Best Practices for Data-Driven Organizations

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In this report we present an overview of best practices for data-driven organizations. We have created this overview during an initial survey of existing literature (reports, blogs, papers, etc.) on data-driven organizations. We are certain this overview is not complete but still deem it valuable for organizations that would like to improve on their data-driven operation or aspire to become data-driven.

Data-Driven Maturity

We would like to start off with an overview of maturity models we have found. Knowing in which maturity level or stage an organization is, is a prerequisite for selecting applicable best practices and a path to improvement of data-driven operation.

TDWI Big Data Maturity Model

The TDWI Big Data Maturity Model (www.tdwi.org/bdmm) includes 5 maturity stages:

1. The **nascent** stage represents a pre–big data environment. In this stage, most companies have a low awareness of big data or its value across much of the business.
2. During the **pre-adoption** stage, the organization is starting to do its homework regarding big data analytics. It knows that it will be implementing big data analytics in the near term, although the eff ort is usually departmental in scope.
3. The **early adoption** stage is typically characterized by one or two proofs of concept (POCs) which become more established and production ready.
4. **Corporate adoption** is the major crossover phase. During corporate adoption, end users typically get involved, gain insights, and transform how they do business.
5. At the **Mature/Visionary** stage, organizations are executing big data programs as a well-oiled machine using a highly tuned infrastructure with well-established program and data governance strategies.

Between stage 3 and 4 TDWI place a so-called chasm to indicate that there is generally a set of hurdles to be overcome to move to corporate adoption.

Big Data Maturity Assessment Criteria
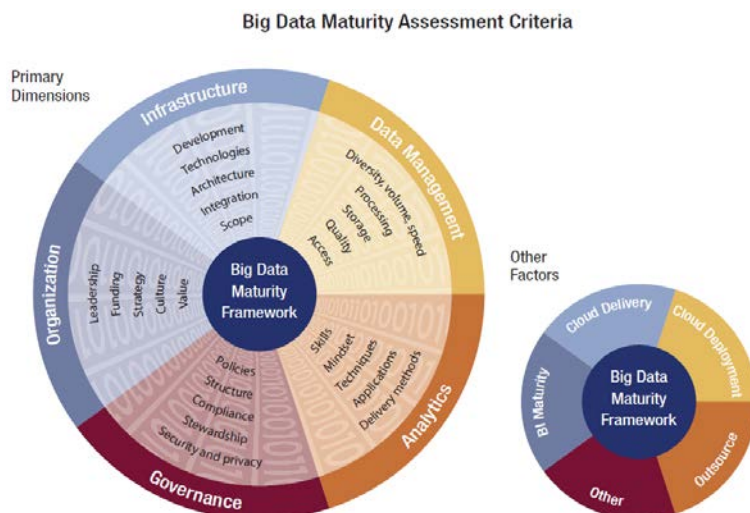
The maturity model comes with an assessment model (questionnaire) that scores big data maturity across 5 primary dimensions: Governance, Organization, Infrastructure, Data Management and Analytics [1].

New Intelligent Enterprise Global Executive Study

As described in [2] the respondents of this survey were segmented based on how they rated their organization's analytics prowess, specifically how thoroughly their organizations had been transformed by better uses of analytics and information. Three levels of analytics capability emerged:

1. **Aspirational.** Use analytics to justify action
2. **Experienced.** Use analytics to guide action
3. **Transformed.** Use analytics to prescribe action

The article that summarizes the survey [2] contains the following table that describes each of these three levels on six dimensions.

THE THREE STAGES OF ANALYTICS ADOPTION
Three capability levels — Aspirational, Experienced and Transformed — were based on how respondents rated their organization's analytic prowess.

	ASPIRATIONAL	EXPERIENCED	TRANSFORMED
Motive	• Use analytics to justify actions	• Use analytics to guide actions	• Use analytics to prescribe actions
Functional proficiency	• Financial management and budgeting • Operations and production • Sales and marketing	• All Aspirational functions • Strategy/business development • Customer service • Product research/development	• All Aspirational and Experienced functions • Risk management • Customer experience • Work force planning/allocation • General management • Brand and market management
Business challenges	• Competitive differentiation through innovation • Cost efficiency (primary) • Revenue growth (secondary)	• Competitive differentiation through innovation • Revenue growth (primary) • Cost efficiency (secondary)	• Competitive differentiation through innovation • Revenue growth (primary) • Profitability acquiring/retaining customers (targeted focus)
Key obstacles	• Lack of understanding how to leverage analytics for business value • Executive sponsorship • Culture does not encourage sharing information	• Lack of understanding how to leverage analytics for business value • Skills within line of business • Ownership of data is unclear or governance is ineffective	• Lack of understanding how to leverage analytics for business value • Management bandwidth due to competing priorities • Accessibility of the data
Data management	• Limited ability to capture, aggregate, analyze or share information and insights	• Moderate ability to capture, aggregate and analyze data • Limited ability to share information and insights	• Strong ability to capture, aggregate and analyze data • Effective at sharing information and insights
Analytics in action	• Rarely use rigorous approaches to make decisions • Limited use of insights to guide future strategies or day-to-day operations	• Some use of rigorous approaches to make decisions • Growing use of insights to guide future strategies, but still limited use of insights to guide day-to-day operations	• Most use rigorous approaches to make decisions • Almost all use insights to guide future strategies, and most use insights to guide day-to-day operations

Figure 1 Table describing maturity levels taken from [2]

The article is not only about the maturity levels but also contains best practices and advice where to start based on your current maturity level.

CapGemini Big Data Survey

The report resulting from a survey from 2014 [3] contains a checklist (10 questions) which results in a score from 9 to 50 points. Based on the score you are either:

1. **Undeveloped**. Improvement is required in all areas.
2. **Developing**. You can improve in certain areas.
3. **Developed**. You have high maturity across all areas.

The areas discussed in the checklist are governance, data management, security and privacy, technology, analytics skills.

Maturity Levels Combined

For our overview of best practices we decided to define 3 maturity levels, let us call them High, Medium and Low. We use those three maturity levels to label the best practices, because for example some best practices are not yet feasible if the maturity level of the organization is Low.

To determine the maturity level of an organization any of the three models above can be used. This is not an exact science but helps to find areas for improvement and to select those best practices that might me most applicable given the situation.

Best Practices Found

We conducted a survey of online material to find best practices for data-driven organizations. In total we found 65 best practices, see the table in the appendix. In this table we label each best practice with the maturity level of the organization that we deem it applicable for. We also label each best practice with one of the 5 primary dimensions of the TDWI Big Data Maturity Model.

The table contains a URL to the source publication for more detailed information on each of the found best practices, so we will not discuss them here in detail. To conclude this report we would like to highlight some interesting observations from the collection of best practices in the table:

1. A lot of best practices (33 till 41 in the table) pertain to the appointment of a **Chief Data Officer**. This is a best practice for organizations with a high maturity level, and emphasizes that a data-driven organization should manage data as a core asset.
2. A number of best practices (14 till 23 in the table) advocate the use of **Agile or Iterative** development models for Analytics.
3. Several best practices (3 till 12 in the table) mention that the Analytics activities should be determined by the **business goals** and produce measurable outcomes with respect to those goals.

Center of Expertise Big Data

The Fontys Hogeschool ICT Centre of Expertise Big Data combines research, education and knowledge dissemination in the areas of Big Data and Applied Data Science. You can contact us if you need help defining or implementing your data-driven business case or if you need help in becoming more data-driven as an organization. Please refer to our website for more information.

References

[1] Fern Halper and Krish Krishnan, "TDWI BIG DATA MATURITY MODEL GUIDE. Interpreting Your Assessment Score", TDWI research, 2013, https://tdwi.org/whitepapers/2013/10/tdwi-big-data-maturity-model-guide.aspx

[2] Steve LaValle, Eric Lesser, Rebecca Shockley, Michael S. Hopkins and Nina Kruschwitz, "Big Data, Analytics and the Path from Insights to Value", MITSloan Management Review, winter 2011, Vol 52, No. 2, http://sloanreview.mit.edu/article/big-data-analytics-and-the-path-from-insights-to-value/

[3] CapGemini Consulting, "Cracking the Data Conundrum: How Successful Companies Make Big Data Operational", https://www.capgemini-consulting.com/resource-file-access/resource/pdf/big_data_pov_03-02-15.pdf

ID	Best Practice	Tag	Tag2	Maturity	Link
1	Meanningful, customizable visual reporting	Analytics	Delivery Methods	Low	http://www.slideshare.net/odsc/elaineleeodsc-final
2	Innovative visualization techniques	Analytics	Delivery Methods	Medium	http://www.sciencedirect.com/science/article/pii/S0925527314004265
3	Focus on the business goal	Analytics	Mindset	Low	http://www.dataversity.net/running-successful-data-science-projects/
4	Obtain clear understanding of the business problem	Analytics	Mindset	Low	http://www.sciencedirect.com/science/article/pii/S0925527314004265
5	Prioritize requirements	Analytics	Mindset	Low	http://www.midp.info/uploads/1/0/6/5/10650753/position_paper_-_final.pdf
6	Introduce success criteria	Analytics	Mindset	Low	http://queue.acm.org/detail.cfm?id=2767971
7	Choose realistic samples	Analytics	Mindset	Low	http://queue.acm.org/detail.cfm?id=2767972
8	Start with clear business objectives and a business case	Analytics	Mindset	Low	http://www.forbes.com/sites/bernardmarr/2015/03/17/where-big-data-projects-fail/2/#3ca545e14990
9	Start with questions, not data	Analytics	Mindset	Low	https://surfdrive.surf.nl/files/index.php/s/SfxvGqIopFV5NU9
10	Identifiable business value	Analytics	Mindset	Low	http://www.midp.info/uploads/1/0/6/5/10650753/position_paper_-_final.pdf
11	Clear project scope and goals	Analytics	Mindset	Low	http://www.midp.info/uploads/1/0/6/5/10650753/position_paper_-_final.pdf
12	Measurable outcomes	Analytics	Mindset	Low	http://www.midp.info/uploads/1/0/6/5/10650753/position_paper_-_final.pdf
13	Incorporate thorough testing	Analytics	Techniques	Low	http://www.dataversity.net/running-successful-data-science-projects/
14	Use a backlog for experiments	Analytics	Techniques	Low	http://queue.acm.org/detail.cfm?id=2767973
15	Agile: Actionable insights over comprehensive reports	Analytics	Techniques	Low	http://www.slideshare.net/vladimirkazantsev/agile-data-science-digital-analytics-summit?next_slideshow=1
16	Agile project methods—with some modifications for Data Science	Analytics	Techniques	Low	http://www.dataversity.net/running-successful-data-science-projects/
17	Short cycles	Analytics	Techniques	Low	https://pmisv.org/document-repository/special-folder/symposium/2013-symposium-presentations/1028-tiffani-crawford-presentation/file
18	Use Scrum methodology	Analytics	Techniques	Low	https://pmisv.org/document-repository/special-folder/symposium/2013-symposium-presentations/1028-tiffani-crawford-presentation/file
19	Have a well-defined repeatable methodology	Analytics	Techniques	Low	http://www.midp.info/uploads/1/0/6/5/10650753/position_paper_-_final.pdf
20	Iterative process model	Analytics	Techniques	Low	http://www.midp.info/uploads/1/0/6/5/10650753/position_paper_-_final.pdf
21	Use short-cycle agile methodology	Analytics	Techniques	Low	http://www.sciencedirect.com/science/article/pii/S026840121630233X
22	CRISP-DM, KDD, SEMMA	Analytics	Techniques	Low	https://decisionstats.com/2013/04/10/visual-guides-to-crisp-dm-kdd-and-semma/
23	Hybrid approach combining Agile with others	Analytics	Techniques	Medium	http://www.slideshare.net/odsc/elaineleeodsc-final
24	Adopt a data-centric development practice	Analytics	Techniques	Medium	http://dl.acm.org/citation.cfm?id=2893482

25	Confirm feasability in early sprints	Analytics	Testing	Low	http://www.dataversity.net/running-successful-data-science-projects/
26	Use Proof of Concepts	Analytics	Testing	Low	https://pmisv.org/document-repository/special-folder/symposium/2013-symposium-presentations/1028-tiffani-crawford-presentation/file
27	Incorporate "getting and cleaning data" step	Data Management	Processing	Low	http://www.midp.info/uploads/1/0/6/5/10650753/position_paper_-_final.pdf
28	High data quality and security	Data Management	Quality	High	http://www.midp.info/uploads/1/0/6/5/10650753/position_paper_-_final.pdf
29	Pay attention to data quality	Data Management	Quality	Low	http://bigdata-madesimple.com/how-a-chief-data-officer-can-make-data-great/
30	Set up Strong Safeguards for Security and Privacy	Governance	Security and Privacy	Medium	https://www.capgemini-consulting.com/resource-file-access/resource/pdf/big_data_pov_03-02-15.pdf
31	Data asset management should report at same level as other resource managers	Governance	Structure	High	http://dl.acm.org/citation.cfm?id=2893482
32	Manage cloud systems in an adhocratic multidisciplinairy team	Governance	Structure	High	http://aslbislfoundation.org/?wpfb_dl=632
33	Add a Chief Data Officer (CDO)	Governance	Structure	High	http://www.oreilly.com/data/free/files/understanding-chief-data-officer.pdf
34	Appoint a Chief Data Officer	Governance	Structure	High	http://www.forbes.com/sites/ciocentral/2016/08/08/big-data-and-the-emergence-of-the-chief-data-officer/#557625d86bb9
35	Appoint a Chief Data Officer	Governance	Structure	High	https://www.pwc.com/us/en/financial-services/publications/viewpoints/assets/pwc-chief-data-officer-cdo.pdf
36	Unit-level CDO to grow to enterprise-level CDO	Governance	Structure	High	https://www.pwc.com/us/en/financial-services/publications/viewpoints/assets/pwc-chief-data-officer-cdo.pdf
37	Appoint a Chief Data Officer	Governance	Structure	High	https://www.frankwatching.com/archive/2016/07/27/digitale-transformatie-waarom-een-chief-data-officer-onmisbaar-is/
38	Appoint a Chief Data Officer	Governance	Structure	High	http://analytics-magazine.org/chief-data-officer-new-seat-in-the-c-suite/
39	Appoint a Chief Data Officer	Governance	Structure	High	https://www.cebglobal.com/blogs/why-your-firm-needs-a-chief-data-officer-and-what-they-do/
40	Appoint a Chief Data Officer	Governance	Structure	High	http://www.marketingfacts.nl/berichten/nederland-heeft-chief-data-officers-nodig
41	Appoint a Chief Data Officer	Governance	Structure	High	https://hbr.org/2012/10/your-c-suite-needs-a-chief
42	Multidisciplinairy teams	Governance	Structure	Low	http://www.midp.info/uploads/1/0/6/5/10650753/position_paper_-_final.pdf
43	Cross-functional project team	Governance	Structure	Medium	http://www.sciencedirect.com/science/article/pii/S0925527314004265
44	Integrate data management and change management	Governance	Structure	Medium	http://www.sciencedirect.com/science/article/pii/S0925527314004265
45	Establish a Well-Defined Organizational Structure	Governance	Structure	Medium	https://www.capgemini-consulting.com/resource-file-access/resource/pdf/big_data_pov_03-02-15.pdf
46	Be able to flexibly scale technology needs at a reasonable cost	Infrastructure	Architecture	High	http://www.slideshare.net/odsc/elaineleeodsc-final

47	Use cloud services	Infrastructure	Architecture	High	https://pmisv.org/document-repository/special-folder/symposium/2013-symposium-presentations/1028-tiffani-crawford-presentation/file
48	Design for monitoring	Infrastructure	Architecture	Medium	https://pmisv.org/document-repository/special-folder/symposium/2013-symposium-presentations/1028-tiffani-crawford-presentation/file
49	Design for testability	Infrastructure	Architecture	Medium	https://pmisv.org/document-repository/special-folder/symposium/2013-symposium-presentations/1028-tiffani-crawford-presentation/file
50	Create a discovery environment	Infrastructure	Architecture	Medium	http://newvantage.com/wp-content/uploads/2013/04/MIT-Sloan-Review-Organizational-Alignment-is-Key-Jan-2013.pdf
51	Create culture of data-driven decision making	Organization	Culture	High	http://www.sciencedirect.com/science/article/pii/S0925527314004265
52	Create a data-driven culture	Organization	Culture	Medium	http://dl.acm.org/citation.cfm?id=2893482
53	Develop a business case	Organization	Funding	Low	http://link.springer.com/chapter/10.1007/978-3-319-21569-3_9
54	Obtaining qualified leadership for data initiatives	Organization	Leadership	High	http://dl.acm.org/citation.cfm?id=2893482
55	Involve top management	Organization	Leadership	Low	http://www.sciencedirect.com/science/article/pii/S0925527314004265
56	Strong Leader at the Top Driving the Big Data Initiatives	Organization	Leadership	Low	https://www.capgemini-consulting.com/resource-file-access/resource/pdf/big_data_pov_03-02-15.pdf
57	Develop shared data centrally	Organization	Strategy	High	http://dl.acm.org/citation.cfm?id=2893482
58	Share and collaborate between departments	Organization	Strategy	Low	http://www.slideshare.net/odsc/elaineleeodsc-final
59	Organizational alignment	Organization	Strategy	Low	http://newvantage.com/wp-content/uploads/2013/04/MIT-Sloan-Review-Organizational-Alignment-is-Key-Jan-2013.pdf
60	Focus on data management	Organization	Strategy	Medium	http://dl.acm.org/citation.cfm?id=2893482
61	Put a data-strategy in place	Organization	Strategy	Medium	http://link.springer.com/chapter/10.1007/978-3-319-21569-3_9
62	Balance between offensive and defensive data strategy	Organization	Strategy	Medium	http://www.forbes.com/sites/ciocentral/2016/08/08/big-data-and-the-emergence-of-the-chief-data-officer/#557625d86bb9
63	Manage data as a core asset	Organization	Strategy	Medium	http://analytics-magazine.org/chief-data-officer-new-seat-in-the-c-suite/
64	Adopt a Systematic Implementation Approach	Organization	Strategy	Medium	https://www.capgemini-consulting.com/resource-file-access/resource/pdf/big_data_pov_03-02-15.pdf
65	Leverage Multiple Channels to Build Big Data Capabilities	Organization	Strategy	Medium	https://www.capgemini-consulting.com/resource-file-access/resource/pdf/big_data_pov_03-02-15.pdf