
Working for Sustainability Transformation in an Academic Environment: The Case of itdUPM

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Abstract

The Innovation and Technology for Development Centre at the Technical University of Madrid (itdUPM) in Spain is a collaborative network of lecturers, research students and non-academic professionals with a common interest in promoting action research for sustainable development. This paper is based on an in-depth analysis of itdUPM's co-evolutionary design process. The study is presented as an example of an inter-disciplinary environment that has been established for the co-creation of innovative technical and organisational solutions to address sustainable development challenges. The aim of this paper is to offer a case study of a collaborative technology and sustainability centre at the

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Technical University of Madrid (UPM), in Spain. Two focus areas are emphasised: the action research process chosen for the establishment and development of a networked centre, the Innovation and Technology for Development Centre (itdUPM), within the dominant disciplinary culture of a University organised along traditional lines, and the Centre's organisational design features which have proven to be appropriate for the inter-disciplinary and multi-actor action research processes necessary for addressing the challenges of creating a more sustainable society. The methodology used draws on theory to explore the Centre's development which is conceived as an evolutionary, participative, and action research process. The paper presents the context, background, design, and launch features of the itdUPM. The main lessons learnt refer to five organisational design issues that were critical for the success of the Centre and its activities. The paper describes the issues and challenges faced by the Centre as a "niche" operating in a dissimilar "regime". Although the findings are specific to the UPM context, we believe that they can inspire and stimulate other Universities interested in the development of sustainability initiatives.

1 Introduction: Universities and Transformation for Sustainability. *Beyond "Greening" the Campus*

The Sustainable Development Goals (SDGs) approved by the UN in September 2015 represent an ambitious and universal international commitment: ambitious, because their achievement implies a process of transformation that extends to all facets of human activity, at individual, social, productive, regulatory and governance levels; universal, because the goals demand responsibility from each and every individual, organisation and government throughout the world (United Nations 2014).

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The SDGs follow in the wake of the Millennium Development Goals (MDGs) that were approved in 2000. The MDGs demonstrated that governments are able to set common and measurable development objectives and collaborate for their achievement. The agreement around the 17 SDGs and their 169 targets thus seems to be an appropriate way to promote a renewed sense of common direction and action. However, setting objectives to fight the effects of poverty in the way that the MDGs did (for example in terms of reduction of hunger or the promotion of access to clean water), is not the same as changing the direction of human development in order to achieve a sustainable future, particularly as sustainability is embraced as a very wide concept in the SDGs. A transformation for sustainability implies going beyond business as usual. This is not just a matter of increasing aid flows from “developed” to “developing” countries (Nicolai 2015); it is a complex process that demands rethinking technical and economic infrastructures, values and practices. In this context, higher education institutions have an important role to play.

Interest in the role of higher education institutions in the transition towards sustainability is not new. The “GUNI” (Global University Network for innovation) annual reports, for example, show an evolution in focus from education for development towards action for effective change. In line with this increasing awareness of “transformation for sustainability”, many universities have introduced research, education and action programmes aimed at contributing to sustainability transformation. As a result, a range of integrated and holistic sustainability programmes are being put in place. This trend has been reinforced by the encouragement of academic networks such as the International Sustainable Campus Network (ISCN).

Many of these programmes are, however, too narrow and represent isolated “greening” initiatives. While largely due to the predominant view that sustainability is a concept limited primarily to its environmental dimension, this is also coupled with a traditional and strongly established approach that promotes unidisciplinary knowledge in both research and teaching. Moreover, sustainability efforts usually emerge in isolation and remain so because they are unable to generate sufficient interest within current university systems.

While there are clearly important challenges that limit university engagement in the sustainability agenda, it is also true that universities are well-suited to offer spaces that encourage the inter-disciplinary and multi-actor collaboration needed to support transformation. Indeed, both inter-disciplinary and multi-actor collaboration have seemingly been prevalent in the sustainability initiatives and strategies boosted by universities. This is, in fact, the sort of language that is widely applauded in formal academic discourse and appears to be a key element in the symbolic exercises that organisations and universities engage in Alvesson (2013). However, the practical reality tends to be somewhat different. As Stirling has recently pointed out, the intensity with which inter-disciplinary initiatives are proclaimed is not often matched by the reality of how research organisations operate and the incentives for working in this way (Stirling 2015).

The “implementability” or conditions that enable the change process towards the practical realisation of genuine inter-disciplinarity cannot rest on “top-down” institutional agreements; they require a process of integration (Bursztyn 2013). In our experience two complementary and connected change processes are needed: one that moves away from a conventional “silo structure” towards an inter-disciplinary environment; and another that shifts the campus towards diverse open “communities” suitable for co-production and the transfer of new kinds of practical knowledge that the SDG agenda requires. The possibility of accomplishing both pathways is dependent upon a range of organisational and cultural factors within universities. These include: the existence of personal purpose and leadership (at least from a few faculty members); an open-minded culture; organisational flexibility and cooperation skills.

In this context, the purpose of this paper is to share the experience of the Innovation and Technology for Development Centre at the Technical University of Madrid (itdUPM) in Spain, in implementing the kind of collaboration that we believe is necessary for the achievement of the SDGs. More specifically, its aim is to discuss the application of sustainability in the UPM, emphasising two key focus areas: the action research process chosen for the establishment and development of a networked centre within the dominant disciplinary culture of a University organised along traditional lines and; the Centre’s organisational design features which have proven to be appropriate for the inter-disciplinary and multi-actor action research processes necessary for addressing sustainability challenges in a collaborative and diverse environment.

2 Methodology

Yin (2008) points out that “a case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real life context, especially when the boundaries between phenomenon and context are not clearly evident”. In this sense, a case study is an appropriate methodology for achieving this paper’s purpose.

Two sources of information have informed this case study: Firstly, a review of the literature to explore relevant contributions to sustainability at Universities including organisational design, transitions theory and action research processes for sustainability. This material has provided the theoretical background for designing and guiding the overall experience of the case. Secondly, the researchers, as members of the Centre from its launch, have contributed information through an evolutionary and continuous process of internal action research.

The integration of thought and action has been a fundamental component of the itdUPM design process. This approach is founded on the belief that the conventional split between thinking and doing is not an appropriate way to deal with the kind of social problems faced by our society (Nelson and Stolterman 2012).

3 The Case of itdUPM. From an Institutional Network to a Networked Organisation

This section studies the origin, approach, purpose and activity of a special centre devoted to sustainable development: the itdUPM. The Centre represents an organisational innovation within the context of a state university operating along traditional lines.

The process of change experienced by itdUPM is that of a transition from an institutional network to a networked organisation. In line with transitions theory (Geels 2011) and its particularisation within the university domain (Robinson et al. 2013), we see this process as the emergence of a “niche” that is trying to evolve, be accepted by and, at the same time, influence the mainstream “regime” of the university as a whole. This “niche” has evolved from a set of research groups with a common interest in international development to an organised network of UPM community members and external experts collaborating together on sustainability challenges.

3.1 itdUPM. Origin and Evolution

UPM is a public university that was officially established in 1971. However, some of its Faculties were established much earlier, in some cases more than 100 years prior to this date. Today, UPM is the largest technological university in Spain. More than 40,000 students follow bachelor, master and PhD programmes in 17 Faculties (known as “Engineering Schools”) and nine Research Centres, which are distributed across four different campuses in the capital of Spain, Madrid.

itdUPM’s origins are rooted in the early 1990s. Three stages can be seen in its organisational evolution: firstly, a spontaneous, bottom-up development (1990–2000); secondly, institutionalisation (2000–2010); thirdly, integration and the creation of a network (2010–present) (see Fig. 1).

In its first spontaneous, bottom-up stage in the 1990s, a common interest in areas like water, agro forestry, energy and Information and Communication Technologies

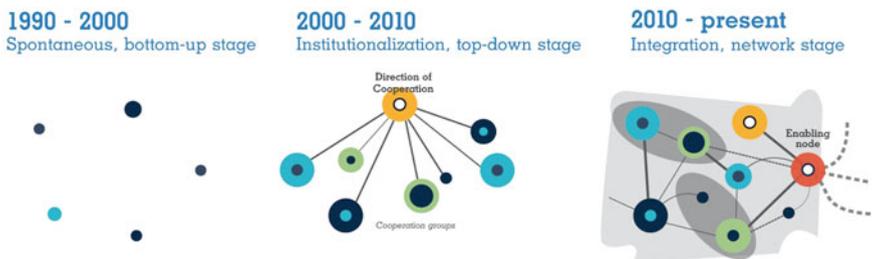


Fig. 1 The organisational evolution of International Development studies at UPM. *Source* The authors

(ICT), and their application in developing countries emerged among UPM researchers and students. In 1991, a group of these researchers established the NGO “Engineers without Borders Spain” and started to collaborate with other NGOs and international agencies.

Some years later, the UPM authorities decided to launch a specific organisational unit, the Directorate of International Cooperation for Development, under the Vice-Rectorate of International Relations (institutionalisation, top-down stage). At this time in Spain a large number of budget increases in Official Development Aid created something of a “golden age” of development grants and funding sources. As a result, the Directorate of International Cooperation for Development established Cooperation Groups. Over 20 Cooperation Groups were soon working in this field, most of which were research groups focused on challenges in developing countries. These groups operated in a very diverse and fragmented manner. Some became internationally recognised groups, e.g. the “Hispano American Health Link,” while others conducted their activities like small NGOs.

Perhaps the most interesting effect of the flourishing of these groups was the consolidation of a strong, informal inter-disciplinary network of researchers and faculty members. These individuals worked together with a shared interest and common purpose. They had a common understanding of the importance of creating a cooperative environment for the co-creation of innovative technical and organisational solutions to address development challenges. This was the breeding ground for the birth of itdUPM.

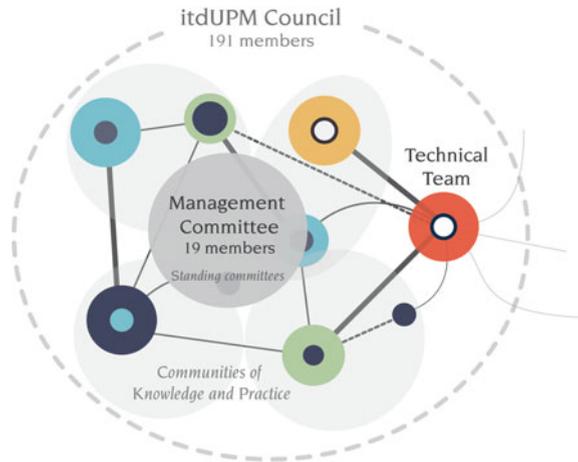
3.2 The Launching of itdUPM. *Vision and First Coordinated Lines of Action*

itdUPM was formally created in March 2012 as a new kind of organisational structure. In order to distinguish it from existing “Research Groups” and “Research Centres”, itdUPM was defined as an “Innovation Centre”. The aim was to create, within UPM, a new type of unit designed to promote inter-disciplinary and multi-actor collaboration in action-research. As the overarching intention was to be better prepared to offer appropriate solutions to the most common and recurring problems of poverty and sustainability, it was necessary for itdUPM to be:

- flexible enough to avoid blocking the ingenuity, spontaneity and identity of pre-existing organisational units and groups; while, at the same time,
- recognised as part of the formal structure of UPM so that it was not seen as a kind of “charity”, particularly in the light of quite strong views that considered cooperation and sustainability as part of a “social action” add-on at the University rather than something embedded in its strategy.

The design of the new Centre was based on five basic features:

Fig. 2 itdUPM internal organisation (2016). *Source* The authors



1. Affiliation of a university researcher or faculty member to itdUPM would not be incompatible with their belonging to a Department or Research Group.
2. The internal organisation of the Centre would take the form of a specific network.
3. A single “feeder” node would ensure the launching and development of the network and assume the functions of external representation, communication and administration.
4. itdUPM would have specific, articulated and regulated decision-making bodies that were appropriately connected with the UPM authorities.
5. Non-academic professionals and experts with a record of collaboration with itdUPM and its groups would be welcome as affiliates.

It should be noted that one of these basic features, multiple affiliation of a person to several organisational units, was facilitated by the previous existence of Research Groups, which allowed a person to belong simultaneously to a Department and a Research Group. With the new arrangement, a faculty member is supposed to undertake teaching duties for their Department, disciplinary research within their Research Group and action-research with members of itdUPM’s network.

These features guided the design of itdUPM’s organisational architecture (outlined in Fig. 2).

Figure 2 shows the main itdUPM decision-making bodies, which are as follows:

itdUPM Council. Composed of 191 itdUPM members with diverse relationships to the UPM, includes professionals from organisations external to the University with whom a close connection exists due to work on joint projects.

Management Committee. Composed of 19 lecturers, including coordinators of Cooperation Groups and young PhD holders. The Committee also has a representative from the Vice-Rectorate of International Relations (responsible for oversight of itdUPM). The Committee is elected by the itdUPM Council.

Standing Committees. Working under the Management Committee to speed up processes and programmes, they include the Quality Commission for the Master's Programme, the Management Commission for Experimental Spaces and the newly formed Management Committee Steering Group.

Technical Team (fulfils the enabler node function). A group of individuals dedicated exclusively to itdUPM under the auspices of the Management Committee.

Communities of Knowledge and Practice. Inter-disciplinary groups of teachers and researchers who apply knowledge from different disciplines to proposals and projects. Includes "communities" focused on energy, the use and application of big data, and resilience.

Inter-disciplinary and integrated projects were required to demonstrate the network's potential from the start. Emphasis was placed on projects with a scope and ambition that could not have been undertaken by a single research group. With this in mind, ten different Departments came together to work on a common project: the development of a Master's Degree in "Technology for Human Development". Although this was quite a challenge to UPM's traditional culture, the Master's Degree is now enrolling students for its sixth edition. With the involvement of the Complutense University of Madrid (UCM) in 2015, the degree has also evolved into an inter-university and inter-disciplinary programme that draws upon UCM's expertise in the field of social sciences.

itdUPM has also obtained various international contracts thanks to the experience of its researchers and the unique combination of competencies that it is able to offer. Inter-disciplinary projects in areas such as innovative and inclusive models of access to basic services (energy, health, water and sanitation) in Latin America and improvements to energy supply in refugee camps through partnerships involving the private sector, have been undertaken with multilateral institutions such as the Inter American Development Bank (IADB), the Office of the United Nations High Commissioner for Refugees (UNHCR), the Spanish Agency for International Development Cooperation (AECID), private technological companies such as Iberdrola and Philips, and corporate foundations such as the ACCIONA Microenergy Foundation.

Some findings and results (2016):

Inter-disciplinary orientation:

- Affiliation of 15 Cooperation and Research Groups from 14 different UPM Schools.
- Broad age range among the 191 itdUPM Council members (from 25 to 70 years).
- 30 pupils on the Master's Programme equally divided between those with a technical background/experience and those with a social background/experience.
- Transversal research themes such as big data, social impact and resilience.

Multi-actor collaboration orientation:

- 25 Master's classes open to the public involving professionals from partner organisations over the last three courses.
- Establishment of 12 strategic agreements with technological companies, international institutions and NGOs.
- International Conference held in June 2015 with support from ten organisations (businesses, corporate foundations, NGOs, communication agencies, professional associations of engineers, among others) and 452 participants.

4 Five Organisational Design Issues. *Critical Factors Are Human Factors*

During the four years since its creation, the organisational design of itdUPM has undergone an evolutionary learning process in which special attention has been given to five issues that appeared as critical organisational design factors for building an effective collaborative environment. These are: (i) a horizontal networked structure; (ii) a leadership style able to pilot the process; (iii) incentives that align participants; (iv) a cultural environment able to deal with several simultaneous identities; and (v) a virtual and physical interactive space that enables and fosters a sense of purpose and community as well as an open culture of trust.

4.1 Network Structure: *Don't Talk About Decentralisation, Practice It!*

To achieve its vision, itdUPM's promoters understood from the start that some kind of networked organisation was necessary. They thus defined a horizontal networked structure with clear and regulated decision-making bodies connected to the UPM

authorities. The network’s nodes were created on the basis of the pre-existing Cooperation Groups that had their own history and dynamics but whose activities would be enhanced by linking to the network. In addition, individual researchers, faculty members and non-academic experts were invited to join the initiative. This latter group sees the Centre as a vibrant community within which they find a creative atmosphere for working. Among other positive effects, the openness of the network has also fostered interest within the business community.

Once the Centre had been designed, a Technical Team was recruited. This team acts as a “feeder” node that nurtures the development of the network. The team also assumes the functions of external representation, communications and administration for the Centre.

A network is very likely to become a “foreign body” in an academic environment. The use of the word “network” may even be interpreted by many as synonymous with “messiness” and at risk of losing control. For this reason, a “sense-making” process was needed through which people could understand and experience the advantages of collaboration processes. itdUPM’s sense-making process focused on how relationships evolve in an open network environment. It was promoted through workshops that were designed to make people “live” the dynamic interactions between departments and research groups, and external organisations. This process has included awareness-raising, training and targeted communication activities (Fig. 3).

In order to launch and promote itdUPM activities, specific personal and financial resources were necessary. To become a “feeder”, the Technical Team has been



Fig. 3 Open sessions, conferences and workshops for itdUPM members and other professionals. *Source* The authors

essential for ensuring the internal and external cohesion of the network. A fee from contracts signed with public and private institutions covers team costs.

itdUPM's business model was defined on the basis of long-term collaboration. As well as working closely with public and private institutions able to offer financial support, this has also meant the inclusion of people who share common strategic interests with itdUPM and who are willing to interact with itdUPM members in co-working processes (Molas-Gallart and Tang 2011). As a result an external network has also been shaped. In parallel, a strong client focus has been developed that promotes reciprocity rather than simply looking for grants. itdUPM thus has strategic agreements with a number of selected public and private organisations with which they collaborate in research (particularly applied research) and training (through collaboration on the Master's degree).

Figure 4 shows the itdUPM organisation as a network connecting people and complementary groups with different roles: individual researchers, faculty members, universities and research centres from other countries, as well as non-academic experts.

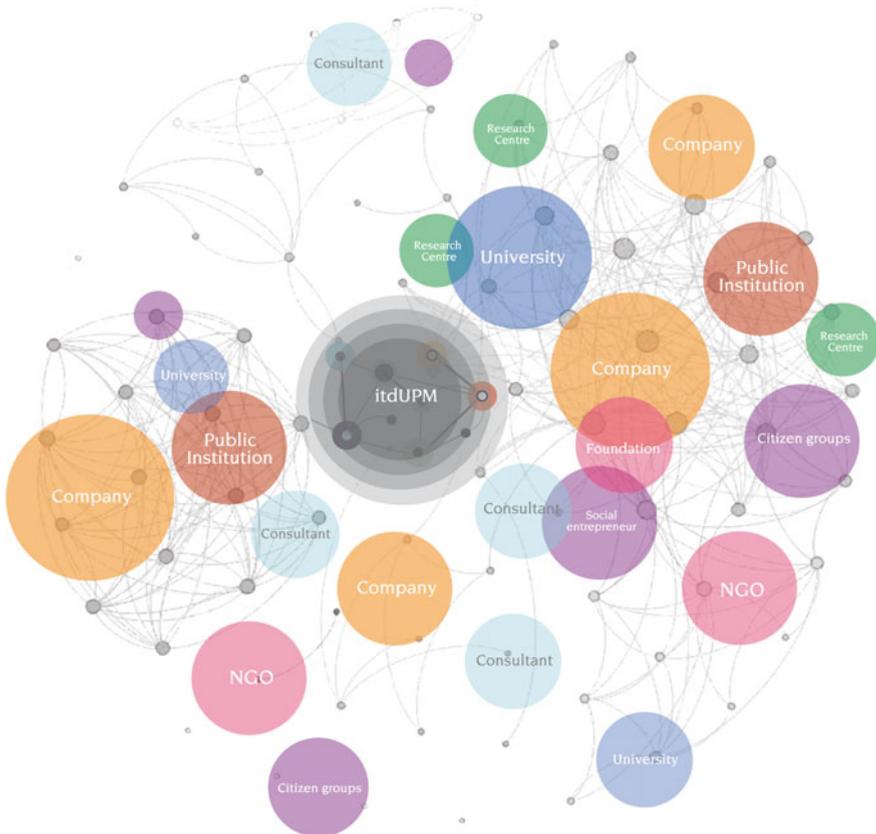


Fig. 4 The itdUPM network environment. *Source* The authors

This structure presents strong similarities with the “Star Model” proposed by Bursztyn and Drummond (2013). They define three different levels of connection within the University: some connections are located in disciplinary departments (Research and Cooperation groups in the itdUPM model); others play a bridging role (such as that of the itdUPM Technical Team); and a third group is formed by those with interests and skills in inter-disciplinary methods and practices (similar to the role played by itdUPM affiliated researchers).

4.2 Leadership and Governance: *From Ego-Systems to Eco-Systems*

As explained above, itdUPM depends organically on the UPM authorities. However, with regard to its plans and activities it functions as a horizontal network and does not have a vertical central node that exerts power over the rest of the nodes. In line with organisational theory it could thus be considered as a sort of holacracy (Robertson 2015). This kind of structure requires a type of distributed leadership and the development of sound self-management capabilities (Laloux 2014). In this respect, and depending on the type of decisions, itdUPM has different leadership styles (as shown in Fig. 2):

- Decisions are taken by consultation in committees such as the Management Committee, the itdUPM Council or the Quality Commission for the Master’s Programme.
- Decisions are taken by consensus in “Communities of Practice”, which include faculty, students, representatives from business and public bodies, as well as Technical Team personnel.
- Decision processes concerning proposals; team composition and supervision of specific projects are designed and undertaken in an ad hoc manner.

None of the cases outlined above involve an “ego-system” leadership style. Moreover, given that “super egos” do not fit within its culture, itdUPM’s is moving “from ego-systems to eco-systems” (Scharmer and Kaufer 2013). Such a culture requires: the silent promotion of increased personal autonomy and decentralised leadership; emphasis on creating a sense of community and purpose; far reaching transparency and accountability, and the promotion of self-criticism, rather than sanctions, as the most appropriate way to ensure continuous improvement.

The governance of itdUPM is based on transparency and participation. All the decision-making bodies mentioned above carry out their work in an agile and transparent manner and receive strong support from the Technical Team. The Centre also has a Director who was appointed by the Rector after a Council Hearing. The Director is, with the support of the Management Committee, responsible for external relations and communication, new project promotion and contracts, as well as supervision of the technical node of the network.

It is also important to highlight the intermediary role played by a range of individuals in the development of itdUPM. The Director of the Centre and members of the Management Committee have engaged in an ongoing process of dialogue and engagement with University authorities in order to position the Centre as an integral and valuable part of the University system. Not only have these efforts guaranteed institutional support for the Centre, they have also created a positive enabling environment for its work.

4.3 Incentives: *When Only Intrinsic Motivators Are Available*

Motivation is what moves us to action. In the case of itdUPM, traditional coercive incentives (money and employment) do not exist because the contracts of professors and lecturers do not depend in any way on itdUPM. The motivation for belonging to the Centre thus relies on its appeal and interest. Its central attraction derives from its purpose (contributing to sustainability), its vision and its collaborative atmosphere. For this reason, open affiliation was a critical element in itdUPM's design.

From the beginning, membership for any UPM faculty member has been based on an individual, personal basis with affiliation made fully compatible with other School, Department, Research Group or Cooperation Group linkages. A number of early candidates were members of existing Cooperation Groups. To enable this possibility, the new Centre was granted a special status by the UPM authorities.

Members of the itdUPM Council, which meets twice a year, agree upon the acceptance of new candidates. As affiliation is voluntary, if the activities are not attractive enough for a given member, she or he can leave by presenting their formal resignation or simply ceasing to participate in itdUPM's activities.

Membership includes a certain personal risk. Inter-disciplinary research papers, for example, still face publication difficulties (Rafols et al. 2012). At the same time, the development success of the new venture has at times been quite insecure due to the budget restrictions affecting the Spanish public sector as a result of the financial crisis. Drastic spending reductions for research and very limited financial support from the UPM for the new Centre have meant that it has been a real challenge to make it grow, reach critical mass and become acknowledged by the rest of the UPM. In some ways, however, this challenge has also been an incentive for membership. Fortunately, many of these difficulties have now been overcome: membership currently exceeds 190 people in total and a more solid financial income enables the Centre to function well.

Many of the Centre's members have stated that the chance to interact and collaborate with members of different disciplines and external professionals in action research projects has been a great incentive for joining itdUPM. In this respect, the early launch of several multi-disciplinary and multi-actor activities and projects has provided itdUPM with credibility and important backing. As an example, during the last Council meeting, a diverse group of eight members, from

young researchers to professors, enthusiastically shared their experience of working with itdUPM, some of their testimonies are reproduced in the following chart.

Previously I felt that I worked in an excessively hierarchical manner; a teacher working more or less on my own. This new phase of working with the itdUPM is extraordinarily interesting and revitalising for me and I am learning a great deal about how inter-disciplinary groups can change the way we do things in the University. (Miguel Ángel Egido, Senior Lecturer, Institute of Solar Energy, School of Telecommunications Engineering)

I love working with itdUPM because it's a space in which we encourage one another not to be afraid of failing... In the coming years, after completing my PhD, I would like to develop my academic career in this fresh, flexible and different space... and include our students in this... (Inma Borrella, PhD Assistant Teacher, School of Industrial Engineering)

In the Centre I have met friendly people with a great capacity for change... (Jaime Cervera, Chair of the School of Architecture)

Other motivations for joining the Centre are more emotional in character and include trust, a shared passion for a theme of interest and a warm atmosphere. In preliminary surveys among the itdUPM community, belonging to a voluntary, challenging and vibrant learning community appears to be one of the main reasons for wanting to participate in the network.

We are aware, however, that the motivations cited above may not be enough to ensure long-term participation. As it expands, and with greater recognition for the Centre, other incentives directly related to the professional careers of researchers are increasingly important. The growing number of scientific papers published in relation to itdUPM projects demonstrates this trend.

4.4 Identities: How to Wear Two or Three Hats Simultaneously?

Collective identity stems from the interpersonal interactions that make up an organisational culture. The main pre-condition for enabling the development of itdUPM as a horizontal network with its own culture within the UPM was its official acknowledgement by the UPM authorities as an "innovation centre" endowed with a specific status.

UPM faculty members are used to belonging to a diversity of organisational units: Schools are the most traditional, permanent homes; Departments, for teaching purposes; and, Research Groups, for disciplinary research activities. In this context, the key was to specify that itdUPM had a different aim, namely, to develop innovations by adopting a multi-disciplinary, multi-actor action-research approach.

In this way a faculty member can engage in disciplinary research in his/her Research Group and collaborate with members of other disciplines and external professionals for innovation purposes in itdUPM.

The development of both an itdUPM culture and a new membership identity was carefully managed by its Director and enabled by the Technical Team via network communications and workshops. Through this process, a shared itdUPM culture has taken form and the Centre's identity has become interiorised by its members.

The culture of the Centre and the new membership identity were reinforced by the design of a logo linked to that of UPM. This "corporate identity" is used in the Centre's network messages and web diffusion spaces, including its website www.itd.upm.es, as well as in the social networks—Twitter, YouTube, SlideShare and LinkedIn.

4.5 Common Spaces: *Where There Is a Will There Is a Way*

Since its inception, the activities undertaken by itdUPM have encouraged members to act as a community of researchers and practitioners that focus on understanding contemporary society through a trans-disciplinary approach to solving key social problems. This, in turn, promotes the co-generation of innovative courses of action that can, as far as possible, be implemented and spread more widely.

The Centre began without an appropriate physical space and has, to date, relied simply on will to pursue its activities. The small office from which it operates has clearly been insufficient, even with the additional use of rooms that have been kindly lent by other Schools at the University. As a result, the idea of designing a project that could be an expression of "regenerative sustainability" (Robinson 2013) emerged: a working space to encompass the kind of organisational model that we wish to pursue.

Inter-disciplinary conversations among researchers and experts were held to explore this idea further. One of the suggestions was the use of the campus as a place for experimentation in sustainable technologies and behaviours. These conversations suggested that a sustainable future for itdUPM might more easily be achieved if it was reinforced by the construction of a bioclimatic building located at the heart of the main university campus (International Excellence Campus Moncloa). Architects (experts in bio-climate buildings), agronomists (experts in urban agriculture), engineers (experts in solar energy and water), and students were then brought together to develop a project that was finally approved in July 2015.

The itdUPM building has now been constructed. It will not only serve as the headquarters of the itdUPM but also as an open demonstration space devoted to spreading technologies and innovations for sustainability. Concepts and prototypes for urban agriculture, decentralised energy systems and the circular economy, among others, will be tested there. In parallel to the construction of the physical infrastructure, scientific and dissemination activities that will take place in this new facility are also being designed.



Fig. 5 The itdUPM building: Pictures of the itdUPM collaborative building process. *Source* The authors

This new physical facility is already attracting the interest of several actors, for example, the network of urban orchards. Several firms have also expressed a wish to use the space to test technological prototypes. Once the facility is available, it will ease multi-actor relationships and the interchange of experiences with the large number of social innovation spaces promoting citizen's involvement that are currently emerging in Spain and elsewhere (Fig. 5).

5 (Non-Definitive) Conclusions. Co-Evolutionary Design Process

The Innovation and Technology for Development Centre that is in place today is the result of an evolutionary organisational design process based on the previous experience of a network of researchers focused on sustainability. An ongoing process of permanent learning and adaptation has been put into practice.

In consequence, any conclusion to this study must be considered as preliminary and in need of fine-tuning. Indeed, conclusions may also need to be abandoned altogether as itdUPM, and other similar initiatives, accumulate, share and analyse their different trajectories and experiences. Bearing this in mind, we nonetheless believe that the following observations are worth sharing.

The creation of collaborative inter-disciplinary and multi-actor spaces has not been a simple task. It has involved a complex design process requiring careful decisions with regard to organisational and human factors such as leadership style, culture and values. In this sense, three lessons can be underlined:

- Solving the potential problem of multiple identities for affiliates from the start was a precondition for success.
- The promotion of self-management capacities and a distributed leadership style have been critical for the attractiveness of the Centre, its growth and the extension of its activities.

- The Centre's collaborative atmosphere and its sustainability focus have proved to be the most appealing incentives for potential members.

Relevant and specific capacities were needed to pilot the launch, not only in terms of financial resources but, above all, in terms of human resources and institutional support. A dedicated team has been crucial to the development of the internal and external network and to nurturing its fragile ecosystem. The process has also required a long time to mature before being able to count on a genuine change management process in which behaviors, relationships and practices moved from those typical of a conventional university environment to those that are appropriate in a more collaborative and diverse environment.

The institutional anchoring of the Centre in the UPM has been crucial to its success. The formal status of the Centre is dependent upon the highest representative of the University: the Rector. At the same time, beyond this formal relationship, the promotion of itdUPM rests upon its personal relationship with the University authorities. This latter connection involves informing and, where possible, involving them, in the strategic decisions of the Centre.

itdUPM's integrative role has been mirrored in the way that external relationships have been built with companies, international organisations and NGOs. Beyond the traditional "extractive perspective" (institutions should support a university that works for sustainability), the Centre has developed a "mutual reciprocity perspective" (universities and other institutions need each other in order to address problems that affect all of them). In this sense, an advanced "client perspective" has been very important for adapting itdUPM training and research services to the real needs of its partners. As a result, a network of long-term relationships has established the basis of a sustainable business model for itdUPM.

Having completed its institutional infancy, itdUPM now faces new challenges. The organisational model based on a lean and horizontal structure needs to be expanded in order to demonstrate that it can scale-up without a centralised control structure. Moreover, its very success may jeopardise the itdUPM initiative, especially if the growing expectations it has created cannot be satisfied, or if the increasing visibility of the Centre is perceived as a threat to dominant interdisciplinary interests.

As Sennett (2012) points out, after decades of obsessive competition we have harmed our capacity for cooperation. At a time when transformation for sustainability is both urgent and desirable, universities have the opportunity to unleash some of the social creativity and clarity needed to find new and better development pathways.

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