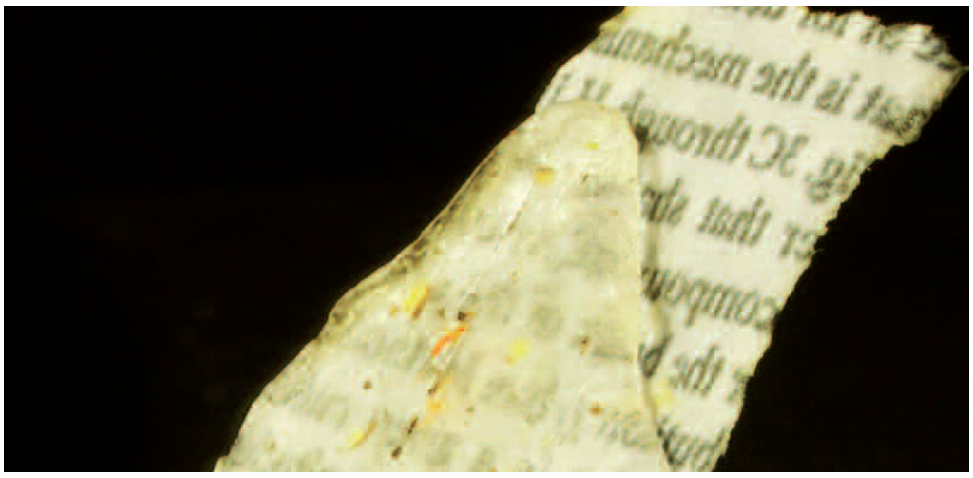
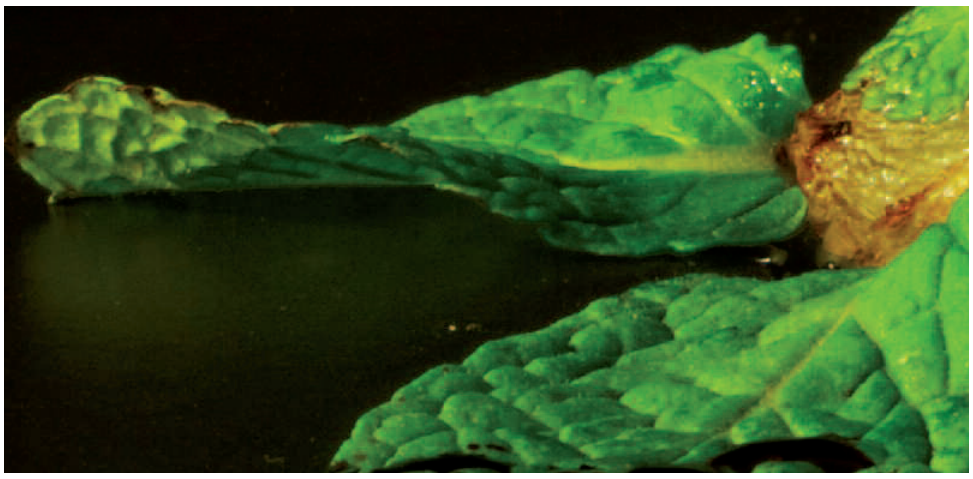
Newspaper 01

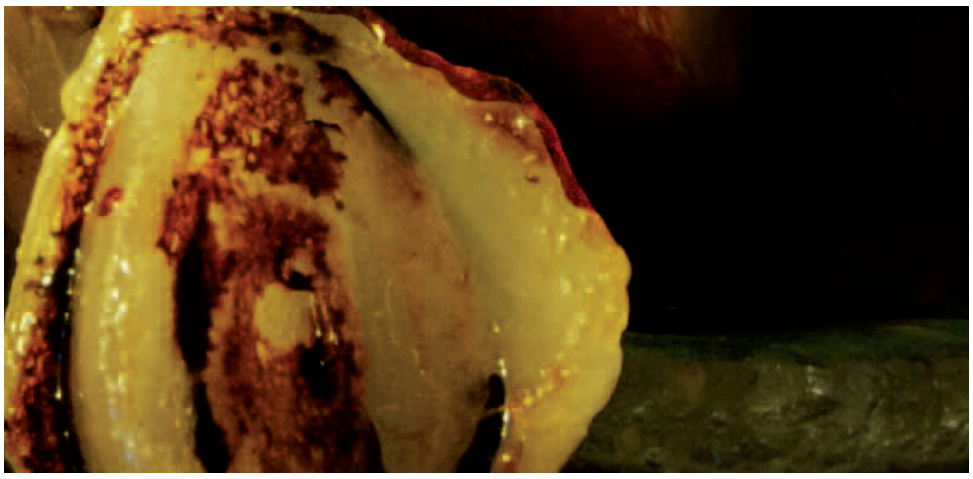
Research News

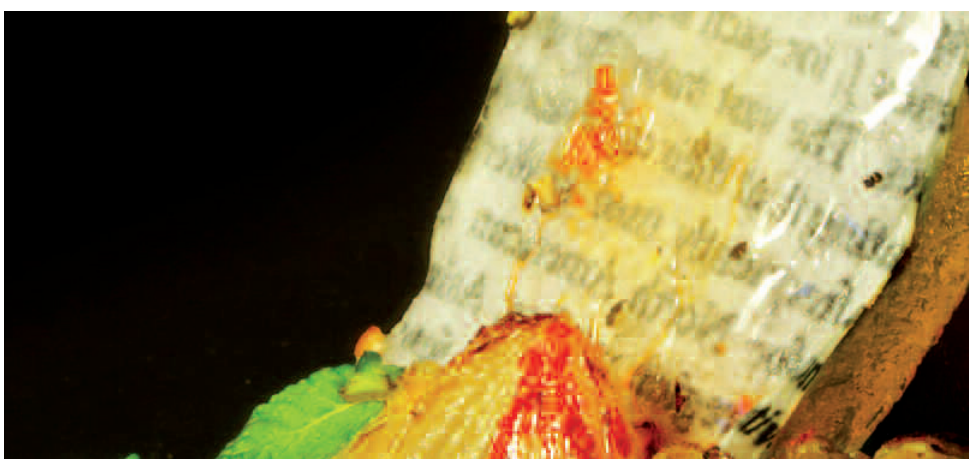
Telefónica Digital

www.tid.es/en/research









THE MAIN INGREDIENT:
A REJECTED PAPER

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Telefónica Research Groups

by **Pablo Rodriguez**
Director of Research

Within the past 5 years, the achievements of the Telefónica research group have had a strong focus on IPR generation -more than 50 patents- and publications -more than 45- in top Internet and Multimedia research conferences such as Sigcomm, Mobicom, NSDI, Sigmetrics, ACM Multimedia, ACM CHI, ACM Recsys, ICASSP. Our projects target both the design of complete systems and prototypes, as well as the transfer of technology to existing products. The Telefónica research groups have a remarkable track record in transforming mid-long term research into new market products. Become one of us joining our global research team in Barcelona.

FIXED AND WIRELESS NETWORKING

ClubWiFi: Increasing wireless bandwidth and coverage at home

Energy Efficient Networks

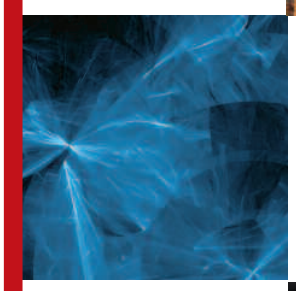
Network Coding

DISTRIBUTED SYSTEMS

Tailgate: Handling long-tail content with a little help from friends

Inter-Datacenter Bulk Transfers with Hermes

Key-Value Store Architectures



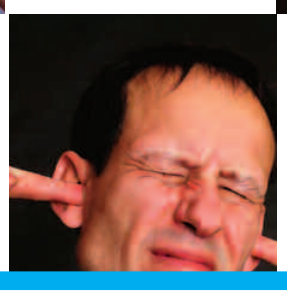
Bittorrent Locality

Apollo

ONLINE SOCIAL NETWORKS

SPAR: Scaling Online Social Networks

Detecting Astroturfing behavior



SONG: Social network Write Generator

MULTIMEDIA ANALYSIS

Multimodal Video Copy Detection

Speaker-centric Audio Analysis Technologies

Photo Storytelling and Computational Models of Media Aesthetics

MIESON: Multimedia Information Extraction from Online Social Networks

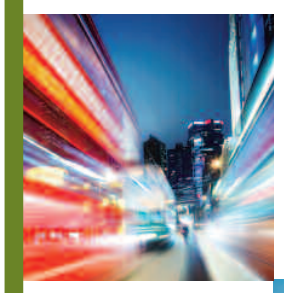
HCI AND MOBILE COMPUTING

Understanding Mobile Web usage

MoviPill

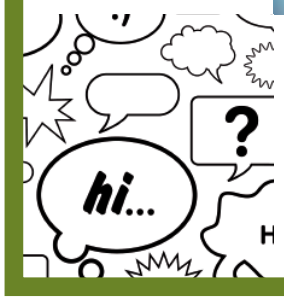
USER MODELING & MACHINE LEARNING

Recommender Systems



Smart Cities

Technologies for Emerging Markets



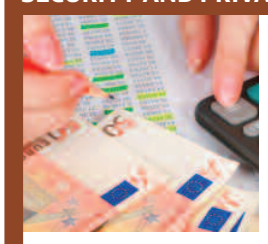
Towards Understanding Human Communication

NETWORK ECONOMICS

Pricing policies for end customers & ISP inter-connection economics

Shapley in the Core: Fair and Accurate Pricing of Transit Bandwidth

SECURITY AND PRIVACY



iTunes for Information

SybilRank: Efficient and Effective Sybil Detection in Online Social Networks

Crowdsourcing identity credential verification

FIXED AND WIRELESS NETWORKING
MULTIMEDIA ANALYSIS
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MOBILE WEB UNDAPPRESSURE

An app for hunting movies, an app for finding new recipes, an app for checking the weather... A research project reveals that smartphone users only search and browse the mobile Web when they don't have "the right" mobile app installed. What would you like to know and which app will you download?

SMARTPHONE USERS are more inclined to use specific mobile apps than browsing the mobile Web when trying to find information, a research project carried out by Telefónica Digital shows [1]. Considering that the Apple'sMac App Store offers more than 500,000 apps, the life expectancy of existing mobile browsers might be shorter Than we think. Mobile search engines or mobile app recommendation apps can recommend appropriate apps to the user after analyzing their mobile behavior. In addition, personal computers no longer rule the market. A market report by Canalys shows that 489 million smartphones were sold in 2011 [2], compared to the 415 million PC's. And the gap is getting bigger: smartphone sales will increase a 22% in 2012 [3]. In this scenario, it isn't surprising that mobile Web usage at home is increasing. Instead of using a laptop or a desktop computer to access online information, people use their phones while at home. According to the research project previously mentioned, more than 70% of mobile Web usage occurs in stationary settings like home and work. The increasing amount of tablets has contributed to this progressive decline of conventional platforms – experts believe 90 million tablets will be sold during 2012.

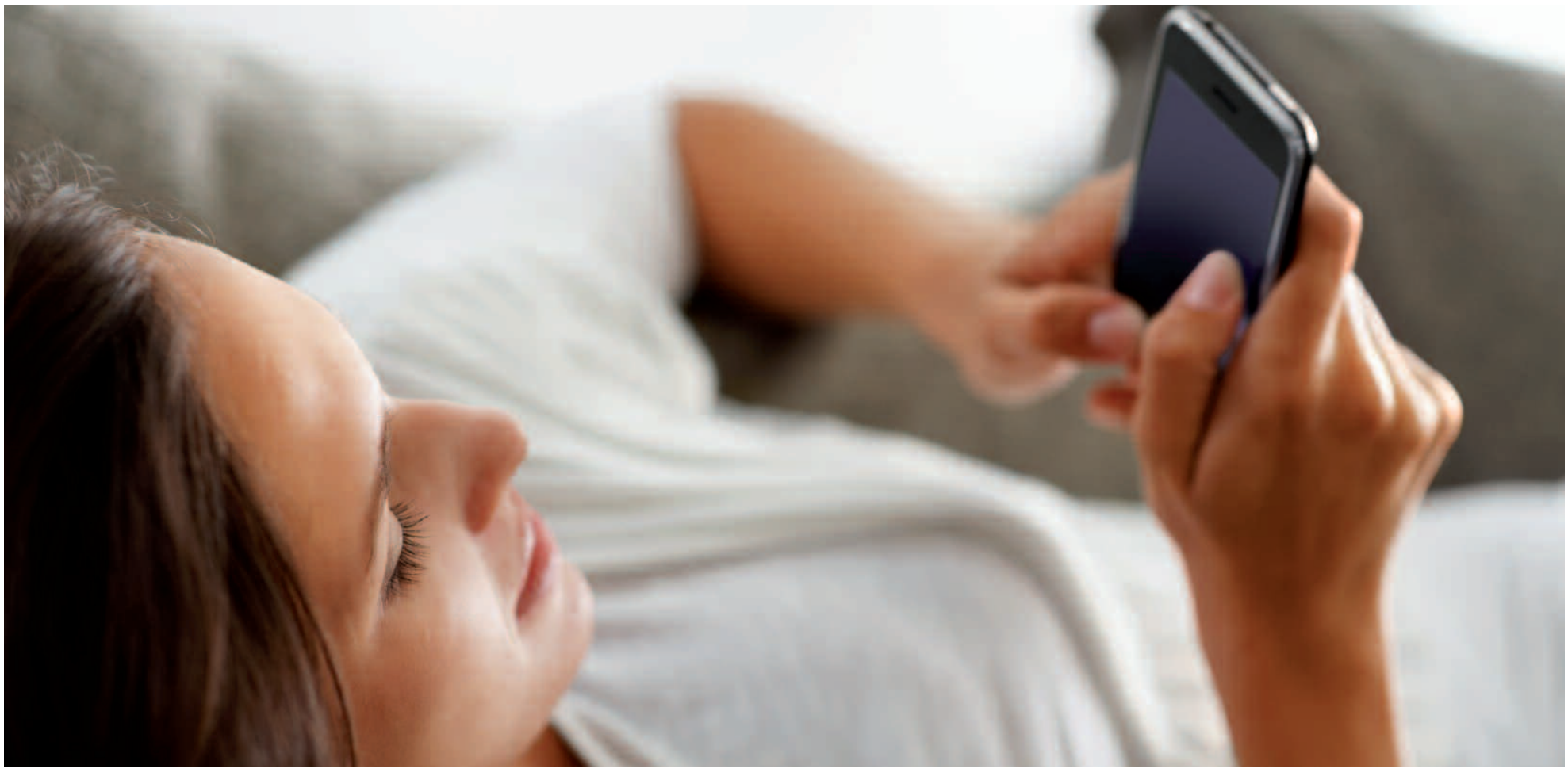
Technology has certainly changed a lot in the last 40 years and its impact on society has been profound. It has shaped a completely new lifestyle, closely related to the spread of new computing devices. Mobile phones have become an extension of the human body –who can stand a whole day without checking email or tweeting what they are up to? We carry our mobile phones everywhere and ringing melodies are heard at funerals, weddings or cinemas. The way we use our phones, the content we consume, the searches we execute, reveal a lot about ourselves.

Another mobile trend discovered by the research team at Telefónica Digital is the increasing social nature of mobile Web access. Imagine you're having dinner with some friends and the topic of last elections comes up; then you use your mobile phone to find out the difference between the most voted party and the second most voted. Indeed mobile search appears to be a social act: 65% of search happens while in the presence of others according to the empirical results obtained by Telefónica Digital. Social search does not seem to follow any concrete temporal patterns, which implies it occurs more by chance than out of habit. It's the conversation that prompts people to use the phone to check details about the topic you're discussing. So let's see who gets it first, the IMDb app or the Web: how many Oscars has Meryl Streep won?

[1] K. Church, N. Oliver. Understanding mobile web use in today's dynamic mobile landscape. In proceedings of the 13th International Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI'11). http://goo.gl/DEryP

[2] More than 1 billion apps are downloaded every month. http://goo.gl/Q84bb

[3] Will smartphones sales keep accelerating forever? http://goo.gl/In7Ha



THINK A **BYTE**

How can the network meet the traffic demand with the current resources? How we solve this question has a consequence for the environment as the digital universe is expanding and the traffic is said to keep growing. A possible answer: to be more sustainable by doing a more efficient use of the current network.

THE DIGITAL UNIVERSE isn't exactly expanding: "it's exploding". In an interview on Wired magazine [1], historian George Dyson states that "digital universe is expanding at the rate of 5 trillion bits per second in storage". At such pace, there won't be enough air-traffic controllers to handle traffic through this massive network. Speaking of which, we may find some inspiration in the principles of yield management used by the low-cost airlines. When managing the network, we should try to understand, anticipate and influence the user behavior in order to maximize the resources usage. To do so requires an in-depth knowledge of the network resources in order to use unutilized bytes currently going to waste during non-peak hours.

[1] "Q&A: Hacker Historian George Dyson Sits Down With Wired's Kevin Kelly" http://goo.gl/1e0Fq

[2] Inter Datacenter Bulk transfers with Hermes
http://goo.gl/lS7l7

[3] Club-Wifi Increasing wireless bandwidth and coverage at home.
http://goo.gl/XxgFM

[4] Inter Datacenter Bulk Transfers with Hermes.
http://goo.gl/M8Chb

[5] Tailgate: Handling longtail content with a little help from friends.
http://goo.gl/HCGkD

That's exactly what NetStitcher [2] does: non-real-time applications, such as back-ups or transfer of bulky updates, can use unutilized bandwidth across multiple datacenters and backbones. Achieving this goal is relevant since leftover bandwidth appears at different times, for different durations, and at different places in the world. NetStitcher gathers information about leftover resources, uses a store-and-forward algorithm to schedule data transfers, and adapts to resource fluctuations. As opportunities to make a more efficient use of the network by using NetStitcher are striking, the Telefónica Digital innovation department is gauging the possibility of implementing a worldwide solution based on this mechanism.

Nevertheless, making a more sustainable use of the network is also in the users' hands. After all, every support is needed to reduce our impact on the environment. ClubWiFi [3], a project developed by the research teams at Telefónica Digital, can help without introducing expensive changes in the infrastructure. In residential neighborhoods, ClubWiFi, just using a single radio WiFi card, connects all the neighbors WiFi gateways and uses their spare bandwidth, which improves the downlink and uplink speeds without impacting the quality of service of the line owners. Aggregating the backhauls, though, is not enough: since there could be a potential high number of users sharing their broadband links, the users always have their own bandwidth at home guaranteed, so the performance is always equal or better than not using ClubWiFi.

Different priorities

Imagine you take a plane to visit the Telefónica Digital research lab in Barcelona, known as "the arrow", and, instead of sharing the flight with other passengers, a cargo of water tanks flies with you. An unusual passenger, you may think. Unusual and expensive: even though we can't survive without water, the shipping cost for the sender would be astronomical. A similar situation occurs in the network: despite the overarching assumption that all communications are intolerant to delay, there are different types of contents that can be treated differently.

The so-called delay tolerant traffic is a good example [4]. In many different situations, research teams start large downloads that can take anywhere from a few to several hours. The content, though, will not be consumed right away. The LHC project by CERN is expected to generate 27 TB of raw data per day that are sent to 30 research labs worldwide. With regard to sustainability, treating this delay tolerant content as ordinary interactive content has a strong impact on the environment as the network needs to be able to meet the high demand on peak hours.

The new scheme proposed by Telefónica Digital can help battle this issue: it rewards the user –for instance, a research team– to move part of their delay tolerant traffic away from the busy hours. On one hand, by lowering their traffic during peak hours, researchers get higher access rates during non-peak hours and more scientific data can be sent; on the other hand, no more infrastructure investments are needed.

There are more cases of contents that can be treated differently. For example, the pictures of the last party posted on Facebook or a short video from a day out with the family. This user generated content, called long-tail, has dramatically increased with the broad adoption of smartphones; nowadays Facebook hosts more images than photo hosting websites such as Flickr. However, the interest group is limited: only friends and relatives will find this content interesting. Here we have the challenge: how can we reduce costs and make this content available only for those who will consume it?

That's why Telefónica Digital has designed a system called TailGate [5] that handles the long-tail content and improves the quality of experience. In order to reduce costs TailGate focuses on different notions that dictate consumption patterns of users. For example, the different time-zones allow TailGate to transfer the content during non-peak hours; the social graph also provides information on who will likely consume the content. By combining both factors TailGate pushes the right data to the right areas at the right time.

TailGate, NetStitcher and the delay tolerant content project have been funded by the 7th Framework by the European Commission. The different teams involved want to thank the European authorities for giving support to their research and contributing to big data sharing.

As opportunities to make a more **efficient use** of the network by using NetStitcher are striking, **the Telefónica Digital innovation department** is gauging the possibility of implementing a **worldwide solution** based on this mechanism.

DATA, **FUTURE OIL**

Countless digital items leak traces of our daily activities: the mobile phone, the credit card, GPS devices... This vast amount of data has been said to be a new class of economic asset like currency or gold. Like oil, this raw data needs to be refined to extract its business potential. At Telefónica Digital, we are carrying out extensive research to make sense of this pervasive data, shed new light on human individual and aggregated behavior and identify opportunities for new services. In the case of emerging countries, this data is a key asset that can be leveraged to understand and improve people's lives.

DESPITE BEING ONE of the first current energy sources and having countless uses, the existence of oil isn't a recent discovery. In fact, the Ancient Greek already used it in the construction of towers and walls. More than 20 centuries later, the Polish Ignacy Lukasiewicz invented the first oil refinery in the world 19 years before the engine, both of which laid the foundations of a completely new economy. In other words, it wasn't until society learned how to refine the crude oil that it became indispensable in the Occidental world. In a similar way, raw data needs to be processed and analyzed in order to extract valuable knowledge from it. The new data refineries are located in the research labs where researchers have a challenging task for the next decade: to extract the value from this resource for both commercial profit and public good.

The World Economic Forum estimates that over 2.5 quintillion bytes of Big Data [1] are generated every day. A large portion of this data is user-generated content available on the Web, specially in blogs and online social networks. The majority, though, is what experts call "massive passive data" or "data exhaust" that is generated when we interact with the digital world via e.g. financial transactions, Web searches, or mobile phone usage. Big Internet companies like Facebook, Google, eBay or Yahoo! are devoting significant resources to materialize the business potential of Big Data [2]. For example, Bob Page, vice president of analytics at eBay, confesses they "now depend on Hadoop (an open source platform that crunches epic amounts of data using an army of dirt-cheap servers) to run the company".

Hadoop can analyze huge volumes of data. More precise analytic tools are building on the foundation laid by Hadoop. Telefónica Digital is currently developing a Big Data analytics system which analyzes terabytes of data in real-time.

[1] "Big Data, Big Impact: New Possibilites for International Development"
http://goo.gl/v3qkH

[2] "How Yahoo Spawned Hadoop, the Future of Big Data"
http://goo.gl/EcFZ1

The research team at **Telefónica Digital** has been carrying out research in Urban Computing since 2008.

Urban analytics is another field where the opportunities of Big Data could have a profound impact in society. The research team at Telefónica Digital has been carrying out research in Urban Computing since 2008. Part of the research is looking into the value of understandinganonymized phone call records. Their findings might push aside traditional ways to analyze urban behavior, such as citizen mobilitysurveys, which face high cost, lack of scalability and increasing unwillingness of people to provide personal information.

Studies carried out so far have generated disruptive knowledge about human dynamics. One example is automatically identifying land use in urban landscapes by using phone calls records [3]. The traditional approach to urban land use characterization only takes into account the planned land use. However, quite often land use planning and real land use are different. Researchers from Telefónica Digital have automatically categorized land uses in Madrid and Barcelona (the two largest cities in Spain) according to five activities: industrial and offices, leisure, nightlife, shopping and residential. They have also studied the way citizens move from one urban area to another. This route detection is key for traffic control, for the design of new public transport lines and to correlate the existing infrastructure with the actual needs of the city.

Mobile phones as a tool to model the propagation of infectious diseases

In today's connected world, the risk of suffering a pandemia is larger than ever before. As illustrated by popular movies, such as Outbreak or Contagion, when facing an infectious disease, the more physical interactions people have, the higher their probability of getting infected. Hence, social dynamics and mobility are key factors in the spread of a disease. In fact, when facing the risk of a pandemia, local governments typically ask their citizens to reduce their social interactions and mobility by staying at home.

Previous research done in epidemiology has focused on clinical features, incubation times or transmission channels. Now the study of human mobility patterns can shed new light on the way we've traditionally looked at the evolution of an infectious disease spreading in a geographical area. The research team at Telefónica Digital has carried out a study of the H1N1 flu outbreak that uses real-life data about citizen dynamics [4]. Particularly the research team has looked into the consequences of the Mexican Government's response during the H1N1 flu outbreak in Mexico. Between April 16th and 30th, 2009, Mexican authorities asked citizens to reduce their mobility, closed schools and universities and suspended all non-essential activities. Our research has revealed that government mandates managed to reduce by 10% the peak number of individuals affected by the virus and postponed the peak of the pandemia by about two days.

As the public sector, social agents also have non-commercial interest in having accurate knowledge about human behavior in emerging countries. Mobile phone records can be used to study citizen dynamics in developing countries as, unlike other technologies, mobile phone penetration rates are very high in emerging economies. In fact, the growth of mobile data traffic from subscribers in emerging markets is expected to exceed 100% annually through 2015. The research team at Telefónica Digital is also working on technologies for development and on how this pervasive data can help us better understand the behaviors and needs of communities in emerging economies. A recent project –mentioned by Forbes magazine [5]– aims at automatically identifying the socioeconomic level of a population by analyzing its citizens calling patterns and then infer their access to housing, education, healthcare, and basic services such as water and electricity [6].

Unlike real oil, data is an inexhaustible resource that actually grows every day as new gadgets with new sensors are adopted by the public. The research described in this article has focused on analyzing cell phone records. However, other types of ubiquitous data open the door to a more in-depth knowledge of human individual and aggregated behavior.

When partitioning the Ottoman Empire in 1919, the United Kingdom and France made an agreement about the oil rights in their Russian and Romanian colonies. "Who owns the oil will rule the world", Henri Bérenger, the French petroleum minister involved in the negotiations, said. Today, data is the new oil.

[3] E. Frias-Martinez. Urban Analysis for the XXI Century: Using Pervasive Infrastructures for Modeling Urban Dynamics. XXI Jornadas Telecom: Las TIC en las Ciudades del Futuro, Santander, 2011. Best Paper Award in Smart Cities
http://goo.gl/7tcA1

[4] E. Frias-Martinez, V. Frias-Martinez, G. Williamson. An Agent-Based Model of Epidemic Spread using Human Mobility and Social Network Information. The 3rd IEEE Int. Conf. on Social Computing (SocialCom 2011), Boston, MA, USA.
http://goo.gl/11E7v

[5] Data Philanthropy is Good for Business
http://goo.gl/dA3rA/

[6] V. Frias-Martinez, J. Virseda. On The Relationship Between Socio-Economic Actors and Cell Phone Usage. 3rd International Conference on Information&Communication Technologies and Development, ICTD 2012, Atlanta, USA.
http://goo.gl/fO8P1

HOW TRUSTWORTHY IS YOUR GRAPH?

New digital economy increasingly depends on recommendations made by users: LinkedIn, Foursquare, Amazon... What if those so-called experts were actually fake profiles? Trust is in the baseline of this economic model, but what can we do with users that don't respect the game's rules? What do we do with those who show an antisocial behavior?

FRIDAY EVENING. You are getting prepared for an exciting weekend when your smartphone buzzes. It's a Facebook private message that says: "Hi, I'm Angelina Jolie. Do you want to be my friend?". There is no doubt: planets have aligned and the day has finally come. You knew she would end up dumping Brad Pitt and asking you to go out. It was a matter of time. Unfortunately, Angelina is too busy taking care of her family to make new friends and who has chatted to you may not even be a person – it could be a machine. Considering how high you got your hopes, the weekend is ruined.

Even though this Angelina Jolie profile would be obviously fake (there's only one Brad Pitt in this world), spam profiles are not always that easy to recognize. False identities on the internet have been a problem since the first day. Online social networks, though, especially because of the dramatically increasing amount of time we spend using them, have become the bull's-eye of hackers and cybernetic gangs. [1] Although there are no official numbers of how many fake Twitter, Facebook and other social networks profiles exist, experts believe the number could overcome the 20%.

In computer security it is known as the Sybil attack when multiple accounts that do not correspond to real users are used to spam other users or steal their contact list (its name came from a best-seller of the 70s, Sybil, about a woman with multiple personality disorder). Turning social graphs into trusted ones is the goal of different research projects at Telefónica Digital. SybilRank addresses the issue of Sybil attacks in online social networks using an effective and efficient social-network-based Sybil detection mechanism for centralized OSNs which goes beyond previous attempts and can help to identify fake profiles.

In the hands of Tuenti, the largest online social network in Spain beyond Facebook, more than 90% of what SybilRank classified as fake accounts were indeed fake. This tool detects 20 times more fake accounts than the manual process.

Researchers at Telefónica Digital have solved another question related to the reliability of the web: can you proof your identity attributes, especially age and profession? Think about it: professionals get recommended by colleagues on LinkedIn, you buy products with good reviews entered by so-called experts on Amazon [2], you tend to visit the restaurant that has the best opinions on Foursquare. All of which means we trust people we don't know. "An entire economy of ideas is based on online reputation, because it's the people with the reputations and the social currency who get people's attention", social psychologist Aleks Krotoski explains on Wired magazine [3]. The issue is even more important as we let our children use online social networks as a part of their education.

That is why researchers at Telefónica Digital have come up with a system that uses online social networks to provide lightweight identity credentials while preserving the user's anonymity. This is FaceTrust: collating friends' opinions with self-claimed identity attributes to verify the real identity. [4]

Moreover, some of these fake profiles have a totally different aim. Politicians and lobbies have always tried to influence the citizens. Since the 80s, though, instead of using marketing strategies, there have been cases of carefully orchestrated campaigns, artificial and well-coordinated, trying to be perceived as "grassroots". Appearance is the key: the messages look like independent and organic when there is actually a public relation firm behind the curtains. This practice, commonly called astroturfing [5] because of Astroturf, a green artificial grass seller, has now arrived to the internet, especially since Twitter and others are playing an undeniable role in the rise of new social movements. Detecting it has become a priority challenge for researchers in order to understand social communications worldwide.

However, Telefónica Digital is not the first to attempt this. The astroturfing phenomenon has been the object of multidisciplinary studies lately. In fact, some of those results have been used by Telefónica Digital, which has focused on Twitter. From a technological perspective, astroturfing profiles on Twitter show different temporal behaviour than spammers; not only do they often tweet in unison, but also spread the same message. Their social influence score is higher than regular profiles too. Despite the efforts, it's still not clear whether suspicious profiles are astroturfers and there are still steps to be made to develop a full-fledged technique to uncover such profiles.

As long as we let our kids use online social networks, we need to find a way to keep the gang away from this particular school playground. Internet has to be a safe and reliable place. Otherwise, we'll be too distrustful to believe it when the real Angelina Jolie actually wants to meet up.

[1] Q. Cao, T. Preguerio, M. Sirivianos, and X. Yang. Aiding the Detection of Fake Accounts in Large Scale Social Online Services. In submission. http://goo.gl/fLmB1

[2] "32% of smartphones owners who use their phone for shopping-related activities read online product reviews before buying" http://goo.gl/SJYIt

[3] "Anyone can manipulate an online profile. Anyone can flood the web with spin. Anyone can create a Cult of Me and get attention" http://goo.gl/Dn6tz

[4] M. Sirivianos, K. Kim, and X. Yang. Assessing the Veracity of Online Identity Assertions via Social Networks. In proceedings of CoNEXT 2011. http://goo.gl/hVtjN

[5] D. Antoniades, V. Erramilli, and G. Siganos. Noise in Information Infostreams. In submission. http://goo.gl/63Cg5

DON'T LET THEM SELL YOUR PERSONAL DATA: **DO IT YOURSELF**

Selling users' private information has become a covered or uncovered practice: Facebook and Google are the best example of sellers. As data is said to be the new oil, it seems fair users get something, even money, in exchange for their personals details. The innovation department at Telefónica Digital is currently studying a solution that will multiply the positive return of its 270 million customers' data in their everyday lives.

IT HAS BEEN ON headlines worldwide: different companies are selling the private information posted on online social networks by the users themselves. Instantly dozens of web security experts have warned the world about the risk of being manipulated by big corporations that now happen to know who you are, what your interests are, what you buy and even where you go. Internet companies and online social networks, they claim, are "selling your identity" to the best bidder. Users have become the product to be sold. In an article published in February in The New York Times, the Chicago-Kent College of Law professor Lori Andrews goes a step further and states that "Facebook is using you". "The magnitude of online information Facebook has available about each of us for targeted marketing is stunning" [1], Andrews says. Indeed the amount and quality of this information is impressive.

However, we can find positive consequences of using this data accurately. Imagine you want to set up a new pet store. You could buy a marketing report about a designated area that might reveal which city blocks get the most foot or car traffic from people whose web browsing history reveals that they own pets. Consequently, your investment would be successful and this existing demand would be met.

Another example: it's easy to find on social networks users' music likes and dislikes. The Beatles have got 25 million fans on Facebook; Lady Gaga, 48 million. This information could be used by record companies for targeted marketing. Hence the data is useful, valuable and lucrative, and companies pay a lot of money for it.

What we're really talking about is privacy and users consent. Proposed solutions to deploy strong privacy guarantees have failed to be adopted and the attempts undermine the utility of data, enforcing constraints. Vijay Erramilli, researcher at Telefónica Digital, offers a different view: "These constraints are unnecessary and an economic rethink would lead to a simple alternative solution".

Erramilli has already been rethinking and has come up with a proposal in collaboration with an international research team: instead of complaining about your data being sold, decide which data you would sell and do it yourself. Or just don't sell it at all. "We´ve called this new concept 'transactional privacy' and it would be the main idea of a personal information market", Erramilli explains [2]. The opt-in premise is basic: users would have the option to keep their information secret. If they were willing to share it, not only would they control which data is made available, but also would get something in return, even money.

Another question arises: who would run the marketplace? The trusted third party would be the legal go-between for the users and the advertising companies. OS, hardware vendors and global Telcos are good candidates. It's the case of Telefónica, whose innovation department and business units are currently analyzing the potential of delivering this research to its 270 million customers worldwide. Maria Jose Tome, one of the business analysts involved, explains: "Not only can data be sold, but it can be used in several manners to make the daily life easier. Our goal is to use this personal data to enrich our customers' lives while protecting at the same time their privacy".

[1] "Unlike other big-ticket corporations, Facebook doesn't have an inventory of widgets or gadgets, cars or phones. Facebook's inventory consists of personal data – yours and mine"
http://goo.gl/Xp3B0

[2] A. Chaintreau, V. Erramilli, B. Krishnamurthy, C. Riederer, P. Rodriguez. For sale: your data; by: you.
http://goo.gl/DBEw6

RESEARCH LIFESTYLE IN BARCELONA

Family&kids

Barcelona is a very international and welcoming city. Close to 30% of everybody living in Barcelona are foreigners. Thus, international schools are easy to find for kids. In addition, Barcelona has many parks, play-areas, attractions, nearby rural locations and a good health care system. And the surrounding areas provide you with easy access to large properties by the sea or the mountains. As such, this has recently made Barcelona the most family-friendly city in the world, according to The Guardian. If you want to know more about how to move your family over, we have a number of team members that would be happy to share their experiences with you!

Restaurants

There's something about Barcelona's scene that cannot be fully explained: it might be its particular identity, the every corner's history, or its lovely Mediterranean weather, perfect for having drinks outside and enjoy the cityscape. One way or another, in this cosmopolitan city every district has its own personality and essence. In Ciutat Vella, the most multicultural area, you'll find dozens of different types of food, from Asia to South-America. The harbor is the best scenario for a romantic and unforgettable dinner; and then you have Gracia, the most popular neighborhood among the youth. Aren't you hungry yet?

Leisure

There's only one thing you can't do in Barcelona: get bored. Even though modernist architecture is a must (how did Antonio Gaudi manage to develop disruptive real estate a hundred of years ago?), the cultural scene won't leave you time if you let it fill your agenda. Moreover, beaches can make your day if you're stressed with work. And if you can't wait to the weekend to get away from the city and enjoy the nature, just stop by the different parks that surround Barcelona. In the Collserola Park, very close to the city, you'll even find different routes that your family will love!

Sports

Sport is one the ingredients of the Mediterranean lifestyle. That might explain the growing popularity of the half marathon that is organized in Barcelona every year. If you enjoy running, there are dozens of races held during all year long. Moreover, the F1 circuit of Catalonia (located at 30 min drive from Barcelona) will drive you crazy, and if it doesn't, the Barça's stadium, Camp Nou, will. Let's try something more relaxed: fancy a beach volleyball match by the sea?

THE MAIN INGREDIENT: A **REJECTED** PAPER

Ferran Adrià
Chef of elBulli Foundation

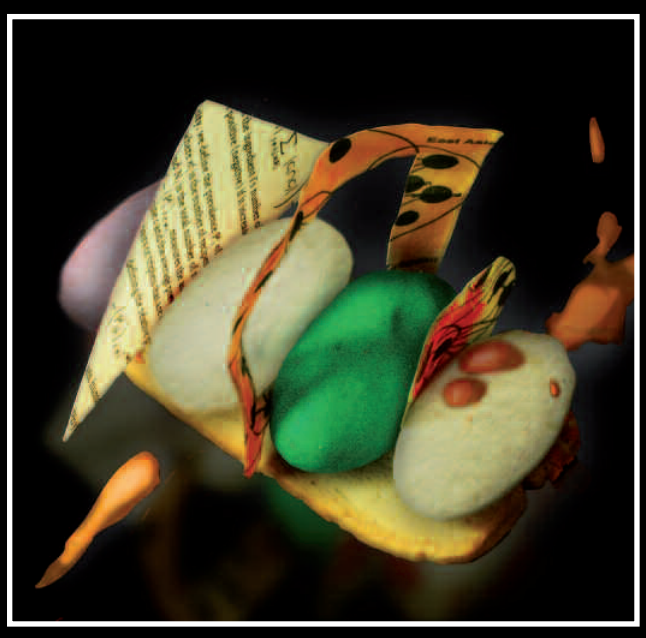
elBullifoundation

FINDING OUT that your paper has been rejected by the program committee can be quite frustrating. However, it does not have to be the end of the paper's journey but the beginning of a new life! With a little imagination, the paper becomes some sort of chocolate topping, a crystallized orange or lemon jelly. You just need to mix your previous work with some new expectations, and dust it all over with a challenging set of ideas for the future. That's exactly what culinary star Ferran Adria is seeking: new horizons. After closing his restaurant elBulli (considered the best restaurant in the world during 5 consecutive years) in Cala Montjoi, he's back to the kitchen with a shopping bag full of projects. The most important is to set up elBulliFoundation by 2014 as a culinary creativity center [1]. And Ferran Adria won't be alone in that pursue: Telefónica Digital Innovation Center in Barcelona is all by his side. The Catalan chef and the Telefónica Digital Research and Innovation teams are working hard together to develop the technological infrastructure that will support the new reborn cathedral of haute cuisine and gastronomy, elBulliFoundation. You can see a small taste of this collaborative open innovation effort in this page: a rejected paper that has been turned into a contemporary cuisine piece of art. There you have: exquisite!

[1] "elBulliFoundation to open in 2014" http://goo.gl/ZsvDA

Unravelled White papers al Pil-pil with paper caviar

Liquorice sponge with green apple , paper and chocolate sorbet



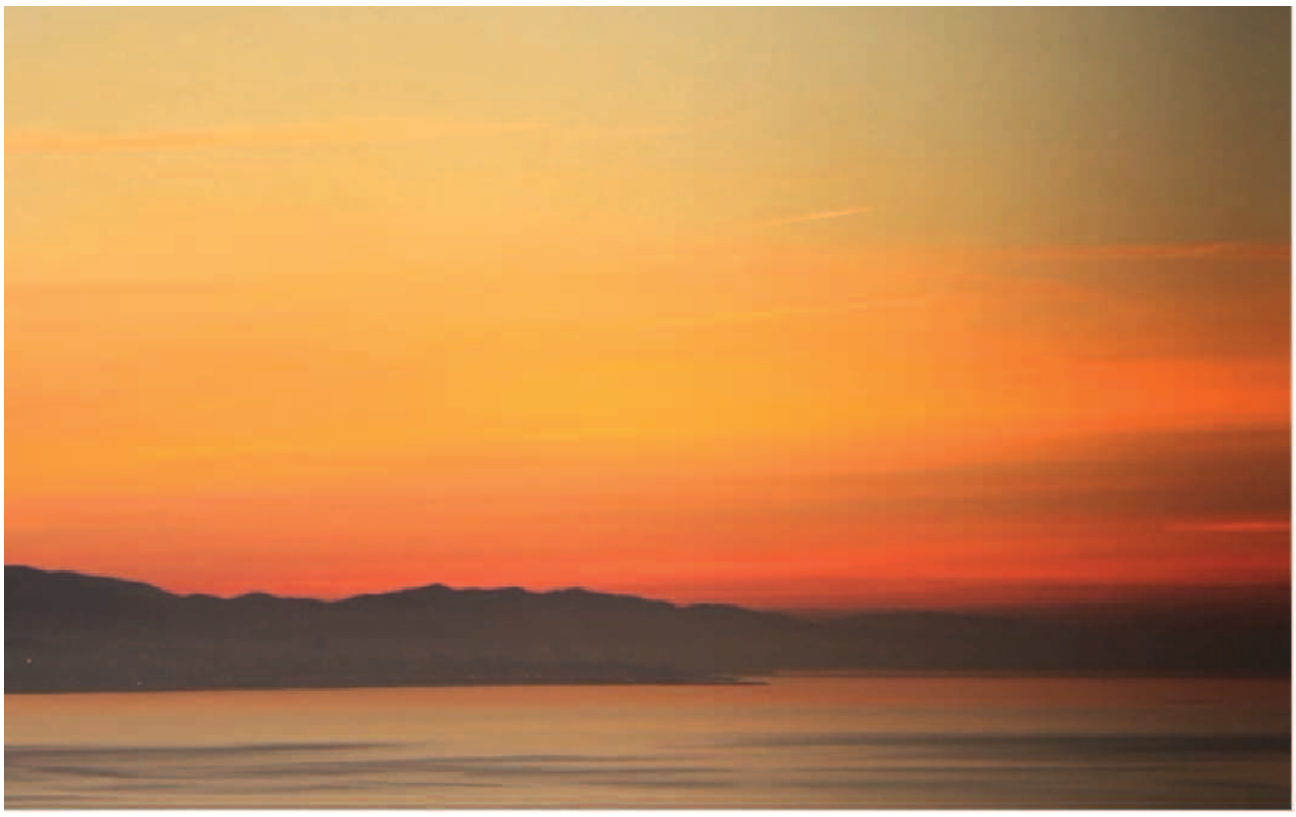
Puffed paper polenta

Hot monkfish liver with shallots and frozen honey paper

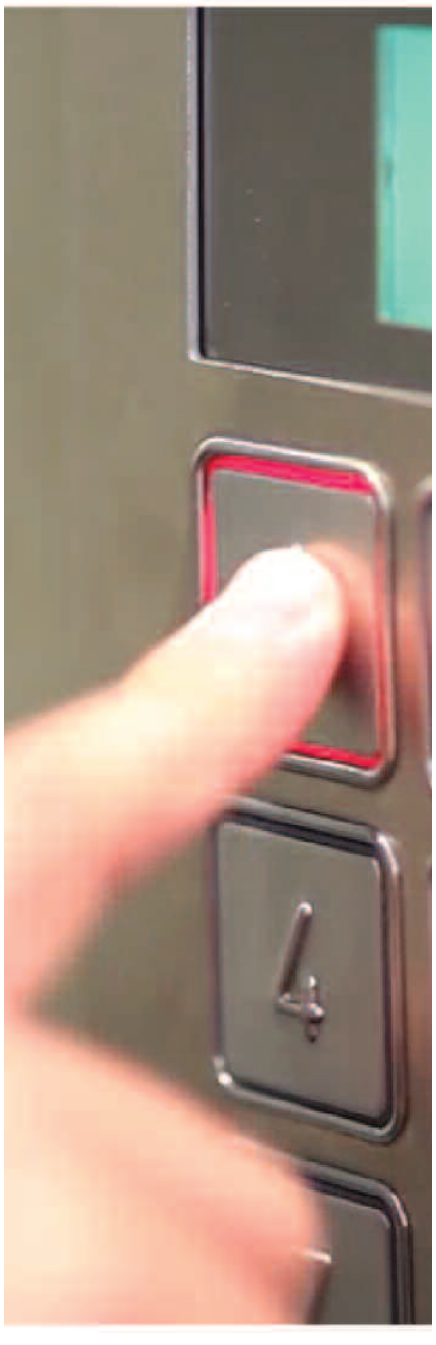
Strawberry sorbet with a filling of fresh cheese and crystallized paper

Beetroot and paper ice

PHOTO: Marc Soler (msn@tid.es)



JOIN US



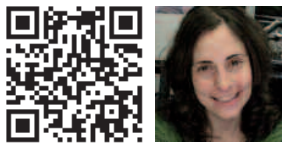
Telefonica

LIFE IS A GAME and the key to success is having the best players on your team. At Telefonica Digital we have in our staff players that have grown up playing among the best teams in the world. The team counts with top players but we're missing you: come and work with us! The match happens in a wonderful building, an architectonic jewell. Located in the 22@, the high-tech district of sunny Barcelona where all the most important tech companies of the city have established their labs, and... you'll get to enjoy the wonderful Mediterranean Sea from your office.

Plus we can always ask our partner, the F.C. Barcelona, for help. The Barça football team and Telefónica Digital have allied in order to bring excellence in new technologies into the sports world. One of the current projects is to improve connectivity at Camp Nou, the Barça's stadium. With 100,000 seats, achieving that all supporters can tweet their team's goals without saturating the network is such a challenging task. "It's a pilot whose results will be used in countless sportive events (for instance, the Olympic Games) where the massive online social network usage is common", Pablo Rodriguez explains. Live concerts also may take advantage of this improvement, and that opens the door to a new generation of mobile apps.

A whole world of opportunities are waiting for you at Telefónica Digital, where you'll become part of the one and only research lab whose members can see their findings applied to the 270 million customers that the company has around the world. Come to Barcelona and find it with us!

Pablo Rodriguez
http://rodriguezrodriguez.com
http://goo.gl/EpgAn



Konstantina Papagiannaki
http://goo.gl/PrxqA

Nuria Oliver
http://goo.gl/Ap6Ti