



OUR CODE YOUR SUCCESS

# COMPANY PAPERS

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# Foreword

## Innovation: Make It Happen

With a strong wind at the aft, Codespring is sailing towards unexplored seas on the new technology stream. The principle of fine-tuning reminds us that everything is about sensitively combining the available resources, adjusting the processes and matching technologies.

In this edition we have chosen to highlight Romania as a rising science, technology and innovation hub, having its less known tradition in the field. The Industry Insights Chapter brings on scene Codespring's involvement in research and development projects.

What's more, a special interview with Ms. Valerica Dragomir - Executive Manager at ANIS (The Employers' Association of Software and Services Industry from Romania ) will give you the chance to understand some of the challenges that the organization is facing and what are the plans for 2014. In the end we questioned ourselves on the topic of Big Data: are we ready for it or not?

Enjoy reading and make things happen in 2014!

Codespring Team.

# Market Report

## Romanian Science, Technology and Innovation: The Pulsating Core of the CEE's New Economy

Formerly referred as a “tiger economy” for its stunning economic growth, Romania is back on track and ready to make a new jump. Embracing digitization and a hyperconnected world, Romania and other developing countries are focusing on innovation to compete for resources and market share. The specific skills set, the overall readiness and the continuous ICT performance mark Romania as the next pulsating core of the CEE's new economy.

### **ICT and Professional Services driven growth**

Having already surpassed analysts' expectations in 2011, with a 2.5% GDP growth, Romanian economy is forecasted to perform further 2.2% GDP growth by 2014. The contribution of the knowledge based economy, namely of the Information and Communication Technology sector to this organic growth is noticeable. According to the latest Cushman & Wakefield's Business Process Outsourcing Location Index, Romania is ranked 2nd, just after Chile (ranked 1st) and before Poland (ranked 3rd). As you

can see in Table 1, Romania provides good offshoring conditions (namely: appropriate labour force, adequate business environment, short time to first supply and good IT infrastructure) and it is an affordable region (in terms of labour costs, property costs and inflation level).

	overall	conditions	risk	costs
Chile	1	9	4	3
Romania	2	6	22	2
Poland	3	15	13	1

Table 1: Top 3 countries of the BPO Location Index, Cushman & Wakefield 2013

In order to have a better understanding of what is currently happening at technological level in Romania, it is relevant to have a look at the Networked Readiness Index 2013, featured in WEF's "The Global Technology Report 2013". Romania is ranked 75 out of 144 surveyed economies. The high literacy of Romanians, the quality of math and science education, the widespread Internet connection across households and businesses can be counted among the top performing indicators. According to the National Institute of Statistics, 28% of the enrolled students in 2011/2012 university year opted for engineering, 21% for economic studies and 10% for medicine studies. Consequently, the skills set coupled with a favorable business environment, propelled Romania on the Top 10 Shoring Locations (2008 – 2012) according to a recent study released by Jones Lang LaSalle's EMEA Location Consulting Services team, based on the information provided by fDi markets.

From a geographical distribution perspective, Romania hosts several technology, ITO/SSC/BPO/KPO and R&D centers. The main centers are situated in the capital city – Bucharest – which has also been ranked 44th in Tholons Top Outsourcing Destinations 2013. The second major center is Cluj-Napoca, mainly focused on outsourcing services and recently consolidated around the CLUJ IT cluster association. Next locations to be mentioned are Timișoara, Iași, Brașov, Sibiu and Târgu-Mureș. It is also relevant to note that most of the main ICT and technology enabled professional services global providers opened at least one center in Romania: Microsoft, Oracle, Cisco, HP, Siemens, Alcatel-Lucent, WIPRO, IBM, Intel, Infineon, Ericsson, Neusoft, Accenture, Genpact, Hellenic Telecommunications Organization, Vodafone, Orange and many others.

Latest UNCTAD data show that the total ICT spending of Romania in 2011 was of Euro 9,88 billion, while the Computer Software and Information Services Exports reached a level of EURO 658 million. A number of 8000 companies have been recorded as active in the ICT sector and 23% of the total active workforce is involved in Science and Technology sector.

## Computer Software and Information Services Export Intensive Economy

Due to the fact that an important number of IT companies are active both in software and information services, it has been often difficult to differentiate among the two categories. One of the most coherent studies in this area is the United Nation's Information Economy Report 2012, The Software Industries and Developing Countries issued on the occasion of the United Nations Conference on Trade and Development (UNCTAD).

As you can see in Figure 1, one key finding is that Romania is a computer software and services exporter: the exports ratio on total computer software & services spending is of 1.1, while the percentage from the GDP is of 0.5%. Therefore, Romania and its neighbor Bulgaria are framed in the top right corner of the low share of economy/high export intensity quadrant.

The Computer software and services indicator value includes two main subcategories: software products and software services.



Fig. 1: Computer software and services export intensity and computer software and services spending as share of GDP, 2010, low- and middle-income economies (percentage) Source: UNCTAD, adapted from WITSA/IHS Global Insight Inc. and WTO statistics database (see annex table II.2). Note: The ratio of exports to computer software and services spending and computer software and services as a percentage of GDP has been capped at 1 to enhance readability of the figure.

The Business Process Outsourcing and ICT –enabled services are excluded from this indicator.

a) The software products include: application software (sold as packages or off the shelf products) and system software (operating systems of servers, desktop computers and mobile devices, other programmes needed to run application software).

Romania's total spending of software products in 2011 was of USD 412 million, comparable with Slovakia ( USD 418 million) and Ukraine ( USD 445 million), but far behind Poland ( USD 2198 million) or Russia(USD4238 million).



## Romania and the Fine - Tuning Theory

While analyzing the available indexes, research papers and studies on the causes that determine Romania's evolution towards a science and technology hub, the answers are diverse and sometimes contradictory. Certainly, the key drivers are the education system, the government orientation towards the alignment with the European e-policies, science and technology goals. One ambitious plan is to reach the R&D intensity ratio of 2% by 2020, in contrast with the current 0.52 % level.

However there are a few immeasurable aspects, such as Romania's tradition in research and innovation. It worth to mention that Romania was the 1st Eastern European Country that has built its own computers. Or, we can add the cultural mix and the geographical location to explain the tendency to adapt the fastest and embrace change. Then, we must look at the core of the economy – the entrepreneurs who saw the opportunities underlying beneath the science and technology related services. Such an example is Codespring, a software development and outsourcing company from Cluj-Napoca who has built an entire strategy around the concept of fine-tuning.

b) The software services cover the traditional software development lifecycle: specification and analysis, design and implementation, testing and maintenance. The category also includes data entries activities and software-intensive IT services. Romania's total spending of software services in 2011 was of USD 509 million, again similar to but lower than Slovakia (USD 611 million) and Ukraine (USD 670 million).

Selecting Romania's peer countries from the CEE region, another key finding is that it is catching-up Czech Republic and Hungary in terms of exported computer software and services value. Still two ranks below Russia (USD 135 million) and Poland (USD 1545 million), Romania is also 4th in terms of employed workforce in software products and services: av. 35000 employees.

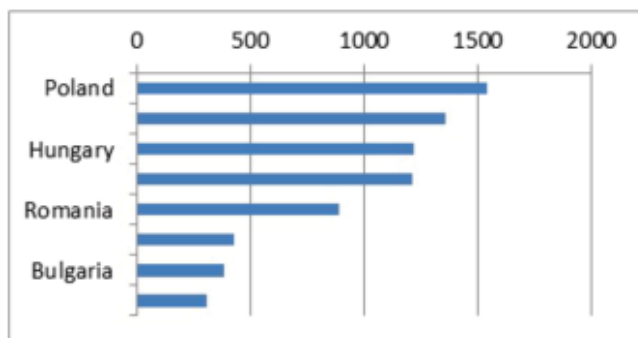


Fig. 2: Computer software and information services exports (USD millions), 2011, by selected country in the CEE (USD millions) Source: adapted from the Information Economy Report 2012, The Software Industries and Developing Countries / UNCTAD / UN Publication

According to the Fine-Tuned Universe theory, the conditions that allow life can only occur when certain universal fundamental physical constants lie within a very narrow range. In a similar way, successful software projects and business partnerships may occur when the main levers of such endeavors are finely adjusted or "fine-tuned". Should Romanian ICT stakeholders not be able to adapt at the finest detail, would we be seeing these data today? (D.C.)

- According to the forecast issued by the National Institute of Statistics of Romania, 2012
- Business Process Outsourcing Location Index, Cushman & Wakefield Publication, 2013
- The Global Technology Report 2013, World Economic Forum & INSEAD, 2013 (p.250)
- 2013 Top 100 Outsourcing Destinations, Rankings and Report Overview, January 2013, Tholons Group
- Own calculation at conversion rate of 1 EURO = 1.3525 USD based on the data extracted from the Information Economy Report 2012, The Software Industries and Developing Countries / UNCTAD / UN Publication,
- Romania Your Business Partner, Romanian Center for Trade and Investment Promotion Publication, 2012
- Innovation Union Competitiveness report 2011, Country profile – Romania
- Fine Tuned Universe, [http://en.wikipedia.org/wiki/Fine-tuned\\_Universe](http://en.wikipedia.org/wiki/Fine-tuned_Universe)

# Industry Insights

## Research & Development: RegionRank: a New Approach for Creating Web Search Services

One of the cornerstones in the field of innovation is research and development. Codespring has been actively involved in R&D activities since its early beginnings. Currently we are proud to count among our constant R&D partners the two elite universities from Cluj-Napoca: Babeş-Bolyai University ([www.ubbcluj.ro](http://www.ubbcluj.ro)) and The Technical University from Cluj-Napoca ([www.utcluj.ro](http://www.utcluj.ro)). Cooperations with prestigious universities from Hungary, Serbia, Denmark and Germany have also been in place, and Codespring is looking forward for new projects in the field.

In order to show case the results from such a partnership, we will further depict one of the projects deployed with Babes-Bolyai University from Cluj-Napoca. Codespring and UBB (Universitatea Babeş – Bolyai, Cluj-Napoca) team formed of: Máté Láng, Levente Pál, Zoltán Sebesi, Károly Simon, Péter Szilágyi, Tamás Török-Vistai have worked a research paper on a new approach to searching geographical and related data on the Internet called “RegionRank: a New Approach for Creating Web Search Services”.



According to the abstract of the before mentioned paper "RegionRank is a map service based web application. It generates results for queries containing multiple criteria and displays these results on a heatmap. In this way, the user can easily select the areas which are the best match for the given query. The user can choose from multiple aspects to build the query, and there is a possibility for setting the importance of these aspects by associating different weight values to each corresponding criterion. A significant difference between RegionRank and other map-based web applications is that it extends the concept of POI (Point of Interest) and introduces the ROI (Region of Interest) concept. In this way, not only points, but also regions can be defined and searched by the application. Furthermore, in the framework of the application there is a possibility for using the classical searching approach and data representation. RegionRank provides a unified API for handling data originating from different data providers, supports different formats, being easily extensible to integrate new data sources."

### The Trigger

For demonstrating the idea, an example can be considered. Foreign students visiting Cluj-Napoca, would like to plan their evening. They want to watch a movie, serve a dinner at a local restaurant, take a walk and go sight-seeing. They also want to minimize the time spent with unnecessary travelling. Using the currently available search services, they have to search separately for each mentioned criterion: first for cinemas, then for restaurants, then later for parks and finally for local attractions. After getting the results, they have to evaluate and make a proper decision. This method is rather unpleasant and time consuming.

Compared to other currently available services, RegionRank provides a faster and more convenient way for searching. Based on the selected criteria, it generates a heatmap, displaying those regions in a city, which are the best-matches, and also those ones, which are the worst, in an easily analyzable way. According to their needs, users can select one or more criterion and they can also set the importance of each criterion separately.

Some examples of criteria which the application can search for are:

- Nearby POIs (schools, hospitals, theaters, museums, cinemas, restaurants, malls, recreational and sport centers, etc.)
- Transportation network (primary roads, public transportation nodes, bicycle roads, etc.)
- Environmental factors (air and noise pollution, green areas, cell phone coverage, public safety statistics, etc.)
- Residents of an area (political views, religious groups, health conditions, etc.)
- Time-dependent criteria (weather, local events, seasonal offers, etc.)



Fig. 1. Result of a complex search displayed on a heatmap (based on a sample data-source containing restaurants and bars, green areas and rivers in Cluj-Napoca). The regions marked in red or warmer colors are more appealing to the user's search criteria.

## Methods and Theoretical Concepts

The methods that worth mentioning are the heatmap and the clustering algorithms.

### The heatmap.

In the framework of the RegionRank project heatmap is used for visualizing the aggregated effect of ROIs in a specified location.

The ROIs can be defined by four parameters: type (geographic coordinate – e.g. representing a POI, polyline – e.g. representing a road, or a polygon – e.g. representing a park), position (the coordinates of the points defining the shape corresponding to the ROI), radius (the radius of the area in which the ROI has an effect) and value (the magnitude of the ROIs'effect). Using these parameters, the application generates a heatmap, which displays the overall effect of the visible ROIs.

### Cluster analysis and POI/ROI clustering.

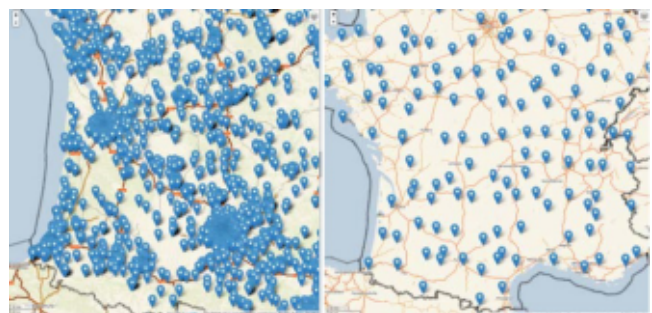


Fig. 2. Active Fonera antennas shown on a map using the RegionRank's classical presentation mode, (left) without clustering and (right) using grid-based clustering (used datasource: <http://poiplaza.com>)

RegionRank's clustering component is developed using the well-known Strategy design pattern, so it can provide different clustering algorithms, making it easily extensible with new clustering methods.

Currently the application provides an implementation for the k-means algorithm and a grid-based clustering method. Upcoming versions of the application are planned to implement an improved version of a hierarchical k-means-type method and a dynamic evolutionary clustering method.





The main advantage of the standard k-means algorithm is its simplicity and speed, even so RegionRank only uses it as a secondary clustering algorithm, because the need to initially specify the number of clusters.

In the case of RegionRank, given the changing nature of the data and real-time calculations this can add up to an unexpected behavior and the need to recalculate the clusters.

### Technologies & Tools

RegionRank is developed using Java technologies. Notably we can name: Spring enterprise framework; MongoDB [4], Vaadin, Leaflet JavaScript API, Guava EventBus , SLF4J API, Apache Shiro, Java Bean Validation, JAX-RS (Java API for RESTful Services), JAX-B.

RegionRank uses Mercurial as source control tool, BitBucket as issue- and bug tracking system, Apache Maven for compilation and build processes.

Codespring is an active supporter of R&D projects initiated by the UBB (Babes-Bolyai University, Cluj-Napoca) and we are committed to continue promoting innovation and research initiative within our community.

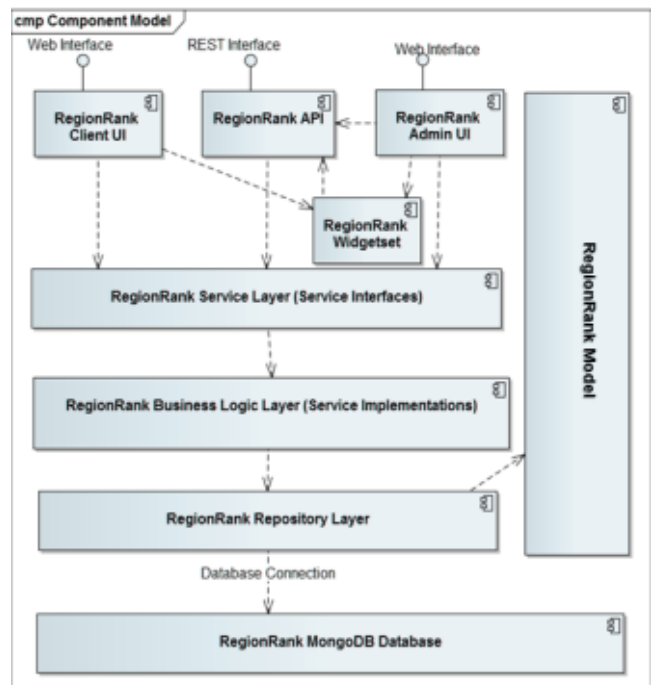


Fig. 3. Region's Rank Architecture

By courtesy of:  
 • Máté Láng, Levente Pál, Zoltán Sebesi, Károly Simon, Péter Szilágyi, Tamás Török-Vistai  
 • Codespring LLC, Babes-Bolyai University

## Special Talks: Interview with Valerica Dragomir – Executive Director, ANIS

I have personally met Ms. Valerica Dragomir at one of Romania's presence at CeBIT - The world's most important business IT event. Always positive and energetic, Valerica has been an active promoter of ANIS (The Employers' Association of Software and Services Industry from Romania) initiatives to promote Romania on the global software development and IT services map.



Valerica has been part of ANIS team since 2001 and she has been appointed Executive Manager since 2005. She has been involved in the strategic planning of all the events organized by ANIS – soft21.ro, Business Club ANIS, IT Café, the Romanian participation at CeBIT Hanover (since 2005) – and all the other projects of the Association.

Since ANIS has recently undergone a rebranding process and we can find the new image online at [www.anis.ro](http://www.anis.ro), we wanted to let you know more about this process and the Associations' perspectives. As usual, Ms. Valerica Dragomir was very open to answer our questions and to share her thoughts and beliefs for our readers.

### **1. What was the motivation for launching a new ANIS image? Why now?**

ANIS is celebrating this year 15 years since its creation; we thought it would be a good moment to connect the rebranding with this special occasion. It is more than a new logo – it is a new visual identity that we hope reflects what we represent for the IT industry at this moment: a dynamic community, caring for and being preoccupied by the development of this industry.

The new visual identity is also a manifestation of the ANIS spirit and of its involvement in the community – both of its members on one side, and of the Board and the executive team, on the other side.

### **2. What are the challenges that ANIS is facing today, compared to other similar associations around Europe?**

I think our concerns are very similar to those of other associations in the industry: how we can contribute to the growth of the IT industry and of the companies that we are representing, the ways to generate a higher representativity of the association in relation with the industry and how we can attract a higher involvement of the members in our projects, how we can keep a balance between the common interests of the members and those individual priorities that makes them compete against each other, and last but not least, how we can finance our current operations and the special projects.

### **3. What projects are you preparing for us in 2014?**

There are several projects that we have announced in the last month and that we really wish to continue next year, too, depending on interest raised. I am mainly referring to the study on the ICT industry's evolution – that we want to roll it out annually, the projects that promote the Romanian outsourcing companies, the contribution to a mechanism that supports those companies involved in the Research and Development activities, the support and the expansion of the dialogue between the private companies and the academic institutions.

Also, the ISTQB certification program organized by ANIS will continue in 2014; we have a plan to organize more courses, on different topics, but again it will depend on the companies' interest.

### **4. What expectation do you have from ANIS Members?**

Our biggest expectation is that our projects are interesting enough for the ANIS members to get involved and to contribute. I believe that this is the most important measure for the Association's success – and this is what we ultimately try to achieve through all our projects.

### **5. And what are your personal hopes and plan as Executive Director of ANIS?**

It may seem a cliché, but it really is one of my deepest beliefs: it is not my own plans and hopes at stake here, as there is not much I can do by myself. What we are striving for, my team and I, is exactly what I have previously mentioned – more interactions with all ANIS members and more involvement on their part in our projects.

This has been my constant objective since I started working at ANIS and I truly believe that this is not like an objective that you reach and then you stop. Quite on the contrary, the expectations are constantly growing and we aim higher and higher.

### **6. A few words for the IT community from Cluj?**

Cluj has one of the most interesting "IT areas" from Romania – it is a diverse ecosystem, with many companies that have interesting projects and reach success on their markets; at the same time, I think you have in Cluj something that can really be called a "community" and that Cluj companies know to protect their own interest and yet to work together on common priorities.

There is one more extremely interesting fact that raised my curiosity for Cluj and that could be adopted by other companies too: the companies in this city have reached a certain maturity and they are doing the exact step that we, as an Association, are aiming to promote across the industry – the interest and the shift from Projects towards Products.

...It would be so much interesting if we could have more communities with such preoccupations and with such an evolution at national level!

In the end, we would like to thank Ms. Valerica Dragomir for her 12 years activity at ANIS and we hope to further cooperate on common projects.

## About ANIS

ANIS (The Employers' Association of Software and Services Industry from Romania) represents the interests of Romanian IT companies and supports the development of the software and services industry, as well as the growth of companies involved both in outsourcing projects and in developing proprietary applications.

Founded in 1998 and having cca. 100 corporate members, ANIS aims to promote Romania as a regional leader for software development and established exporter for high quality software products and services. ANIS is also acting as main point of contact for information regarding the industry.

During the last years, ANIS was closely involved, together with other organizations, in creating and promoting abroad the national brand for the IT industry –“romaniaIT – Creative Talent. Technical Excellence”.

Cooperation with both public and private sector partners is the main success factor for many of the association's projects. ANIS is a member in the Export Council, was involved in CoNaCo – National Competitvity Council and is now represented in the Coalition for the Development of Romania, created by the Prime Minister and coordinated by the Ministry of Economy.

ANIS is also closely involved and has active partnerships with bilateral chambers of commerce – AmCham, Romanian-French Chamber of Commerce, Romanian-German Chamber of Commerce – as well as with commercial representations attached to embassies of the target countries for our industry.

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*Interviewer:* Diana Ciorba.

For interview republication purposes please write at [diana.ciorba@codespring.ro](mailto:diana.ciorba@codespring.ro)



## employers' association of the software and services industry

New ANIS Logo / launched in 2013

For cooperation opportunities or information about ANIS projects we invite you to use the following contact details:

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# Thinking Point

## **Big Data: Are we ready for it?**

Certainly, most of us are already used to provide basic data, to handle some data, to gather specific data, to share data, to analyze data or to interpret data. Suddenly, we have just realized that the unit measure of the data handled in a given amount of time reaches the order of exabytes. This data is not only big in volume, but is also extremely diverse and it moves at incredible speeds.

What about the information in the Data? Who can have access to it? What can they do with it? – These are just some of the questions arising when speaking about Big Data.

Getting mobile, switching to the cloud, being active on the social media – all these behaviors engender creation, sharing and circulation of data. At this point, we doubt our understanding of the implications of this phenomenon and we will try to highlight some aspects related to it.



## What does Big Data actually mean?

At first sight we can describe Big Data as very large and complex data sets, impossible or hard to handle with classic data processing tools. The expression itself is being used as it originated from English; we must note that French specialists are currently translating it as “grosses données” (big data) or “données massives” (massive data) or even “datamasse”(datamass) as in “biomass”. The novelty of the concept and the blurred definition lines prevent the localization of the term.

In 2012, Gartner (that has somehow contoured the term in the early 2000's) has updated the definition: *“Big data is high volume, high velocity, and/or high variety information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimization.”*

The above definition outlines the dimensions of Big Data – the well-known 3Vs – volume, velocity, variety. Yet, the great thing about this formulation is that it opens multiple perspectives on the Big Data concept. We may note a technology view, a process view and a business view.

### The opportunities

When dealing with a completely new size level, the capture, the storage, the research, the distribution, the analysis and the visualization of data must be redefined. The perspective of handling big data are enormous and yet unsuspected!

It is often recalled the possibility to explore information shared in the media, to acquire knowledge and to assess, to analyze trends and to issue forecasts, to manage risks of all kind (commercial, of insurance, industrial, natural) and phenomena of all kind (social, political, religious, etc.). In geodynamics, meteorology, medicine and other explorative fields – big data is ought to improve the way the processes are being deployed and the data interpreted.

### Big Data Management

One of biggest challenges at the time being is to build the proper tools and systems to manage big data. As real-time or near-real time information delivery is one of the key features of big data analytics, the research aim to set-up data base management systems able to correspond to the new requirements.

The technology in progress involves the following:

**Storage:** For the storage and retrieval of data, the underlying NoSQL developments are best

represented by MongoDB, DynamoDB, CouchBase, Cassandra, Redis and Neo4j. Currently they are known as the most performing document, key value, column, graph and distributed databases.

**Software:** The Apache Hadoop set counts Cloudera, HortonWorks and MapR. Their main goal is to expand the usage of big data platforms to a more diverse and capacious user range. Secondly these technologies focus on increasing the reliability of big data platforms, to enhance the capability of managing them and their performance features.

**Data Exploration and Discovery:** Big data analytic discovery is a hot research and innovation topic. Major developments have been done by Datameer, Hadapt, Karmasphere, Platfora or Splunk.

### Operating Big Data

The hard talks also get to the question: who will define data categories? Who will structure the shape of analytics? Inevitably this will be a man-owned job and it will belong to the new “data scientists”. These will be prepared specialists able to handle data for a specific field. Some will have a certain business domain expertise able to ask the right questions, while others will have technology expertise able to understand the limitations of software and hardware.

### The Big Data Readiness

At this point a few level must be stressed out: there are already active research initiatives on how to better handle complex, fast and large amount of data; the explosion of user generated data is due to our way of embracing social media platforms and M2M technologies; a new generation of specialists is on the rise; from an ethical and legislative point of view there are still many questions to be answered.

Probably the vast majority of people involved in the big data phenomenon do not understand it clearly yet. As it is still unclear what we are facing it is less probable to state that we are ready for it. (D.C.)



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