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Developing an Analytics Center of Excellence (Or The Care and Feeding of Magical Creatures)

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ABSTRACT

Analytics is becoming a mission-critical venture for companies who want to be ahead of their competition. For those of us in the field it's been a long-time coming and we're excited to see the possibilities. But what does it take for companies to really succeed in analytics? We have a talent shortage of analytics professionals, a wealth of tools and technology, tons of buzz words, and organizations that know they want it, but don't know what "it" is. Based on our experience and expertise, this paper will give the reader insight into some of the challenges of building an Analytics Center of Excellence and guidance in ways to overcome them.

The paper will be accessible and valuable to any attendee in any industry. It will be of particular interest to anyone with the desire to promote analytics within their organization.

INTRODUCTION

Many business fads have come and gone over the years. One that has been in the making for over a hundred years is the corporate analytics culture. In his 1903 book, Mankind in the Making, H.G. Wells said "the time may not be very remote when it will be understood that for complete initiation as an efficient citizen … it is as necessary to be able to compute, to think in averages and maxima and minima, as it is now to be able to read and write."[1] While not much else is worth keeping from that book, this concept is. Regardless of whether our citizens meet this necessity or not, our corporations are starting to embrace this analytical thinking. The analytical forerunners – Statistical Process Control, Data Warehousing, Business Intelligence, Six Sigma, and Knowledge Management – have paved the way for Big Data and Big Analytics, and the amazing growth in computing power and the network (intra-, inter-, and mobile) have given us the tools to provide this capability to everyone.

However, a corporate analytics mindset can be a big cultural and behavioral change and planning for change is essential and good planning needs a sound vision. The Experis Business Analytics Practice has extensive experience helping companies develop a roadmap for analytics excellence and then achieving it. This paper uses that experience to help companies develop their vision of an Analytics Center of Excellence (ACE). First, the paper will give a short comment on what is meant by Analytics Excellence; describe the core of the ACE, which will be called the analytician, for lack of a better word; discuss some of the components of an ACE; suggest how the ACE would operate; and introduce some ideas for taking it to the next level. These topics cannot be covered in much depth in this paper, but it is hoped to provide an overview of the main considerations of each.

WHAT IS ANALYTICS?

Business Analytics or just Analytics is the new catchphrase that has everyone abuzz. Some see this as an emerging discipline that combines the methodologies of Statistics with business acumen, programming skills and database capabilities. Michael Rappa, Director of the Institute for Advanced Analytics at North Carolina State University, says instead that it's more of a bundle of quantitatively-focused skill sets like an MBA.[2] Statisticians would say that the discipline of Statistics has been evolving in this direction already (e.g. as Statistical Engineering[3]) and an investigation into the field would bear this out well, though aspects of it are leaving academic statisticians behind.

The exciting outcome is that the attention from the business community has advanced the positive impact that analytics has been able to have on our corporations. As we move past the historical views of business intelligence and knowledge management into the forward thinking mindset of analytics, companies have better tools and information to improve decision–making.

WHAT IS EXCELLENCE?

The history of this question goes back over two millennia. Aristotle is quoted as saying "We are what we repeatedly do. Excellence, then, is not an act but a habit." Lao Tzu is to have said "The supreme excellence is not to win a hundred victories in a hundred battles. The supreme excellence is to subdue the armies of your enemies without even having to fight them."

More recently, Senator Jerry Moran said "Perfection has to do with the end product, but excellence has to do with the

process." As we'll see, analytical excellence will come from building a team that makes a habit of strong analytical, business and development processes in order to work with rather than fight against the business.

ANALYTICS INFRASTRUCTURE

The key to Analytics Excellence is to build the right Analytics Infrastructure, defined here (contrary to Grossman[4]) as the set of people, processes, technology, and software that is used to perform the analytics. This infrastructure is different for different companies depending on how and to what extent they use analytics. Some companies, large and small, have gotten away with doing only basic analytics in a non-repeatable manner that may contain pockets of advanced analytics for R&D or Sales. Others have embraced the analytical culture and their infrastructure is more advanced and integrated with the rest of the organization.

These three components – Analytics, Excellence and Infrastructure – will be the central theme as we move forward in this paper.

THE ANALYTICIAN

The people are the most important piece of the analytics infrastructure to consider in achieving analytics excellence. Without the right people, achieving excellence would be impossible. With the right people, excellence can be achieved at times even when the other infrastructure components are not well done, but they may not be your people for long. As alluded to above, performing analytics means having a combination of statistics, database programming, programming, and business sense. Below we add the soft skills necessary in all consulting.

STATISTICS

Statistics is the foundation of analytics, but in companies today, the statistics are not always very advanced, or if so, then it's only in pockets. Some people might use Excel to do simple statistics and for their business at this time it might be enough. However, we want to achieve excellence and that means taking advantage of all that the discipline of statistics can give us. The typical hierarchy for analytics is shown in this diagram from Competing on Analytics[5].

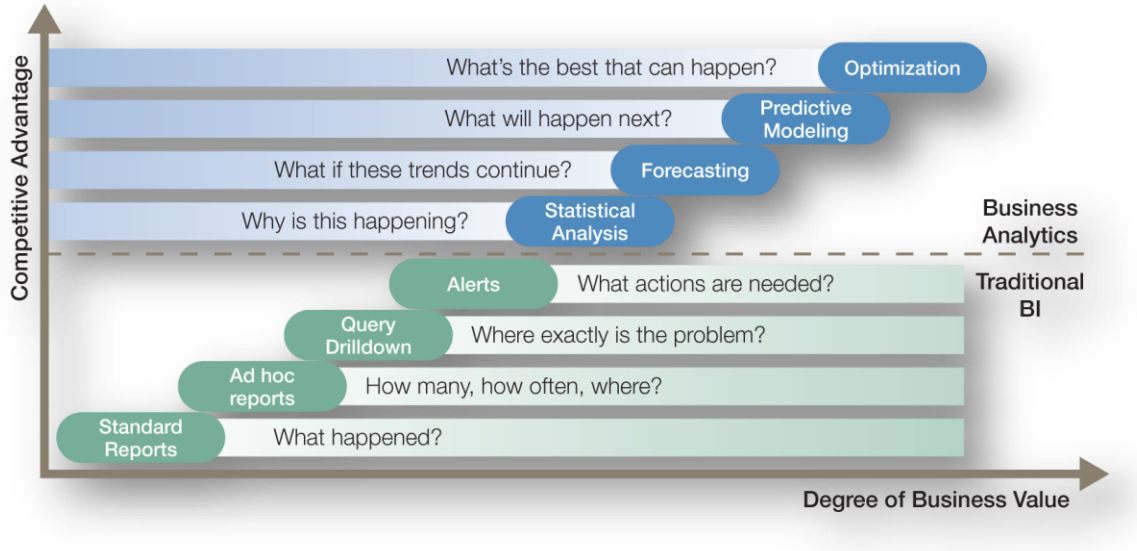


Figure 1 Business Intelligence to Analytics

Companies need to be doing the things below the line. That's just standard business now. But to excel they need to be above the line. That's where they gain the greater competitive advantage and higher business value. Accenture Research says that companies that invest in advanced analytical capabilities outperform the S&P 500 by an average of 64%.[6] A couple of quick examples show the difference.

Sales is one area that has adopted analytics well. Traditional BI would tell you which of your current customers were your best last year and you could offer them a plaque. On the other hand, forecasting sales would tell you which is going to be your best new customers next year and you could offer them your service.

If you keep stock in inventory, then drilldowns can tell you which distribution centers have backlogs and which have the most stock sitting around. Then you can move inventory from one to another to meet your customers' demands.

On the other hand, predictive modeling or even optimization can tell you to which distribution center to send your stock the first time so that you don't have angry customers waiting.

You can look into the past with traditional BI and that's important, but the excellence we want to achieve is to look into the future. Therefore, the people on your team have to understand advanced analytics such as logistic regression, mixed models, neural nets, time series and linear optimization. Whether they have to understand all of the theory behind these is becoming less important as the software becomes more capable. However, great risk can be introduced when a method is inappropriately applied to a process and important decisions are made with the results.

DATABASE PROGRAMMING

Database programming is necessary in at least two ways. The large amounts of data we use, affectionately known as Big Data, makes doing the analytics cumbersome if not impossible. If we must extract the data we have to be able to do it efficiently. However, we prefer to avoid extraction and instead let the DBMS do the processing itself, i.e. in-database processing. Where we might have had a DBA working with us before, in many places this skill has become part of being an analytician or data scientist.

PROGRAMMING

In the past, statisticians have often been fairly isolated. They get the data from someone and give back the results of the analysis. More often now the analytical process involves multiple steps with multiple handoffs. It becomes necessary for the analytician to create programs – using python, perl or similar languages – that handle those steps such as parsing data from web sites, working with unstructured data sets, or sending data out as a web service. Analyticians also need to be able to program platforms like Hadoop that help with Big Data.

BUSINESS

For many years it has been recognized that the statistician has to understand the business. The more they understand the meaning behind the data they are analyzing, then the more strategically they can contribute with their analysis and expertise. The importance of understanding continues to grow as the duties and the area of purview grows for the analytician. The analytician is more often part of a cross-functional team in which he or she is wearing the hats of business analyst and project manager as well as statistician. They have to understand the goals of the business, speak the language of their colleagues and present results descriptively, numerically and visually so that they tell the story in such a way that it is immediately actionable.

SOFT SKILLS

The skills above can be difficult to find even in pairs, let alone all at once. Often a company has to train employees in one or more of these areas, which is not unreasonable. It's the skills beyond these that can't be trained and are more important in the search. These soft skills are

Problem solving

- The ability and enthusiasm to dig into a problem and the intuition and perseverance to look at it from multiple angles until it's solved. This skill requires asking questions, examining assumptions, listening well, and synthesizing ideas from diverse sources.

Collaboration

- The willingness to allow others to share control and responsibility for decisions and outcomes without giving up one's own responsibility. Active listening, understanding possibly without agreeing, communicating transparently, and contributing possibly without recognition are all required for real collaboration.

Presentation skills

- The ability to package and communicate information and ideas in such a way that they are clearly and completely understood by the audience. Presentation involves multiple channels of communication often at the same time - personal appearance, body language, story telling, and graphical displays. Along with these channels one needs to be able to prioritize information, utilize trained rhetorical skills, accept critical feedback and, yes, create compelling PowerPoints.

HIRING

Every industry expert identifies “staffing the right talent” as key to a successful analytics group. Companies are looking wide to find analyticians and good candidates come from many quantitative fields, such as Statistics, Physics, Economics, or Operations Research, but the quantitative skills above aren’t typically found in one field. Institutes and departments are cropping up at universities around the country – such as NCSU, Oklahoma State, University of Alabama – so that candidates are receiving training in the above skills. As we’ll see, though, the demand for analytics talent far outweighs the supply, so it’s important for companies to find people with some of the technical skills and train them in the others.

The soft skills are very difficult to teach and harder to evaluate in a candidate. Two techniques used in the Experis Business Analytics Center of Excellence are a problem solving scenario and a self-selling presentation. The scenario is presented in an ambiguous way (like most engagements with customers) and the person has to ask questions (sometimes only “yes/no” questions) in order to solve the problem. For tougher scenarios they aren’t expected to solve the problem. It’s explained up front that the interviewer is more interested in getting a glimpse into their problem-solving skills. Do they ask questions? How many questions? Do they repeat the questions? Are the questions purely strategic, purely tactical or an appropriate mixture of both? Do they verify their understanding? Do they question their assumptions? Do they look for the question behind the question?

The candidate is also asked to give a presentation that sells the Practice on them as the product for the position that is open. This task requires developing a new presentation, shows their presentation skills, covers the basic interview questions, shows their level of self-confidence, and helps the Practice to know whether they understand what the position is about. All of these factors are important for a successful candidate at this level.

THE CENTER

This leads the discussion into the organization of the Analytics Center of Excellence. What roles are needed? Is the group centralized or are individuals attached to separate business units? What alternatives are there when a company can’t find enough talent? These questions are, again, shared by other groups such as IT and are ones that statistical groups have been answering for years.

ROLES

Building on the discussion so far, it is clear that in an Analytics Center of Excellence the following roles are needed.

Statistician
- Performs statistical analyses to answer business questions.

Database Programmer
- Interacts with database to extract, transform and/or load (ETL) data. May develop in-database programming.

Programmer / Application Developer
- Writes code (e.g. python) for ETL from non-traditional data sources. Builds analytical applications to automate analytical processes.

Business Analyst
- Interacts with the client to translate their business requirements into functional or analytical requirements.

Project Manager
- Manages the time, resources, change, risk, quality,etc. around service delivery.

Product Manager
- Manages product releases and long-term strategy of features and fixes for data products, custom analytical applications and service lines.

Public Relations Specialist
- An analytical evangelist who develops case studies, marketing material, elevator speeches, etc so that the group's existence and efforts are well publicized throughout the company

IT Liaison
- Works with IT so that they understand the unique domain-specific requirements of analytics with respect to, for example, data management, data governance and high performance. Aslo works with IT to explore, evaluate and incorporate new technologies and solutions such as cloud, big data, in-memory or mobile analytics.

Trainer
- Educates clients and decision makers on the capabilities of analytics, their role in the analytics lifecycle, and the limits of analytics.

As in other situations, the distinctiveness of the roles will be different depending on the size of the group. When the group is small (< 5) everyone will have multiple roles or even all of them. As the group gets bigger the roles can be broken out into various structures depending on the culture of the company, the skill set of the group members and the type of work coming in.

STRUCTURE

There are many pendulums in management that swing back and forth over time between different approaches. One is whether the analytics support should be centralized or decentralized. When the people are centralized it's easier to work as a group – collaboration, sharing lessons, tracking all work, balancing assignments, cross-pollination, etc. It's easier for the group to have a sense of identity when centralized. The group may be funded directly or by chargeback. Often the latter is difficult if the client doesn't have a strong sense of need for the analytics. Typically

when starting, companies want to make the analytical support process as "painless" as possible. However, it can be difficult for the business to appreciate the support when the product appears to be free. The group may serve better when they operate "as a service provider with a catalog of products and services aligned with customer needs and product goals."[7]

When decentralized, the individuals are attached to the business units they are supporting. Their funding comes from the business unit so they are a direct burden on the budget. The collaboration with other analyticians in the group won't be as easy, but collaboration with the business is better. Typically a decentralized group finds it harder to mature with the roles not moving beyond the analytician. The analytics will be more tactical than strategic and the supporting roles described above, as opposed to the analytics roles, will be more difficult to fund.

An Analytics Center of Excellence would have the team reporting under one umbrella and supporting the particular business units in a matrix structure. This gives them the collaboration of a central team with the focus of a decentralized team.

ALTERNATIVES

Whether a company is searching for a statistician, analytician, or data scientist, the market for these roles is very tight. CareerBuilder.com defines labor pressure as a "ratio used to estimate the difficulty in acquiring talent by comparing the supply and demand for the position. … [A] lower number indicates that there is less supply to satisfy the demand."[8] For the title "statistician," they calculate the labor pressure over the six months from July 2011 to January 2012, to be 0.2, which means that it is very difficult for employers to find and retain the right talent. This profession is a good example of the Talent Shortage identified by ManpowerGroup in their identification of the Human Age.[9][10] When we review the positions over the last decade that companies look to Experis to fill, we find them becoming increasingly specialized with greater demands in experience and expertise.

When those demands cannot be met companies look to us to deliver creative solutions that meet the talent gap. Two options are available in most situations, contract support or process automation. The latter can include automating the tactical support described above or automating manual processes, especially if they are long or multi-platform. Contract support can be on-site or off-site in a Center of Excellence such as one of the four that the Business Analytics Practice maintains. Space limitations, cost of living differences, co-employment issues, and infrastructure support all make the off-site option attractive.

OPERATIONS

It's important to the success of an ACE to be deliberate about its interactions with other parts of the business and about who it will support and what kind of work it will take on. Some aspects of their mission are similar to certain IT groups and, as discussed, lessons can be learned from the organizational structure, financial backing, interactions and other aspects that have been successfully tried in the organization. Analytics is different than IT, though, in the important fact that work can be done without it, albeit likely poorly or with high risk. Unless the company has a mature analytical focus from high up in the organization, business groups don't necessarily "need" an analytics group. This section will discuss the need for a compelling marketing message, consistent and efficient analytics lifecycle processes and a strategic approach to analytics support.

MARKETING

Unless all groups have a clear directive to utilize the services of the ACE, marketing must be done so that people are aware of what the ACE can do and how they do it. The ACE can use any kind of standard marketing scheme allowed by their organization, such as announcements, videos, pamphlets, training. The message is best when it provides value propositions in the language of the business, that is, the value received by the business when they utilize the ACE's services.[11] It's one thing to tell them that you can create predictive models and another entirely to say that you can reduce their costs when recovering lost debt by helping them to focus on those most likely to repay with the higher amount of debt. Keep Lao Tzu's quote in mind when approaching other groups. We don't win by forcing them to do analytics, but by showing them its value, how it will make their jobs easier and make them more successful.

It's easier to show this value through case studies describing work done for the organization previously. Describe the business problem, the solution or services provided and the benefits the business achieved. The measurement framework described below is helpful in creating compelling case studies. These case studies can be published via appropriate channels to other parts of the organization. These should also be familiar to the members of the ACE so that they can use them to follow up an "elevator speech" when running into business colleagues in the hallways, gym and, yes, the elevator. Business units can also be invited to seminars that would showcase strategic case studies and familiarize the business with ACE processes and procedures.

PROCESSES

Mark Schwartz, CIO for the U.S. Citizenship and Immigration Services department, says, “The IT organization—with its constrained resources, backlog of projects, governance processes and controls, and focus on security and maintainability—can’t always help or respond quickly enough.”[12] The ACE must have well-thought-out interaction processes so that they don’t fall into this trap.

It can be profitable to structure your group’s process maturity with something like the Capability Maturity Model Integration (CMMI) published by the Software Engineering Institute at Carnegie-Mellon.[13][14] There are many similarities in the workings of an ACE and a software development group. And the goal of CMMI fits well with Aristotle’s lesson as it builds toward the right repeatable processes (habits). The maturity levels are

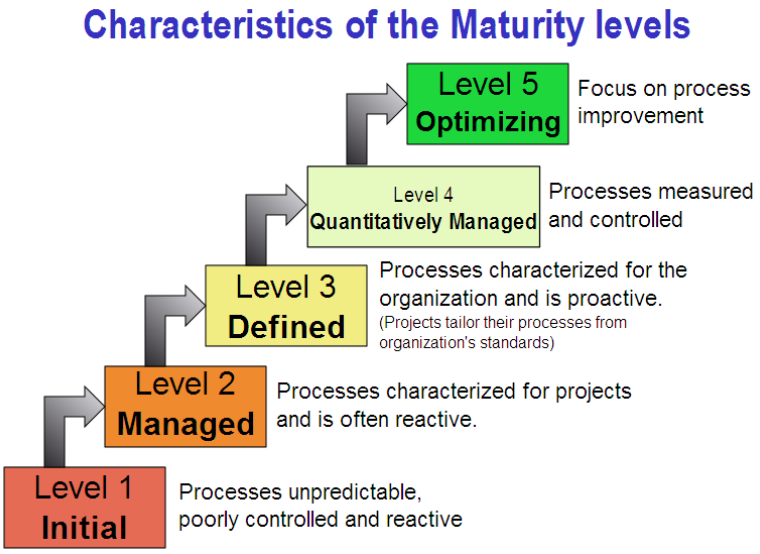
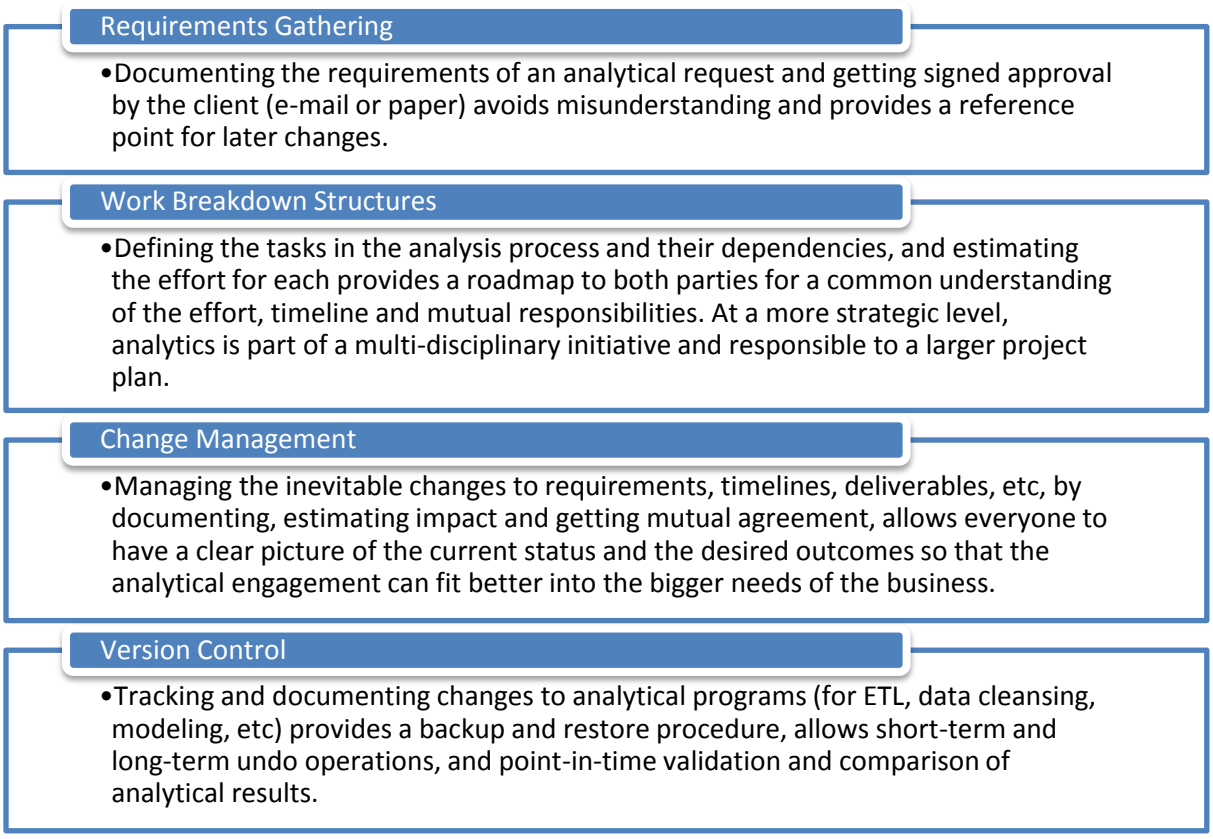


Figure 2 CMMI Maturity Levels

Embarking on the full CMMI is an ambitious task and may not be necessary. However, using it as a guide is very helpful. As an example, a business client engaging a Level 1 ACE would have very different experiences depending entirely on which team member they approached. With one they may have an initial discovery meeting with well communicated timelines and updates. With another they may have multiple discoveries as information is requested in an unorganized manner without regular status reports or with an open-ended timeline. (“I’m trying out decision trees now to see if that gets better results.”) At this level, rigor and confidence comes because the individual brings it to the table, but it’s not consistent across the group. True excellence in the experience comes about when the client knows what to expect going in, has confidence that the analytics team understands their problems, and is regularly updated with progress towards a well-defined deadline and deliverable.

This rigor helps the team as well. First it reduces their own uncertainty and stress because they are confident that they understand the business problem well and they can rely on the methods to produce valuable, actionable results. Second the rigor helps the group to work towards standardized processes that, at some point and to some degree, may be turned into automated processes. We’ll say more about this later.

As groups strive for excellence, they will find that achieving it means they take on processes that are outside the “pure” analytics, such as project management, software engineering, and marketing (as above). The principles and practices of project management and software engineering are foundational to Level 2 and 3 in CMMI. Gone are the days of the physicist coming back months later with a solution that assumes a spherical chicken. Transparent and collaborative communication must be the norm for Analytics Excellence. Examples of these principles and practices include



These examples of standard operating procedures in project management and software engineering are not always natural to the service-oriented people in analytics. It's more common to take some notes and start programming and only when our beautiful output is questioned by the client do we realize that maybe there's another way we should have done it. An excellent analytics group will incorporate these and other best practices into their standard operating procedures. It may be necessary to have a person functioning as a Project Management Office (PMO) to train group members and oversee the quality and consistency of these practices. Even better is when the group can leverage an Enterprise PMO that understands the peculiarities of analytical consulting.

SUPPORT

Two decisions that may seem obvious are who to support and what kinds of projects to support. The typical service-oriented analytician would say everyone and everything, since analytics can help all aspects of the organization. However, according to Evan Stubbs from SAS, excellence requires being more selective in the approach. The first step is to develop, in collaboration with the business, a framework for measuring the value of projects so that the ACE can more easily select which projects to take on and then communicate to the organization the results and benefits of their participation. Stubbs rightly argues that by collaboratively defining and using business, analytical and technical measures the ACE can explain how they contribute to the company's bottom line and so elevate from "simply delivering operational efficiencies to becoming the focal point for organizational success."[15]

Certainly every division within an organization can be transformed by leveraging advanced analytics. Often, though, the business needs to be educated on the full potential of that leverage. Until then they will come to the group for less strategic opportunities: after the data has been collected or the analysis done in order to "bless" the results, with requests for simple graphs, or spreadsheet-like analyses. If they have time, the ACE can take these on in order to build the relationship with the business unit. However, the education and prioritization must happen from the beginning so that the group doesn't get bogged down at this level. The table below lists alternative solutions for getting this work done in increasing value.

Table 1 Solutions for Providing Services

	Pros	Cons
Assigning lower level analysts to perform the work for the business	Cheaper than analytician doing the work Provides career path for training new team members Work is accomplished for the business	Requires staffing budget Need to train analysts to understand the business Doesn't enhance the analytical mind of the business
Providing the business with education and a statistical tool to perform the work themselves	Enhances the analytical mind of the business Provides opportunities for education beyond the tool Enables the business to utilize other tool capabilities	Distances the analytics from the Analytics Center of Excellence Business can venture into analytics on which they are not trained
Providing a custom tool with appropriate education	Enhances the analytical mind of the business Provides opportunities for education beyond the tool Focuses the business on the specific analytics needed The language of the tool can be specific to the business Automation can reduce or eliminate analysis time Tracking behavior and results can surface education or meta-analysis opportunities Other analytical features can be added with future releases	Requires internal or external application developers Can distance the analytics from the Analytics Center of Excellence Application can stagnate without proper attention

Beyond the tactical support, leveraging the full capabilities of advanced analytics means that the business brings complex problems for analysis. The measurement framework will help prioritize these opportunities so that the ACE is taking on only projects that have clearly defined outcomes, are the right size for the group, and fit within the capabilities of the group.

THE NEXT LEVEL

This paper has discussed many aspects of creating an Analytical Center of Excellence and has described some of the factors that make an analytics group excellent. Below are some suggestions unique to analytics that the group can leverage to take their strategic contribution to the next level.

Besides hiring analytic talent from the outside, an ACE should look internally to the organization. Those with analytical talent can come from any discipline and the experience they have in the business or science of the company is valuable to an ACE. Consider also training that analytic talent without bringing them officially into the group. The more analytic-minded is the organization at large the more its overall competitive advantage increases.

Once you have the talent or have identified the talent, cultivate it. Don't hide it. Develop analytics networks to increase collaboration. Hold analytics seminars to showcase strategic projects. It is also important to budget for the team to attend conferences such as SAS Global Forum, ASA's Conference on Statistical Practice, and O'Reilly's Strata. Attending conferences provides the team with continued learning and networking opportunities. Don't be afraid to expose them to each other and to the industry. Allow the talent to contribute to the discipline by giving presentations and providing leadership. Often it's by these benefits rather than salary that a company can motivate and retain analytic talent.

These conferences also help the ACE to stay on the cutting edge of each of its component disciplines: Statistics and IT. The group can evaluate advances such as text analytics or in-database processing and bring them to bear as appropriate for the benefit of the company. For example, sas.com reports that Bank of America cut loan-default calculation time from 96 hrs to just 4 hrs by using SAS GRID technology.[16] By being on the cutting edge Bank of America realizes a tremendous advantage in faster information for better decision-making.

We are becoming a data driven society. An ACE can be innovative in looking for new sources of data and other ways to use the available data. Mike Loukides points out that the CDDB service came about by looking at music as data but in a different way. They realized that the length of tracks provided a unique signature for each CD and now their service provides the song and CD titles in iTunes.[17] Data about report usage can drive strategic corporate decisions when tracked and considered in the right way, as described in a previous paper by the author.[18]

To achieve that next level Thomas Davenport recommends creating analytic service lines. These service lines are like the data products or automated processes described previously. Following the teachings of Aristotle, service lines come from what the group has done several times with a good outcome. A defined process based on available and understood data can be marketed to likely customers. The service line becomes a productization of the analytics capabilities of the group. Davenport says that “Creating a set of analytical service lines, and executing on them effectively, will go a long way toward scaling up analytics in your organization and delivering them efficiently.”[19]

CONCLUSION

Analytics Centers of Excellence have become a necessity for all organizations not only those in the corporate world, but education and government, too. The experience of the Experis Business Analytics Practice from helping clients has been that putting together the right people and the right processes can provide transformational change to an organization’s future. This paper provides guidance for organizations that want to make that transformation into analytical excellence.

Acquiring the right talent is key to the transformation. Team members need to have expertise in statistics, programming, database programming, business and the necessary soft skills. In today’s tight labor market, companies must move beyond the traditional means of finding, attracting and retaining this talent. Increasing the company’s analytics maturity is done by gathering that talent into an Analytics Center of Excellence. Excellence requires repeatable processes that work with the business. To achieve this goal more roles are needed, such as project manager, so that the talent becomes more diverse and somewhat more specific. Experis helps clients find this talent and leverage viable alternatives when this talent is not available or affordable.

It’s important that the ACE provides an excellent experience for the businesses that engage them. This excellence is achieved when the business knows what to expect going in and has the confidence that the analytics lifecycle processes will provide advanced value to their strategic goals. The ACE must define thoughtful processes that promote, not hinder, the business operations. They must also define measures for their projects so that they can be prioritized (and charged back, if desired). If the strategic value of the project isn’t well defined, then the ACE might turn it down, or better yet, use alternative methods of achieving the goals such as creating analytic applications. The successful engagements and applications can be turned into analytic service lines so that the ACE becomes almost a business with the business. Experis exemplifies this behavior in its own successful business model.

Finally, the ACE cultivates talent in its own group and in the rest of the organization through training, conferences, internal symposiums and bringing in cutting edge methods and technologies. In the age of Talentism where talent is the new driver of business success, only so much can be done through technology and automation. Attracting and keeping the right talent must be part of the organizational strategy.

Experis has worked with companies at every stage of the continuum of analytics excellence. They have found that though the combination and implementation of these practices is unique to each organization it is well within every organization’s reach.

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