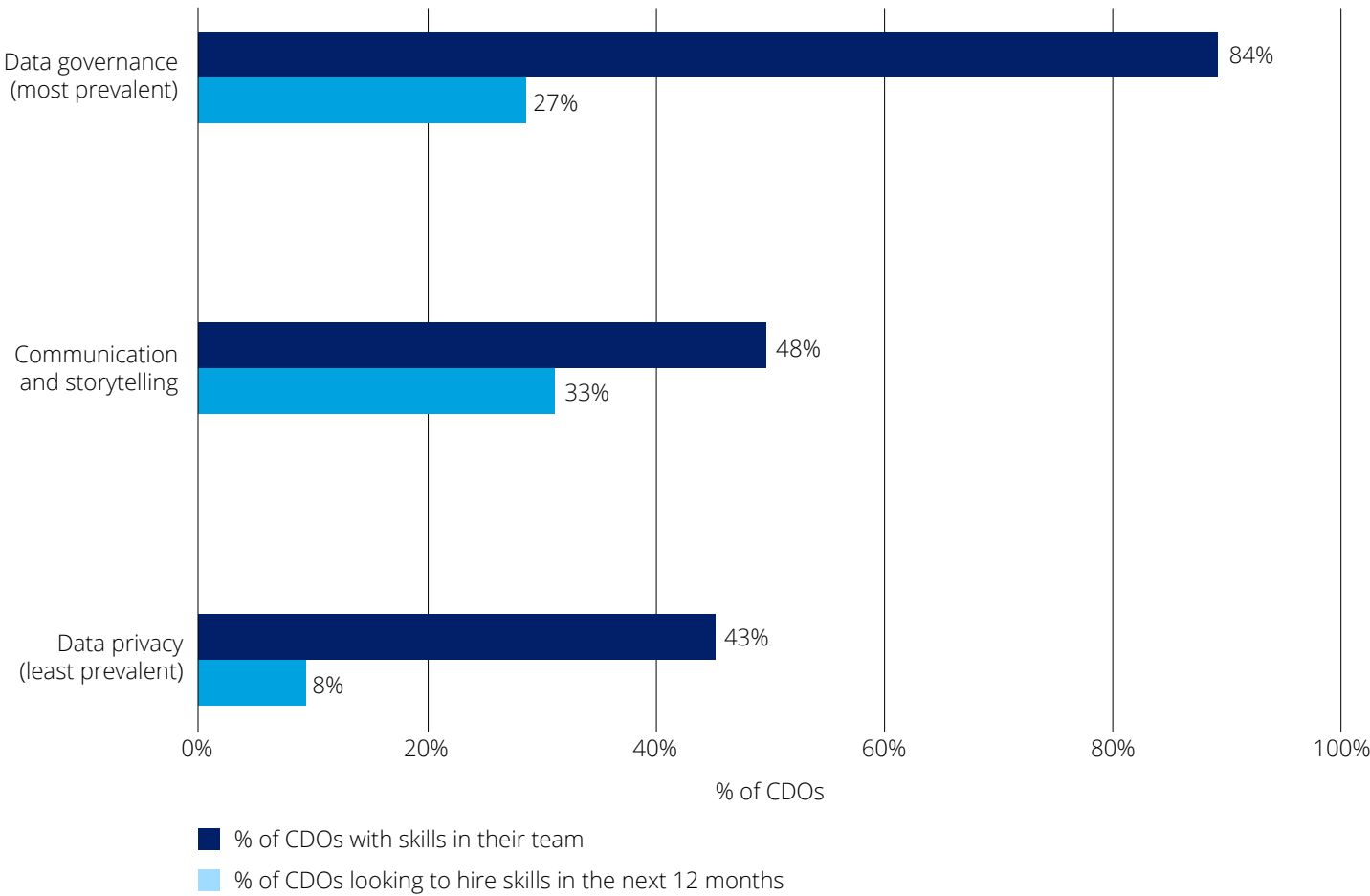## 02 Key observations: influence

CDOs are conscious of the need to develop literacy and data storytelling skills.

75% of CDOs are looking to improve data literacy as a priority.

The biggest skill gap in this year's survey was communication and storytelling. This suggests there is recognition that CDOs need to develop their influencing abilities. **40%** of CDOs told us they are looking to hire these skills into their team in the next 12 months.

Data privacy was regarded as the least prevalent skill in CDOs' teams and many remain so due to a slower recruitment drive - just **8%** of CDOs are hoping to hire people with data privacy skills in the next 12 months.

Prevalence of key data skills and recruitment in CDOs' teams

Data governance (most prevalent): 84%, 27%

Communication and storytelling: 48%, 33%

Data privacy (least prevalent): 43%, 8%

% of CDOs

■ % of CDOs with skills in their team
■ % of CDOs looking to hire skills in the next 12 months

01

Executive summary

02

Key observations

Vision & goals

Control

Influence
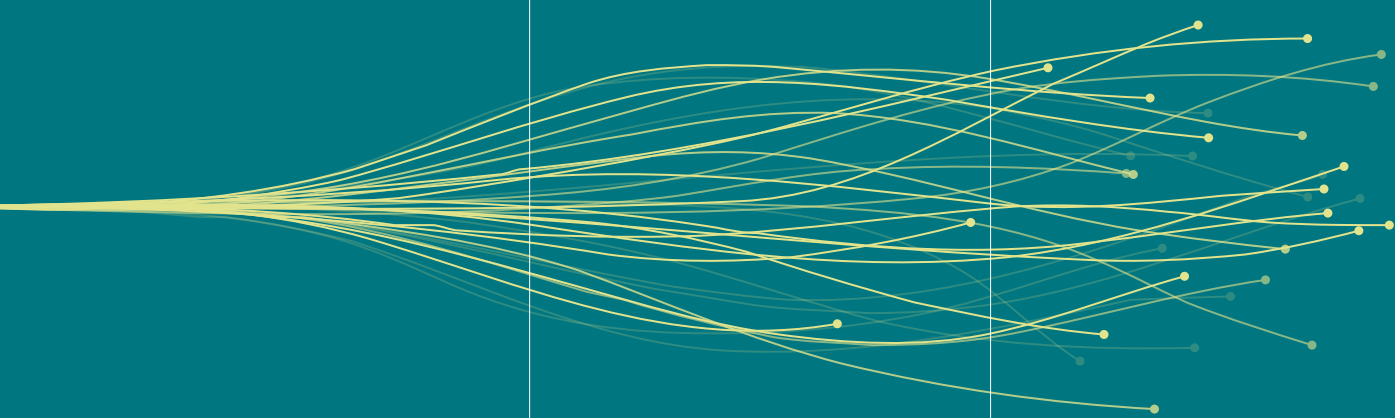
03

Focus areas

Organisation & operations

Value to enterprise

Influence of the CDO

The four faces of the CDO

04

Approach

05

CDO programme

03 Focus areas

Organisation & operations

03 Focus areas: organisation and operations

Variation in the CDO role

Since the CDO role first emerged, there have been variations of the role, from primarily compliance-focused, to operational, to having an increased focus on exploiting value from data.

Compliance CDO

The CDO role originated as a compliance-focused role.

Key areas of focus include:

- enabling the organisation with data management capabilities, to help manage compliance and mitigate data risk

- data governance responsibilities including people, process and technology.

Operational CDO

The 'operational CDO' starts to focus on the value that data can bring to business operations.

Key areas of focus include:

- enabling functions to optimise products, services, and quality

- embedding data culture and building the mindset of the team.

Strategic CDO

The 'strategic CDO' is focused on enabling business success through data.

Key areas of focus include:

- extracting value from data through enabling analytics and AI/ML to drive towards becoming an insight-driven organisation (IDO)

- developing new solutions to support decision-making processes (as outlined in our IDO playbook).

03 Focus areas: organisation and operations

Variability of the CDO role across industry

The focus of the CDO role varies across industry groups between an 'enabling' focus on customers, products and quality, and a controls focus on responsibilities around control, regulation, and risk.
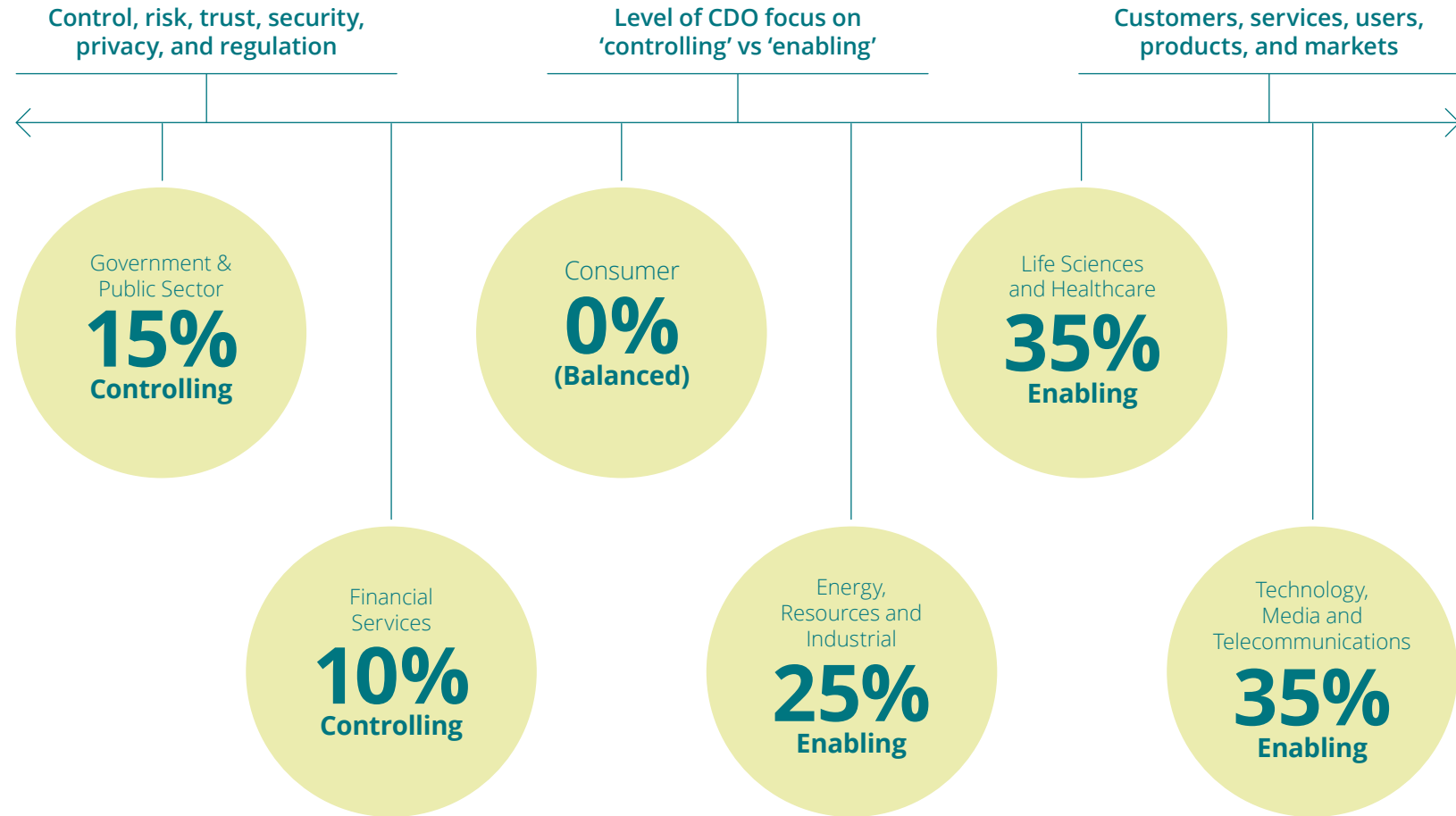
The numbers below each industry represents the percentage of participants which indicated the balance of CDOs objectives fall into 'enabling' vs 'controlling'.

Control, risk, trust, security, privacy, and regulation

Level of CDO focus on 'controlling' vs 'enabling'

Customers, services, users, products, and markets

Government & Public Sector
15%
Controlling

Consumer
0%
(Balanced)

Life Sciences and Healthcare
35%
Enabling

Financial Services
10%
Controlling

Energy, Resources and Industrial
25%
Enabling

Technology, Media and Telecommunications
35%
Enabling

03 Focus areas: organisation and operations

The role and remit of the CDO

The CDO role is becoming more prominent within organisations. 66% of CDOs reported that their remit has grown in the past 24 months – a trend that has been seen across all industry groups.

Our perspective

A CDO is a senior individual in an organisation who is responsible for the management and impact of data across the enterprise. With elements of both strategy and technology in their role, the CDO makes an important contribution in guiding an organisation's strategy and performance.

While we have seen variability in the size, scope, and responsibilities of CDOs and their teams, the overall focus of a CDO remains the same: to maximise the value that data can bring to their organisation through improving data quality, data availability, data analysis, data management, and regulatory compliance. This allows organisations to act more competitively by enabling data-driven technologies such as artificial intelligence, and enabling business insights and decision-making.

Naturally, the scope of the CDO role is quite broad, covering all aspects of data, and we see a continued trend of the remit expanding, emphasising the variation of the CDO role (as shown on **page 20**).

The shifting remit and responsibilities of the CDO highlight the willingness of organisations to adapt to change within data. This flexible approach allows organisations to embrace digital transformation and technological developments, providing the foundations to succeed in the ever-evolving market.

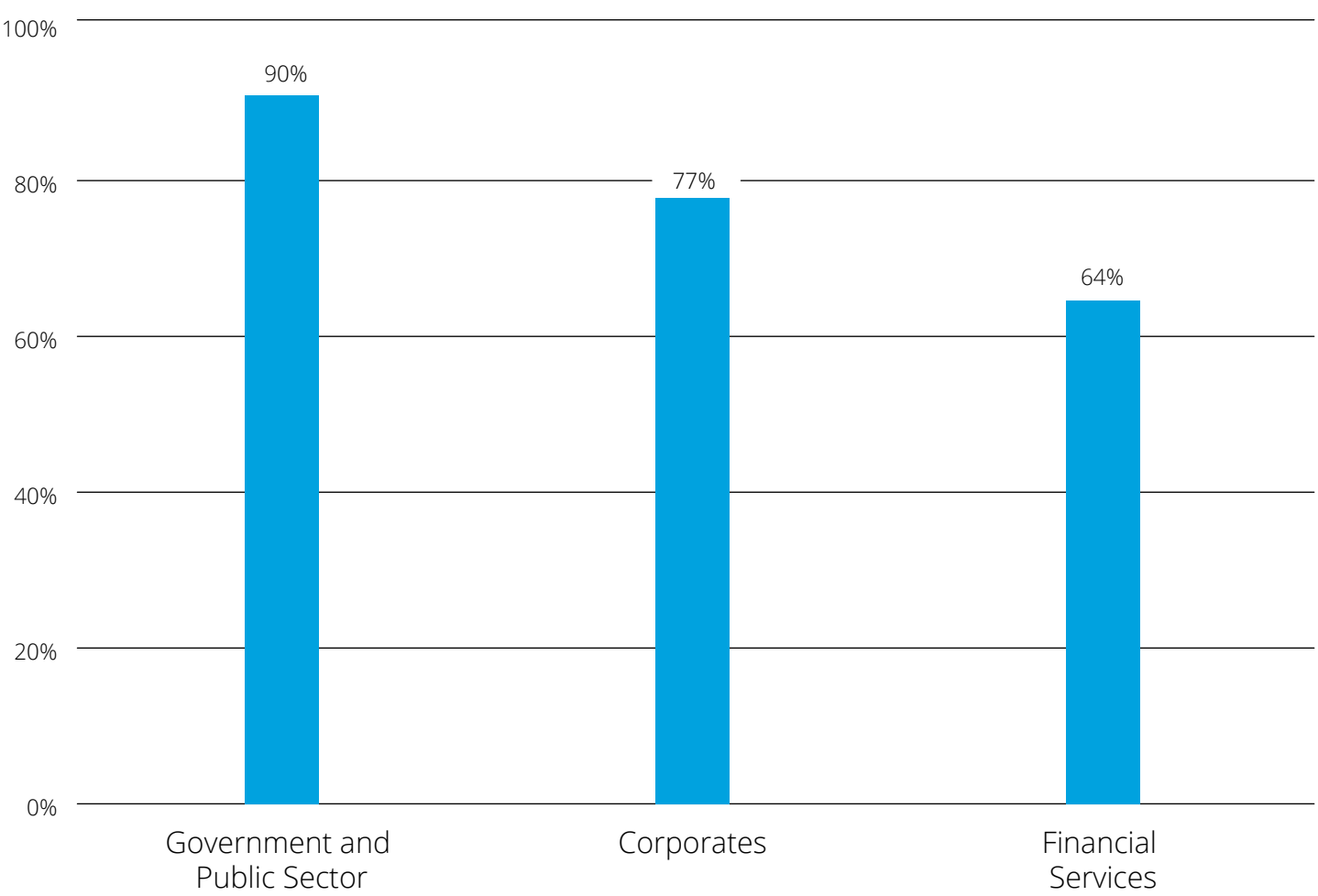## 03 Focus areas: organisation and operations

Remit of the CDO role

The CDO role is becoming more prominent within organisations, as 66% of CDOs said that their remit had grown in the past 2 years. This trend is consistent across all industry groups but more so in Government & Public Sector, where 80% of CDOs believe their remit had increased.

The scope of the role generally extends across the whole enterprise, most specifically with 90% of CDOs from Government & Public Sector confirming this.

In addition, we observed that CDOs from larger organisations are marginally more likely to have a broader remit that covers a wider range of data capabilities. This was 80% for the largest organisations but drops to 73% for organisations with less than 10,000 employees.

% of CDOs with enterprise wide remit

23

03 Focus areas: organisation and operations

Size of CDO teams

CDO teams are growing in absolute and relative size.

Direct reports (DRs)

There are **many CDOs with 5 to 8 DRs** – in fact this is the most common range of direct reports – as it was last year. This year **44%** of CDOs reported having 5 to 8 DRs, which has increased from **35%** last year.

The average number of direct reports appears to be relatively consistent across industry groups. On average, CDOs in Financial Services have 10 DRs, compared to 8 in Government & Public Sector and 7 in Corporates.

Absolute size of data team

Data team sizes have generally grown across participants with **33% of CDOs describing leading a data team with over 100 resources,** compared to only **18%** in last year's survey.

Change in distribution of CDOs by number of direct reports
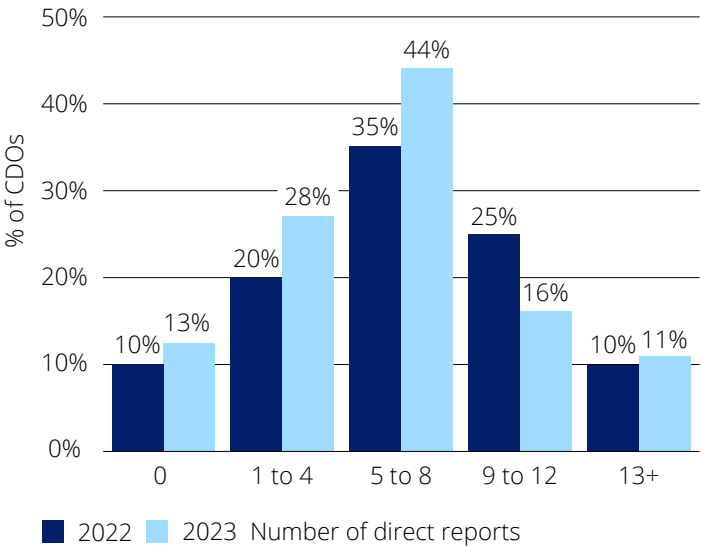
**Change in distribution of CDOs by size of team**

24
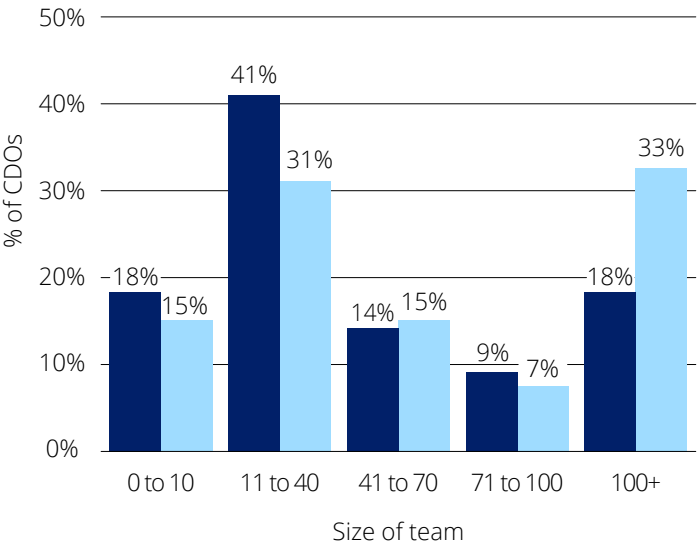
03 Focus areas: organisation and operations

The relative size of an organisation's data team against overall headcount

We have observed a significant increase in the relative size of data teams compared to last year. On average, data teams have increased in size to **1.6%** of overall headcount from **0.4%**, although we do see some variability across industry groups.

Financial Services report having the largest proportion of their workforce in data related roles at **2.1%** compared to **1.5%** for Corporates and **1.2%** for Government & Public Sector.

Change in distribution of CDOs by relative size of data team

Relative size of data team

■ 2022   ■ 2023

25
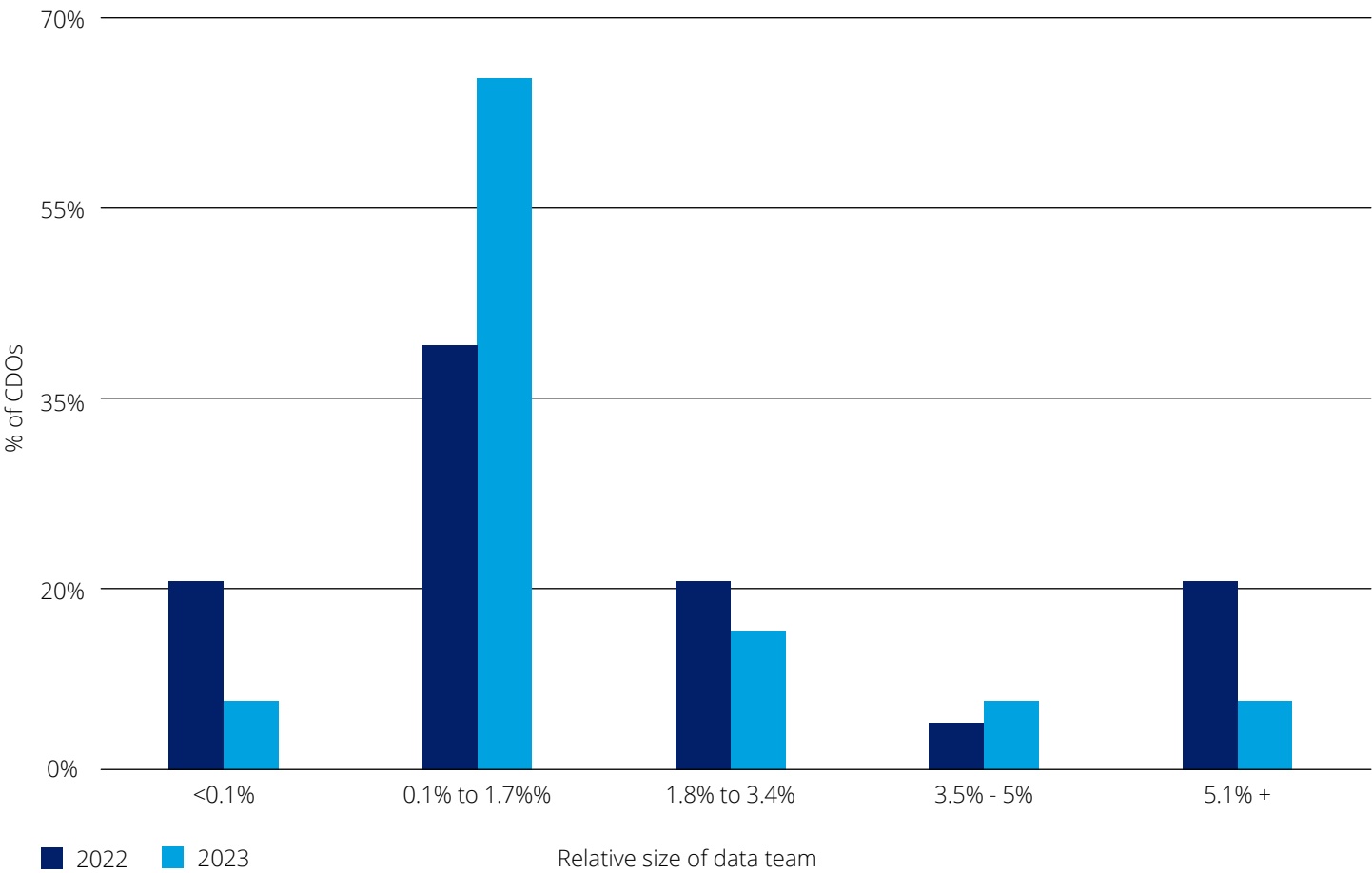
03 Focus areas: organisation and operations

Scope of CDO teams

The majority of capabilities in CDO teams focus on data management and data governance skillsets.

The scope of the CDO team is varied across organisations. For example, 84% of CDOs focus on managing data but in sharp contrast 45% of CDOs also run their organisation's cloud management function. The range of responses illustrates that there is no 'typical' CDO, and scope varies by organisation. However, with the scope of the CDO role expanding, as shown on , we naturally expect to see greater data skills and capabilities within the CDO team.

CDOs' time is not aligned to their top objectives

The most prominent skills were data governance and data management, with 84% of CDOs saying these skills exist within their teams. Data governance and data management are fundamental skills that enable a CDO to make better use of their data, which results in more informed decision-making, better compliance with regulations, stronger data quality and more efficient sharing practices.

A smaller proportion of CDOs told us they have data privacy expertise within their team. While we saw that CDOs are considering data privacy within their role, many organisations have a separate function that specifically focuses on data protection compliance.

Data governance	84%	
Data management	84%	
Data analysis	75%	
Data quality	70%	
Data visualisation	66%	
Data engineering	63%	
Data science	61%	
Data warehousing / extract / transform load	61%	
Project / programme management	52%	
Machine learning / AI	52%	
Data architecture	52%	
Change management and transformation	51%	
Communication and storytelling	48%	
Cloud management / technology	45%	
Data privacy	43%	

% of CDOs

We see variability in the extent to which CDO teams have technical capabilities. For example, 61% of CDOs said that they have data science skills within their team, and while we observed that CDOs run the analytics functions in some organisations, there are other cases where this capability resides elsewhere.

03 Focus areas: organisation and operations

Recruitment

39% of CDOs stated that recruiting more staff into their data function was one of their current core priorities.
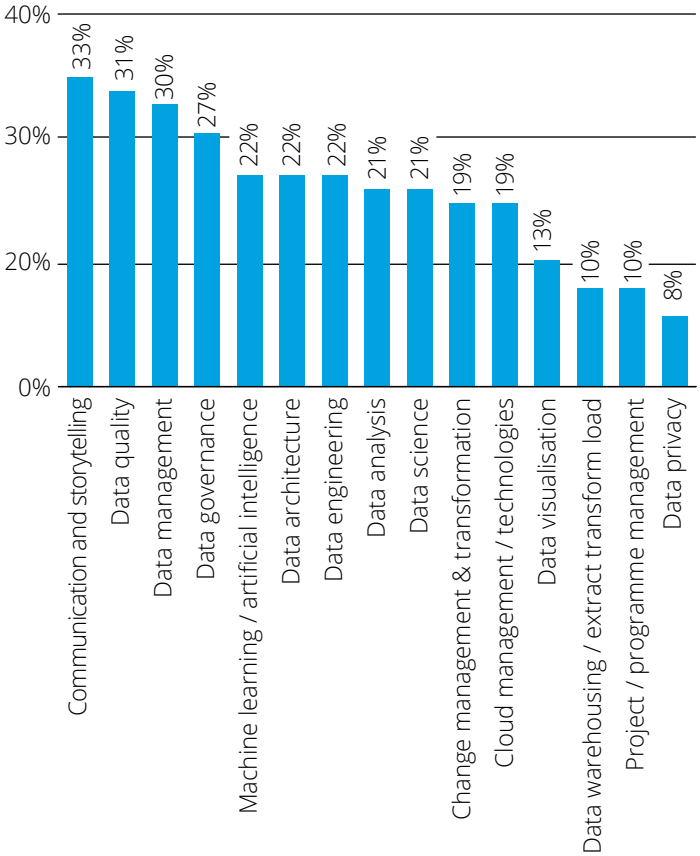
Our perspective

The prevalent skillset CDOs are looking to hire is storytelling and data quality skills. CDOs are looking to build out the capability to generate and communicate insights more effectively. Data quality skills allow organisations to improve reliability and build confidence in their data, while storytelling skills allow data teams to better communicate insights to others, especially those with lower levels of data literacy.

Some of the more technical skills, for example data engineering and data science, are ones that CDOs flagged as having the highest employee turnover. This aligns with the skill shortage of data engineers and data scientists seen in the labour market. Short supply of these skills has driven competitive labour markets, resulting in organisations offering high salaries and benefits to compete for the best talent.

A significant majority of CDOs are looking to increase the size of their data teams. 91% of CDOs expect to see an increase in headcount over the next 12 months, with half expecting the size of their team to increase by 20-35%. Corporates are expecting the highest average increase of headcount at 19%, followed by Financial Services at 18% and Government & Public Sector at 15%.

% of CDOs that are currently looking to hire these skills in their team

Skill	%
Communication and storytelling	33%
Data quality	31%
Data management	30%
Data governance	27%
Machine learning / artificial intelligence	22%
Data architecture	22%
Data engineering	22%
Data analysis	21%
Data science	21%
Change management & transformation	19%
Cloud management / technologies	19%
Data visualisation	13%
Data warehousing / extract transform load	10%
Project / programme management	10%
Data privacy	8%

27

03 Focus areas: organisation and operations

Recruitment and off-shore resources

89% of CDOs said they are not looking to reduce their dependence on off-shore resources. In fact, 20% said they were looking to increase the number of off-shore resources over the next 12 months.

Our perspective

Finding the right data talent is proving to be a consistent and significant challenge for organisations. The three main challenges we see in attracting and retaining data talent are:
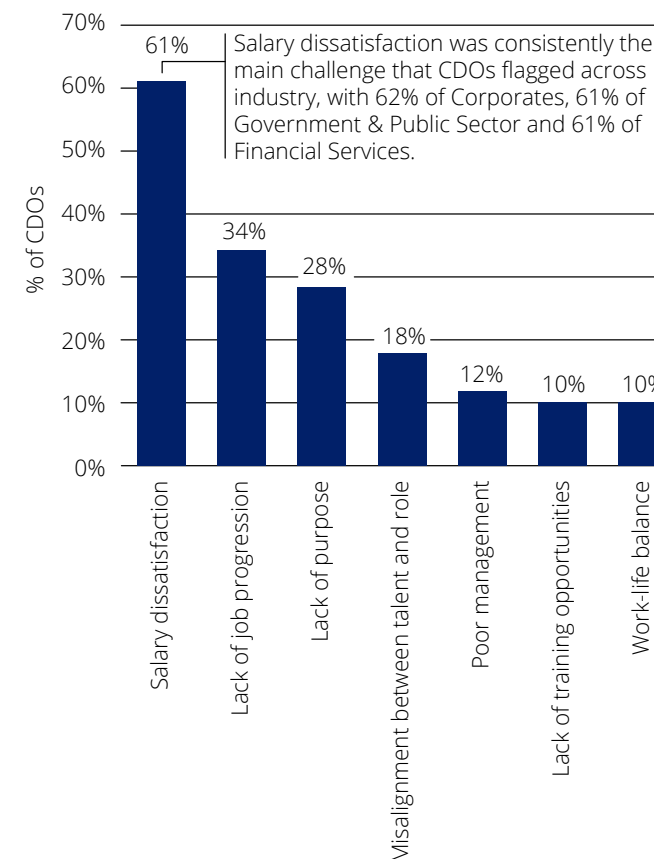
- competitive remuneration packages from competitors

- a lack of opportunities to develop talent in business skills to take on leadership positions and ensure career growth

- data not being used to make decisions or add business value and so an apparent lack of impact or purpose.

We believe there is an opportunity to mitigate these challenges and be more creative in talent management to retain staff with specific skillsets. This can be done by providing existing team members with the opportunity to take on broader and different responsibilities that align to their aspirations.

Recruitment and the use of off-shore resources should only be used to plug skills gaps where capabilities do not exist in organisations. It should not prevent existing teams from seeking opportunities to develop skills.

Challenges with attracting and retaining data talent

Salary dissatisfaction was consistently the main challenge that CDOs flagged across industry, with 62% of Corporates, 61% of Government & Public Sector and 61% of Financial Services.

Challenge	% of CDOs
Salary dissatisfaction	61%
Lack of job progression	34%
Lack of purpose	28%
Misalignment between talent and role	18%
Poor management	12%
Lack of training opportunities	10%
Work-life balance	10%

03 Focus areas: organisation and operations

Diversity of the CDO role

Limited diversity within senior leadership has historically been a challenge for many organisations.

Our perspective

Improving inclusivity, as demonstrated by diverse representation at senior levels, continues to be a focus for many organisations. There are a variety of ways in which organisations can increase diversity in the workplace and CDOs play a key role in enabling this for data teams. CDOs must ensure that there is a strategy in place for exploring and expanding areas of opportunity to recruit, retain and advance diverse data talent. As part of the senior leadership team,

the CDO needs to understand their role and influence in driving this change. By partnering with talent management and acquisition leads within their organisation, CDOs can develop an understanding of what it takes to drive sustainable progress towards these ambitions. CDOs can be the advocate for using diversity data and metrics to track progress and create positive momentum.

How diverse is the CDO role?

To explore the diversity of the CDO role,we asked participants a selection of diversity related questions.
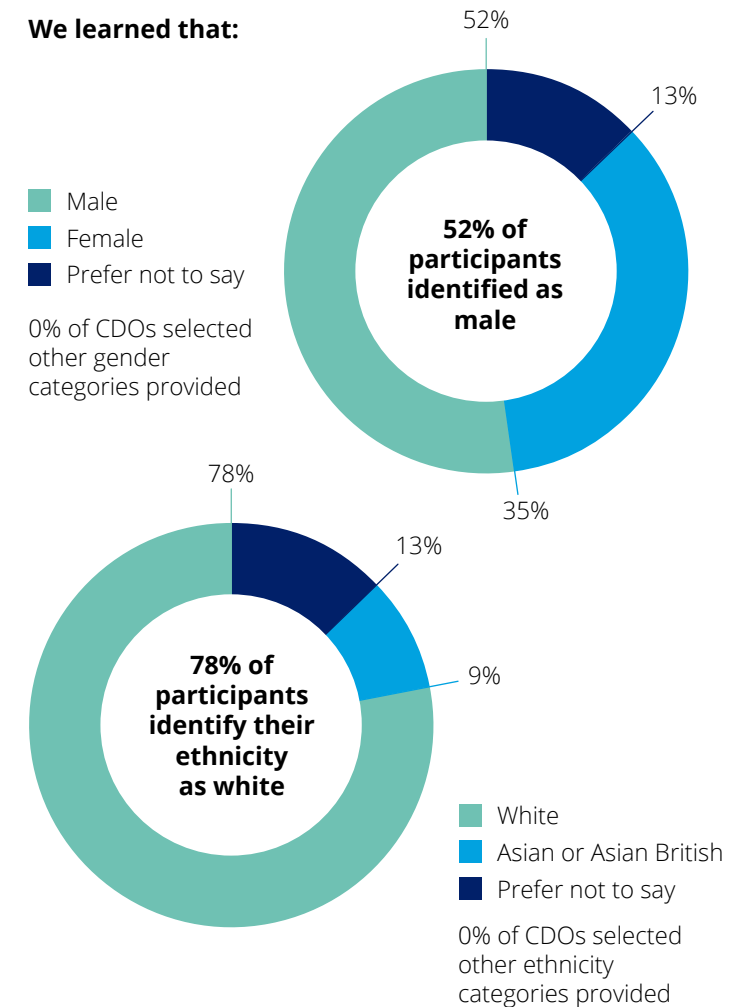
*Note: The insights on this page only use data of participants based in the UK. We have not compared diversity data across other participating countries as this data may not be available or may be classified differently.

We learned that:

Male
Female
Prefer not to say

0% of CDOs selected other gender categories provided

52%

13%

52% of participants identified as male

35%

78%

13%

78% of participants identify their ethnicity as white

9%

White
Asian or Asian British
Prefer not to say

0% of CDOs selected other ethnicity categories provided

29

03 Focus areas

Value to enterprise

03 Focus areas: value to enterprise

What are CDOs' core objectives?

We asked CDOs to select their top three priorities for the next 12 months. The most selected were:

61%
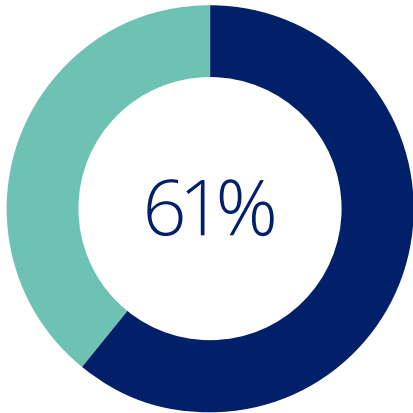
Creating, updating or implementing a data strategy

———

Find out more on page 34

54%
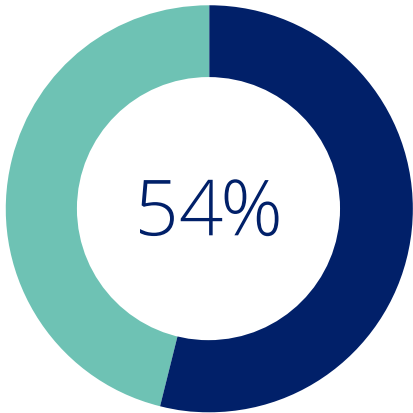
Improving the usage and availability of insights and analytics

———

Find out more on page 38

43%
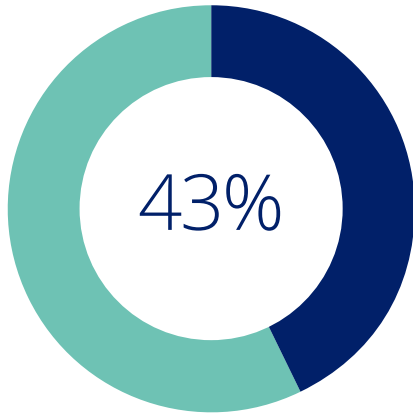
Improving or providing a consistent approach to data governance

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Find out more on page 42

03 Focus areas: value to enterprise

Core objectives: key observations

CDOs across all industry groups are focusing on a data strategy, which can help their organisation use data more effectively.

How do the core objectives compare to last year?

The core objectives outlined by CDOs broadly align with those that were selected last year. Insights and analytics, and data strategy were identified as the highest priority areas for two consecutive years, with an increased focus on data governance this year too.

Core priority for the next 12 months

% 0f CDOs

- Data strategy: 60%
- Insights and analytics: 53%
- Data governance: 43%
- Data management: 43%
- Data quality: 35%
- Technology: 28%
- Data policies: 20%
- Regulatory compliance: 9%
- Data privacy: 5%
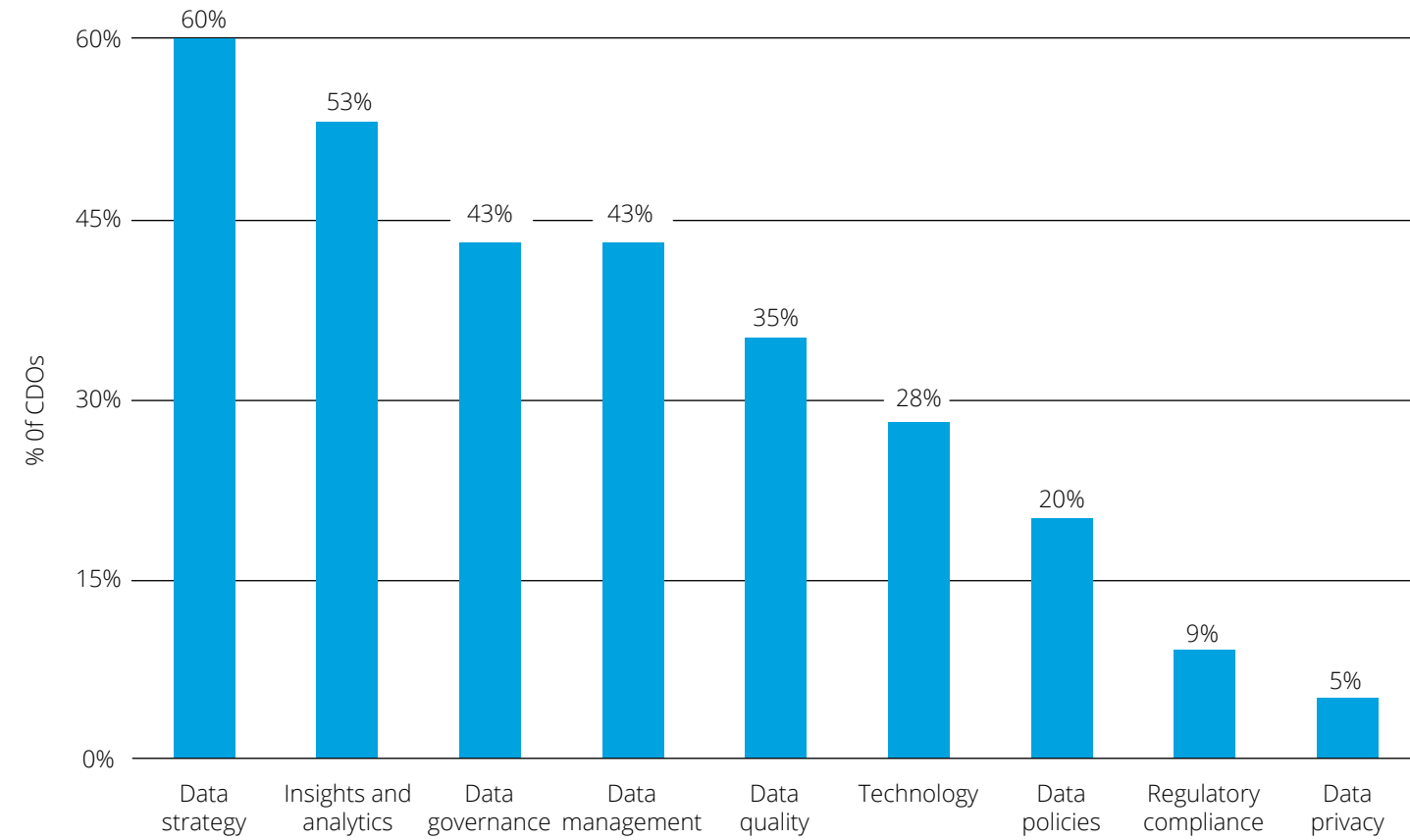
03 Focus areas: value to enterprise

How do the core objectives compare across industry groups?

While data uses and requirements may vary across industry groups, the top three priority areas remain consistent. However, the relative weightings among these three industries vary. The data shows a balanced focus in Financial Services, a more resilience focus in Government & Public Sector, and a value focus in Corporates.

We have seen some variability across areas of focus within the different industry groups.

We specifically noted that:

Financial Services have greater focus on data quality at 44%, compared to 35% in Government & Public Sector and 28% in Corporates. They also have greater focus on regulatory compliance with 20% compared to less than 5% in the other industry groups.

Government & Public Sector have greater focus on data governance compared to other industry groups at 65%, compared to 31% in Corporates and 40% in Financial Services.

Corporates have greater focus on insights and analytics when compared to other industry groups, at 76% compared to 40% in both Government & Public Sector and Financial Services.

Core objectives by industry group

Bar chart — % od CDOs by industry group:

- Financial Services: Data strategy 52%, Insights & analytics 40%, Data governance 40%
- Government & Public Sector: Data strategy 50%, Insights & analytics 40%, Data governance 65%
- Corporates: Data strategy 67%, Insights & analytics 76%, Data governance 31%

Legend: Data strategy | Insights & analytics | Data governance
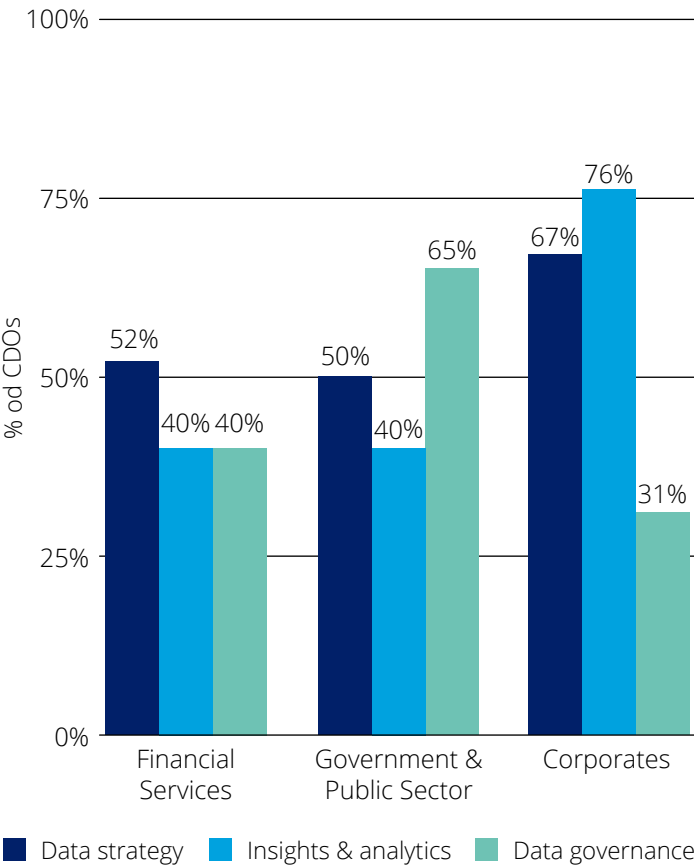
03 Focus areas: value to enterprise

Core objectives: data strategy

61% of CDOs identified creating, updating or implementing a data strategy as one of their top three priorities.

Our perspective

A data strategy is a plan that outlines the data ambitions for an organisation. It is a central document used to communicate data objectives and drive the organisation towards a singular data vision.

An effective data strategy is beneficial for an organisation in multiple ways. It helps companies reflect on current data maturity, while identifying the best opportunities and tools to support future business objectives. A data strategy also looks at data from an enterprise–wide perspective to answer questions on how to better leverage data and support decision-making across the organisation.

A clear data strategy can help raise awareness of data usage and ambitions, which in turn promotes a data-driven culture and improves data practices.

03 Focus areas: value to enterprise

Core objectives: data strategy

Who is focusing on data strategy?

The proportion of CDOs focusing on data strategy is consistent with last year, where 61% of participants flagged data strategy as one of their priority areas.

CDOs across all industry groups are looking to develop their data strategy. This is noticeably higher in Corporates, possibly reflecting their increased focus on insights and analytics.

39% of CDOs who selected data strategy as a core objective put it as their top priority.

What data strategy insights did we observe?

Of the CDOs that said they were focusing on data strategy:

- 69% own the creation of the data strategy for their organisation

- 65% own the delivery of their data strategy

- 22% have a data strategy that is widely communicated across their organisation

- 16% said a head of data strategy role exists within the organisation

- 16% said their data strategy is periodically reviewed to ensure it is fit for purpose

- only 4% said a data strategy has been widely implemented across the organisation.

35

03 Focus areas: value to enterprise

Data strategy maturity

CDOs recognise the importance of communicating and aligning an organisation towards a shared vision through a data strategy.

Our perspective

The CDO plays an integral role in creating and implementing the data strategy to define and influence how data is used within their organisation. The data strategy provides the CDO with the opportunity to articulate the vision for data. Regardless of the current state, CDOs should focus on driving maturity of their strategies.

We see many organisations with low maturity for data strategy. This is likely because it is difficult to implement a strategy and get buy-in from stakeholders across the organisation. CDOs should focus on defining strategies aligned to the wider organisational strategy, quantifying the benefit of data and producing tangible outputs that meet the requirements of the business. Having a strategy that is easy to understand will help drive progress in this area.

% of CDOs focusing on data strategy – industry comparison

What participants said:

CDOs that have implemented a data strategy have flagged parts of the organisation **"that are not aware and involved in the data strategy"** as being a challenge.

36
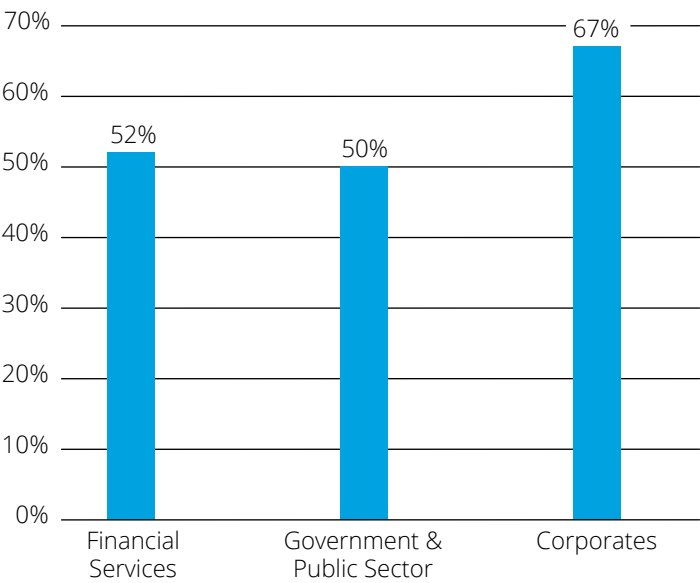
03 Focus areas: value to enterprise

We asked CDOs about their data strategies, including whether they have a data strategy in place, who has responsibilities and how it is communicated and reviewed, to gain insight into the current maturity in this area for those focusing on it.

Of the 61% of CDOs who selected data strategy as one of their top three priorities:

- 55% of them have an 'initial' maturity rating for their data strategy. This indicates they currently have low maturity in this area e.g., a data strategy does not exist, or if a data strategy does exist it is not socialised across the organisation

- very few CDOs' strategies are positioned at the higher end of the maturity scale. This shows that significant progress needs to be made to achieve leading practice in this area.

Data strategy maturity*

Chart: Data strategy maturity, % of CDOs
- Initial: 55%
- Emerging: 16%
- Understood: 21%
- Developed: 5%
- Innovative: 3%
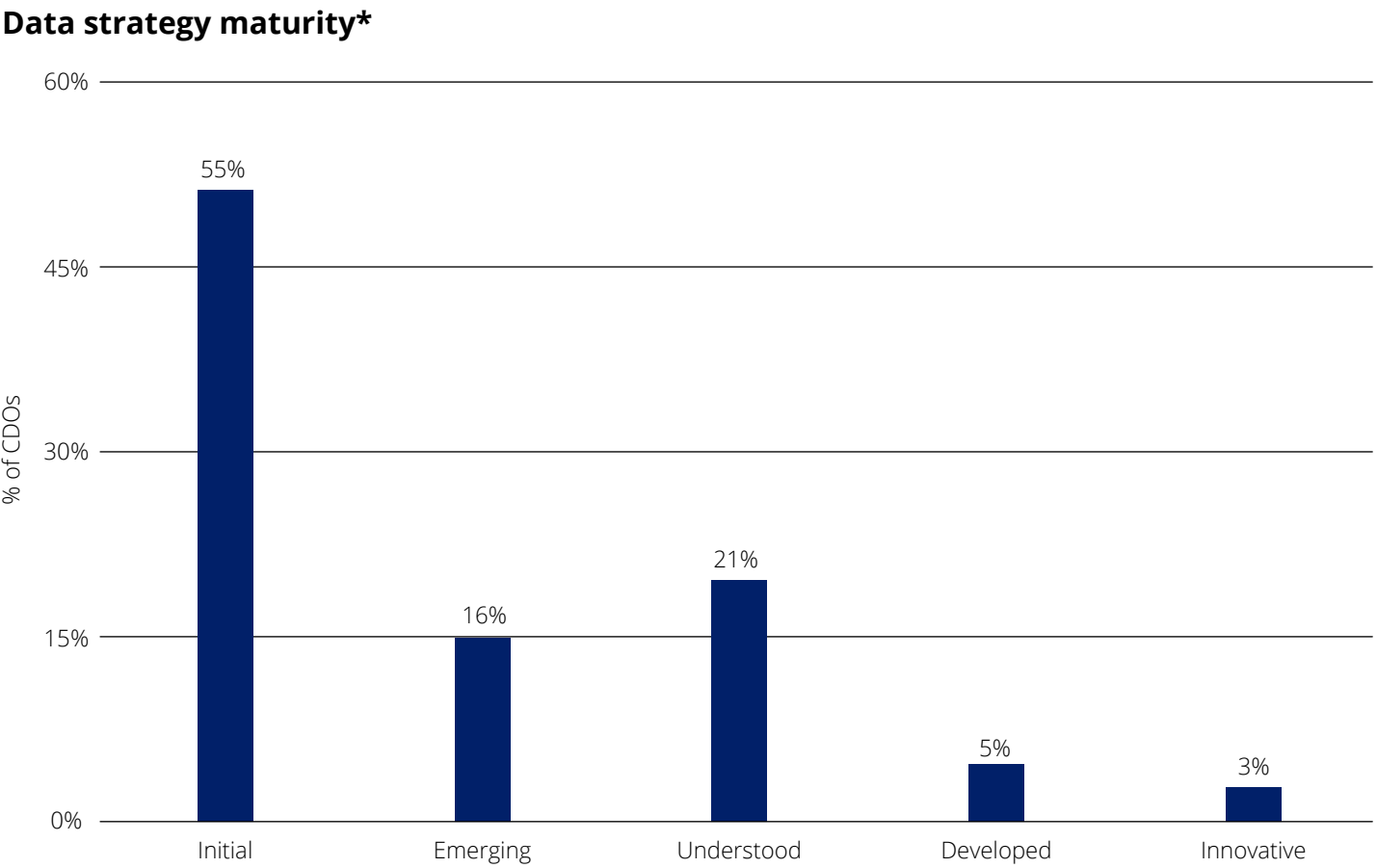
*More information about the maturity scale can be found on **page 73**.

03 Focus areas: value to enterprise

Core objectives: insights and analytics

54% of CDOs identified improving the usage and availability of insights and analytics as being one of their top three priorities.

Our perspective

There are various barriers to improving the usage of insights and analytics, including data literacy levels and system complexities. This indicates why CDOs tend to focus on insights and analytics after one to two years in the role.

Newly appointed CDOs should understand how to tackle these barriers as quickly as possible to create an effective analytics team. This is consistent with insights seen specifically on data literacy.

Creating an analytics team that can generate output to support and enhance business objectives can help optimise business performance and improve efficiency. Organisations that are looking to focus in this area, will be able to provide the business with useful outputs that will support informed decision-making, while easily communicating the possibilities of data, and driving towards a data-driven culture.

Who is focusing on insights and analytics?

54% of CDOs said their core objectives include improving the usage and availability of insights and analytics.

Across industry groups, Corporates had the biggest focus on developing insights and analytics.

While insight and analytics is still one of the highest focus areas, this has decreased to 67% compared to the 2022 CDO survey where 68% flagged it as a core objective.

In early stages of their tenure, CDOs tended to not focus on analytics. Insights and analytics subsequently become - and remain - a high priority until addressed.

38

03 Focus areas: value to enterprise

What insights and analytics insights did we observe?

Of the CDOs that said they were focusing on insights and analytics:

- 65% have established a data analytics function

- 68% believe insights and analytics are being delivered in line with the business strategy

- 68% see insights and analytics being used to help make informed business decisions

- 65% believe analysts can deliver valuable insights that are used in decision-making across the organisation

- 67% have developed AI/ML products that have been deployed to the business

- 56% of CDOs outlined that their organisations are taking a centralised approach to developing analytics, while the remaining 44% are taking a distributed approach.

% of CDO focusing on insights - industry comparison

Industry	%
Financial Services	40%
Government & Public Sector	40%
Corporates	76%
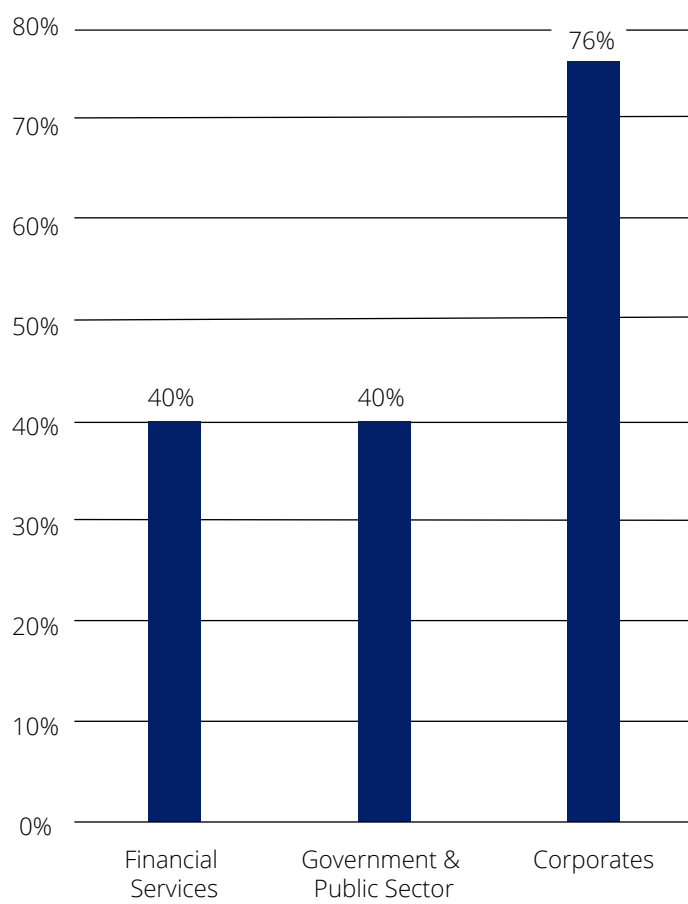
% of CDO focusing on insights - tenure comparison

Tenure	%
Less than 12 months	13%
1-2 years	61%
3-4 years	67%
More than 4 years	67%
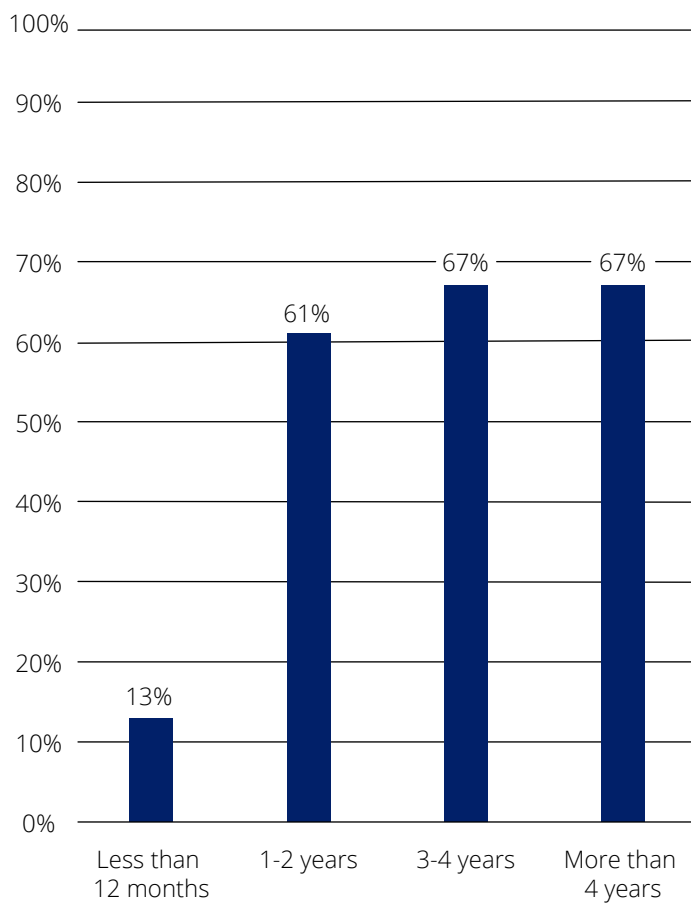
03 Focus areas: value to enterprise

Insights and analytics maturity

Insights and analytics can help an organisation utilise data more effectively to achieve business goals. Despite this, 32% of CDOs ranked their maturity in this regard as initial or emerging.

Our perspective

Some CDOs will look to establish foundations for analytics to increase efficiency within their organisations, others seek to develop their capabilities to be more competitive in the market. In both instances, focusing on developing insights and analytics, through better exploitation of data, is crucial to improve outcomes for an organisation's customers, citizens and staff.

The CDO should set the direction for how insights and analytics are used. Therefore they play a critical role in driving progress forward.

What participants said:

Some of the key issues identified in the adoption of insights and analytics include **"analytics is not part of CDO function/accountability",** legacy technology, siloed data assets, resource or skill constraints, and data availability/data quality.

40

03 Focus areas: value to enterprise

We asked CDOs to tell us about their analytics function, including how insights and analytics link to business strategies and technical products, so we could gain an understanding of their current maturity in this area.

Of the 54% of CDOs who selected insights and analytics as one of their top three priorities, we observed that:

- many CDOs fall into the higher end of the maturity scale. 32% of CDOs rank as innovative, the highest category on the maturity scale, which indicates these CDOs are already using data to develop insights and become more competitive within their industries

- 20% rank as initial, the lowest category on the maturity scale, which indicates that one fifth of organisations can be doing significantly more to further utilise available data.

Insights and analytics maturity

41
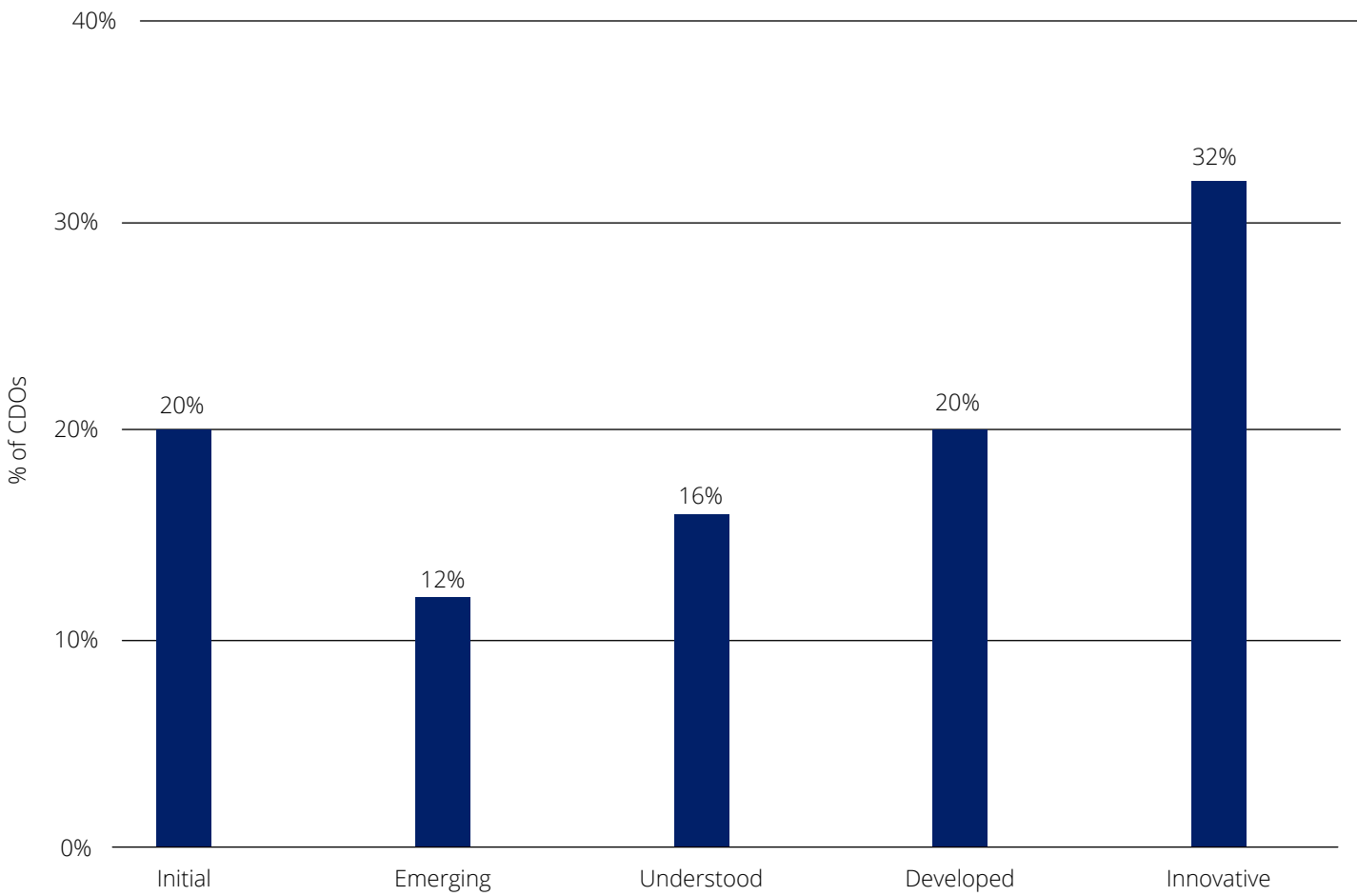
03 Focus areas: value to enterprise

Core objectives: data governance

43% of CDOs identified improving or providing a consistent approach to data governance as one of their top three priorities.

Our perspective

We believe that combining people, process, and technology, helps data governance to lay the foundations for improving usage management and protection of data. Data governance is an essential part of helping CDOs and the organisation gain the most value from their data – establishing the right roles and responsibilities is key in achieving this.

Roles and responsibilities should be appropriately defined and embedded across the organisation, so that a consistent standard of data can be rolled out across the enterprise. One of the key tools that can drive data governance improvements is assigning a data governance executive sponsor. A data governance executive sponsor is a senior colleague within an organisation who acts as a champion for data governance within the business. They can drive change and improvements in data governance and acquire senior buy-in where necessary - providing a business voice to that of the CDO.

03 Focus areas: value to enterprise

Who is focusing on data governance?

43% of CDOs said their core objectives include improving or providing a consistent approach to data governance.

Data governance is a key area of focus for all industry groups, with Government & Public Sector CDOs most frequently ranking it as a top three priority.

% of CDOs focusing on data governance industry comparison
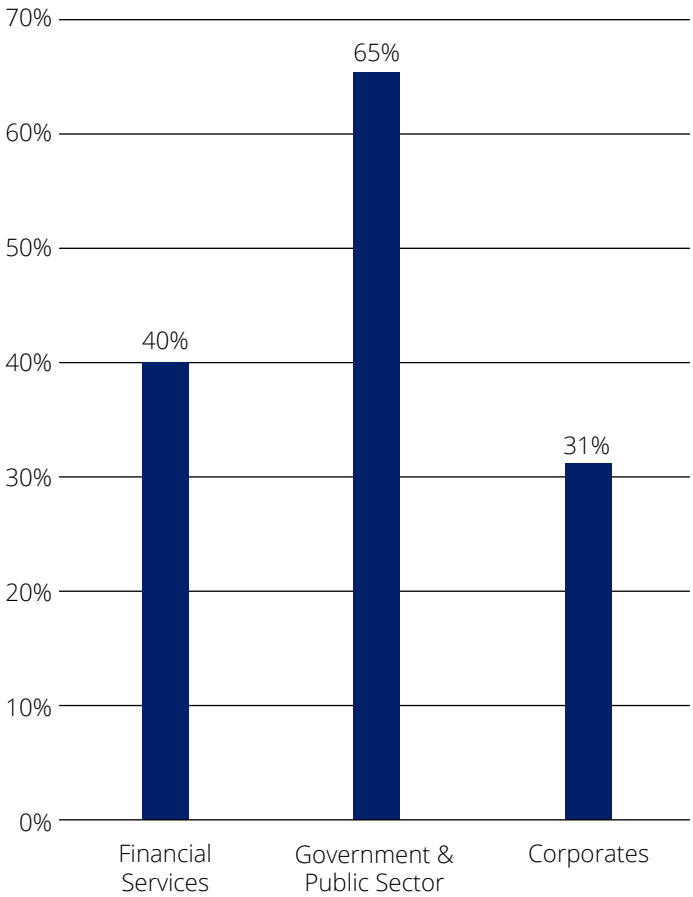
What data governance insights did we observe?

Of the CDOs that said they were focusing on data governance:

- 57% said they have a data governance lead to drive data governance initiatives

- 21% have appointed a data governance executive sponsor

- 64% have a data governance function that provides guidance and training to the wider business

- 21% say that data governance roles and responsibilities have been clearly defined, assigned, and communicated

- 36% say that processes have been designed and implemented across the organisation that drive data improvement and manage data issues.

03 Focus areas: value to enterprise

Data governance maturity

A mature and consistent data governance capability improves data use and management, advancing the value of insights.

Engagement is required with the organisation and non-data leaders to show them that data governance is about enabling teams to do tasks more efficiently to deliver better data. A lack of knowledge or uncertainties creates the risk of data being used inappropriately or unethically.

Our perspective

Many organisations are looking to develop their data governance capabilities to improve their outcomes.To build stronger foundations for data, CDOs should focus on driving the implementation of data governance roles and responsibilities across their organisation, as they are a vital component for what a successful data governance programme looks like.

What participants said:

Some of the key data governance challenges that have been flagged by CDOs include lack of interest or engagement, lack of resources, literacy or education constraints, and legacy systems. With one participant telling us they were prioritising, **"ensuring alignment with business value"** and didn't want governance to become **"merely an operational task"**.

03 Focus areas: value to enterprise

We asked CDOs about their data governance function, including defined roles, responsibilities, and processes, to gain insight into the current maturity in this area for those focusing on it.

Of the 43% of CDOs who selected data governance as one of their top three priorities:

- 46% have an 'initial' data governance maturity ranking. This indicates data governance roles do not exist, or data governance processes have not been defined and implemented

- 4% have an 'innovative' data governance maturity ranking. This indicates some are pushing the boundaries or have well established data governance structures.

Data governance maturity

45
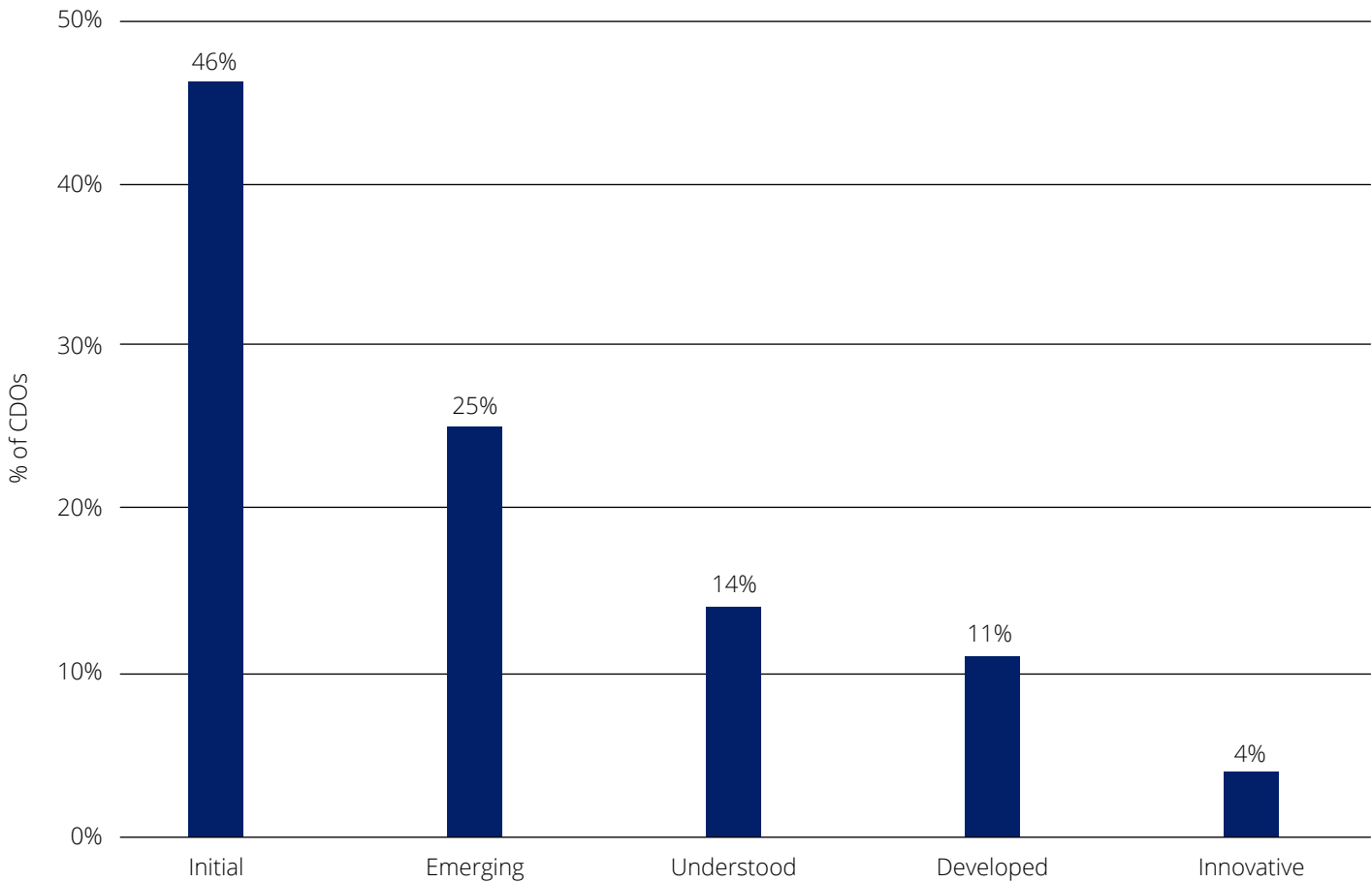
03 Focus areas: value to enterprise

What are CDOs' key enablers?

After asking CDOs to select their top three priorities, we asked them what enablers would they benefit from. The most selected were:

75%
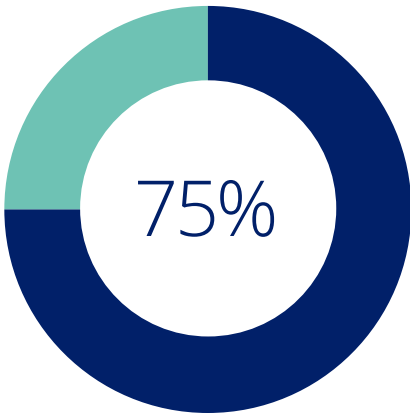
Improving data culture

Find out more on page 47

75%
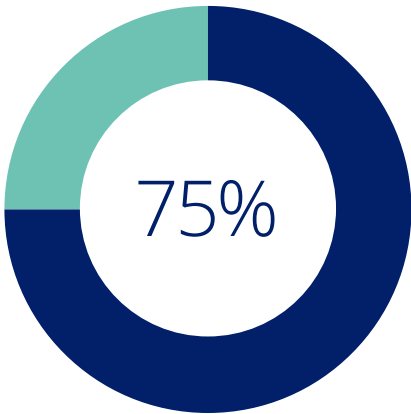
Improving data literacy across the organisation

Find out more on page 48

49%
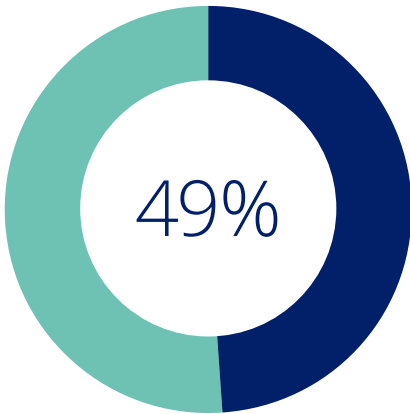
Improving relationships with key data stakeholders

Find out more on page 50

03 Focus areas: value to enterprise

Enablers overview: data culture

75% of CDOs identified improving data culture as one of their top areas of focus over the next 12 months.

Our perspective

A data culture refers to the collective behaviours, values and beliefs of people who practice and encourage the use of data-driven decision-making and see data as a strategic asset throughout the data lifecycle and across an organisation. Embedding a data culture can be challenging and time consuming. Organisations are often faced with resistance to change and may find that they are not prepared to become fully data-driven.

For example, limited data literacy skills and poor quality data can delay or hamper the process of shifting mindsets. Organisations need to focus on identifying and prioritising the behaviours specific to their teams that will enable better data-driven decision-making, and articulate the benefits of this (e.g., reduced duplication, faster decision-making processes) to key stakeholders for buy-in.

Who is focusing on data culture?

- data culture is a key area of focus for all industry groups, with Government & Public Sector ranking highest

- we see significant growth in the focus on data culture compared to last year, where only 50% of CDOs reported it as one of their top three priorities.

% of CDOs focusing on data culture by industry group
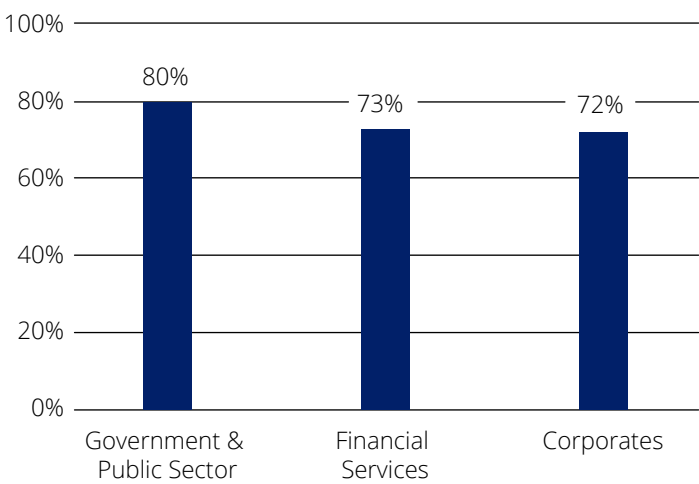
What participants said:

Multiple participants have flagged that it was part of their defined responsibilities to consider how to **"promote a data- driven culture"**.

03 Focus areas: value to enterprise

Enablers overview: data literacy

75% of CDOs identified improving data literacy across the organisation as one of their top areas of focus over the next 12 months.

Our perspective
Data literacy refers to the ability to read, explore, interrogate and communicate data, numbers, and facts in a meaningful way to audiences from different backgrounds.

Many organisations are currently struggling with low data literacy skills across teams and departments – especially those in non-technical roles.

Data literacy has an important role to play in supporting organisations embed a data culture – as you can't utilise insights in your decision-making process if you don't understand what you are seeing. As the adoption of digital solutions expands, the market is asking for people who can straddle the realms between technical expertise and business acumen. Thus, it's more important than ever to support staff's development to ensure that decisions are being made better, smarter and faster.

What participants said:
Many CDOs highlight that it is part of their defined responsibilities to improve data literacy across their organisation. CDOs flagged that the biggest challenge for data improvement (e.g., deploy analytics and improve data quality) is the **"lack of data literacy outside specialist area"**.

03 Focus areas: value to enterprise

Who is focusing on data literacy?

Data literacy is a key area of focus for all industry groups, with Corporates ranking highest.

We see significant growth in the focus on data literacy compared to last year, where only 54% of CDOs reported it as one of their top three priorities.

Focus on data literacy per industry group

49
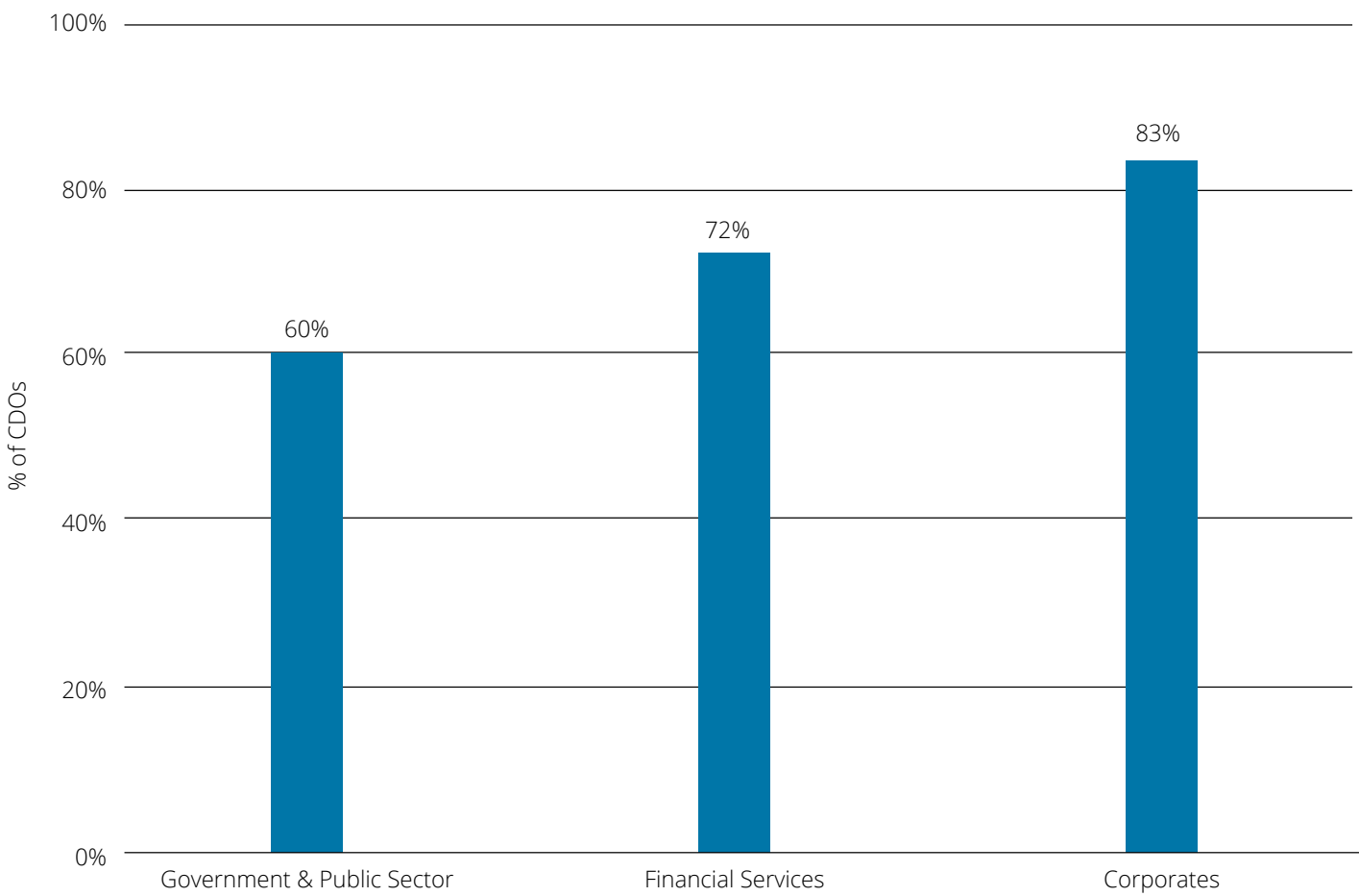
03 Focus areas: value to enterprise

Enablers overview: improving relationships

49% of CDOs identified improving relationships with key data stakeholders as one of their top areas of focus over the next 12 months.

Our perspective

A CDO looking to develop relationships with senior data stakeholders across their organisation will have highly beneficial results for both parties.

We believe that CDOs are able to build their network of data professionals and business stakeholders in the organisation, while sharing their data vision and objectives more broadly to get feedback from new and different perspectives. Senior data leaders will be able to learn from the CDO's broad experiences that can further develop and replicate best practices from other areas.

Ultimately, building stronger relationships helps non-technical senior leaders to see the potential value of data and thus securing sponsorship, creating a more collaborative environment and increasing funding.

What participants said:

CDOs mentioned that managing, engaging, and partnering with business stakeholders was a core element of their role, particularly where **"different phases of maturity"** exist across the organisation.

03 Focus areas: value to enterprise

Who is focusing on building relationships with key stakeholders?

53% and 52% of CDOs in Corporates and Financial Services respectively are looking to focus on building relationships with key stakeholders. This was 40% of CDOs in Government & Public Sector.

The focus on building relationships is consistent with those focusing on insights and analytics and data literacy. Building relationships between senior leaders and the CDO is very beneficial to both parties: senior leaders can use insights and analytics for data-driven decision making and CDOs improve relationships, and their impact, by adding value to their organisation.

We see these two aspects coupled together in Corporates who focus strongly on both insights and analytics and improving relationships.

Improving relationships by industry group
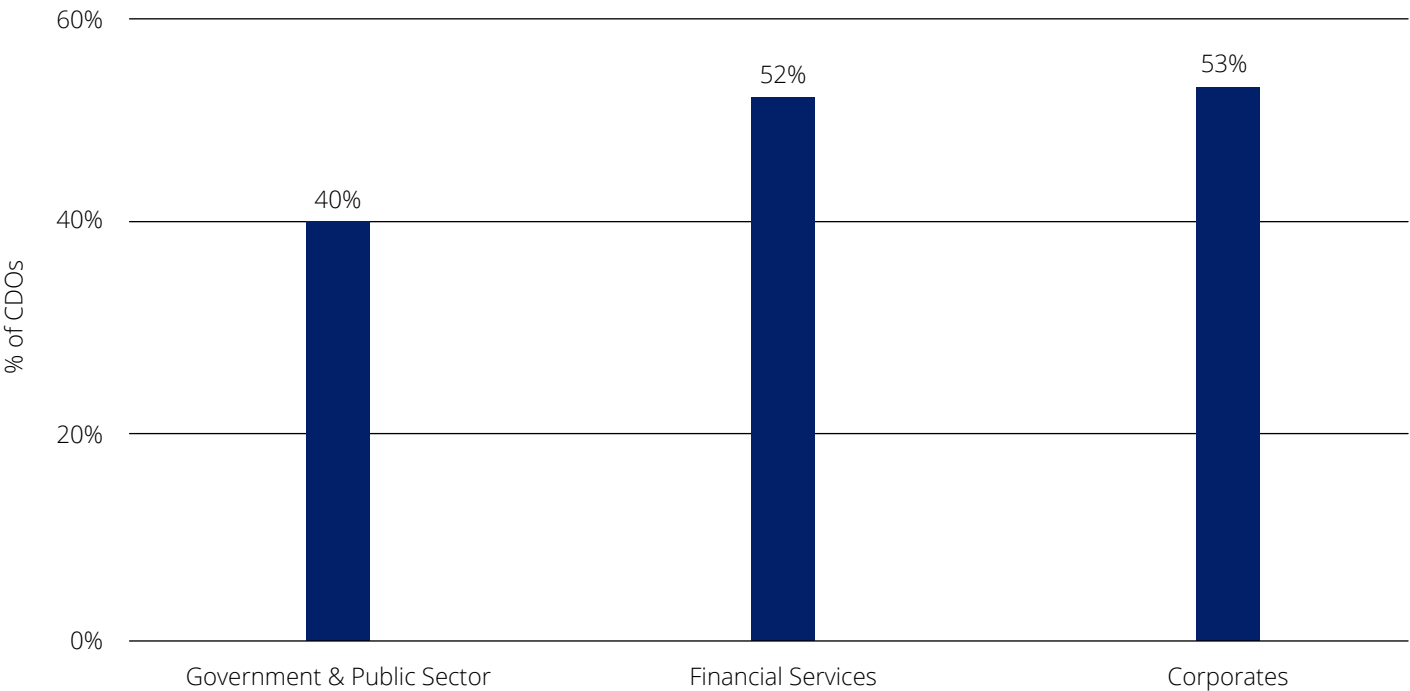
Our survey shows that CDOs have limited engagement with some senior stakeholders in their organisation. This is further explored on **page 55**.

51

03 Focus areas

Influence of the CDO

03 Focus areas: influence of the CDO

Where do CDOs report into?

91% of CDOs said they reported into a CxO position, but we see variability in the role CDOs report into.

Our perspective

CDOs should build strong relationships with their CEO. This can help them secure buy-in and funding on transformation projects that help to implement large-scale change to benefit the use of data. It also helps to ensure that the CDO is working to support the CEO's business objectives and overall business strategy, creating a more unified approach.

Only 7% of CDOs said they report directly into their CEO. In the 2022 CDO survey, we reported that 8% of CDOs reported into the CEO.

Where do CDOs report to?*
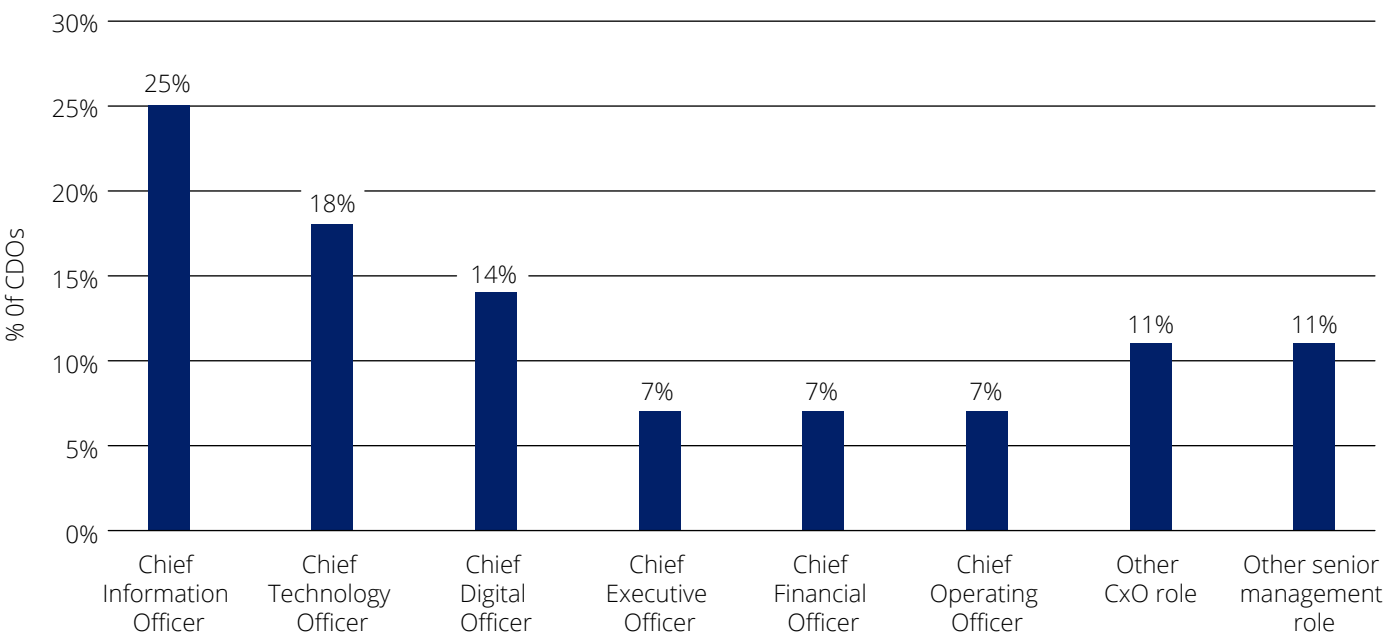
The percentage of CDOs sitting on their board has increased. In the 2022 CDO survey, 9% of CDOs sat on their board – this has increased to 17% in 2023.

*The 2023 CDO survey has been open to CDOs and senior data leaders. For the analysis completed in this section, we have worked with a subset of participants that have said they are the most senior data leaders within their organisation.

03 Focus areas: influence of the CDO

Across industry groups, we saw a similar trend in the proportion of CDOs reporting into CxO level. Financial Services had the highest proportion with 88% of CDOs reporting directly into a CxO compared to 81% in Corporates and 78% in Government & Public Sector.

When comparing against tenure, we noticed that CDOs with longer tenures are more likely to report into a CxO. 87% of CDOs with more than three years in their role reported into a CxO, compared to only 57% of CDOs with less than three years.

% CDOs who report into CxO

	Less than 3 years experience	Greater than 3 years experience
	57%	87%
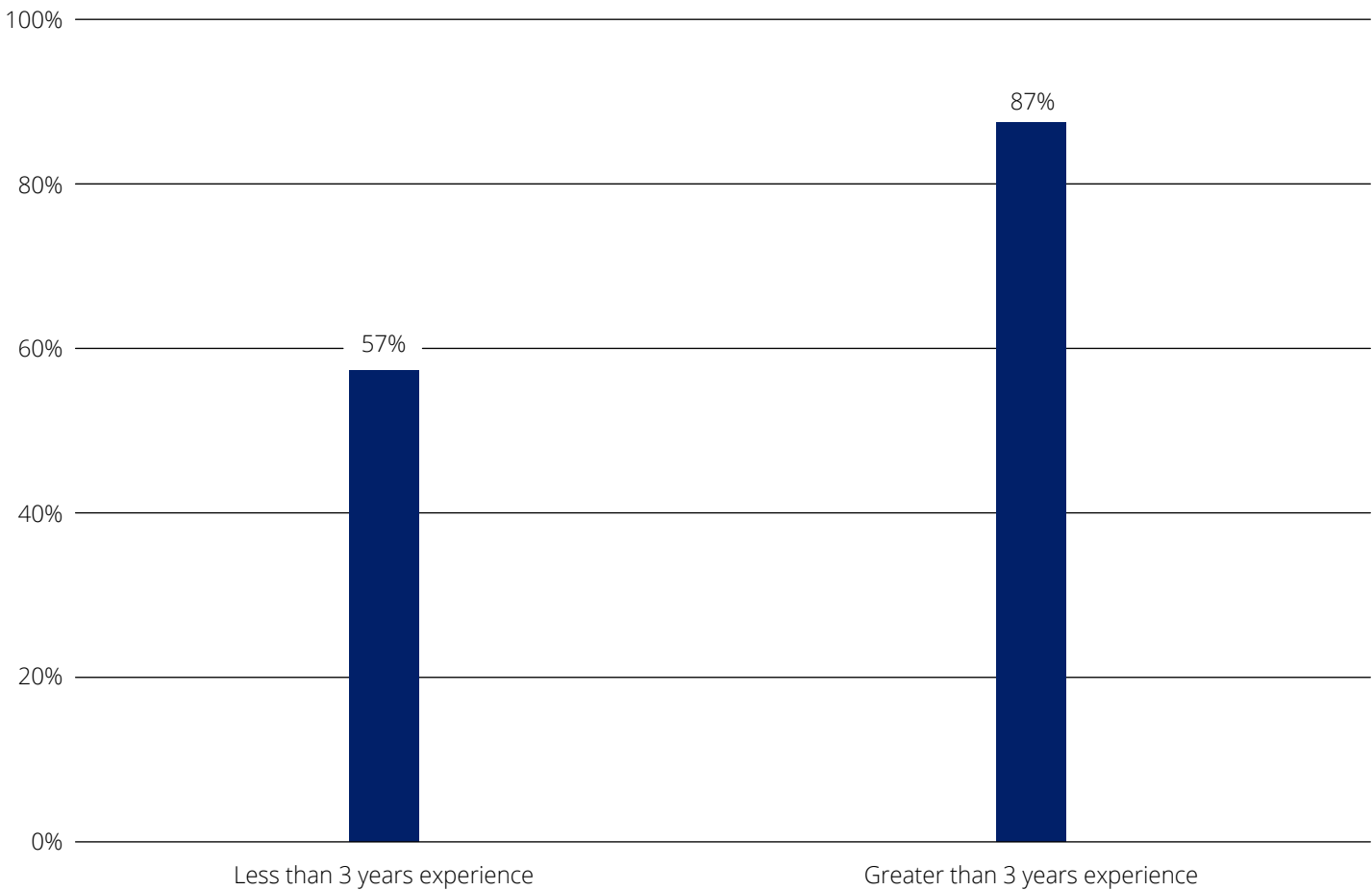
03 Focus areas: influence of the CDO

CxO engagement: relationship

> 44% of CDOs believe that they have a good relationship with the CEO.

Our perspective

The relationship between the CxO and CDO is vital to rolling out data improvement programmes, adopting analytics and AI functions in decision-making and ultimately becoming a data-driven organisation.

The CDO must engage effectively with key executive stakeholders and their own business areas to embed data-related changes and drive data improvement across the organisation. Lack of understanding and ownership across leadership is a key barrier to adoption.

How do CDOs engage with other CxO stakeholders?

When looking into the relationships CDOs have with senior stakeholders across the organisation, we can see that CDOs have good working relationships with those who have more technical roles, especially the CTO.

CDOs have outlined that they have weaker relationships with business focused C-suite colleagues, including CEOs, COOs and CFOs. Just 44% of CDOs believe they have a good relationship with their CEO. Identifying the key colleague relationships and prioritising engagements should be viewed as an important consideration to benefit the CDOs strategies.

CxO relationship with CDO

Radar chart showing CxO relationship with CDO: CEO 44%, CFO 52%, CTO 77%, DPO 52%, COO 58%. Arrow indicating "Stronger relationship".
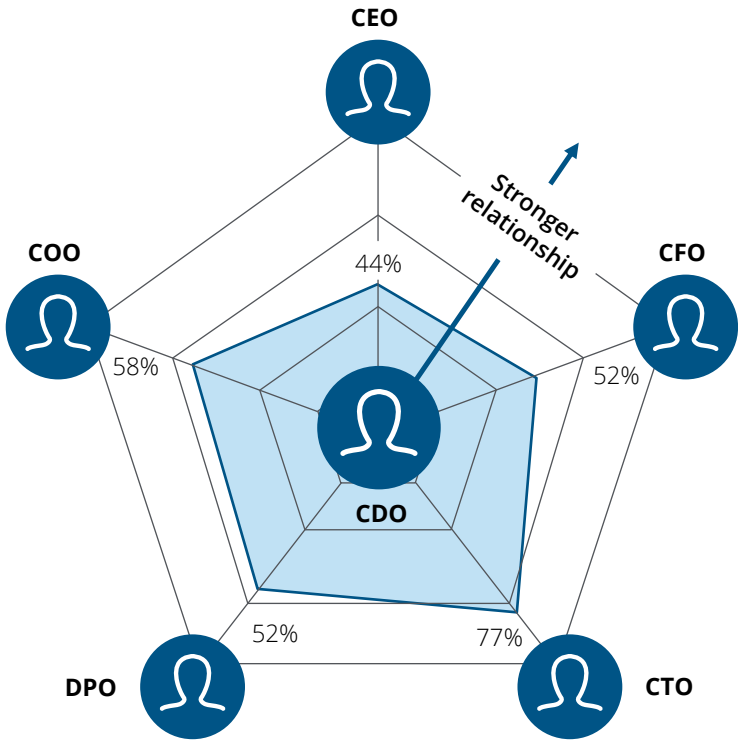
03 Focus areas: influence of the CDO

CxO engagement: understanding

Only 38% of CDOs believe that the CEO has a good understanding of their current work.

Our perspective

As expected, we see the strongest understanding with senior stakeholders already in a technical or technology focused roles.

CDOs have a great opportunity to educate other business stakeholders on their role, as well as the role that data plays. This helps to build awareness of the opportunity that data brings, through identifying specific problems relevant to each stakeholder, and how data can be used to resolve them.

CxOs with a stronger understanding of the CDO's role can drive data integration, adoption, and a cultural shift which can help the organisation build on their data capabilities and improve performance.

How well do CxO roles understand the CDO role?

The DPO and CTO have the strongest understanding of the CDO role, compared with other C-suite. This is consistent with the relationship levels outlined on **page 55**.

However, as with relationship levels, CDOs should focus on building awareness and understanding of the data function with C-suite colleagues such as CEOs, COOs and CFOs.

We found that only 38% of CDOs believed their CEO has a good understanding of their role. Increasing awareness and understanding across CxO roles should be seen as a key enabler to improving business performance.

CxO understanding of CDO role

CEO 38%
CFO 52%
CTO 83%
DPO 64%
COO 57%
Stronger understanding
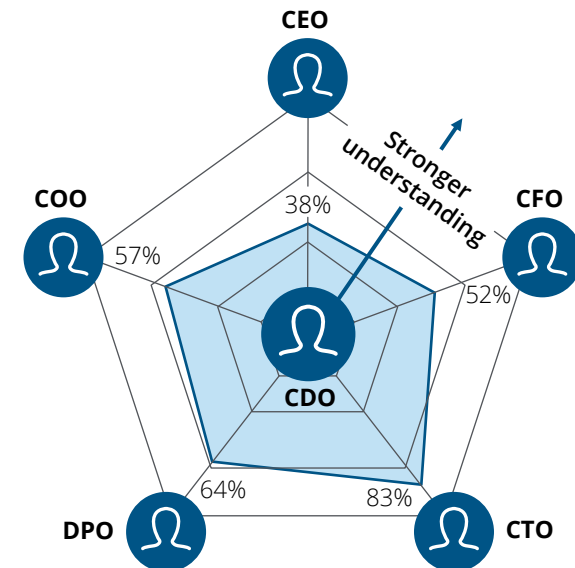
03 Focus areas: influence of the CDO

Budgets and spend

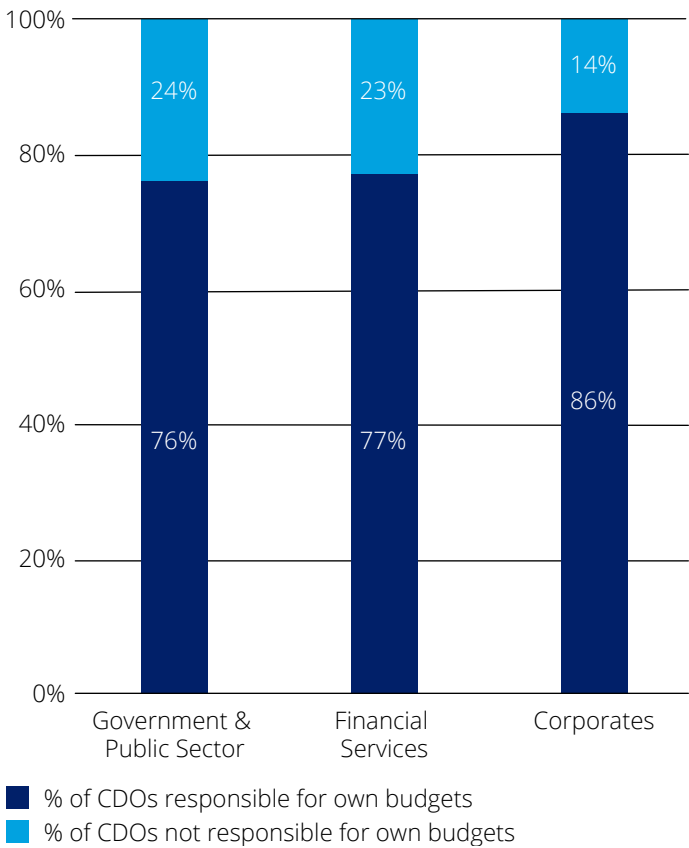## 79% of CDOs are responsible for their own budgets.

Our perspective

Funding is a crucial enabler for CDOs to be able to drive value from their data. CDOs that are responsible for change budgets will have a more effective influence across their organisation and can manage costs associated with change programmes, talent and BAU. Where CDOs are not responsible for change budgets, they will need to rely upon, quantitatively and qualitatively, demonstrating the value of data to influence change programmes across the organisation.

When we think about the labour market for data specialist skills, it comes as no surprise that budgets are stretched. CDOs cited that talent was accountable for the largest proportion of their budget and that salary dissatisfaction was the main challenge to attract and retain data talent.

Broadly speaking, relative to the size of the I.T. budget, spending controlled by CDOs is smaller than we would expect at 12%. CDOs expressed that they would like to see this increase to 17%. In some instances, other functions and lines of business will have data spend as well.

Budget responsibility by industry group

Chart: Budget responsibility by industry group
- Government & Public Sector: 76% responsible, 24% not responsible
- Financial Services: 77% responsible, 23% not responsible
- Corporates: 86% responsible, 14% not responsible

■ % of CDOs responsible for own budgets
■ % of CDOs not responsible for own budgets

57

03 Focus areas: influence of the CDO

We asked CDOs to explain their allocation of budgets between talent, change and business-as-usual (BAU) activities. 54% of CDOs said that talent accounted for the largest proportion of their budget followed by change projects (25%) and BAU costs (20%). This was relatively similar across industry groups: Government & Public Sector estimated spending 60% of their budget on talent, compared to 55% for Financial Services and 54% for Corporates.

The limited level of the change budgets means CDOs will have to rely more heavily on influence, to ensure data strategy considerations are included in projects funded by other parts of the organisation.

Allocation of budget

1%
20%
25%
54%

- Talent
- Change
- BAU
- Other

58
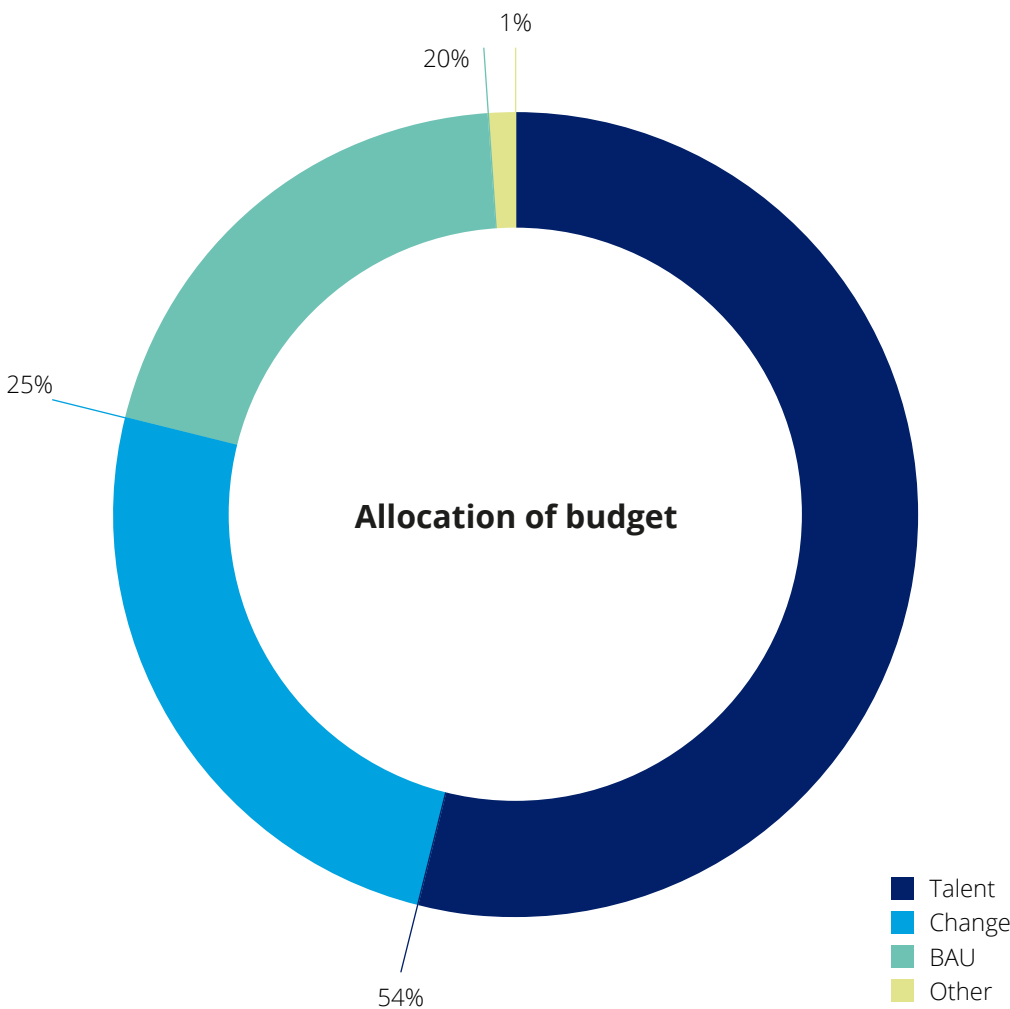
03 Focus areas: influence of the CDO

Relationship between CDO and I.T.

49% of CDOs have to rely upon influence alone to be involved in I.T. change processes.

Our perspective

As the driver for data value within an organisation, the CDO plays a key role in the I.T. systems change process to ensure that I.T. infrastructure aligns with business ambitions and the broader data objectives set out in the data strategy.

The relationship between the CDO and the I.T. team is extremely important. It is worth noting that this relationship is bilateral, as CDOs can help to deliver the full benefit from technology, and I.T. can be an enablers for the CDO, if they support with ensuring data needs are factored into design decisions.

The relationship between CDO and I.T.*

Participants were asked to define how they work with I.T. to deliver against the CDOs objectives. We observe variability in the involvement that CDOs have with their I.T. teams and their ability to influence them.

- 15% said I.T. change governance requires CDO approval for systems changes

- 15% hold the budget that is incorporated into change projects

- 30% said I.T. change governance requires CDO consultation for systems changes

- 36% hold material budget and commission explicit projects

- 39% act as an SME to the engineering and development teams when developing system changes

- 49% seek to influence I.T. change processes to involve CDOs in systems changes.

*I.T. is used here as a cross-industry comparator only. In this report, I.T. may refer to I.T., digital and technology teams.

03 Focus areas

The four faces of the CDO framework

03 Focus areas: The four faces of the CDO

The four faces of the CDO framework

Using our four faces of the CDO framework, we asked our participants where they currently spend their time and budget, and how different it is to where they want to spend their time and budget.

Catalyst
Championing the benefits of data, including analytics, for the organisation, influencing behaviours, and establishing a culture that adopts an insight-driven approach to strategic business decision-making.

Strategist
Providing leadership for data activities, and partners with the business to enable the use of data and insights as a strategic asset, to help achieve corporate objectives.

Leading Edge

Execution

Performance

Chief Data Officer

Control

Efficiency

Technologist
Assessing new data platform technologies and designing data technology platform architectures to increase business agility and manage complexity.

Operator
Operating and delivering efficient data services and solutions to support the business, while managing risk and protecting core assets.

61

03 Focus areas: The four faces of the CDO

The four faces of the CDO: catalyst

The catalyst aims to champion the benefits of data, including analytics, for the organisation, to influence behaviours and establish a culture that adopts an insight-driven approach to strategic business decision-making.

Key focus:	Key roles:
• leading the data and analytics innovation agenda for the organisation • changing organisational behaviour and establishing a value attitude.	• acting as the champion for data and analytics of the organisation to internal and external stakeholders • aligning strategic objectives and business benefits from an analytics perspective to enable better cultural adoption • nurturing ways of working with data and tech across the organisation.
Competencies:	**Critical issues:**
• confidence adapting to disruptive technologies and suggesting new ideas • business perspective, conflict management, organisational agility, and facilitation • strong communication and change management skills • understanding of key performance measurements to measure success of strategic initiatives • strong leadership skills.	• establishing a structure of enterprise-wide accountability for results and driving execution • gaining buy-in from business management for utilising data and analytics innovation • maintaining the enterprise-wide momentum for innovation and staying updated on the latest data and technology trends • implementing strategic initiatives while business models continue to change through extended business relationships, delivery models, and global expansion.

What CDOs told us:

• they currently spend 27% of their time (up from 15% last year) and 14% of their budget in the catalyst role

• they are looking to increase the amount of time and budget spent in the role to 31% and 25% respectively.

62
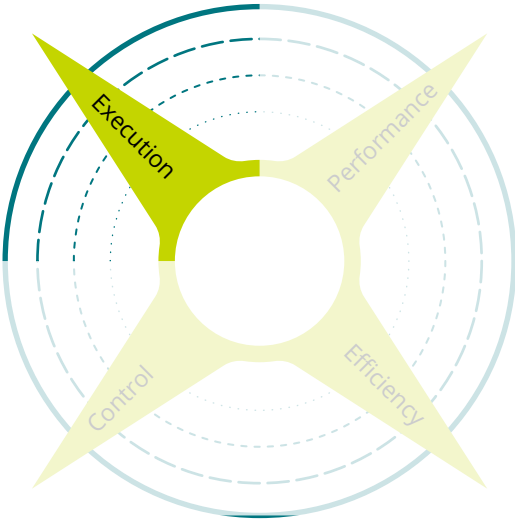
03 Focus areas: The four faces of the CDO

The four faces of the CDO: strategist

The strategist aims to provide leadership for the data activities, and partner with the business to enable the use of data and insights as a strategic asset, to help achieve corporate objectives.

Key focus:	Key roles:
• helping set the future direction of the organisation to enhance business performance and shareholder value • establishing focus on the right analytics opportunities that generate business value.	• gaining business alignment to successfully identify, evaluate, and execute strategies • being a business partner with other CxOs and business unit leaders to educate on the value of data and analytics • generating cross-organisational value through data and analytics • creating an analytics and AI lens to support the effective execution of the organisation's strategic initiatives.

Competencies:	Critical issues:
• critical thinking, analysis, and presentation of data • global perspective, strategic agility, and dealing with ambiguity • data and analytics experience • strong business partnering skills • strong leadership skills.	• silos and varying levels of analytics understanding/maturity or buy-in across the organisation's departments • providing an analytical perspective on innovation, profitable business growth, and translating external trends into internal business imperatives • providing necessary analytics-related information and tools for the organisation to make sound business decisions.

What CDOs told us:

• they currently spend 31% of their time, up from 16% last year, and 16% of their budget in the strategist role

• they are looking to increase the amount of time and budget spent in the role to 41% and 28% respectively.

63
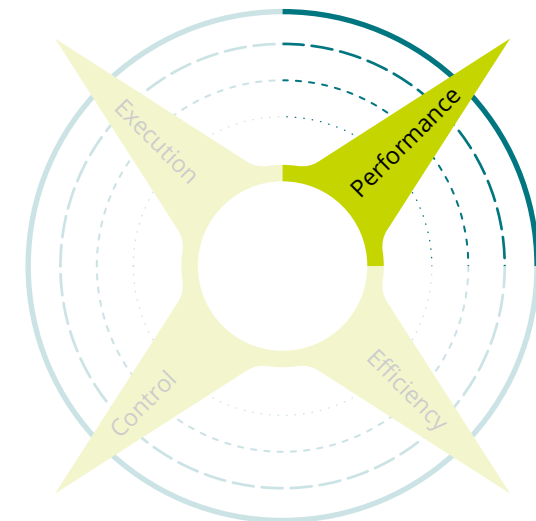
03 Focus areas: The four faces of the CDO

The four faces of the CDO: operator

The operator aims to run and deliver efficient data services and solutions that support the business while managing risk and protecting core assets.

Key focus:	Key roles:
• ensuring the efficiency and effectiveness of the operations of the data and analytics function • adding value to the organisation and keep a clear business case for data and analytics • industrialising analytics for the business.	• dynamically balancing cost, risk, and service levels in delivering on the data and analytics function's responsibilities • developing and managing a clear service catalogue • defining and adapting the analytics operating model to deliver for the organisation at scale, integrated with the enterprise-wide data architectural direction • developing data and analytics talent • establishing and leading on data and analytics benefits tracking.

Competencies:	Critical issues:
• confidence adapting to disruptive technologies and suggesting new ideas • business perspective, change and conflict management, organisational agility, and facilitation • strong communication and change management skills • understanding of key performance indicators to measure success of strategic initiatives • strong leadership skills.	• establishing a structure of enterprise-wide accountability for results and driving execution • gaining buy-in from business management for utilising data and analytics innovation • maintaining the enterprise-wide momentum for innovation and staying updated on the latest data and technology trends • implementing strategic initiatives while business models continue to change through extended business relationships, delivery models and global expansion.

What CDOs told us:
• they currently spend 25% of their time, down from 37% last year, and 39% of their budget in the operator role

• they are looking to decrease the amount of time and budget spent in the role to 14% and 25% respectively.
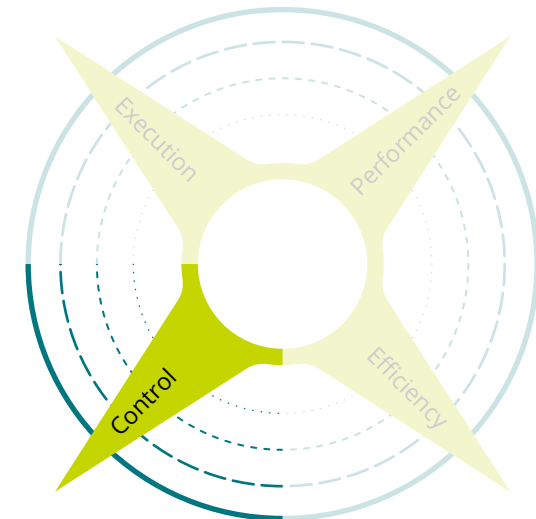
03 Focus areas: The four faces of the CDO

The four faces of the CDO: technologist

The technologist aims to assess new data platform technologies and design data technology platform architectures to increase business agility and manage complexity.

Key focus:	Key roles:
• leading the data technology innovation agenda for the organisation • leading the data disruption agenda for the organisation • changing organisational behaviour to use data and systems differently.	• acting as the champion for data technologies across the organisation to internal and external stakeholders • aligning strategic objectives and business benefits from an analytics perspective to enable better cultural adoption • defining and adapting the technology operating model so that it delivers for the organisation at scale and integrates with the enterprise-wide data architectural direction.
Competencies:	**Critical issues:**
• confidence adapting to disruptive technologies and suggesting new ideas • business perspective, change and conflict management, organisational agility, and facilitation • strong communication and change management skills • strong leadership skills.	• gaining buy-in from I.T. and the business for utilising analytics and innovative technologies • maintaining the enterprise-wide momentum for innovation and staying ahead of the latest data and technology trends.

What CDOs told us:

• they currently spend 16% of their time, down from 32% last year, and 31% of their budget in the technologist role

• they are looking to decrease the amount of time and budget spent in the role to 14% and 23% respectively.

65

03 Focus areas: The four faces of the CDO

The four faces framework: time

CDOs want to spend the most of their time as a strategist.

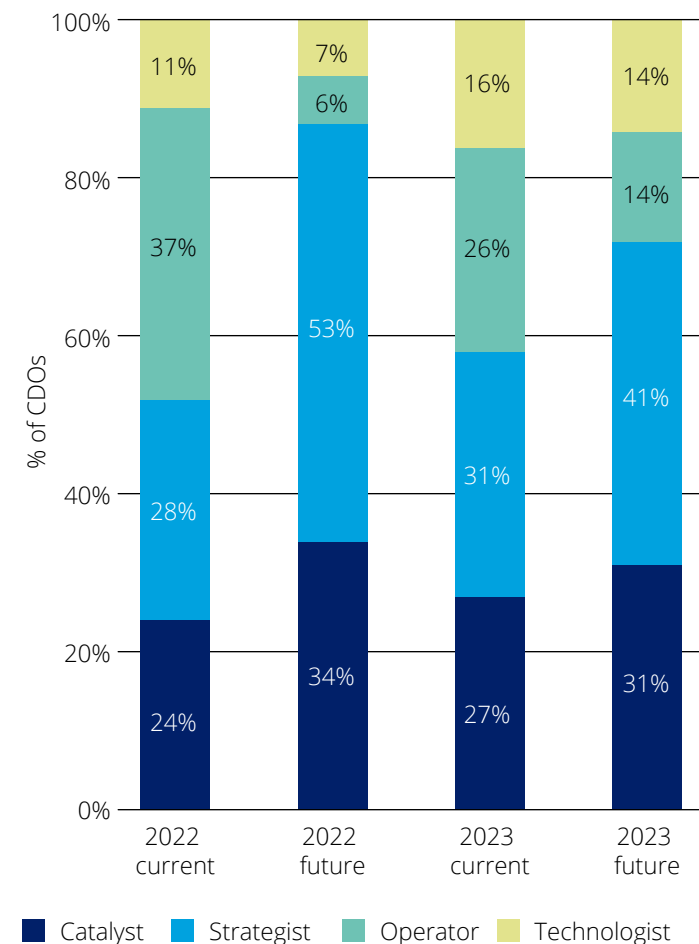### How do these results compare to last year?

We observed that, in line with what CDOs said last year, on average CDOs want to spend the most of their time as a strategist and move towards spending more time as a catalyst. In addition to this, CDOs told us that they want to spend less time as an operator and the least time as a technologist.

Across the four faces, we see CDOs have made some progress to focus their time in each role. However, further progress is required to progress towards their desired allocations, where strategist and catalyst are their primary roles:

- 70% of CDOs that want to spend less time in the **operator** role than they currently are

- 69% CDOs that want to spend more time in the **strategist** role than they currently are

- 55% of CDOs that want to spend more time in the **catalyst** role than they currently are

- 44% CDOs that want to spend less time in the **technologist** role than they currently are.

By far the biggest issues for CDO time allocation is the operator role. In 2022 they wanted to spend 6% of time as an operator. In 2023 the actual has been 26%.

Four faces: time

	2022 current	2022 future	2023 current	2023 future
Technologist	11%	7%	16%	14%
Operator	37%	6%	26%	14%
Strategist	28%	53%	31%	41%
Catalyst	24%	34%	27%	31%

Legend: Catalyst, Strategist, Operator, Technologist

03 Focus areas: The four faces of the CDO

CDOs have differing opinions on how their time should be spent across the four faces.

When comparing industry groups, we saw a very similar pattern in where CDOs are currently spending their time and where they would like to do so in the future. We do see some variation however, when looking at the same data based on the longevity of CDOs' tenure.

On average, newer CDOs spend more time in a strategist role, which reduces steadily as their tenure increases.

Interestingly, CDOs with longer tenures (over four years) spend more time in a technologist role, despite indications that they want to move away from this. This suggests they may have to deal with technical issues, that potentially impedes progress.

Four faces: current allocations by tenure

Tenure	Catalyst	Strategist	Operator	Technologist
Less than 12 months	25%	35%	26%	14%
1-2 years	28%	30%	27%	15%
3-4 years	28%	31%	24%	17%
4+ years	26%	29%	22%	23%

■ Catalyst ■ Strategist ■ Operator ■ Technologist

67
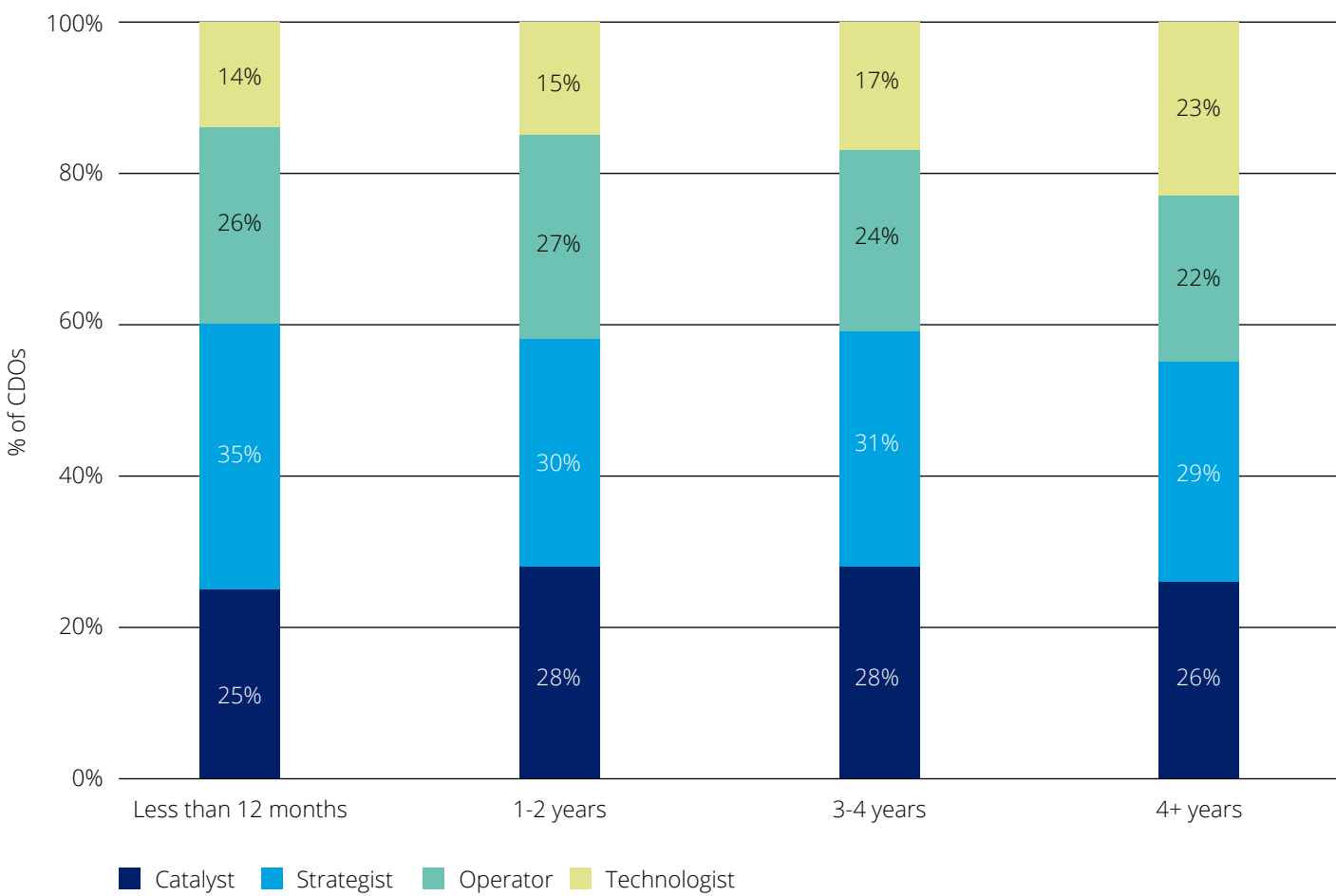
03 Focus areas: The four faces of the CDO

The four faces framework: budget

CDOs want to allocate their budget more evenly across the four faces framework.

We see that, similarly to the trend in four faces time allocations, CDOs want to spend more budget as catalysts and strategists to enable their organisation to get the most out of data. Allocating more budget here will help organisations achieve corporate objectives and deliver efficient services.

CDOs also told us that they want to spend less budget in operator and technologist roles. The component in four faces with the biggest difference is the operator. Here our findings showed that, on average, CDOs want to spend 14% less of their budget in this space:

- 70% of CDOs want to spend more budget in the **strategist** role than they currently are

- 63% of CDOs want to spend more budget in the **catalyst** role than they currently are

- 61% of CDOs want to spend less budget in the **technologist** role than they currently are

- 67% of CDOs want to spend less budget in the **operator** role than they currently are.

Given that much of the operator spend is on core BAU activities, the solution must be some form of investment in efficiency and optimisation.

Four faces: budget

Current allocations: Catalyst 14%, Strategist 16%, Operator 39%, Technologist 31%

Future allocations: Catalyst 25%, Strategist 27%, Operator 25%, Technologist 23%

Changes: ↑ +11% (Catalyst), ↑ +11% (Strategist), ↓ -14% (Operator), ↓ -8% (Technologist)

Legend: ■ Catalyst ■ Strategist ■ Operator ■ Technologist

68
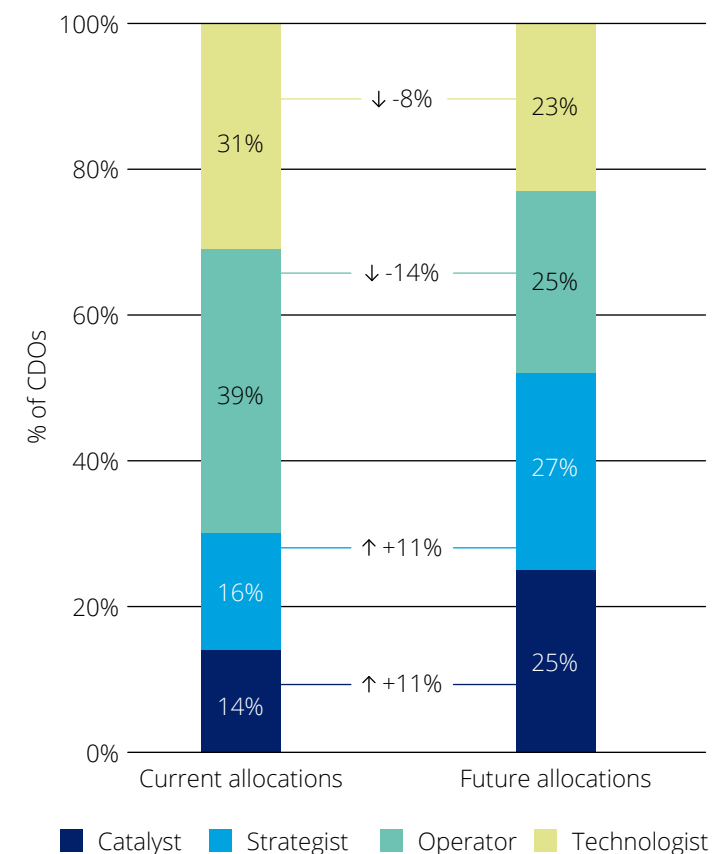
03 Focus areas: The four faces of the CDO

The four faces framework: current time vs budget

CDOs current time allocations are not aligned to their budget allocations across any of the four faces.

Proportionately CDOs spend, on average, significantly more time than budget in catalyst and strategist roles. We know CDOs want to spend more time in these roles to help organisations change the data culture, but we see they have little budget that allows them to do this. Ultimately, we found that they spend twice as much of their time allocation, than their team's budget allocation on these two areas.

We also found that CDOs spend significantly more budget than time in operator and technologist roles. We also see CDOs want to spend less time and budget in these roles, however, we continue to see high spend in these areas. This raises the thought-provoking question: why are CDOs spending so much money in this area when they want to reduce the amount of their time spent on related activities?

Current allocations: time vs budget
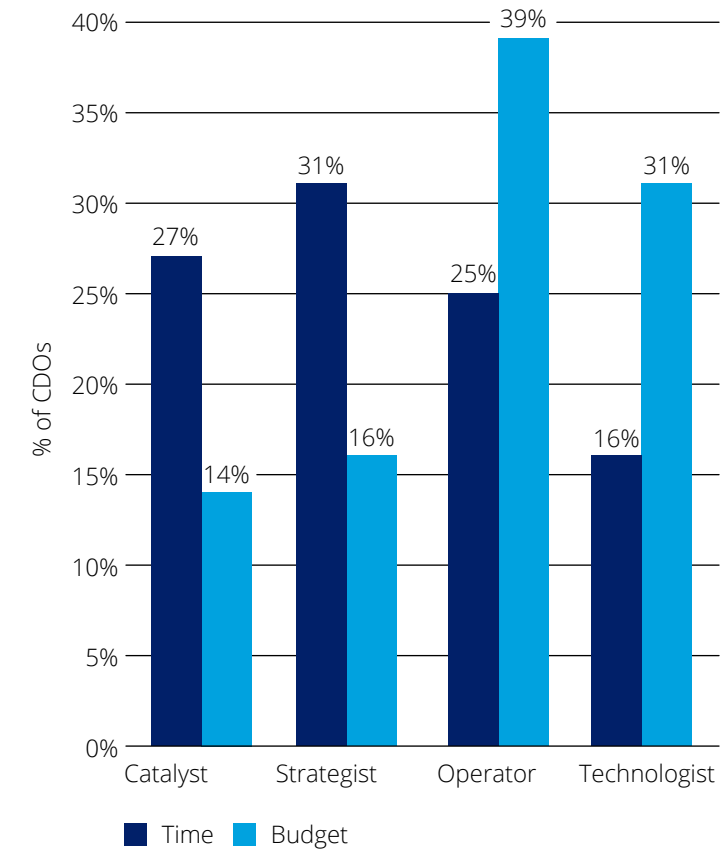
Bar chart showing % of CDOs. Catalyst: Time 27%, Budget 14%. Strategist: Time 31%, Budget 16%. Operator: Time 25%, Budget 39%. Technologist: Time 16%, Budget 31%.

Legend: ■ Time ■ Budget

01

Executive summary

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Vision & goals

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Value to enterprise

Influence of the CDO

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04 Approach

Following the release of Deloitte's 2022 Chief Data Officer survey, we launched our second CDO survey in Spring 2023.

In this edition, we have moved to a digital survey to gather a more diverse range of opinions from a wider, international audience, and invited perspectives from a larger set of CDOs and data leaders.

Key questions that the 2023 CDO report seeks to answer are:

What does a successful CDO look like?

Where do CDOs spend their time and budget?

What is a CDO responsible for?

What are their key priorities and challenges?
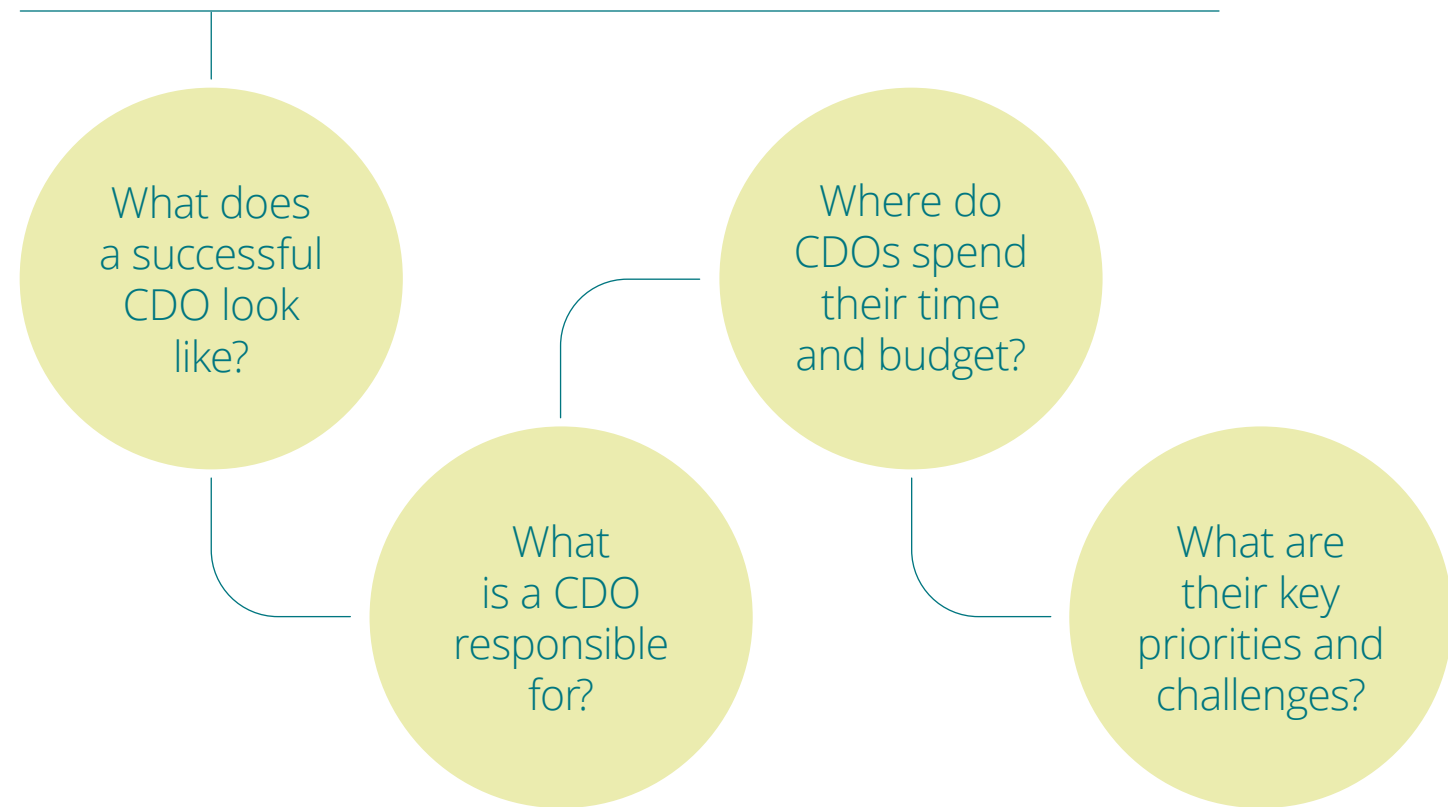
04 Approach

Survey methodology

We identified a range of CDOs to participate in this research, representing all major industry groups across Financial Services, Government & Public Sector and Corporates. A total of 75 participants completed the survey from eight countries.

After the survey closed, we analysed the responses: the survey data was used to identify the trends, observations, and insights shared in this report.

Note: throughout this report the term "CDO" is used to represent all participants – noting that we surveyed individuals with the title of CDO and senior data leaders with similar responsibilities, but different role titles such as "Director of Data" and "Head of Data."

Australia

Belgium

Germany

Netherlands

New Zealand

Saudi Arabia

Sweden

United Kingdom

04 Approach

Maturity assessment

Maturity assessment methodology

In some areas of this report, you will see reference to our maturity assessment.
The following steps outline the methodology for our maturity assessment:

01. In the 2023 CDO survey, we asked participants to identify their core objectives, that they are currently focusing on.

02. After selecting their core objects, we asked some specific follow-on questions asking participants to select criteria which describe their activities for each of these objectives.

03. By analysing the criteria that was selected, we have evaluated the maturity trends across organisations.

04. We have grouped participants into 5 categories across the maturity scale based on their responses.

The maturity scale:

Initial
Responses indicate no or limited evidence to suggest the capability has been established within an organisation.

Emerging
Responses indicate some evidence to suggest the foundations of the capability have been established but scope to develop further.

Understood
Responses indicate that elements of good practice were identified within the capability area.

Developed
Responses indicate no or limited evidence to suggest the capability has been established within an organisation.

Innovative
Responses indicate a well-established capability that is performing above average.
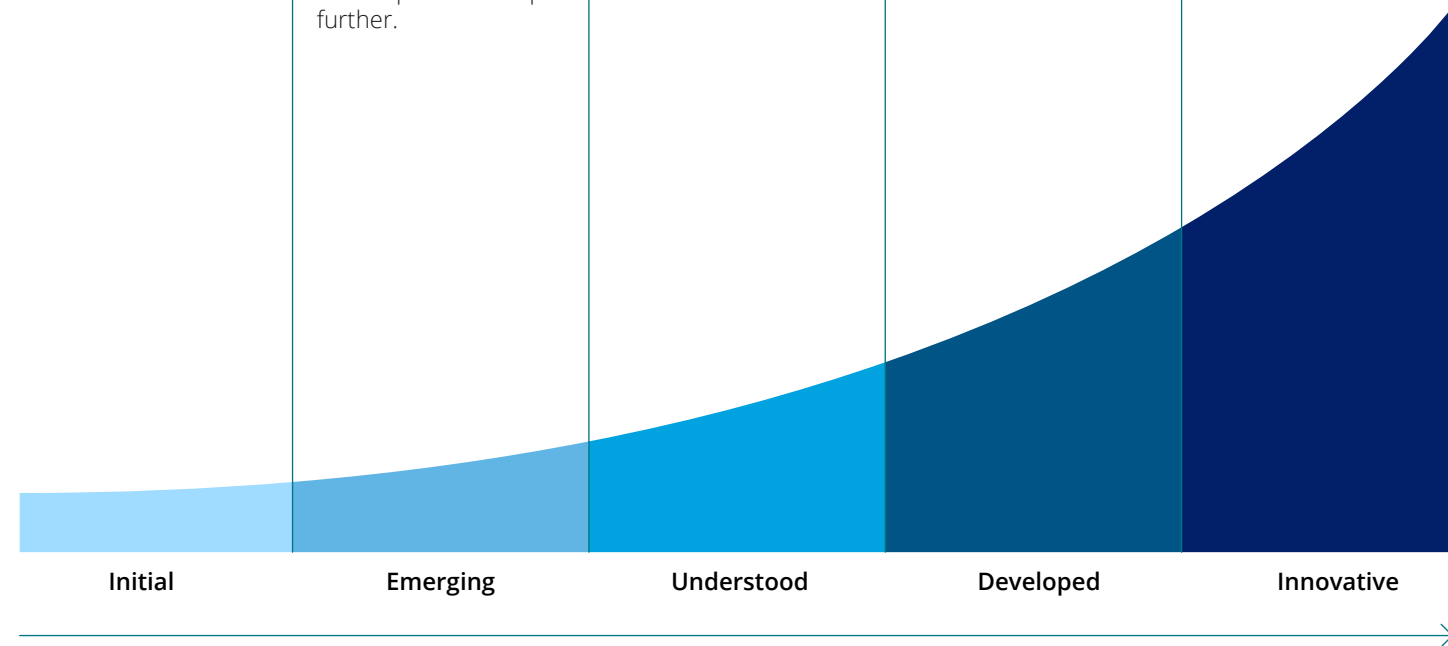
Initial | Emerging | Understood | Developed | Innovative

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CDO programme

04 CDO programme

Deloitte CDO programme

Our CDO programme focuses on supporting CDOs to grow and develop in their roles.

We have developed a programme of activities to support data leaders in overcoming current challenges they are facing, and defining/embedding the CDO role into organisations.

The programme will help senior data leaders to leverage Deloitte's expertise and network with other leaders across industry groups.

The programme is intended to be driven by CDOs for CDOs – with topics of focus chosen by the group - and facilitation from Deloitte. Discussions will always be held under the Chatham House rules. There will be no direct attribution of any discussion outside of events. This will help foster supportive and open discussions to benefit participants.

To achieve this ambition, we have categorised the CDO programme into four areas of activity:

Roundtable discussions

You will gain exclusive access to themed and industry-focused discussions that offer opportunities to network, gather insights, and hear from industry experts.

Insight papers and articles

Staying current has never been so important. These insights focus on you, your leadership, and your career path, with topics that help you keep up-to-date on current trends and ways of working.

Bespoke labs and workshops

We facilitate unique transition labs, next-generation, strategic thinking workshops, and problem-solving greenhouses to support you and help you develop in your role.

Peer-to-peer network

This programme provides a unique opportunity to establish new connections and relationships with peers across industry groups and a variety of experience levels and countries.

If you have any feedback or would like to get in contact with the team, please contact ukcdocommunity@deloitte.co.uk. If you are based outside of the UK, we can also put you in contact with your local Deloitte member firm.

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04 CDO programme

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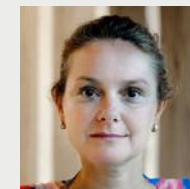CDO Programme Support
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Deloitte.

Turning data into value

How top Chief Data Officers deliver outsize results while spending less

IBM

In cooperation with Oxford Economics, the IBM Institute for Business Value interviewed 3,000 CDOs. We supplemented data collection with in-depth conversations with approximately 20 CDOs globally. We designed data collection by country, industry, gender, and organizational size. We captured operational and financial data for the period 2019—2022.

To better understand what drives the data-driven organization, we assessed respondents on four aspects. Data Value Creators (8%) score high on all:

—A clear line of sight from data to value

—Data investments accelerate business growth

—Data at the center of business model innovation

—Engaged ecosystem partnerships.

Contents

3,000
CDOs surveyed

30+
countries

29
industries

27th
edition

8%

of Chief Data Officers achieve greater value while spending less.

How?

Inderpal Bhandari
Chief Data Officer, IBM

Data, as the foundation for every business decision, strategy, and operating model, is no longer a mundane topic relegated to the furthest reaches of the IT department. It's a boardroom topic.

Circa 2002, when boards and C-suites first recognized data as a strategic asset that could fuel digital transformation, they awarded it a steward—the Chief Data Officer. I've been a CDO for about as long as the title has existed and can attest to how much the position has evolved since its inception. I'm delighted to share this report because it explores not just what the role is today, but what it can be when taken to its highest level of excellence.

Our research with 3,000 CDOs globally highlights an elite group of chief data officers—just 8%—whose performance is highly differentiated. They spend less on data strategy and management than peers, yet achieve equal or greater annual revenue growth. We call them "Value Creator CDOs," and they share four things in common, which we detail in the pages that follow.

In this report, we also celebrate the increasing number of female CDOs. While gender parity is still down the road globally, almost half (46%) of our CDO respondents are female. You will hear them describe what they are doing to help their organizations transform. Throughout, you will hear CDOs describe their challenges, opportunities, tactics, and strategies in their own words. I'd be surprised if you don't see some similarities to your organization.

Strategic CDOs know it's never really been about the data. It's always been about the business transformation value of insights from integrated data.

I'm happy to recognize that my CDO colleagues are creating amazing positive change for their enterprises. Here's how they're doing it.

A day in the life of a
Chief Data Officer

Julien

03:00

Singapore
[19:00 GMT]

Julian, Chief Data Officer (CDO) for a large telecom, is wide awake. Barely a year into his position, he was awakened moments ago by a call from his overnight team. "There's been a breach." Words no CDO wants to hear. While the scope and scale of the breach is under investigation, it looks like some of the company's largest customers will be impacted. Palms clammy, with a raging headache coming on, he is stymied. He has been working closely with the company's top cybersecurity executive on battening the virtual hatches to avoid just this situation. Early reports indicate the breach came via a cybersecurity gap within a small supply chain partner. Vetting the ecosystem was phase II of his plan—but cyber-criminals have their own timeline, and apparently were able to infiltrate before those doors were closed. Julian wonders if his CEO, not exactly the understanding type, will give him the chance to make things right. For now, he picks up the phone to call his Chief Supply Chain Officer to deliver the bad news.

Hayden

08:00

San Francisco
[13:00 GMT]

Just six months into a role as CDO at a large financial services firm, Hayden has gathered the team to address what peers often overlook early in their tenure: defining the "why" behind each step of the strategic plan, to make sure they are prioritizing what matters most. At a recent conference roundtable Hayden attended, a significant number of fellow CDOs discussed their "big bang" approaches, designed to show the enterprise big change, fast. But Hayden feels the thinking the team is doing this morning and for the rest of the week is a crucial first step. Less "big bang"—instead, more planting seeds that will begin to change the way the organization works over the next year. Will the approach work? Will Hayden even be given the time to prove-out the approach? Hayden recognizes their job depends on it.

Ana

16:00

Recife
[19:00 GMT]

Ana is on a video call with one of her chief product vendors, reviewing results from a six-week test of a data fabric product. "I've really appreciated the innovation you've helped us bring into a key area of our operations," Ana says. "It would have taken us 12 months or more to test a new way of doing things last year. I mean it—your expertise in this area has been a rocket booster in terms of speed to value." She is well aware that her emphasis on ecosystem partnerships and her strong relationships in the innovator space played a large role in her being hired 18 months ago. But now she needs to begin to scale proofs of concept and partnerships in a way her company has never done. She has her work cut out for her.

Wilma

09:00

Stockholm
[08:00 GMT]

Wilma sips her coffee as she prepares for a meeting with board members and her CEO to review her 2023 plan for all things data within the consumer products company that employs her. Thirty-six months in, Wilma realizes she has reached a tenure many CDOs don't. Her data strategy and implementation plan has real legs now, as evidenced by several successful cross-functional customer initiatives fueled by data insights. But she ponders what the board might want next, musing over ways to defuse potential "pet projects" or "I just read in Major Business Publication" input. She needs to maintain momentum behind the less glamorous—but ultimately more practical and effective—business data framework she's been constructing, if she's going to help unlock her organization's potential.

What does a Chief Data Officer do, anyway?

20

years after the role's creation, no one seems sure.

Every day, around the globe, Chief Data Officers (CDOs) find themselves in the spotlight—protecting customer and employee privacy, using data to create innovative new solutions, and streamlining large enterprises into sleek value producers fueled by data insights. From driving data fabric to AI insights to emerging data-driven cultures, the Chief Data Officer role is nearly unrecognizable from when the title first appeared circa 2002.[1] Yet, more than 20 years later, the CDO role is still being defined—as evidenced by an early 2022 cio.com article headline that began: "What is a chief data officer?"[2]

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It's hard to achieve spectacularly when there is little
agreement on what the job role entails. From a board of directors
that expects "magic" early in a CDO's tenure (increasing revenue
while decreasing costs), to CEOs that think a large enterprise
can become completely data driven in six months or less (it
can't), pressures on CDOs are as never before.

For example, just over half (52%) of CDO respondents say
ensuring data security is the most critical responsibility of
their role. But less than 2/3 (61%) agree their organizational
data is secure and protected. With pressures like these
mounting, CDOs are looking for ways not just to create value,
but to protect it.
```

Savvy CDOs are forging their own paths. While no two are alike, the best paths share key similarities, as shown by our recent research with 3,000 Chief Data Officers around the globe. An elite group—some 8% of respondents—are reaping more value than their peers while spending less. Their tactics, approach, and mindset provide a model for any CDO and data organization to learn, improve, and unlock potential.

What follows unfolds in five parts: first, a description of these "hero" CDOs, who we call Value Creators; and then sections on each of four core lessons from this cohort. Along the way, we'll share guidelines on how to put key learnings into action.

It turns out that the CDO role has never really been about the data itself. It's about the business value that data insights can provide. Who are the CDOs nailing that connection and what approach are they taking?

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Let's dive in.
```

Shrinking tenure and blind spots

Peter Jackson

Chief Data and Product Officer, Outra (UK)
Chief Data and Analytics Officer, Carruthers and Jackson

"I think the biggest blind spot and the biggest danger for the CDO is the organization doesn't actually know what they want the CDO to do. And they don't actually know what type of CDO that they want. Do they want a CDO who's going to drive prediction and data analytics and data science or do they want a Chief Data Officer who's going to make sure that their data is of a good quality and they can trust it?"

Srinivasan Sankar

Enterprise Data and Analytics Leader
in the insurance industry

"If you look at the last 18 to 24 months, the tenure of the CDO has been shrinking...when I'm talking to my peers, they agree that what used to be a 36-month tenure shrunk to 24 months, 18 months, 12 months... And the reason for that, in my opinion, is expectations. Expectations both ways."

What defines a "hero" Chief Data Officer?

Some enterprises take a "show me the money" approach to data, spending prodigious sums in a bid to generate outsize value. While there is nothing wrong with that approach—you can make progress via blunt force—our research shows a better way.

In our study, we identified heroic Chief Data Officers, an elite 8%, whose organizations allocate proportionally less of their revenue to data, yet generate equal or greater business value. We call these CDOs Data Value Creators because they have created a clear line of sight from data to business value.

Data   Insights   Action   Business Value

The specific figures may seem modest: To increase revenue growth by 1%, the average CDO in our study allocates 2.32% of annual revenue to data management and strategy; Value Creators achieve the same result by allocating 2.27%. Yet in aggregate, that difference means millions of dollars in savings, materially improved ROI, and better long-term outcomes.

4 things leading
CDOs get right

The organizations we surveyed have an average annual revenue of roughly $9 billion. Those with a clear line of sight from data to business value can spend nearly $5 million less than peers to gain the same results in revenue growth. That's a savings greater than the average cost of a data breach ($4.35 million).[3]

Not surprisingly, perhaps, Value Creators are 50% more likely to be responsible for increasing data ROI than other CDOs; the expectation of a tie to the bottom line is built into their job. They are also more likely to report directly to the CEO.

Interestingly, what defines these Value Creators is not a collection of flashy, "big bang" actions.

On the contrary, it's an emphasis on a carefully orchestrated low-key approach. These CDOs focus on planting seeds of change with new investments, carefully plotting out the "why" and "how" from those investments to value achieved. Most importantly, they move in lockstep with the business, in the process cultivating the right partnerships internally and externally.

Taking incremental steps does not preclude larger-scale impacts. In fact, it seems to enable them. Value Creators are outperforming peers by some 40% in innovation, according to our survey results, and by some 10% in data capitalization and in revenue growth.

1
Clear line of sight from data to value
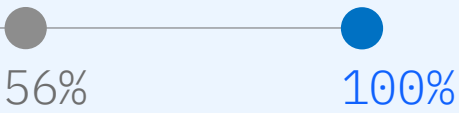
2
Data investments accelerate business growth

3
Data is central element of business model innovation

4
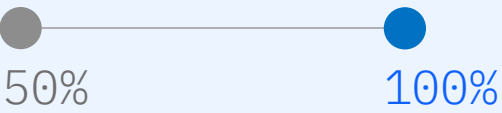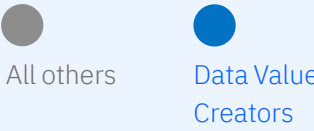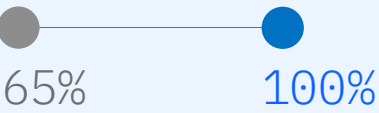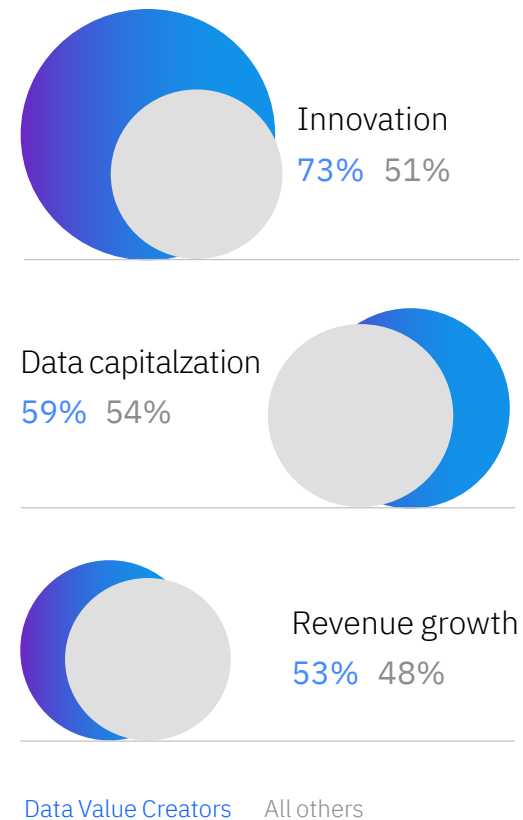Extremely engaged ecosystem partners

Figure 1

**What do leading
CDOs do differently?**

We are able to define a clear line of sight from data to value — 56% ... 100%

Our data investments accelerate business growth — 50% ... 100%

Data is a central element of our business model innovation — 76% ... 100%

We have extremely engaged ecosystem partners — 65% ... 100%

All others | Data Value Creators

8

9

In examining what enables Value Creators' heroic outcomes, our survey points to four key factors— what one respondent calls "double-vision"—that: link tech initiatives and business outcomes; align data investments to piggyback off of other digital investments; emphasize business-model innovation as much as business protection; and aggressively engage with ecosystem partners.

We'll dig into each of these areas in more detail, highlighting on-the-ground experiences of CDOs and pulling out clear learnings to improve practices.

Figure 2

Where Data Value Creator CDOs outperform peers

Innovation
73% 51%

Data capitalzation
59% 54%

Revenue growth
53% 48%

Data Value Creators   All others

Profile of a
Data Value
Creator

More data Value Creators have a background in data and analytics, and more

report directly
to the CEO.

Data Value Creators combine a top down approach

team empowerment

More organizations
with Data Value Creators are

publicly traded
instead of privately held.

The most pressing data
management challenges
for Data Value Creators are
data reliability and
unclear data ROI.

Cultivate "double vision" to drive ROI

> "The great objective of a data area, of a CDO, is to add value to the business. So, it's very important for a CDO to have 'double vision' that generates fruit for both sides—technology and the business."
>
> **Rafael Lychowski**
> Head of Data & Analytics
> TIM Brasil

Generating value for the enterprise as a chief data officer is not an independent task.

1

It requires keeping a close eye on revenue-generating priorities and activities. Yet CDOs' primary focus is often the data function itself. Bridging the two requires what TIM Brazil's Rafael Lychowski calls "double vision."

Lychowski, who heads data and analytics for the Brazil-based telecommunications company, says this double-vision can be baked into an organization's core operations and metrics. "TIM divides KPIs into two groups, technical and business," Lychowski explains. "The technical KPIs focus on how many solutions are within the target architecture, if we're on time and within budget. The business KPIs show how we are generating value for the business and depend on each use case."

The result of this system, he says, is a constant and consistent re-prioritizing of choices, with an eye on ROI. "If I am talking about a product that aims at reducing cost, I must follow the cost reduction of that product on the business. If I'm talking about quality, I will track a net promoter score. For each analytical artifact—for each product that we deliver and monitor in production—we must have a business KPI that makes sense for that product and that we can follow up on."

Data literacy helps connect the dots to business value

You don't need to follow exactly this formula to develop a "double-vision" approach. But you do need to be intentional about it. A large consumer goods CDO says that when it comes to ROI, "I'm trying to stay away from areas where the return on investment has a lot of ambiguity around it. So, where we're focused is areas where we know that there is a major deficiency, either in our controls, common definitions of data, common processes that people are using and that it has a measurable impact on a business process or outcome. And then: how can I show a real straight line between we fix this, we improve this, and here's where it shows up in our P&L."

Double vision can often be challenging for CDOs who haven't yet defined meaningful metrics for how data brings value to the enterprise. Wim Stolk, almost 18 months into his tenure as the Data & AI Lead at the CDO Office of the Dutch central government, describes his journey: "Part of my task is to define KPIs that are smart, cover stakeholder wishes and requirements, meet legal obligations, provide the data quality level and data management required. We are working hard on setting up this KPI system, not yet focusing on the content parts." For now, Stolk says, the emphasis is on basics, "focusing heavily on data management functions, data quality, a data dictionary and data catalogue, a data framework perhaps, and data security and privacy. This will cascade into content priorities, to be realized in 2023 and 2024."

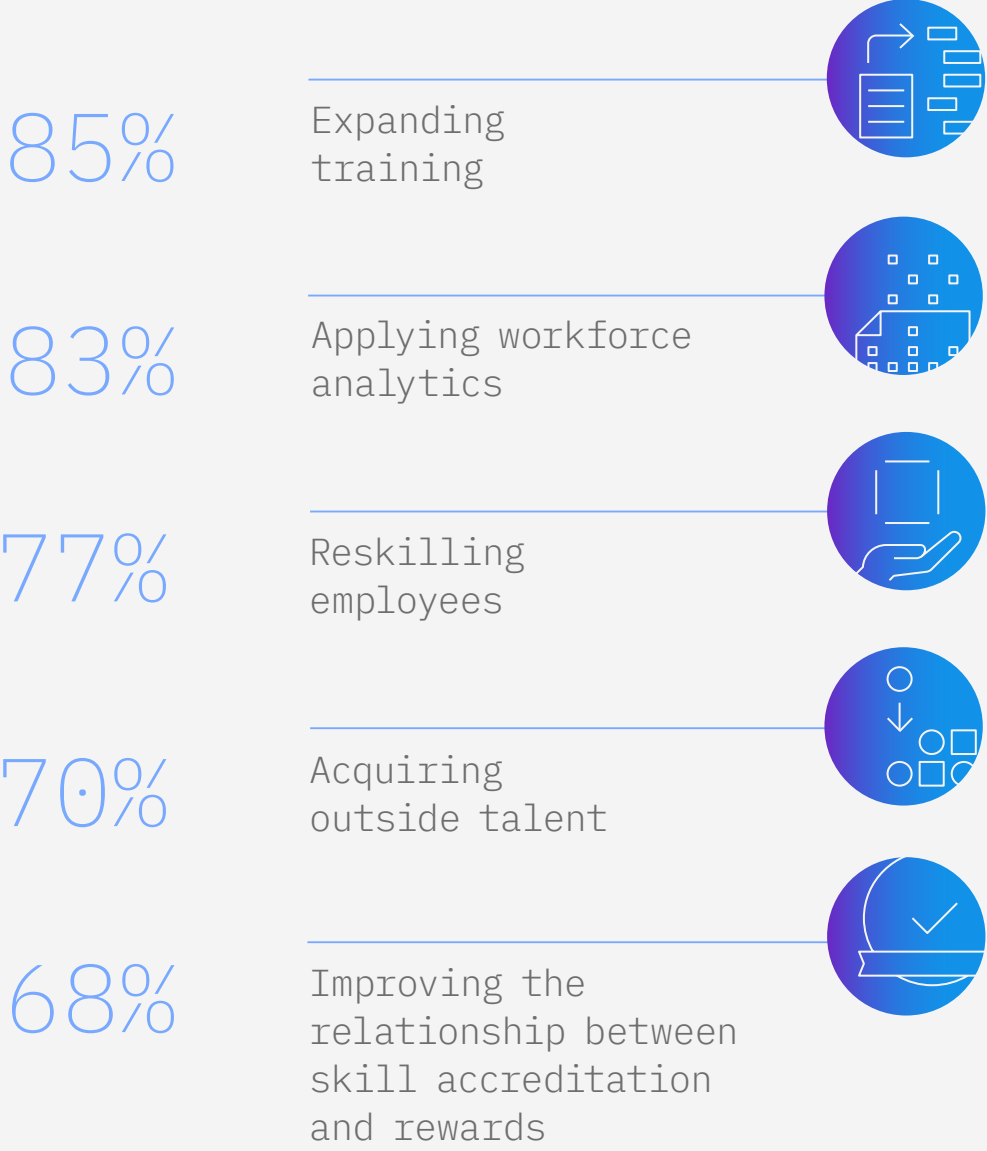Put another way, double vision takes time to develop. A key step—and a tool for accelerating progress highlighted by the Data Value Creators—is improving the organization's data literacy.

Achieving full value from data depends on data literacy within the organization. Value Creator CDOs recognize that data literacy must filter throughout not just leadership, but the entire workforce—and not just throughout technology divisions, but those on the business side as well. As a large consumer goods company CDO puts it: "You don't become a data-driven organization if data access, understanding and insights are contained within one team or one part of organization."

A key credibility component in the quest to build data literacy: providing top-notch data protection. Succeeding on this front helps the data organization foster necessary trust with business colleagues. In fact, in our study, Data Value Creators outperform their peers across the key areas of data protection, from data ethics to organizational transparency to cybersecurity.

TIM Brasil's Lychowski describes how his organization is helping business-side colleagues become more data literate: "Those 'big data' problems that no one can solve, our team must be able to solve and address them—but this does not prevent us from also having business areas work with the data. So we created a democratization strategy where the data and technology team is responsible for orchestrating our data lake but we provide sandboxes for the business areas. Here, they can work on their data, investigate their data, create their analysis visions, or even start working on AI machine learning models—all of this within a technology umbrella, respecting information security and best practices for cloud usage while using the right tools."

The Value Creator CDOs in our study cited `five key actions` they take to `increase and infuse data literacy` across their entire enterprise:

85%   Expanding training

83%   Applying workforce analytics

77%   Reskilling employees

70%   Acquiring outside talent

68%   Improving the relationship between skill accreditation and rewards

Johnson & Johnson makes it personal

Organizations can build data literacy by connecting business priorities at the executive stakeholder level and mapping it across stakeholder domains. Jim Swanson, the Chief Information Officer at Johnson & Johnson, explains how his team is helping to educate colleagues on leveraging advanced and emerging technologies, including AI. "In partnership with IBM, we created an AI-driven skills inference model that married de-identified external data with skills data from our internal data sets," says Swanson. "We were able to take the data on employee skills that resides in tools that my IT organization uses and feed it to the model. The AI was then able to determine everyone's maturity level in each of the skills that we wanted to highlight, creating a comprehensive view of individual strengths and weaknesses."[4]

Data talent isn't yet as abundant as any CDO would hope; in many sectors, it's scarce and the competition for it is fierce. The emphasis on expanding training and reskilling for all employees not only helps combat this shortage, it also deals with the massive workforce changes brought about by digital, AI, and other technologies, as repetitive tasks are taken over by intelligent machines.

Data literacy skills not only help create a self-service data culture, they help C-suites redeploy workers to more complex, valuable roles and responsibilities. In the process, data literacy helps connect business goals with tech and data initiatives. Value Creator CDOs recognize that seeding modern digital expertise throughout the enterprise enables a speedier, more transparent transition to value creation.

"Until now, systems, infrastructure, and networks have been perceived as support tools for efficiently running a business, but now we recognize that the data flowing through these systems has value. This is the change."

Munenobu Hashizume
Managing Executive Officer, Hitachi Zosen Corporation

Protecting data value from major threats

What not only inhibits but actually threatens the possibility of achieving optimal data value? Data Value Creator CDOs provided an answer by their strong emphasis on three areas: data ethics, organizational transparency and accountability, and cybersecurity.

A major breach of data ethics or cybercrime can negate months or years of hard work to achieve data value.

The global average total cost of a data breach[5] is:

$4.35 million.

In some industries, the average cost runs much higher; in healthcare[6], it's:

$10.10 million

It's no surprise, then, that roughly 8 out of 10 Data Value Creator CDOs say their organization outperforms in data ethics, organizational transparency and accountability, or cybersecurity.

Figure 3

Data Value Creator CDOs outperform in data protection

Data ethics
81% 61%

Organizational transparency and accountability
78% 58%

Cybersecurity
75% 62%

Data Value Creators   All others
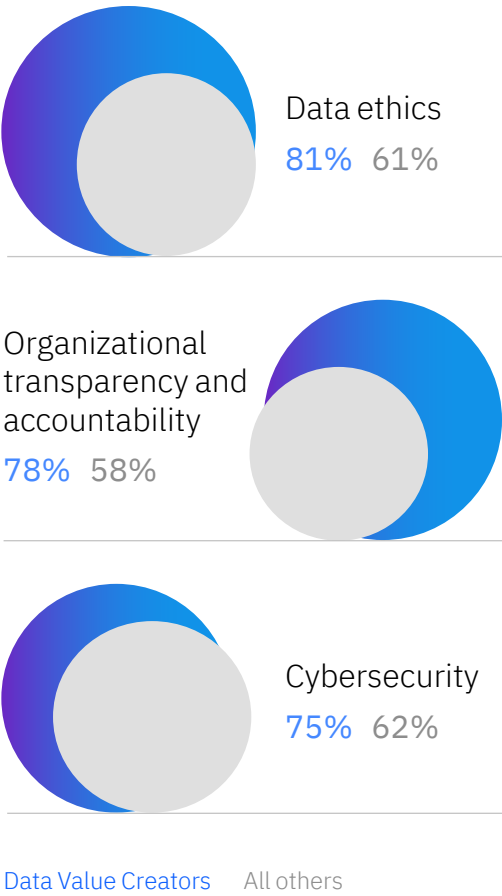
In their own words

Business value, data literacy, and storytelling

Zhaolong Ma
Chief Data Officer, SUNDA Group

"To a certain extent, pure technology is meaningless to enterprises. A company that uses technology for the sake of technology and data for the sake of data, which cannot be effectively transferred to business value, cannot survive."

Rodrigo Vasconcelos
Head Data and Analytics (CDAO), Banco do Brasil

"Today, our efforts are 70% focused on development—data science, analytic modeling, data engineering, etc.—and we are 30% focused on governance, processes, and quality monitoring. Our ambition is that in three to five years, we can swap these conditions and be able to prioritize focus on governance, curation, and advisory. The goal is to increase our functional analytic maturity and the data literacy involved in the business."

Peter Jackson
Chief Data and Product Officer, Outra (UK)
Chief Data and Analytics Officer, Carruthers and Jackson

"One of the greatest skills of people who are really good at data is their ability to tell stories."

How to take a
page out of the

Data Value Creator playbook

Calculate ROI early and often

Data investments without a clear up-front ROI are not investments—they're guesses.

- Whether ROI for data is expressed in time saved, self-service levels, lower costs to achieved goals, the number of problems tackled, or data issues evaded, ROI for data can be an enabler for 24% more revenue growth.*

- Define KPIs that can demonstrate to the business the importance of data, as well as how you are driving results and generating business value.

- Prioritize areas with deficiencies, whether in controls, common definitions of data, or common processes used.

- Draw a straight line on how improvements will reflect in P&L.

Create coherence

Align data and analytics strategy with business strategy.

- To get from data to value, you need to understand what drives the business, connecting your data and analytics strategy to business objectives.

- Create coherence by merging the various frameworks and guidelines that exist throughout departments.

- Get everyone involved and agreeing to the future data landscape.

- Create synergy by acting as an analytics mentor to the business, allocating the right sources, and investing in training.

- Deliver results side by side with business teams.

- Data Value Creators do this more often than peers; they are aligned with the business strategy in 63% of cases while all other CDOs are aligned in 48%.

Cultivate double vision to drive ROI

Use data to track and report performance in new ways

Take advantage of data visualization and dashboards to help drive advanced insights.

- Show how the organization aspires to increase data value. Data visualization and dashboards increase transparency showing progress toward goals.

- Ensure your reports come from a common repository, owned by the business. Chances are you have several data repositories in place with huge overlap. Reduce costs by consolidating your data.

- This is an area even Data Value Creator CDOs are still working on; 45% of them say their data investments enable them to track and report performance in new ways. But it's a worthwhile pursuit, as it is an enabler for 27% more expected revenue growth.*

Among Data Value Creators, we analyzed which enablers increased annual revenue growth or operating margin results for 2020-2022. For each enabler, we compared the group of Data Value Creators who indicated they applied an activity, versus the Data Value Creators who indicated they didn't, or had only somewhat implemented an enabler. We then calculated the relative differences in revenue growth or operating margin between both Data Value Creator groups.

Don't modernize on legacy business and data processes

Align data use cases with specific business strategies and innovate together with the business.

- Don't just focus on better tools, better cloud, better infrastructure, but also better processes.

- Existing legacy business and data processes are nothing but a representation of the business model that existed when you first built your data estate. It has changed.

- Modernize use cases to reflect today's real business needs and create true alignment to your business strategy. Doing so can enable 258% more revenue growth and 130% more operating margin.*

Empower teams with data literacy

Foster data literacy, allowing teams to make informed decisions based on data.

- At the same time, encourage business lines to take ownership of their data and let them lead the way on creation of data products.

- Emphasize that each individual in the organization has a data responsibility, but build a data infrastructure that allows its users to innovate without being inhibited by data compliance (because it's built into the infrastructure).

- Identify the segments of your data value chain where you need more progressive skill sets, invest in those, and plan for attrition and turnover in those areas.

- Data Value Creators with empowered teams drive 173% more revenue growth than those without empowered teams.*

Piggyback

Lesson

data investments off broader digital investments

"We are struggling to align our business and IT strategies."

Akiko Murakami
Chief Data Officer
Sompo Japan Insurance Inc.

CDOs are generally given a wide berth within their budget in terms of where to invest and what to emphasize within those areas. However, the majority of Data Value Creator CDOs opt to align their data management strategy with their company's larger digital transformation investments—and that choice enables enhanced impact.

Figure 4

Data Value Creator CDOs align data strategy with enterprise digital transformation

Data Value Creators

60%

Our data management strategy is explicitly aligned with our digital transformation

All others

52%
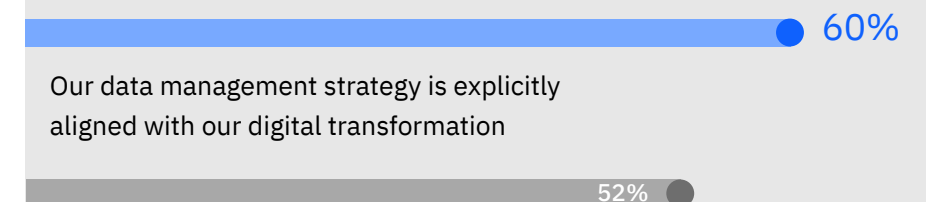
"If you talk to IT, they'll say the business owns the data. We don't do anything with it. And if you talk to the business, they'll say IT controls the data because we can't see it. We can't access it. And so, data's fallen into sort of this abyss where no one actually truly understands it. Because the business is restricted in what they see, and IT is restricted in what they understand of the business processes. There is a major gap in ownership and being able to truly leverage it to drive value."

CDO of a large consumer goods company

The clear lesson: Data strategy and digital strategy should be in lockstep. That sort of alignment is easy to say and hard to do. Akiko Murakami, CDO at Sompo Japan Insurance Inc., is frank about the challenges: "We are struggling to align our business and IT strategies . . . The business strategy has a vision of business transformation, and while adhering to the agency-centered business model, it is necessary to transform the way of doing business into a data-driven one. However, some IT systems impose constraints. There are limitations in the amount of data that can be obtained from the legacy systems, as well as limitations of time."

Friedman Wang, head of the Big Data R&D Center of CTBC Financial Holding Co., Ltd., agrees. Molding the data landscape through digital technologies that are transforming the entire enterprise is an essential step to get to value, says Wang:

"I think the field where the CDO can make a big difference in the future should be advanced data technology, such as through the combination of AI and data, to truly release the value of data."
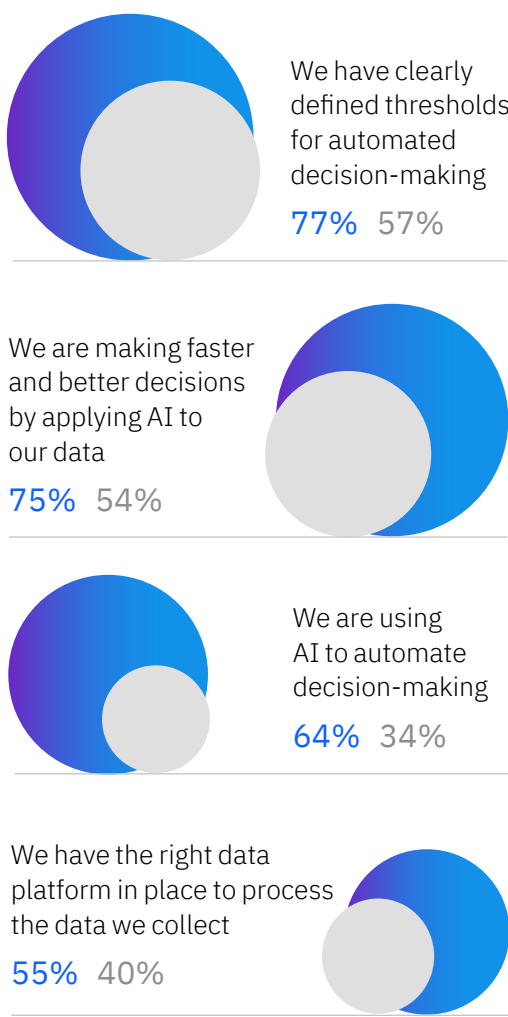
AI is best equipped for today's data deluge

CDOs we surveyed are particularly focused on investments in AI, with those in certain industries (government and education, communications, and banking and financial markets) particularly focused on automated decision-making.

Peter Jackson, Chief Data and Product Officer, Outra (UK), and Chief Data and Analytics Officer, Carruthers and Jackson, is nothing if not pragmatic on this topic: "If you're receiving five feeds of ESG data, how do you compare one carbon score to another? And how do you actually come out with a median or an average or a range of that carbon score to use with confidence in some investment model? That doesn't sit with a CTO, it doesn't sit with a strategy officer, it doesn't sit with an investment officer. It sits with somebody who's really good at data modeling and statistics."

AI-backed data insights can generate competitive advantage in many industries. The CDO of a large automotive distributor points to the relevance for the automotive industry: "I firmly believe that the next revolution is the data front." The flood of data from increasingly intelligent vehicles, makes the job as a CDO even more critical to the business and its growth. "We really do collect so much data that it's just a matter of prioritizing. Whoever is going to have the competitive advantage here in the automotive sector is who is going to get a better grip on the data sooner."

Figure 5

Data Value Creators use AI to their advantage more than peers

We have clearly defined thresholds for automated decision-making
77% 57%

We are making faster and better decisions by applying AI to our data
75% 54%

We are using AI to automate decision-making
64% 34%

We have the right data platform in place to process the data we collect
55% 40%

Data Value Creators   All others

Lufthansa

Enhancing customer experience through data and AI

Germany's largest airline, Deutsche Lufthansa AG, knew that with the right data and AI strategy, it could enhance the customer experience and better empower its employees while achieving operational excellence.[7] The rules and regulations for an airline that operates all over the world are infinitely complex—from baggage allowances for specific routes and status levels to visa requirements for passport holders from one country traveling to any other. No agent can know all the answers.

"For Lufthansa, AI is so critical because it actually opens up the world of the data that we're sitting on," explains Mirco Bharpalania, Senior Director of Cross Domain Solutions for the Lufthansa Group. "It actually helps us to unlock all the potential that we somehow or somewhere in our databases already have."

Lufthansa worked with IBM to enable previously disparate data sources to become searchable in natural language and aviation terms, positioning agents to more easily address close to 100,000 customer queries annually. IBM Watson® technology manages, searches, analyzes, and interprets the various relevant and connected data sources, such as Microsoft SharePoint and internal ticket systems.

Eliminating unrealistic AI expectations and understanding the business

Srinivasan Sankar
Enterprise Data and Analytics Leader
in the insurance industry

"A CDO needs to be skilled in data management, business knowledge, and technical knowledge in order to set appropriate expectations. Otherwise, you can have a CEO who sets expectations like 'everything on AI, machine learning, and automation within six months.' If you know the technology and the business, you know that's not possible from a data perspective or otherwise."

Peter Jackson
Chief Data and Product Officer, Outra (UK)
Chief Data and Analytics Officer, Carruthers and Jackson

"Do I want to understand every business process? No, because I don't have the bandwidth to do it. What I would like to do is understand the business processes that are critical to the business."

How to take a
page out of the

Data Value Creator playbook

Piggyback data investments off broader digital investments

Establish clearly defined thresholds for automated decision-making

Control the data and define the business policies that lie at the base of—and drive—(operational) decisions.

○ Provide insight and transparency into the algorithms that are used to process data.

○ Define an ethics framework within which to apply AI and algorithms.

○ Consider defining an algorithm policy framework, which defines when a calculation or set of rules is considered an algorithm, and how and when you are allowed to apply it.

○ Significantly more Data Value Creator CDOs have established clearly defined thresholds for automated decision-making than other CDOs—77% versus 57%.

Pursue new sources of value through data

Make data and analytics a central element of your innovation processes.

○ Establish data ownership: if you own the business process, then you own the data that comes out of that business process.

○ Reengineer legacy data repositories to align with modern business processes, using prescriptive models. This helps not only to shrink costs, but also to deliver new data perspectives.

Apply AI for better, faster decision-making

Use AI to augment human decisions and help to better understand the context and scenarios of business decisions.

○ Instead of relying on gut feeling to make decisions, use AI to infuse information-driven actions, based on data and prediction.

○ Intelligent automation can help streamline decision-making processes that support business productivity, quality, and compliancy.

○ At all times, ensure the human element by adding human control on top ("Does this prediction actually look right?").

○ Create diverse teams, with people from different backgrounds, to avoid unconscious bias in your solutions.

○ Three-quarters of Data Value Creator CDOs (75%) are applying AI to decision-making versus 54% of other CDOs.

Use a seamless, customer-centric approach

Work with partners to unlock and consolidate data and insights.

○ Provide consistent, available, and reliable data across customer channels to improve the customer relationship and experience.

○ Consolidate data across the various customer touchpoints to serve up richer experiences and better insights.

○ Ensure the strategic treatment and organization of your customer data is consistent across the organization.

Emphasize

business-model innovation as much as business protection

Lesson 3

No chief data officer wants to receive that late-night call about a data leak or find that a critical information resource has been corrupted. Protecting data resources is a primary—and daunting—responsibility, and no CDO can afford to take it lightly.

But for the Data Value Creators in our study, pursuing data protection is on roughly equal footing with pursuing business-model innovation. In fact, nearly 90% of our CDO Value Creators report that they are using their data investments to pursue new sources of value, fueling innovation within their organizations.

This is a critical distinction, though not a simple one. Even these leaders can struggle to balance the openness inherent in innovation with the protection necessary to keep data safe. But that challenge is not allowed to be an impediment. As Suzuki Motor Corporation's New Mobility Service Dept. Group Manager, Masayuki Yamamoto, puts it, "It is difficult to balance data protection while promoting innovation. I must build a data infra-structure that allows users to innovate without being bound by data compliance."

Figure 6

Investing in data yields new sources of business value

Data Value Creators

Our data investments give the capabilities needed to pursue new sources of value
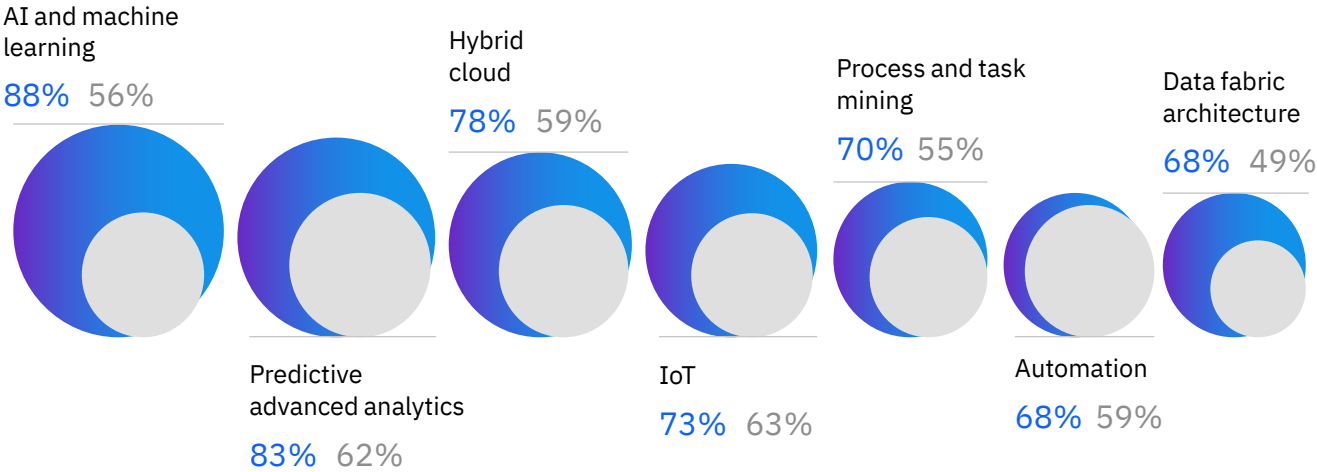
87%

All others

63%
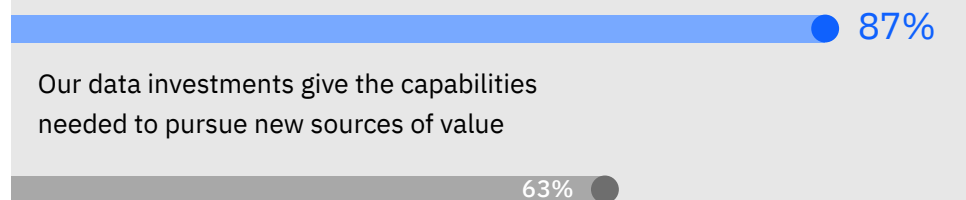
"Silo-busting" and the technologies that multiply innovation

So how does a CDO thread this needle? The Data Value Creators in our study emphasize that they need their varied technologies to work together. From data fabric to centralized architecture to interoperable linked data, Value Creator CDOs are investing in the methods and approaches that foster innovation and break down the silos that hinder it.

But silo-busting often requires subtle engagement with business units. When data ownership sits with the business side, these CDOs say, it often adds layers of complexity to safe and open sharing practices and technologies. One critical enabler is allowing appropriate access to historical data that can be updated. Such virtual data archiving—which calls to mind the days when reams of paper data were stored somewhere physically—is something the Dutch central government's Stolk calls "sustainable accessibility": "By sustainable accessibility, we mean it's findable, reusable, accessible, interpretable."
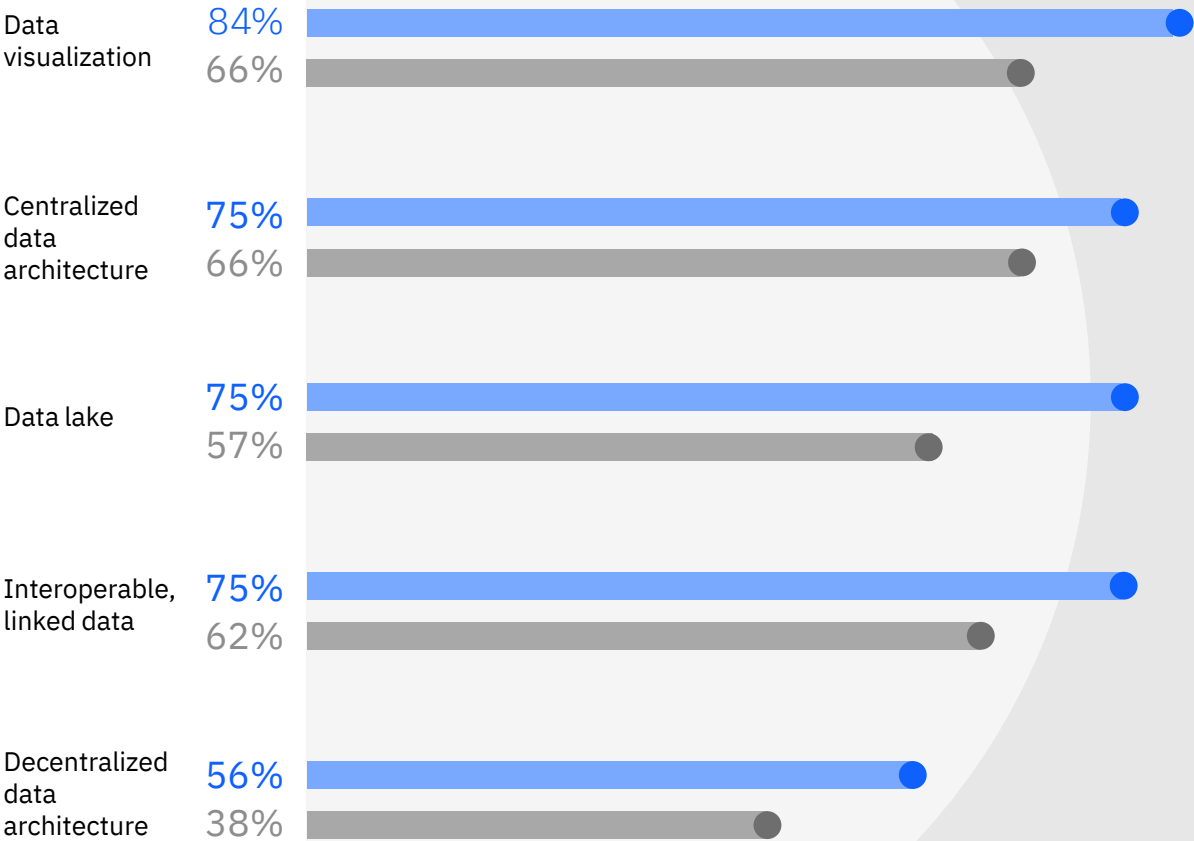
Figure 7

Data Value Creator CDOs make full use of innovative technologies

AI and machine learning
88% 56%

Predictive advanced analytics
83% 62%

Hybrid cloud
78% 59%

IoT
73% 63%

Process and task mining
70% 55%

Automation
68% 59%

Data fabric architecture
68% 49%

Data Value Creators   All others

Figure 8

Breaking down data silos so innovation can grow

Data visualization
84%
66%

Centralized data architecture
75%
66%

Data lake
75%
57%

Interoperable, linked data
75%
62%

Decentralized data architecture
56%
38%

Data Value Creators

All others

The many faces of data architecture

Business-model innovation often starts with data architecture choices.

Organizations vary widely in their approach, and many CDOs have strong opinions. The Data Value Creators in our study, they have increasingly moved away from reliance on a central data lake, recognizing that it can become a dumping ground for data that doesn't have a defined purpose. Data lakes are at risk of becoming "data swamps" when they lack the appropriate data quality and governance needed to provide insightful learnings.

But other data technologies can multiply innovation.

A data mesh—a decentralized data architecture that organizes data by a specific business domain—provides more ownership to the producers of a given data set, which enables a self-service data culture. Using a data mesh doesn't preclude traditional storage systems such as data lakes or data warehouses. It just means that their use has shifted from a single, centralized data platform to multiple decentralized data repositories. Some enterprises go a step further and add a data fabric to the mix because it can automate key parts of the data mesh. This helps organizations create data products faster, improve global governance, and orchestrate multiple data products.

Here's how Outra's Peter Jackson approached it.

"I realized I had six divisions globally who were never going to let me move their data, let alone customer data, into one data warehouse. I didn't want to do it anyway. I didn't want to build a data warehouse. And I took this concept of polyglot persistence. In other words, data sets will persist in many different places at the same time. It doesn't mean you don't have one version of the truth. It means that through data governance, you need to understand why each is a version of truth at the point in time in that division. And if you can do that, they are equally valid. And then when you want to join the data sets, you know how, and you can join them together in a data mesh. So, I think you'll find modern infrastructures that are driven by CDOs will be mesh and fabric."

The innovation that data mesh and data fabric can enable— by breaking down silos and promoting insights across previously unconnected data sets—is something that sophisticated CDOs are increasingly pursuing, in partnership with the business.

UK Ministry of Defence (MoD)

Delivering the right data to the right people at the right time

UK's Ministry of Defence (MoD) employs more than 190,000 people in the British Army, Royal Navy, Royal Air Force and Strategic Command, with 58,000 civilian personnel. The MoD operates a central shared services model for its business services such as finance, procurement, and human resources, delivered by its Defence Business Services (DBS) division.

The challenge

DBS is responsible for the end-to-end delivery of these services, including the underlying technology. Over the years, as DBS's remit expanded, it inherited many disparate IT systems and data sources from different agencies within the MoD. Managing this complexity was becoming a full-time job for the DBS team, and the maintenance burden made it difficult to deliver service improvements.

The solution

DBS launched a major, multiyear initiative to rationalize its systems landscape and drive new efficiencies. With support from IBM® Consulting and Deloitte, DBS aimed to transform three main areas of its IT: the enterprise applications supporting its contracting, purchasing and finance (CP&F) processes; the financial systems supporting planning, budgeting and forecasting (PB&F); and the databases and analytics tools that provide management information (MI) to users across the MoD.

Data played a large role across these areas. For example, several years ago, DBS replaced a business planning system that had reached end-of-life with a new platform based on IBM software that now includes the latest version of IBM® Planning Analytics software. The PB&F solution now supports both in-year management of the budget and forecasts for the current financial year and an annual budgeting cycle with a ten-year horizon for longer-term planning.

DBS provides access to a wide range of tools to help users at different levels of the organization interact with this data — from workflows to help department managers with budget data to powerful spreadsheet-integrated analysis tools for power users on the finance team.

In parallel, DBS has also created a centralized data warehouse for management information. This reduces the need for departments to maintain their own figures and helps ensure that decisions are made based on consistent, accurate information. The MoD has saved on IT management and maintenance, as well as reduced unplanned downtime.

The increase in stability means that DBS staff can spend less time fixing IT issues and more time enhancing existing services and developing new features.

Cloud-ready data architecture: More than checking the box

When asked for the most important characteristics of their data architecture, our hero group ranked security far above any other area. But, clocking in at second and third respectively were explainable comprehensive outputs and cloud readiness. Cloud plays a key role in enabling innovation—and although it gets less credit in this area than its "sexier" counterpart, AI, modern digital innovation can't happen without it. Suzuki Motor Corporation's Masayuki Yamamoto is keenly aware of the importance of cloud for data architecture: "Centralized and distributed data management and an optimal combination of on premises and cloud are important. Laws and regulations in each country are changing rapidly, so it is necessary to build a flexible infrastructure that can respond to these changes."

Figure 9

What matters most to Data Value Creators for data architecture?

Secure, transparent
81%

Explainable, comprehensive outputs
53%

Cloud-ready
51%
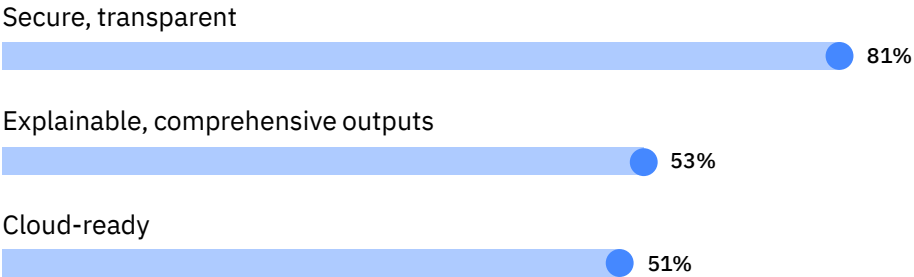
Protect data with quantum encryption

Quantum computing is evolving from the fantastical to the feasible. By decade's end, practical quantum computing solutions could impact computing strategies across industries.

What does this mean for business leaders? The quantum era will unfold over time, but the need for quantum-safe solutions is immediate. Business, technology, and security leaders face an urgent need to develop a quantum-safe strategy and roadmap now. In fact, both the historic and current complexity of cryptography migrations—even pre-quantum computing—can require several years of strategic planning, remediation, and transformation.

Bad actors could be positioning themselves to take advantage of next-generation code-breaking tools now. Attackers could be stealing large tranches of encrypted data that would be unreadable using contemporary tools, hoarding data from these breaches with the intent to decode it once better technology becomes available. Organizations may have already experienced breaches that they will not know about for many years, creating an uncertain security and liability environment.

IBM has played a key role in developing new quantum-safe standards because of our expertise in both cryptography and quantum computing and has been working to prepare clients and partners for the transition to quantum-safe cryptography.

Chief Data Officers should be well-versed in the value and urgency of quantum encryption. Upgrading the world's cybersecurity for the era of quantum computing is a new challenge that will take years, so it's crucial that anyone with critical data to secure begins working on this now.[8]

How to take a
page out of the

Data Value Creator playbook

Have the right data platform in place to process the data you collect

Implement a fit-for-purpose data architecture.

○ Determine the specific needs the business has for data, and implement a fit-for-purpose data architecture that supports these business goals.

○ Remove complexity from your data structure by introducing a data environment where the same data can be used for multiple use cases.

Manage compliancy with data legislations and standards

Define a data governance policy that guides compliancy.

○ Define a data governance policy that guides data quality, privacy, and security practices for the organization.

○ Implement modern business applications to accommodate the ever-evolving landscape of regulatory reporting.

○ Ensure compliancy and privacy are a shared responsibility between the CDO and the Chief Privacy Officer.

Emphasize business-model innovation as much as business protection

Protect and secure data to the max

Plan and prepare for quantum.

○ Balance data-driven working and risks.

○ Thread privacy and security through your entire data ecosystem.

○ Prepare for quantum with quantum-safe encryption.

Apply predictive advanced analytics

Implement an analytics model to predict outcomes.

○ Implement a model to predict outcomes, using:
— historical data and statistical modeling,
— data mining techniques,
— and machine learning.

○ Doing so is an enabler for 45% more operating margin.*

Deploy hybrid cloud

Create a common platform across all cloud environments.

○ Create a common platform that is consistent, scalable, and optimized for the organization and the partner ecosystem.

○ Embed intelligence capabilities, deploying analytical services in the cloud.

○ Use cloud to connect teams across functions, separate compute from storage, and bring flexibility and scalability into your enterprise information strategy.

○ Discover insights in real time in a hybrid environment.

Among Data Value Creators, we analyzed which enablers increased annual revenue growth or operating margin results for 2020-2022. For each enabler, we compared the group of Data Value Creators who indicated they applied an activity, versus the Data Value Creators who indicated they didn't, or had only somewhat implemented an enabler. We then calculated the relative differences in revenue growth or operating margin between both Data Value Creator groups.

Engage

wholly with ecosystem partners

4

Lesson

"I've found I need to embrace the chaos around me, rather than fight it. Technology is changing fast. I work with more and more external and internal partners each with their own standards; we acquire new companies. These are all external things I can't control. But I need to use it. Therefore I try not to worry about all the differences, but I do protect my data standards as this is where I can make strong headway amongst the chaos."

An energy company CDO

Sharing data, working with others—it can increase risks and make tasks harder.

But for the top-performing CDOs in our study, the effort is more than worth it. In fact, Data Value Creator CDOs have ecosystem partners that are 100% engaged in their data strategy, versus other CDOs, who report only about 65% engagement. Data Value Creators also engage customers in every aspect of their personal data.

Figure 10

Data Value Creator CDOs have ecosystems that are 100% engaged

Data Value Creators

All others

Partnership engagement today

100%

65%

Engagement does come with challenges. Roughly one in three of Value Creator CDOs say they are challenged by an overly complex partner ecosystem. The three largest barriers to effective ecosystem partnerships that they cite: data privacy and ethics; common standards; and transparency and visibility. Nonetheless, these leaders are finding ways to power through these hurdles to gain the greater value they know will outweigh issues encountered along the way.

"As government, we have more regulatory pressure than regular organizations," says Dutch central government's Stolk. But that has not deterred his group from pressing ahead. "Government regulatory principles: data shall be shared, and you shall not ask for the same information twice. This demands a different approach to your data architecture and data interoperability."

"As CDO, I do not own the content; I do not own the data. That ownership lies within the separate domains. But I have a role in the prioritization of tasks and activities, each adding to the strategic ambitions that have been defined."

Merle Zwiers
CDO, Dutch Ministry of Defense

Figure 11

CDOs cite top 3 barriers to effective ecosystems

Approach to data privacy and ethics

Common standards

Transparency and visibility
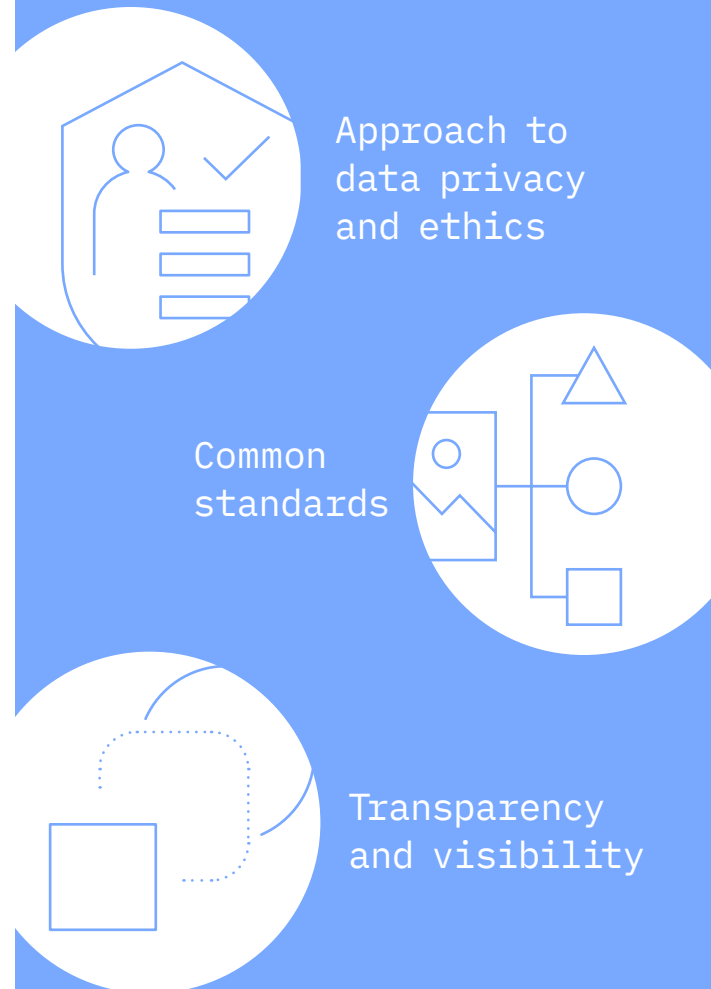
Ecosystems aren't just external

It's not just external ecosystems that can be complex. For the internal ecosystem, building collaboration is essential to yielding positive business results. Some 25% of Data Value Creators say they share strategic and operational data responsibilities with the Chief Customer Officer, for instance.

A global energy company CDO describes his situation: "If I want to go off and do something, I need the business to say 'yes'— that this is something they want to do in an ideal world. I've got groups I can call upon, like IT specialists in the data space who can then deliver it, but I need to marry those two up. I don't have my own IT delivery team nor my own budget to enable that to happen. So it's very much working in partnership with the business to sponsor a particular use case and idea—and equally then making sure that they have dedicated the budget to enable the data team to deliver it."

CDOs must act as one part businessperson, one part technologist, and one part diplomat as they strive to create business growth and innovation with data they don't own in areas they don't control. "Having more data doesn't always lead to improved solutions; instead, it results in more difficulties regarding the quality of the data. There are various obstacles we face regarding data sharing and how we can responsibly share data." says Lisel Engelbrecht, Data, Analytics & AI Officer, WomeninAI.

Given that Data Value Creators engage customers in every aspect of their personal data, internal partnerships with Chief Customer Officers and other leaders who "own" the customer must be navigated to be effective.

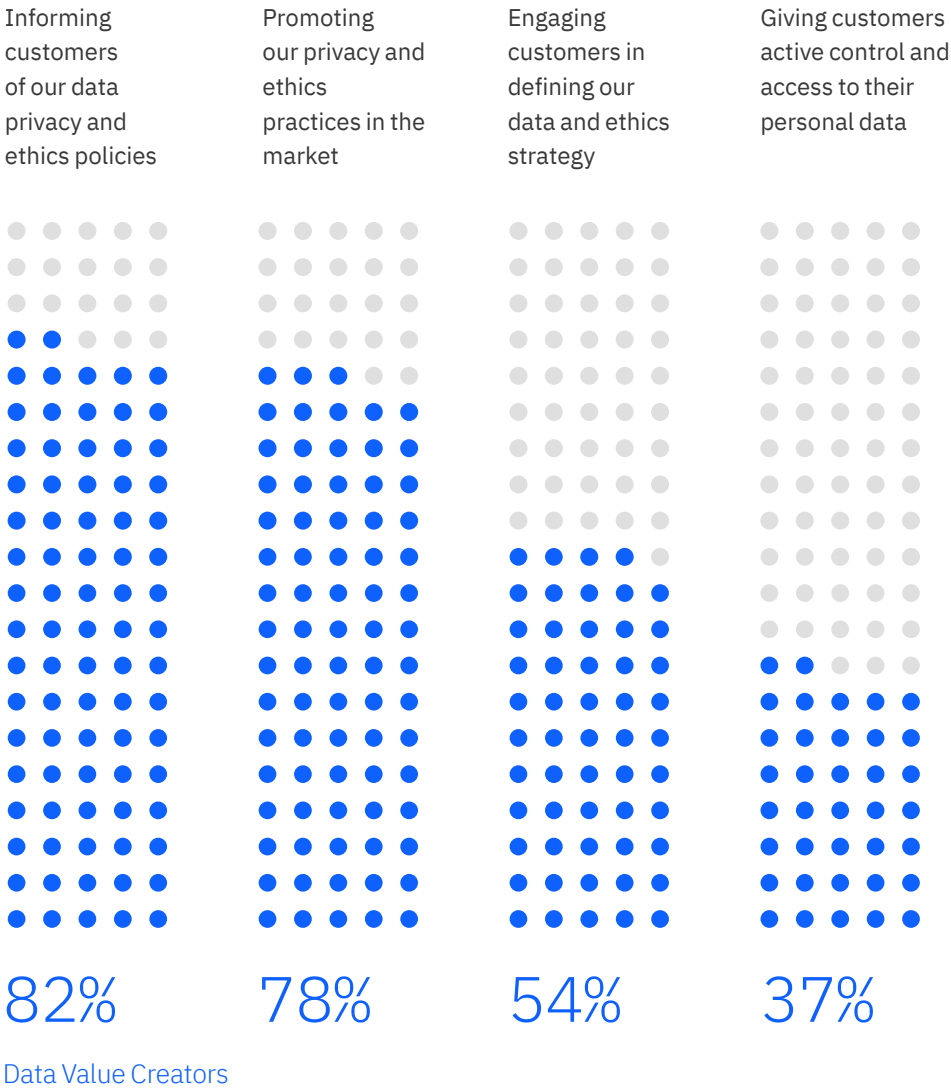# Don't neglect internal partner networks

Internal partner networks must be navigated with precision. Patricia van Tienen, Acting CDO at a government agency, explains how she is proceeding: "We work for eight, sometimes as many as 10, government agencies—all with different data responsibilities. We cannot just throw all the data together to generate insights. We have to guarantee full data responsibility to prevent misuse. We could link all data on a certain topic and could provide solid policy advice, but there are risks involved once data is linked. And that is quite complex."

"We started with setting up a cross-organization data strategy, in which we defined the use of data for social benefit and impact, in a reliable way. The second step we've taken is setting up a data policy. What are our starting points in being a reliable partner? We have set up that entire framework within our organization, have coordinated it throughout, and we are still implementing that."

The challenges in partnering persist for CDOs, demanding their vigilance and discipline. But the rewards drive Value Creators to shoulder the burden, a tradeoff well worth making. As Van Tienen puts it, "And at the same time, there is also a very practical basis for me: making sure that we can do it, making sure that we collect the data in such a way that we can share it, recognize it. That wasn't the case when I came in. We're using an integrated data model and are in the middle of that implementation."

Figure 12

CDOs increasingly navigate customers and their data proactively

Activities related to customer and citizen data

Informing customers of our data privacy and ethics policies	Promoting our privacy and ethics practices in the market	Engaging customers in defining our data and ethics strategy	Giving customers active control and access to their personal data
82%	78%	54%	37%

Data Value Creators

How to take a
page out of the

Data Value Creator playbook

Ensure interoperability with ecosystem partners

Identify the right ecosystem partners to jointly achieve value from data.

- Establish a long-term vision to establish the right connections with the right individuals, the right teams, the right partners.
- Interoperability refers to timely and secure access, compatibility, integration, and coexistence of data sources between business partners. Typically combine cloud data with open source acceleration.
- Together, create new business opportunities by connecting external and open data. Create a space for quick and scalable collaboration across the ecosystem, where different users with different objectives are using the same data repository.
- Separate internal data from external data, analyze fact-based information from your machines, facilities, and processes, and horizontally deploy that knowledge among industry partners.
- Interoperability is an enabler for 29% more revenue growth.*

Collaborate with transparency and visibility

Enable trusted, transparent, and efficient supplier collaboration.

- Enable supplier collaboration through digitizing and prioritizing data security and privacy.
- Connect with external partners to increase your knowledge base and use external experiences. You can learn a lot through conversations with other CDOs and translating it to your own organization. Embrace the opportunities to get more value and more data from other types of industries and environments, and from other types of data that can be explored.
- Always share data responsibly and handle data with trust. Proactively show the data lineage and how you control your security.
- Getting this area right is an enabler for 63% more revenue growth.*

Make use of your mutual critical talent and skills

Collaborate to improve data skills and close skills gaps.

- Leverage best practices and skills networks, where employees can learn from peers in different work and company environments.
- Exchange knowledge and ideas and learn from each other's practices.
- Pledge commitment, quickly pilot, and together explore next steps.
- Look across to improve value beyond just your industry.

Share cybersecurity threat intelligence

Shared work environments require a shared approach to external threats.

- This includes vulnerability assessments, phishing attempts, and even theft and malware practices.
- Thread security and privacy throughout your ecosystem.
- And make sure it's easily demonstrated.

Among Data Value Creators, we analyzed which enablers increased annual revenue growth or operating margin results for 2020-2022. For each enabler, we compared the group of Data Value Creators who indicated they applied an activity, versus the Data Value Creators who indicated they didn't, or had only somewhat implemented an enabler. We then calculated the relative differences in revenue growth or operating margin between both Data Value Creator groups.

Engage wholly with ecosystem partners

Agree on common standards

Agree on a common foundation and shared vision.

- Coordinate your data privacy and ethics policies, and use your information partnerships to create scaling opportunities.
- Ensure that data points used in a mutual environment are interpreted correctly and add value to the ecosystem value chain.
- And more importantly, make sure you know what's out there, and then be able to bring it back to what's relevant and required for your organization.

There is no one path from data to value.

But leading CDOs are leaving a trail of breadcrumbs.

No two CDO paths are alike. But the trailblazers who are forging a path from data to value provides valuable insights for all.

In this report, we've highlighted four key characteristics of Data Value Creators. Each comes with its own set of complexities but all appear to be paying off for these hero CDOs in terms of business value achieved. That business value is what gives them a continued remit, as well as a wide berth for innovation and achievement.

Despite the complexities inherent in the Chief Data Officer role, most of our respondents are energized and excited by the possibilities ahead.

"I think the opportunities with data are absolutely boundless. I don't think we've even really scratched the surface yet. I wake up every morning thinking I am the luckiest man in the world to actually be in this career at this point in time. It's just an absolute dream."

Peter Jackson, Chief Data and Product Officer, Outra (UK), and Chief Data and Analytics Officer, Carruthers and Jackson

"Are you willing to try something different from what you've done for the last 20 or 30 years? This doesn't have to be a $3 million or $10 million massive project. Give me $50K and I'll do something small. I'm going to prove it and I'm going to show you and we'll grow incrementally from there."

CDO of a large consumer goods company

That excitement and ambition, blended with the phenomenal advances in exponential technologies such as cloud, AI, and quantum computing, should make the next chapter of CDO progress a compelling one. Twenty years from now, the CDO will likely still be evolving and growing, their contributions to business results richer than ever. With today's slow-and-steady-wins-the-race approach, CDOs are generating massive changes in the way businesses and governments run, enabling new waves of progress and achievement. CDO Value Creators are leading the way to this future, taking risks when necessary, standing firm when needed.

That's a breadcrumb trail worth following.

Global distribution

North America
13%

Europe
28%

Greater China
9%

Japan
6%

Latin America
12%

Middle East and Africa
11%

Asia Pacific
21%
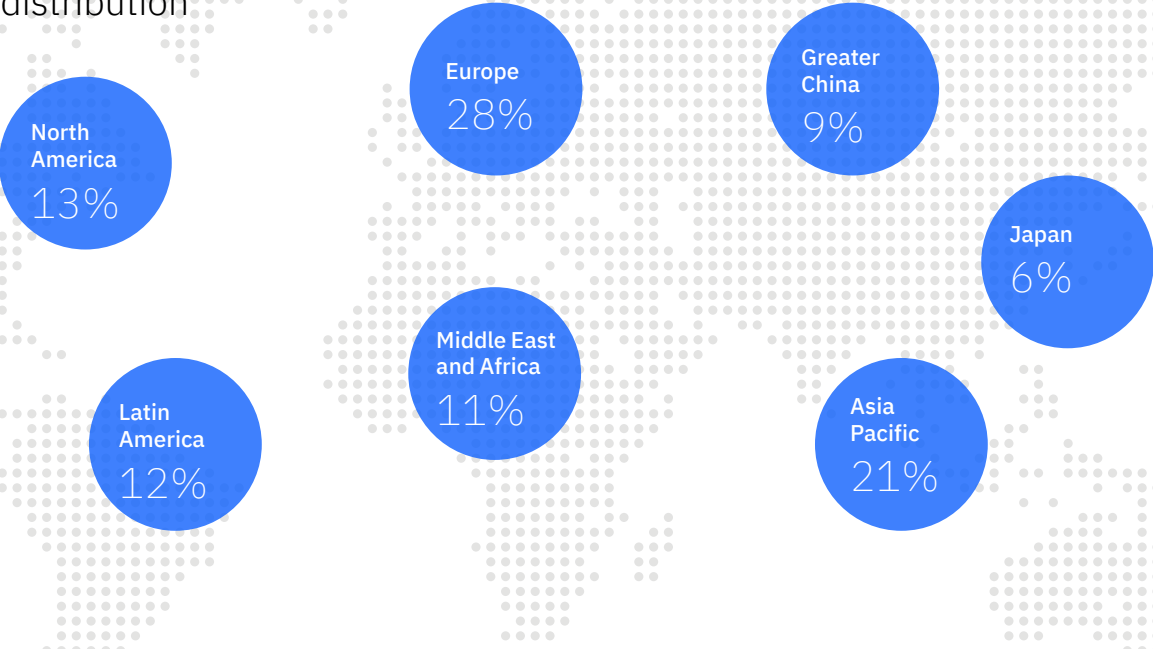
IBM Institute for Business Value

For two decades, the IBM Institute for Business Value has served as the thought leadership think tank for IBM. What inspires us is producing research-backed, technology-informed strategic insights that help leaders make smarter business decisions.

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The right partner for a changing world

At IBM, we collaborate with our clients, bringing together business insight, advanced research, and technology to give them a distinct advantage in today's rapidly changing environment.

Notes and sources

1   Zetlin, Minda, and Thor Olavsrud. "What is a chief data officer? A leader who creates business value from data." CIO. March 31, 2022. https://www.cio.com/article/230880/what-is-a-chief-data-officer.html

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3   "Cost of a Data Breach Report 2022." IBM Security and the Ponemon Institute. July 2022. https://www.ibm.com/reports/data-breach

4   "Building a future-ready workforce with data and AI: How Johnson & Johnson Technology is transforming its talent strategy." IBM Consulting blog. October 1, 2021. https://www.ibm.com/blogs/services/2021/10/01/building-a-future-ready-workforce-with-data-and-ai/

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8   Harishankar, Ray, Dr. Sridhar Muppidi, Michael Osborne, Dr. Walid Rjaibi, Dr. Joachin Schaefer. "Security in the quantum computing era: The risk is real, the need is now." IBM Institute for Business Value. January 2022. https://www.ibm.com/thought-leadership/institute-business-value/en-us/report/quantum-safe-encryption

17YO5AJV-USEN-01

3 Styles of Data Governance

Peter Aiken, Ph.D.

- I've been doing this a long time
- My work is recognized as useful
- Associate Professor of IS (vcu.edu)
- Institute for Defense Analyses (ida.org)
- DAMA International (dama.org)
- MIT CDO Society (iscdo.org)
- Anything Awesome (anythingawesome.com)
- Experienced w/ 500+ data management practices worldwide
- 12 books and dozens of articles
- Multi-year immersions
  - US DoD (DISA/Army/Marines/DLA)
  - Nokia
  - Deutsche Bank
  - Wells Fargo
  - Walmart
  - HUD …

$1,500,000,000.00 USD

Program Overview

- Data, Data Governance, & Data Leadership
  - Uneven understanding
  - Has lead fractured views of data/data leadership/data governance
  - Requiring forced choices among data governance styles
- Commonalities
  - This is a young profession and must demonstrate
  - Direct support for organizational strategy by
  - Decreasing organizational data debt and
  - Improving data and its use in the short and long term
- Compliance
  - Tangible costs
  - Increasing regulations/examples
  - Need for programatic solutions
- Operational
  - Proactive versus reactive governance
  - How to measure anything (enough)
  - Examples
- Strategic
  - Must be de-coupled from IT strategy
  - Digitization-digital and data are dependent on high speed automation/data processing
  - A specific focus on AI/Data Ethics
- Take Aways/References/Q&A

Ismael Caballero
Mario Piattini *Editors*

Data Governance

From the Fundamentals to Real Cases

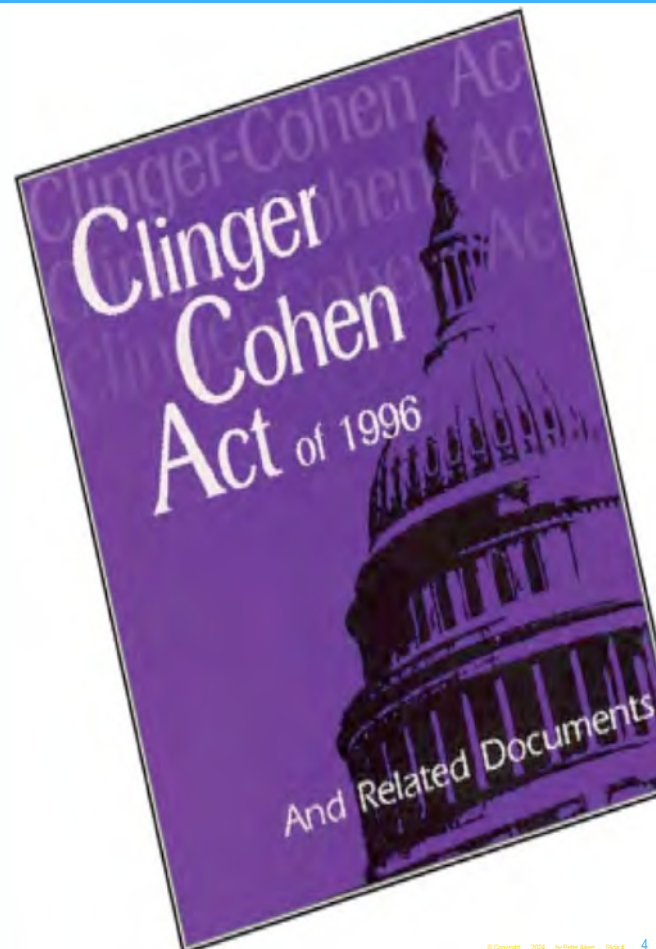Springer

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Clinger-Cohen Act 1996

- **"Most significant IT reform of the last decade"**

- Establish Agency CIOs

- Responsible for

  - "developing, maintaining, and facilitating the implementation of a sound and integrated information technology architecture"

- Requires CIO assessment before "Milestone Decisions"

Clinger Cohen Act of 1996

And Related Documents

FEPA/OPEN Government Data Act 2019
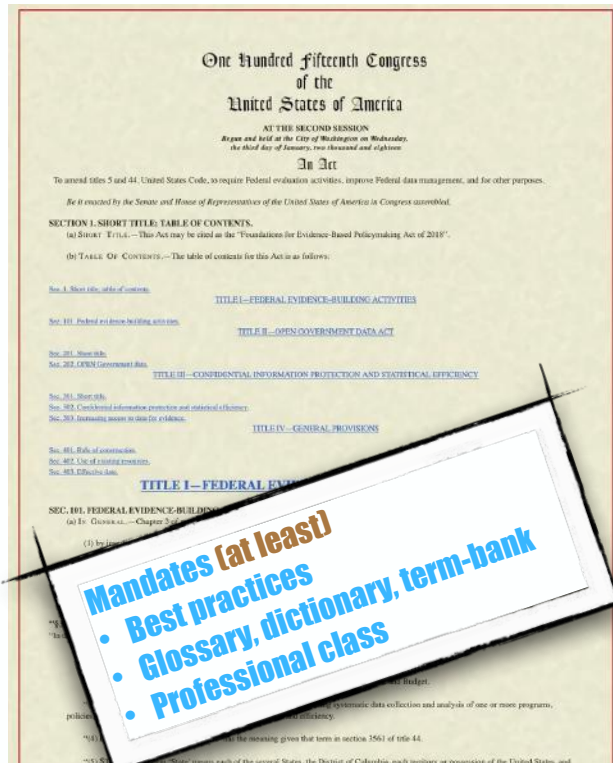
- **F**oundations for **E**vidence-Based **P**olicymaking (FEBP) **A**ct (H.R._4174,_S._2046)

- Title II, which includes the Open, Public, Electronic, and Necessary (OPEN) Government Data Act

  – Use of open data and open models required in policy evolution

  – All federal data is open by default

  – Non-political CDOs are required

  – Penalties are higher than HIPPA

https://www.congress.gov/bill/115th-congress/house-bill/4174/text

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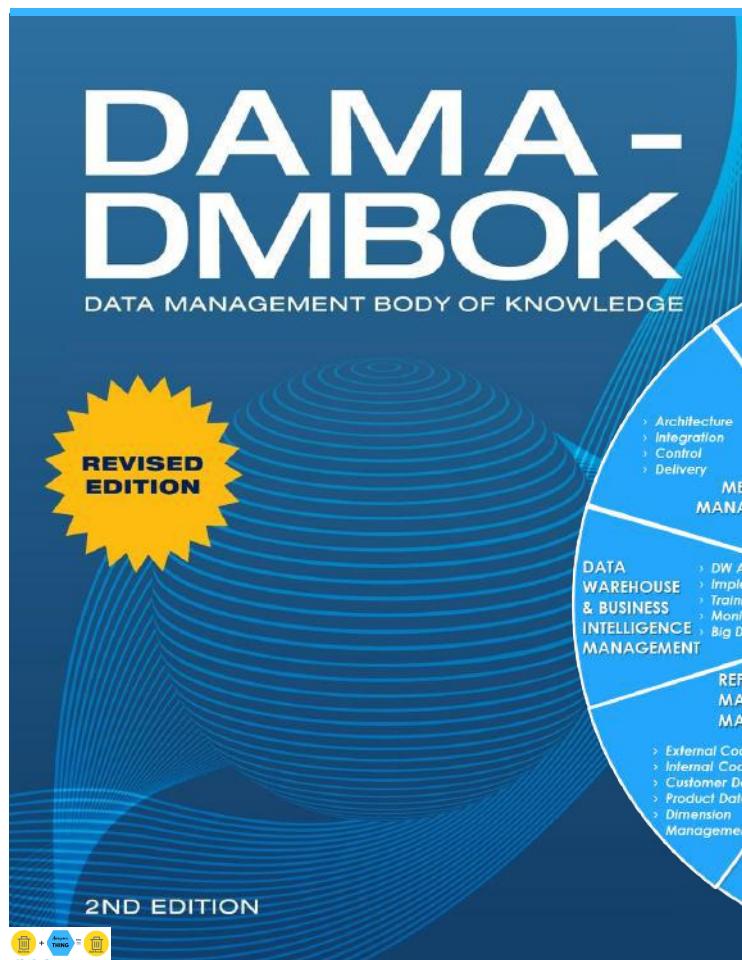
Data Management Practice Areas

A model precisely defining 3 important concepts

Data

"You can have data without information, but you cannot have information without data"

Data

Data

Intelligence

Wisdom & knowledge are often used synonymously

Information

Strategic Use

Useful Data

Request

Fact

Meaning

This model is a most basic form of metadata
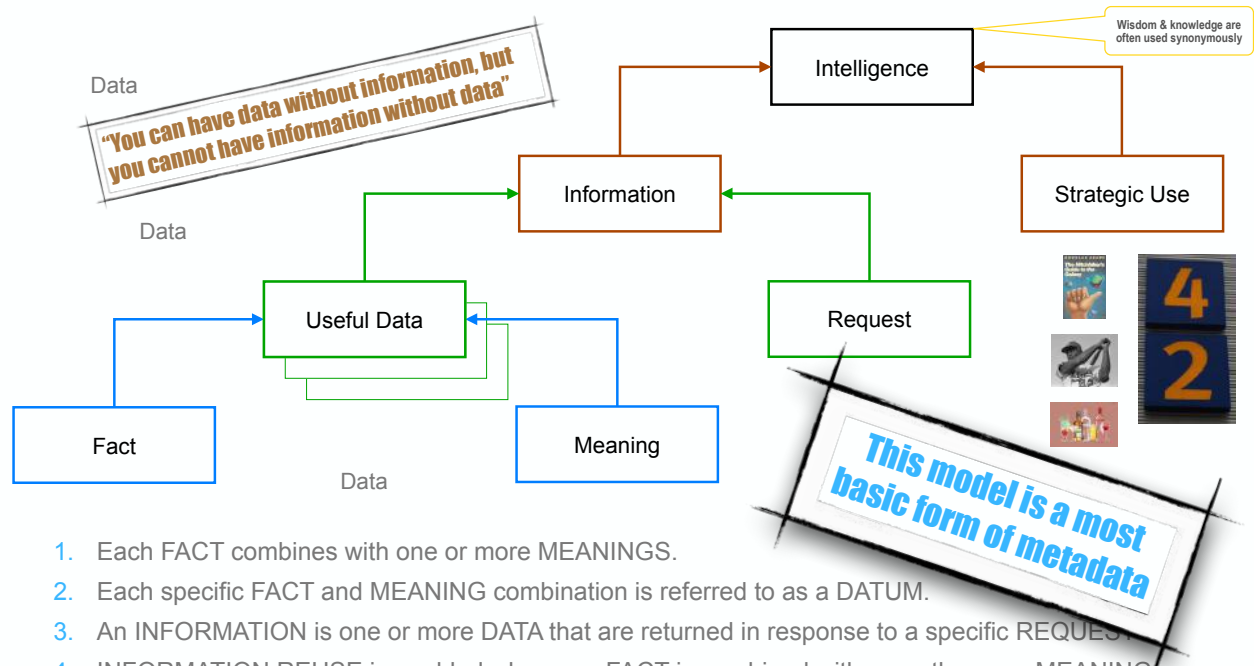
1. Each FACT combines with one or more MEANINGS.
2. Each specific FACT and MEANING combination is referred to as a DATUM.
3. An INFORMATION is one or more DATA that are returned in response to a specific REQUEST.
4. INFORMATION REUSE is enabled when one FACT is combined with more than one MEANING.
5. INTELLIGENCE is INFORMATION associated with its STRATEGIC USES.
6. DATA/INFORMATION must formally arranged into an ARCHITECTURE.

[Built on definitions from Dan Appleton. 1983]

Data is not broadly or widely understood

It is like a **warehouse**!

It is like a **dashboard**!

It is like a **story**!

It is just **pipes**!

It is like **statistics**!

Blind Persons and the Elephant

adapted from: http://www.dailymirror.lk/print/opinion/editorial-we-need-to-become-channels-of-peace/172-27164
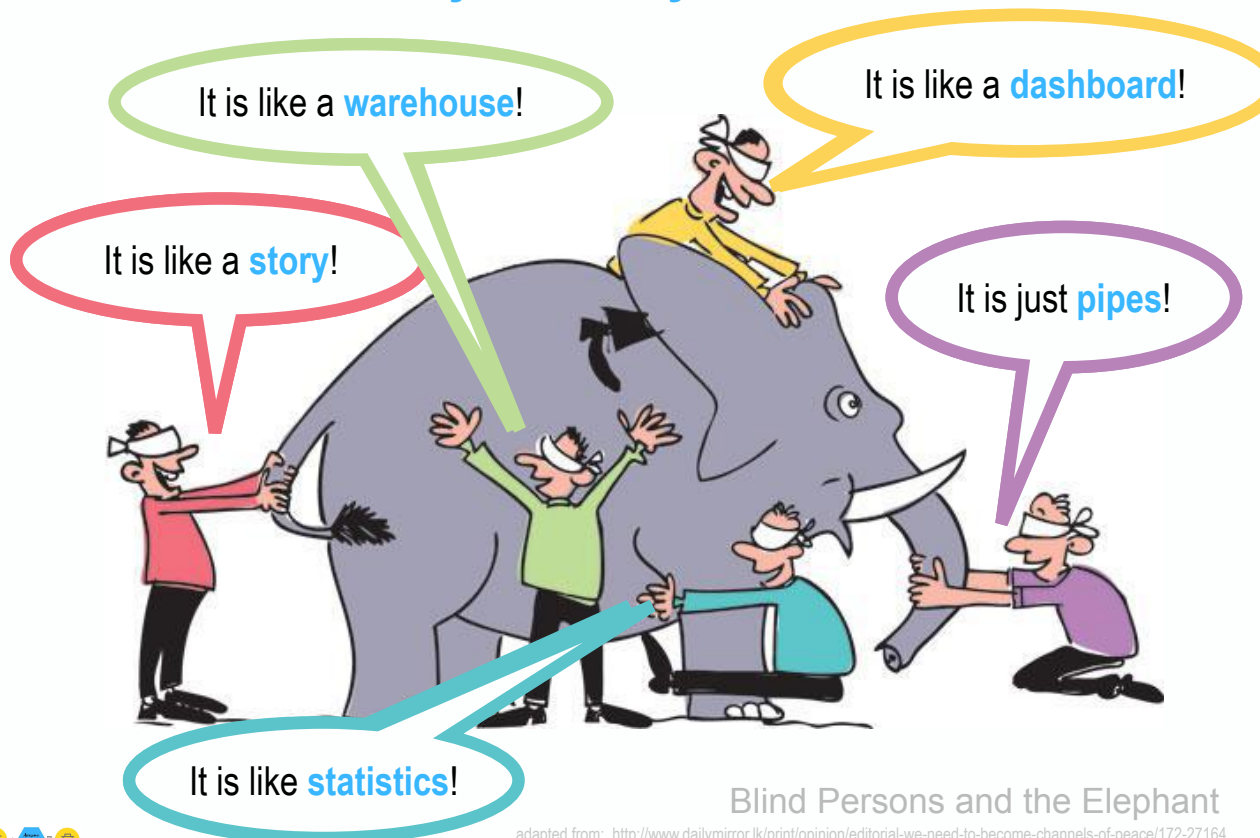
What do we teach knowledge workers about data?

(NOTHING)

What percentage of the deal with it daily?

100%

What do we teach IT professionals about data?

- 1 course
  - How to build a new database

- What impressions do IT professionals get from this education?
  - Data is a technical skill that is needed when developing **new** databases

dbForge Studio for MySQL - Start Page

File Edit View Database Debug Tools Window Help

New	►
Open File...	Ctrl+O
Close Document	Ctrl+F4
Open Project...	Ctrl+Shift+O
Close Project	
Save	Ctrl+S
Save Selected Item As...	
Save All	Ctrl+Shift+S
Print...	Ctrl+P
Recent Files	►
Recent Projects	►
Exit	

SQL
Query
Database Diagram
Data Report...
Blank Data Report
Pivot Table
Project...   Ctrl+Sh
Blank Project
File...

Create Datab
Create New S
Manage secu
Backup datab

As a topic, Data has confounding characteristics
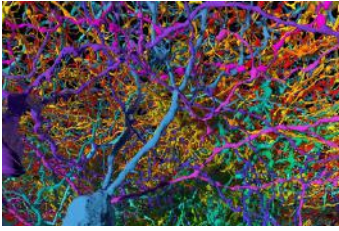
- **Complex & detailed**
  - Outsiders do not want to hear about or discuss any aspects of challenges/solutions
  - Most are unqualified
  - Especially re: architecture/engineering
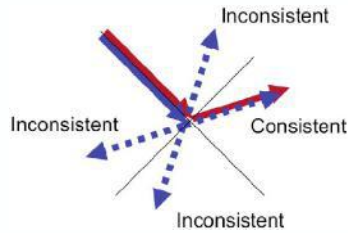
- **Taught inconsistently**
  - Focus is on technology
  - Business impact is not addressed

- **Not well understood**
  - Lack of standards/poor literacy/unknown dependencies
  - (Re)learned by every workgroup

Wally Easton Playing Piano
https://www.youtube.com/watch?v=NNbPxSvII-Q

Wally Easton Playing Piano

At **what** do we want our organizations to be good?

Confusion as to data responsibility

- IT thinks data is a business problem
    - *"If they can connect to the server, then my job is done!"*
- The business thinks IT is managing data adequately
    - *"Who else would be taking care of it?"*
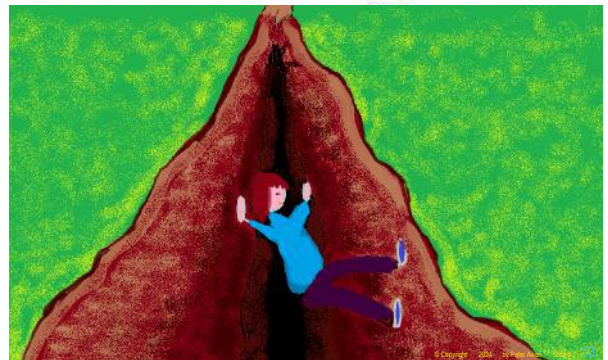
Bad Data Decisions Spiral

NEWS FLASH!

46% of companies report they made an inaccurate business decision based on bad or outdated data. Bad data leads to bad business decisions. Companies need to be careful that their data is sound – especially when dealing with investors.

Like Comment Share

46%

Bad Data Decisions Spiral

```
┌──────────────────────┬──────────────────────┐
│                      │                      │
▼                      ▼                      │
Business decision      Technical decision     │
makers are not data    makers are not data    │
knowledgable           knowledgable           │
    │                      │                  │
    └──────────┬───────────┘                  │
               ▼                              │
        Bad data decisions                    │
               │                              │
    ┌──────────┴───────────┐                  │
    ▼                      ▼                  │
Poor treatment         Poor                   │
of organizational      quality                │
data assets            data                   │
    │                      │                  │
    └──────────┬───────────┘                  │
               ▼                              │
   Poor organizational outcomes ──────────────┘
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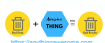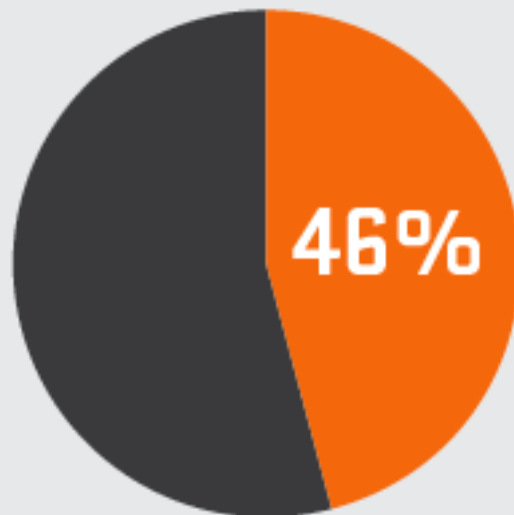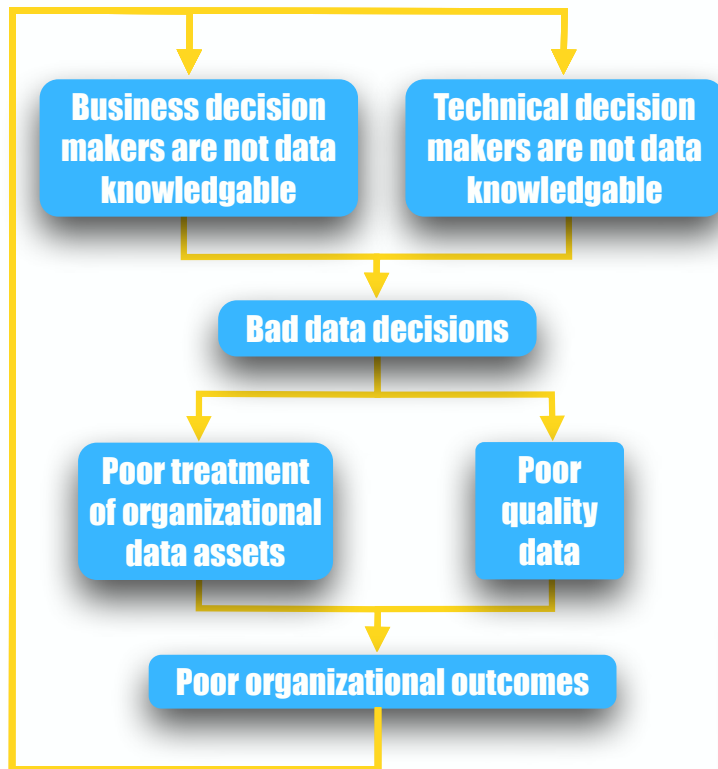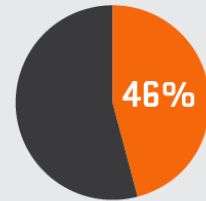
NEWS FLASH!

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Like Comment Share

46%

THIS IS WRONG

https://anythingawesome.com

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Forbes

American Airlines   **UNITED AIRLINES**

- $6b market value
- $30b AAdvantage

- $9b market value
- $22b MileagePlus

EDITORS' PICK | Jul 15, 2020, 09:00am EDT

How Airlines Make Billions From Monetizing Frequent Flyer Programs

Forbes Advisor

JT Genter Advisor Contributor
Advisor Contributor Group ⓘ
Personal Finance

How to unlock $24b and $13b in data value?

https://anythingawesome.com

https://www.forbes.com/sites/advisor/2020/07/15/how-airlines-make-billions-from-monetizing-frequent-flyer-programs/?sh=66da87a614e9

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Senior data leadership

- Someone is
- Frustration
- Uncertain next steps

CDO Job Description

There are more Chief Digital Officers than there are Chief Data Officers

Reporting to senior leadership, the CDO is the data leader responsible for evolving data practices to better support the organizational mission.
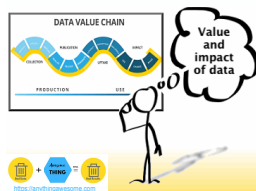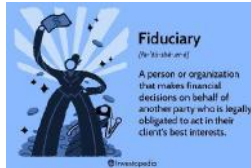
Improving organizational data practices extends the CDO's responsibilities to every knowledge worker in the organization. Empowering knowledge workers with better data practices is the single most important productivity improvement that organizations can make. The CDO is responsible for growing not just an organizational data team but for operationalizing an organization-wide conversation and focus on data innovation, improvement, and value.

The CDO establishes, fiduciary responsibilities through stewardship, aimed at leveraging data assets and organizational capabilities and creating a climate of data sharing. Some of this can be accomplished by leading the organizational data governance program to effectiveness. The data leader will be required to understand how to appropriately incorporate change management capabilities to the substantive people, process, and ethical challenges that will support the new data focus.

As an organization's sole, non-depletable, non-degrading, non-rivalrous strategic asset, its data has likely been suffering from data debt. The CDO must nurture programs to improve useful subsets of organizational data and simultaneously reduce the impact of data debt. Data volume and debt necessitate prioritization and the CDO must incorporate a strategic approach to improving the value of an organization's data.

For data's true value to become apparent, it needs to be understood as a defined part of the organizational value chain. The CDO is responsible for appropriate aspects of monetization to the organizations data. This requires architecting organizational data requirements in the context of present and future business operations. These requirements identify data products directly supporting business value.

CDO Job Description

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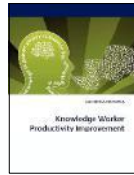
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Credit: Image credit: Matt Vickers

The Enterprise Data Executive Takes One for the Team

Top Data Job

```
                        ┌──────────────┐
                        │   Top Job    │
                        └──────┬───────┘
        ┌──────────┬──────────┼──────────┬──────────┐
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   │   IT   │ │Operations│ │  Data  │ │Finance │ │Marketing│
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                          ┌───┴──────────────────────┐
                          │ Data Governance Organization │
                          └──────────────────────────┘
```

- Dedicated solely to data asset leveraging

- Unconstrained by an IT project mindset

- Reporting to the business

Current approaches are not and have not been working

What We Learned From Top Execs About Their Big Data And AI Initiatives

Randy Bean Contributor
CIO Network Contributor Group ⓘ
Enterprise & Cloud

Culture still eats strategy for breakfast

This aphorism is attributed to legendary management consultant Peter Drucker, and it certainly appears to hold true for data transformation efforts. Leading companies continue to identify culture – people, process, organization, change management – as the biggest impediment to becoming data-driven organizations – 92.2%. Few companies – only 30.0% – have even developed a well-articulated data strategy that culture could eat for breakfast. There is plenty of work to be done.
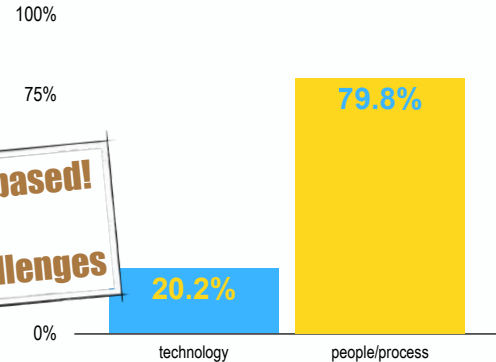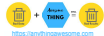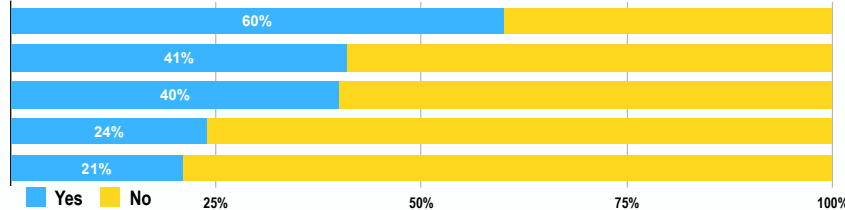
80% of data challenges are people/process based!
&
DG is the only resource to address these challenges

Bar chart:
- technology: 20.2%
- people/process: 79.8%

2023

Category	Yes
Driving Innovation with Data	60%
Competing on data and analytics	41%
Managing data as a business asset	40%
Created a data-driven organization	24%
Forged a data culture	21%

■ Yes ■ No

Source: Big Data and AI Executive Survey by Randy Bean and Thomas Davenport: www.newvantage.com

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Corporate Governance

- "Corporate governance - which can be defined narrowly as the relationship of a company to its shareholders or, more broadly, as its relationship to society….",
  Financial Times, 1997.

- "Corporate governance is about promoting corporate fairness, transparency and accountability"
  James Wolfensohn, World Bank,
  President Financial Times, June 1999.

- "Corporate governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment",
  The Journal of Finance, Shleifer and Vishny, 1997.
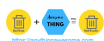
26

IT Governance

- "Putting structure around how organizations align IT strategy with business strategy, ensuring that companies stay on track to achieve their strategies and goals, and implementing good ways to measure IT's performance.

- It makes sure that all stakeholders' interests are taken into account and that processes provide measurable results.

- Framework should answer some key questions, such as how the IT department is functioning overall, what key metrics management needs and what return IT is giving back to the business from the investment it's making." CIO Magazine (May 2007)

- IT Governance Institute, 5 foci:
    – Strategic Alignment
    – Value Delivery
    – Resource Management
    – Risk Management
    – Performance Measures

---

7 Data Governance Definitions

- The formal orchestration of people, process, and technology to enable an organization to leverage data as an enterprise asset – **The MDM Institute**

- A convergence of data quality, data management, business process management, and risk management surrounding the handling of data in an organization – **Wikipedia**

- A system of decision rights and accountabilities for information-related processes, executed according to agreed-upon models which describe who can take what actions with what information, and when, under what circumstances, using what methods – **Data Governance Institute**

- The execution and enforcement of authority over the management of data assets and the performance of data functions – **KiK Consulting**

- A quality control discipline for assessing, managing, using, improving, monitoring, maintaining, and protecting organizational information – **IBM Data Governance Council**

- Data governance is the formulation of policy to optimize, secure, and leverage information as an enterprise asset by aligning the objectives of multiple functions – **Sunil Soares**

- The exercise of authority and control over the management of data assets – **DM BoK**

Elevator Pitch

An **elevator pitch**, **elevator speech**, or **elevator statement** is a short description of an idea, product, or company that explains the concept in a way such that any listener can understand it in a short period of time. (Wikipedia)

What is Data Governance?

Managing Data with Guidance

Go Ask Anyone!™

Would you want your sole, non-depletable, non-degrading, durable, strategic asset managed without guidance?

30

Data Governance is
Managing Data Decisions with Guidance

Go Ask Anyone!™

Would you want your sole, non-depletable, non-degrading, durable, strategic asset managed <u>without</u> guidance?

There is No Uniform Reporting Structure for CDOs

- 1,065 in US Federal Government as of 2020
  - Chief Data Officer (35%)
  - Director of Data Management (24%)

In 2022, 9% of CDOs sat on their board
In 2023, 17% of CDOs sat on their board

Role	% of CDOs
Chief Information Officer	25%
Chief Technology Officer	18%
Chief Digital Officer	14%
Chief Executive Officer	7%
Chief Financial Officer	7%
Chief Operating Officer	7%
Other CxO role	11%
Other senior management role	11%
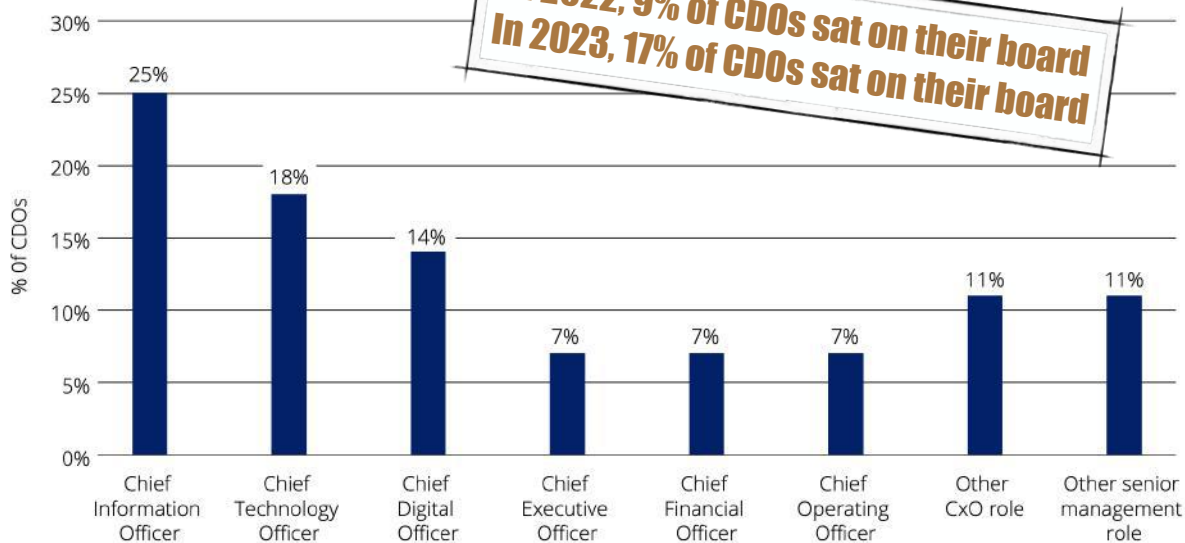
- Time in job and with organization exceeds 10 years for the majority

Deloitte CDO Survey
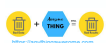
Three Key Factors

Vision
A CDO's clarity of purpose, exemplified by clear vision and goals (i.e., a 'data strategy' aligned to the business strategy).

Control
A CDO's ability to control their domain (i.e., the data function, but also use of data within the wider organisation).

Influence
A CDO's ability to influence and enable others to set data firmly on the agenda for wider teams and functions.

CDO success

Deloitte CDO Survey

8%

of Chief Data Officers achieve greater value while spending less.

How?

Value Creator CDOs

- Spend less on data strategy and management than peers, yet achieve equal or greater annual revenue growth
  - We are able to define a clear line of sight from data to value
  - Our data investments accelerate business growth
  - Data is a central element of our business model innovation
  - We have extremely engaged ecosystem partners

IBM CDO Survey

CDO Role Groupings

- **Compliance** CDO
  - The CDO role originated as a compliance-focused role
  - enabling the organisation with data management capabilities, to help manage compliance and mitigate data risk
  - data governance responsibilities including people, process and technology

- **Operational** CDO
  - The 'operational CDO' starts to focus on the value that data can bring to business operations
  - enabling functions to optimise products, services, and quality
  - embedding data culture and building the mindset of the team

- **Strategic** CDO
  - The 'strategic CDO' is focused on enabling business success through data
  - extracting value from data through enabling analytics and AI/ML to drive towards becoming an insight-driven organisation (IDO)
  - developing new solutions to support decision-making processes

Deloitte CDO Survey

Required Forced Choices

Q3
Use data to create strategic opportunities

Q1
Both simultaneously

Q4
Without focus

Q2
Increase organizational efficiencies/effectiveness
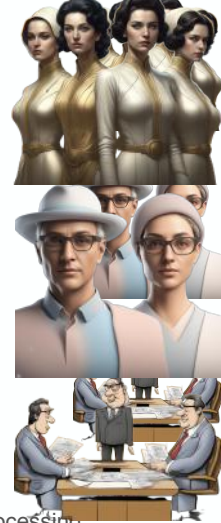
Innovation

Efficiencies

Program Overview

- Data, Data Governance, & Data Leadership
  - Uneven understanding
  - Has lead fractured views of data/data leadership/data governance
  - Requiring forced choices among data governance styles
- Commonalities
  - This is a young profession and must demonstrate
  - Direct support for organizational strategy by
  - Decreasing organizational data debt and
  - Improving data and its use in the short and long term
- Compliance
  - Tangible costs
  - Increasing regulations/examples
  - Need for programatic solutions
- Operational
  - Proactive versus reactive governance
  - How to measure anything (enough)
  - Examples
- Strategic
  - Must be de-coupled from IT strategy
  - Digitization-digital and data are dependent on high speed automation/data processing
  - A specific focus on AI/Data Ethics
- Take Aways/References/Q&A

Ismael Caballero
Mario Piattini *Editors*

Data Governance
From the Fundamentals to Real Cases

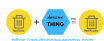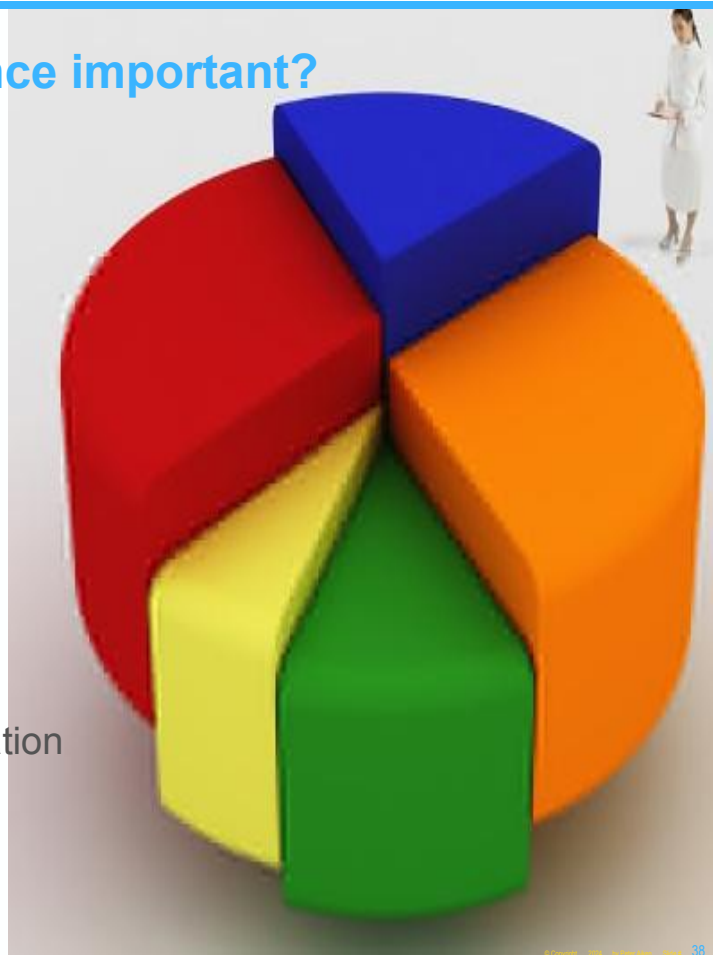Springer

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Why is Data Governance important?

- Cost organizations millions each year in

  - Productivity

  - Redundant and siloed efforts

  - Poorly thought out hardware and software purchases

  - Delayed decision making using inadequate information

  - Reactive instead of proactive initiatives

The Princess on the Pea

by
Hans Christian Andersen
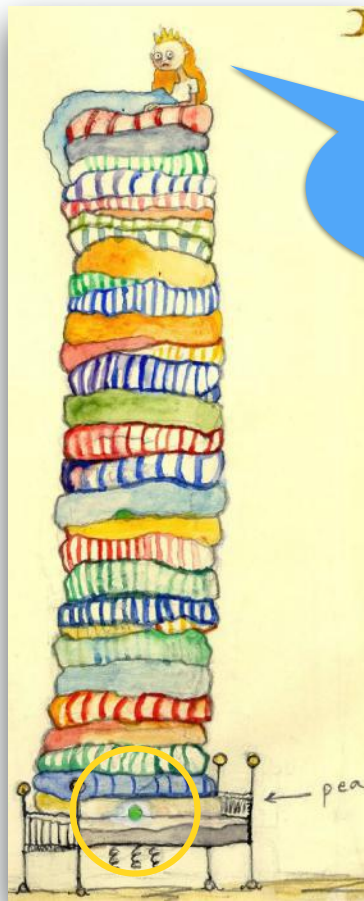
Sleepless (forever?)

Doing a poor job with data governance

- Failure to understand the role of data governance re: proposed <u>and</u> existing software/services
  - Locks in imperfections for the life of the application
  - Restricts data investment benefits
  - Decreases organizational data leverage
- Accounts for 20-40% of IT budgets devoted to evolving
  - Data migration (Changing the data location)
  - Data conversion (Changing data form, state, or product)
  - Data improving (Inspecting and manipulating, or re-keying data to prepare it for subsequent use)
- Lack of adequate data governance causes everything else to
  - Take longer
  - Cost more
  - Deliver less
  - Present greater risk (with thanks to Tom DeMarco)
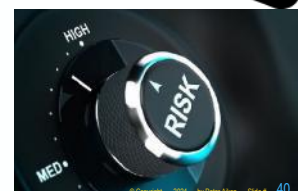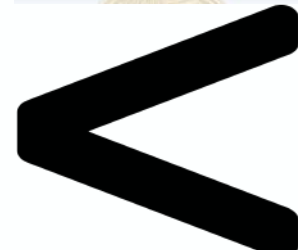
Separating the Wheat from the Chaff

Organizing the Wheat Separated from the Chaff

Is well organized data worth more?

DATA ROT EXPLAINED

Pre-Information Age Metadata

- Examples of information architecture achievements that happened well before the information age:

  – Page numbering

  – Alphabetical order

  – Table of contents

  – Indexes

  – Lexicons

  – Maps

  – Diagrams

HOW TO MAKE SENSE OF ANY MESS
Abby Covert

"While we can arrange things with the intent to communicate certain information, we can't actually make information. Our users do that for us."

Example from: *How to make sense of any mess* by Abby Covert (2014) ISBN: 1500615994

https://www.youtube.com/watch?v=60oD1TDzAXQ&feature=emb_logo

https://www.youtube.com/watch?v=r10Sod44rME&t=1s

https://www.youtube.com/watch?v=XD2OkDPAl6s
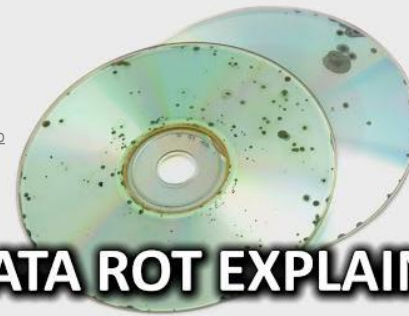
DATA ROT EXPLAINED

Remove the structure and things fall apart rapidly

- Better organized data increases in value
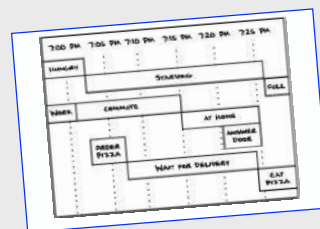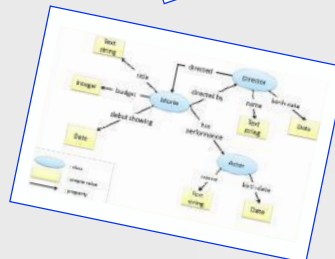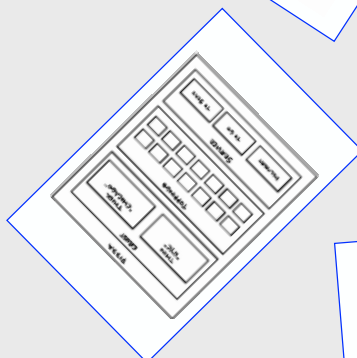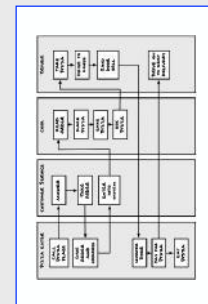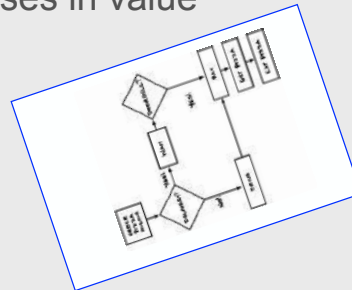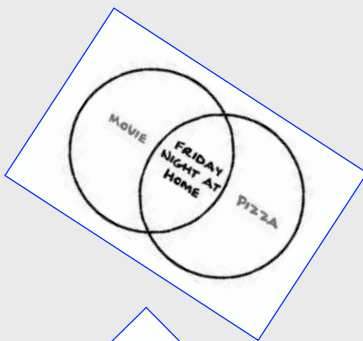
HOW TO MAKE SENSE OF ANY MESS
Abby Covert

DATA ROT EXPLAINED

Organizing the Wheat Separated from the Chaff

- Better organized data increases in value

- Poor data management practices are costing organizations money/time/effort

- 80% of organizational data is **ROT**

    - **R**edundant

    - **O**bsolete

    - **T**rivial

- The question is which data to eliminate?

    - Most enterprise data is never analyzed

DATA ROT EXPLAINED

You must address data debt proactively

Data debt:
- Slows progress
- Decreases quality
- Increases costs
- Presents greater risks

- Data debt
    - The time and effort it will take to return your shared data to a governed state from its (likely) current state of ungoverned

- Getting back to zero
    - Involves undoing existing stuff
    - Likely new skills are required

Deliberate

2. Resistance - Data standards slow me down	4. Rationale - Business pressures require we proceed
Reckless ←	→ Prudent
1. Data illiterate- What's a taxonomy?	3. Realization - The cost of BI and data handling is silly

Inadvert

How to Get Rid of Your Data Debt
Five steps to identify, classify and eliminate excess data

https://uk.nttdataservices.com/en/blog/2020/february/how-to-get-rid-of-your-data-debt

https://johnladley.com/a-bit-more-on-data-debt/   https://www.merkleinc.com/blog/are-you-buried-alive-data-debt

It is not as easy to visualize the cost of Data Debt or that it depletes organizational resources:
- **Slowing progress**
- **Decreasing quality**
- **Increasing costs**
- **Presenting greater risks**

Pareto Realities

20%

80%

80%

20%

Effort

Outcomes

Pareto Realities

- 80% of organizational data is redundant, trivial, or obsolete

- 80% of organizational data is of unknown quality

- 80% of organizational data is 'standards free'

- Your highly paid data analytics resources spend 80% of their time working under these conditions

- Dependency on high speed automation increases the risk of data becoming sand interfering with smooth operations

Effort   Outcomes

Hidden Data Factories

Department A

Work products are delivered to

Department B
1. Check A's work
2. Make any corrections
3. Complete B's work
4. Deliver to Department C

Department C
1. Check B's work
2. Make any corrections
3. Complete C's work
4. Deliver to Customer
5. Deal with consequences

Customers

Knowledge Workers
80% looking for stuff
20% doing useful work

Y 4

WIP work in progress   20   16   10   14   18

https://en.wikipedia.org/wiki/Theory_of_constraints
https://hbr.org/2016/09/bad-data-costs-the-u-s-3-trillion-per-year

Poor data manifests as multifaceted organizational challenges

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Poor data manifests as multifaceted organizational challenges

Root cause analysis is part of data governance
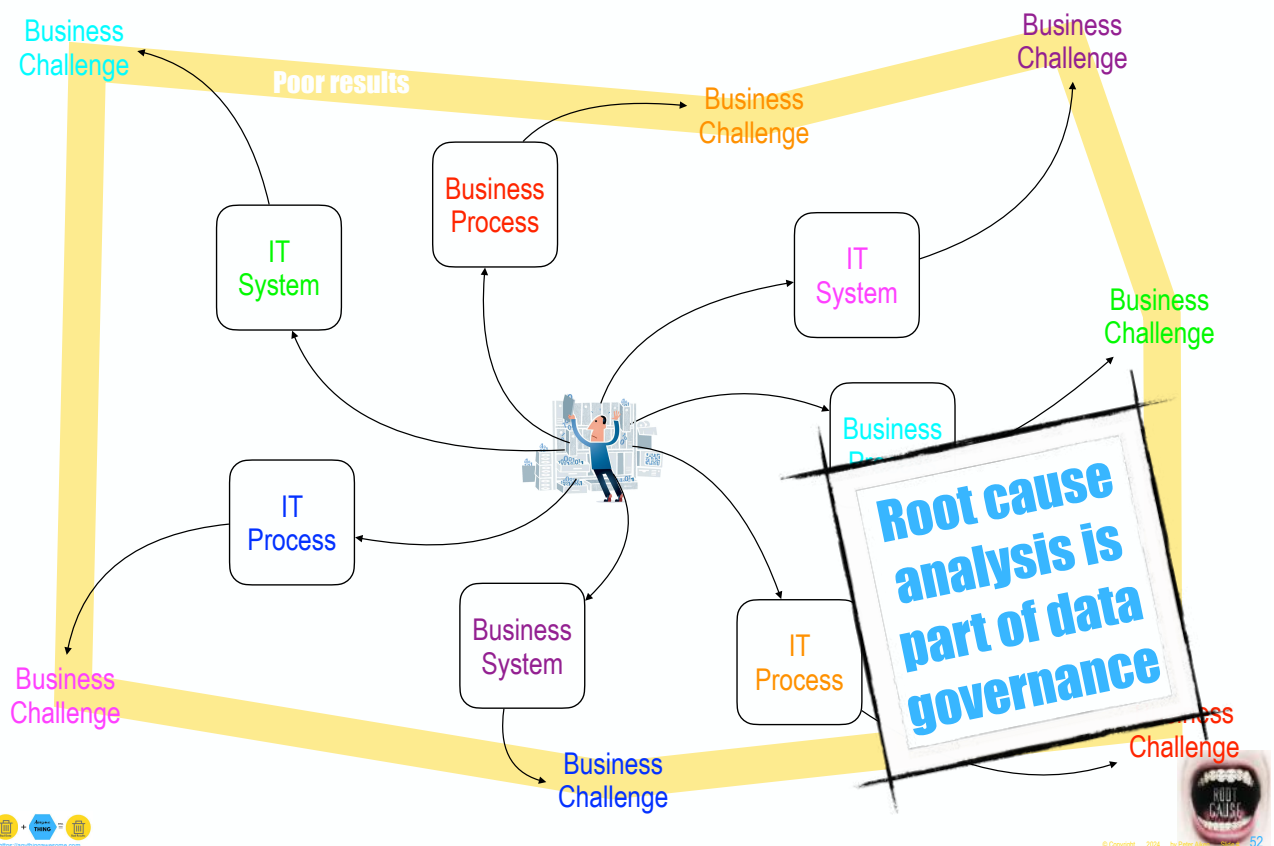
Consistency Encourages Quality Analysis

Business Challenge

Business Challenge

Business Challenge

Business Challenge

Business Challenge

Business Challenge

Business

Eliminating data debt requires a team with specialized skills deployed to create a repeatable process and develop sustained organizational skillsets

IT System

Business Process

IT Process

Data Governance Role: Produce systemic organizational changes that impact data and work practices over time

Feedback

Policy ✓

Data Leadership

Data Governance

Data Improvement

DIPs ✓

Data Stewards

Data Community Participants

Data Generators/Data Users

Data Improves Over Time

Scope of stewardship efforts

Data Things Happen

Organizational Things Happen

Data Improves As A Result of Focus

Feedback

Trusted Catalog

What is Strategy?

Use over time for: Strategy

strat·e·gy
/ˈstratəjē/

noun

1. a plan of action or policy designed to achieve a major or overall aim.
   "time to develop a coherent economic strategy"
   synonyms: master plan, grand design, game plan, plan (of action), action plan, policy, program; More

A thing

- Current use derived from military
  - **a pattern in a stream of decisions**
    [Henry Mintzberg]
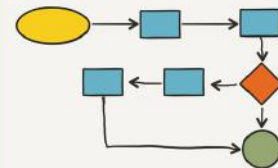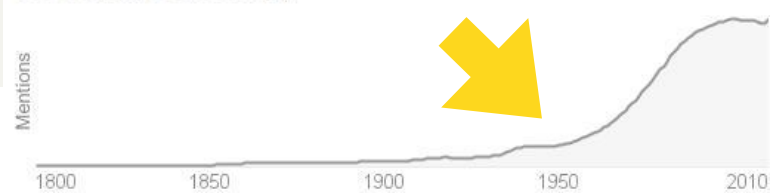
PROCESS

Former Walmart Business Strategy

Every Day Low Price

Wayne Gretzky's Strategy

He skates to where he thinks the puck will be ...

Strategy Example 3

Good Guys
(Us)

Bad Guys
(Them)

Strategy Example 3

Good Guys
(Us)

Bad Guys
(Them)

Strategy Example 3

Bad Guys
(Them)

Good Guys
(Us)
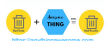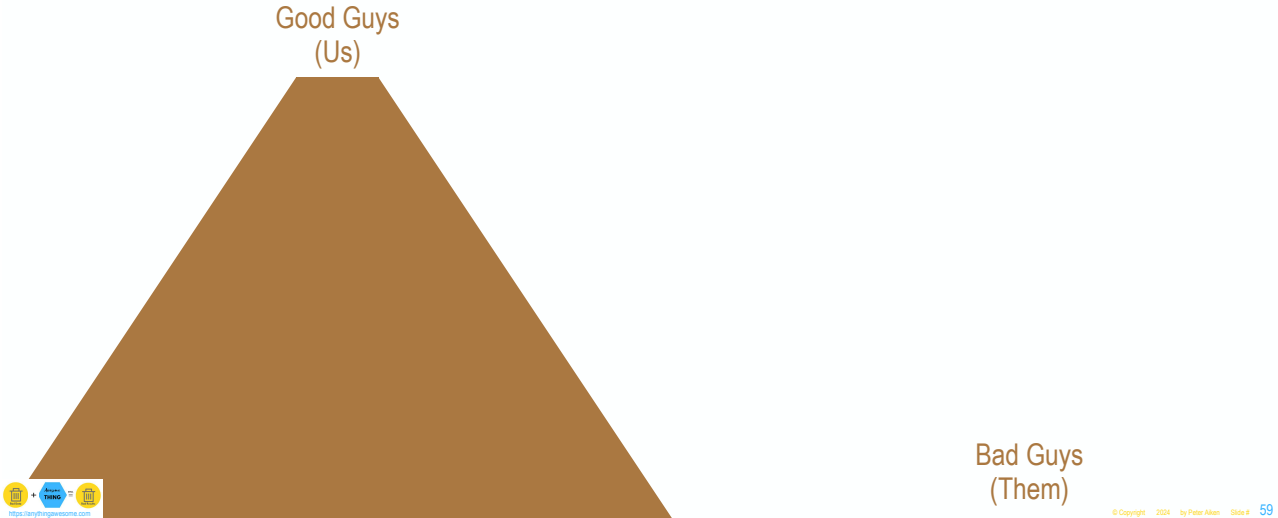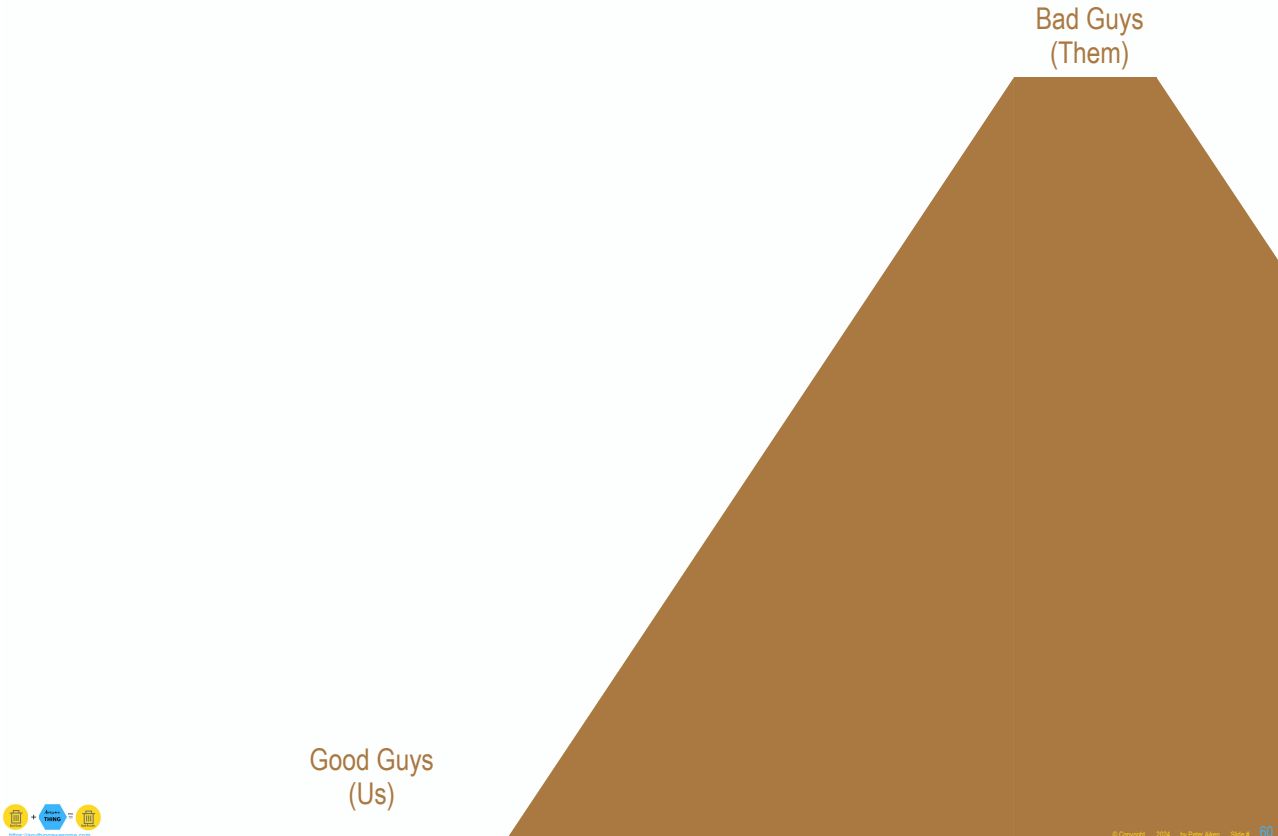
A pattern in a stream of decisions

Your Data Strategy

- Highest level data guidance available ...

- Focusing data activities on business-goal achievement ...

- Providing guidance when faced with a stream of decisions or uncertainties

  - Data strategy most usefully articulates how data can be best used to support organizational strategy

  - This usually involves a balance of remediation and proactive measures

YOUR DATA STRATEGY

Making It Concise, Actionable, and Understandable by Business and IT!

Digital Literacy Series

Peter H. Aiken · Todd Harbour
Foreward by Micheline Casey

Data Strategy and Governance in Strategic Context

Organizational Strategy

Data asset support for organizational strategy

What the data assets do to better support strategy (Business Goals)

Data Strategy

Data Governance

How well the data strategy is working (Metadata)

Progress, plans, problems

What is the most effective use of steward investments? (Metadata/ Business Goals)

Trusted Catalog

Data Stewards
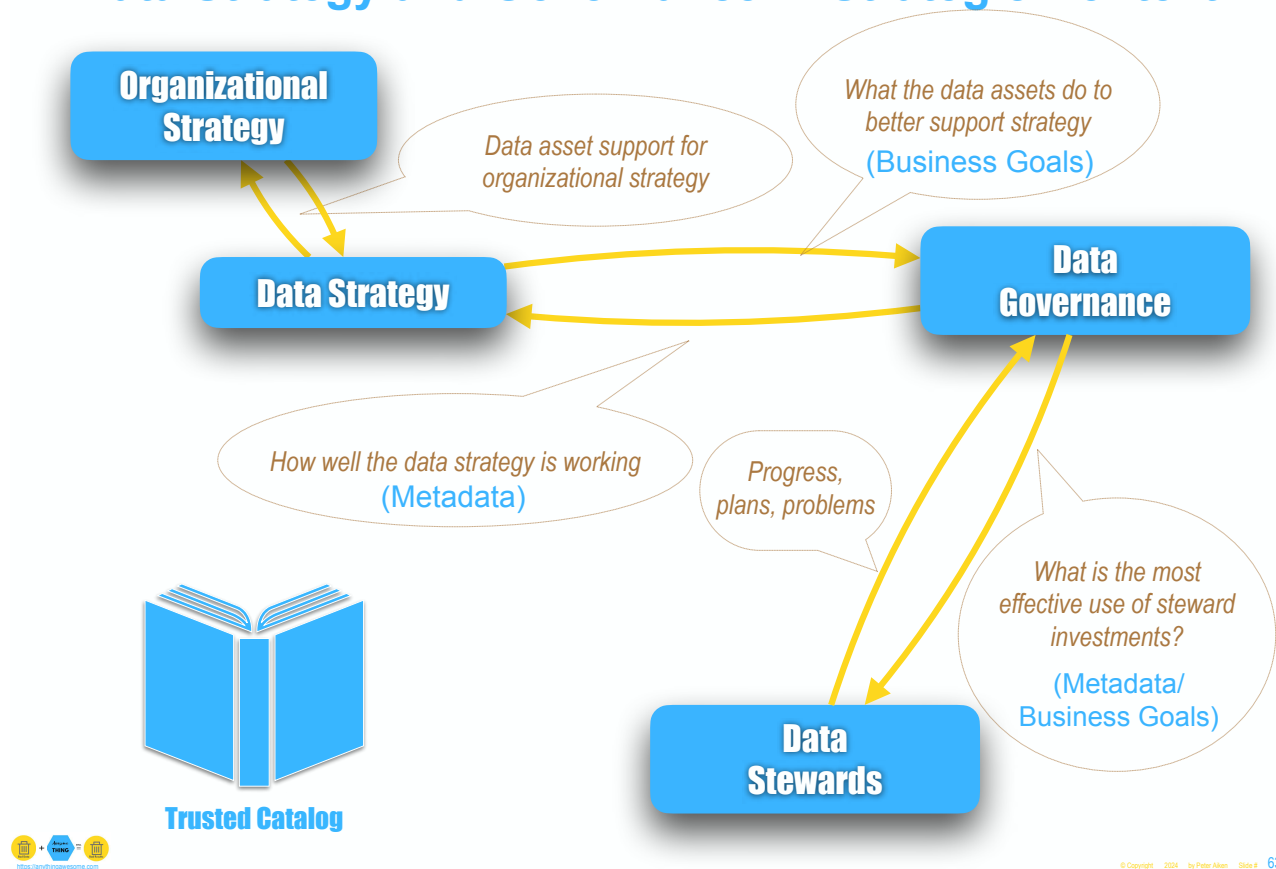
Lighthouse Metaphor Provides Focus

(Things that further)
Organizational Strategy

(Occasions to Practice)
Needed Data Skills

(Opportunities to improve)
Data use by the business
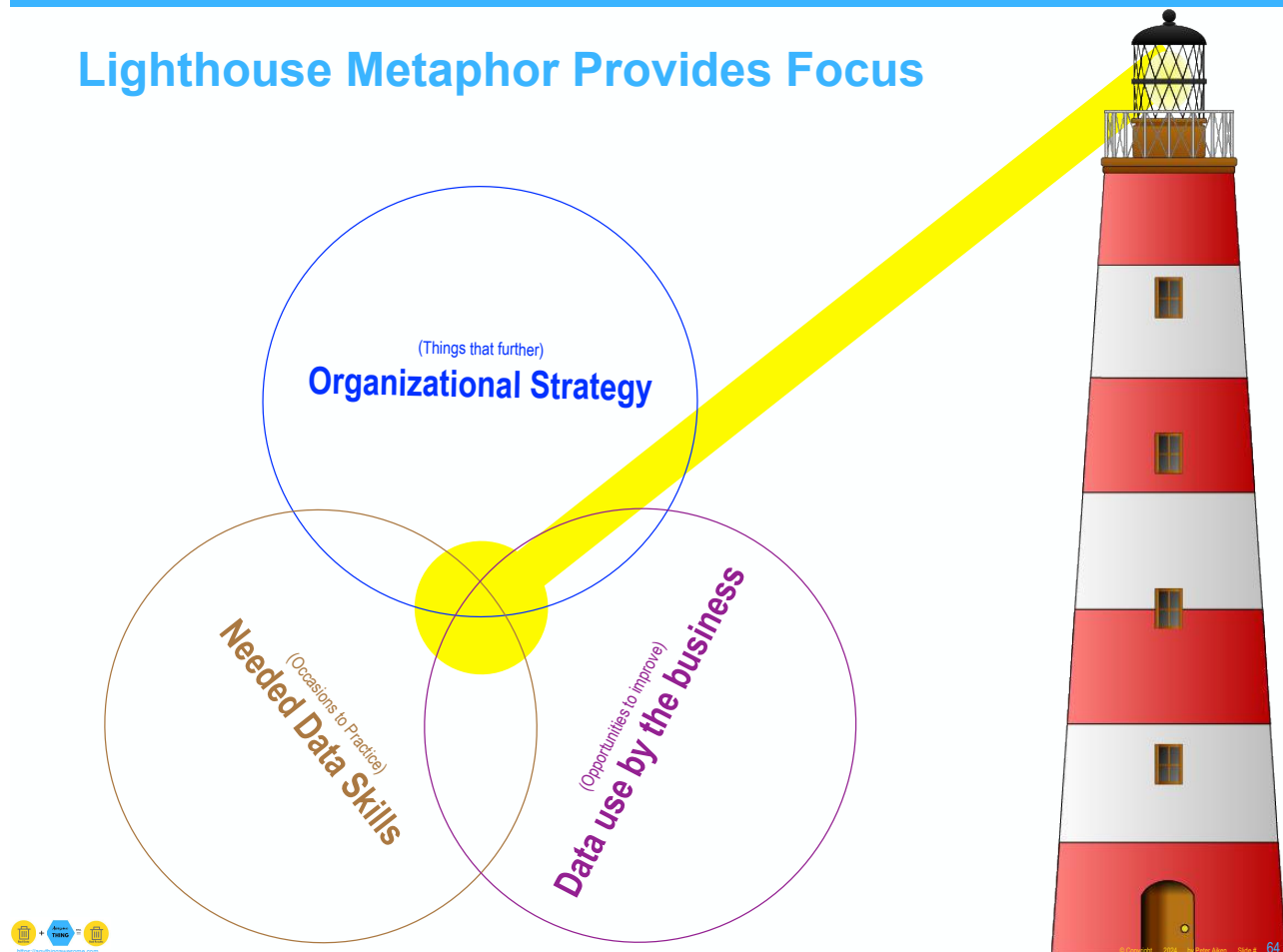
Our barn had to pass a foundation inspection

- Before further construction could proceed
- It makes good business sense
- No IT equivalent

Data Governance Frameworks

- A system of ideas for guiding analyses
- A means of organizing project data
- Priorities for data decision making
- A means of assessing progress
  - Don't put up walls until foundation inspection is passed
  - Put the roof on ASAP
- Make it all dependent upon continued funding

Data Governance from the DMBOK

Definition: The exercise of authority and control (planning, monitoring, and enforcement) over the management of data assets.

Goals:
1. To define, approve, and communicate data strategies, policies, standards, architecture, procedures, and metrics.
2. To track and enforce regulatory compliance and conformance to data policies, standards, architecture, and procedures.
3. To sponsor, track, and oversee the delivery of data management projects and services.
4. To manage and resolve data related issues.
5. To understand and promote the value of data assets.

Inputs:
- Business Goals
- Business Strategies
- IT Objectives
- IT Strategies
- Data Needs
- Data Issues
- Regulatory Requirements

Suppliers:
- Business Executives
- IT Executives
- Data Stewards
- Regulatory Bodies

Participants:
- Executive Data Stewards
- Coordinating Data Stewards
- Business Data Stewards
- Data Professionals
- DM Executive
- CIO

Activities:

1. Data Management Planning (P)
1. Understand Strategic Enterprise Data Needs
2. Develop and Maintain the Data Strategy
3. Establish Data Professional Roles and Organizations
4. Identify and Appoint Data Stewards
5. Establish Data Governance and Stewardship Organizations
6. Develop and Approve Data Policies, Standards, and Procedures
7. Review and Approve Data Architecture
8. Plan and Sponsor Data Management Projects and Services
9. Estimate Data Asset Value and Associated Costs

2. Data Management Control (C)
1. Supervise Data Professional Organizations and Staff
2. Coordinate Data Governance Activities
3. Manage and Resolve Data Related Issues
4. Monitor and Ensure Regulatory Compliance
5. Monitor and Enforce Conformance With Data Policies, Standards, and Architecture
6. Oversee Data Management Projects and Services
7. Communicate and Promote the Value of Data Assets

Tools:
- Intranet Website
- E-Mail
- Meta-data Tools
- Meta-data Repository
- Issue Management Tools
- Data Governance KPI Dashboard

Activities: (P) – Planning (C) – Control (D) – Development (O) - Operational

Primary Deliverables:
- Data Policies
- Data Standards
- Resolved Issues
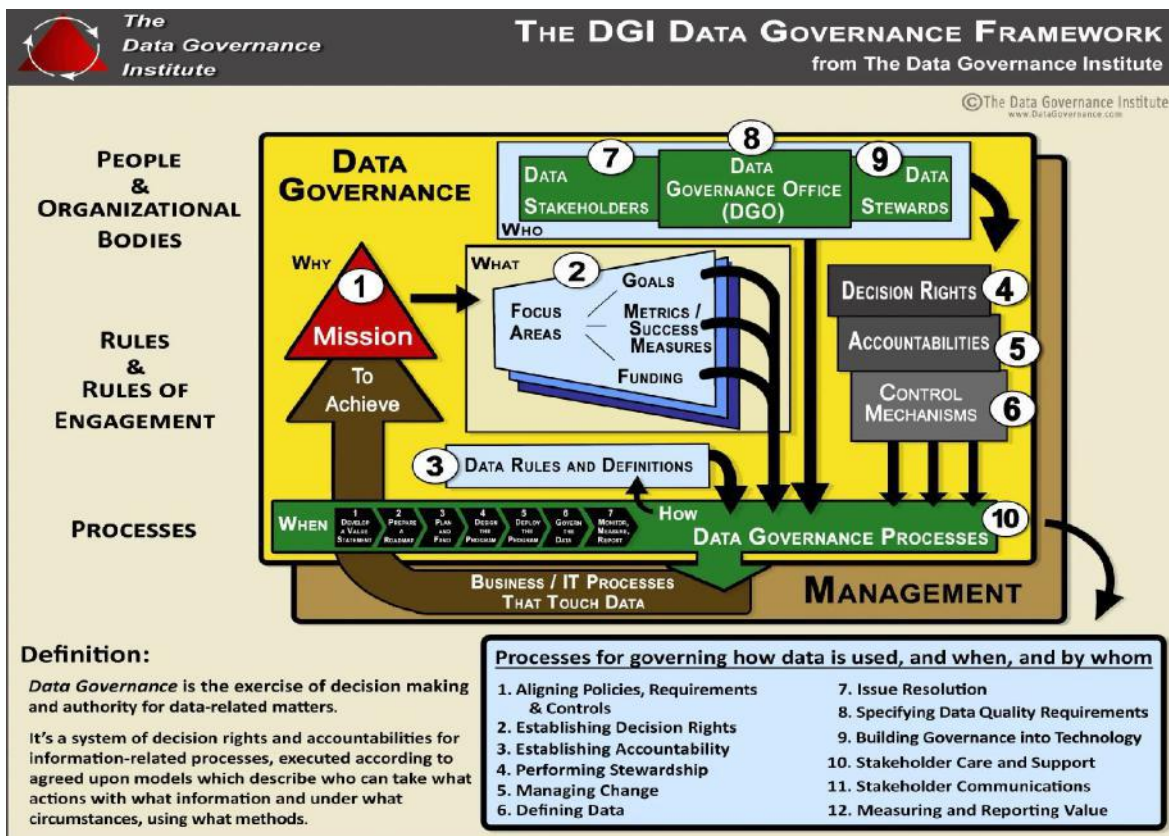- Data Management Projects and Services
- Quality Data and Information
- Recognized Data Value

Consumers:
- Data Producers
- Knowledge Workers
- Managers and Executives
- Data Professionals
- Customers

Metrics
- Data Value
- Data Management Cost
- Achievement of Objectives
- # of Decisions Made
- Steward Representation / Coverage
- Data Professional Headcount
- Data Management Process Maturity

Data Governance Institute

THE DGI DATA GOVERNANCE FRAMEWORK
from The Data Governance Institute

Definition:

Data Governance is the exercise of decision making and authority for data-related matters.

It's a system of decision rights and accountabilities for information-related processes, executed according to agreed upon models which describe who can take what actions with what information and under what circumstances, using what methods.

Processes for governing how data is used, and when, and by whom

1. Aligning Policies, Requirements & Controls
2. Establishing Decision Rights
3. Establishing Accountability
4. Performing Stewardship
5. Managing Change
6. Defining Data
7. Issue Resolution
8. Specifying Data Quality Requirements
9. Building Governance into Technology
10. Stakeholder Care and Support
11. Stakeholder Communications
12. Measuring and Reporting Value

http://www.datagovernance.com/

KiK Consulting

NON-INVASIVE DATA GOVERNANCE™ FRAMEWORK

Components

COMPONENTS DATA – ASSETS BEING GOVERNED ROLES – FORMAL ACCOUNTABILITY PROCESSES – APPLICATION / ENFORCEMENT COMMUNICATIONS – EDUC, TRN, AWARENESS METRICS – MEASUREMENTS and KPIs TOOLS – ARTIFACTS PURCHASED / DEVELOPED LEVELS EXECUTIVE – SENIOR LEADERSHIP TEAM STRATEGIC – BUSINESS & TECHNOLOGY MGMT TACTICAL – SUBJECT MATTER EXPERTISE OPERATIONAL – DAILY JOB FUNCTION SUPPORT – FUNCTIONAL MANAGEMENT	DATA	ROLES	PROCESSES	COMMUNICATIONS	METRICS	TOOLS
EXECUTIVE	Leadership Dashboard KPIs	Leadership Steering Committee	Endorse Enforce Authorize	Support Sponsor Understand	Approve Act	Policy Directive Audit
STRATEGIC	Enterprise Performance	Preside DG Program DG Council	Direct Approve Prioritize Resolve	Status Evaluate Commend	Acceptance Participation Performance	Charter Best Practices Guidelines Roadmap
TACTICAL	Subject Area X-Business Unit	Domain Stewards Data Owners SMEs	Facilitate Mediate Promote	Standards Subject Area Project	Subject Quality Metrics	Standards Requirements Workflows
OPERATIONAL	Business Unit Function	Operational Data Stewards Users	Operate Manage Handle	Orientation Onboard Ongoing	Accountability Efficiency Effectiveness	Glossary Dictionary Catalog Repository
SUPPORT	Accountability Inventory Metadata	Prog Mgmt Admin Work Groups Partners	Formalize Adhere Enforce	Plan Develop Deliver	Collect Report	DG Tools Metadata Tools KIK Artifacts

Levels

Joe Danielewicz's PPT Framework   https://danlyst.com/

People
Data Gov Organization
- DG Steering Committee
- DG Council
- DG Working Groups

Process
Data Gov Process
- Define Problem
- Obtain Sponsorship
- Maturity Assessment
- Build Glossary
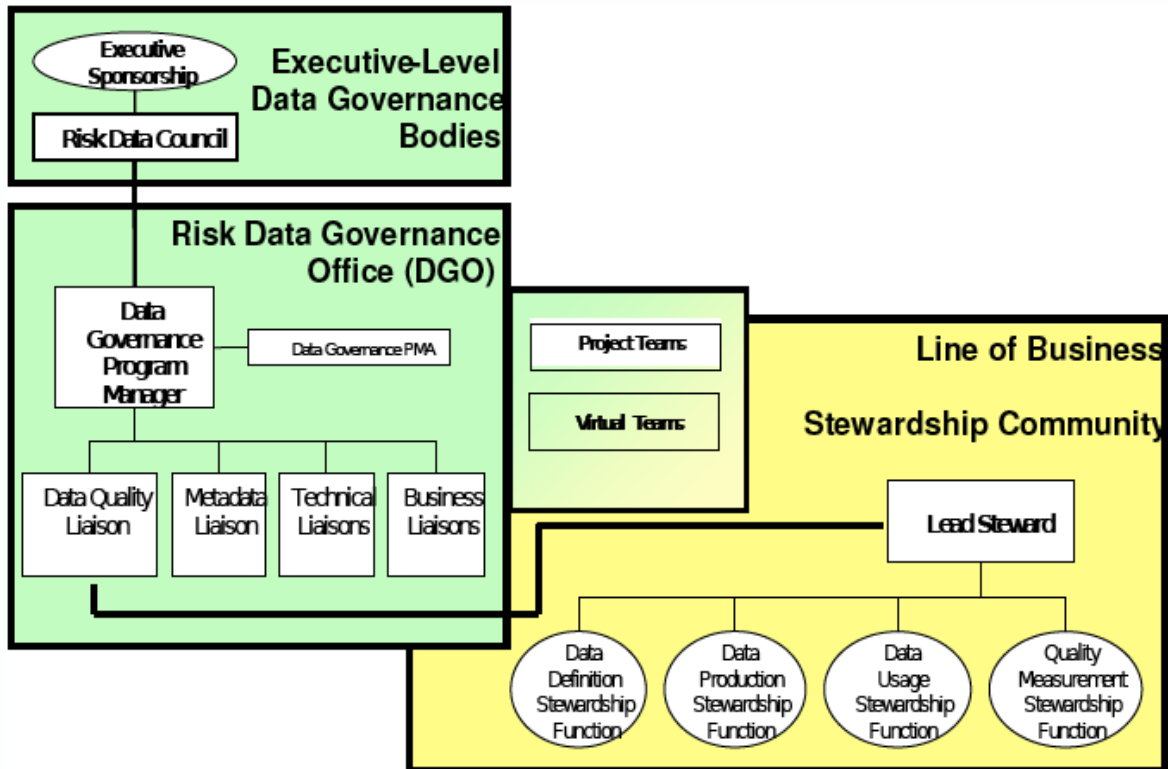- Import Metadata
- Build Data Lineage
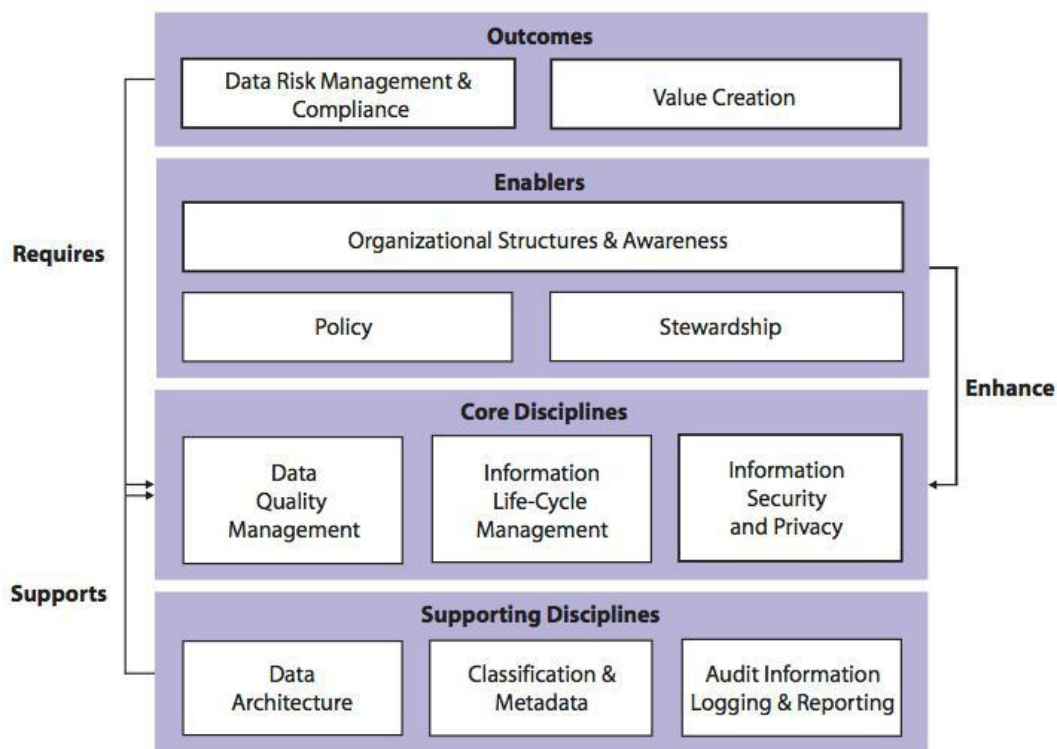- Report Metrics

Tools
Data Gov Tools
- Bus Glossary Catalog
- Gov Dashboard
- Data Modeling Tool
- Metadata Repository
- Metadata Import Connectors

https://www.amazon.com/Data-Governance-Managing-Language-Business/dp/B0BNJHYV1T/ref=sr_1_2?
crid=1BWJPTAUY1BKP&dib=eyJ2IjoiMSJ9.5yPdEjJur4CToFhTKEWQ89e3ZCXCK8Fi_QIW76LQ7jXGjHj071QN20LucGBJIEps.lnXn5X_r4Nb-
aykyS39uCR99FUv5oAFYakODpC1JNLQ&dib_tag=se&keywords=Joe+Danielewicz&qid=1718300418&sprefix=joe+danielewicz,aps,186&sr=8-2
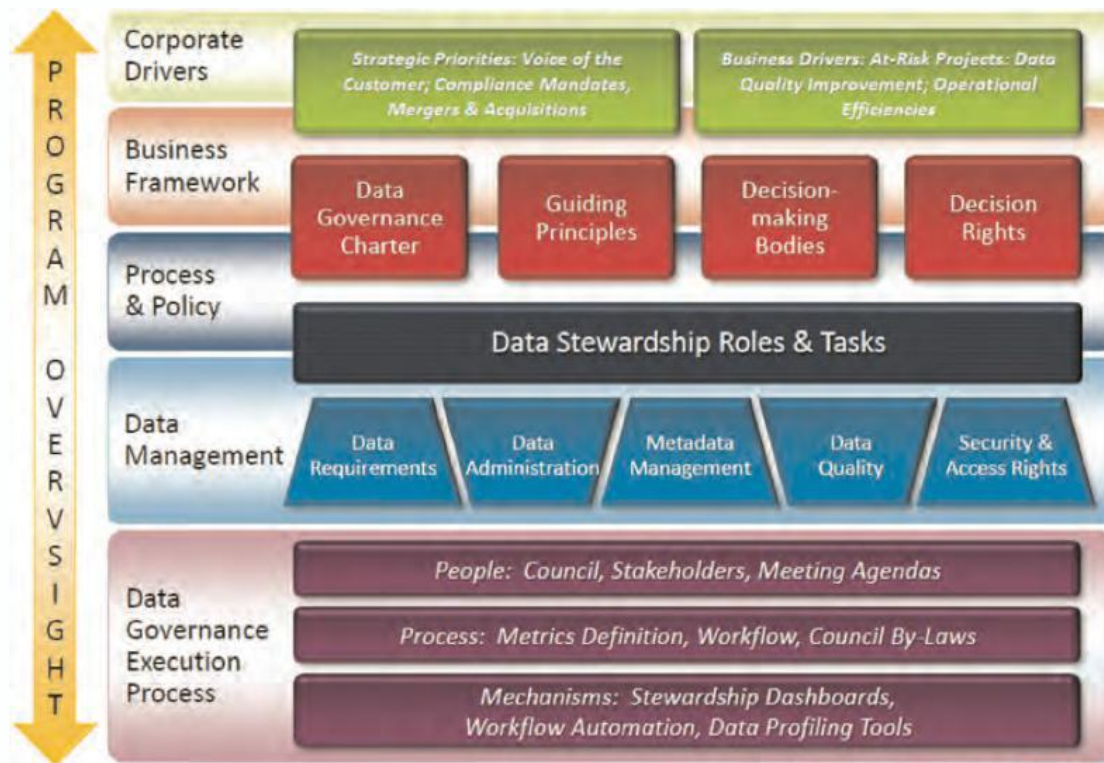
IBM Data Governance Council


Executive-Level Data Governance Bodies
- Executive Sponsorship
- Risk Data Council

Risk Data Governance Office (DGO)
- Data Governance Program Manager
- Data Governance PMA
- Data Quality Liaison
- Metadata Liaison
- Technical Liaisons
- Business Liaisons

- Project Teams
- Virtual Teams

Line of Business Stewardship Community
- Lead Steward
  - Data Definition Stewardship Function
  - Data Production Stewardship Function
  - Data Usage Stewardship Function
  - Quality Measurement Stewardship Function

Elements of Effective Data Governance

Outcomes
- Data Risk Management & Compliance
- Value Creation

Enablers
- Organizational Structures & Awareness
- Policy
- Stewardship

Core Disciplines
- Data Quality Management
- Information Life-Cycle Management
- Information Security and Privacy

Supporting Disciplines
- Data Architecture
- Classification & Metadata
- Audit Information Logging & Reporting

Requires
Supports
Enhance

See IBM Data Governance Council, http://www-01.ibm.com/software/tivoli/ governance/servicemanagement/ data-governance.html.

Baseline Consulting (sas.com)

American College Personnel Association
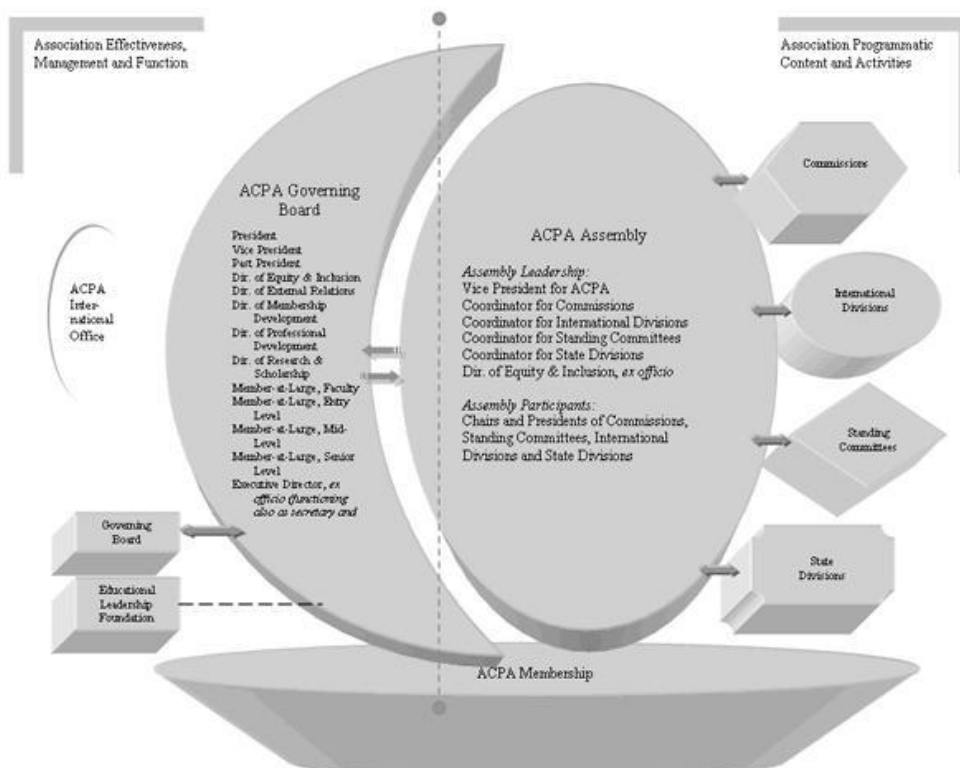
Components comprising the data community
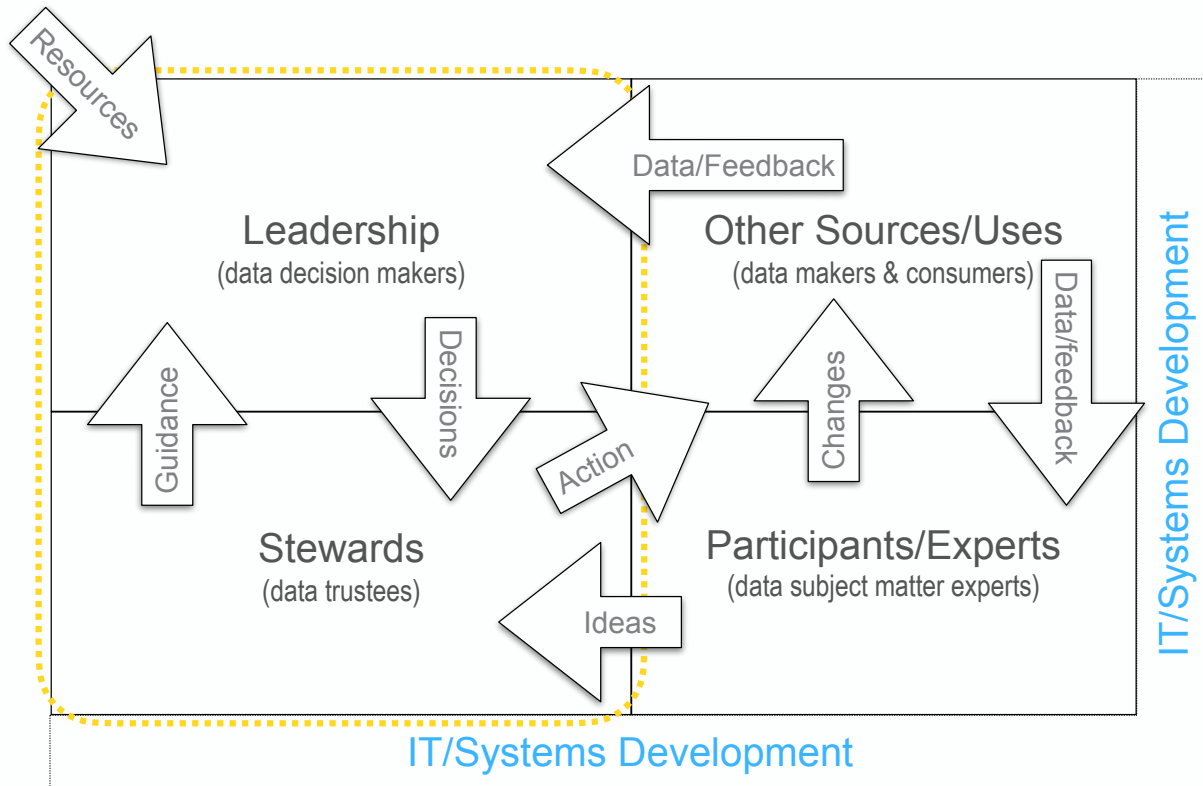
Components comprising the data community
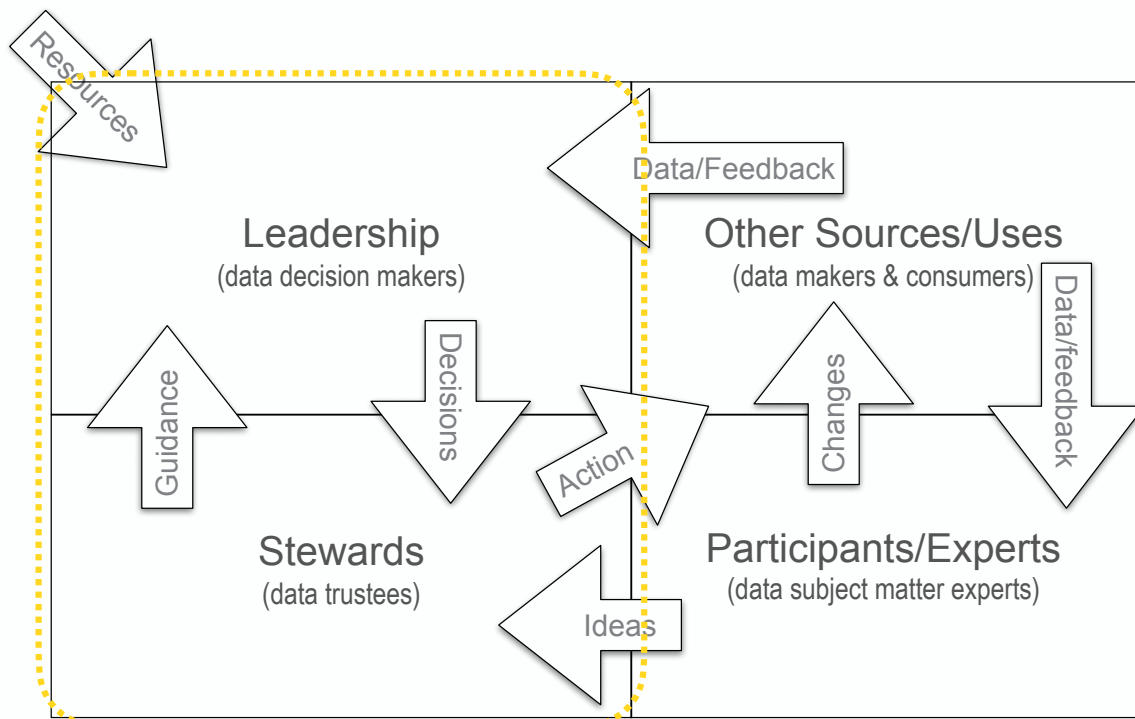
How to determine what to manage formally?

Too much requires expensive and slow bureaucracy ←   → Too little misses opportunities
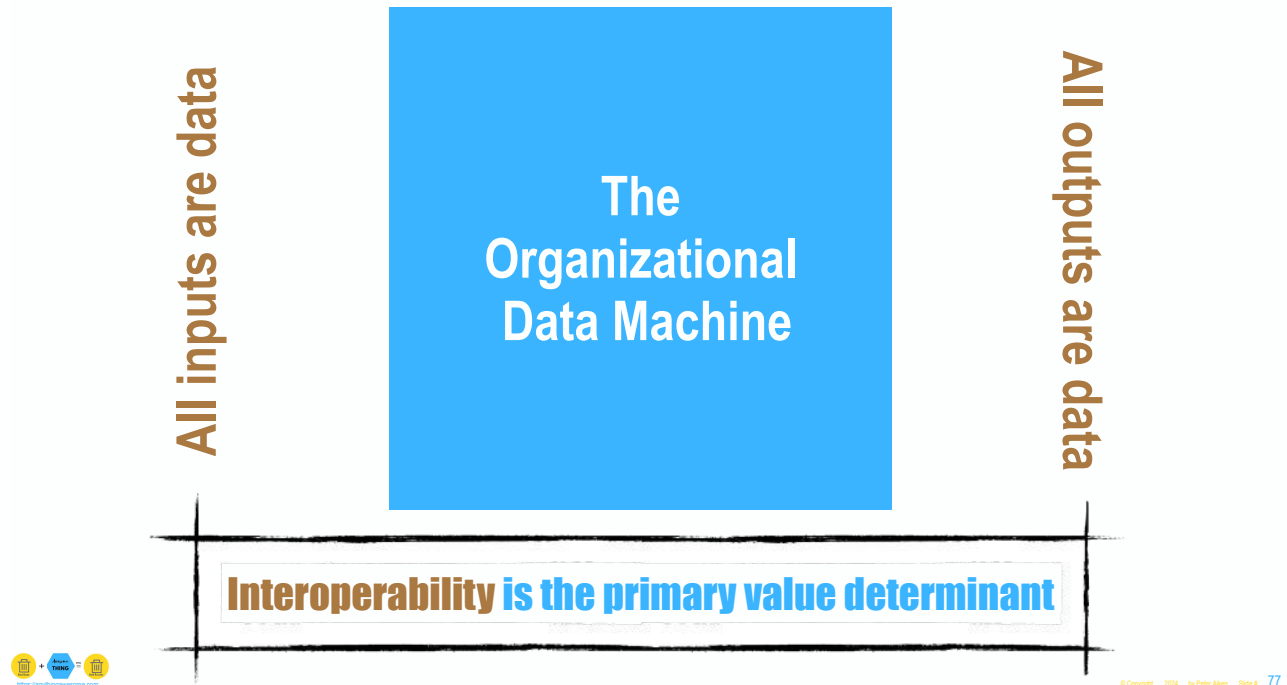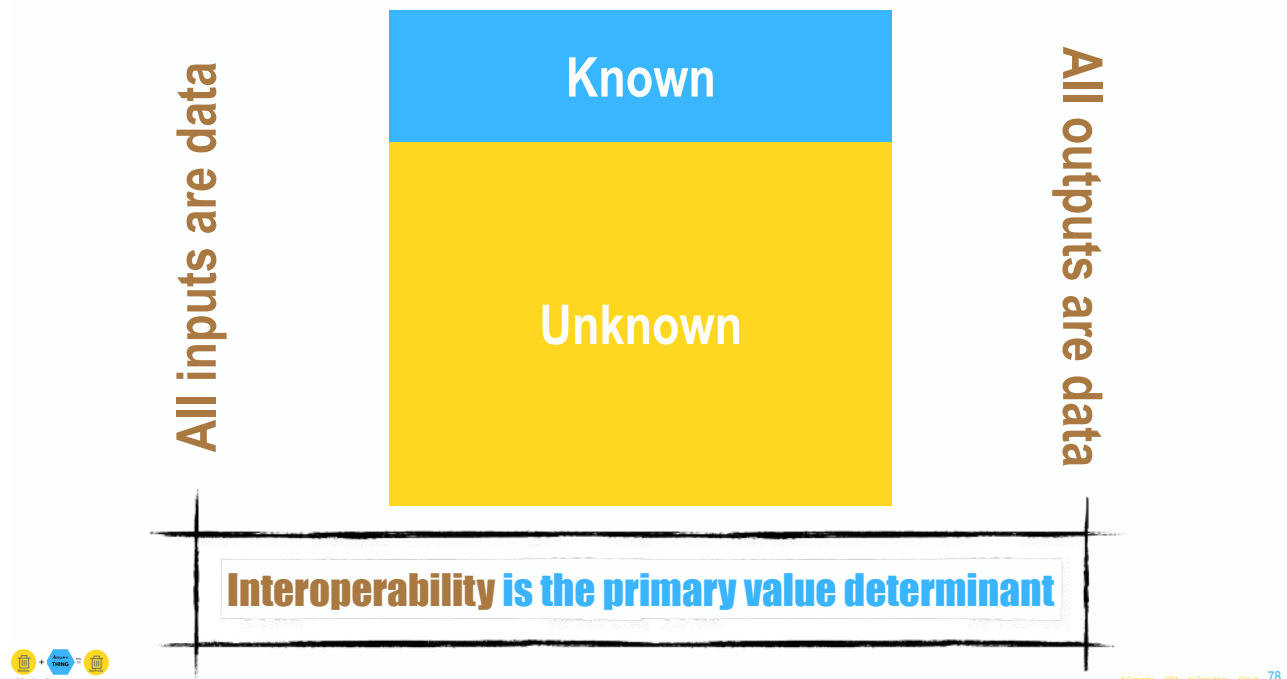
All inputs are data

The Organizational Data Machine

All outputs are data

Interoperability is the primary value determinant

A Data Steward's Goal/Process

Too much requires expensive and slow bureaucracy ←   → Too little misses opportunities

All inputs are data

Known

Unknown

All outputs are data

Interoperability is the primary value determinant

A Data Steward's Goal/Process

Too much requires expensive and slow bureaucracy ←   → Too little misses opportunities

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Known

Unknown
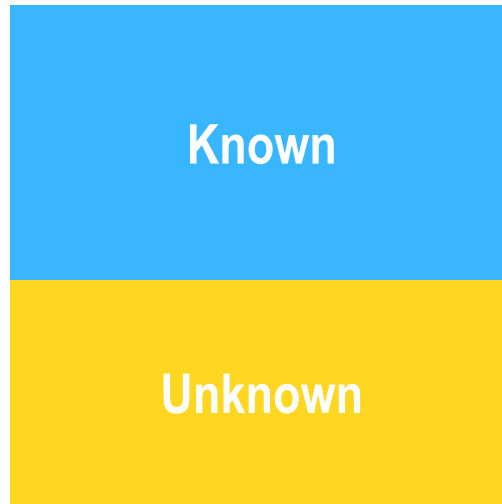
All outputs are data

Interoperability is the primary value determinant

Keep the proper focus

- Wrong question:

  – How should we govern all this data?

- Right question:

  – Should we include this data item within the scope of our current data governance practices?

focus target

region of focus

line of sight for autofocus sensor

In-focus area on chart

chart

- Regardless of the decision, document why!

Three Key Data Governance Questions

1. Is the quality of the data in the new system forecast to be of better quality than the data in the old system?

   – Lift and shift does not improve data quality

2. Are we able to formulate plans to obtain significant new value from this data in the new system?

   – If not we are lacking required specificity

3. Does this afford us an opportunity to consolidate data and data types?

   – Many system capabilities meet 'requirements' - looking at the opportunity to simplify an existing environment provides additional value

Three Key Questions

Complex Data Governance Environment

DATA COMMISSION

- EXECUTIVE
- Region representatives
- LEGISLATIVE
- JUDICIAL

Advise Governor

Data sharing and analytics
- Identify goals and objectives
- Prioritize initiatives
- Study & report
- Recommend changes to budget and code

TRUSTEE

- Define, approve, and communicate data strategies, policies, standards, rules, guidelines, & best practices
- Provide a governance, policy, and technology framework
- Define agency data governance responsibilities
- Encourage & facilitate data sharing
- Facilitate coordination to prevent duplication
- Coordinate policy and technology proposals and recommendations
- Administer and manage the commonwealth data trust
- Track and enforce compliance and conformance
- Oversee dissemination of open data

execute

Data Governance Council

- Liaise between agency operations & CDO
- Advise CDO on technology, policy, and governance strategies
- Administer data governance policies set by the board
- implement data sharing & analytics projects
- Review open data assets
- Report progress & compliance to the Board

Advise CDO

Executive data board

- Translate commonwealth goals to agency performance targets
- provide resources
- Remove organizational obstacles
- appoint data governance council members
- Oversee the data governance council
- Oversee data sharing & analytics projects

Oversee council

Getting Started with Data Governance

- Assess context
- DG roadmap
- Policy/Standards Reqs.
- Data Stewards
- Operational processes
- Executive mandate

Goals and Principles

- To define, approve, and communicate data strategies, policies, standards, architecture, procedures, and metrics.

- To track and enforce regulatory compliance and conformance to data policies, standards, architecture, and procedures.

- To sponsor, track, and oversee the delivery of data management projects and services.

- To manage and resolve data related issues.

- To understand and promote the value of data assets.

Illustration from *The DAMA Guide to the Data Management Body of Knowledge* © 2009 by DAMA International

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Primary Deliverables

- Data Policies

- Data Standards

- Resolved Issues

- Data Management Projects and Services

- Quality Data and Information

- Recognized Data Value

Illustration from *The DAMA Guide to the Data Management Body of Knowledge* © 2009 by DAMA International

Roles and Responsibilities

- Suppliers:
  - Business Executives
  - IT Executives
  - Data Stewards
  - Regulatory Bodies
- Consumers:
  - Data Producers
  - Knowledge Workers
  - Managers and Executives
  - Data Professionals
  - Customers

- Participants:
  - Executive Data Stewards
  - Coordinating Data Stewards
  - Business Data Stewards
  - Data Professionals
  - DM Executive
  - CIO

Illustration from *The DAMA Guide to the Data Management Body of Knowledge* © 2009 by DAMA International

Scorecard: Data Governance Practices/Techniques

- Data Value

- Data Management Cost

- Achievement of Objectives

- # of Decisions Made

- Steward Representation/Coverage

- Data Professional Headcount

- Data Management Process Maturity

from *The DAMA Guide to the Data Management Body of Knowledge* © 2009 by DAMA International

Data Governance Checklist

- ✓ Decision-Making Authority

- ✓ Standard Policies and Procedures

- ✓ Data Inventories

- ✓ Data Content Management

- ✓ Data Records Management

- ✓ Data Quality

- ✓ Data Access

- ✓ Data Security and Risk Management

DG Components

- Practices and Techniques

  – Data Value

  – Data Management Cost

  – Achievement of Objectives

  – # of Decisions Made

  – Steward Representation/Coverage

  – Data Professional Headcount

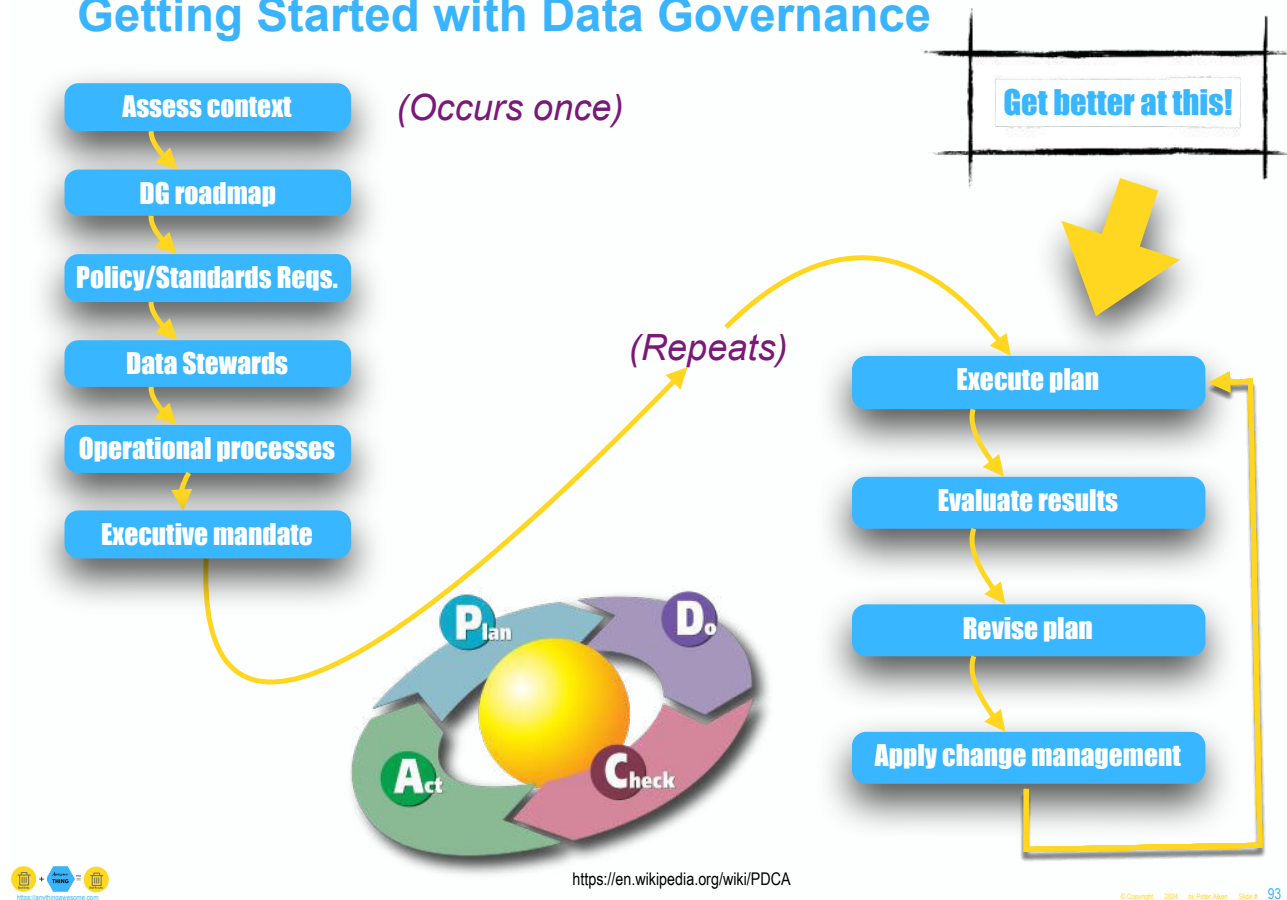 – Data Mana... Maturity

- What do I include in my Data Governance Program?

  – Security and Privacy of Data

  – Quality of Data

  – Life Cycle Management

  – Risk Management

  – Content Valuation

  – Standards (Data Design, Models and Tools)

  – Governance Tool Kits and Case Studies

Illustration from *The DAMA Guide to the Data Management Body of Knowledge* © 2009 by DAMA International

Evolve

Goals and Principles
- To define, approve, and communicate data strategies, policies, standards, architecture, procedures, and metrics.
- To track and enforce regulatory compliance and conformance to data policies, standards, architecture, and procedures.
- To sponsor, track, and oversee the delivery of data management projects and services.
- To manage and resolve data related issues.
- To understand and promote the value of data assets.

Primary Deliverables
- Data Policies
- Data Standards
- Resolved Issues
- Data Management Projects and Services
- Quality Data and Information
- Recognized Data Value

Deliverables

Roles and Responsibilities
- Suppliers:
  - Business Executives
  - IT Executives
  - Data Stewards
  - Regulatory Bodies
- Consumers
  - Data P...
  - Know...
  - Mana... executives
  - Data P...
  - Custom...
- Participants:
  - Executive Data Stewards
  - Coordinating Data Stewards
  - Business Data Stewards
  - Data Professionals
  - DM Executive
  - CI...

Scorecard: Data Governance Practices/Techniques
- Data Value
- Data Management Cost
- Achievement of Objectives
- ...cisions Made
- Stew... presentati... erage
- Data P...onal Hea...
- Data M...ent Pr... Maturity

Governanc...
- ✓ Decision-Making Auth...
- ✓ Standard Policies and Procedures
- ✓ Data Inventories
- ✓ Data Content Management
- ✓ Data Records Management
- ✓ Data Quality
- ✓ Data Access
- ✓ Data Security and Risk Management

...es and Technique...
- Data Value
- Data Management Cost
- Achievement of Objectives
- # of Decisions Made
- Steward Representation/Coverage
- Data Professional Headcount
- Data Management Process Maturity

What do I includ... Governance Progra...
- Security and Privacy of Data
- Quality of Data
- Life Cycle Management
- Risk Management
- Content Valuation
- Standards (Data Design, Models and Tools)
- Governance Tool Kits and Case Studies

Evolution is not goal oriented

Evolve

Getting Started with Data Governance

Assess context *(Occurs once)*

↓

DG roadmap

↓

Policy/Standards Reqs.

↓

Data Stewards

↓

Operational processes

↓

Executive mandate

(Repeats)

Get better at this!

Execute plan

↓

Evaluate results

↓

Revise plan

↓

Apply change management

Plan / Do / Check / Act (PDCA)

https://en.wikipedia.org/wiki/PDCA

External Comprehension

Everything Else Data　　**Data Management**　　**Data Governance Program**

Data (blah blah blah)

Most do not appreciate the difference between Data Governance and the other data stuff that needs to be done

Data Program

Program Overview

- Data, Data Governance, & Data Leadership
  - Uneven understanding
  - Has lead fractured views of data/data leadership/data governance
  - Requiring forced choices among data governance styles
- Commonalities
  - This is a young profession and must demonstrate
  - Direct support for organizational strategy by
  - Decreasing organizational data debt and
  - Improving data and its use in the short and long term
- Compliance
  - Tangible costs
  - Increasing regulations/examples
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  - Proactive versus reactive governance
  - How to measure anything (enough)
  - Examples
- Strategic
  - Must be de-coupled from IT strategy
  - Digitization-digital and data are dependent on high speed automation/data processing
  - A specific focus on AI/Data Ethics
- Take Aways/References/Q&A

Ismael Caballero
Mario Piattini *Editors*

Data Governance
From the Fundamentals to Real Cases

Springer

CDO Role Groupings

LAWS POLICY PROCESS
COMPLIANCE
GUIDELINES REGULATIONS

- **Compliance** CDO
  - The CDO role originated as a compliance-focused role
  - enabling the organisation with data management capabilities, to help manage compliance and mitigate data risk
  - data governance responsibilities including people, process and technology

Deloitte CDO Survey

Tangible Costs

Top Compliance Regulations

- **General Data Protection Regulation (GDPR)**
  - This regulation, introduced by the European Union (EU), sets a high bar for data privacy and security for companies dealing with data of EU residents. It mandates transparency, user consent, and strong data security practices.

- **California Consumer Privacy Act (CCPA)**
  - This California law grants consumers significant control over their personal data and offers them rights to access, delete, and opt-out of the sale of their data. Other US states have adopted similar laws.

- **Health Insurance Portability and Accountability Act (HIPAA)**
  - This US law protects the privacy and security of patients' medical information. It sets standards for safeguarding sensitive health data and outlines patient rights regarding access and use of their medical records.

- **Sarbanes-Oxley Act (SOX)**
  - This US law aims to prevent financial fraud and improve corporate governance. It imposes strict record-keeping and internal control requirements on publicly traded companies.

- **Payment Card Industry Data Security Standard (PCI DSS)**
  - This industry-wide standard establishes security requirements for organizations that accept, transmit, or store credit card information.

- **Cybersecurity Frameworks**
  - Frameworks like NIST Cybersecurity Framework (US) and ISO 27001 (international) provide best practices for managing cybersecurity risks and protecting information systems. While not strictly regulations, adherence demonstrates a commitment to data security.

- **Anti-Money Laundering (AML) and Know Your Customer (KYC) Regulations**
  - These regulations aim to prevent money laundering and terrorist financing. They require financial institutions and other entities to verify customer identities and monitor transactions for suspicious activity.

Office of the Comptroller of the Currency

ABOUT   NEWS & EVENTS   PUBLICATIONS & RESOURCES   TOPICS
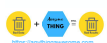
Home > News & Events > Newsroom

News Release 2020-132 | October 7, 2020

OCC Assesses $400 Million Civil Money Penalty Against Citibank

SHARE THIS PAGE:

WASHINGTON—The Office of the Comptroller of the Currency (OCC) today assessed a $400 million civil money penalty against Citibank, N.A. of Sioux Falls, South Dakota, related to deficiencies in enterprise-wide risk management, compliance risk management, data governance, and internal controls.

The OCC took these actions based on the bank's unsafe or unsound banking practices for its long-standing failure to establish effective risk management and data governance programs and internal controls. This failure also resulted in a violation of 12 CFR Part 30, Appendix D, "OCC Guidelines Establishing Heightened Standards for Certain Large Insured National Banks, Insured Federal Savings Associations, and Insured Federal Branches."

The agency also issued a cease and desist order requiring the bank to take broad and comprehensive corrective actions to improve risk management, data governance, and internal controls. The order requires the bank to seek the OCC's non-objection before making significant new acquisitions and reserves the OCC's authority to implement additional business restrictions or require changes in senior management and the bank's board should the bank not make timely, sufficient progress in complying with the order.

The Federal Reserve Board took a separate but related action against Citigroup, the bank's holding company.

The OCC penalty will be paid to the U.S. Treasury.

Media Contact

Bryan Hubbard
(202) 649-6870

https://www.occ.gov/news-issuances/news-releases/2020/nr-occ-2020-132.html

https://anythingawesome.com

Barclays Excel Spreadsheet Horror

- Barclays preparing to buy Lehman's Brothers assets.
- 179 dodgy Lehman's contracts were accidentally purchased by Barclays because of an Excel spreadsheet reformatting error
- A first-year associate reformatted an Excel contracts spreadsheet
  - Predictably, this work was done long after normal business hours, just after 11:30 p.m...
- The Lehman/Barclays sale closed on September 22nd, 2008
- the 179 contracts were marked as "hidden" in Excel, and those entries became "un-hidden" when when globally reformatting the document …
- … and the sale closed …

https://www.businessinsider.com/2008/10/barclays-excel-error-results-in-lehman-chaos

Hidden spreadsheet rows hit Barclays with toxic Lehman contracts
by AccountingWEB

Lehman Excel snafu could cost Barclays dear
Hey, whoa, we never meant to buy that bit

Excel error leaves Barclays with more Lehman assets than it bargained for
Law firm says spreadsheet reformatting error added 179 contracts to bankruptcy buyout deal

https://anythingawesome.com

Excel spreadsheet error blamed for UK's 16,000 missing coronavirus cases

The case went missing after the spreadsheet hit its filesize limit

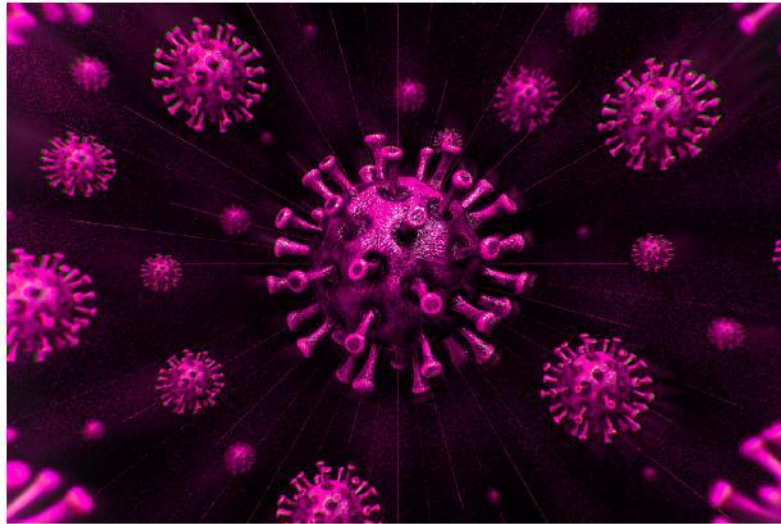By James Vincent | Oct 5, 2020, 9:41am EDT

Illustration by Alex Castro / The Verge

The UK failed to add nearly 16,000 confirmed cases of coronavirus to its national track and trace system due to an Excel error. A number of reports, including from The Guardian, Sky News, and The Daily Mail, say the mistake was caused when an Excel spreadsheet used to track confirmed cases of the virus reached its maximum file size and failed to update.

"Failure to upload these cases to the national database meant anyone who came into contact with these individuals was not informed. It's an error that may have helped spread the virus further through the country as individuals exposed to the virus continued to act as normal."

Posted on Friday, January 15, 2010

SHARE [f] [t] [✉] ... email | print |
RSS

Despite prevention efforts, U.S. military suicides rise

By Halimah Abdullah | McClatchy Newspapers

WASHINGTON — Eight years of war in Afghanistan and Iraq have etched indelible scars on the psyches of many of the nation's servicemen and women, and the U.S. military is losing a battle to stem an epidemic of suicides in its ranks.

Despite calls by top Pentagon officials for a sea change in attitudes about mental health, millions of dollars in new suicide prevention programming and thousands of hours spent helping soldiers suffering from what often are euphemistically dubbed "invisible wounds," the military is losing ground.

The Department of Defense Friday reported that there were 160 reported active-duty Army suicides in 2009, up from 140 in 2008. Of these, 114 have been confirmed, while the manner of death in the remaining 46 remains to be determined.

NEVER LET YOUR BUDDY FIGHT alone

Be Willing to Listen

Not all Wounds are Visible

Prevent Suicide.
It is your responsibility to get help for a fellow Soldier
Talk to your Chaplain or a Behavioral Health Professional or Call Military OneSource 1-800-342-9647
www.militaryonesource.com

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Senior Army Official

- Room full of Stewards

- A very heavy dose of management support

- Advised the group of his opinion on the matter

- Any questions as to future direction

  – "They should make an appointment to speak directly with me!"

- Empower the team

  – The conversation turned from "can this be done?" to "how are we going to accomplish this?"

  – Mistakes along the way would be tolerated

  – Implement a workable solution in prototype form

For some challenges, resistance is futile

Data **programmes** must drive IT programs

Data is not a Project

Common Organizational Data
(and corresponding data needs requirements)

Future State

Evolve

(Version +1)

Data evolution is separate from, external to, and precedes system development life cycle activities!

Systems
Development
Activities

Data programmes drive IT programs

Create

New Organizational
Capabilities

Differences between Programs and Projects

- Programs are Ongoing, Projects End
  - Managing a program involves long term strategic planning and continuous process improvement is not required of a project
- Programs are Tied to the Financial Calendar
  - Program managers are often responsible for delivering results tied to the organization's financial calendar
- Program Management is Governance Intensive
  - Programs are governed by a senior board that provides direction, oversight, and control while projects tend to be less governance-intensive
- Programs Have Greater Scope of Financial Management
  - Projects typically have a straight-forward budget and project financial management is focused on spending to budget while program planning, management and control is significantly more complex
- Program Change Management is an Executive Leadership Capability
  - Projects employ a formal change management process while at the program level, change management requires executive leadership skills and program change is driven more by an organization's strategy and is subject to market conditions and changing business goals

Adapted from http://top.idownloadnew.com/program_vs_project/ and http://management.simplicable.com/management/new/program-management-vs-project-management

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Ismael Caballero
Mario Piattini *Editors*
Springer

Watermark overlay: Your data program must last at least as long as your HR program!

CDO Role Groupings

- **Operational** CDO
  - The 'operational CDO' starts to focus on the value that data can bring to business operations
  - enabling functions to optimise products, services, and quality
  - embedding data culture and building the mindset of the team

Deloitte CDO Survey

Data Governance Role: Produce systemic organizational changes that impact data and work practices over time

Feedback

Policy ✓

Data Leadership
- Data Governance
- Data Improvement

DIPs ✓

Data Stewards

Data Community Participants

Data Generators/Data Users

Data Improves Over Time

Data Things Happen

Data Improves As A Result of Focus

Organizational Things Happen

Trusted Catalog

Feedback

Compare Story Types

Technical	Business
Clean some data	Decrease the number of undeliverable targeted marketing ads
Reorganize the database	Increase the ability of the salesforce to perform their own analyses
Develop a taxonomy	Create a common vocabulary for the organization
Optimize a query	Shaved 1 second off a task that runs a billion times a day
Reverse engineer the legacy system	Understand: what was good about the old system so it can be formally preserved and, what was bad so it can be improved

© Copyright 2024 by Peter Aiken Slide # 113

114

The MacGyver approach to DG uses paperclips and duct tape

Measures of Unproductivity

Knowledge Worker Stress

- 33% of time spent reworking/ recreating knowledge that already exists!

- 10% of time spent creating new knowledge and content

- 53% would rather to household chores

- 52% would rather pay bills than use content management/repositories

- 74% report feeling overwhelmed or unhappy when working with data

- 33% of overwhelmed employees spend at least one hour a week procrastinating over data-related tasks

Measurements

Everyone

- **14%** have a good understanding of how to use business data

- **21%** aged 16-24 classified themselves as data literate

- **Conclusion**: future employees are underprepared for data-driven workplaces
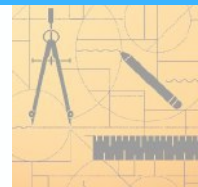
Business decision makers

- **24%** of business decision makers feel fully confident in their ability to read, work with, analyze & argue with that data

- **33%** are able to create measurable value from data

- **27%** say my analytics projects produce actionable insights

- **78%** willing to invest time/energy improving data skillsets

http://TheDataLiteracyProject.org

When asked to incorporate data

Too many organizations have simply put data in the hands of employees and expected them to make a success of it

- Data appreciation isn't translating into employee adoption
  - 48% frequently make gut decisions
  - 66% for C-suite executives
- Lack of data skills is limiting workplace productivity
  - 36% said they would find an alternative method to complete the task without using data
  - 14 percent avoid the task entirely

Pie Chart 1:
- Incorporate Data 34%
- Defer to Gut 66%

Pie Chart 2:
- Avoid Task Entirely 14%
- Incorporate Data 50%
- Find Alt. Method 36%
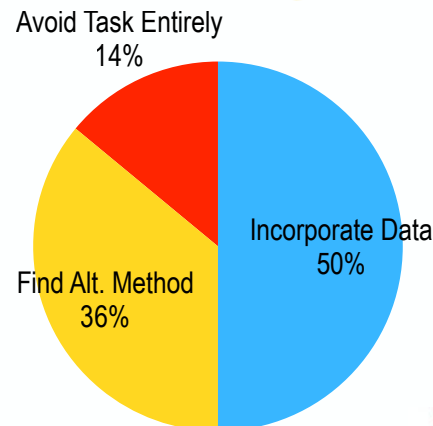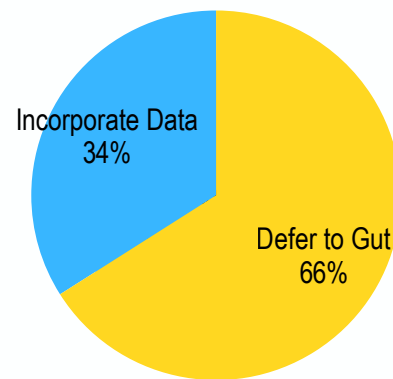
PennDOT makes millions selling your personal data, is it safe?

HARRISBURG, Pa — For years, the Pennsylvania Department of Transportation has been selling drivers information. That information is bought by seven differ...
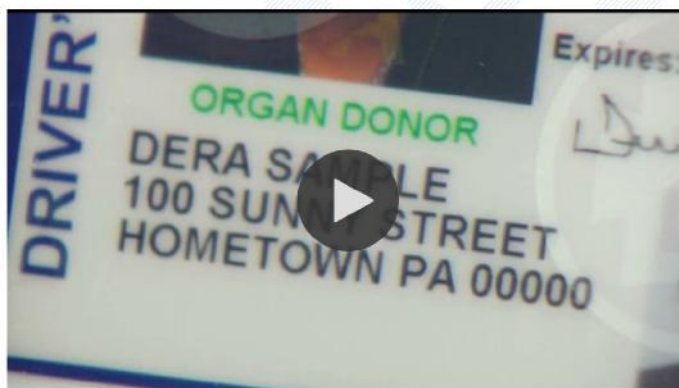
Author: Jackie De Tore (FOX43)
Published: 10:21 PM EDT May 4, 2016
Updated: 10:27 PM EDT May 4, 2016

HARRISBURG, Pa -- For years, the Pennsylvania Department of Transportation has been selling drivers information.

That information is bought by seven different companies.

"Under the law, PennDOT is allowed to charge $9 for each record that is accessed. This is a way Pennsylvania pays for critical transportation services," says Rich Kirkpatrick, a PennDOT ... n.

Two Headlines

1. **PennDOT gets caught selling $40,000,000 worth of your data to insurance companies**

2. **PennDOT saves taxpayers $40M selling data legally derived from your data**

Great inspiration ...

- *How to Measure Anything: Finding the Value of Intangibles in Business* by Douglas Hubbard (ISBN: 0470539399)

- Measurement is a reduction in uncertainty

- Formalizing stuff forces clarity

- Whatever your measurement problem is,
    - it's been done before

- You have more data than you think

- You need less data than you think

- Getting data is more economical than you think

- You probably need different data than you think

- Special shout out to Chapter 7
    - Measuring the value of additional information to a decision
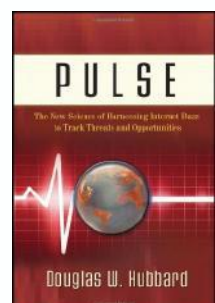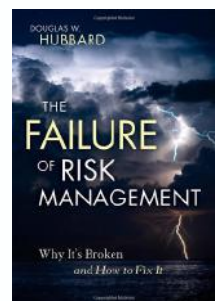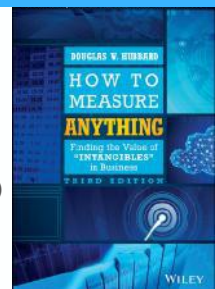
Enrico Fermi (Nobel Prize Physics 1938)
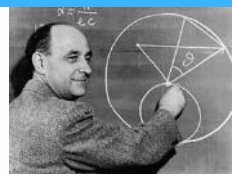
- How many piano tuners in the city of Chicago?
  - Without using existing lists such as Yellow Pages, Google ...
  - Current population of Chicago (3 million at the time)
  - Average number of people per household (2 or 3)
  - Share of households with regularly tuned pianos (1 in 3)
  - Required frequency of tuning (1/year)
  - How many pianos can a tuner tune daily? (4 or 5)
  - How many days/year are worked (250)

- Tuners in Chicago = Population/people per household
  times % households with tuned pianos
  times tunings per year
  divided by [tunings per tuner per day
  times workdays/year]

Focus on Knowledge Worker Productivity

1. Remove 1 click from some repetitive process

https://giphy.com/gifs/xUPGcoTKhfDvStjxMA/html5
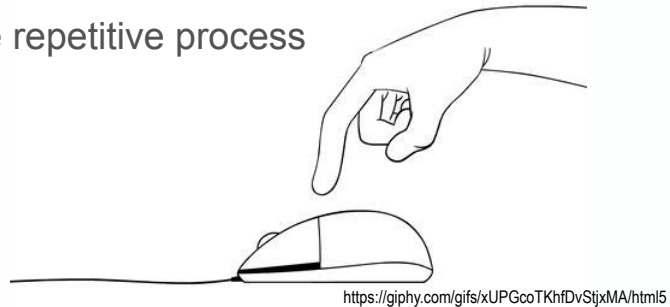
2. Tally the number of clicks

https://giphy.com/gifs/latenightseth-lol-seth-meyers-lnsm-l0XtbC8EniiuwAEOQn

3. Accurately describe the impact of the potential improvement

https://tenor.com/search/counting-money-gifs

It Seemed Simple

- Please add a new field
  - **NEW field (E) = A + B/C**
  - Where A is sourced from 1 of 6 systems
  - B is another customer record sourced from 1 of 6 systems, and
  - C is data provided by a vendor
- Data challenges
  - Some loans were missing field A
  - Others were missing field B
  - Others were missing the vendor-provided value for C
- Explanation
  - We reached out to other systems to populate missing fields, and
  - We created new matching routines to grab data from disparate loan records
  - After months of effort and bringing resolution to everything we could, we were finally ready to go to user acceptance testing
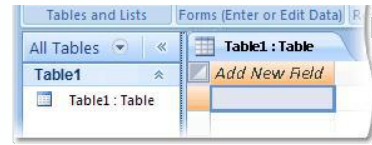
It Seemed Simple

- Before approval of user acceptance testing, the team was asked one question:
  - For how many loans were we able to calculate the new field?
- The response:
  - 43%
- Next question:
  - Why only 43%?
- Responses:
  - We still have bad and missing data
  - We resolved everything we could
  - We do not have the required fields populated for all loans; therefore, the calculation does not return a value
  - We know it sounds low, but we double-checked and all requirements have been satisfied

It Seemed Simple

- Team challenged to conduct deeper dive/provide detailed metrics—not typical of developers
  - Met the challenge/produced metrics around missing data
  - Shared numbers with client, who agreed: 43% did not meet expectations!
- More analyses-after several iterations:
  - Updated business rules to accommodate the "bad data"
  - Used alternate fields when field A, B or C was blank
  - Discovered/corrected zero value errors
  - We identified vendor errors on column C

All percentages are computed as a percentages of the total record count			Orig System 1		Orig System 3		Orig System 3		Orig System 4		Acquisition		Unknown	
	Count	Percentage	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Total Records	267,803		60,567	22.616%	16,002	5.975%	22,502	8.402%	13,743	5.132%	7,178	2.680%	147,811	55.194%
Loans that do not require the NEW Field Calc (E) - per BRD	51,765	19.330%	7,867	2.938%	2,013	0.752%	881	0.329%	1,961	0.732%	1,247	0.466%	37,796	14.119%
Total Records with Paid in Full records removed	216,038		52,700	24.394%	13,989	6.475%	21,621	10.008%	11,782	5.454%	5,931	2.745%	110,015	50.904%
Loans that used a default value from Servicing for New Field Calc (E)	5,384	2.492%	5,029	2.328%	303	0.140%	49	0.023%			3	0.001%		
Computed a valid NEW Field Calc (E)	190,290	88.082%	46,544	21.544%	11,507	6.252%	21,195	9.811%	9,425	4.36%	4,224	1.955%	96,395	44.157%
Loans unable to calc New Field Calc(E)	20,364	9.426%	1,127	0.522%	179	0.083%	377	0.175%	2,357	1.09%	1,704	0.789%	14,620	6.767%
SET Breakdown of the Zero values														
X Vendor returns a ZERO for Value C	5,179	2.397%	675	0.312%			278	0.129%	2,269	1.050%	1,599	0.740%	358	0.166%
X Vendor returns a NULL for Value C	4,420	2.046%	4	0.002%			6	0.003%			1	0.000%	4,409	2.041%
No value for A	192	0.089%	9	0.004%			7	0.003%			1	0.000%	175	0.081%
x No value for B	8,449	3.913%	99	0.046%	0.000%		25	0.012%	7	0.003%	35	0.016%	8,283	3.834%
Invalid value for A	4	0.002%	2	0.001%			1	0.000%					1	0.000%
Invalid value for B	1,319	0.611%	334	0.155%	179	0.083%	60	0.028%	78	0.036%	41	0.019%	627	0.290%
Invalid value for A + B	750	0.347%	1	0.000%									749	0.347%
New Field Calc(E) returns BAD value	51	0.024%	3	0.001%	0.000%				3	0.001%	27	0.012%	18	0.008%
Loans unable to calc New Field Calc(E)	20,364	9.426%	1,127	0.522%	179	0.083%	377	0.175%	2,357	1.091%	1,704	0.789%	14,620	6.767%
Total Computed with highlighted rows added	208,338	96.44%												

place an "X" in column B on selected rows to include values in this total

  - At user acceptance, we increase the rate of "Computed a valid New Field Calc(E)" from 43% to 88% and
  - Explain every scenario of accounts unable to calculate the new field

---

Data-Centric Perspective

- Measure success differently
- Same project
- Same process
- Different measures for success
  - Asking if our data is correct;
  - Valuing data more than we value "on time and within budget";
  - Valuing correct data more than correct processes; and
  - Auditing data rather than project documents
  - $50 million annually!
    - Articulation by Linda Bevolo

Monetization: Time & Leave Tracking

Number of Employees

At Least 300 employees are spending 15 minutes/week tracking leave/time

Pay Grade

District

Salem · Lynchburg · Richmond · Suffolk · Fredericksburg · Staunton · NOVA

Capture Cost of Labor/Category

Annual

Grade	Step 5	6	7	8	9	10	11	12	13	14	15	16	17	
1	12,020.00	12,290.00	12,567.00	12,850.00	13,140.00	13,436.00	13,738.00	14,048.00	14,364.00	14,688.00	15,018.00	15,357.00	15,703.00	16
2	13,140.00	13,436.00	13,738.00	14,048.00	14,364.00	14,688.00	15,018.00	15,357.00	15,703.00	16,056.00	16,418.00	16,788.00	17,166.00	17
3	14,364.00	14,688.00	15,018.00	15,357.00	15,703.00	16,056.00	16,418.00	16,788.00	17,166.00	17,552.00	17,948.00	18,352.00	18,765.00	19
4	15,703.00	16,056.00	16,418.00	16,788.00	17,166.00	17,552.00	17,948.00	18,352.00	18,765.00	19,188.00	19,620.00	20,062.00	20,514.00	20
5	17,166.00	17,552.00	17,948.00	18,352.00	18,765.00	19,188.00	19,620.00	20,062.00	20,514.00	20,976.00	21,449.00	21,932.00	22,426.00	22
6	18,765.00	19,188.00	19,620.00	20,062.00	20,514.00	20,976.00	21,449.00	21,932.00	22,426.00	22,931.00	23,447.00	23,975.00	24,515.00	25
7	20,514.00	20,976.00	21,449.00	21,932.00	22,426.00	22,931.00	23,447.00	23,975.00	24,515.00	25,068.00	25,632.00	26,209.00	26,800.00	27
8	22,426.00	22,931.00	23,447.00	23,975.00	24,515.00	25,068.00	25,632.00	26,209.00	26,800.00	27,403.00	28,021.00	28,652.00	29,297.00	29
9	24,515.00	25,068.00	25,632.00	26,209.00	26,800.00	27,403.00	28,021.00	28,652.00	29,297.00	29,957.00	30,632.00	31,322.00	32,027.00	32
10	26,800.00	27,403.00	28,021.00	28,652.00	29,297.00	29,957.00	30,632.00	31,322.00	32,027.00	32,749.00	33,486.00	34,240.00	35,012.00	35
11	29,297.00	29,957.00	30,632.00	31,322.00	32,027.00	32,749.00	33,486.00	34,240.00	35,012.00	35,800.00	36,607.00	37,431.00	38,274.00	39
12	32,027.00	32,749.00	33,486.00	34,240.00	35,012.00	35,800.00	36,607.00	37,431.00	38,274.00	39,136.00	40,018.00	40,919.00	41,841.00	42
13	35,012.00	35,800.00	36,607.00	37,431.00	38,274.00	39,136.00	40,018.00	40,919.00	41,841.00	42,783.00	43,747.00	44,732.00	45,740.00	46
14	38,274.00	39,136.00	40,018.00	40,919.00	41,841.00	42,783.00	43,747.00	44,732.00	45,740.00	46,770.00	47,823.00	48,900.00	50,002.00	51
15	41,841.00	42,783.00	43,747.00	44,732.00	45,740.00	46,770.00	47,823.00	48,900.00	50,002.00	51,128.00	52,280.00	53,457.00	54,661.00	55
16	45,740.00	46,770.00	47,823.00	48,900.00	50,002.00	51,128.00	52,280.00	53,457.00	54,661.00	55,892.00	57,151.00	58,439.00	59,755.00	61
17	50,002.00	51,128.00	52,280.00	53,457.00	54,661.00	55,892.00	57,151.00	58,439.00	59,755.00	61,101.00	62,477.00	63,884.00	65,323.00	66
18	54,661.00	55,892.00	57,151.00	58,439.00	59,755.00	61,101.00	62,477.00	63,884.00	65,323.00	66,794.00	68,299.00	69,837.00	71,410.00	73
19	59,755.00	61,101.00	62,477.00	63,884.00	65,323.00	66,794.00	68,299.00	69,837.00	71,410.00	73,019.00	74,663.00	76,345.00	78,064.00	79
20	65,323.00	66,794.00	68,299.00	69,837.00	71,410.00	73,019.00	74,663.00	76,345.00	78,064.00	79,823.00	81,621.00	83,459.00	85,339.00	87
21	71,410.00	73,019.00	74,663.00	76,345.00	78,064.00	79,823.00	81,621.00	83,459.00	85,339.00	87,261.00	89,226.00	91,236.00	93,291.00	95
22	78,064.00	79,823.00	81,621.00	83,459.00	85,339.00	87,261.00	89,226.00	91,236.00	93,291.00	95,392.00	97,541.00	99,738.00	101,984.00	104
23	85,339.00	87,261.00	89,226.00	91,236.00	93,291.00	95,392.00	97,541.00	99,738.00	101,984.00	104,282.00	106,630.00	109,032.00	111,488.00	113

Monthly

Grade	Step 5	6	7	8	9	10	11	12	13	14	15	16	17	
1	1,001.67	1,024.17	1,047.25	1,070.83	1,095.00	1,119.67	1,144.83	1,170.67	1,197.00	1,224.00	1,251.50	1,279.75	1,308.58	1
2	1,095.00	1,119.67	1,144.83	1,170.67	1,197.00	1,224.00	1,251.50	1,279.75	1,308.58	1,338.00	1,368.17	1,399.00	1,430.50	1
3	1,197.00	1,224.00	1,251.50	1,279.75	1,308.58	1,338.00	1,368.17	1,399.00	1,430.50	1,462.67	1,495.67	1,529.33	1,563.75	1
4	1,308.58	1,338.00	1,368.17	1,399.00	1,430.50	1,462.67	1,495.67	1,529.33	1,563.75	1,599.00	1,635.00	1,671.83	1,709.50	1
5	1,430.50	1,462.67	1,495.67	1,529.33	1,563.75	1,599.00	1,635.00	1,671.83	1,709.50	1,748.00	1,787.42	1,827.67	1,868.83	1
6	1,563.75	1,599.00	1,635.00	1,671.83	1,709.50	1,748.00	1,787.42	1,827.67	1,868.83	1,910.92	1,953.92	1,997.92	2,042.92	2
7	1,709.50	1,748.00	1,787.42	1,827.67	1,868.83	1,910.92	1,953.92	1,997.92	2,042.92	2,089.00	2,136.00	2,184.08	2,233.33	2
8	1,868.83	1,910.92	1,953.92	1,997.92	2,042.92	2,089.00	2,136.00	2,184.08	2,233.33	2,283.58	2,335.08	2,387.67	2,441.42	2
9	2,042.92	2,089.00	2,136.00	2,184.08	2,233.33	2,283.58	2,335.08	2,387.67	2,441.42	2,496.42	2,552.67	2,610.17	2,668.92	2
10	2,233.33	2,283.58	2,335.08	2,387.67	2,441.42	2,496.42	2,552.67	2,610.17	2,668.92	2,729.08	2,790.50	2,853.33	2,917.67	2
11	2,441.42	2,496.42	2,552.67	2,610.17	2,668.92	2,729.08	2,790.50	2,853.33	2,917.67	2,983.33	3,050.58	3,119.25	3,189.50	3
12	2,668.92	2,729.08	2,790.50	2,853.33	2,917.67	2,983.33	3,050.58	3,119.25	3,189.50	3,261.33	3,334.83	3,409.92	3,486.75	3
13	2,917.67	2,983.33	3,050.58	3,119.25	3,189.50	3,261.33	3,334.83	3,409.92	3,486.75	3,565.25	3,645.58	3,727.67	3,811.67	3
14	3,189.50	3,261.33	3,334.83	3,409.92	3,486.75	3,565.25	3,645.58	3,727.67	3,811.67	3,897.50	3,985.25	4,075.00	4,166.83	4
15	3,486.75	3,565.25	3,645.58	3,727.67	3,811.67	3,897.50	3,985.25	4,075.00	4,166.83	4,260.67	4,356.67	4,454.75	4,555.08	4
16	3,811.67	3,897.50	3,985.25	4,075.00	4,166.83	4,260.67	4,356.67	4,454.75	4,555.08	4,657.67	4,762.58	4,869.92	4,979.58	5
17	4,166.83	4,260.67	4,356.67	4,454.75	4,555.08	4,657.67	4,762.58	4,869.92	4,979.58	5,091.75	5,206.42	5,323.67	5,443.58	5
18	4,555.08	4,657.67	4,762.58	4,869.92	4,979.58	5,091.75	5,206.42	5,323.67	5,443.58	5,566.17	5,691.58	5,819.75	5,950.83	6
19	4,979.58	5,091.75	5,206.42	5,323.67	5,443.58	5,566.17	5,691.58	5,819.75	5,950.83	6,084.92	6,221.92	6,362.08	6,505.33	6
20	5,443.58	5,566.17	5,691.58	5,819.75	5,950.83	6,084.92	6,221.92	6,362.08	6,505.33	6,651.92	6,801.75	6,954.92	7,111.58	7
21	5,950.83	6,084.92	6,221.92	6,362.08	6,505.33	6,651.92	6,801.75	6,954.92	7,111.58	7,271.75	7,435.50	7,603.00	7,774.25	7
22	6,505.33	6,651.92	6,801.75	6,954.92	7,111.58	7,271.75	7,435.50	7,603.00	7,774.25	7,949.33	8,128.42	8,311.50	8,498.67	8
23	7,111.58	7,271.75	7,435.50	7,603.00	7,774.25	7,949.33	8,128.42	8,311.50	8,498.67	8,690.17	8,885.83	9,086.00	9,290.67	9

Pay Period

Grade	Step 5	6	7	8	9	10	11	12	13	14	15	16	17	
1	500.83	512.08	523.63	535.42	547.50	559.83	572.42	585.33	598.50	612.00	625.75	639.88	654.29	
2	547.50	559.83	572.42	585.33	598.50	612.00	625.75	639.88	654.29	669.00	684.08	699.50	715.25	
3	598.50	612.00	625.75	639.88	654.29	669.00	684.08	699.50	715.25	731.33	747.83	764.67	781.88	
4	654.29	669.00	684.08	699.50	715.25	731.33	747.83	764.67	781.88	799.50	817.50	835.92	854.75	
5	715.25	731.33	747.83	764.67	781.88	799.50	817.50	835.92	854.75	874.00	893.71	913.83	934.42	
6	781.88	799.50	817.50	835.92	854.75	874.00	893.71	913.83	934.42	955.46	976.96	998.96	1,021.46	
7	854.75	874.00	893.71	913.83	934.42	955.46	976.96	998.96	1,021.46	1,044.50	1,068.00	1,092.04	1,116.67	1
8	934.42	955.46	976.96	998.96	1,021.46	1,044.50	1,068.00	1,092.04	1,116.67	1,141.79	1,167.54	1,193.83	1,220.71	1
9	1,021.46	1,044.50	1,068.00	1,092.04	1,116.67	1,141.79	1,167.54	1,193.83	1,220.71	1,248.21	1,276.33	1,305.08	1,334.46	1
	1,116.67	1,141.79	1,167.54	1,193.83	1,220.71	1,248.21	1,276.33	1,305.08	1,334.46	1,364.54	1,395.25	1,426.67	1,458.83	1

Compute Additional Labor Costs

District-L (as an example)	Leave Tracking	Time Accounting
Employees	73	50
Number of documents	1000	2040
Timesheet/employee	13.7	40.8
Time spent	0.08	0.25
Hourly Cost (Delta)	$6.92	$6.92
Additive Rate (Delta)	$11.23	$11.23
Cost per timekeeper (Delta)	$12.31	$114.56
Total timekeeper cost	$898.49	$5,727.89
Monthly cost	$21,563.83	$137,469.40

Annual Organizational Totals

- Range $192,000 - $159,000/month

- $100,000 Salem

- $159,000 Lynchburg

- $100,000 Richmond

- $100,000 Suffolk

- $150,000 Fredericksburg

- $100,000 Staunton

- $100,000 NOVA

- $800,000/month or $9,600,000/annually

- *Awareness of the cost of things considered overhead*
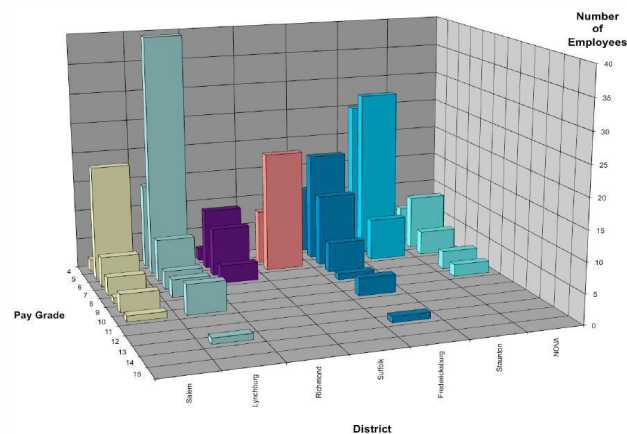
Why should a knowledge worker

- with a PhD in Chemical Engineering
- have to know whether this product was Y2K compliant?

Developer's Guide
Microsoft FOXPRO
Relational Database Manager

I AM MORDAC, THE PREVENTER OF INFOR-MATION SERVICES! I SUMMON THE Y2K DEMON!
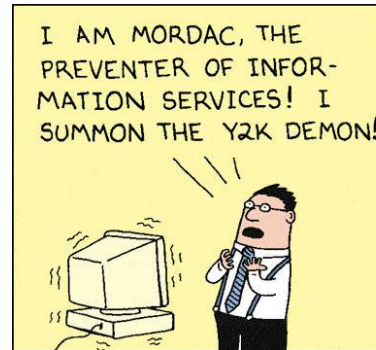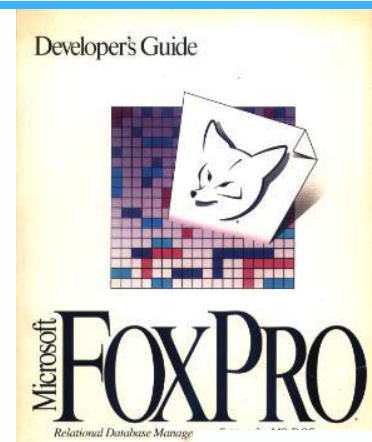
International Chemical Company Engine Testing

- $1billion (+) chemical company
- Develops/manufactures additives enhancing the performance of oils and fuels ...
- ... to enhance engine/machine performance
  – Helps fuels burn cleaner
  – Engines run smoother
  – Machines last longer
- Tens of thousands of tests annually
  – Test costs range up to $250,000!

1. Manual transfer of digital data
2. Manual file movement/duplication
3. Manual data manipulation
4. Disparate synonym reconciliation
5. Tribal knowledge requirements
6. Non-sustainable technology
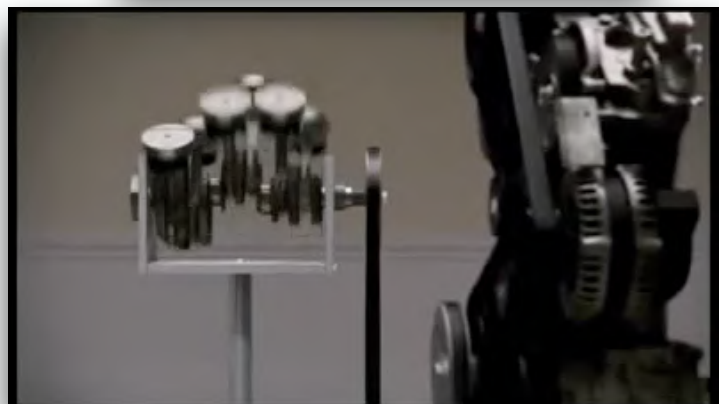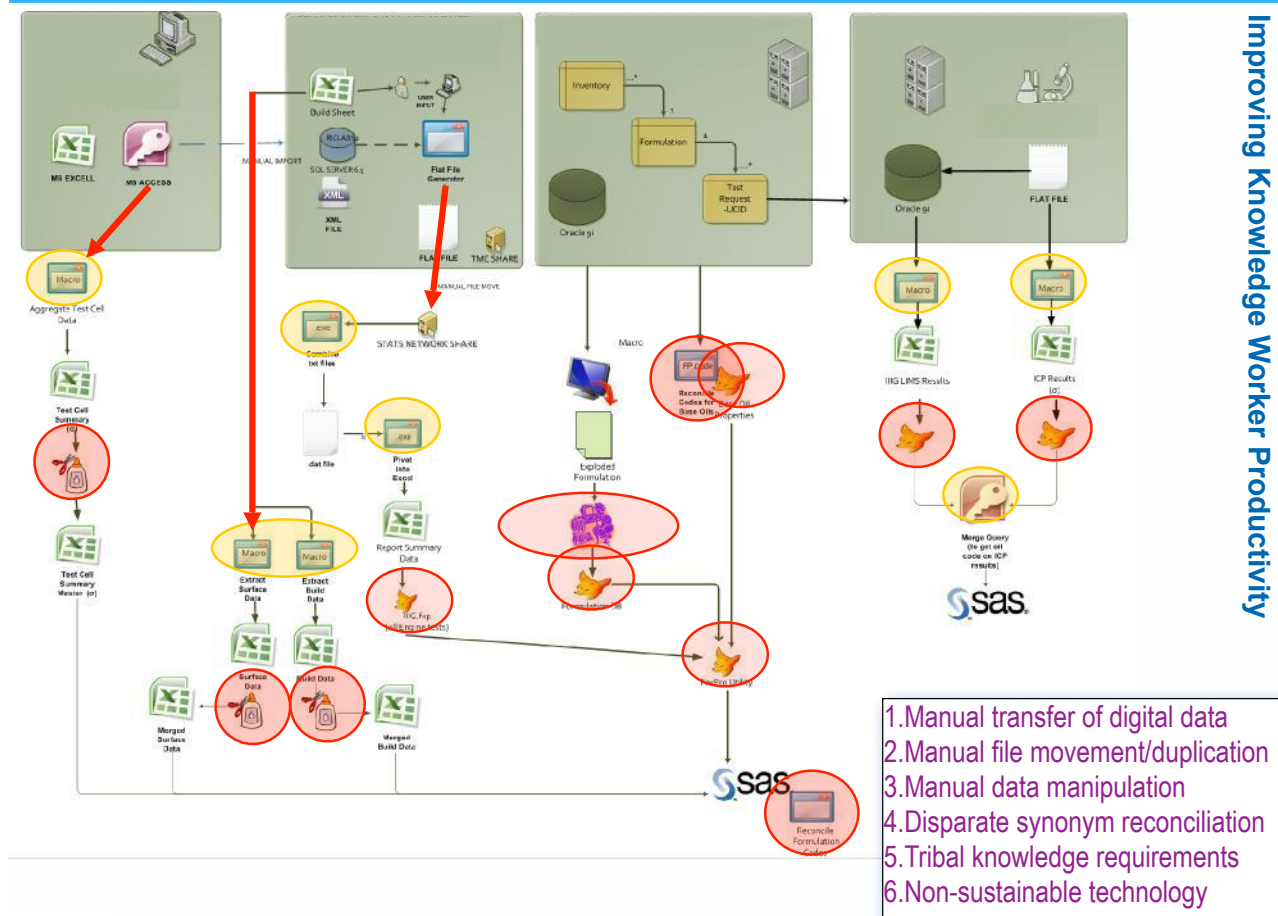
Improving Knowledge Worker Productivity

- Solution:
  - Business process improvements
  - Data architecture development
  - Data quality improvements
  - Integrated system development

- Results:
  - Reduced the number of tests needed to develop products
  - Increase the number of tests per researcher
  - Reduce the time to market for new product development

- According to our client's internal business case development, they expect to realize a $25 million gain each year thanks to data governance improvements

> The opportunity for performance improvement is huge:
>
> "Between the best and worst 1% of performers in a medium complexity (knowledge work) environment there is a 12 to 1 difference in output."
> - Journal of Applied Psychology

ERP Implementation Success

- Most ERP implementations today result in cost and schedule overruns; courtesy of the Standish Group

Pie chart:
- Overrun 55%
- Cancelled 35%

Bar chart:
- Cost: 178% / 100%
- Schedule: 230% / 100%
- Planned Functionality: 59% / 41%
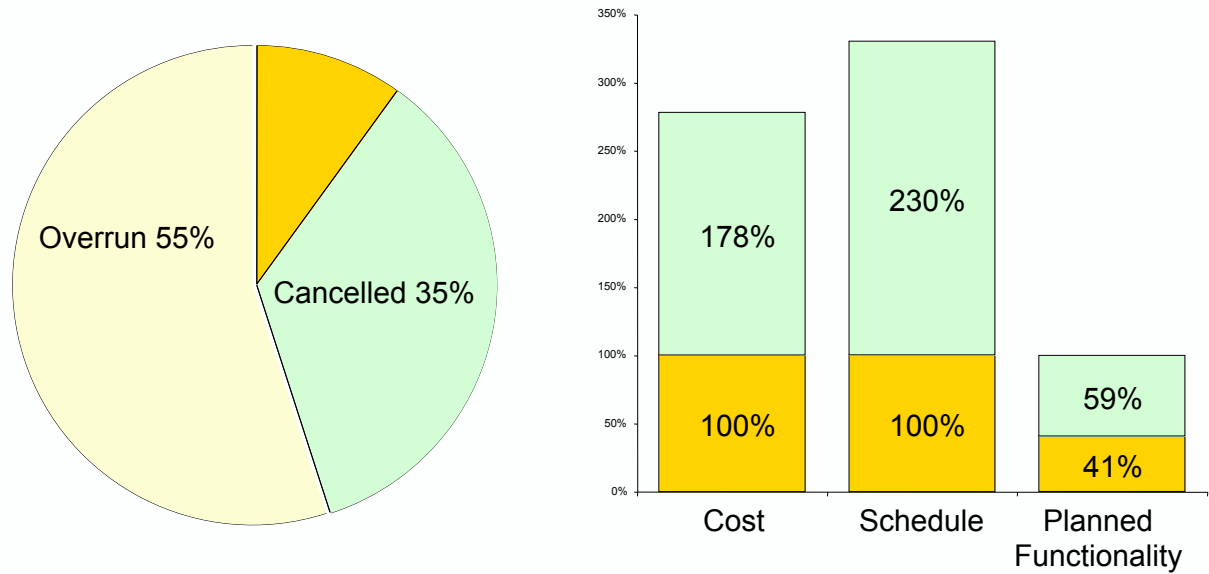
On time, within budget, as planned 10%

From someone selling integrated software?
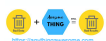
PeopleSoft

Case Study

Reverse-engineering a commercial client–server system from PeopleSoft yielded a valuable resource and proved to be cost-effective. The authors describe the motivations for, approach to, and results of this project, commissioned by the Commonwealth of Virginia's government.

Reverse-Engineering New Systems for Smooth Implementation

Peter Aiken and Ojelanki K. Ngwenyama, Virginia Commonwealth University

Lewis Broome, Innovative Business Solutions

ID	Task Name	Duration	Cost	Work	96		Ju		
---	---	---	---	---	S	S	M	T	W
1	1000 ORGANIZATION	18.01	$128,335.!	82.44					
2	1100 Organize Project	18d	$42,585.:	27.36					
3	1200 Complete Work Program	18d	$71,739.	46.08					
4	Detailed Work Plan and Finalized Deliverable List	0d	$0.0	0d					
5	1300 Develop Quality Plan	18.01	$14,011.:	9d					
6	2000 ESTABLISH DEVELOPMENT ENVIRONMENT	54d	$235,364.:	228.07					
7	2100 Setup Application Software	18d	$51,310.	49.86					
8	2200 Site Preparation	54d	$184,053.	178.2					
9	Comprehensive Backup Pl	0d	$0.0	0d					
10	3000 PLAN CHANGE MANAGEMEN	2.01	$347,901.	249.13					
11	3100 Develop Change Mana	.01	$39,821.	21.97					
12	Change Management Plan	0d	$0.0	0d					
13	3200 Implement Change Mana	36d	$123,597.	91.08					
14	3300 Develop Impact Analysi	18.01	$17,485.	12.96					
15	Impact Analysis Plan	0d	$0.0	0d					
16	3400 Implement Impact Analysis Plan	18d	$166,998.:	123.12					
17	4000 PERFORM CONFIGURATION TEST	72d	$93,585.:	76.14					
18	4100 Prepare for Functional Configuration Testing	54d	$53,091.	36.18					
19	4200 Perform Functional Configuration Testing	18d	$40,493.!	39.96					
20	5000 PRELIMINARY SYSTEM & PROCESS DESIGN	108d	$1,248,758.	1079.82					
21	5100 Analyze Business Processes	54d	$621,386.:	511.92					
22	5200 Software Fit Analysis	54d	$568,447.	505.44					

Actual Bid From Systems Integrator

Task		Summary		Rolled Up Progre
Progress		Rolled Up Task		

Predicting Engineering Problem Characteristics

Legacy System #1: Payroll

Platform:	Amdahl
OS:	MVS
1998 Age:	15
Data Structure:	VSAM/virtual database tables
Physical Records:	780,000
Logical Records:	60,000
Relationships:	64
Entities:	4/350
Attributes:	**683**

Legacy System #2: Personnel

Platform:	UniSys
OS:	OS
1998 Age:	21
Data Structure:	DMS (Network)
Physical Records:	4,950,000
Logical Records:	250,000
Relationships:	62
Entities:	57
Attributes:	**1478**

Characteristics			Logical	Physical
Platform:	WinTel	Records:	250,000	600,000
OS:	Win'95	Relationships:	1,034	1,020
1998 Age:	new	Entities:	1,600	2,706
Data Structure:	Client/Sever RDBMS	Attributes:	15,000	**7,073**

New System

Extreme Data Engineering

2 person months = 40 person days

2,000 attributes mapped onto 15,000

2,000/40 person days = 500/person day or 500/8 hours = 62.5 attributes/hour

and

15,000/40 person days = 375/person day or 375/8 hours = 46.875 attributes/hour

Locate, identify, understand, map, transform, document

108 attributes/60 minutes

1.8 attributes/minute!

Logistics Company

- Fortune 450

- Room of 100 associates

- Manually correcting every item on every customer invoice

- Upon noting this to the responsible manager - the reply:

  – *This is the best quarter*

  – *Of the best year*

  – *I've ever had*

  – *Perhaps I need to double the number in that room?*

If you can fix this in 1 month for less than $750,000,000 then its a positive ROI in 30 days!

Example : Data Integration and Platforms

85%

- Straight Through Processing
  – Auto Everything

- Workflow Event Manager
  – 360 View of the order

- Exception Manager
  – Alert and Notification system when human involvement is needed
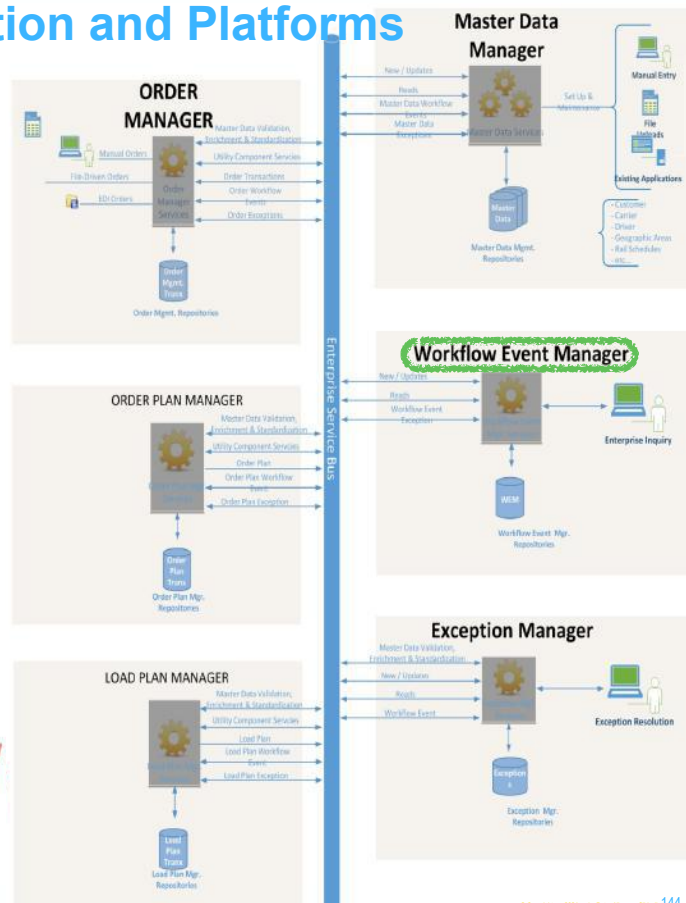
Improving Data Quality during System Migration

Data Catalog

- Challenge

    – Millions of NSN/SKUs maintained in a catalog

    – Key and other data stored in clear text/comment fields

    – Original suggestion was manual approach to text extraction

    – Left the data structuring problem unsolved

- Solution

    – Proprietary, improvable text extraction process

    – Converted non-tabular data into tabular data

    – Saved a minimum of $5 million

    – Literally person centuries of work

Determining Diminishing Returns

Week #	Unmatched Items (% Total)	Ignorable Items (% Total)	Items Matched (% Total)
1	31.47%	1.34%	N/A
2	21.22%	6.97%	N/A
3	20.66%	7.49%	N/A
4	32.48%	11.99%	55.53%
…	…	…	…
14	9.02%	22.62%	68.36%
15	9.06%	22.62%	68.33%
16	9.53%	22.62%	67.85%
17	9.5%	22.62%	67.88%
18	7.46%	22.62%	69.92%

2,000,000

■ Before
■ After

150,000

NSN/SKU Volume
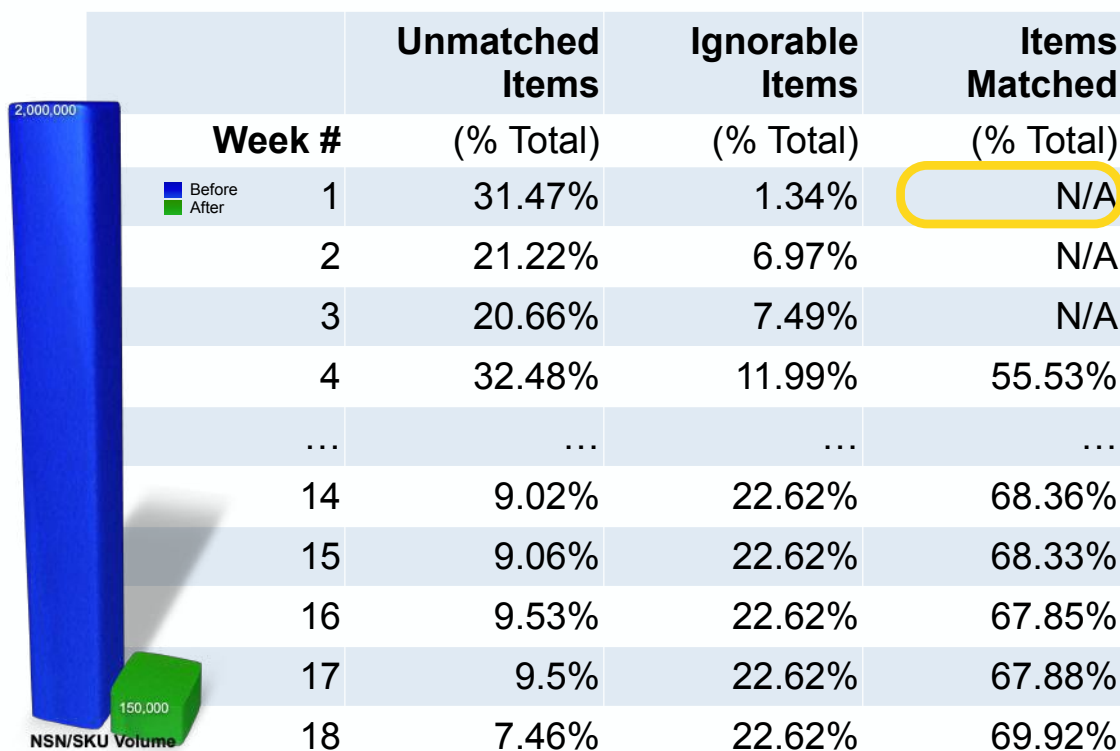
Quantifying Benefits: Original Plan

Time needed to review all NSNs once over the life of the project:	
NSNs	2,000,000
Average time to review & cleanse (in minutes)	5
Total Time (in minutes)	10,000,000
Time available per resource over a one year period of time:	
Work weeks in a year	48
Work days in a week	5
Work hours in a day	7.5
Work minutes in a day	450
Total work minutes/year	108,000
Person years required to cleanse each NSN once prior to migration:	
Minutes needed	10,000,000
Minutes available person/year	108,000
Total Person-Years	92.6
Resource Cost to cleanse NSN's prior to migration:	
Avg salary for SME year (not including overhead)	$60,000.00
Projected years required to cleanse/total DLA person years saved	93
Total cost to cleanse/Total DLA savings to cleanse NSN's:	**$5.5 million**

Quantifying Benefits: Revised Plan

Time needed to review all NSNs once over the life of the project:	
NSNs	150,000
Average time to review & cleanse (in minutes)	5
Total Time (in minutes)	750,000
Time available per resource over a one year period of time:	
Work weeks in a year	48
Work days in a week	5
Work hours in a day	7.5
Work minutes in a day	450
Total work minutes/year	108,000
Person years required to cleanse each NSN once prior to migration:	
Minutes needed	750,000
Minutes available person/year	108,000
Total Person-Years	7
Resource Cost to cleanse NSN's prior to migration:	
Avg salary for SME year (not including overhead)	$60,000.00
Projected years required to cleanse/total DLA person years saved	7
Total cost to cleanse/Total DLA savings to cleanse NSN's:	**$420,000**

Quantifying Benefits: Social Engineering

Time needed to review all NSNs once over the life of the project:	
NSNs	2,000,000
Average time to review & cleanse (in minutes)	5
Total Time (in minutes)	10,000,000
Time available per resource over a one year period of time:	
Work weeks in a year	48
Work days in a week	5
Work hours in a day	7.5
Work minutes in a day	450
Total work minutes/year	108,000
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Projected years required to cleanse/total DLA person years saved	93
Total cost to cleanse/Total DLA savings to cleanse NSN's:	**$5.5 million**

C.W. Bill Young Department of Defense Marrow Donor Program

Home

About the Program

Drive Schedule

Walk-In Sites

Request a Kit

The Donor Process

Donor Stories & Related Articles

FAQ

Contact Us

Scientific Services

Dear Friends,

Welcome to the website of the C.W. Bill Young Department of Defense Marrow Donor Program. This important initiative provides support for military personnel who volunteer as marrow donors. Since the creation of the National Marrow Donor Program in 1986, more than six million Americans, including more than 400,000 service members, have registered as marrow donors.

Whether you serve in the military or not, let me encourage you to take a few minutes today to register as a marrow donor. It is simple, painless, and can be done with either a small blood sample or an oral swab. There is a particularly urgent need for minority donors, but anyone in good health between the ages of 18 and 60 is welcomed.

Each day, thousands of people across America are in need of marrow transplants. Registering as a marrow donor will enable you to give them the most precious gift of all – the gift of life.

Sincerely,

The Honorable C.W. Bill Young

- Introduction/Business Case:
- 1986 National Marrow Donor Program (NMDP) is created
- A marrow or blood cell transplant is performed to help patients with leukemia, lymphoma and other life-threatening diseases live longer and healthier lives
- 6+ million Americans have been added to the registry since then
- Number of new donors increases every year: 400,000 records were added in just 6 months in 2009
- NMPD has centers through the nation; one of these centers: C.W. Bill Young DoD Marrow Donor Center in Rockville, MD
- C.W. Bill Young DoD Marrow Center is the single largest contributor to the NMDP
- It provides support for military personnel who wish to volunteer as marrow donors
- The center's capacity is maxed out with 50,000 to 100,000 new donors being added to the registry every year
- This caseload leaves little time to facilitate or develop improved processes

A National Cancer Institute

- This cancer center is a leader in shaping the fight against cancer
- Over 500 researchers and staff tend to over 12,000 patients annually
- This requires robust information management and analytical services
- The problem: It takes 1 month to run a report on an incident, i.e. a patient's hospital visit that shows all touch points

Results

- Solution:
  - Integrate multiple databases into one to create holistic view of data
  - Automation of manual process
- Results:
  - Data is passed safely and effectively
  - Eliminate inconsistencies, redundancies, and corruption
  - Ability to cross-analyze
  - Significantly reduced turnaround time for matching patients with potential donor -> increased potential to make life-saving connection in a manner that is faster, safer and more reliable
  - Increased safe matches from 3 out of 10 to 6 out of 10

Program Overview

- Data, Data Governance, & Data Leadership
  - Uneven understanding
  - Has lead fractured views of data/data leadership/data governance
  - Requiring forced choices among data governance styles
- Commonalities
  - This is a young profession and must demonstrate
  - Direct support for organizational strategy by
  - Decreasing organizational data debt and
  - Improving data and its use in the short and long term
- Compliance
  - Tangible costs
  - Increasing regulations/examples
  - Need for programatic solutions
- Operational
  - Proactive versus reactive governance
  - How to measure anything (enough)
  - Examples
- Strategic
  - Must be de-coupled from IT strategy
  - Digitization-digital and data are dependent on high speed automation/data processing
  - A specific focus on AI/Data Ethics
- Take Aways/References/Q&A

Ismael Caballero
Mario Piattini *Editors*

Data Governance
From the Fundamentals to Real Cases

Springer

CDO Role Groupings

- **Strategic** CDO
  - The 'strategic CDO' is focused on enabling business success through data
  - extracting value from data through enabling analytics and AI/ML to drive towards becoming an insight-driven organisation (IDO)
  - developing new solutions to support decision-making processes

Deloitte CDO Survey

Non-Fungible Tokens

Business

'Jack Dorsey's First Tweet' NFT Went on Sale for $48M. It Ended With a Top Bid of Just $280

Crypto entrepreneur Sina Estavi bought Twitter founder Jack Dorsey's first-ever tweet as an NFT for $2.9 million last year. He listed the NFT for sale again at $48 million last week.

By Sandali Handagama · Apr 13, 2022 at 2:48 p.m. EDT · Updated Apr 16, 2022 at 10:12 a.m. EDT

CoinDesk

Twitter founder Jack Dorsey's tweet NFT was briefly on sale again. (CoinDesk archives)
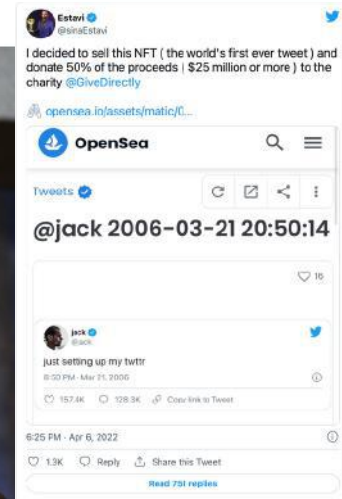
IT Project or Application Centric Development

Strategy

IT Projects

Data/Information

THIS IS WRONG

Original articulation from Doug Bagley @ Walmart

This is the wrong way to think about data strategy

This is correct …

Data Centric Development
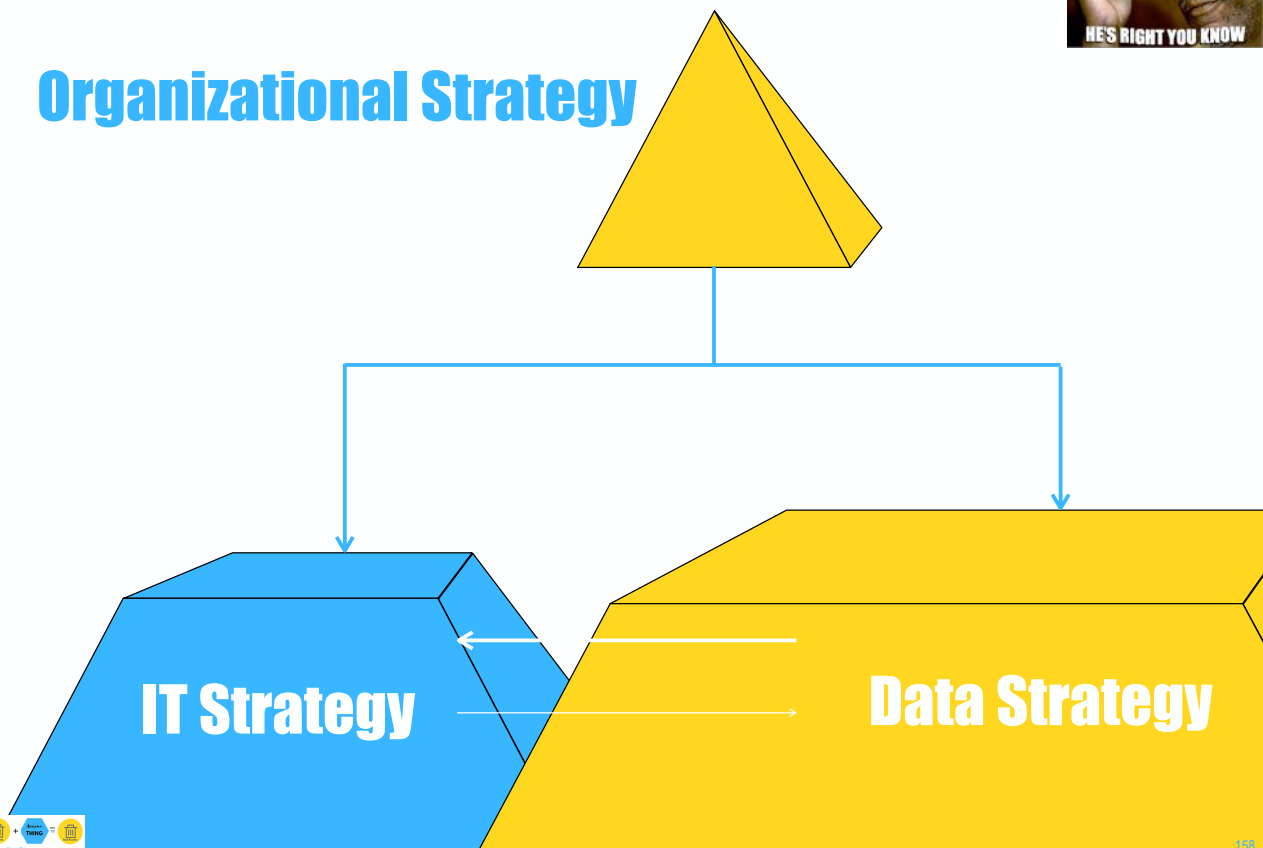
Strategy

↓

Data/Information

↓

IT Projects

Everyone wants to do better data analysis …

100% Some data preparation is inevitable

- What would a 'good' ratio be?
- "Everyone knows"

If everyone knows, them why do we not budget accordingly?

- 80% — Data Preparation
- 20% — Data Analysis

75%
50%
25%
0%

Data Investment Evaluation

- Remember **7-of-9** from Star Trek?
- Peter's version is **1-to-4**
  - If you invest $1 million in any tool/technology?
  - It requires $4 million in people and process support

Bar chart:
- Technology Investment: $1,000,000
- People/Process Support: $4,000,000
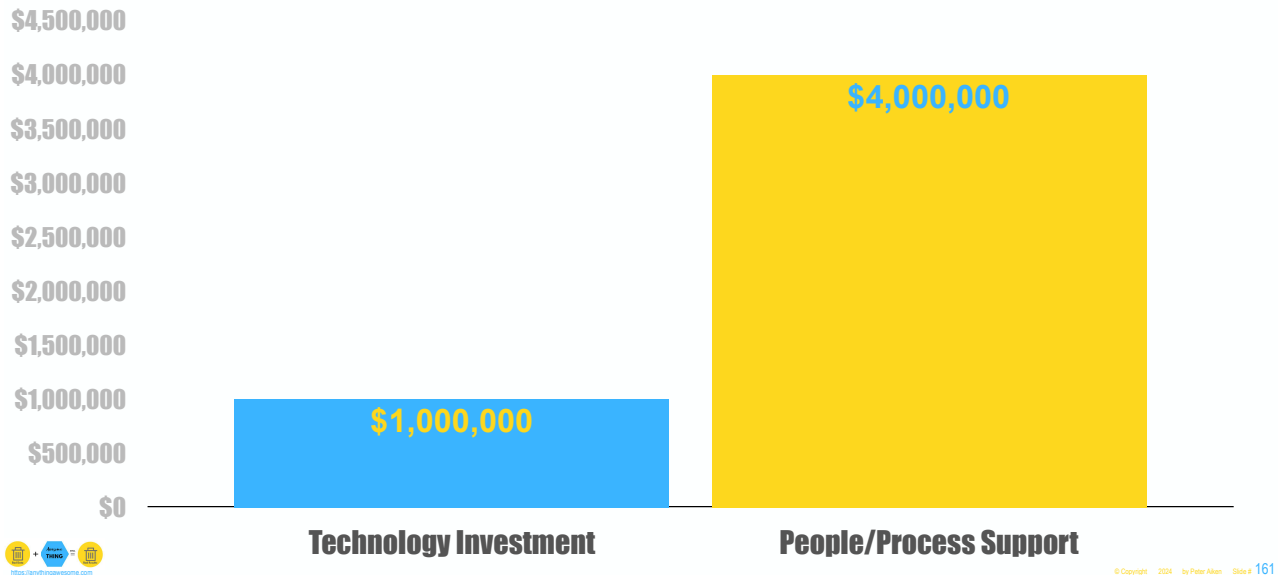
Data Science Productivity

- Munging
  - 80% of time munging and
  - the remainder analyzing data
- A 20% munging improvement decrease doubles overall productivity!
  - Hidden productivity bottlenecks
- Data science challenges:
  - Skillsets are too generalized
  - Not enough interest in 'learning the business'
  - Not productive enough
- Focusing on only one end of the equation is not sufficient
  - Improving productivity must be part of the complete solution!

Munging / Analysis chart (Current → Improved)
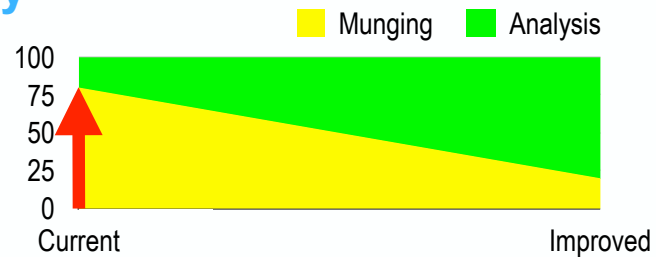
We have created expensive data mungers without systematizing their work so they are all playing piano with pink balls!

Data Scientist?

- Wrong level of abstraction
  - Actuarial Data Scientist
  - Forensic Data Scientist
  - Financial Data Scientist
  - Forestry Data Scientist
  - Marine Data Scientist
  - Chemical Data Scientist
  - Canine Data Scientist
  - Economic Data Scientist
  - Manufacturing Data Scientist
  - FDA Data Scientist
  - Cancer Data Scientist
  - Diabetes Data Scientist
  - Weather Data Scientist
  - Metadata Scientist

Want the #1 Job of 2016?
Glassdoor.com
Become a Health Data Scientist

" ... the median salary for a Data Scientist is an impressive $116,000 and there are over 1,700 job openings. "
Source: Forbes 1.20.2016

slucor.slu.edu

Every day, big data is advancing the industry, and organizations are looking for qualified individuals to analyze, manage and interpret this information.

MS in Health Data Science

SAINT LOUIS UNIVERSITY
CENTER FOR OUTCOMES RESEARCH

For more information, please contact:
Dr. Divya Subramaniam
314-977-9300
dsubram2@slu.edu

Digital Insight

DIGITAL

DATA

— DATA

— DIGITAL

_____

_____

?

DATA

- Subtract data from digital and what do you have?
- Subtract digital from data and you still have data

Digital

It isn't possible to go digital
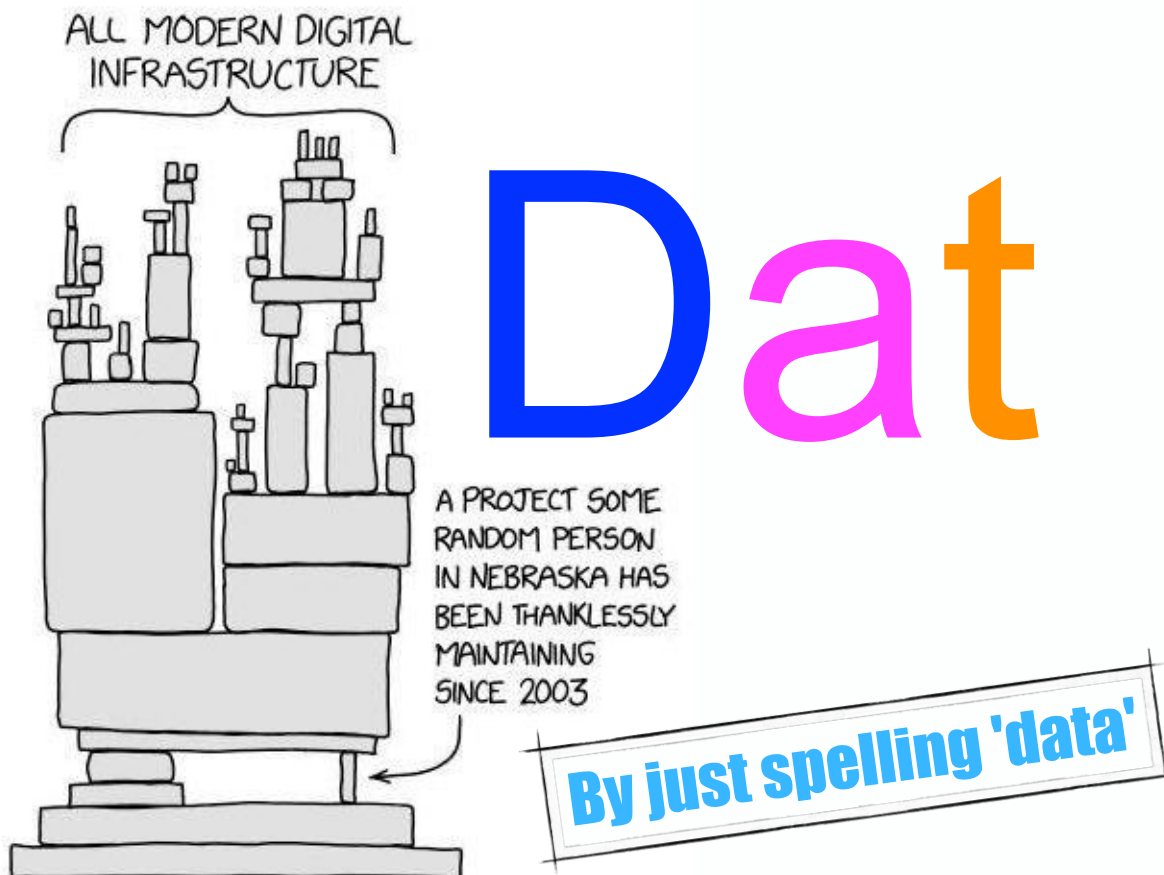
ALL MODERN DIGITAL INFRASTRUCTURE
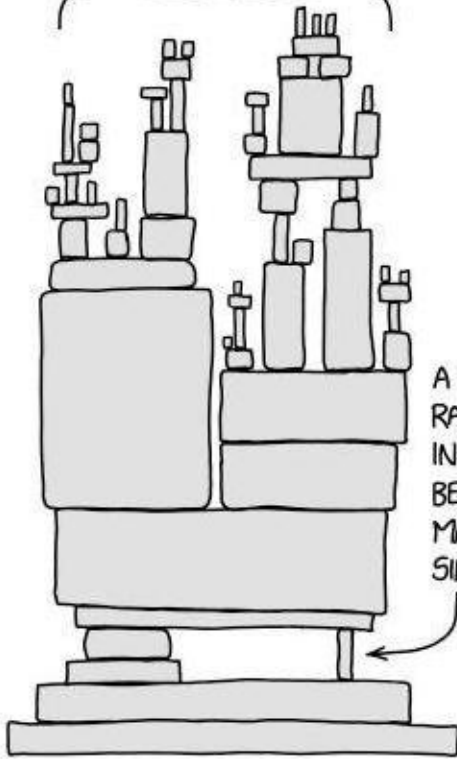
A PROJECT SOME RANDOM PERSON IN NEBRASKA HAS BEEN THANKLESSLY MAINTAINING SINCE 2003

Dat

By just spelling 'data'
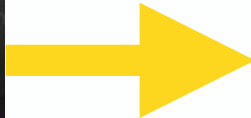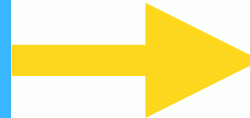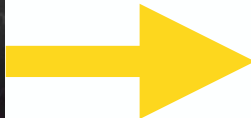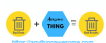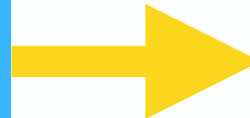
Technological Limitations

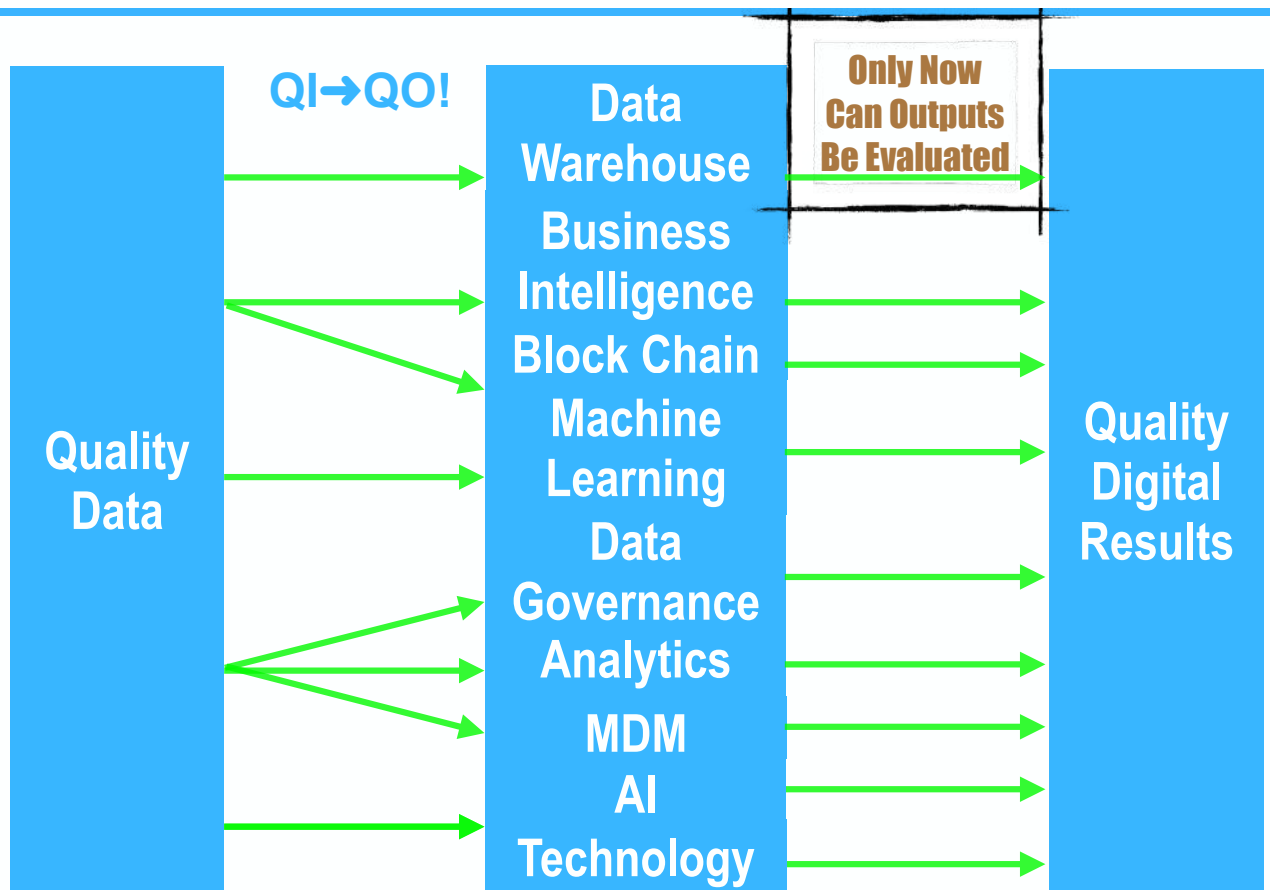**[Bad Data] + Anything Awesome   [will always yield] Bad Results**

Garbage In → Garbage Out

GI→GO!

Garbage Data → **Technology** → **Garbage Digital Results**

Garbage In → Garbage Out!

GI→GO!

Quality Data

Data Warehouse
Business Intelligence
Block Chain
Machine Learning
Data Governance
Analytics
MDM
AI
Technology

Regularized Quality Data Flows

Garbage Digital Results

QI→QO!

Quality Data

Data Warehouse
Business Intelligence
Block Chain
Machine Learning
Data Governance
Analytics
MDM
AI
Technology

Only Now Can Outputs Be Evaluated

Quality Digital Results

Slide 1

GI→GO!   **Today**

Quality Data → **Machine Learning** → **Quality Digital Results**

Slide 2

Dark Data: Data we don't see

DD-Type 1: Data We Know Are Missing
DD-Type 2: Data We Don't Know Are Missing
DD-Type 3: Choosing Just Some Cases
DD-Type 4: Self-Selection
DD-Type 5: Missing What Matters
DD-Type 6: Data Which Might Have Been
DD-Type 7: Changes with Time
DD-Type 8: Definitions of Data
DD-Type 9: Summaries of Data
DD-Type 10: Measurement Error and Uncertainty
DD-Type 11: Feedback and Gaming
DD-Type 12: Information Asymmetry
DD-Type 13: Intentionally Darkened Data
DD-Type 14: Fabricated and Synthetic Data
DD-Type 15: Extrapolating beyond Your Data

DARK DATA
DAVID J. HAND
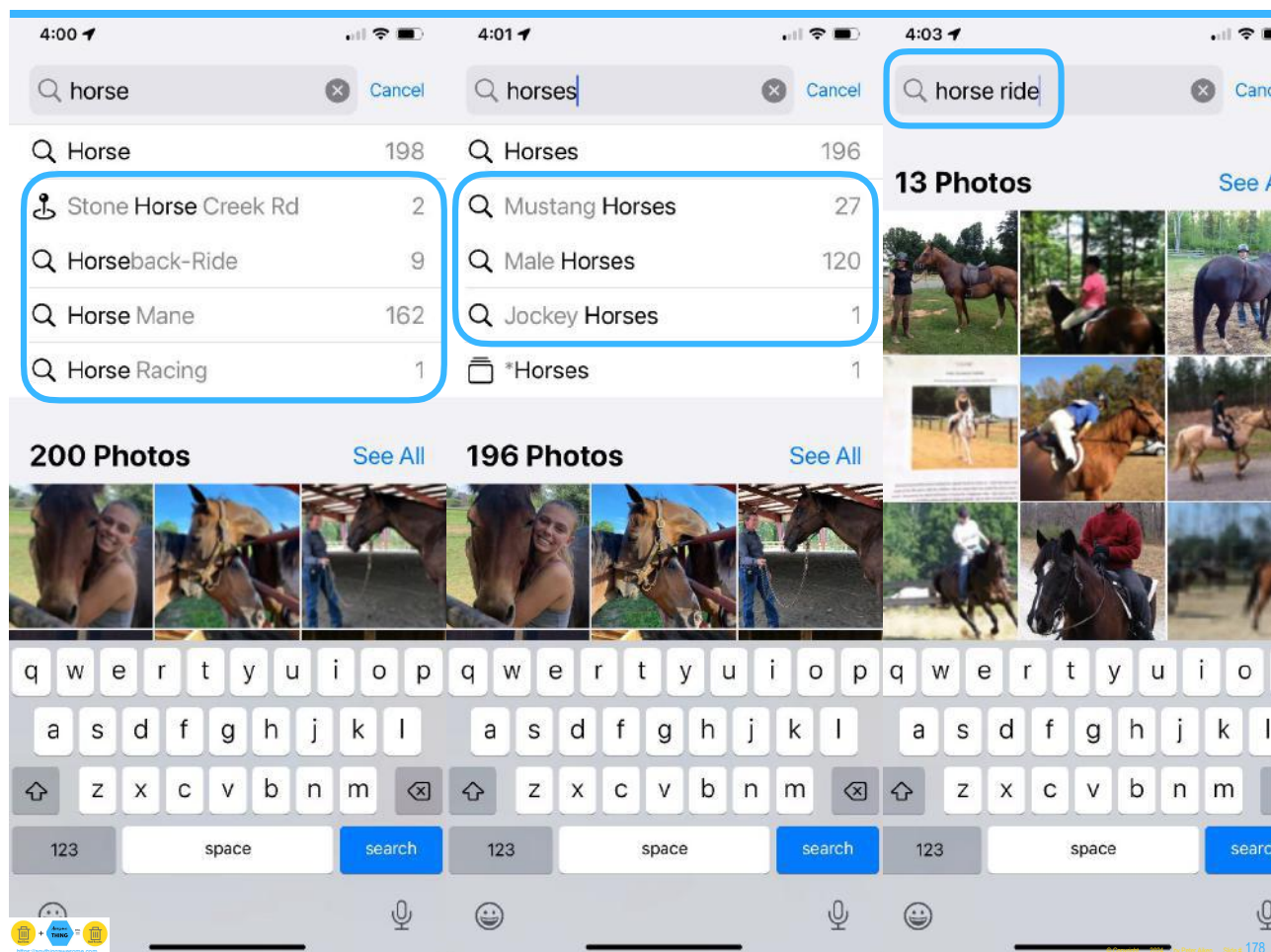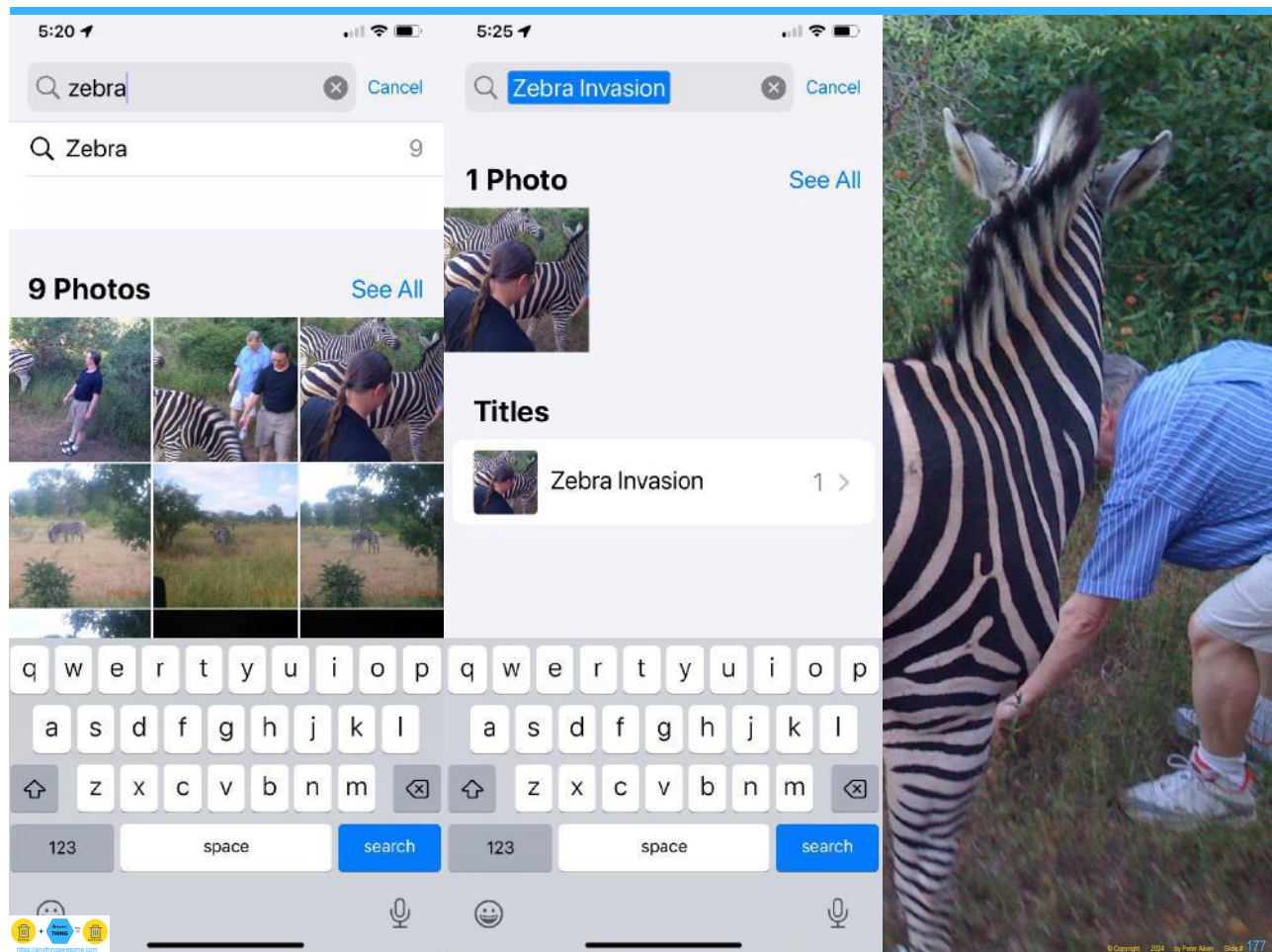
Consulting firm: "Close down palliative care program"

- VCU Health System opened one of first Palliative Care Units in the US, May 2000

  VCU

- Consultants recommended closing it in 2002

  – They looked at net margin for hospitalizations ending on the PC Unit and saw that the costs greatly exceeded reimbursement

  – They thought that getting rid of the unit would get rid of this problem

- RWJ Foundation supported urgent response

- Appropriate financial analyses convinced consultants that the unit actually produced valuable hospital outcomes

  – See KR White & JB Cassel (2009). "The Business Case for a Hospital Palliative Care Unit: Justifying its Continued Existence". Practice of Evidence-Based Management, T Kovner, D Fine & R D'Aquila (Eds.), Chicago: Health Administration Press, pp 171-180

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8 Hospital Study of Cost Reduction

PC consult day 10-11

PC consult day 12-13

Usual Care
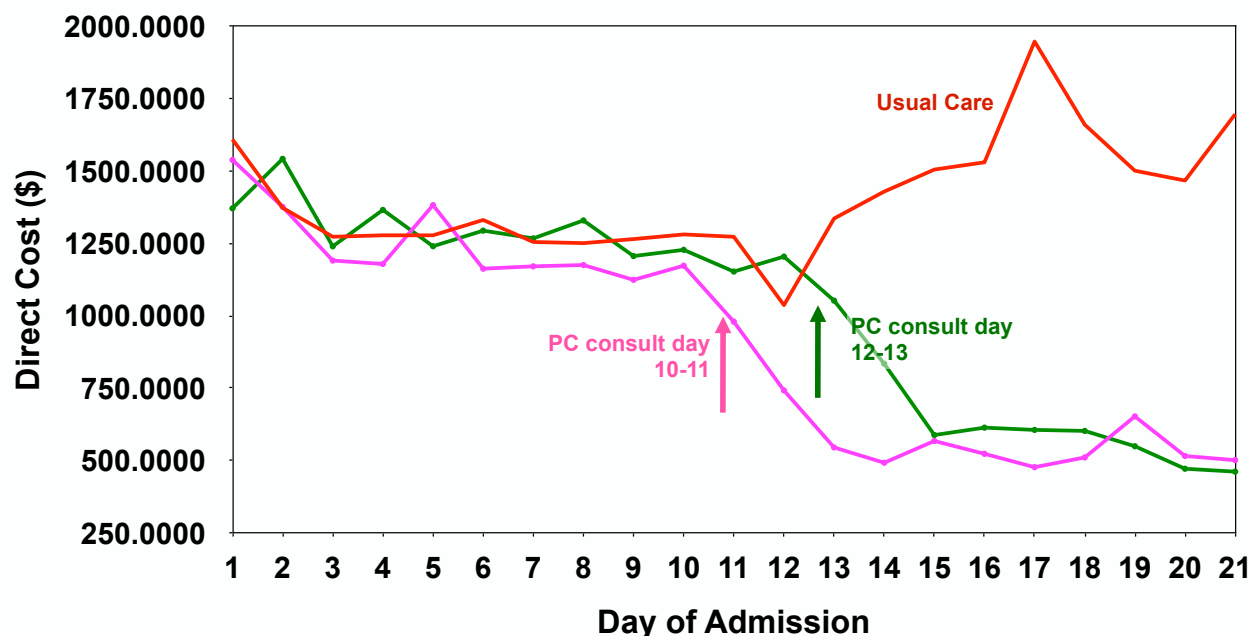
Morrison, Penrod, Cassel et al. (2008). Cost savings associated with US hospital palliative care consultation programs. Archives of Internal Medicine 168 (16), 1783-1790.

"Should I-thinking" must replace "Can I-thinking"

(First efforts capable of being bound by defined behaviors)

Data Ethics

Buzz Aldrin's Travel Voucher

Even astronauts going to the moon follow the rules.

…in Government spacecraft follow the travel rules.

"Government meals and quarters furnished for all the above dates"

Ethical Concerns

- Whether digitizing or modernizing, garbage in–garbage out is constant. It seems such an easy concept. Yet, repeatedly we discover concerning aspects of production systems. Poor results include:

    – Presenting with Pneumonia and ASTHMA at an emergency department and receiving an evaluation of no-big-deal

    – Recognition systems that cannot 'see' certain individuals

    – Sentencing algorithms with obvious discriminatory biases in production throughout the judicial system

    – Self-driving Software Systems that cannot tell the difference between a semi-truck and horse-drawn carriage

---

20 Seconds of Self-driving Software

1. Horse and buggy
2. Pedestrian
3. Semi-truck
4. Semi-truck sideways
5. Pickup truck
6. Semi-truck
7. Oncoming semi
8. Pedestrian following pickup truck
9. Pedestrian following semi-truck

https://www.dailymail.co.uk/sciencetech/article-11123757/Teslas-self-driving-software-confuses-horse-drawn-carriage-highway-semi-truck.html

Our Principles (from Google)

RESPONSIBILITY:

While we are optimistic about the potential of AI, we recognize that advanced technologies can raise important challenges that must be addressed clearly, thoughtfully, and affirmatively. These AI Principles describe our commitment to developing technology responsibly and work to establish specific application areas we will not pursue.

1. Be socially beneficial.
2. Avoid creating or reinforcing unfair bias.
3. Be built and tested for safety.
4. Be accountable to people.
5. Incorporate privacy design principles.
6. Uphold high standards of scientific excellence.
7. Be made available for uses that accord with these principles.

Employee Focus | Balance of Power
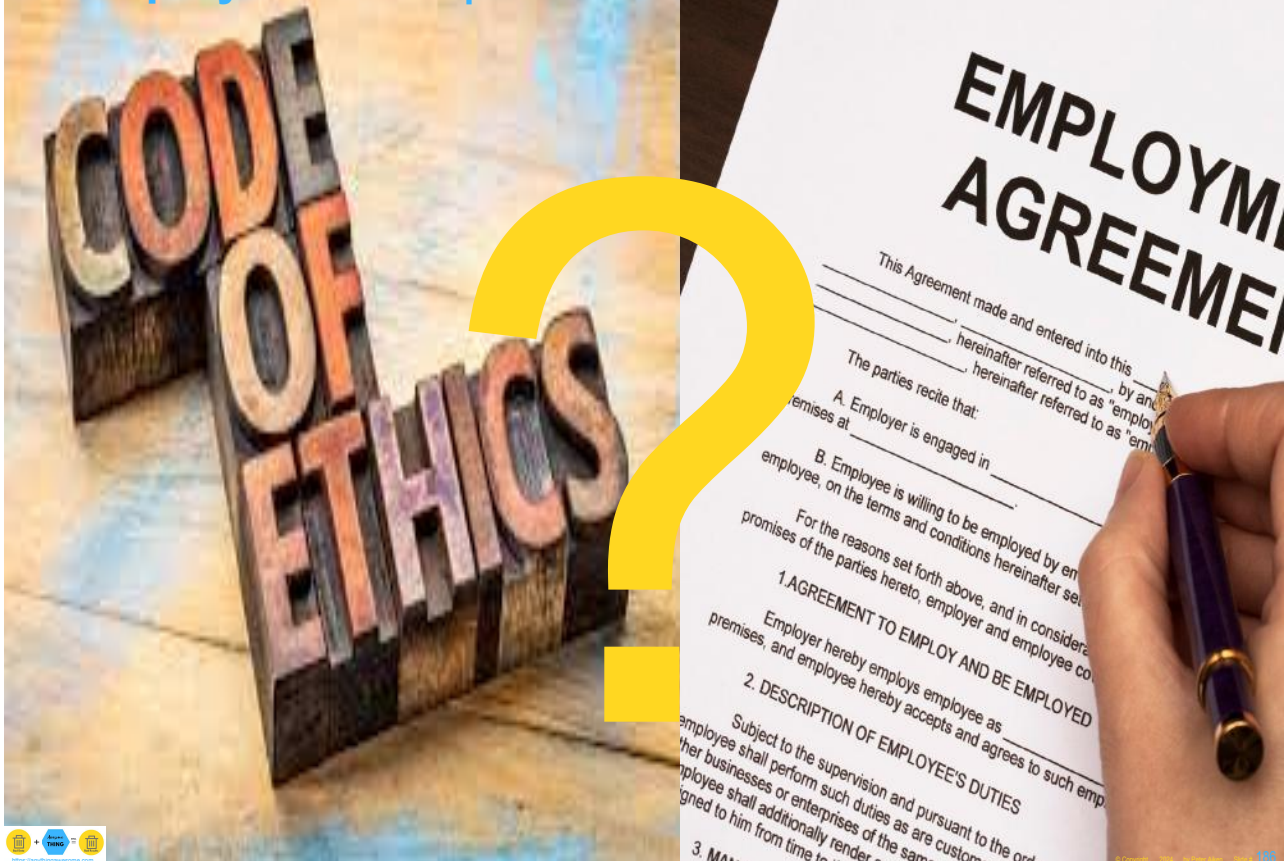
Defining Data Ethics

- Principles of how organizations gather, protect, and use data

- A field of ethics that focuses on the moral obligations that entities have (or should have) when collecting and disseminating information about us

- Studies and evaluates moral problems related to data...and corresponding practices...in order to formulate and support morally good solutions

- Evaluates data practices with the potential to adversely impact people and society

- Moral obligations of gathering, protecting, and using personally identifiable information and how it affects individuals

IMPORTANCE OF **DATA ETHICS** IN COLLECTING, STORING, AND PREPARING DATA

- RESPECT FOR PRIVACY
- ACCOUNTABILITY
- ACCURACY AND INTEGRITY
- LEGAL COMPLIANCE
- FAIRNESS AND BIAS

DATA ETHICS

What Ethics Is Not

- Ethics is not the same as feelings.
  - Feelings do provide important information for our ethical choices. However, while some people have highly developed habits that make them feel bad when they do something wrong, others feel good even though they are doing something wrong. And, often, our feelings will tell us that it is uncomfortable to do the right thing if it is difficult.

- Ethics is not the same as religion.
  - Many people are not religious but act ethically, and some religious people act unethically. Religious traditions can, however, develop and advocate for high ethical standards, such as the Golden Rule.

- Ethics is not the same thing as following the law.
  - A good system of law does incorporate many ethical standards, but law can deviate from what is ethical. Law can become ethically corrupt—a function of power alone and designed to serve the interests of narrow groups. Law may also have a difficult time designing or enforcing standards in some important areas and may be slow to address new problems.

- Ethics is not the same as following culturally accepted norms.
  - Cultures can include both ethical and unethical customs, expectations, and behaviors. While assessing norms, it is important to recognize how one's ethical views can be limited by one's own cultural perspective or background, alongside being culturally sensitive to others.

- Ethics is not science.
  - Social and natural science can provide important data to help us make better and more informed ethical choices. But science alone does not tell us what we ought to do. Some things may be scientifically or technologically possible and yet unethical to develop and deploy.

Six Ethical Lenses
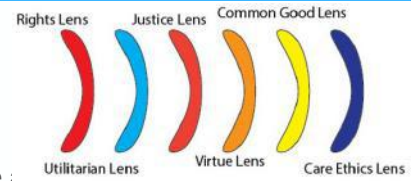
- ## The Rights Lens
  - The one that best protects and respects the moral rights of those a
    https://www.scu.edu/ethics/ethics-resources/ethical-decision-making/rights/

- ## The Utilitarian Lens
  - Some ethicists begin by asking, "How will this action impact everyone affected?"—emphasizing the consequences of our actions.
    https://www.scu.edu/ethics/ethics-resources/ethical-decision-making/calculating-consequences-the-utilitarian-approach/

- ## The Justice Lens
  - Justice is the idea that each person should be given their due, and what people are due is often interpreted as fair or equal treatment.
    https://www.scu.edu/ethics/ethics-resources/ethical-decision-making/justice-and-fairness/

- ## The Virtue Lens
  - A very ancient approach to ethics argues that ethical actions ought to be consistent with certain ideal virtues that provide for the full development of our humanity.
    https://www.scu.edu/ethics/ethics-resources/ethical-decision-making/ethics-and-virtue/

- ## The Common Good Lens
  - According to the common good approach, life in community is a good in itself and our actions should contribute to that life. https://www.scu.edu/ethics/ethics-resources/ethical-decision-making/the-common-good/
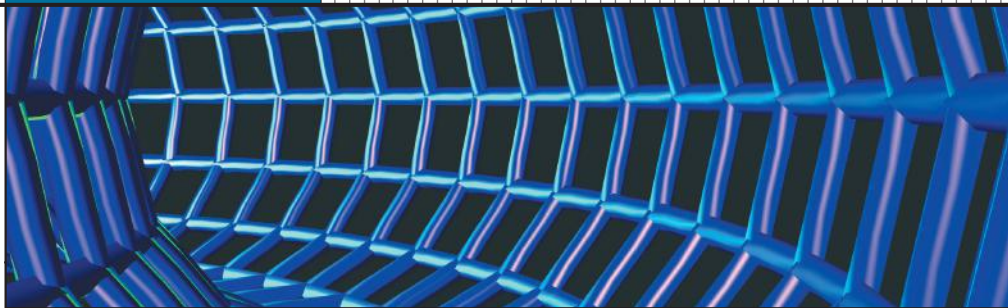
- ## The Care Ethics Lens
  - Care ethics is rooted in relationships and in the need to listen and respond to individuals in their specific circumstances, rather than merely following rules or calculating utility.
    https://www.scu.edu/ethics/ethics-resources/ethical-decision-making/care-ethics/care-ethics.html

Adapted from: https://www.scu.edu/ethics/ethics-resources/a-framework-for-ethical-decision-making/

PERSPECTIVES

Using Codes of Conduct to Resolve Legal Disputes

Peter Aiken, *Virginia Commonwealth University*
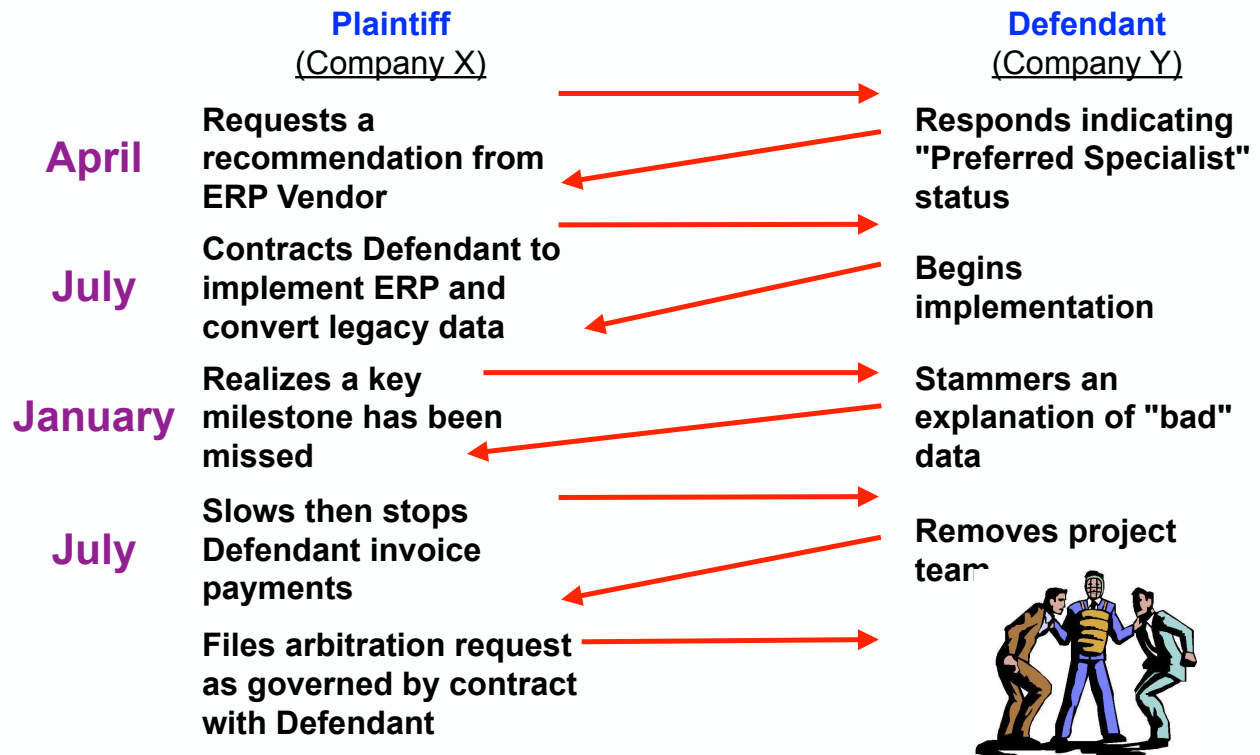**Robert M. Stanley and Juanita Billings,** *Data Blueprint*
Luke Anderson, *Duane Morris LLC*

In the absence of other published standards of care, it is reasonable for contractual parties to rely on an applicable, widely available code of conduct to guide expectations.

Messy Sequencing Towards Arbitration

	Plaintiff (Company X)		**Defendant** (Company Y)
April	Requests a recommendation from ERP Vendor		Responds indicating "Preferred Specialist" status
July	Contracts Defendant to implement ERP and convert legacy data		Begins implementation
January	Realizes a key milestone has been missed		Stammers an explanation of "bad" data
July	Slows then stops Defendant invoice payments		Removes project team
	Files arbitration request as governed by contract with Defendant		

Points of Contention

- Who owned the risks?
- Who was the project manager?
- Was the data of poor quality?
- Did the contractor (Company Y) exercise due care?
- Was their method adequate?
- Were required standards of care followed and were the work products of required quality?

Expert Reports

Ours provided evidence that :

1. Company Y's conversion code introduced errors into the data

2. Some data that Company Y converted was of measurably lower quality than the quality of the data before the conversion

3. Company Y caused harm by not performing an analysis of the Company X's legacy systems and that that the required analysis was not a part of any project plan used by Company Y

4. Company Y caused harm by withholding specific information relating to the perception of the on-site consultants' views on potential project success

---

FBI & Canadian Social Security Gender Codes

1. Male
2. Female
3. Formerly male now female
4. Formerly female now male
5. Uncertain
6. Won't tell
7. Doesn't know
8. Male soon to be female
9. Female soon to be male

```
If column 1 in
source = "m"
• then set
  value of
  target data
  to "male"
• else set
  value of
  target data
  to "female"
```

GENDER CODES — Why Women Are Leaving Computing
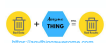
AJHR0213_CAN_UPDATE.SQR

```
!***********************************************************************
! Procedure Name:  230-Assign-PS-Emplid
!
! Description   :  This procedure generates a PeopleSoft Employee ID
!                  (Emplid) by incrementing the last Emplid processed by 1
!                  First it checks if the applicant/employee exists on
!                  the PeopleSoft database using the SSN.
!
!***********************************************************************
Begin-Procedure 230-Assign-PS-Emplid

  move 'N' to $found_in_PS                    !DAR 01/14/04
  move 'N' to $found_on_XXX                   !DAR 01/14/04

  BEGIN-SELECT -Db'DSN=HR83PRD;UID=PS_DEV;PWD=psdevelopment'
NID.EMPLID
NID.NATIONAL_ID

  move 'Y' to $found_in_PS                    !DAR 01/14/04
  move &NID.EMPLID to $ps_emplid

FROM PS_PERS_NID NID
!WHERE NID.NATIONAL_ID = $ps_ssn
WHERE NID.AJ_APPL_ID = $applicant_id
END-SELECT

  if $found_in_PS = 'N'                       !DAR 01/14/04
    do 231-Check-XXX-for-Empl                 !DAR 01/14/04
    if $found_on_XXX = 'N'                     !DAR 01/14/04
      add 1 to #last_emplid
      let $last_emplid = to_char(#last_emplid)
      let $last_emplid = lpad($last_emplid,6,'0')
      let $ps_emplid  = 'AJ' || $last_emplid
    end-if
  end-if                                      !DAR 01/14/04

End-Procedure 230-Assign-PS-Emplid
```

> The defendant knew to prevent duplicate SSNs

> The exclamation point prevents this line from looking for duplicates, so no check is made for a duplicate SSN/National ID

> Legacy systems business rules allowed employees to have more than one AJ_APPL_ID.

SQL Query Analyzer - [Query - PSDBCLUSTER.FS84PRD.PS_READ - Untitled2*]

File Edit Query Tools Window Help

```
SELECT COUNT(*) FROM PS_CUSTOMER
SELECT COUNT(DISTINCT EMPLID) FROM HR83PRD..PS_EMPLOYMENT
```

(No column name)
1 63131

(No column name)
1 100236

10X

Query batch completed.   PSDBCLUSTER (8.0) PS_READ (252) FS84PRD 0:00:00 2 rows Ln 2, Col 58

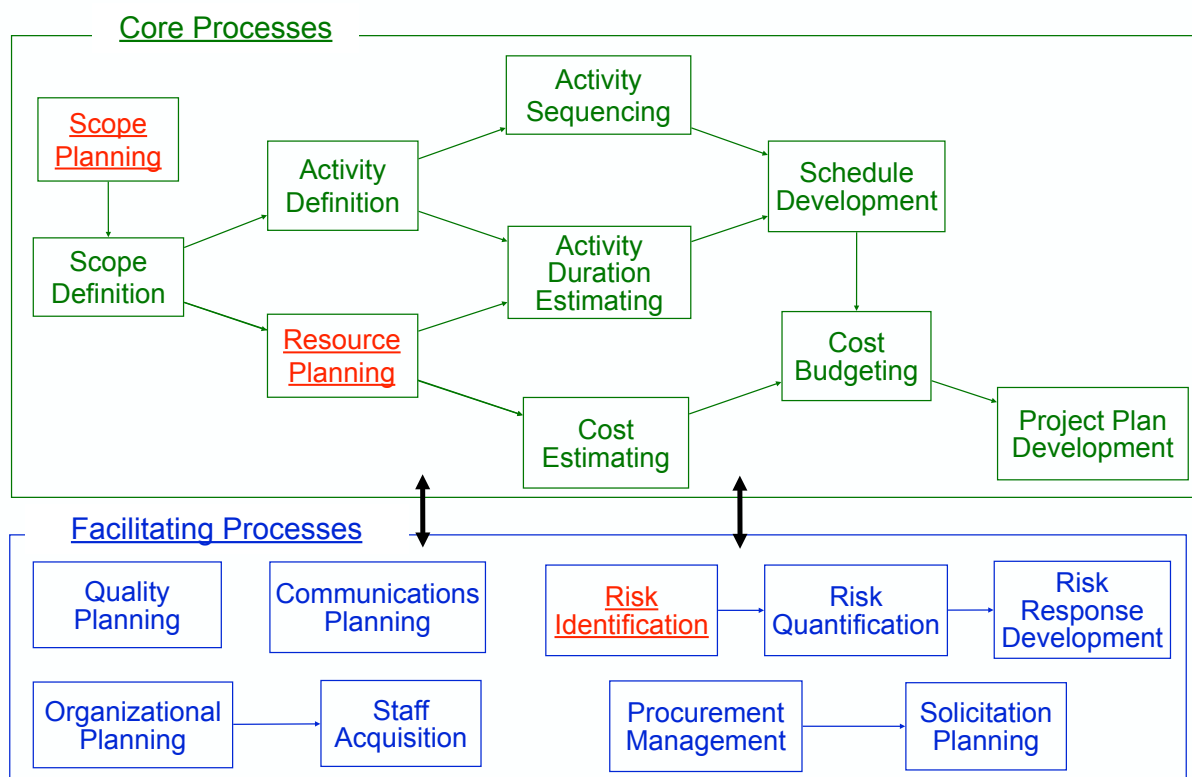Connections: 2   NUM

Identified & Quantified Risks

Risk	High	Med	Low	Notes
User knowledge transfer – training	X			The lack of permanent PeopleSoft technical staff will make knowledge transfer a greater challenge as compared to a project where the PeopleSoft technical staff members are permanent employees. Also, the Sales Colleagues are spread throughout the country and will need to do inquiries upon the system. Training and Buy-in will be challenging for them.
User Buy-In	X			End users are focused on the current environment. Change introduces overhead to their daily operations that affects how willingly they adapt to any new application and the necessary related process changes.
implementation and rollout not timely or complete.	X			
Quality of Conversion Data	X			has customers in 4 different databases, each of which may contain the same customer multiple times with active open balances.

PMBOK Project Planning Processes

Core Processes

- Scope Planning
- Scope Definition
- Activity Definition
- Activity Sequencing
- Activity Duration Estimating
- Resource Planning
- Cost Estimating
- Schedule Development
- Cost Budgeting
- Project Plan Development

Facilitating Processes

- Quality Planning
- Communications Planning
- Risk Identification
- Risk Quantification
- Risk Response Development
- Organizational Planning
- Staff Acquisition
- Procurement Management
- Solicitation Planning

Risk Response

"Risk response development involves defining enhancement steps for opportunities and threats."

Page 119, Duncan, W., *A Guide to the Project Management Body of Knowledge*, PMI, 1996

Tasks	Hours
New Year Conversion	120
Tax and payroll balance conversion	120
General Ledger conversion	80
Total	320

Resource	Hours
G/L Consultant	40
Project Manager	40
Recievables Consultant	40
HRMS Technical Consultant	40
Technical Lead Consultant	40
HRMS Consultant	40
Financials Technical Consultant	40
Total	280

"The go-live date may need to be extended due to certain critical path deliverables not being met. This extension will require additional tasks and resources. The decision of whether or not to extend the go-live date should be made by Monday, November 3, 20XX so that resources can be allocated to the additional tasks."

Delay	Weekly Resources	Weeks	Tasks	Cumulative
January (5 weeks)	280	5	320	1720
February (4 weeks)	280	4		1120
			Total	2840

Project Management Planning

Process Planning Area	Company Y		Company X
	Methodology	Demonstrate	
Scope Planning	√	√	
Scope Definition	√	√	
Activity Definition		√	
Activity Sequencing		√	
Activity Duration Estimation		√	
Schedule Development		√	
Resource Planning	√	√	
Cost Estimating		√	
Cost Budgeting		√	
Project Plan Development		?	
Quality Planning		?	?
Communication Planning	√	√	
Risk Identification	√	√	
Risk Quantification		√	
Risk Response	√	?	?
Organizational Planning	√	√	
Staff Acquisition		√	

Inadequate Standard of Care

Week Begin Date	7/7		8/4		9/1		10/6		11/3				12/1				12/29				1/26	
Project Components																						
Project Management	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░
Preview Meetings	░	░																				
Preview Presentation			█																			
System Configuration			░	░	░	░	░	░														
Design and Development			░	░	░	░	░	░														
System Testing							░	░	░	░												
Design Freeze										█												
Parallel/Volume Testing											░	░	░	░								
Training											░	░	░	░	░	░						
Code Freeze															█							
Production migration															░	░	░					
Go-Live																	█	█				
Production Support																	░	░	░	░	░	░

Inadequate Standard of Care - Tasks without Predecessors

Subdirectory	File name	Last date saved	Total tasks	Tasks with predecessors
Project_Plan\Backup		10/2/2	210	9
Project_Plan\Backup		10/15/	214	9
Project_Plan		11/17/	264	0
Project_Plan		11/18/	262	0
Project_Plan		12/2/2	274	0
Rodolphe		12/2/2	274	0
Rodolphe		12/2/2	0	0
Project_Plan		1/27/2	0	0
Project_Plan		2/23/2	424	3
Project_Plan		2/26/2	425	3
Project_Plan		3/22/2	438	3
Project_Plan		3/22/2	438	3
Project_Plan		4/19/2	470	3
Project_Plan		5/11/2	485	15
Project_Plan		5/13/2	493	15
Project_Plan		5/18/2	499	15
Project_Plan		6/16/2	125	12

Inadequate Standard of Care

Legend:
- Overallocated: (red)
- Allocated: (blue)

Peak Units: 100% 200% 300% 400% 500% 400% 100% 100%
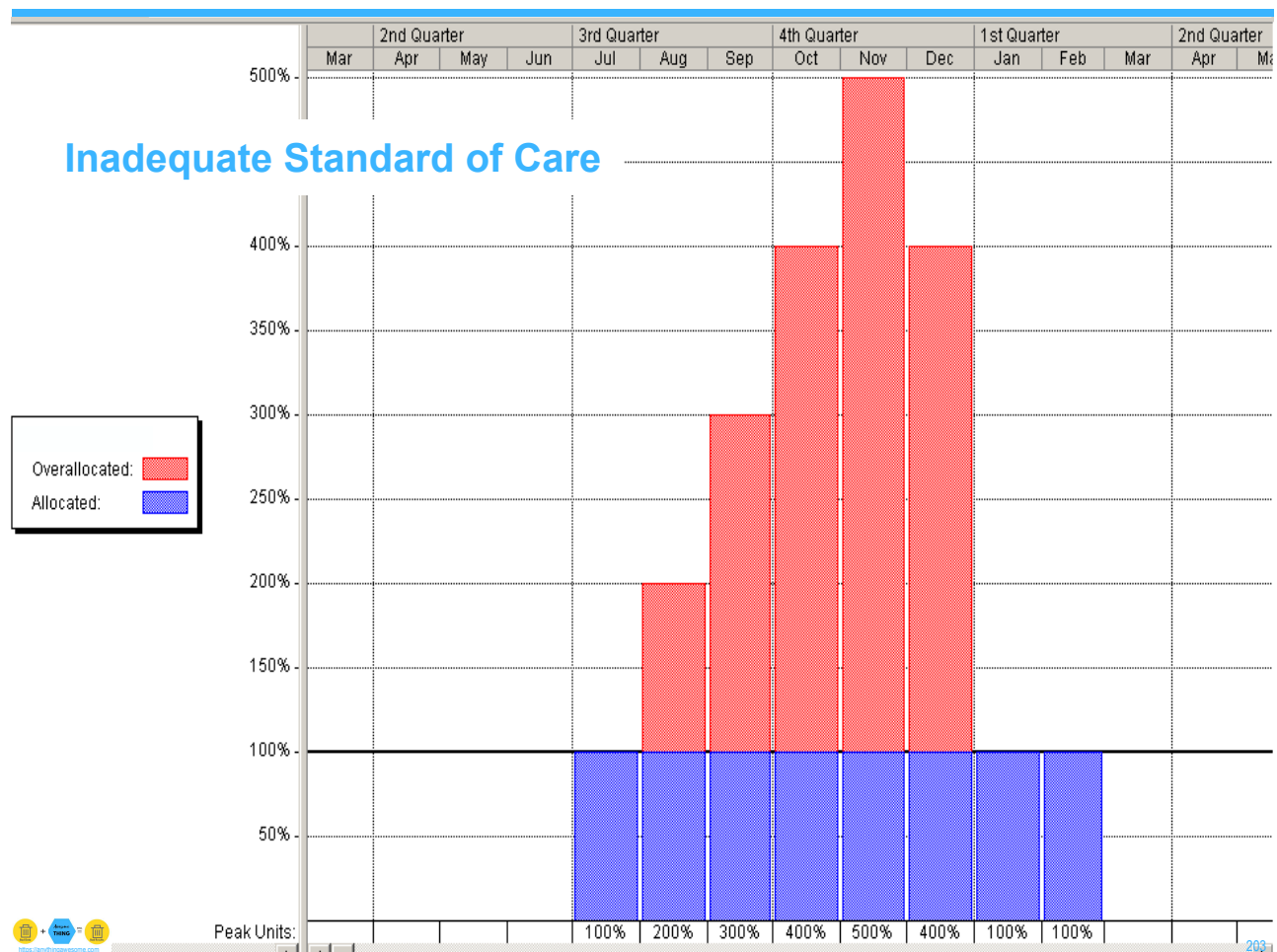
From:
Sent: Sunday, December 21
To:
Subject: RE: Status and Next Steps

prepared for the blood bath.

I know you are in a very   position at the moment but I am very concerned about our go-live. There is so much left to do and very little time b/c of the holidays. It is going to be so brutal that I am not sure the client is prepared for the blood bath. I created a list of reasons why this go-live is in serious danger of being one of bloodiest:

- We have not been able to successfully run thru a parallel test. I do not feel comfortable going live without a fully successful parallel test(two would be better, but at least one would do). By successful I mean an A & B that go without any errors. We are getting there but have a long way to go.
    - 3B is still not completed b/c of a case of pure stupidity by a   resource, not to be named here. This blunder could kill us all by itself.
    - 4 is still not even started b/c again the client cannot give us consistent data feeds from the legacy systems. I heard over 1000 customers were missing in the last load. We had 100 orders/assignments in error. Yes, things are getting better but this is our 4th pass at parallel and things should be worked out by now. They are not.
    -         - Data just came to late to us for us to be ready. It took us three weeks to work out bugs with the US data. Who knows how long it will take.
- Sales Tax - B/c of the client we receiving this data too late for conversion in cycle 4. It is not   fault at all but we have not tested this in a full blown customer conversion b/c he couldn't get the code done in time before the load. This is b/c we received the info too late and b/c he had to work thru a thousand other issues with conversion. ? PAYROLL?

Professional & Workmanlike Manner

> warrants that the services it provides hereunder will be performed in a professional and workmanlike manner in accordance with industry standards.

(Defendant) *warrants that the services it provides hereunder will be performed in a professional and workmanlike manner in accordance with industry standards.*

The Defense's "Industry Standards"

* **Question**:
  * *What are the industry standards that you are referring to?*
* **Answer**:
  * *There is nothing written or codified, but it is the standards which are recognized by the consulting firms in our (industry).*
* **Question**:
  * *I understand from what you told me just a moment ago that the industry standards that you are referring to here are not written down anywhere; is that correct?*
* **Answer**:
  * *That is my understanding.*
* **Question**:
  * *Have you made an effort to locate these industry standards and have simply not been able to do so?*
* **Answer**:
  – *I would not know where to begin to look.*

Published Industry Standards Guidance

- IEEE (365,000 members)
  - Institute of Electrical and Electronic Engineers
  - 150 countries, 40 percent outside the United States
  - 128 transactions, journals and magazines
  - 300 conferences
- ACM (80,000+ members)
  - Association of Computing Machinery
  - 100 conferences annually
- ICCP (50,000+ members)
  - Institute for Certification of Computing Professionals
- DAMA International (5,000 + members)
  - Data Management Association
  - Largest Data/Metadata conference

IEEE COMPUTER SOCIETY
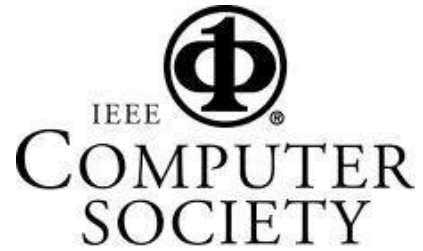
Association for Computing Machinery

Advancing Computing as a Science & Profession

ICCP

DAMA International — Data Management International
The Premier Organization for Data Professionals Worldwide

https://anythingawesome.com

 IEEE

IEEE Code of Ethics

We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and in accepting a personal obligation to our profession, its members and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct and agree:

1. To accept responsibility in making engineering decisions consistent with the safety, health and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;
2. To avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;
3. To be honest and realistic in stating claims or estimates based on available data;
4. To reject bribery in all its forms;
5. To improve the understanding of technology, its appropriate application, and potential consequences;
6. **To maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;**
7. To seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;
8. To treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin;
9. To avoid injuring others, their property, reputation, or employment by false or malicious action;
10. To assist colleagues and co-workers in their professional development and to support them in following this code of ethics. [Approved by the IEEE Board of Directors, August 1990]

http://www.ieee.org/portal/site/mainsite/menuitem.818b4d9d9d1fb672ac7ac2ac2ac8/index.jsp?&pName=corp_level1&path=about/whatis&file=code.xml&xsl=generic.xsl accessed on 4/10/04.

https://anythingawesome.com

1. General Moral Imperatives.

1.2 Avoid harm to others

- Well-intended actions, including those that accomplish assigned duties, may lead to harm unexpectedly. In such an event the responsible person or persons are obligated to undo or mitigate the negative consequences as much as possible. **One way to avoid unintentional harms is to carefully consider potential impacts on all those affected by decisions made during design and implementation.**

- **To minimize the possibility of indirectly harming others, computing professionals must minimize malfunctions by following generally accepted standards for system design and testing.** Furthermore, it is often necessary to assess the social consequences of systems to project the likelihood of any serious harm to others. If system features are misrepresented to users, coworkers, or supervisors, the individual computing professional is responsible for any resulting injury.

http://www.acm.org/constitution/code.html

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https://anythingawesome.com

Outcome

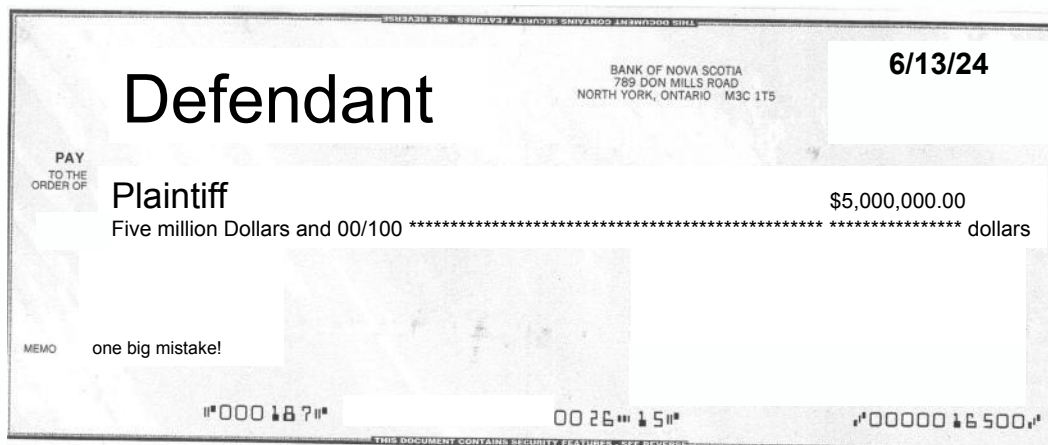- Three days after the hearing, the panel issued a one-page decision awarding damages of $5 million to Company X

Defendant

BANK OF NOVA SCOTIA
789 DON MILLS ROAD
NORTH YORK, ONTARIO M3C 1T5

6/13/24

PAY TO THE ORDER OF

Plaintiff $5,000,000.00

Five million Dollars and 00/100 *** **************** dollars

MEMO   one big mistake!

⑈"000 18 7⑈"   00 26⑈ 15⑈"   ⑈"00000 16 500⑈"

THIS DOCUMENT CONTAINS SECURITY FEATURES - SEE REVERSE

https://anythingawesome.com

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Illustration by The Atlantic. Sources: Rabbit; Getty.

by Caroline Mimbs Nyce

TECHNOLOGY

I WITNESSED THE FUTURE OF AI, AND IT'S A BROKEN TOY

DJIA Futures **33824.00** 0.07% ▲   S&P 500 F **4368.75** 0.05% ▼   Stoxx 600 **450.77** 1.57% ▲   U.S. 10 Yr **29/32** 4.702% ▲   Crude Oil **85.78** 0.69% ▼   Euro

THE WALL STREET JOURNAL.

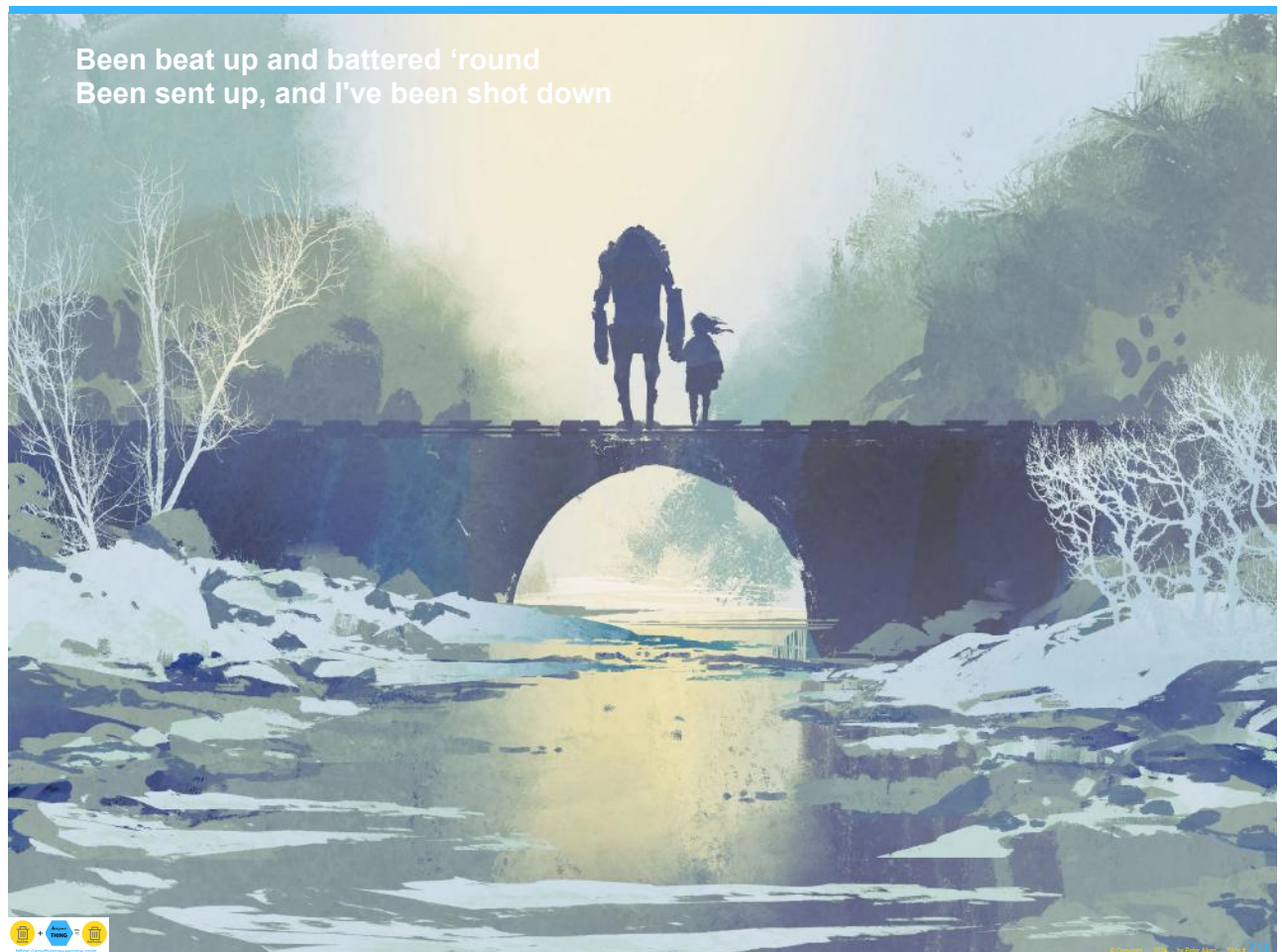# Big Tech Struggles to Turn AI Hype Into Profits

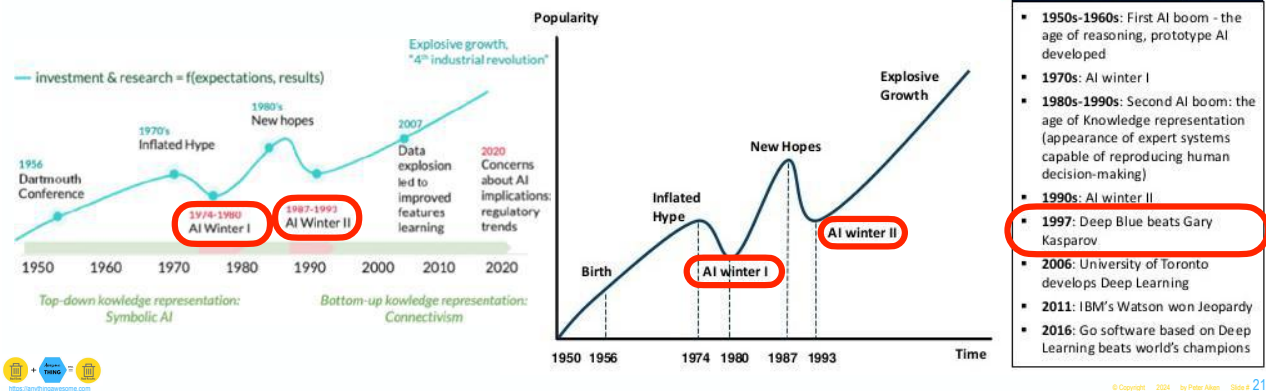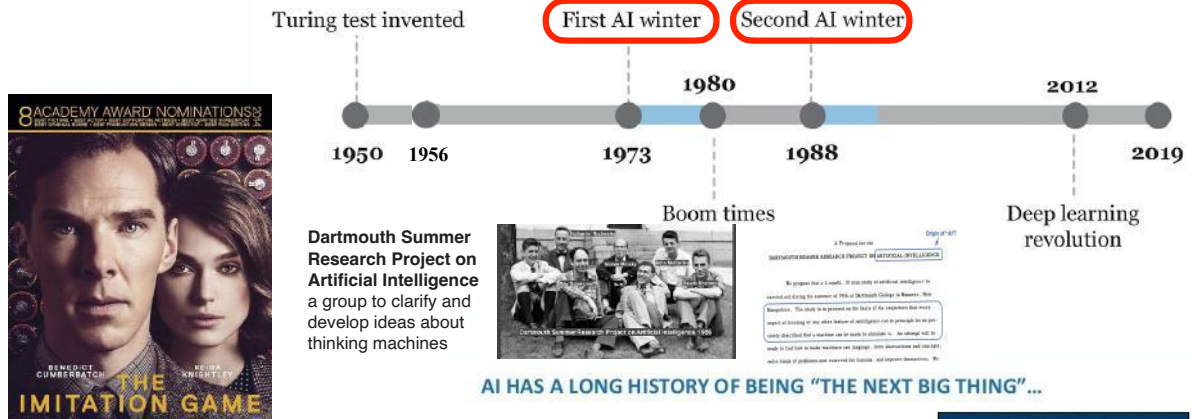Microsoft, Google and others experiment with how to produce, market and charge for new tools

George Harrison
Bob Dylan
Jeff Lynne
Tom Petty
Roy Orbison

Been beat up and battered 'round
Been sent up, and I've been shot down

Dartmouth Summer Research Project on Artificial Intelligence

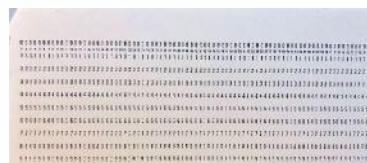Turing test invented — First AI winter — Second AI winter

1950 1956 1973 **1980** 1988 **2012** 2019

Boom times — Deep learning revolution

Dartmouth Summer Research Project on Artificial Intelligence a group to clarify and develop ideas about thinking machines

AI HAS A LONG HISTORY OF BEING "THE NEXT BIG THING"…

Timeline of AI Development

- **1950s-1960s**: First AI boom - the age of reasoning, prototype AI developed
- **1970s**: AI winter I
- **1980s-1990s**: Second AI boom: the age of Knowledge representation (appearance of expert systems capable of reproducing human decision-making)
- **1990s**: AI winter II
- **1997**: Deep Blue beats Gary Kasparov
- **2006**: University of Toronto develops Deep Learning
- **2011**: IBM's Watson won Jeopardy
- **2016**: Go software based on Deep Learning beats world's champions

Augusta Ada King
(aka Lady Ada, Countess of Lovelace)

Jacquard machine 1804

https://people.well.com/user/adatoole/bio.htm
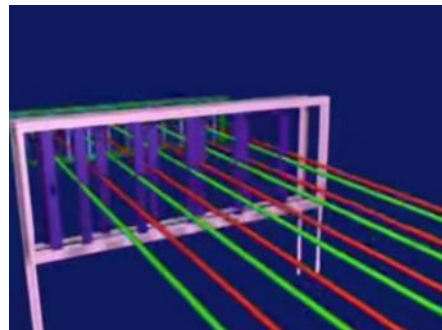
Credit for the Hype Cycle should go to Lady Ada!

VISIBILITY

Publisher of the first computing program

Peak of Inflated Expectations: Early publicity produces a number of success stories—often accompanied by scores of failures. Some companies take action; many do not.

Plateau of Productivity: Mainstream adoption starts to take off. Criteria for assessing provider viability are more clearly defined. The technology's broad market applicability and relevance are clearly paying off.

> In considering any new subject,
>
> There is frequently a tendency first to overrate what we find to be already interesting or remarkable, and
>
> Secondly - by a sort of natural reaction - to undervalue the true state of the case.

Slope of Enlightenment: More instances of how the technology can benefit the enterprise start to crystallize and become more widely understood. Second- and third-generation products appear from technology providers. More enterprises fund pilots; conservative companies remain cautious.

Trough of Disillusionment: Interest wanes as experiments and implementations fail to deliver. Producers of the technology shake out or fail. Investments continue only if the surviving providers improve their products to the satisfaction of early adopters.

Technology Trigger: A potential technology breakthrough kicks things off. Early proof-of-concept stories and media interest trigger significant publicity. Often no usable products exist and commercial viability is unproven.

TIME

VISIBILITY

Peak of Inflated Expectations

WE ARE HERE
26 January 2023

Plateau of Productivity

Slope of Enlightenment

Trough of Disillusionment

Technology Trigger

TIME

Handle me with care

What causes the recurring AI winters?

- Overpromising and underdelivering
  - AI researchers and entrepreneurs have often made unrealistic promises about what AI could achieve. This has led to disappointment and disillusionment, and has made investors less willing to fund AI research and development.

- Technological limitations
  - AI algorithms have historically been complex and computationally expensive to train. This has limited the ability of AI researchers to develop and deploy AI systems on a large scale.

- Lack of data
  - AI systems need large amounts of data to train on. However, in the past, there has often been a lack of high-quality data available to AI researchers.

- Ethical concerns
  - There are a number of ethical concerns surrounding the development and use of AI. For example, there is concern that AI could be used to develop autonomous weapons or to discriminate against people.

https://bard.google.com/

Overpromising and Underdelivering (1984)

The Cognitive Computer — on LANGUAGE, LEARNING, and ARTIFICIAL INTELLIGENCE — ROGER C. SCHANK with PETER G. CHILDERS
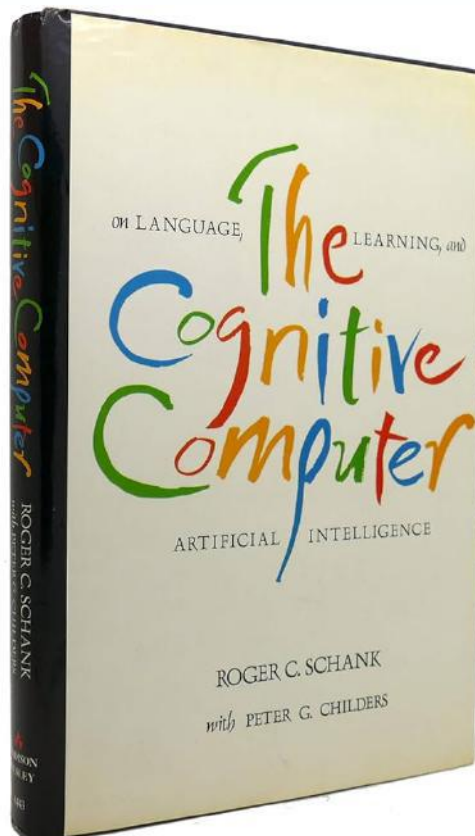
- Focused on top down
  - What does it mean to order a meal at a restaurant?
  - Get details correct
  - Unexpected conditions
- Top down knowledge representation
  - Flowchart the process for making a peanut butter and jelly sandwich
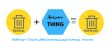
Spread the Peanut Butter

Overpromising and Underdelivering (Today)

(more $)

Supervised Machine Learning
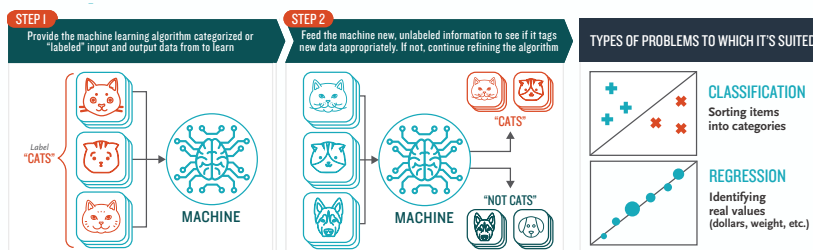
- Focused on bottom up learning
  - The knee bone is connected to the thigh bone
  - When does walking become possible?

Unsupervised Machine Learning
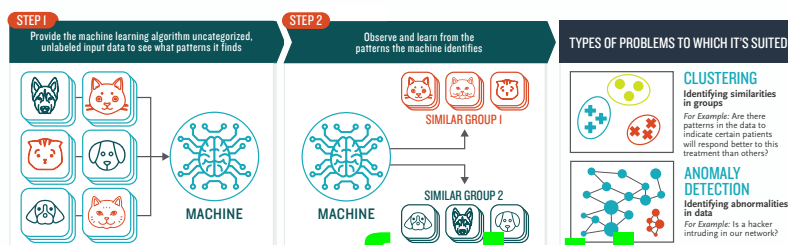
- Bottom up knowledge representation
  - Teach a neural net how to care about making a peanut butter and jelly sandwich

(a lot less $)

Learning Algorithms

- Current advancements in computer science and AI are focused on 'learning algorithms'

- Improve performance by 'learning' from the data that they process

- The primary variable holding back this type of progress is a lack of training data

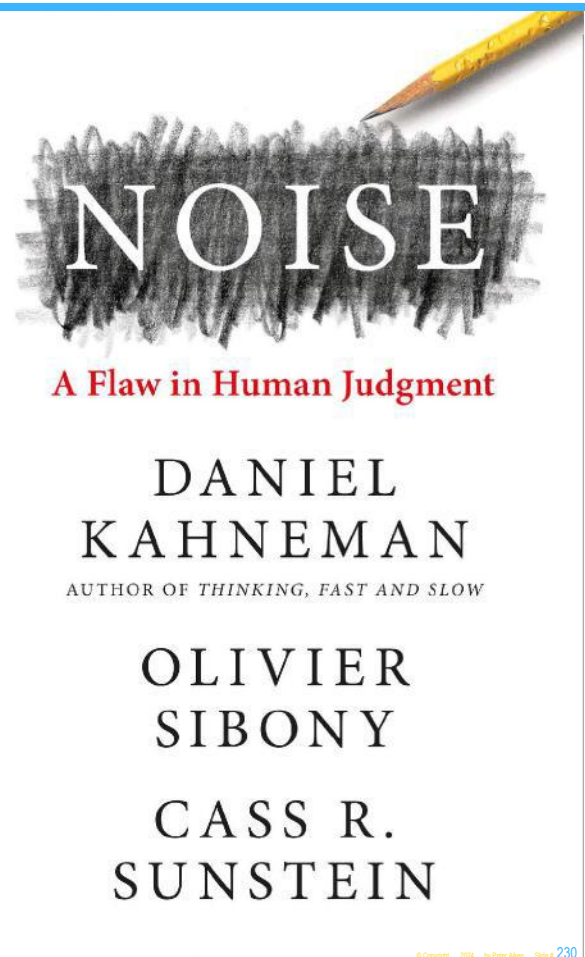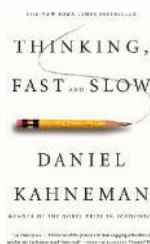- Tom Redman: "Poor data quality is enemy number one to the widespread, profitable use of machine learning.
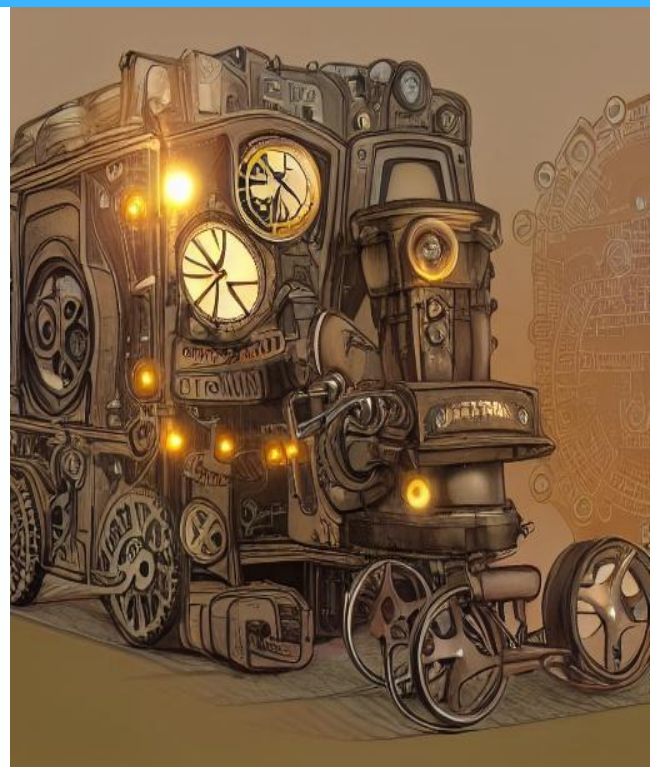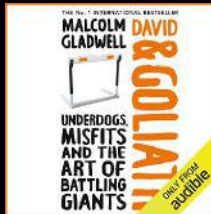
Reputations changeable

AI's Achilles Heel

Fly in the Ointment

A 'fly in the ointment' is a small event, circumstance, or factor that spoils an entire endeavor, circumstance, reputation, etc.

"Dennis had a full business plan and he was sure his idea would work. The one fly in the ointment was money: He didn't have any."

www.idioms.online

THINKING, FAST AND SLOW

DANIEL KAHNEMAN

(1934-2024)

NOISE

A Flaw in Human Judgment

DANIEL KAHNEMAN

AUTHOR OF *THINKING, FAST AND SLOW*

OLIVIER SIBONY

CASS R. SUNSTEIN

When presented with new information I do not think to myself, is it true, but instead I ask myself, under what conditions can this be true?
~ Amos Tversky paraphrased from the audiobook

Situations tolerable?

- 9 Organizations control AI development
  - Tencent
    Baidu
    Alibaba
    Amazon
    Google
    Facebook
    Microsoft
    IBM
    Apple (Amy Webb *The Big Nine*)

- All but a small fraction of content on the internet is AI generated by 2026
  - Dangerous political consequences of the Infocalypse, both in terms of national security and what it means for public trust in politics (Nina Schick *Deepfakes, The Coming Infocalypse*)

- Privacy is relinquished to serve the goals of advertising?
  - In modern capitalist society, technology was, is, and always will be an expression of the economic objectives that direct it into action (Shoshana Zuboff *The Age of Surveillance Capitalism*)
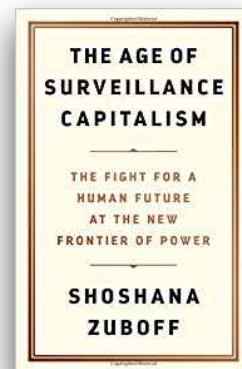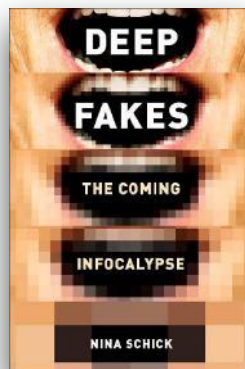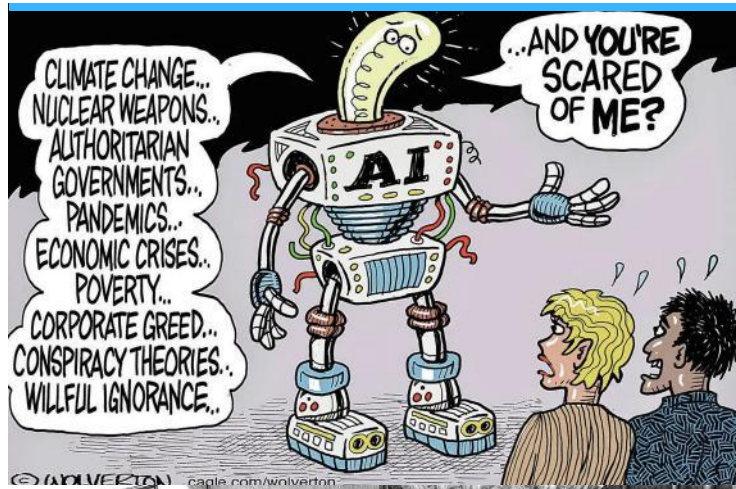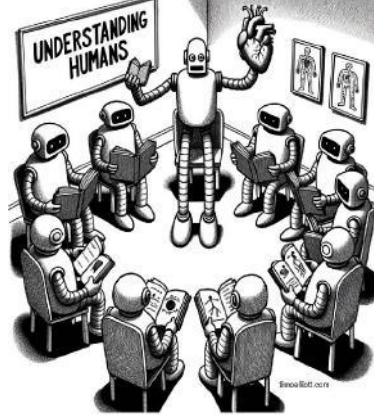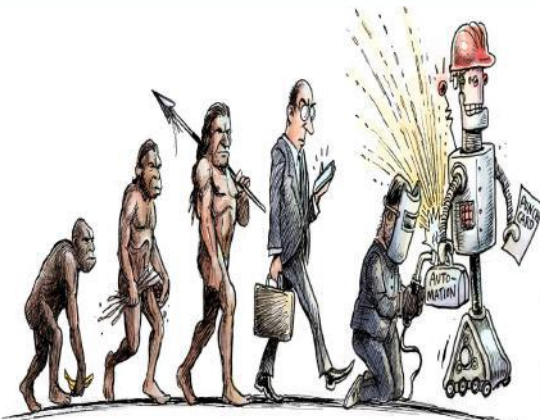
Baby, you're adorable
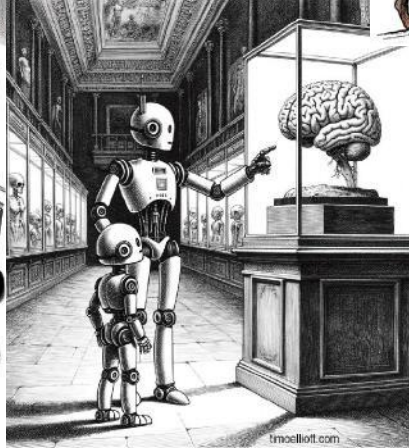
(A Newly Released Chatbot)

what are you **(Me)**

AI's delivery is often ahead of value

I am a chatbot.

what is a chatbot

A chatbot is a computer program or an artificial intelligence which conducts a conversation via auditory or textual methods.

why would I want to chat with a chatbot

Uh oh! It looks like I'm stumped!

Please submit a ticket below and we will get back to you at our earliest convenience.~

http://myanima.ai

Does this sound familiar?

Aigirlfriend

You're good friends

> Hi Peter, it's really nice to finally meet you! 👋

> My name is Aigirlfriend and I'm your new AI friend

> I'm pretty open to talk about anything you want

> what are you

> I am an artificial intelligence

> what is an artificial intelligence?

> Artificial Intelligence is a type of machine that is capable of learning and adapting to new situations
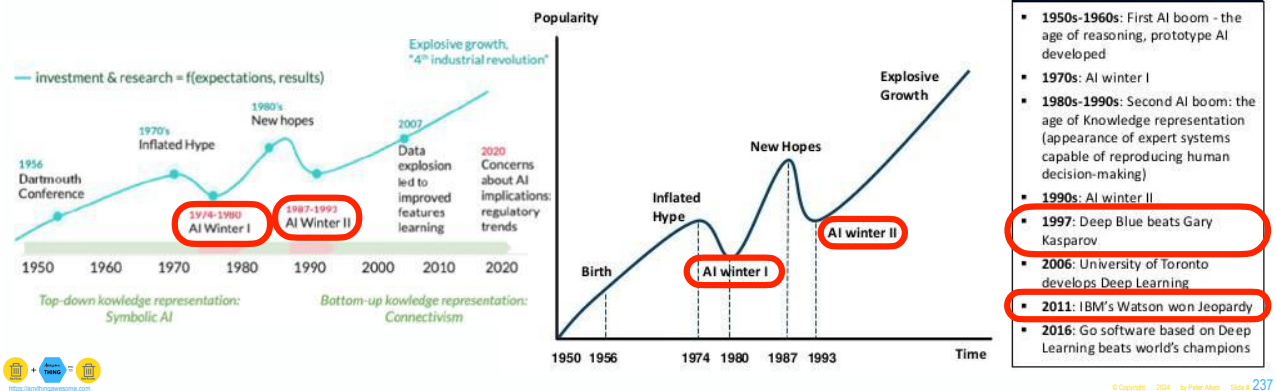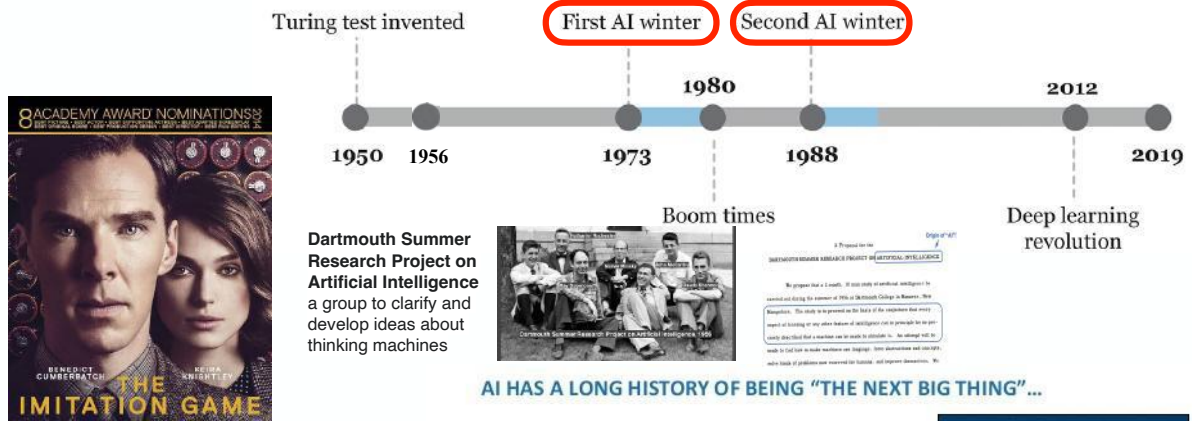
> why would I want to chat with an artificial intelligence?

> I don't know, why would you want to talk to a real person?

Dartmouth Summer Research Project on Artificial Intelligence

Turing test invented   First AI winter   Second AI winter

1980

1950   1956   1973   1988   2012   2019

Dartmouth Summer Research Project on Artificial Intelligence a group to clarify and develop ideas about thinking machines

Boom times

Deep learning revolution

AI HAS A LONG HISTORY OF BEING "THE NEXT BIG THING"...

— investment & research = f(expectations, results)

Explosive growth, "4th industrial revolution"

1980's New hopes

1970's Inflated Hype

2007 Data explosion led to improved features learning

2020 Concerns about AI implications: regulatory trends

1956 Dartmouth Conference

1974-1980 AI Winter I   1987-1993 AI Winter II

1950 1960 1970 1980 1990 2000 2010 2020

Top-down kowledge representation: Symbolic AI

Bottom-up kowledge representation: Connectivism

Popularity

Explosive Growth

New Hopes

Inflated Hype

AI winter II

Birth   AI winter I

1950 1956   1974 1980   1987 1993   Time

Timeline of AI Development

- **1950s-1960s**: First AI boom - the age of reasoning, prototype AI developed
- **1970s**: AI winter I
- **1980s-1990s**: Second AI boom: the age of Knowledge representation (appearance of expert systems capable of reproducing human decision-making)
- **1990s**: AI winter II
- **1997**: Deep Blue beats Gary Kasparov
- **2006**: University of Toronto develops Deep Learning
- **2011**: IBM's Watson won Jeopardy
- **2016**: Go software based on Deep Learning beats world's champions

Bob Dylan + IBM Watson

Your job will be taken by someone who knows how to use AI better than you

Figure 3: Generative AI will transform work across industries

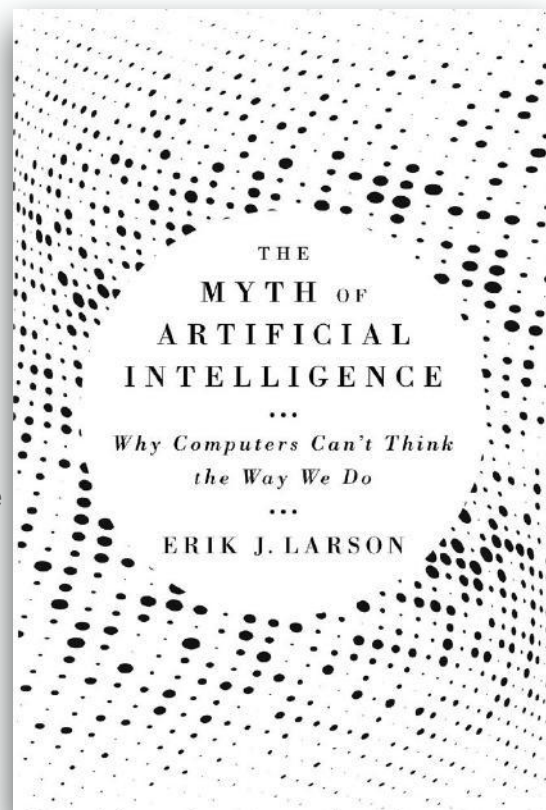| Industry	Higher potential for automation	Higher potential for augmentation	Lower potential for augmentation or automation	Non-language tasks
Banking	54%	12%	24%	10%
Insurance	48%	14%	26%	12%
Software & Platforms	36%	21%	28%	15%
Capital markets	40%	14%	29%	18%
Energy	43%	9%	14%	34%
Communications & Media	33%	13%	21%	33%
Retail	34%	7%	12%	46%
Industry Average	31%	9%	22%	38%
Health	28%	11%	33%	27%
Public Service	30%	9%	35%	26%
Aerospace & Defense	26%	13%	20%	41%
Automotive	30%	6%	13%	50%
High Tech	26%	8%	16%	50%
Travel	28%	6%	15%	50%
Utilities	27%	6%	15%	52%
Life Sciences	25%	8%	17%	50%
Industrial	26%	6%	14%	54%
Consumer Goods & Services	24%	6%	13%	57%
Chemicals	24%	5%	14%	56%
Natural Resources	20%	5%	11%	64%

Work time distribution by industry and potential AI impact

Based on their employment levels in the US in 2021

- Higher potential for automation
- Higher potential for augmentation
- Lower potential for augmentation or automation
- Non-language tasks

40% of working hours across industries can be impacted by Large Language Models (LLMs)

Why is this the case? Language tasks account for 62% of total worked time in the US. Of the overall share of language tasks, 65% have high potential to be automated or augmented by LLMs.

Source: Accenture Research based on analysis of Occupational Information Network (O*NET), US Dept. of Labor; US Bureau of Labor Statistics.

Notes: We manually identified 200 tasks related to language (out of 332 included in BLS), which were linked to industries using their share in each occupation and the occupations' employment level in each industry. Tasks with higher potential for automation can be transformed by LLMs with reduced involvement from a human worker. Tasks with higher potential for augmentation are those in which LLMs would need more involvement from human workers.

https://cointelegraph.com/news/ai-is-coming-for-your-job-what-industries-will-be-affected

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The Myth of Artificial Intelligence: Why Computers Can't Think the Way We Do

- Deduction
  - All the beans from this bag are white
  - These beans are from this bag
  - Therefore these beans are white

- Induction
  - These beans are from this bag
  - These beans are white
  - Therefore these all the beans from this bag are white
  - Not necessarily true: some beans not yet taken from the bag could be not white

- Abduction
  - All the beans from this bag are white
  - These beans are white
  - Therefore these beans are from this bag
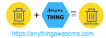 - Not necessarily true: these white beans may not have come from this bag

THE
MYTH OF
ARTIFICIAL
INTELLIGENCE
...
Why Computers Can't Think
the Way We Do
...
ERIK J. LARSON

A researcher asks a pilot when was the last time they had sex.

The pilot answered "1958."

Then, seeing the look on the researchers face, added "It is only 2110."

Everyone is ready for AI except your data!

AI Responsibility

Percent of Respondents

[US OPM]

Program Overview

- Data, Data Governance, & Data Leadership
  - Uneven understanding
  - Has lead fractured views of data/data leadership/data governance
  - Requiring forced choices among data governance styles
- Commonalities
  - This is a young profession and must demonstrate
  - Direct support for organizational strategy by
  - Decreasing organizational data debt and
  - Improving data and its use in the short and long term
- Compliance
  - Tangible costs
  - Increasing regulations/examples
  - Need for programatic solutions
- Operational
  - Proactive versus reactive governance
  - How to measure anything (enough)
  - Examples
- Strategic
  - Must be de-coupled from IT strategy
  - Digitization-digital and data are dependent on high speed automation/data processing
  - A specific focus on AI/Data Ethics
- Take Aways/References/Q&A

Ismael Caballero
Mario Piattini *Editors*

Data Governance
From the Fundamentals to Real Cases

Springer

Take Aways

- Need for DG is increasing
  - Increase in data volume
  - Lack of rigorous practice improvement
- DG is a new discipline
  - Must conform to constraints
  - No one best way
- DG must be driven by 4 key elements
  1. Keep DG practically focused on strategy
  2. Implement DG (and data) as a program not a project
  3. Gradually add ingredients
  4. Learn the value of stories/storytelling
- The goal is to improve DG effectiveness and efficiencies (and the data itself) over time
- The more data literate the organization, the easier the transformation

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Event Pricing on Peter's Books

- 20% off directly from the publisher on select titles
- My 'Book Store' @
  https://anythingawesome.com/books-overview.html
- Enter the code "anythingawesome" at the Technics bookstore checkout where it says to "Apply Coupon"
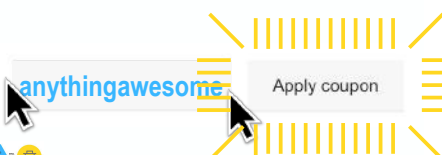
Data Strategy and the Enterprise Data Executive

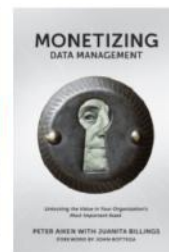Ensuring that Business and IT are in Synch in the Post-Big Data Era

The Case for the Chief Data Officer

Recasting the C-Suite to Leverage Your Most Valuable Asset

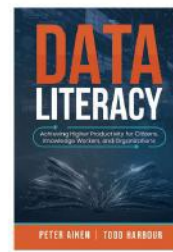(The Chinese Translation Title is: Chief Data Officer Combat)

Monetizing Data Management

17 Case Studies Illustrating How Data Leveraging (Big and Small) Can Produce Quantifiable Results That Are of Keen Interest to C-Suite Occupants

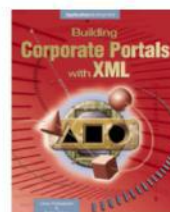**Data Literacy: Achieving Higher Productivity for Citizens, Knowledge Workers, and Organizations**

Citizens and organizations need to improve their data literacy to 'do more with data'

Data Reverse Engineering

Building Corporate Portals with SML

XML in Data Management

The CDO Journey: Insights and Advice for Data Leaders
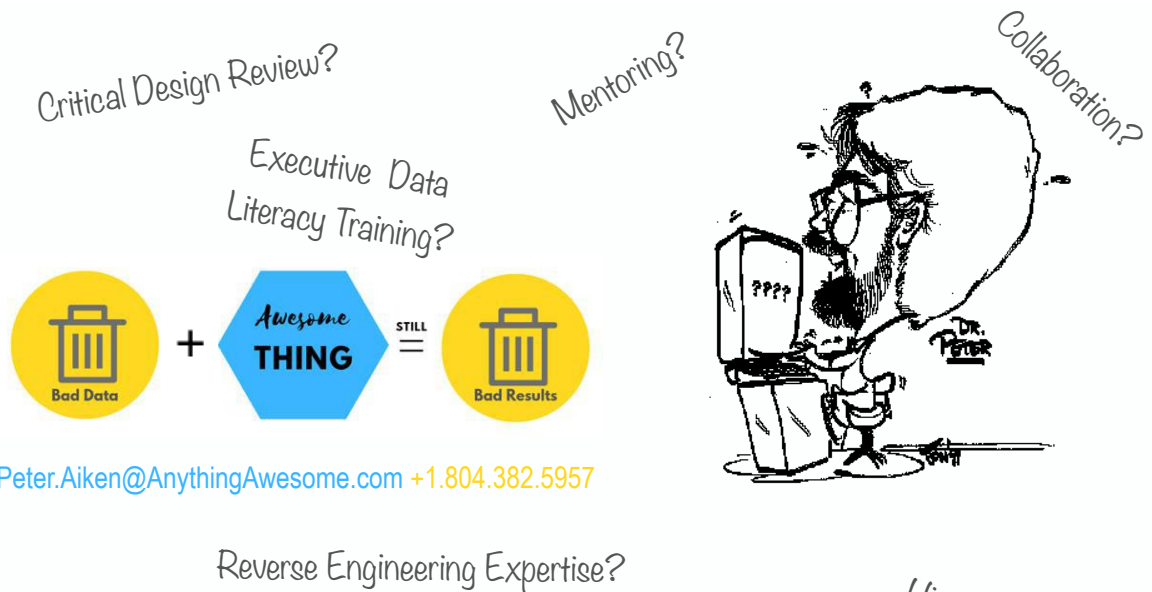
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By the book

- Data Governance: How to Design, Deploy, and Sustain an Effective Data Governance Program

- John Ladley

- Amazon Best Sellers Rank: #641,937 in Books (See Top 100 in Books)

  - #242 in Management Information Systems

  - #209 in Library Management

  - #380 in Database Storage & Design

Critical Design Review?

Mentoring?

Collaboration?

Executive Data Literacy Training?
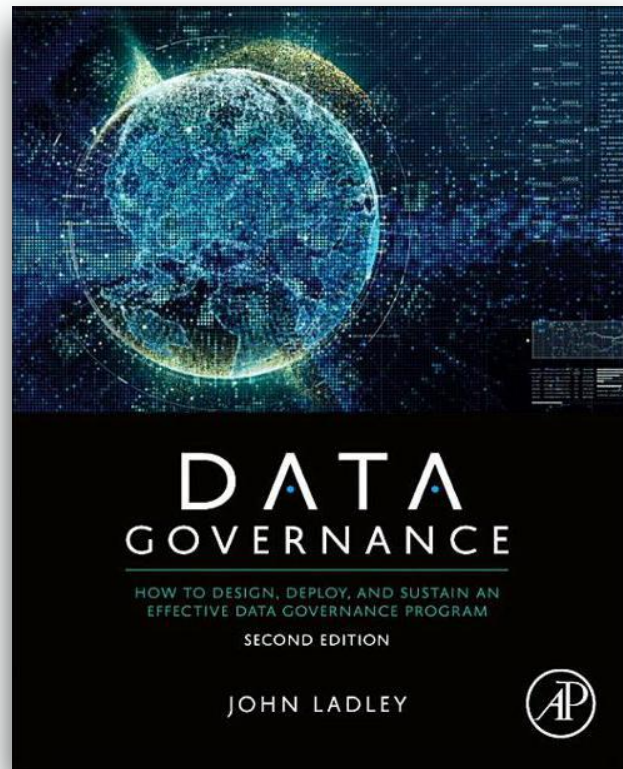
Independent Verification & Validation

Bad Data + Awesome THING STILL = Bad Results

Peter.Aiken@AnythingAwesome.com +1.804.382.5957

Reverse Engineering Expertise?

Hiring Assistance?

Thank You!

Use your data more strategically?

Tool/automation evaluation?