4x4 Analytics Framework: developing organization and their data scientists in Business Analytics

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Many business commentators have been recently claiming that "Data is the new oil" (e.g. Palmer 2006 and Rotella 2012.) With the rise of numerical tools and solutions, more and more data has become available for businesses to leverage and optimize their activities. Ganz and Reinsel (2011) reports that the world created more that 1.8 zetabytes (1.8 trillion gigabytes) in 2011, growing by a factor of 9 in five years, and the authors predict a growth to 35.2 zetabytes by 2020. "With so much data available, It's not about the amount of data, it's about your ability to spot the patterns in that information." (Hinssen 2012) Companies now need to develop the right set of human resources to manage this "data avalanche."

In a very famous paper, Davenport and Patil (2012) announced that data scientist may become the sexiest job of the 21st Century. The Data Scientist is a job title for an employee or a consultant who excels at analyzing data, particularly large amounts of data, to help a business gain a competitive edge (Swan and Brown 2011.) A Data Scientist is at the core of the Business Analytics process, which examines large amounts of data of a variety of type to uncover hidden patterns, unknown correlations and other useful information (e.g. see Laursen and Thorlund 2010.) A recent study conducted in the UK (CEBR 2012), estimated the total numbers of data-specific jobs created over the 2012-2017 period to be 58,000 for this country alone! While many studies and papers emphasize the raising importance of these roles in the business, organizations still suffer from the lack of real Business Analytics culture, and, up to the best of our knowledge, little research has been done on how to select, attract, develop and retain these Business Analytics experts.

The objective of our work is to analyze what are the organizational conditions, skills and capabilities needed to succeed in developing a sustainable Business Analytics practice. We build on the work of Davenport and Patil (2012), Davenport, Harris and Morison (2010) and Davenport and Harris (2007) by claiming that success in developing analytics in organizations is a result of the integration of many elements beyond the pure acquisition of the right analytics software and having some statisticians on board. Many dimensions are indeed critical: analytics executive sponsorship, the right mix of competences and personality, culture of analytics, career path, organizational systems and processes, sustainability of analytical competence. "*What abilities make a data scientist successful? Think of him or her as a hybrid of data hacker, analyst, communicator, and trusted adviser. The combination is extremely powerful—and rare.*"

During our research, we identified two sets of success factors required in order to building a sustainable Business Analytics practice within an organization: (i) how to develop the data scientists' skill (4 core skills) and (ii) how to organize the data scientists' management dynamics within the company (4 organization dynamics). While developing the skills and personality of the data scientist is crucial, one should not forget to consider the dynamics within the organization and its impact on the Business Analytics practice. We develop this "4x4 Analytics Framework" in what follows.

In terms of the required skills and competences for a data scientists, we propose a competence framework containing four core skills: (1) Analytical (quantitative skills, modeling capability, methodology, performance management, etc.), (2) Technical (data management, database design, IT programming, BI Tools, etc.), (3) Business (understanding of the business as such, business culture, how to make the recommendations actionable, relevancy, flexibility, urgency, etc.) and (4) Communication (being able to express complex ideas in simple terms, good interaction with decision makers, right format to the right audience, emotional intelligence, etc. see for instance Goleman 1998.) On top of these four core skills, one needs to develop the data scientists on two complementary dimensions on the longer run: leadership and project management. The following figure summarizes our competence framework.
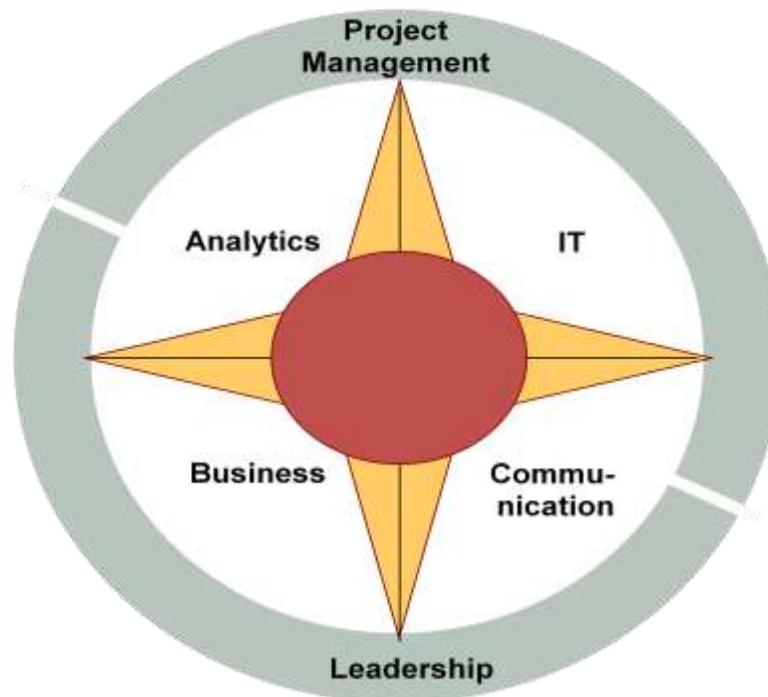
In terms of the dynamics within the organization, four factors need to be considered to insure the success of the Business Analytics practice: (1) Sponsorship, (2) Recruitment, (3) Talent and Knowledge Management, and (4) Cross-fertilization.

First, a critical success factor of Analytics is the presence of analytics sponsors in the boardroom. "Still better if it is the CEO himself who is the 'Analytics genetically convinced' guy." (Davenport and Harris 2007). A Business Analytics culture rarely emerges from the bottom of the company to the top. It is usually because a strong sponsor, at a top position in the company's hierarchy, is convinced that Business Analytics should be developed, that such a practice is steered successfully to success.

Second, in terms of recruitment, one needs to consider all the dimensions that will make a data scientist successful (see above.) Too often, a data scientist candidate is tested only on her Analytical or Technical skills if she is selected by other company's data scientists; while the other dimensions (Business and Communication) are not even discussed during the interview. In contrast, using a third party to recruit

Data scientist may lead to a mixed feeling experience due to the partial misunderstanding by the HR officer of who is a data scientist. It is important to educate your in-house HR officer about Analytics and establish a close collaboration with her long before you need to fill data scientist positions.

Third, managing data scientists' talents and developing their skills can really be a major challenge and they are usually interested by other types of developments as other employees. The data scientist's motivation is often related to interesting content and intellectual challenges and it is crucial to attain the right balance between education, experience and exposure (see Lombardo and Eichinger 2010.) Top data scientists typically have advanced master or PhD levels, and their trainings need to be managed taking into account their specific interests and skills. They want a high degree of organizational protection, and the recognition that their ideas are important. They also demand the freedom to explore and fail (Goffee and Jones 2007.) On top of this, the data scientist evolution needs to be considered in the light of their specific expectations. While gaining experience, experts are not necessarily in search of another type of job content but would like to grow within their current position. Too often perspectives of career evolution mean doing something completely different in the organization. In their sometimes-forced career transitions to more generalist jobs, experts will experience a real challenge. Hence again the importance of developing them on the four core skills we described above. Many data scientists are introvert, who like details and are secured by them. They are fact-based thinkers who need completeness and expert legitimacy to take decisions. Data scientists are sometimes concerned by their legitimacy outside their territory of expertise. Hence, the challenge they face when moving from the position of a data scientist expert to becoming a team leader. Their managers can help them to shift some believes or to approach new situations (e.g. with coaching), and this can lead to the emergence of new actions and results.

Finally, the data scientist group dynamics is important to cultivate. Discussions with others (non data scientists) can become difficult when the experts are not focused enough on the actionability and the real impact of the insights they create. It is important to cultivate the data scientists' business, communication and interpersonal skills in general. Kelley and Caplan (1998) reports that when companies promote internal networking systematically, experts not only improve but also pass along the benefits to their colleagues and the company's bottom line. This again relates with the four core dimensions we described above. But how can a company insure that Business Analytics experts will go out of their comfort zone and meet new people? The answer is diversity. In Business Analytics, moving from one sector to another is not a problem; it is actually an opportunity to enrich the Business Analytics practice culture and understanding of the business as a whole. Successful teams usually mix data scientists from many different backgrounds: mathematics, statistics, business modeling, etc. but also social sciences, life sciences, psychometrics, human resource management systems and processes, or employment law (e.g. see Davenport, Harris and Shapiro 2010.) Cross-fertilization within the Business Analytics team grooms the Data Scientists to the development of a broader view on the Business Analytics world.

In conclusion, we strongly believe that companies should adopt an integral approach for analytics that include many perspectives: Analytical, Technical, Business and Communication skills (4 core skills) but also the importance of Sponsorship, Recruitment, Talent and Knowledge Management and Cross-

fertilization (4 organization dynamics) within the organization. In other words, our "4x4 Analytics Framework" aims at consolidating an already existing number of separate paradigms into an integrated framework; allowing organizations to develop their Business Analytics talents and Business Analytics practices with a consistent strategy.

References:

CEBR (2012) "Data equity – unlocking the value of Big Data", Center for Economics and Business Research Ltd, http://www.cebr.com/data-equity-unlocking-the-value-of-big-data/.

T. H. Davenport and J. G. Harris (2007) "Competing on Analytics: The New Science of Winning." Harvard Business School Press.

T. H. Davenport, J. G. Harris and R. Morison (2010) "Analytics at Work: Smarter Decisions, Better Results." Harvard Business School Press.

T. H. Davenport, J. G. Harris and J. Shapiro (2010) "Competing on Talent Analytic." Harvard Business Review. http://hbr.org/2010/10/competing-on-talent-analytics/ar/1.

T. H. Davenport and D. J. Patil. (2012) "Data Scientist: The Sexiest Job of the 21st Century." Harvard Business Review 90, no. 10 (October 2012): 70–76. http://hbr.org/2012/10/data-scientist-the-sexiest-job-of-the-21st-century/ar/1.

J. Ganz and D. Reinsel (2011) "Extracting Value from Chaos." EMC Corporation, http://www.emc.com/leadership/programs/digital-universe.htm.

R. Goffee and G. Jones (2007) "Leading Clever People." Harvard Business Review, http://hbr.org/2007/03/leading-clever-people/ar/1.

D. Goleman (2000) "Working with Emotional Intelligence." Bantam books.

P. Hinssen (2012) "Information is the new oil." Across Technology, http://datascienceseries.com/assets/blog/GREENPLUM_Information_is_the_new_oil-LR.pdf.

R. Kelley and J. Caplan (1998) "How Bell Labs creates star performers", Harvard Business Review, 71(4):128-139. http://hbr.org/1993/07/how-bell-labs-creates-star-performers/ar/1.

G. H. N. Laursen and J. Thorlund, (2010) "Business Analytics for Managers: Taking Business Intelligence Beyond Reporting." Wiley and SAS Business Series.

M. M. Lombardo and R. W. Eichinger (2010) "Career Architect Development Planner." Korn/Ferry International, 5th Edition.

M. Palmer (2006) "Data is the New Oil." ANA Marketing Maestros, http://ana.blogs.com/maestros/2006/11/data_is_the_new.html.

P. Rotella (2012) "Is Data the New Oil?" Forbes, http://www.forbes.com/sites/perryrotella/2012/04/02/is-data-the-new-oil/.

A. Swan and S. Brown (2011) "The skills, role and career structure of data scientists and curators: An assessment of current practice and future needs." Key Perspective Ltd, www.jisc.ac.uk/media/documents/programmes/digitalrepositories/dataskillscareersfinalreport.pdf.