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UPM INNOVATECH

Technical University of Madrid innovative research

**Centre for Support of
Technological Innovation – UPM
makes a difference**





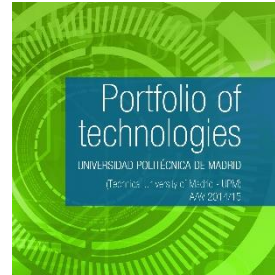
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The most innovative ideas in the XI actúaupm



It is opened the deadline for submitting business plans for participants in the XI UPM Entrepreneurship Contest, actúaupm, until October 1st, 2014. actúaupm allows launching business projects based on innovative ideas and/or research results from both students and professors and researchers of the UPM.

actúaupm is an opportunity for management training, individual counseling, accessing to external mentors, networking and assistance in seeking funding, being eligible for 40,000 € in prize money and participating in the Spanish leading entrepreneurship university initiative.

In the past 10 actúaupm editions, more than 2,600 researchers and students projects have been involved and over

800 teams have received specialized training.

Moreover, 162 technology-based companies have been created in recent years and 36 million euros of investment have been attracted only from 2007.

To, be updated, just fill out a short form online through [www.upm.es / actúaupm](http://www.upm.es/actuaupm)

More information and guidelines: www.upm.es/actuaupm

News: <http://actuaupm.blogspot.com>



Meet the most innovative technological projects awarded in the last edition X actúaupm promoted by UPM researchers and professors



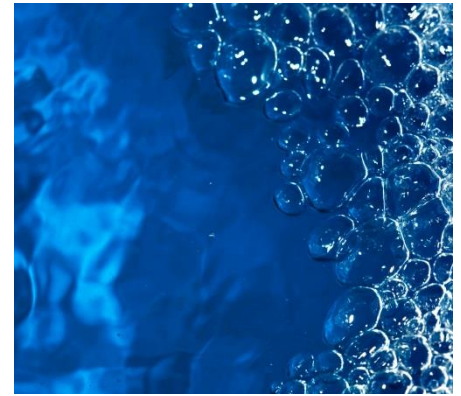
F²TE³ is a project based on a UPM patented super-insulating which reaches 90% more efficient than traditional insulation systems. Promoted by Luis Alonso Pastor, architect and researcher at the UPM, the solution consists of a transparent facade system with 3.5 cm thick insulating as well as a wall of 35 cm, also allowing design by architectural freeform.

Luis A. Pastor has recently been recognized by the "Innovators under 35 Spain", initiative managed by the MIT Technology Review.



Graphene Light proposes obtaining clean energy from urban street lamps using graphene. The solar cells installed on lampposts allow daylight to collect their subsequent conversion into energy. Such cells are organic, flexible plastic material and low cost, thanks to the use of graphene instead of more expensive materials and contaminants.

Javier Martínez, a researcher of the Institute of Systems Optoelectronics and Microtechnology (ISOM) of the UPM, drives the project based on patented technology.



Robdos, Underwater Robotics, proposes the production of autonomous submarines capable of travelling long distances in the ocean to acquire relevant information. Promoted by a multidisciplinary team that includes engineers from UPM ETSI Navales, Robdos bases its activity on the development of offshore platforms that can take to the sea and complete specific missions fully autonomously and in constant communication with the ground operator.

Now, as a company, Robdos completes its offer with advisory services.

“The first months after setting up a start-up are awful”



Biicode is a UPM spin-off that has developed a new technology of software development that will allow an efficient code management resulting in time and costs savings in the development of computing solutions.



Diego Rodríguez Losada is one of the promoters. He is a professor and a researcher at the Automatic and Robotic Centre at School – UPM and has shared his experience with us.

Q: How did the idea of creating a company come out?

A: The idea came out from some needs of the team. As a result of our work at programming, we realized that we had relevant inefficiency in the development process and this lack could be enhanced because we had the abilities required to face the challenge.

Q: What profile does the company require?

R: The company profiles are highly technical: such as programmers,



systems, devtools, testings. We are in an early stage of development and we have not started to market the product yet. Fortunately, we count on Manuel Arrufat, the Chief Executive Officer, who will be responsible for business task and to manage the company.

Q: What kind of support and difficulties have you found in the process of creating your company?

A: Certainly, actúaupm and its team are an important support. Family, friends and acquaintances who are always willing to help by providing contact agenda,

seeking for funding or looking for collaborations. In general, the work of the entrepreneur is well accepted and socially appreciated. On the other hand, the difficulties are not insignificant: facing the challenge of working on unknown areas such as marketing and accounting or dealing with bureaucratic aspects. Although, the biggest difficulty is not to give up, to overcome the numerous negativities: rejection of some investors, not winning a certain prize, negative reviews of the technical and business idea.

To find a human team with complementary technical capabilities and to achieve that the team looks at the same direction is also a hard task. It is quite important to establish clear relationships among the partners in early stages, the contributions of each member and the degree of commitment to the project.

Biometrics, the security of the future



The biometrics industry is a large market which includes products and services focused on biometric security on mobile devices. It is a market that will grow from M\$ 30 to M\$165 in 2015 in terms of business, according to the analyst estimates.

As a result, the Group of Biometrics, Biosignals and Security (GB2S) of the UPM has developed two solutions for biometric identification that focuses on the mobile phone industry.



TV report «Biometrics based on physical or behavioral characteristics of a person» at RTVE: <http://bit.ly/1aZY3vU>



In-air Signature is a software application that verifies personal identity through the authentication of an in the air gesture by the user simulating a signature with his mobile phone. This solution can be quite polyvalent because it can be integrated easily to other applications. The mobile phone does not need many special requirements and the software can be compatible for mobile payments or the

operation of online contents.

Hand Geometry is an application that allows personal identification through hand geometry by taking a photo and analyzing it with a mobile phone, which is the only thing the user has to do. As with In-AirSignature, Hand Geometry has a low hardware cost and a wide industry implementation of its application.



Technology investment trends in the United States



Do not hesitate to visit the following video (through a QR code or through this link <http://youtu.be/pgjGVzDNOcs>).

You will have the opportunity to see the talk of Glenn Osaka after participating in the 1st UPM Innovatech International Workshop in Spain.

Glenn Osaka has an extensive experience in executive positions in ICT large companies. He is the former CEO of Reactivity Inc, a software company acquired by CISCO. Osaka is also the former director of a venture capital firm based in Silicon Valley and the former adviser of Insight Venture Capital (funds raised 7,6 \$B) and Paypal, amongst other activities.

Osaka gave a general view of technology investment in the United States during his talk at the UPM Innovatech International Workshop: "Leading trends in technology investments and start-ups in California and the US".



Glenn Osaka, with over 30 years of senior management experience in leading companies in the ICT sector as Juniper Networks, Cisco or HP, is a member of the International Advisory Board of the Centre for Support of Technological Innovation UPM



Jonathan Taplin "Crisis are the better times for innovation"

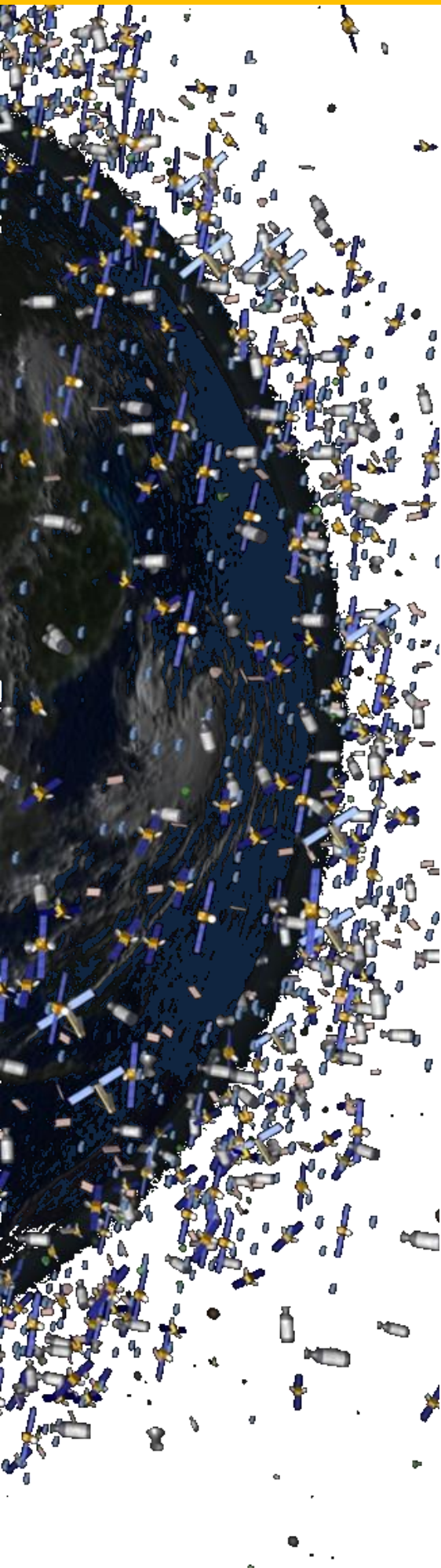
Jonathan Taplin is a member of the International Advisory Board of the Centre for Support of Technological Innovation (CAIT). The American writer, film producer and scholar Jonathan Taplin is one of the most important entrepreneurs in the media industry of the United States. He has been one of the speakers of the 1st UPM Innovatech International Workshop.

Question: What do you think about European and United States strategies on technological innovation? Are they good enough? Is there something to do they are not including? And, do you think we should talk about two different speeds in these strategies?

Answer: I think there are two main differences between Europe and the United States strategies on technological innovation. One of them is that in the United States there is a very good venture capital infrastructure that is very supportive of entrepreneurial activities and it is not so good in Europe. The other one, a very important one, is that in the United States there is a very important culture of risk so it is ok to fail [...]

[Read the full interview here](#)





Half a century of space activities and the lack of a natural and effective mechanism to bring the objects back to the Earth, gave rise to a collection of defunct objects in orbit around the Earth. Space debris includes non-functional objects like satellites out of service, spent rocket stages and a huge population of fragments result of explosions and collisions. There is around 6,000 tons of space debris that, due to the high orbital velocity (about 8km/s) can produce severe damages to operative satellites. The space debris problem is critical in LEO (Low Earth orbit) with near-polar inclinations and altitudes within the range 800-1000 km. These orbits contain massive and big satellites, which have a higher collision probability and would produce a large number of small fragments in case of collision.

ESA and NASA models show that, even without new launches, the number of objects in orbit will increase. We are now under the Kessler syndrome: current space debris density is high enough to make the fragmentation rate of space debris due to collision exceeds the elimination rate due to reentry in the atmosphere. The last collision, in 2009, involved a non-operative Russian satellite (Cosmos 2251) and an operative satellite from the Iridium constellation (Iridium 33). Two years earlier, a Chinese missile impacted against Fengyun-1C, a satellite orbiting at 860 km of altitude. In both cases the result was a dangerous cloud of 1.5 ton of shrapnel.

“... 6.000 tons of space debris with speeds of up to 8 km/s...”

A first step to solve the problem is to prevent the generation of new space debris. It is necessary to deorbit, i.e. to bring back to the Earth, the satellite and upper rocket stages at the end of mission. This action requires a deorbit technology. Kessler syndrome, however, reveals that critical orbits must be cleaned with Active Debris Removal

“Even without new launches, the number of objects in orbit will increase...”

“...the fragmentation rate of space debris due to collision exceeds the elimination rate due to reentry in the atmosphere”

missions. This second scenario involves both capture and deorbit technologies. In the long term, i.e. once the critical orbits have been cleaned, just a light, reliable and effective deorbit technology is required.

Current deorbit technologies are organized in two families. *Propulsive systems*, which include chemical rockets and electrical propulsion, use a propellant to deorbit the satellite. Chemical rockets are reliable but have a high cost due to the required propellant mass. Electrical propulsion, which are less reliable, can reduce dramatically the fuel mass but they need power system and attitude control during the long deorbiting. On the other hand, *dissipative systems*, i.e. sails and electrodynamics tethers, do not require propellant and they are passive. They deorbit the satellite because a natural resistance force dissipates the orbital energy. Sails work thanks to the aerodynamic drag due to the relative motion between the sail and the atmosphere. This system, however, is not effective at critical orbits because of the atmospheric density. In the case of electrodynamics tethers, the relative motion with respect to the ambient magnetized plasma leads to the Lorentz drag. Plasma density and geomagnetic field strength in LEO are high enough to yield deorbiting times of the order of few months for well-designed missions using electrodynamics tethers.

Market

Taking on board a deorbiting technology to eliminate the satellite or a launcher upper stage at the end live is, in principle, economically unproductive. This can lead to an initial rejection by part of the space

sector. International organisms and space agencies, however, agree that the current unsustainable model need to be change. Beside the harmful long term state predicted by Kessler, economical losses due to collisions by operative satellites (like Iridium 33) can be also important. This unfavorable scenario does not help to the space industry, which plans to launch about 1,000 satellites in the next decade with a total cost of 150,000M€.

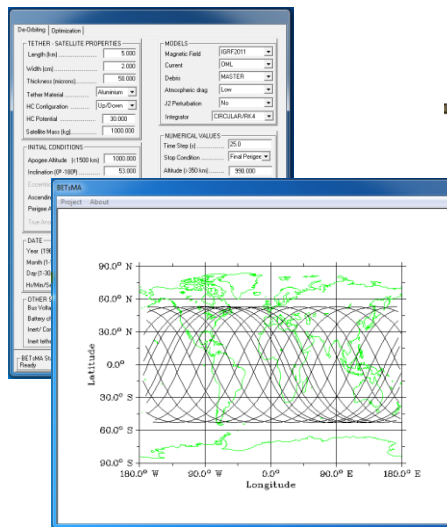
The in-orbit demonstration of an efficient deorbiting system can trigger an international agreement about space debris. Every launched satellite and upper rocket stage could be deorbited and the end of mission with a low cost. This would probably accelerated legal changes in order to achieve a sustainable model. The space market for deorbiting technologies would be open and the lightest and reliable technology would be selected among others to be on-board of every launched satellite.

Space tethers and the BETs project

A bare electrodynamic tether is an aluminum tape of length equal to few kilometers, width few centimeters and thickness of the order of tens of microns. The tether is rolled up in a reel during the satellite operation and it is deployed along the local vertical at the end of mission. The tether acts as a giant Langmuir probe, thus collecting electrons from the ambient plasmas. The electrons are ejected by a plasma contactor, a small device placed at its end. The tether works passively, without propellant or power system, thanks to the Lorentz drag on the electric current. The tether system can avoid a possible collision with another satellite during the long deorbiting maneuver by just switching off the plasma contactor for a while. BETs is a FP7/Space project funded by the European Commission and coordinated by Professor J. Sanmartín, who introduced the bare tether concept in 1993. The BETs consortium is made of seven specialized partners on tether technology: UPM, Università di Padova, emxys, DLR, ONERA, Tecnalia and Colorado State University.

BETsMA software solution

UPM activities led to a design algorithm for a generic deorbiting mission using electrodynamic tethers. This algorithm has been implemented in BETsMA, a friendly software aimed at



the preliminary analysis of tether missions. In addition to the optimal tether geometry (length, width and thickness), BETsMA computes the main figures of merit of the system, including the deorbiting time, the masses of the subsystems, the satellite trajectory and the probability of survival of the tethers. Both experts and beginners can design their own tether missions by just interacting with an intuitive interface. The software is indicated for quick parametric studies in a broad range of orbital and tether conditions, which must be followed by detailed simulations.

UPM researchers

BETs coordinator, Prof. J. Sanmartín, has been the director of several projects from the Spanish *Ministerio de Ciencia e Innovación* and he participated in the design of several space tether missions. Gonzalo Sánchez Arriaga is currently a PhD Assistant Professor at the *ETSÍ Aeronáuticos* (UPM). After finishing his PhD, supervised by Prof. J. Sanmartín, he spent two years at the Commissaria á l'Energie Atomique (Paris) for a postdoctoral fellowship on laser-plasma interactions.



Dr Gonzalo Sánchez Arriaga
PhD Assistant Professor
ETSÍ Aeronáuticos – UPM



Investment round for Alise Devices



This spin off company from the UPM focuses its work on production at industrial level and the commercialization of LILIAC, a prototype of security and authentication devices which are innovative and protected by an international patent. This device was developed at the CEMDATIC, a research centre of the UPM. The LILIAC devices, in their three ranges, consist of a flexible plastic sheet in where there are latent images, they are different for each side and are visible with the help of a partial polarized light (such as the light given by TFT screen, a LCD TV or mobile phone). Since the LILIAC is a plastic sheet completely flexible and with a minimum thickness, it can be integrated as a security system in all types of items: clothes, accessories, food packaging, pharmaceutical products or tobacco. This

wide range of potential applications makes that those LILIAC devices are a product of commercial high value and high impact. The technology employed is completely innovative and disrupting in this sector being practically unforgeable due to the hard work of knowhow and the technological and research experience behind. So far, this technology had not

been employed.

After attending several investment forums round Spain, there were various particular investors who had interest in the project, consequently there was an investment round of €150,000 that allowed researchers to complete and execute the Neotec loan of €230,000 previously granted.



Another actúaupm start up on the spotlight



Tourist Eye on the media

We all know Lonely Planet, who has not used his guides ever. Well, the publishing giant on guides just buy small technology startup Tourist Eye, former participant in actúaupm.

This is the news of the day in the world of Spanish startups: media as El País (thanks for mentioning the Technical University of Madrid), El Blog Salmon, Engadget, Engadget, Loogic or Tech Crunch have echoed this new purchase . No figures for the purchase of time but it seems that the brand will be maintained and the team will continue with some autonomy.

Congratulations to the founders, Javier Escribano and Ariel Camus, good work of these young entrepreneurs and soon we hope to give more details about the operation.





“The best 3 projects could be considered as COM projects for their financing, development and incubation with the support of Santander, ISBAN y PRODUBAN”

- Distributed systems architectures for applications in companies, middleware and context-aware platforms, real-time stream processing, storage and massive data management...
- Management of social and massive data such as obtaining information structured from social data, detection of behavior patterns and predictive models as well as machine learning from social data...

The deadline for the reception of the ideas in the field of *open middleware* was on **November 18th 2013**. The application requested a brief description of the business idea according to the defined format and highlighting innovative aspects, the needs to be covered and its market potential.

After assessing the ideas received, a selected group of teams moved into the next phase: training and contact with experts to develop the business model. Besides, the best three ideas were awarded with €1,000.

Those projects with higher potential moved into the final phase and were awarded with prizes worth €10,000. In addition, the best three projects were considered as COM projects for their financing, development and incubation with the support of Santander, ISBAN y PRODUBAN.



The middleware, the software layer able to communicate the levels of network/infrastructure and application, is a critical concept in any TI system for years. The global market of middleware is growing over the last years at rates of around 10%, a business figure near the M\$ 20,000 in companies such as IBM, Microsoft and TIBCO, which leads the industry, according to Gartner Consulting.

The **Center for Open Middleware**, a joint centre of the Technical University of Madrid (Universidad Politécnica de Madrid) with **Santander Bank, ISBAN and PRODUBAN**, aims to boost the creation of an open ecosystem, which is innovative and sustainable build around the middleware and open source platforms. In order to support the transformation of ideas into innovations, the COM launched in collaboration

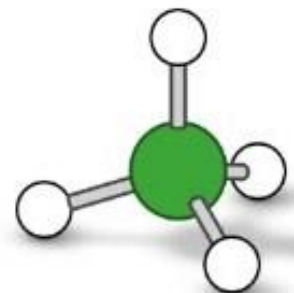
with UPM Entrepreneurship Program the 1st competition of UPM Innovation Open Middleware **actúa_COM**.

The competition, which was divided into phases along the next months, allowed us to identify innovative business ideas, to support the development of business models and to promote its value into market.

The call was open to all UPM university community: professors, researchers, students, management staff and all former members of the university.

The competition was organized around the following technological challenges:

- Human-machine interfaces such as written and spoken natural language, gesture recognition, security, identity or biometrics...
- Applications for smartphones and tablets that include banking functionality such as payment mechanisms or social networks integration.





Its activity is focused on technological challenges which are based on analysis and coding of images, 3D graphics, media distribution using Content Delivery Network, transmission (IPTV, OTT) and 3DTV Quality of User Experience. The research group is collaborating in these fields with companies such as Alcatel-Lucent, Hispasat and Telefónica.

So far, the results and activities of Dem-3DTV have an international impact. The group carried out, for example, subjective quality tests for MPEG standard groups aiming to assess the new 3DVC which is focused on the coding of 3D videos. Dem-3DTV was one of the 13 Independent Testing Laboratories selected worldwide to conduct the assessment tests. The collaboration between the international standard bodies (MPEG and ITU) is intense through the participation in the development of standards UIT-T J.81, MPEG-2, MPEG-4 and MPEG-7. In addition, the group has recently participated in the JEDI European research project (Just Explore Dimensions: End to End High Definition 3DTV for Consumer), that conducted the first world Blu-ray 3D™ quality broadcast experience.



The increasing demand of audiovisual contents of high quality and able to enhance the user experience has

provoked that one of the main drivers of audiovisual sector is the generation and distribution of 3D contents by service providers, once the commercialization of 3D televisions are widespread and became popular. It is expected a percentage of market penetration of these devices of 40% approximately in 2015 and an estimated sales of 200 million units in 2018.

The 3D Television Demonstrators (Dem-3DTV), located at the UPM Centre of Support for Technology Innovation, is coordinated by the Image Processing Group (GTI) of the University. It is equipped with a complete infrastructure to support R&D, equipments of technology integration oriented to acquisition, analysis, compression, distribution and display of audiovisual content with depth perception. Through the integration of these solutions focused on signal treatment, they can provide advanced services related to demonstrating R&D results, experimentation in 3D TV or the integration of development carried out by audiovisual companies.

The Dem-3DTV is also a Production and Experimentation Centre for digital content that seeks to be “a reference Centre in

the generation of stereoscopic 3D content for media companies, standardization bodies, universities and technology centres”, said Fernando Jaureguizar, a professor at the UPM.

“The Dem-3DTV is a new space for experimentation and integration of technologies in the 3D audiovisual sector”





The Best Business Ideas Award Ceremony of the 11th actúaupm competition was held on March 25. Over 1,000 people from diverse areas of expertise and belonging to the UPM community, presented a total of 350 business ideas. This competition has been promoting entrepreneurship and technological innovation of UPM for a decade. A selection of 10 proposals was awarded for their best business ideas and other 15 proposals received a certificate for their potential development. The ideas based on technologies developed by research teams of UPM were positively assessed, such as:



Accenture is platinum sponsor of the UPM Business Plan Competition, actúaupm. From your experience, how would you describe the meaning of the concept of innovation in your company?

Accenture is known for being an innovator. It is evident through its Innovation Labs and Centers (over 30), implanted worldwide, with highly skilled teams in technology and development. Its perspective is to keep up on the latest trends and explore, to achieve an increasingly disruptive innovation and thus respond to customer needs, including improving their expectations.

Thus, the company seeks to implement an open innovation model that achieves maximum efficiency. This model requires three basic ingredients: passion, experience and creativity. Passion, necessary to progress, to go beyond what is established; experience, it is essential knowledge, it would be impossible without it; and creativity, to create connections that are not conventional, or have not been done so far at least.



How does this model applies and which are the difficulties in its development?

In order to apply it is important to build internal capabilities. Through bottom up philosophy, collective intelligence (from “they think” to “we think”) is used. A developer working on a project of Finance can contribute ideas to a problem that has found a partner in another area. This breaks the silos structure, to make ideas permeable from one sector to another, which increases the sense of ownership and belonging, and also motivates and inspires. Thus, the search for solutions is joint, and it can be applied in lots of different sectors. Definitely, anyone can have a good idea.

Read more in actúaupm’s blog



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Portfolio of technologies

UNIVERSIDAD POLITÉCNICA DE MADRID

(Technical University of Madrid - UPM)

AW 2014/15



Check UPM portfolio of technologies 2014/2015

UPM *innovatech* program periodically updates the portfolio of UPM technologies, which includes a set of innovative technology solutions developed by the UPM research teams and classified by industrial sectors. In this version (September 2014), 70 commercial sheets have been published, including information such as the technology solution description, development stage, IPR issues, competitive advantages and application sectors.



CENTRO DE APOYO A LA
INNOVACIÓN TECNOLÓGICA

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