

R&D Management

Conference 2015

Book of Abstracts

Pisa, 23 - 26 June



R&D



(Fast?) Connecting R&D

Institute of Management



Scuola Superiore
Sant'Anna
di Studi Universitari e di Perfezionamento

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Abdallah, S. Ben - ESG UQAM, Montréal, Québec, Canada
 Therrien, Paule Marie - ESG UQAM, Montréal, Québec, Canada
 Sicotte, Hélène - ESG UQAM, Montréal, Québec, Canada

A Real Options Approach to Project Portfolio Management

Project portfolio management is a complex and critical process (Roussel, Saad, & Erickson, 1991) that translates operationally the mission and strategy of firms into projects. Ineffective portfolio management can consume scarce resources on poor projects and miss good ones, a situation that makes firms facing extremely delicate situations (Buet, 2014).

The most popular models of project portfolio management remain the traditional financial methods based on discounting cash-flows (DCF) such as the Net Present Value (NPV), payback period, and rate of return that seem well-fitted to select projects with maximum value but usually they do not perform sufficiently well with respect to the other goals of portfolio management (Cooper & Edgett, 2003). Even with respect to the value maximization goal, traditional financial methods suffer some serious pitfalls. As shown in recent economic and financial researches, traditional financial approaches do

not evaluate correctly flexible investment opportunities under uncertainty and that it is more appropriate under these conditions to apply the Real Option Approach (ROA).

Uncertainty, irreversibility and flexibility are deemed to be the three conditions under which the ROA overpasses traditional techniques for project evaluation based on capital budgeting techniques. To manage proactively uncertainty when investment is irreversible, the project manager takes advantages of available flexibility such as the possibility to delay, suspend or abandon the project at hand or split it into multiple sequential parts.

The traditional techniques for project evaluation assume that project management is static i.e. the project evolve through time exactly as expected at its start. ROA accounts for the ability of the project manager to react to new information whereas DCF techniques... [...]

Agamis, Catherine - Grenoble Ecole de Management, France
 Assimakopoulos, Dimitris - Grenoble Ecole de Management, France

Collaborative R&D networks of innovating SMEs in a French Med-tech ecosystem

Firms, small and large alike, increasingly forge and use relationships with external entities to form the basis of their R&D strategy in emerging innovation and entrepreneurial ecosystems. For small firms in particular, R&D relationships with external innovators, large public research labs and universities, as well as industrial and other supporting partners are at the heart of how knowledge intensive innovation is organised and managed today. Yet, organizations tend to embark on such R&D relationships with an opportunistic mind-set and without much consideration of how such R&D relationships will impact their capabilities, performance and identity. Executives can neither assume that more connectivity is always better, nor that fruitful relationships will occur without a clear understanding of how these relationships may contribute both at the dyadic and ecosystem architecture. This is particularly important for innovating SMEs, which cannot afford to waste resources, and time on unrewarding re-

lationships and memberships in multiple ecosystems. Today's dual challenge for innovating SMEs is therefore to understand the underlying social structure at the ecosystem level and model their appropriate R&D networks to leverage knowledge and drive innovation in the short to medium term. In this paper, we explore through a qualitative case study how four leading SMEs, directly involved in a French Med-tech ecosystem, manage the social structure of their collaborative innovation.

Aghas, Keivani - Royal Institute of Technology (KTH), Stockholm, Sweden
 Colombo, Massimo G. - Politecnico di Milano, Italy
 Rossi Lamastra, Cristina - Politecnico di Milano, Italy

Antecedents of target CEO departure in post-acquisition: *The leading role of founder*

Acquisitions of small high-tech firms are commonly practiced for technology and human capital sourcing. These firms' CEOs are presumed as a source of human capital for the acquirer. In this respect, in small high-tech firms we expect that all else being equal if the CEO is also founder, the human capital embedded in CEO such as social capital and technological know-how is valuable for the acquirer. Therefore the acquirers prefer to keep them in post-acquisition; this paper investigates on validity of this argument. The sample consists of acquisitions of small high-tech firms between 2001 and 2005. The result indicates that being founder decreases the probability of CEO departure in post-acquisition. This effect is so strong that acquirers keep founder-CEOs at expense of redundancies when target is structurally integrated or product relatedness is high. The findings of the paper suggest that founder-CEOs' possess specific human capital that differentiate them from professional CEOs

Albers, Albert - Karlsruhe Institute of Technology (KIT), Germany
 Krämer, Lukas - Karlsruhe Institute of Technology (KIT), Germany
 Fritzsche, Albrecht - Friedrich-Alexander University Erlangen-Nuremberg, Germany

Enabling dynamic R&D for a unique Luxury Car Brand

At the beginning of a car's lifecycle, R&D has to meet increasing customer and tightening regulatory demands with the product design. In light of the resulting technological advances, luxury car companies have to leverage their unique engineering heritage and tradition. The question is how R&D should prepare for this challenge ahead? This contribution presents the case of a luxury car brand using a bottom-up approach to identify which are the current and traditional strengths of an R&D division that need to be developed in order to cope with changes in the firm's environment. Starting from a sub section level, we aggregate competencies to the division's level in workshops complemented by semi-structured interviews. Based on this information, dynamic clusters of existing competencies are identified using Design Structure Matrices in a network analysis. Moving on, a target state of desired competencies is derived from product and technology roadmaps. This enables a fit/gap-analysis in order to examine critical areas where dynamic capabilities need to be increased and where the underlying competencies need to be reconfigured.

Alexy, Oliver - TU Munich, Germany
 Hausberg, Piet - University of Osnabruck, Germany
 Spaeth, Sebastian - University of Hamburg, Germany

May the crowd be with you! Firm- and industry-level performance consequences of selective revealing

How do the adoption of selective revealing strategies and the consequential diffusion of knowledge affect an industry's innovativeness? Under what circumstances is the adoption of this strategy profitable? One could suggest that large-scale diffusion of selective revealing leads to homogenization and conformity. We hypothesize instead that open innovation of this kind can increase the speed of innovation to a degree that it outweighs the equalizing effect of the knowledge sharing that often is associated to open innovation strategies. More precisely, the net effect of open innovation on industry innovativeness depends on the exact circumstances. We find that there are scenarios in which the ability of imitators to correctly retrieve knowledge and anticipate the results of adopting the revealers' knowledge have surprisingly little influence. On the other hand, the contribution of the crowd reciprocating with its creative power to the esteemed revealers is a decisive factor. We contribute to innovation management theory in general and in particular to that of open innovation and selective revealing. The agent-based, bottom-up simulation of the consequences of selective revealing on revealing firms as well as industry dynamics altogether have important implications also for innovation management practice. Above all, it underscores the vital role that committed and engaged crowds of independent developers and user innovators play for the success of this management practice.

Amoroso, Sara - JRC-IPTS, European Commission
 Dosso, Mafini - JRC-IPTS, European Commission
 Moncada Paternó Castello, Pietro - JRC-IPTS, European Commission

The impact of skill endowments and trade unions on R&D greenfield FDI

The paper distinguishes among three types of greenfield FDI, namely FDI in research activities, development and testing activities, and manufacturing activities, and brings forward the hypothesis that the characteristics of the domestic labour markets influence the heterogeneity of greenfield FDI inflows. More specifically, we argue that along with country and industry specific factors, different types of greenfield FDI inflows are determined by the quality of labour and the labour market regulation, in terms of trade union density, wage dispersion and non-wage labour costs.

Andersen, Maj M. - Technical University of Denmark, Lyngby, Denmark
 Faria, Lourenço G.D. - Technical University of Denmark, Lyngby, Denmark

Eco-innovation Dynamics and Green Economic Change: the role of sectoral-specific patterns

In this paper we seek to point out and understand the features of the Green Economic Change process at the meso-level: the greening of industries. We posit that, as for “traditional” innovations (Pavitt, 1984), it is possible to identify sectoral eco-innovation patterns and these represent key but neglected factors in the dynamics of green economic evolution. Multiple questions arise connected to this complex novel agenda and we offer a first – albeit important – contribution to future research.

Quite early in the environmental sustainability agenda, the role of technology became an important issue (Ehrlich & Holdren, 1972; P. R. Ehrlich & Holdren, 1971). At that time, however, the interest has been concentrated more on which of the factors to blame the most for the environmental degradation, rather than to look into the possibilities for changing the dynamics behind it. From the beginning, the position of technology was negative,

focusing on its faulty role as the core cause of pollution and overconsumption when embedded in products and production processes. In theory, it was recognized that technological change could offset the process of growth in population and consumption, but the expectation was that this would not take place. The dominating growth mania would only lead to an increasingly environmentally harmful technological trajectory where possible incremental improvements would be offset by rebound effects (Mark, 1999; McNicoll, 2001; Ehrlich & Ehrlich, 2009; Wei, 2011; Mitchell, 2012). Hence no serious attention was given to analyzing the dynamics of technological change related to the environment.

Even after decades, the remarkable rise of the “green economy” and the role of eco-innovations as mechanisms to reach higher levels of both economic and environmental development have been object of little attention... [...]

Annunziata, Eleonora - Scuola Superiore Sant’Anna, Pisa, Italy
 Rizzi, Francesco - Scuola Superiore Sant’Anna, Pisa, Italy
 Gasbarro, Federica - Scuola Superiore Sant’Anna, Pisa, Italy
 Frey, Marco - Scuola Superiore Sant’Anna, Pisa, Italy

Institutional entrepreneurship for the transition towards an innovative energy sector

In times of growing challenges related to multifaceted customers’ and society’s needs, firms require institutional contexts that support the business model innovation. When institutional contexts are not spontaneously supportive, firms trying to foster institutional change take the role of institutional entrepreneurs. This article aims to explore roles and dynamics of institutional entrepreneurship in the renewable energy industry and, in particular, in the field of shallow geothermal energy for thermal uses. In this sector, the integration of entrepreneurial dynamics with existing institutional pressures and tensions towards the development of sustainable services and business models has determined a sharp change in the institutional setting.

A detailed case analysis of 13 organization in 6 European countries that contribute as institutional entrepreneurs to the transition towards an innovative energy sector is described. The analysis showed

that an effective institutional entrepreneurship needs 1) strong relationships with local and regional public authorities, 2) legitimacy and 3) support of organizational actors (i.e. trade associations, “complementary” firms, universities and research centers) within highly institutionalized contexts. Institutional entrepreneurs adopt four main tactics: collaboration, lobbying, framing and theorization. The integration of these tactics closely depends on the institutional embeddedness of organizations, namely the level of interconnections between organizations and their institutional context. Therefore, the institutional embeddedness moderates risks in developing innovative services and business models. What is more, the institutional embeddedness emerges as useful option when mainstream innovation systems, political structures and local socio-technological conditions are adverse to the exploration of promising market niches.

Antonioli, Davide - University of Ferrara, Italy
 Ramaciotti, Laura - University of Ferrara, Italy
 Rizzo, Ugo - University of Ferrara, Italy

The effect of intrinsic and extrinsic motivations on academics' entrepreneurial intention

The identification of an entrepreneurial opportunity is an intentional behaviour. Entrepreneurial behaviour is largely predicted by entrepreneurial intention. Investigating entrepreneurial intention is therefore an important research task which help understand and predict entrepreneurship (Krueger et al 2000). Although intention has been considerably investigated in the entrepreneurship research, few studies approached the issue in the realm of new technology based firms (e.g. Fini et al 2012) and no studies, to our knowledge, investigated the topic at the level of academic spin-offs.

This work investigates the factors related to the propensity of scientists to consider the exploitation of their research results via new venture creation, that is their entrepreneurial intention. Two main theoretical models of entrepreneurial intention have been proposed, the Theory of Planned Behaviour (Ajzen 1991) and the Model of Entrepreneurial Event (Shapiro

1982). The two models have been found to be both robust to empirical tests and basically to converge toward a similar interpretation of the determinants of the entrepreneurial intention (Krueger et al 2000).

These models identifies two main elements which are considered to be strong predictor of the intention of an individual to create a venture. These two elements are perceived feasibility and perceived desirability. It must be specified that, although intention is a very strong predictor of behaviour, the former may be identified long time before the actual behaviour is enacted, and the behaviour may also never take place.

Perceived feasibility represent the confidence an individual have toward undertaking the entrepreneurial process. The construct of self-efficacy is considered the main predictor of perceived feasibility. [...]

Appio, Francesco Paolo - University of Pisa, Italy
 Apreda, Riccardo - Erre Quadro Srl, Italy
 Martini, Antonella - University of Pisa, Italy
 Fantoni, Gulatiero - University of Pisa, Italy

Characterizing the knowledge base in the middle-earth: a longitudinal patent-based analysis of the Bioinformatics industry

This paper investigates the nature of bioinformatics inventions by analysing technological contributions (patents). By analysing data from USPTO, EPO, and WIPO, we shed some light on the antecedents that gave rise to what can be thought of as an interdisciplinary radical innovation. A quadruple helix of actors, entailing the exceptional role of single inventors, shaped the field. First evidence about trends and the role of non-patent references suggest that Bioinformatics has roots in science; the latter, still providing fundamental contributions for the growth of the industry and the patenting activity. A diversity analysis supports the view that scientific contributions (first and more than their technological counterparts) played an important role in sustaining the patenting activity in the Bioinformatics industry

Appio, Francesco Paolo - University of Pisa, Italy
 Baglieri, Daniela - University of Messina, Italy
 Cesaroni, Fabrizio - University of Messina, Italy
 Martini, Antonella - University of Pisa, Italy

The interplay of science and technology in shaping the patenting activity of top companies in the nanotech industry

Due to their pervasiveness and their business potential, carbon nanotubes (CNTs) and graphene are currently attracting the largest investments by firms focussing on the development of nanotechnologies. However, firms present a wide heterogeneity in the strategies they pursue to develop CNTs and graphene technologies, which is reflected both in the diversification degree of their nanotechnology-related patent portfolios and in the type of partnerships they establish with external actors (being other firms or universities) to promote technology development. Such an heterogeneity in firms' behaviour and innovation outcomes may also mask a different ability (or intention) to promote nanotechnologies that present different levels of radicalness and that show a different potential to become basic building blocks of the nascent nanotechnology trajectory. Against this background, this paper analyses the nanotechnology-related competences currently possessed by the largest players in this field. For each

patent possessed by firms, we explore how the probability to generate a radical knowledge recombination is affected by the diversity of knowledge bases on which such a patent has been built. We distinguish two main knowledge bases, the one linked to scientific knowledge (and assessed through non-patent references), and the other linked to technological knowledge (and assessed through patent references). We thus explore to what extent science and technology have contributed to technology development, and to what extent the diversity among firms' patent portfolios is explained by a different ability to combine together different scientific and technological sources. Results show that firms are heterogeneous in their ability to recombine knowledge. Albeit there are no companies neglecting neither science nor technology, some of the top inventors tend to cite more science than technology (their trajectory is characterized by science-driven recombinations)... [...]

Aquilani, Barbara - University of 'Tuscia' of Viterbo, Italy
 Abbate, Tindara - University of Messina, Italy

Value co-creation and capture in Open Innovation: bridging strategic and Service Dominant Logic perspectives

The concepts of value creation and value capture have been studied following different perspectives and almost separately; strategy studies focusing more on value creation - especially linked to R&D activities - and marketing studies on value capture issues. However, contributions have rarely studied them jointly within the Open Innovation context in order to better understand which processes lead to value co-creation and which are more or less aimed at capturing it. To fill this gap in literature, this paper aims at identifying the shared characteristics and the distinctive traits of strategic perspective and Service Dominant Logic in value co-creation and value capture domains, also studying which Open Innovation processes co-create value and which are most deemed to capture it.

Based on a literature review, we compared strategic and Service Dominant Logic contributions, we then studied an Open Innovation Intermediary instead of a firm which had already embraced Open

Innovation, to better understand which co-created and which captured value in different Open Innovation processes. The analysis leads to the following findings: (1) firms are rarely oriented to adopt Open Innovation inside-out processes mostly due to cultural barriers and lack of openness; (2) time is a strategic factor able to profoundly influence innovation processes, in that they need long term activities based on lasting and effective relationships among partners to achieve durable profitability and growth; (c) value is co-created by each partner involved in Open Innovation processes, even if each follows different perspectives.

Arcese, Gabriella - Roma Tre University, Rome, Italy
 Flammini, Serena - Roma Tre University, Rome, Italy
 Lucchetti, Maria Claudia - Roma Tre University, Rome, Italy
 Martucci, Olimpia - Roma Tre University, Rome, Italy
 Ruggeri, Federico - Roma Tre University, Rome, Italy

Google and Open Innovation

In these days characterized by strong competition and changing economies, several firms have become aware of the importance to acquire ideas not only from inside the company but also from outside, shifting from a Closed innovative approach to an Open innovative one (Chesbrough, H. 2003). In this new frame knowledge represents a key element for firms to be successful (Viskari et al., 2007). Knowledge can be increased by taking insights from the external environment in different procedures including acquisitions (Chesbrough 2003, 183). Indeed acquisitions could spur innovation (De Man and Duysters, 2005). According to that, Phillips and Zhdanov (2012) have pointed out that large firms usually integrate their innovation policies to increase their performance through acquisition strategies. Google is one of the main examples in this sense. Therefore, we think that could be of some interest to carry an initial exploratory observation on how Google applies OI practices, with a focus on the trends

and on some of the main characteristics of Google acquisition strategy over the years. As Google is worldwide recognized as one of the most innovative companies that was born with a partially Open R&D approach to transfer technologies. To pursue this aim we started by presenting an overview of the literature about the topic, then we have screened the acquisitions done by Google between the years 2001 and 2014, after that we have described and clustered the sample and finally our conclusions. From our findings seems that Google's Open Innovation approach, through acquisitions, integrates processes of knowledge acquisition and therefore the company's innovation capacity.

Armellini, Fabiano - Polytechnique Montréal, Canada
 Beaudry, Catherine - Polytechnique Montréal, Canada
 Kaminski, Paulo Carlos - Escola Politécnica da Universidade de São Paulo, Brazil

Open within a box: an analysis of open innovation patterns within Canadian aerospace companies

Even though open innovation is a topic of growing academic and commercial interest, few studies have analysed its relevance within traditional high-tech industry segments, such as aerospace. In order to fill this gap, this paper investigates whether and how aerospace firms in Quebec (Canada) adopt open innovation within their R&D strategies. This paper critically analyses the results of a survey performed by means of in-company questionnaire-structured interviews with high-ranking R&D managers of 31 companies in the Quebec aerospace cluster. The survey addresses a wide range of innovative and collaborative practices that are often associated with open innovation, including managerial, cultural and strategic aspects of the concept. The research found that innovation in the segment is product oriented, showing a lower adoption of formal intellectual-property (IP) protection mechanisms (e.g., patents) compared to strategic ones (e.g., secrecy and complexity of design).

The sample clearly presented evidence of collaboration, external sourcing and co-development with strong support from local government, universities and research institutes. However, these open approaches are mostly confined within the boundaries of the aerospace industry and, therefore, not part of diversification and expansion strategies, but a natural consequence of complementarities that are necessary to the development of complex aerospace products. This paper concludes with a discussion about the possible consequences of engaging in such limited open-innovation strategies in a world of rapid technological changes where there is a risk of substitute technologies replacing entire niche markets. Also at risk are business opportunities that these knowledge-intensive companies lose when they do not disseminate internal technologies into different markets.

Arora, Ashish - Duke University, Durham, USA
 Gigena, Manuel - KU Leuven, Leuven, Belgium
 Verhoeven, Dennis - KU Leuven, Leuven, Belgium
 Veugelers, Reinhilde - KU Leuven, Leuven, Belgium, CEPR, London; ECOOM, Leuven

The role of small firms, large firms and universities in the creation, development and commercialization of radical innovations in biotech

Despite anecdotal evidence, literature does not provide a clear understanding of how the process of radical innovation unfolds. A capabilities-based view leads to a division of labour wherein large firms are more efficient at commercializing novelty, whereas small firms may either be creators of novelty, or intermediaries between universities and large firms. Using patent-based indicators, we sketch a framework to study the role of different actor types in the generation of technological novelty, its development, and approach its commercial application.

Arts, Sam - KU Leuven, Leuven, Belgium
 Appio, Francesco Paolo - University of Pisa, Italy
 Bakker, Jurriën - KU Leuven, Leuven, Belgium
 Gigena, Manuel - KU Leuven, Leuven, Belgium
 van Looy, Bart - KU Leuven, Leuven, Belgium
 Verhoeven, Dennis - KU Leuven, Leuven, Belgium
 Veugelers, Reinhilde - KU Leuven, Leuven, Belgium

Some inventions are more equal than others: validating patent indicators that signal radical inventions

Since Schumpeter's seminal work on economic development (Schumpeter 1934), innovation is considered as one of the main drivers of firm performance and economic growth. At the same time, technological innovations vary considerably in terms of impact with only a minority of new inventions contributing significantly to technological progress and economic growth. More recently a number of indicators derived from patent documents have been advanced to capture the nature and impact of technological inventions. In this paper, we report on an ongoing research program (MSI, KU Leuven) which aims to assess, develop and validate such indicators. Starting from indicators advanced recently in the literature, we introduce and validate a number of new indicators. Validation efforts build on a set of biotechnology inventions that shape the development of that industry (Arts, Ap-

pio & Van Looy, 2013) Our new findings signal that novel indicators - reflecting novel functionality and novel (scientific & technological) origins - have a considerable impact in terms of precision (from 69 % to 90%). At the same time, recall remains cumbersome; combining existing and new indicators (both ex ante and ex post), allows to retrieve 29% of the (independently) identified major inventions. As such, we currently conduct a series of case studies (with an emphasis on 'false negatives') which might inform the development of additional indicators. Case studies pertain to recombinant DNA, PCR, stem cell research, 'breakthroughs' in the field of AIDS/HIV and a number of ICT developments (ADSL broadband, GNSS, MPEG). The findings of these case studies and their implications for indicator development will be presented and discussed during the conference.

Asimakopoulus, Grigorios - University Carlos III of Madrid, Spain
 Revilla, Antonio - University Carlos III of Madrid, Spain
 Rodríguez, Alicia - University Carlos III of Madrid, Spain

Born-global technology sourcers: the effects of R&D offshoring on innovation efficiency in newly born firms

The study of R&D offshoring strategies in newly born firms is practically non-existent. In this paper, we analyse 'born-international R&D sourcing firms' and disentangle the relation between their R&D offshoring strategies and innovation efficiency. Specifically, we propose theoretically and confirm empirically that firm's age has a negative moderating effect on the relationship between R&D offshoring and innovation efficiency. Therefore, the newly born firms have more difficult to improve their innovation efficiency via performing R&D offshoring activities. The arguments above suggest that firms need certain maturity to be able to leverage of R&D offshoring advantages.

We test our theoretical arguments on a panel dataset of Spanish firms spanning from 2004 to 2011. In a first stage, we obtain efficiency scores for every observation using Data Envelopment Analysis (DEA). We then use DEA scores in a regression analysis in order to analyse the

effects of international R&D sourcing. We find that offshoring does not contribute to innovation efficiency; moreover, firm age exerts a positive moderating effect on such relationship, so that the impact of R&D offshoring is significantly negative for younger firms. Therefore, we call for both managers and scholar to carefully consider the benefits and costs of R&D offshoring, as well as the organizational contingencies that may shape its overall impact on performance.

Bagheri, Seyed Kamran - Scuola Superiore Sant'Anna, Pisa, Italy
 Di Minin, Alberto - Scuola Superiore Sant'Anna, Pisa, Italy
 Piccaluga, Andrea - Scuola Superiore Sant'Anna, Pisa, Italy

Intellectual Property Visionaries of the new business era

The business world has changed dramatically. Increasing adoption of open-innovation practices, the rise of servitization and the explosion of IP-intensive and IP-enabled business models are among the most recognized changes of the modern global economy. These, inter alia, have led to the increased complexity of IP management beyond what already studied and reported in the literature.

In this paper, we: (1) introduce some of the visionary emerging business practices in IP management; (2) refer at least to one business case for each emerging practice and place each into context; (3) try to locate the identified practices within a widely adopted IP management framework, the Value Hierarchy Pyramid. We argue that many companies have already understood the strategic implications of IP for their businesses. However, the concept of being a visionary firm at the top of the IP management hierarchy needs to be broadened as the existing concept falls

short in, at least, two aspects: (1) it limits the changes that future may hold to only new products, technologies and markets, and (2) it extend the low-level defensive approach to IP into the future. Our study shows that the Value Hierarchy Pyramid could be improved to accommodate for the new realities of Open Innovation era.

Baglieri, Daniela - University of Messina, Italy
 Cinici, Maria Cristina - University of Messina, Italy
 Pellegrino, Roberta - University of Messina, Italy

The Value of Cognitive Frames: Developing Business Models and Technology

Building on cognitive theories in psychology and business model literature, the object of this paper is to analyze to what extent entrepreneurs rely on heuristics to develop business models and technology. Despite the constraining effect that traditionally management and entrepreneurship literature has attributed to these cognitive tools, we argue that in making sense of uncertainty “fast and frugal” heuristics provide entrepreneurs with robust strategies to connect the dots that give rise to business models. Data drawn from 130 questionnaires submitted to potential entrepreneurs are presented and analyzed. We find that similarity informs the development of business models. More specifically, entrepreneurs adopt the following three decision rules: (a) to look at a similar product/service to overcome weaknesses in their own business models, (b) to look at a similar product/service to transfer and improve strengths in their own business models, and (c) to bank on a successful product/service to

avoid risks. Our findings contribute to open up the cognitive toolbox entrepreneurs use to recognize market opportunities and customer needs as well as the direction of technology evolution.

Baldi, Francesco - Luiss University, Rome, Italy
 Baglieri, Daniela - University of Messina, Italy
 Trigeorgis, Lenos - University of Messina, Italy

Making a Good (Fast) Start in Multi-Stage R&D Projects. A Real Option Approach to Biopharmaceutical Licensing

In emerging technology fields, firms face technological and market uncertainty that, in turn, affect product development process and commercialization strategies. In these settings, firms mostly rely upon technology licensing (Granstrand, 1998; Anand & Khanna, 2000), that is a inter-firm contractual agreement between a licensor - a firm that own the core patented technology that requires to be further developed - and a licensee - a firm that possesses capabilities to develop innovation and purchase the subsequent rights to use these patents. Prior work has pointed out that technology licensing agreements are a means to access partner's key resources in order to jointly create more value. Accordingly, research has explored motivations behind it as a market entry strategy (Arora and Ceccagnoli 2006; Sine et al. 2003), the rewards associated with it (e.g., Boyd and Spekman 2010) and the design decisions involved in organizing technology licensing agreements (e.g., Aulakh et al. 2010; Jiang et al.

2009, Baldi and Trigeorgis, 2014). Despite these findings, research has not offered insight into how the timing of such co-creation alliances influences partners' negotiation capabilities. This paper addresses this gap and unpacks the specific causal mechanisms that distinguish the effects of such capabilities in different stages of the alliance. Since negotiation capabilities affect partners' returns, distribution strategy is not a trivial decision for the licensor as it can have significant consequences concerning the value it creates from an individual technology licensing agreement (Boyd and Spekman 2010). To examine this distribution strategy in multi-stage R&D projects, we take a real option approach which emphasizes the value to a firm of possessing those investments that allow it to manage risk proactively by exploiting uncertainty over time in a flexible fashion (Trigeorgis, 1996). [...]

Bali, Azad Singh - Murdoch University, Perth, Australia
 McKiernan, Peter - Murdoch University, Perth, Australia
 Vas, Christopher - Murdoch University, Perth, Australia
 Waring, Peter - Murdoch University, Perth, Australia

Rule #1: Value co-creation starts with a firm-level innovation culture

At the firm level, what facilitates co-creation of value? This paper reflects on the theoretical literature on value co-creation and makes the argument that a strong firm-level innovation culture is an essential prerequisite to co-creating value between firms and customers. This study reports the results of a benchmarking exercise of firm-level innovation practices in a representative sample of 215 manufacturing SMEs across 6 industrial sub-sectors in Singapore.

Singapore is undergoing sweeping economic reforms aimed at reenergizing the manufacturing sector, improving productivity, fostering collaborations and innovation in creating value. The government's efforts in Singapore to incentivize firms to collaborate with external stakeholders and co-create value is largely encumbered by firm-level characteristics (poor communication, limited empowerment, lack of collaboration, top-down approaches, limited appetite for risk and

failure) and other attributes that do not facilitate innovation, collaboration, and co-creation of value. Our findings are a lesson in caution, and the limited efficacy of the role of fiscal incentives to improve collaboration and the creation of value, in the absence of a firm-level culture that facilitates innovation.

Barjak, Franz - University of Applied Sciences and Arts Northwestern, Switzerland
 Perrett, Pieter - University of Applied Sciences and Arts Northwestern, Switzerland

Business Model Innovation as a composite type of innovation

In order to find better ways of operationalising business model innovations (BMI) the paper relates this concept to the literature on innovation indicators. It conceptualises BMI as a fundamental change of the mechanisms and arrangements of how a company creates, delivers and captures value. It translates this definition into a composite innovation indicator that uses the four types of innovations put forth in the OECD Oslo Manual: product, process, marketing and organisational innovations. Taking 60 cases from a teaching case repository we then code BMI cases according to the co-occurrence of these types of innovation and develop a taxonomy of BMI that meets the main criteria suggested in theories of classification: clear theoretical relationship of the included characteristics, non-overlapping and collectively exhaustive taxa, grouping into polythetic classes, high recognizability and interpretive value of the results.

We find three types of business model innovators: all-round goods innovators, revenue model innovators, and small scale BMI. Our analysis provides a better understanding of the patterns of BMI and points to the need of better conceptualizing and measuring revenue model innovations as an important aspect of BMI (and measuring innovations in general).

Barontini, Roberto - Scuola Superiore Sant'Anna, Pisa, Italy
 Miroshnychenko, Ivan - Scuola Superiore Sant'Anna, Pisa, Italy

R&D investment and corporate growth in Europe

Impact of innovation on firm growth has received some attention among scholars. However, prior empirical evidence on the R&D investment-firm growth relationship is at odds with the expectation that R&D investment can increase firm-specific capabilities and determine a competitive advantage that could allow a firm to conquer a higher market share and to improve its growth. In this paper we add some additional empirical evidence to the literature, investigating firm growth determinants on a sample of 680 large EU publicly-traded corporations, from 12 industrial sectors and 11 EU countries over the period from 2002 to 2011. Our results show that R&D investment exerts a positive effect on corporate growth in Europe, even after taking into account country, sector and year fixed effects. We find that "good" governance and legal environment improves corporate growth. Both external (total debt) and internal (cash flows) financing are important determinants of growth. We document that cash flow has

a positive effect on growth, while leverage is negatively associated with growth. Firms operating in countries with good governance and legal environment have lower corporate growth-cash flow sensitivities. Firm growth negatively affects its age as far as younger firms grow faster than older ones. The implications of the findings for research and practice are offered.

Barontini, Roberto - Scuola Superiore Sant'Anna, Pisa, Italy
 Tagliatalata, Jonathan - Scuola Superiore Sant'Anna, Pisa, Italy

The relationship between patents and firms' performance: evidence from changes in credit ratings of Italian SMEs

This study investigates the relationship between innovative activity and corporate ratings, taken as a proxy of firm's default risk and financial performance. Innovation is expected to induce a broad increase in riskiness, but could also greatly improve firms' long-term competitiveness. Its effect on future firms' dynamics is therefore ambiguous and it is worth to be studied empirically. Previous studies mainly focused on large companies and have considered firm's characteristics at the time of rating attribution. In this paper, we use changes in ratings between the years when the innovative effort is carried out and the following five years, with the aim of capturing the long-term effect on firm risk and competitiveness related to innovation.

We analyse a dataset of 488 innovative companies, compared with a control sample of about 4000 firms operating in the same industrial sectors. We use patents applications as a proxy for innovative ac-

tivity. Even if innovation might enhance companies' risk, the empirical evidence suggests that the decrease in rating quality is weaker than expected. Although we consider the period 2005-2010, when business conditions were particularly stressed because of the financial recession, innovating SMEs appear to be better at the moment of patenting and, more importantly, they suffer a lower reduction in the rating quality in comparison to the control sample. These results hold in particular for small firms, and are not reversed taking into account the most innovative companies. The empirical evidence suggests the opportunity to consider innovative characteristics in rating assignments, especially for small companies.

Barrett, Gillan - University College Cork, Cork, Ireland
 Dooley, Lawrence - University College Cork, Cork, Ireland
 Bogue, Joe - University College Cork, Cork, Ireland

Understanding open innovation in the born global firm: the influencing factors

Research in the practice of open innovation has been considerable in recent years. However, this research has primarily concentrated on large-scale enterprises in high technology industry sectors rather than on SME firms. SMEs are an important segment of the industry base that contribute greatly to economic growth and technological innovation (Acs and Audretsch, 1987). In a European context, 99% of all European businesses are, in fact, SMEs. The SME sector is regarded as a vital contributor to sustainable economic and employment recovery (Lawless et al., 2012). Therefore, SMEs in the context of open innovation are worthy of study (Gassmann et al., 2010; Vanhaverbeke, 2012). The overarching question encompassing our research is to what degree open innovation practices exist or have been adopted by the SME community? There are a multitude of factors influencing the adoption of innovative practices and their readiness to embrace the open innovation paradigm. Our research seeks

to identify these factors and the relationship between them, thus, informing better management.

Focus

The focus for our research is to understand the practices of open innovation within born global firms, essentially how born global firms engage in the practices of open innovation? Born global firms are essentially a niche category of SMEs. They are firms with a high growth potential, a faster internationalisation requirement and a vision for a global market positioning (Gabrielsson et al., 2008). These firms normally suffer greater resource limitations than SMEs due to their high ambition for globalisation. Typically, born global firms have the determination and vision of large-scale enterprises but with the constraints of SMEs. Therefore, collaboration with other independent global organisations with similar objectives may assist these firms to realise their ambitions. [...]

Belingeri, Paola - LUISS Guido Carli, Rome, Italy
 Leone, Maria Isabella - LUISS Guido Carli, Rome, Italy

Start-Ups and Licensing Agreements: An Exploratory Case Study

Licensing agreements can exist between established companies but they increasingly also give rise to start-up companies, built around the licensed technology. Licensing-out technology can represent a risk as well as an opportunity for any licensor as there is a trade-off between additional revenues that can be gained from the licensing agreement and the costs related to the transfer itself, as well as the risks of opportunism by the licensee. When licensing to a start-up, this risk is higher, as start-ups have scarce resources, high failure rates and no past performance on which to gauge the start-up's success. For the start-up the license could also represent a risk in the form of sunk costs and constraints on their evolution path. This paper discusses under which conditions technology licensing between a licensor and a start-up can be beneficial to both parties. Through a qualitative analysis, interviewing a number of European start-ups, we will examine in particular the role of contractual clauses,

the relationship between licensor and licensee, the role of the licensed technology in the final product and the role of a technology push versus demand-pull scenario in a licensing deal. For all these aspects we will reflect on their influence on the licensor and licensee.

Belussi, Fiorenza - University of Padua, Italy
 Sedita, Silvia Rita - University of Padua, Italy
 Savarese, Maria Francesca - University of Padua, Italy
 Orsi, Luigi - University of Verona, Italy

The secrets of beauty: open and recombinative. A novel approach to the management of innovation

The aim of this chapter is to explore how the reuse of knowledge affects the innovation evolutionary trajectories of a specific firm: L'Oréal. The Parisian L'Oréal Group is the world's largest cosmetics and beauty company. Concentrating on hair colour, skin care, sun protection, make-up, perfumes and hair care, the company is active in the dermatological, tissue engineering and pharmaceutical fields. Our contribution is rooted in the evolutionary theory of the firm. This theory has focused on the concepts of knowledge creation and recombination, which correspond to the capacity of the firm to develop knowledge and capabilities, also absorbing knowledge externally produced for instance by acquired firms. This paper offers an empirical illustration of how a specific modality of knowledge recombination, can nurture a "speciation" process generating new products in new market niches. The innovation strategy of the firm appears to be sustained by knowledge reuse that is both devel-

oped internally and externally acquired. We reconstruct the historical pattern of innovations developed by the firm, demonstrating that the knowledge reuse and knowledge absorption gives rise to innovation cascades and new niches creation.

Benvenuto, Marco - University of Salento, Lecce, Italy
 Cavallo, Giuseppe - University of Salento, Lecce, Italy
 Sambati, Francesco Vincenzo - University of Salento, Lecce, Italy
 Viola, Carmine - University of Salento, Lecce, Italy

A novel approach to co-create value in health care system: the Pro Domo Sud experience

The present research intends to address in a comprehensive, transversal and interdisciplinary manner the chronic patient management process in the research project named "PRO DOMO SUD" in order to identify operational inefficiencies, thus demonstrating that these are largely attributable to incurred costs and, thus, evaluate possible solutions for providing effective and appropriate responses by healthcare and social services. Due to the complexity of the issue, the methodological approach adopted must be multidimensional and interdisciplinary, with the involvement of medical, epidemiological, engineering, sociological and economic expertise, addressing the complexity of the chronic patient from all viewpoints, not reducing it, yet analyzing, understanding, rearranging and managing it in an organic manner. The PRO DOMO SUD experience derived from the Living Lab, a novel model of participated innovation in which the end-user plays a crucial role. A Living Lab is a new paradigm for indus-

trial research and development activities which allows the final users to actively collaborate with the designers and technicians in the development and test of new products and services aimed to them. The Living Labs stimulate social innovation by transferring research results from the closed industrial laboratory towards real life contexts where citizens and users become co-developers. The end user designs, with the help of engineers, the product according to his real needs, interest and attitude. With Living Labs user communities are involved not only as observed subjects, but also as a source of co-creation value.

Berg, Silvan - University of Bonn, Germany
 Preschitschek, Nina - University of Bonn, Germany
 Bröring, Stefanie - University of Bonn, Germany

Path-dependency in technology development? Evidence from patents in converging settings

Product development in the setting of converging markets and blurring industry structures implies that firms gain new knowledge and competences of, yet, unrelated industrial sectors. However, the development of absorptive capacity - which is needed to assimilate and exploit the missing external knowhow - builds on previous knowledge and can hinder innovation processes, since organizational development is cumulative and, thus, path-dependent. This paper serves as a first proof of concept. We use the patent perspective and translate the three phase model of Sydow et al. (2009) to assess whether patent activities in the dynamic environment of phytosterols follow a dependent path. To this end, we focus on two levels: an aggregated level and industry specific level.

In our findings, we are able to visualise a dependable path on the aggregated level and more diversified paths in the industry specific samples. Whereas technology developments in the personal care industry

show a quite clear dedication to a dependent path, developments in the food, pharmaceutical and chemical industry sectors seem to be less affected by previous activities.

Berthinier Poncet, Anne - Cnam, Paris, France
 Grama, Simona - Cnam, Paris, France
 Saïdi, Sana - Cnam, Paris, France

Perceptual distance between firms and governance of a technopole. What impact on innovation?

A number of recent studies have shown the impact of technopole governance on the performance of member firms. Empirical studies examining the effect of governance practices on innovation nonetheless remain rare. To better understand the impact of such practices, we use two theoretical concepts: the neo-institutional approach, with its notion of institutional work, and the perceptual distance approach. We thus assume that the smaller the perceptual distance of institutional innovation practices between entrepreneurs and technopole governance members, the greater the positive impact on company innovation.

To test our assumption, we examine the single case study of the Technopole de l'Aube in the Champagne region of France. We carried out 26 semi-structured interviews (company managers and members of the governing bodies), between June 2014 and January 2015. Our first exploratory results reveal certain perceptual differences in the implementation of

practices. We also note that when such differences are minor, they have a positive impact on the innovative activity of technopolitan companies.

Berti, Chiara - Scuola Superiore Sant'Anna, Pisa, Italy
 Casprini, Elena - Scuola Superiore Sant'Anna, Pisa, Italy

Business model innovation in airports: the case of Forlì

This paper provides an analysis of how an airport's business model has been innovated. In particular, it considers a business model innovation due to an exogenous driver, i.e. a change in the legislative environment. The paper analyses the case of Forlì, an Italian regional airport that has been renewed by changes in the National Plan of Transport. We extend previous research on business model and air transport industry in two ways. First, we contribute to Gillen (2011)'s framework, via introducing a new kind of ownership/governance structure, that of long term concession, characterized by the concession of the comprehensive management to a private company for 30 years. Second, we look at how a business model has been implemented and used as a manipulating device over the two phases of Forlì airport development, that of incubation and generation.

Bessière, Véronique - Université de Montpellier, France
 Gomez Breyse, Marie - Université de Montpellier, France
 Messeghem, Karim - Université de Montpellier, France
 Ramaroson, Andry - Université de Montpellier, France
 Sammut, Sylvie - Université de Montpellier, France

Competency acquisition in entrepreneurial teams and innovation performance in academic spin-offs

Research on academic spin-offs (ASOs) has developed considerably in recent years as a result of the economic potential they represent through the commercial exploitation of inventions and their contribution to local development. Researchers have highlighted the importance of technological innovation performance in developing the long-term performance of companies. One of the central elements in the development of innovation in companies is human capital. Several existing studies have focused on the role of entrepreneurial teams in developing performance. However, they fail to show a direct link between the two, and recent studies have suggested isolating the different sources that can be used to explain this relationship. For this reason, our research focuses on the contribution of the prior experience of entrepreneurial teams and competency acquisition in ASOs to the development of technological innovation performance. To explore this

question, we looked at the ASOs created in French academic incubators between 2005 and 2007. This study is based on a sample of 205 respondents and reveals a direct albeit weak link between the prior experience of entrepreneurial teams and technological innovation performance. The findings show that competency acquisition via recruitment has a significant influence on technological innovation performance, whereas a significant and negative relationship was found in the case of competency acquisition via training, confirming previous research on the role of staff heterogeneity in the performance of ASOs.

Bettiga, Debora - Politecnico di Milano, Italy
 Del Mauro, Gaia - Politecnico di Milano, Italy
 Fabi, Martina - Politecnico di Milano, Italy
 Lamberti, Lucio - Politecnico di Milano, Italy
 Lettieri, Emanuele - Politecnico di Milano, Italy

New Business Models in Health Care: Consumers' Technology Acceptance and Willingness to Pay for an eHealth Service for Cardiovascular Prevention

Health care is moving towards new patterns and models, with an increasing attention paid to prevention. In this respect, eHealth and the development of technologies (Consumer Health Information Technologies - CHIT) for monitoring the state of essential parameters in healthy or non-severe patients. A very debated issue in literature related to eHealth innovation refers to the critical role played by the patients' willingness to pay services, specially whereas such services are preventive rather than curative. In order to understand this issue, we developed a conceptual framework by enriching the Technology Acceptance Model (TAM) suited for understanding the intention to use of CHIT with arguments about subjective norms derived from the Theory of Planned Behavior to explore the determinants of users' willingness to pay for an eHealth Service for Cardiovascular Prevention on a

sample of 211 hypertensive and non-hypertensive Italian individuals. Our results support the idea that subjective norms actually are to be included in this kind of analysis as they strongly antecede both intention to use and willingness to pay. The study has also managerial implications, providing new elements to further the relevance of combining Marketing and R&D in the design of new services as well as new business models in eHealth and CHIT... [...]

Bianchini, Stefano - BETA University of Strasbourg, France
 Pellegrino, Gabriele - University of Sussex, UK
 Tamagni, Federico - Scuola Superiore Sant'Anna, Pisa

Innovation Strategies and Firm Growth: New Longitudinal Evidence from Spanish Firms

In this work, we explore the relationship between sales growth and a set of innovation indicators that capture the different sources, modes and results of the innovative activity undertaken within firms. We exploit a rich panel on innovation activity of Spanish manufacturing firms, reporting detailed CIS-type information continuously over the period 2004-2011. Standard GMM-panel estimates of the average effect of innovation activities reveal significant and positive effect for internal R&D, while no effect is found for external sourcing of knowledge (external R&D, acquisition of embodied and disembodied technologies) as well as for output of innovation (process and product innovation). However, fixed-effects quantile regressions reveal that all innovation activities, apart from process innovation and disembodied technical change, display a positive effect on high-growth

performance. Also, we find evidence of super-modularity of the growth function, revealing complementarities of internal R&D with product innovation, and between product and process innovation.

Bonesso, Sara - Ca' Foscari University of Venice, Italy
 Gerli, Fabrizio - Ca' Foscari University of Venice, Italy
 Pizzi, Claudio - Ca' Foscari University of Venice, Italy
 Tintorri, Sara - Ca' Foscari University of Venice, Italy

Diversify your ability to innovate by leveraging on your emotional social and cognitive competencies: the case of Italian luxury footwear industry

As firms are increasingly approaching to the open innovation paradigm (Chesbrough, 2003) they require employees with a broader set of competencies to enable them to absorb new ideas from outside the organizational boundaries as well as promoting and implementing innovation through the frequent interactions with external sources and partners. As a consequence, not only firms need to redesign units, practices and positions to easily engage employees in the innovation process (Chiaroni, Chiesa, and Fratini, 2010; Salter, Criscuolo and Ter Wal, 2014), but they also require to redesign the competency profile of the key roles in charge of the innovation activities. In this regard, a recent study has analysed the behavioral competencies professionals need for working in open innovation teams (du Chatenier, Versteegen, Biemans, Mulder and Omta, 2010). This study has outlined the relevance of the behaviors which concern self- and interpersonal

management competencies such as self-confidence, perseverance, influence and empathy. However, innovation management literature has primarily drawn the attention to the cognitive skills that enable individuals to pursue innovation outcome, such as lateral and analogical thinking (Enkel and Gassmann, 2010), neglecting the relevance of other behavioral competencies that are increasingly relevant to pursue the Open Innovation approach. Furthermore, the attention has been primarily devoted to the skills for product innovation, underestimating the necessary behaviors for implementing other types of innovation (process, organizational, marketing). Our paper adds to this debate investigating the behavioral competencies that employees need for achieving innovation outcomes. Behavioral competencies refer to the ability to recognize, understand and manage one's own (emotional competencies)...
 [...]

Bortone, Ilaria - Scuola Sant'Anna, and MIUR, Ospedale San C. De Lellis, Mesagne, Italy
 Gaballo, Giuseppe - University of Salento, Lecce, Italy
 Frisoli, Antonio - Scuola Superiore Sant'Anna, Pisa, Italy
 Distante, Alessandro - ISBEM, Mesagne, Italy
 Benvenuto, Marco - University of Salento, Lecce, Italy and ISBEM, Mesagne, Italy

Postural Education at School (PoSE): An innovative co-creative approach for health value

Recent technological advancements have induced significant changes in the whole society, and thus in workplaces and lifestyles. Recent epidemiological data stated that back pain starts early in life and that prevalence rates increased rapidly during adolescence, reaching adult levels around the age of 18. Furthermore, several authors considered long retained erroneous positions as a possible cause of postural diseases which do contribute, in their opinion, to the development of pathological forms. With this evidence, prevention should have a central role in order to avoid damage and pain in day-to-day life, but it is poorly practiced in the majority of countries, even in the Western world. We proposed a new concept of value co-creation by developing an innovative activity which involves young children as well as their families as active co-creators of health. We were able to involve school management, physical education teachers, students and their

families and medical professionals in an holistic model that aimed to create the behaviors and perceptions of individuals in to health and safety in schools and to conceive the school as a workplace tailored to the needs of the students and teachers. The preliminary results of PoSE showed a new competitive space for industrial and social growth. However, in order to compete effectively, managers need to invest in knowledge industry for the new infrastructure capabilities, as well as new functional and governance capabilities that are centered on co-creation through high-quality customer-company interactions and personalized co-creation experiences.

Brenk, Sebastian – RWTH Aachen University, Germany
Lüttgens, Dirk – RWTH Aachen University, Germany

Business Model Design in the Context of Disruptive Technologies: Development of a Process and Scenario-based Approach

Traditional manufacturing business models erode constantly due to the disruption from the technology and market side. Thus, firms like manufacturing companies cannot rely only on their product, service or process innovativeness while the established business model is the reason for losing competitiveness. The erosion of business model competitiveness is considered as a major reason for the emergence of business model innovation (BMI). Within incumbent manufacturing firms, BMI should facilitate the deviation from a pure product producer. However, the majority of firms in the field of mechanical engineering are still preserving their traditional way of doing business. They avoid necessary business model changes and most firms rely on their technological research and development (R&D) capabilities. Thus, business model innovation with all its potential benefits is not a common approach or even widely applied in practice. A German mid-sized industrial equipment manufacturer is investigated in our

longitudinal single case study. During our case study we develop and evaluate a systemized approach for BMI according the design science research, which addresses the identified barriers of BMI initiatives. Based on a dual workshop approach, we design a customized business model innovation process (BMIP) by guidance and modification as well as an iterative design procedure. We practically determined the systematization of BMI related activities, methods and tools. During the development, testing and evaluation, we investigated, whether systemization of BMI is an effective solution approach to accelerate the adoption of BMI by reducing the identified barriers. Within our investigations, we intend to merge the practical problem solving of a mid-sized manufacturer with the academic and theoretical objectives.

Burmeister, Christian – RWTH Aachen University, Germany
Lüttgens, Dirk – RWTH Aachen University, Germany
Piller, Frank T. – RWTH Aachen University, Germany

Business Model Innovation for Industrie 4.0: Why the “Industrial Internet” mandates a new Perspective on Innovation

“Industrie 4.0”, the implementation of cyber-physical systems along the entire value chain, is said to significantly change our current industrial system. While most of the previous discussion on Industrie 4.0 (I40) has been focused on technologies and standards, we propose that having the right business model will ultimately decide about companies’ market positions and profitability. This makes a systematic process of business model innovation (BMI) a key priority for companies. While a number of trade books discuss BMI, the academic literature has offered mostly conceptual reviews. Empirical analyses of management approaches and processes applied for BMI are scarce. Based on an exploratory research design using I40 as the topical context, we present the results of a comparative interview study with large companies and industry associations to provide an in-depth perspective of the status-quo of BMI. We are especially interested in dedicated processes, organizational structures, and

tools for BMI. Our results indicate a diverse picture. Current practices of product and service development still need to be complemented by a systematic approach to BMI, building the fundamental capability to exploit the opportunities of I40.

Butler, Jeff - Independent Researcher and Technovation Area Editor

The role and influence of design in the development and commercialisation of advanced materials. Lessons from the EU InnoMatNet project

Much of the time R&D is divergent and design is convergent: R&D creates new technological opportunities; design chooses the best option amongst a range of possible solutions. At other times R&D is convergent and design is divergent (e.g. R&D proves what is possible or safe; design imagines diverse ways to apply technology).

Although R&D and design can be practised informally, both activities are usually regarded as specialist professional disciplines. The expertise needed to be proficient in any particular area depends on a sophisticated combination of (R&D or design) methodology and (domain or application) knowledge. The balance of effort between technology development (R&D) OR market and user customisation (design) is subject to managerial and entrepreneurial influences and commercial and economic circumstances. Ideally, perhaps, we need to find a better balance: between R&D AND design methodology and domain AND application knowledge.

Some might argue that this is the essence of fifth-generation R&D and innovation management, or open innovation, but it is also possible to argue that we do not yet understand enough how to manage these activities and get the correct balance.

In the case of advanced materials (e.g. graphene and composites), the evolution of scientific knowledge, technological and industrial capability and design interest and relevance can determine how quickly a new material is commercialised, or how much a new technology is exploited, or how successful are the solutions offered by designers to users and clients. Many materials have taken 15-20 years from lab to market. There is a dynamic between technology and design which we need to appreciate more fully and deeply if we want to improve on this performance. Just as technology-push and market-pull models of innovation proved over time to be oversimplistic, so too is the concept of design-driven innovation in need of refinement. [...]

Cameron, Hugh - University of Manchester, UK

How long should things last? Implications of product durability

Abstract: The durability of manufactured artefacts is a design choice for businesses. It has profound consequences for society, affecting sustainability, societal well-being, and the decisions of consumers over much of their spending in affluent societies. Intuitively, consumers and policy makers think that increasing the useful lifetime of manufactured artefacts must be a good thing, reducing consumer spending and reducing demands on the environment. This paper surveys the factors which influence durability and the implications of extending the lifetime of products, which are pervasive and not straightforward. Economists have analysed the concept for more than 50 years, with many obscure conclusions, some contested conclusions, and more recently some relevance to the real world. In product classes experiencing stability (little innovation), extending durability seems a reasonable objective, and can be achieved by increasing initial costs of design and manufacture. However, in areas with sig-

nificant and continuing performance improvement for products, the advantages are reduced as older artefacts will underperform their newer counterparts - in particular in environmentally sensitive ways such as fuel efficiency. Two aspects of this are investigated. First, how can the design of products extend their durability when there is continuous innovation and performance improvement? In particular can standards be designed to cope with future changes? Second, at an economy-wide level, extending durability may lead to long-term inflexibility and delayed transition to more sustainable capital stocks.

Candi, Marina - Reykjavik University, Iceland

Design in technology-based service innovation

The value of design as an element of product innovation is widely acknowledged and supported by empirical research. Design in the context of service innovation is less well understood, although there is also some work that suggests the importance of design in this context. Technology-based firms are viewed as key loci of innovation and, indeed, this innovation is not limited to product innovation, even though many of the stereotypes that come to mind have to do with the development of ever more technologically advanced “widgets”.

This work takes a holistic view of design and examines how designers (viewed as design capacities/resources), design emphasis (emphasis on aesthetics, experiences and social aspects) and the outcomes of design (design excellence) jointly contribute to market growth among firms engaged in technology-based service innovation. Data collected from 140 technology-based firms at two points in

time (one year apart) are used to test relationships in a structural model.

The findings suggest that design emphasis is more important than the involvement of design resources (namely designers) for technology-based firms engaged in service innovation. This lends credence to the notion that design in technology-based firms need not be executed or driven by designers – which resonates with the notion of “silent design”, or design performed by those who are not designers and whose formal role is not design. Design excellence is not found to contribute to performance, which is an unexpected finding.

The relationships found in the structural model help add to our understanding of how design can play a positive role in technology-based service innovation as well as suggesting how firms might best take advantage of this opportunity.

Candi, Marina - Reykjavik University, Iceland
Colurcio, Maria - University of Catanzaro “Magna Graecia”, Italy
Melia, Monia - University of Catanzaro “Magna Graecia”, Italy

Service Business Models: Considering the Social Dimension

The complexity of global competition and the increasing relevance of sustainability and ethical issues call for business models that combine business needs with social needs. There is a scarcity of research that addresses these two issues concurrently. Social innovation is currently a popular concept, but one that suffers from a lack of consensus regarding its definition and sphere of applicability. Unlike business innovations that are primarily concerned with the for-profit perspective of economic growth and competitiveness, social innovation is adopted and used to resolve societal changes and improving quality or quantity of life. This is not necessarily linked with economic success. An overarching sentiment is that of the inherent merit of social innovation for improving people’s well-being. However, social innovation tends to be viewed as being separate from, and even in opposition to, profitable business innovation, which seems likely to detract from the potential to actually achieve these

envisioned levels of well-being. Recent empirical and theoretical research has provided a venue to question whether “business” and “social” should continue to be treated as distinct forms of innovation. Using quantitative survey data collected from a sample of service firms, this research explores the relationships among social innovation, service innovation and business model innovation. The findings suggest that social innovation and business model innovation are positively related. More specifically, firms that invest effort in business model innovation – which usually involves a holistic approach to a firm’s business – are likely to put effort into improving the well-being of society. The tentative conclusion that can be drawn from this research is that it is those firms that are actively involved in developing new business models that are most likely to take the social dimension into account than firms that focus more narrowly on service innovation.

Castellani, Davide - University of Perugia, University of Lund, Centro Studi L. d'Agliano
 Montresor, Sandro - Kore University of Enna, Italy
 Schubert, Torben - University of Lund, Sweden
 Vezzani, Antonio - JRC-IPTS, European Commission, Seville, Spain

Multinationality, R&D and productivity. Evidence from the top R&D investors worldwide

The paper investigates the impact that the multinational scope of firms' activities can have on their productivity. First, we argue that such an impact is both direct and indirect, and that the latter is channeled through higher incentives to invest in R&D. Second, we posit that the composition of these direct and indirect effects is different if multinationality is measured at the intensive margin (higher share of multinational on total activities) rather than at the extensive margin (greater geographical dispersion of multinational activities). Using a large sample of top R&D investors in the world, we propose an econometric model based on an R&D and a productivity equation, which are both allowed to depend on multinationality. With this model we can disentangle the direct and indirect effects of multinationality on productivity appropriately. We find: i) a positive direct impact of multinational intensity on productivity, while the geographical dispersion of multinationality is negatively correlated with productivity; ii) multina-

tionality (along both dimensions) has a positive indirect impact through higher investments in R&D; iii) this positive indirect effect is however not large enough to compensate the negative direct one at the extensive margin. Results are largely consistent with a theoretical approach that combines transaction cost theory with an economic analysis of how incentives to invest in R&D depend on multinationality.

Ceci, Federica - University G. D'Annunzio, Pescara, Italy
 Masciarelli, Francesca - University G. D'Annunzio, Pescara, Italy
 Prencipe, Andrea - University G. D'Annunzio, Pescara, Italy

“Religious beliefs lead to unscientific thinking”: how spirituality affects innovation

In this paper we posit that entrepreneurs who share the same values with other entrepreneurs in their network are more likely to introduce innovation. We focus on spirituality, which indicates an assessment about the positive effects of religious practices both at personal and social level, along with the confidence in the existence of a supreme being. Our results show that while individual spirituality does not affect firm innovation, belonging to a network of entrepreneurs who share this value positive moderates the effect of this value on the firm probability to introduce innovation.

Cennamo, Carmelo - Bocconi University, Milan, Italy
Ozalp, Hakan - Bocconi University, Milan, Italy

Why Do New Platform Technologies Fail? The Paradox of Technological Superiority

Technological superiority provides more functional value for users, and is considered a critical factor for challengers of incumbent technological platforms. We argue that while technological superiority might drive early user adoption and consequent support from complementors, it also causes greater innovation challenges for complementors limiting their contribution of complementary products. This creates unfavorable expectations and slows down its adoption. Eventually, these platforms fail. We develop this logic conceptually and identify three specific problems through a qualitative analysis of the US video game console industry. Our logic helps explain the existing puzzle documented by a number of studies that it is often the inferior technology to become the dominant platform. Our study highlights that what is perceived as 'superior' from a technological perspective is in fact 'inferior' from an ecosystem perspective that accounts also for complementors.

Chang, Teh-Yuan - Aletheia University, New Taipei City, Taiwan, Republic of China

Roles of research meetings in managing R&D projects: a case of the uses of project objectives and milestones by university scientists

Having observed twelve university scientists, involving in nine university-industry collaborations (UICs) in Taiwan, this paper provided an understanding of the processes of using project objectives and milestones to manage academic R&D (research and development) and UICs, demonstrating that university scientists deal with project objective and milestones differently, likely resulting from the functions of projects objectives and milestones perceived by them, and the processes of using project objectives and milestones to manage academic R&D and UICs.

The contributions of this paper would be twofold: (a) communications, particularly irregular research meetings, appear to be the fundamental mechanism of using project objectives and milestones to manage R&D projects by university scientists, referring to the theories of managing 'open innovation' or 'academic R&D projects'; (b) university scientists tend to adopt organic, rather than mechanical, approaches to

employ project objectives and milestones for managing R&D projects. In terms of managerial implication, it is recommended that the 'best practice' for managing UICs, would be based on effective communications, i.e. using regular research meetings and irregular research meetings interactively, in order to make the processes of define/redefine project milestones for managing academic R&D and UICs efficiently and effectively.

Cho, Chanwoo - Ajou University, Suwon, South Korea
 Lee, Sungjoo - Ajou University, Suwon, South Korea

Users' contribution to technological innovation: Evidence from patent analysis

The potential of users as one of the main body of innovation has been demonstrated in relevant research. Users have been regarded as an important and valuable source for innovation, and their role in the innovation process has become apparent in such industries as sports equipment, medical instruments and software.

As a result, user innovation has attracted considerable attention both in academia and practice. Many firms have tried to adopt innovation outcomes of user innovation, or to make users to participate in their innovation process. In this way, users have contributed to firms' innovation. Much research has investigated user innovation cases as a way to facilitate firms' innovation activities but little effort has been made to analyze how users have contributed to firms' "technological" innovation. Users' contribution to technological innovation is worth examining as users have more expert knowledge and own capabilities for innovation. In addition,

users may contribute to innovation in a distinct way in different technological areas due to the differences in technological characteristics, users' contributions to technological innovation across different technology areas are valuable to be analyzed.

This study aims to investigate users' contribution to technological innovation by using a patent database. Patent analysis is one of the primary tools for technological intelligence, measuring characteristics of innovation activities. Moreover, the amount of available patent data is large, covering all countries and thus suitable for our analysis. For this purpose, we firstly defined four types of users' contribution to technological innovation based on patent bibliography. Secondly, we selected target industries for analysis and collect patents data for them from the United States Patent and Trademark Office database. [...]

Ciliberti, Stefano - University of Perugia, Italy
 Martino, Gaetano - University of Perugia, Italy
 Bröring, Stefanie - University of Bonn, Germany

Drivers of innovation across the Italian food industry: a comparative analysis using CIS10

The present paper investigates the characteristics of innovation activities across the Italian agro-food sector. The aim is to analyze how organizational patterns (internal and external R&D, collaboration) and source of knowledge affect innovators' performances as well as whether these drivers differently influence product and process innovation. Furthermore, particular attention is also devoted to SMEs that represent the backbone of the Italian food industry. In order to test the research hypotheses of the paper a dataset from the 2010 Community innovation survey (CIS) is adopted. Micro level data referred to 431 Italian food companies are used to run econometric models. Findings show that successful innovating food companies try to elaborate new trajectories and strategies of internal product development by relying on in-house R&D activities and on acquisition of new technology and knowledge in order to rapidly fulfil new market requirements. As concerns process innovation, it is indeed

relevant the increasing strong influence of the cross-industry inducement, due to the fact that investments in capital goods and cooperation play a crucial role for innovation in such a small low-tech industry, as a result of a constructive "mutual understanding" along the supply chain. In addition, it is noted that SMEs' product development strategy particularly benefits from information flows coming from public research institutes (e.g. Universities), whereas large companies' product innovation benefit from strengthening both R&D in-house activities and insourcing of external technology, so as to better exploit information coming from clients or customers. Lastly, while process innovation of SMEs is strongly linked to the capacity to establish specific and stable collaboration with other enterprises in order to share R&D activities, large companies adopt new organizational patterns to integrate and manage inside the firm both information from suppliers and external source of knowledge.

Corsini, Filippo - Scuola Superiore Sant'Anna, Pisa, Italy
 Rizzi, Francesco - Scuola Superiore Sant'Anna, Pisa, Italy
 Frey, Marco - Scuola Superiore Sant'Anna, Pisa, Italy

Institutional legitimacy of non-profit innovation facilitators: forms and antecedents in regulated environments

Sustainable production and consumption is a hot topic in innovation policies. Most European producers of electrical and electronic equipment have joined collective compliance schemes - generally called Producer Responsibility Organizations (PROs) - to guarantee compliance with the mandatory requirements that enforce the Extended Producer Responsibility principle. The role of PROs is to manage a small percentage - defined by law - of the product value chain so as to: (1) reduce the environmental impact of the end-of-life of products, and (2) stimulate innovation pathways throughout the supply chain. The paper presents an explorative analysis of European PROs operating in the e-waste sector and highlights that regulations introducing policy targets in terms of supply chain performance without organizational prescriptions lead to a limited number of isomorphisms. The vertical integration of supply chain actors and the density of network relations emerge as the main determinants of organizational and strategic postures.

Cozza, Claudio - University of Trieste, Italy
 Zanfei, Antonello - University of Urbino "Carlo Bo", Italy

Firm heterogeneity, absorptive capacity and technical linkages with external parties in Italy

While it is widely acknowledged that internal R&D is a fundamental source of the ability to absorb, select and use external knowledge, severe data limitations prevent from capturing differences across firms in this respect. Using a novel dataset supplied by the Italian Bureau of Statistics (ISTAT), we highlight that, when controlling for internal R&D efforts, not all firms are equally prone to gain access to external technology, and to the knowledge provided by universities in particular. We find that firms which do not only perform R&D activities but also belong to a group exhibit a higher propensity to access to external knowledge by either contracting out R&D or cooperating with external parties, as compared to independent firms that are not organized into groups. This premium persists when controlling for different measures of internal R&D efforts. Furthermore, the differential in the propensity to access external knowledge is particularly high in the case of R&D performers belonging to foreign groups, i.e. Italian affiliates of foreign owned companies; and it is even higher in the case of the few Italian firms that have R&D activities abroad. The relative dis-advantage of independent firms, which represent the bulk of the Italian industry and include most small and medium sized enterprises, appears to be less of an obstacle in the case of linkages with universities, especially when R&D contracting out is considered.

De Massis, Alfredo - Lancaster University Management School, UK
 Frattini, Federico - Politecnico di Milano, Italy
 Kotlar, Josip - Lancaster University Management School, UK
 Messeni Petruzzelli, Antonio - Politecnico di Bari, Italy
 Wright, Mike - Imperial College Business School, UK and University of Ghent, Belgium

Innovation Through Tradition: The Success Secrets of Innovative Family Businesses

According to conventional thinking in innovation, relying on knowledge and resources from the past can cause path-dependence, inflexibility and conservatism, thus reducing a firm's capability to meet current environmental needs and expectations (Sorensen and Stuart, 2000) and innovate successfully (Leonard-Barton, 1992). Innovation scholars have therefore mostly neglected the question of how firms search for innovation across time (Argote, 1999), advising managers to create a corporate sense of urgency and obtain a mandate to dismiss the past and open the door to the future. However, recent research has indicated that downplaying the past in innovation is more a cultural choice than an imperative or a strategic need, in other words the result of a "recency bias" that may instead hinder a firm's innovation performance (e.g., Katila, 2002; Nerkar, 2003 Capaldo et al., 2015). As such, the conventional view about the

past in innovation research may prove inadequate or even counterproductive, and the scant attention to the temporal dimension of search processes emerges as a significant gap in innovation research. In fact, relying upon traditional resources, as reflected by the stock of traditional knowledge, competencies, values, norms, and beliefs pertaining to the past, is increasingly recognized as a powerful and unique source of innovation advantage (Messeni Petruzzelli and Albino, 2014).

Despite the increasing attention paid by management scholars to temporal search processes in innovation, little is known about how traditional resources can be turned into successfully new products. This represents an opportunity for management and organization scholars to make a major contribution to understand the phenomenon.
 [...]

Derrien, Emmanuel - Enjoy Your Business, France

R&D strategy: fusion of HMI and neuroscience to improve management

At present time, we find thousands of software solutions, all directed towards specific functions. They are mostly designed for a purely functional purpose, by obscuring the man machine interface nevertheless fundamental in the decision-making.

R & D on new software interfaces is essential, especially for the user experience. Consideration of neuroscience, including user reaction against digital information, moves forward to new interfaces. The digital management is impacted in part by technological advances but also by the study of human behaviour through web interfaces. User experience, as well as the reaction to digital information pushed by the system, is however a major cause of inefficiency when EIS do not allow dealing with human neurobiological nature. In the literature we observed a deep attention given to the way processes and organization is described by the information system. In this project, we experimented a

new way for building interaction between EIS and human, based on results recently obtained by cognitive neurosciences, and especially the way our brain takes a decision from data received and personal experience.

In this paper, we will explore the mechanisms involved in the decision-making brain activity and how they interact with messages received by an experimental design approach especially focused on the human management of priorities. We try to assess several experimental and measurable outputs including the time to decision, the relevancy of the choice and the ability to disambiguating in various configurations and various digital input like verbal, non-verbal items.
 [...]

Di Comite, Francesco - European Commission, DG Joint Research Centre, Seville, Spain
 Kancs, d'Artis - European Commission, DG Joint Research Centre, Seville, Spain
 Torfs, Wouter - European Commission, DG Joint Research Centre, Seville, Spain

Macroeconomic Modelling of R&D and Innovation Policies: An application of RHOMOLO and QUEST

The paper presents a spatial computable general equilibrium (SCGE) approach to policy impact assessment which is useful for capturing knowledge spillovers and spatial interactions between regions. First, the relationship between regional productivity and R&D expenditures is estimated econometrically by applying the catching-up framework of technology diffusion of Benhabib and Spiegel (2005) to EU regions. Second, a SCGE model RHOMOLO is combined with a DSGE model QUEST to simulate and assess the impact of research and innovation funding allocated by the 2014-2020 EU Cohesion Policy.

Our simulation results suggest that in the short-run the benefits of R&D policies are concentrated in the less developed regions. In the long-run, however, the benefits spread throughout the EU, favouring also the more developed regions. In light of the empirical results, the paper identifies strengths and limitations of the adopted approach, and the advantages of

aligning a spatially and sectorally disaggregated SCGE framework with the inter-temporal dynamics of DSGE models.

Di Minin, Alberto - Istituto di Management, Scuola Superiore Sant'Anna, Pisa, Italy
 Marullo, Cristina - Istituto di Management, Scuola Superiore Sant'Anna, Pisa, Italy
 De Marco, Chiara Eleonora - Istituto di Management, Scuola Sant'Anna, Pisa, Italy

Open Innovation 2.0 strategies and new open business models. Case studies from Europe

Since the rising of the web 2.0 and related advances in ICTs (increased bandwidth, telecommunication networks deployment, social media environment), a new generation of business models emerged and converged in the paradigm of Open Innovation 2.0 (Curley, Salmelin 2013). This new paradigm involves "principles of integrated collaboration, co-created shared value, cultivated innovation ecosystems, unleashed exponential technologies, and extraordinary rapid adoption" (Salter, Alexy 2013).

In a wider networking and co-creative collaboration environment significant changes arise in the breadth of the relevant sources for knowledge to be involved (from universities to governments, competitors, partners), and in the depth of knowledge interactions, with companies' models of innovation rapidly shifting from a transactional paradigm to a relational one. The increased role of customers and web users in the enlarged pattern

for knowledge exchange requires firms in most industries to rethink their existing business models according to new strategic opportunities, in order to co-generate enabling innovation and creating shared competitive advantage.

Therefore, a recent and urgent research question is to reach a state-of-the-art taxonomy in order to explain the influence of the new technologies on open innovation strategies and the rise of new innovative business models (or the transformation of existing ones).

The aim of this study is to provide new knowledge about new models of Open Innovation 2.0 within the broader context of ICT innovation in Europe. Different approaches used by firms towards business model innovation are analysed by the development of a new conceptual framework of analysis; main strategic spaces are identified at the intersection between the breath of... [...]

Di Paola, Nadia - University of Naples Federico II, Italy
 Spanò, Rosanna - University of Naples Federico II, Italy
 Vona, Roberto - University of Naples Federico II, Italy
 Caldarelli, Adele - University of Naples Federico II, Italy

Why Do Life Scientists Decide to Become Entrepreneurs? The Role of Motivations

The linkage between entrepreneurial ideas and actions continues to be central to the entrepreneurship debate. However, the possible implications of the various entrepreneurial motivations on the process are still largely understudied. On this ground, our study aims to contextualize the theoretical model linking the entrepreneurial intentions, the motivations, and the actions, with particular reference to the academic entrepreneurship within the Life Sciences. We use the QCA set-theoretic method to process the data gathered among 21 scholars, active in the life sciences context. We carry out the analysis in two steps. The first step demonstrates that the negation of behavioral beliefs, or the negation of the normative beliefs together with the negation of the control beliefs, are two sufficient conditions for the Entrepreneurial intentions to occur. Moreover, we find that the entrepreneurial intentions and the extrinsic motivations may lead to the entrepreneurial actions. Our findings offer interesting insights on the whole of the phenomenon, by revealing that the reference to specific contexts may well determine implications that differ from those already detected in the literature.

Doherty, Matthew - Medicines for Malaria Venture – MMV, Geneva, Switzerland
 Assimakopoulos, Dimitris - Grenoble Ecole de Management, France

The Institutional Evolution of Collaborative Practice and the Strategic Value of Mobilizing Network Capital in Public-Private Science, Technology and Innovation Communities

The role of socio-technical networks and communities in fuelling science, technology and innovation (STI) has been highlighted in a growing body of literature on organizations. The management and funding of collaborative R&D processes in such complex STI constellations are critical drivers for human and organizational development as they function both as inputs and outputs of evolutionary processes within and around organizations, and increasingly at ecosystem and community levels of analysis.

are not well understood resulting in misperceptions and lack of strategic insight where the 'liability of collective action' can plague members if organizational communities are poorly coordinated (Baum & Singh, 1994, p. 368). The primacy of the need for adequate funding, substantial innovation and complex collaboration in order to meet the ultimate objectives of reducing mortality and morbidity in low and middle-income countries, and attaining the highest possible levels of health for populations across the globe, means that the stakes are high.

Since the turn of the century, the global health architecture has reached an unprecedented level of complexity creating several overlapping organizational fields and communities with multifaceted identities and agendas. Cooperation and collaboration are essential for such mission-driven entities, as is an ability to shape, orchestrate and mobilize their environments. Enabling mechanisms, as a result of how these environments have evolved, In order to begin exploring the relations between actors that occupy and operate across several of the interest fields in global health R&D this paper advances a conceptual framework grounded in the literature on communities and networks and a methodology that leverages the relational structure/culture approach of practice...
 [...]

Dooley, Lawrence - University College Cork, Ireland
Cronin, Michael - University College Cork, Ireland

Enabling higher levels of innovation: Analysis of CIS2008

Innovation is a key determinant of economic development, yet our understanding of “some of its most crucial aspects is still incomplete and exhaustive quantification of all key dimensions of innovation activity is still lacking” (Evangelista et al., 1997). The higher the level of innovation produced by a firm, then the greater its potential for competitive advantage and growth. This research seeks to explore the factors that influence the level of innovation that a firm introduces to the market. In undertaking this research, a quantitative based approach was adopted based on the Eurostat Community Innovation Survey (2008) dataset. The analysis was undertaken on a sample of 28,720 firms that reported introducing either a ‘new or significantly improved product/service to their market’. This paper presents a model of factors that support higher levels of innovation and an ordinal logistic regression model is fitted to the dependent variable, with all other variables included as explanatory variables.

The effect of each variable was quantified using the odds-ratio calculated from a logistic regression model.

Dopfer, Martina - University of St. Gallen, A. von Humboldt Institute, Berlin, Germany
Sauer, Roman - University of St. Gallen, Switzerland

How the cognition of the entrepreneurial agent shapes a startup's business model development

Research in entrepreneurship theory points to the influence of a founder's cognition on the development of a startup's business model. This study explores how a founder's industry, technology- and managerial experience affects the way a novel technology or market-driven idea is embedded in a business model.

We conduct a cross-case analysis of eight German-based start-ups focusing on the background of the entrepreneurial agent and the way they imitate business model typologies. Our findings to the industry and technology background suggest four ideal archetypes of founders that differ significantly in the sequence the business model development process is carried out. Additionally, we find that with growing managerial experience, radical business model imitation – inspired by business model typologies – increases. In this way, we propose a framework that can guide founders towards more strategic actions and enable them to better take advantage of their preliminary experiences.

Duwe, Julia - EBS University, Oestrich-Winkel, Germany
 Täube, Florian - Solvay Brussels School, Brussels, Belgium
 Nestle, Volker - EBS University, Oestrich-Winkel, Germany

Sensing, Seizing, and Reconfiguring in Ambidextrous Organizations: A Communication Perspective

This paper explores innovation processes of ambidextrous organizations from a communication perspective. With a focus on product innovation in large multinational industrial firms, we study how organizations communicate internally in the face of turbulent markets and constant technological change. We therefore build on the concept of ambidexterity as a dynamic capability assuming that exploration and exploitation are simultaneously performed. As the Dynamic Capabilities view spotlights the role of senior management, we specifically focus on leadership communication in our analysis. In a qualitative in-depth case study analysis of a German provider of components for industrial automation, we explore what internal leadership communication looks like in the process of product innovation and how it affects the process. We analyze if and how communication patterns differ in radical innovation projects compared to incremental innovation projects. Starting from the scientific evidence that

ambidexterity has a positive effect on firm performance of technology-oriented firms in rapidly changing environments the research question is if and how communication of senior managers affects ambidexterity and how it can promote ambidexterity of technology-based firms. The overall objective is to develop a holistic model of internal leadership communication in ambidextrous technology-based firms that can both serve as a model for managerial communication activities and contribute to the current body of knowledge on communication in innovation processes. Preliminary findings show that communication styles differ significantly in radical vs. incremental innovation settings. The findings also indicate that it is an important communication task for top and senior managers to balance exploitation and exploration and to verbally promote both incremental and radical innovation within the organization.

Enkel, Ellen - Zeppelin University, Friedrichshafen, Germany
 Heil, Sebastian - Zeppelin University, Friedrichshafen, Germany
 Hengstler, Monika - Zeppelin University, Friedrichshafen, Germany
 Wirth, Henning - Zeppelin University, Friedrichshafen, Germany

Exploratory and exploitive innovation: To what extent do the dimensions of individual level absorptive capacity contribute?

Depending on a firm's exploration or exploitation strategy, externally sourced knowledge can inspire breakthrough and incremental innovation. Individuals are seen as the frontline that allows firms to learn from external sources. However, firms can only benefit from individual efforts if they understand to what extent the dimensions of individual level absorptive capacity are related to their innovation strategy. We examine the driving factors of individual level absorptive capacity regarding a firm's exploration versus exploitation strategy. Using quantitative data from 104 individuals, we conducted partial least squares structural equation modeling (PLS-SEM) analysis. Our results verify individuals' competencies in identifying external knowledge as a trigger for both exploratory and exploitative innovation. Consequently, these specific abilities also extend the concept of individual level ambidexterity. Furthermore, our results show dichotomous contribution of individual competencies in assimilating external

knowledge. While exploratory innovation thrives with individual assimilation efforts, exploitative innovation is not significantly related. Ultimately, individuals' competencies in utilizing external knowledge are significantly related to neither exploratory nor exploitative innovation. Furthermore, we provide means for managers to systematically position individuals in the external search process.

Ernst, Dorothea - Celviva, Aachen, Germany
 Adams, Richard - University of Surrey Business School, Guildford, Surrey, UK
 Esche, Charles - Van Abbemuseum, Eindhoven, The Netherlands
 Erbslöh, Ulrike - Beyeler Museum AG, Riehen/Basel, Switzerland

Business model innovation: cultural venues as laboratories, art as the tool

The business model is a gradually maturing concept in management science becoming distinct from strategy and business plans through its focus on the dynamics of value. Perhaps like at no other time, organizations are confronting powerful drivers for Business Model Innovation (BMI) and amongst the most demanding of these are the sustainability agenda and the influence of digital technologies. While an extensive theoretical and conceptual literature on BMI exists, empirical studies either at scale or richly descriptive have been less common, particularly regarding the processes of designing novel business models in changing and volatile environments. We address this gap by reporting an in-depth case study of BMI in the publicly-funded cultural and creative sector, specifically the van Abbe Museum in Eindhoven. In doing so, the case directly addresses a number of research questions highlighted in a recent special issue of R&D Management: including, 'How can firms ideally create

supporting conditions and organize business model innovation processes with entrepreneurs and in established companies?' and 'How is business model innovation different from traditional, product or process-related innovation processes?' Further, we draw attention to a "learning by doing" approach characterised by the use of "art as tool" which emerged and was developed to stimulate conversation, concept development and more radical thinking.

Fai, Felicia - University of Bath, UK
 Tomlinson, Philip R. - University of Bath, UK
 Branston, J. Robert - University of Bath, UK

Connecting to temporary spaces in far off places – implications for innovation in the North Staffordshire ceramics district, UK

We investigate the role of global pipelines formed by temporary translocal clusters for the innovation performance of the UK's North Staffordshire Ceramics industry. Survey data from 112 firms finds both local linkages and global linkages have positive and significant impacts upon innovation; intensifying the use of local linkages leads to significant increasing returns to innovation, however intensifying the use of temporary translocal clusters has positive but insignificant effects. Additionally, we find the interaction between local and temporary translocal knowledge clusters are complementary (albeit weakly) in their affect upon innovation. We offer implications of our findings for innovation in local clusters and suggest the need for theoretical development of the global pipelines concept in relation to temporary translocal cluster.

Farrukh, Clare - University of Cambridge, UK
 Athanassopoulou, Nikoletta - University of Cambridge, UK
 Phaal, Robert - University of Cambridge, UK
 Tietze, Frank - University of Cambridge, UK

SME Innovation – practice and needs, lessons from the PrISMS programme

Innovation management is widely recognised as an integral part of strategic thinking in firms, and has become an area of rapidly growing interest within academia and industry. However, amid calls for practical approaches to support implementation of innovation in smaller manufacturing firms, there is a lack of practice-based knowledge about innovation management in such companies and how it is related to and influenced by their operational strengths and constraints.

This paper reviews the innovation practices and needs of seven manufacturing SMEs by drawing on data from outputs of the PrISMS project, a European-funded manufacturing development programme, in the context of the SME innovation literature. Using data from the PrISMS programme we explore how this small group of SMEs approach innovation drawing

upon their operational context, looking at their current practices and where they require further support to grow their businesses sustainably.

Ferretti, Marco - Università degli Studi di Napoli Parthenope, Italy
 Parmentola, Adele - Università degli Studi di Napoli Parthenope, Italy
 Degroof, Jean-Jacques - Institute for Industrial Engineering and Management, IEM

The trigger factors in the process of generation of academic spin-offs. An explorative study in southern Italy

Abstract. Many scholars analyzed the spin-off realization process as a succession of different stages but they do not examine in detail which factors can trigger or hindered the passage from one stage to another. On the other hand the scholars that analyze the determinants of spin off creation often realize a static analysis identifying generically only the factors that affect spin-off generation without considering which variables influence the different stages of the generation process. Our paper try to overcome these literary gaps matching the studies that describe the spin-offs generation process with the studies that analyze the spinoff determinants identifying a model of progressive stages that describe the process of spinoff development considering the factors that act on the creation process and which can favor or hamper the passage from one stage to another. To answer to our research questions we

provide an explorative case studies analysis of the spin-offs achieved in southern Italy an area not yet investigated by previous studies and that have not a long tradition in spinoffs realization.

Ferretti, Marco - Università degli Studi di Napoli Parthenope, Italy
 Ferri, Salvatore - Università degli Studi di Napoli Parthenope, Italy
 Fiorentino, Raffaele - Università degli Studi di Napoli Parthenope, Italy
 Parmentola, Adele - Università degli Studi di Napoli Parthenope, Italy

Growth and performance of academic spin-offs. The effect of ownership structure and board composition

University spin-offs play a key role in the production and valorization of academic research. Nevertheless, the benefits of the engagement of academic researchers in these knowledge transfer activities depend on the ability of academic spin-offs to obtain satisfactory growth and performance. In spite of the increasing attention of scholars to the creation of academic spin-offs, there is a lack of studies on the factors affecting their performances and growth. The aim of this paper is to verify the effects of ownership structures and board composition on the performance of academic spin-offs. Specifically, we analyze the engagement of academics members and external ventures in the governance structures of university spinoffs. We test theoretical hypotheses by a hierarchical regression analysis of a sample of 194 Italian academic spin-offs. The findings suggest that the engagement of academic faculty members positively affects the early growth of academic spin-offs, whilst shares held by academics nega-

tively impact on the performance. Indeed, the participation of universities and non-research ventures negatively moderates the relations.

Ferrigno, Giulio - University of Catania, Italy
 Dagnino, Giovanni Battista - University of Catania, Italy
 Xavier, Martin - Tilburg University, The Netherlands

On The Boundaries Between Value Creation And Appropriation In Strategic Alliances: A Review And Research Agenda

How firms create and appropriate value by means of alliances is a key question that has been explored by many scholars from strategic management field. However, the distinction between these two phenomena is still unclear. This article offers a review of the extant value creation and appropriation literature in strategic alliances and organizes it under various facets: i.e., (a) theoretical lenses, (b) measures and (c) levels of analysis. The article also highlights existing gaps in the present understanding of value creation and appropriation and outlines a research agenda by identifying key research questions and issues in the areas where further research is needed.

Flor, M. Luisa - Universitat Jaume I, Castellón, Spain
 Cooper, Sarah Y. - University of Edinburgh, UK
 Oltra, Maria J. - Universitat Jaume I, Castellón, Spain

Absorptive capacity, external knowledge search and radical innovation in high-tech firms

Absorptive capacity and open innovation are two concepts based on the idea that companies can leverage the knowledge generated externally to improve their innovation performance. The aim of this paper is to analyse the joint effect of absorptive capacity and open innovation on a firm's radical innovation. Absorptive capacity is described by distinguishing between potential and realised absorptive capacity. Open innovation is expressed in terms of external search breadth and depth strategies. In order to test our hypotheses, we carried out an empirical research in firms operating in high technology industries. Results indicate that internal routines and processes for absorbing external knowledge help explain radical innovation as they show a positive significant effect of potential and realised absorptive capacity. Also there is an additional positive moderating effect of absorptive capacity on variables related to open innovation. Specifically, potential absorptive capacity exerts a positive effect on

the relationship between external search breadth and depth and radical innovation. These results suggest the complementary nature of potential absorptive capacity and open innovation search strategies on radical innovation.

Fusco, Francesco - Scuola Superiore Sant'Anna, Pisa, Italy
 Turchetti, Giuseppe - Scuola Superiore Sant'Anna, Pisa, Italy

Disruptive innovation in Healthcare: breaking the old patterns of business modelling and Health Technology Assessment. Preliminary results for the assessment of an innovative knee Telerehabilitation device in Tuscany

Economic impact of healthcare is becoming a recurrent issue in our societies. In particular, Total Knee Replacement (TKR) is leading to an expenditure of almost 182 million of Euros per year in Italy. Information and Communication Technologies (ICT) could reduce expenditures by preserving the quality of treatment, but also having an effect on service processes. However, telerehabilitation after TKR has yet to be assessed in terms of business modelling and cost effectiveness. This paper aims to gather economic evaluation to qualitative data retrieved from the decision makers (DMs) in Tuscany in order to shed light on value creation for the society.

Methods: The qualitative phase of the project was addressed through semi-structured interviews to DMs with the aid of 4 business/governance models and a questionnaire. The current work focuses on the results of the most relevant sections for the DMs: key activities, key resources and patients' segment. The quan-

titative step relies on a four-state Markov model to estimate costs and clinical outcome (knee flexion range of motion - ROM) over a period of 10 years and results are reported as incremental cost-effectiveness ratios (ICERs).

Results: The DMs' responses for key activities and patients' segment sections were similar across the 4 models: respectively, they would prefer to rent the devices even if it would leave them partial control on telesessions, while DM identified patients cohabiting and working as freelancer as the best profile for telerehabilitation. Their responses for key resources varied across the 4 governance models, registering regional funds as most important in the conservative scenario, while national authorities' incentives were pivotal in the more innovative ones. The quantitative phase showed telerehabilitation could lead to an average saving of 21€ to 410€/ROM per patients per year. Discussion... [...]

Gagliardi, Dimitri - The University of Manchester, Manchester, UK
 Navarra, Pierluigi - Catholic University Medical School, Rome, Italy
 Dello Russo, Cinzia - Catholic University Medical School, Rome, Italy

Connecting competences: The case of ABACAVIR in Italy

Most of the studies on pharmaceutical innovation focus on the drug discovery and the R&D process. This paper looks at the story behind the attempt to revive ABACAVIR, a drug employed in the treatment of patients with HIV/AIDS since it was discovered that hypersensitivity reactions to the drug were significantly associated with a genetic trait. The study is based on the historical method: through a series of interviews and secondary documentation we have explored the network of Italian research centres sponsored by ViiV Healthcare and the competences brought in to play to develop a strategy to keep the compound on the market and assure patients' safety. The historical reconstruction shows that the 'point of entry' of pharmacogenetics into the mainstream pharmaceutical market was determined by the needs of the patent holder rather than technology driven dynamics and subject to the availability of technologies, standardised guidelines and pharmacogenomics-specific competences (Crews et

al, 2012). In this pursuit, the patent holder has been targeting the integration of pharmaceuticals core-activities either in pharmaceutical science and/or research and development and benefitting from connecting with the science base outside the pharmaceutical industry involving university virology and pharmacology laboratories, clinical and diagnostic centres. The participants to the Italian network seem to self-organise around themes set out together with ViiV Healthcare and on the basis of the personal competences, capabilities and capacity of the individuals. The organisation does not fully reflect current collaborative management practices such as open innovation or other contractual collaborative R&D arrangements (i.e R&D outsourcing).

Galiakhmetov, Ruslan - University of Bologna, Italy
 Giuri, Paola - University of Bologna, Italy
 Munari, Federico - University of Bologna, Italy

How to enhance patent commercialization? An analysis of patent aggregators in Europe

This paper explores a phenomenon of patent aggregators, entities that acquire third party patents with the goal of commercializing them by means of sale, licensing, enforcement, or creation of new patent-based companies. Based on the existing literature, we provide a classification of distinctive types of patent aggregators. Using several qualitative research methods, we construct a comprehensive mapping of patent aggregators established in Europe. By means of four case studies, we illustrate various characteristics of patent aggregator business models and their strategies. Finally, we identify main barriers and key success factors for functioning of patent aggregators, leading to several policy and practical recommendations.

Garrett, Alex - Queensland University of Technology, Brisbane, Australia
 Straker, Karla - Queensland University of Technology, Brisbane, Australia
 Wrigley, Cara - Queensland University of Technology, Brisbane, Australia

Design Intersection: The Growth of Community-Led Technology Enabled Companies

The sharing economy or collaborative consumption based firms have the potential to disrupt long-standing traditional industries. However, little is known on the topic, specifically the role of design in these successful community-led, technology enable firms. It is the proposition of this research that the intrinsic innovation of collaborative consumption firms is not merely a technological one. With successful firms being identified by being able to marry both technological advancement and human insight on product meaning. Therefore, the authors suggest the use of design as an effective way to capitalise and build on product meaning, not only technological advancements in order to foster the growth of a community. To explore this further, the research team decided to investigate two fast growing examples of industry disrupting, sharing economy businesses; Airbnb and Uber. Of the two cases, the use of design was found to be more evident within, Airbnb, due to wide profession of using design

techniques. Each case study has been mapped on Guenther's (2012) framework of techno-economic innovation to help illustrate this marriage of innovation agendas. This paper explored the role of design in community-led companies by presenting an argument for why they have succeeded due to an understanding of human need and key market trends, instead of only technological innovation alone. Findings and implication of these case studies suggest the future role of design as a method to achieve this success. Built on the core tenants of design thinking, these techniques rationalise technology, human needs and business viability to product innovative solutions. Upon these findings, the research team has created a new framework for understanding community-led technology enabled companies, one that builds upon the work of Guenther's (2012) model of enterprise design innovation. This paper is the first step in a new research agenda.

Gasbarro, Federica - Scuola Superiore Sant'Anna, Pisa, Italy
 Rizzi, Francesco - Scuola Superiore Sant'Anna, Pisa, Italy
 Frey, Marco - Scuola Superiore Sant'Anna, Pisa, Italy

Sustainable entrepreneurs are running in a steeplechase: evidence from a market transformation in a clean energy sector

In this paper we explore how sustainable entrepreneurs innovate in order to foster a sustainable transformation in the energy sector. The findings from a case study on the shallow geothermal sector in Italy suggest that the most significant barriers to the market uptake of sustainable products and services are: (1) social norms and cultural-cognitive barriers, (2) carbon lock-in, (3) inappropriate regulations, (4) low individual benefits and macroeconomic situation, and (5) technical aspects. Entrepreneurs that follow innovative business models to address these barriers are able to use sustainable innovation as a trigger for institutional change and, thus, act as sustainable entrepreneurs.

Our results highlight the primary role for sustainable entrepreneurs: in setting new value propositions; the capacity of pioneering applications to influence stakeholders' beliefs and assumptions; non-economic dimensions in the genera-

tion of social benefit. This study can help sustainable entrepreneurs to assess systemic barriers to sustainable development and possibly overcoming them.

Gasbarro, Federica - Scuola Superiore Sant'Anna, Pisa, Italy
 Testa, Francesco - Scuola Superiore Sant'Anna, Pisa, Italy
 Frey, Marco - Scuola Superiore Sant'Anna, Pisa, Italy

The determinants of open innovation: evidences from life sciences industry

The concept of open innovation has gained extraordinary attention from research and practice; however the determinants of open innovation remain an underexplored field. Drawing upon a database of around 122 firms operating within life sciences industry in the Lombardy Region, this paper investigates the determinants of open innovation both in terms of internal context characteristics and in terms of external context characteristics. The factors fostering open innovation seem to be low financial resources allocated to R&D and the relationship with hospitals and industry associations and members. At the contrary, a relationship with the research institutions tends to reduce the probability to engage firms in open innovation, as well as the presence of qualified human resources and structures and suppliers in the region.

Giachetti, Claudio - Cà Foscari University of Venice, Italy
 Marchi, Gianluca - University of Modena and Reggio Emilia, Modena, Italy
 Corradini, Riccardo - Independent

Users' ability to anticipate new product technologies in online communities: The role of product knowledge

Previous research on user innovation in online communities has regarded product knowledge as an important characteristic influencing the level of user innovativeness. In this study, we examine the degree to which product knowledge influences the user's 'ability to anticipate' the introduction of firms' brand new product technologies and incremental ameliorations of existing product technologies, i.e. the extent to which the user's suggestions or expressed needs for new product technologies correspond to what firms will subsequently introduce in the market. The findings show that, in online communities, there is an inverted U-shaped relationship between the user's product knowledge and her/his ability to anticipate innovations, both brand new product technologies and incremental ameliorations of existing product technologies. This study examines consumer-to-consumer discussions in the GSMArena online community, a forum for mobile phone users owned by GSMArena.com, a provider of online con-

tents about the mobile phone industry. Hypotheses are tested using the data of 6,528 messages posted by 3,564 participants during the year 2003 and a comprehensive data set including over 3,500 handset models and related technologies introduced by 68 mobile phone vendors during the 1994–2010 time period.

Giovanetti, Emanuele - Anglia Ruskin University and DSE, UK; Verona University, Italy
 Piga, Claudio - University of Keele, UK

Assessing the Contrasting Effects of Passive and Active Cooperation on R&D and ICT on product, process and organizational Innovation. Evidence from UK Firms

This paper explores how spillovers from intangible innovation activities and information and communication technologies (ICT) affect the introduction of product, process and organizational innovations. These externalities percolate across firms both through workers' interaction, according to their proximity in geographic space and by firms trading with their customers and suppliers along the supply chains. We estimate a two stage model using firm level data on innovation and ICT activity from the UK Community Innovation Survey (CIS), the Annual Respondents Database (ARD) and the Business Expenditure on Research and Development (BERD). We find that trade-mediated R&D spillovers, seen as a form of passive cooperation, have a direct and positive impact on the probabilities that a firm may introduce process, product and organizational innovations. Our estimates of the geographic spillovers show that intangibles investments in R&D and ICT diffuse in space, positively affecting

other firms' ICT expenditure and exerting a positive, indirect, effect on innovations. We also find that the set of a firm's active cooperative relations with its customers and suppliers increases its probability of introducing process, product and organizational innovations. Interestingly for its competition policy implications, we also find that active cooperation with competitors lowers R&D expenditure, suggesting that this form of explicit active cooperation can be used as a coordination device, among competitors, to soften product market competition, reducing both process and product innovations, the key elements for product market competitiveness and dynamic efficiency.

Gkypali, Areti - University of Patras, Greece
 Tsekouras, Kostas - University of Patras, Greece
 Rafailidis, Apostolos - Technological Education Institute of Western Greece, Patras

Innovation and Export performance: do young and old innovative firms differ?

Firms of European small open peripheral economies, such as Greece, face an increasing globalization of markets, a strengthening of global value chains, a well documented knowledge and technological gap and all these in conjunction to the current crisis at least in the southern part of Europe. These conditions compose a demanding and complex environment within which firms must cope and survive. In this direction, boosting exporting activities and investments in Innovation, R&D and knowledge intensity are considered of the utmost importance since they are seen as drivers of productivity, growth and competitiveness. Especially with respect to Greece's economic outlook, as it has been documented in several European policy documents and analyses, the country's innovation performance has been consistently characterized as "moderately following" (IUS, 2013) the EU's innovation leaders. The same picture is sketched with respect to Greek firms' export performance (European Competitive-

ness Report, 2012). Examining more closely the relationship between firms' exporting activities and innovation dynamism, the theoretical and empirical evidence suggests that firms which are presenting innovation activities are more likely to export, more likely to export successfully, and more likely to generate growth from exporting than non-innovating firms (Golovko and Valentini, 2011; Love and Roper, 2013). In other words, innovation and export performance are directly linked with the creation of a sustainable competitive advantage and are considered as a primary precondition for economic growth (Piercy et al., 1998). [...]

Grama, Simona - Troyes Business School, Troyes, France
 Royer, Isabelle - University Jean Moulin Lyon 3, Lyon, France

Impact of open innovation competences on performance: A study in Romanian incubators

In the open innovation era, business incubators are spaces that favour open innovation through their network formed by internal and external incubator partners. Incubators offer a wide panel of services designated to increase the performance of incubated startups, such as general-administrative services, business support and networking services. The exploitation of these services requires specific entrepreneurial behaviours. Our research aims at understanding how entrepreneurs can better exploit incubator's services to develop innovation and competitiveness. For this purpose, we analysed the relationships among the use of incubator's services, open innovation competences of entrepreneurs and the performance of startups by using PLS method on a sample of 73 entrepreneurs from 16 Romanian incubators.

Our results showed that these open innovation competences moderate the relationship between the use of incubator

services by entrepreneurs and the performance of startups measured in terms of innovation and competitiveness. These results are useful for entrepreneurs who will acquire open innovation competences and for incubator's management-teams which can use them as a selection criterion or accompanying tool when proposing training or coaching programs.

Grandori, Anna - Bocconi University, Milan, Italy

The governance of knowledge-intensive work and human capital investments

This paper specifies an effective configuration of mechanisms for governing knowledge intensive work and human capital investment relations, and provides empirical evidence drawn from both quantitative and qualitative studies on top teams in new economy firms as well as in established firms. In those situations work relations are complicated by factors that make efficient to govern them by associating human assets rather than governing exchanges (transactions) of labor services. Those factors include: the presence of investments of knowledge assets into the employing entity; uncertainty in metering both inputs and outputs; and distributed knowledge. The paper advances a series of propositions on superior governance arrangements in those situations, supported by results from a series of studies conducted by the author and associates, from early 2000s on, on human resources governance systems in innovative settings. These arrangements are argued and shown to consist of a

combinative mix of the following governance mechanisms: 'partnership' rather than 'exchange' contracts, 'democratic' allocation of decision and control rights, moderate risk transfer through compensation packages, and networked human capital markets.

Green, Andrew - Munich University of Applied Sciences, Germany
 Tunstall, Richard - Munich University of Applied Sciences, Germany
 Peisl, Thomas - Munich University of Applied Sciences, Germany

The benefits of crowdfunding for early-stage entrepreneurs: Between finance gap and democratic involvement

Crowdfunding has fundamentally impacted the world of entrepreneurial finance by providing a new alternative to equity, debt and bootstrapping which allows entrepreneurs to leverage 'the crowd' in order to generate financial investment and further 'value-added' benefits (Belleflamme et al., 2014; Harrison, 2013; Ordanini et al., 2011) generating £2.7 billion of investment in 2012 (Massolution, 2013). While research has begun to develop understanding of the phenomenon, this has tended to focus on the dynamics of investment platform activity, rather than the experiences of the entrepreneurs who engage in this activity. This paper empirically investigate the perceptions of benefits by early-stage entrepreneurs involved in one of the most common forms of crowdfunding; reward-based.

Through thematic analysis of interviews with a pilot sample of 2 experts and 5 early-stage entrepreneurs, benefits were identified, explored and contrasted with the literature and an existing conceptual

framework before being explained. This resulted in a new empirically contextualised 'benefits' conceptual framework. Some of the anticipated benefits in the literature including overcoming finance difficulties and providing a basis for future finance were supported. Whilst the literature emphasises democratic investor involvement through financing decisions, the results of interviews indicated that investor involvement was more wide ranging and diverse, from simple investment to continuous engagement in the development of the business, supporting an understanding of how democratic involvement of the 'crowd' actually occurs. Furthermore, a number of drawbacks to crowdfunding are identified, such as the onerous time commitments of engaging in crowdfunding. Overall, the approach of each entrepreneur, their engagement with investors and the benefits they realised was found to be influenced by their personal ambitions and approach. [...]

Guertler, Matthias R. - Technische Universität München, Garching, Germany
 Wiedemann, Francesco - Technische Universität München, Garching, Germany
 Lindemann, Udo - Technische Universität München, Garching, Germany

The relevance of stakeholder analysis for Open Innovation

Open Innovation (OI) opens a company's innovation process to its environment and enables the purposeful collaboration with external partners, such as suppliers, customers, consumers, universities or even competitors. This allows the utilisation of external expertise and creativity. In a qualitative study, we identified the selection of suitable OI-partners as one of the main challenges for companies conducting OI - especially when no or only little experience with OI. A common mistake is focussing only on OI-partners for solving the (technical) task and neglecting strategic-political relevant OI-partners. This could mean that only users of a product were involved while the actual buyers of the product were another group and not involved. However, another mistake was focussing on external OI-partners and not considering internal OI-partners sufficiently, such as employees or superiors. Thus, we developed an OI-specific approach for identifying relevant OI-partners for an OI-project. Besides iden-

tification methods from OI and Lead-User approach for assessing the "technical" solution-oriented skills and expertise of OI-partners, stakeholder analysis assesses their strategic relevance. At the example of five industry cases, we evaluate our approach and the relevance of a combined consideration of technical solution-oriented potential and strategic relevance of OI-partners. At this, stakeholder analysis does also focus on the identification of internal OI-partners, who are necessary for developing a solution for the OI-project's task. However, they might also be relevant for reducing internal barriers such as Not-Invented-Here syndrome or resistance against change.

Habicht, Hagen - HHL Leipzig Graduate School of Management, Leipzig, Germany
Farahbakhsh, Siavash - Technische Universität Chemnitz, Germany
Frattini, Federico - Politecnico di Milano, Italy

The impact of innovation orientation on the role of absorptive capacity

The external sourcing of knowledge plays an important role for nurturing an organization's innovativeness. In order to harness this resource, organizations need absorptive capacity (ACAP), i.e. the know-how to identify, assimilate, transform, and exploit external knowledge. Higher levels of ACAP will increase the performance of converting external knowledge to economic ends. But is this equally true for different forms of innovation orientation? The exploration of new knowledge and the deepening of familiar knowledge require different approaches and management regimes. We explore whether the impact of ACAP is different for exploration and exploitation. Preliminary results by Partial least square show that potential absorptive capacity positively moderates the effect of innovation orientation on innovation performance. Further data will allow testing for the abovementioned difference.

Haggège, Meyer - Grenoble Ecole de Management, France
Gauthier, Caroline - Grenoble Ecole de Management, France
Rüling, Charles-Clemens - Grenoble Ecole de Management, France

Understanding six key drivers of business model performance

Business model performance has been addressed from a variety of theoretical angles, and the extant literature lacks an integrative framework of drivers of business model performance. To address this gap, the present paper builds on a systematic review of existing research on business model performance to propose a set of six key drivers of business model performance including both static and dynamic views on performance and linking both to a firm's life cycle.

Hauck, Monika - WHU - Otto Beisheim School of Management, Vallendar, Germany
 Hienerth, Christoph - WHU - Otto Beisheim School of Management, Vallendar, Germany

Investigating the properties of recent business ecosystem development: a conceptualization based on literature streams and case illustrations

With rising importance of the external economic environment of organizations and open and collaborative innovation, the recent two decades have seen an emergence of diverse literature streams on business ecosystems. Investigating the phenomenon, some authors took a rather holistic approach and relied strongly on the ecological metaphor. Others have discussed and conceptualized the functioning and building parts of ecosystems, contributing also with first empirical insights. However, those authors mainly focused on ecosystems that function in the information and telecommunication technology industries - companies such as Apple, IBM, Intel and Microsoft - and primarily included actors which were driven by economic interests. After reviewing diverse literature streams, we argue that the conceptual foundation of the business ecosystems remains rather vague, making "business ecosystem" rather an umbrella term. With the goal to contribute to the extant literature and better understand

the central factors that foster evolution, functioning and growth of business ecosystems, we provide a systematic overview of the ecosystem concept evolution in the literature. We draw on open and user innovation, cluster, platform and entrepreneurship literature to identify novel ecosystem properties. We then illustrate them by using prominent recent ecosystem case illustrations and propose that increased influence of creative individuals, power of crowds and communities, and culture can serve as additional units of ecosystem analysis, and that aspects such as the role of geographical and virtual hubs, and user entrepreneurship can add a new perspective to the understanding of the ecosystem concept.

Hsiu-Ching, Ho Mei - Taiwan University of Science & Technology, Taipei, Taiwan
 Harnying, Cheo - Agriculture Technology Research Institute, Taiwan

Who matters the knowledge interactions in a technological innovation system? - Case of GMO technologies

This study applies the growth in GMO plant technologies to express the linkages among different stakeholders in an innovation system. As the importance of interactions among different stakeholder, i.e. university, government, and firms, is increasing for a growth of innovation systems, we aim to examine the role of different institutional characteristics on their diffusing activities in this GMO technological knowledge network.

We collect more than 4000 patents and identify 492 institutional assignees for empirical examinations. In the first stage, we visualized the networking relationships among different stakeholders by patent citation information. The linkages also explain the flows of GMO knowledge among different institutions. Furthermore, we apply empirical regression models to examine whether the stakeholder's institutional type, innovation effort, and cross-geographical linkages can explain whether the assignee's importance in fa-

ilitating knowledge diffusion in the innovation system. The results showed that industrial actors tend to be a coordinator in industrial field whereas the governmental units are likely to be a liaison among different stakeholders (e.g. among universities and industries). In addition, cross-national linkage is a critical characteristics to facilitate the U-I-C (university-Industry-Government) interaction in an innovation system but the domestic linkages only support for the interactions with same type of institutions.

Homann, Florian - University of St.Gallen, Switzerland
 Gassmann, Oliver - University of St.Gallen, Switzerland
 Bader, Martin - BGW Management Advisory Group, St.Gallen, Switzerland

Knowledge Protection Strategies of MNCs in Emerging Markets: The Influence of Ownership Structure

Practitioners tend to name knowledge spillovers from MNCs' emerging market subsidiaries to their competitors as a perpetual threat to sustainable firm performance, especially in the context of emerging markets' constrained market access and forced localization policies in combination with weak IP legislation. Nevertheless, western firms perform R&D in emerging markets to fulfil the requirements for market access and to better meet local customer needs, using informal protection strategies to protect their knowledge and IPR.

The issue of firm-level characteristics on knowledge protection strategies that MNCs use in emerging markets as so far not been addressed by researchers. Thus, the aim of this paper is to investigate differences between knowledge protection strategies with regard to the ownership structure of firms. We collected data from six European MNCs that perform R&D in

emerging markets. Our analysis shows how and why firms employ different protection strategies as well as in how far and why the use of and the success with individual protection strategies differs between family and nonfamily firms. We find that family firms rely more on and are more successful with preventive knowledge protection strategies, whereas non-family firms rely more on remedial protection strategies. Based on our insights, we derive implications for practitioners of western firms to improve the utilization of knowledge protection strategies in the future.

Hwangbo, Hyunwook - Lancaster University, United Kingdom
 Cooper, Rachel - Lancaster University, United Kingdom
 Tseklevs, Emmanuel - Lancaster University, United Kingdom

Ambidexterity of design management in different approaches to digital design: Review of Organizational Attitudes in the East and the West in New Product Development Process

Currently, there is growing interest in shaping a digital ecosystem that embraces holistic design approaches. In the digital realm, organizational approaches to managing design are required to shift to 'designing' towards holistic digital design, rather than 'design' for a completed output.

Within this context, this paper reviews how organizational cultures can impact the development of holistic product design in competitive digital landscapes. This is done by investigating different organizational cultures as reflected in large Eastern and Western organizations' approaches to managing design in the new product development (NPD) process. Despite significances of 'designing' this study discovered ambidexterity aspects of digital design in NPD projects, from international organizational perspectives. The findings offer key understandings that can explain the dilemmatic relations by examining key differences of design prior-

ities in new digital product development in the East and the West: namely the East focusing on 'design output'; whereas the West expecting 'design outcomes'. Based on this we propose two major scenarios that represent the different approaches to managing design by organizational cultures.

Iscaro, Valentina - Second University of Naples, Capua, Italy
 Castaldi, Laura - Second University of Naples, Capua, Italy
 Sepe, Enrica - University of Naples Federico II, Napoli, Italy

The Experimental Lab to boost entrepreneurship in the University Ecosystem

The overall goal of this work is to provide a contribution to the studies that aim to boost the effectiveness and usefulness of entrepreneurial universities in favouring entrepreneurship.

The more immediate objective is to explore whether the experimental lab could be an effective tool to support aspiring entrepreneurs in turning their ideas into successful start-ups and if, indirectly, it could help universities become more entrepreneurial. The experimental lab is a network of entrepreneurial individuals “federated” from universities, research labs, start-ups and business partners who become part of an innovative ecosystem rather than relying only on their skills. This innovative ecosystem is the entrepreneurial university (Curley and Formica, 2012), a “community of personnel” - professors, researchers, students, external professionals - that interact with each other and with the external environment to generate entrepreneurial innovation. Indeed modern knowledge-

based economies urge universities to embrace the third mission, i.e., to promote economic and social development, and regard themselves as critical factors in the development process (Etzkowitz, 2004; Etzkowitz and Leydesdorff, 2000). Thus, in the attempt to achieve the objective of providing a contribution to the effectiveness and usefulness of universities in favouring entrepreneurship, and led by the belief that potentially implementable results have to be achieved, this paper sheds light on the adoption by entrepreneurial universities of a concrete tool, the experimental lab, to support aspiring entrepreneurs with fertile soil and a strong network to progress from an idea to a start-up. The university ecosystem exploits its knowledge base and collaborative network, to help aspiring entrepreneurs who simply hold an intuition and an entrepreneurial inclination providing them with capabilities and competences that they do not possess.

[...]

Jacobsen, Lina F. - Aarhus University, Aarhus C, Denmark
 Sørensen, Bjarne T. - Aarhus University, Aarhus C, Denmark
 Tudoran, Alina - Aarhus University, Aarhus C, Denmark
 Lähteenmäki, Liisa - Aarhus University, Aarhus C, Denmark

Understanding Motivations and User Interests as Antecedents for Different Interaction Forms in Online Communities – What to focus on during the innovation process?

This study contributes to the understanding of online user communities as a potential source of innovation. That would require an interest from users in interacting in such communities. In order to establish interaction, users must provide as well as consume information. However, depending on the innovation task, one may be more important than the other. It is therefore important to understand, how companies can increase user willingness to engage in these different interaction forms.

This study investigates the influence of various motivation factors and user interests on intention to provide or consume information in online food communities. A survey was conducted among 1009 respondents followed by analysis based on Structural Equation Modelling. Results revealed the effect of motivation factors to be stronger than basic consumer interests indicating that companies can influence

the intended interaction. More specifically, possibility for self-marketing, improvement of product/skills and expected process enjoyment could be emphasised for supporting information provision. Only possibility for improving product/skills should be emphasised to support information consumption. Product and process interests may have minor influences on the intended interaction, but are not sufficient for establishing interaction in online communities.

Jean, Fabien - Centre de Gestion Scientifique MINES - ParisTech, France
 Le Masson, Pascal - Centre de Gestion Scientifique MINES - ParisTech, France
 Weil, Benoit - Centre de Gestion Scientifique MINES - ParisTech, France

Engage engineers as designers to generate new meanings in concept generation

The meaning of a product is the profound psychological and cultural reasons people use the product (Verganti 2013). The original meaning resulting from such design-driven research is often compromised when handed-over during concept generation (Dell'Era et al. 2011). Literature gives three models of interactions between designers and their network, i.e. networkers use their knowledge as filter, provide designers with knowledge, or are willing to restructure their knowledge base. Our research question "What is an effective marker event of radical innovation of meaning in concept generation?" is investigated through a multiple case-study comparing 35 marker events in a single organisation. The analysis confirms that meaning attributes are lost when networkers use their knowledge as filter, but surprisingly actors lose attributes even when they adopt methods to prevent it. We also found four main mechanisms for networkers to proactively hand a new meaning. Where the canonical model of

gate meeting prevents hand-over to experts, our model of Generative Gate Meetings performs better. Finally engineers play a key role when they elaborate Technology Pretexts which are instrumental for exploring value propositions integrating new meanings. Lastly, we synthesise managerial implications in a process model of concept generation for radical innovation of meaning. To the best of our knowledge, this paper is unique in investigating technology epiphanies in such a technology-intensive organisation as SAF-RAN and drawing significant bridges between functional innovation and design-driven innovation.

Jeong, Yujin - Dongguk University, South Korea
 Park, Inchaee - Dongguk University, South Korea
 Yoon, Byungun - Dongguk University, South Korea

Exploration of promising R&BD areas based on integrated intellectual property right analysis

As the paradigm shifts from asset-based to knowledge-based economy, it becomes more and more important to acquire and exploit intellectual property rights. Although investments of R&D by government and firms has enlarged and the amount of patents increased rapidly, it almost fails to commercialize for various reasons such as insufficient supportive policy of government, asymmetric information between technology and business. Previous studies have analysed factors influencing success in technology commercialization and just focused on patent itself without considering other IPRs. Therefore, this paper aims to explore promising R&BD (Research and Business, Development) areas and establish business strategy based on valuable patents by analysing IPRs - patent as well as design, trademark - comprehensively. Because such IPRs are bibliographical information comprised of description, classification and designated applicable fields for invention and product, it is appropriate to

establish business plan for relevant firms on the basis of IPRs. This research has two modules - exploring possible product and business areas and establishing business plan. At first, citation information is utilized to extract relationships between patent and design. Then, citation network is generated based on citation relations between two IPRs, resulting in a pattern that shows combination of technology and product. Centrality serves as criteria for exploring potential pattern in that field. Secondly, design and trademark are associated relying on keywords at the industry and firm level. Potential R&BD areas are derived from comparison of relations between levels. Then, owners and registered product class corresponding to each trademark can be identified, which makes possible to investigate the scope of possible business areas and types of business by developing patent map as well as design-trademark portfolio. Business plans can be derived from...
 [...]

Jin-Hee, Bae - Korea Institute for Advancement of Technology, Seoul, Korea

Analysis of Influence Factors on Performance Creation of Industry R&D Program : Focusing on financial condition of firm

This study is an empirical analysis for the performance creation success probability regarding a R&D program within the Korean government, especially focusing on financial condition of firm that carry out R&D project. This study aims to verify the differences on the performance creation success probability regarding financial condition of firm. Binary Logic regression models are developed based on typical R&D Logic Models, and R&D performance factors are investigated such as Publications, Patent, Technology Transfer, Sales. Using data on a large sample of data for project management (2005~2013) and financial data of firm, we examine the impact of R&D program in 2005-2013. This study's major findings are as follows. First, compared large, middle but high potential, medium firm with small firm shows a greater success probability of publication, patent, tech transfer, but large firm have lower success probability of sales compare with small firm. Second, the higher debt ratio has lower perform-

ing at publication and patent but higher performing at tech transfer and sales. The higher operating profit has higher performing at publication and tech transfer but lower performing at sales. Third, the difference of performance creation on financial condition by firm size is different but didn't have clear tendency. Lastly, projects classified in the surveillance target have less success probability of publication, patent in case of debt ratio, tech transfer in case of interest coverage ratio and operation profit. So the regulatory about financial condition in selecting R&D project is partially available

Kahl, Björn - GPS Gesellschaft für Produktionssysteme GmbH, Stuttgart, Germany
 Nilsson, Klas - Lund Universit, Sweden
 Zimmermann, Thilo - GPS Gesellschaft für Produktionssysteme GmbH, Stuttgart

SMErobotics - Case study on the Challenges of a large-scale FP7 Integrating Project in Industrial Robotics

European research projects (in FP7 and their successors in H2020) are already highly regulated by EC reporting guidelines and the so-called General Annex to a Grant Agreement. The motivation of this paper is to show where these management rules need to be amended to support the successful execution of large-scale integrated research projects, especially aiming at technology transfer between academia and industry. While the EC regulations are designed to allow financial and legal monitoring of the use of public funds in these projects, they fall short on the daily management challenges of large projects.

Key challenges in the management of large integrated research projects are less in financial and administrative monitoring, but more in the interplay of economic and legal requirements and the scientific coordination. As such the primary task of project management in research is to maintain an open and innovative envi-

ronment for the scientific staff active in the projects.

This paper presents a case study on how to manage R&D in a large scale FP7 Integrating Project in industrial robotics research and is particularly based on the experience and best practice of the SM-Erobotics project.

There are reasons to believe that good R&D management in projects with diverse partners spread over the European continent is based on (a) classical management and administration based on numbers and (b) communication, specification and integration.

[...]

Kahlert, Jonas - University of St. Gallen, Switzerland
 Lingens, Bernhard - University of St. Gallen, Switzerland
 Palmié, Maximilian - University of St. Gallen, Switzerland
 Gassmann, Oliver - University of St. Gallen, Switzerland

Ensuring long-term Innovativeness: A new Perspective on Decision-making Structures

How to ensure long-term innovativeness and competitive advantage? For this, decision-making plays a major role since it influences organizational outcomes and affects organizational effectiveness and efficiency. However, since previous research on decision-making typically focusses either on reducing the number of wrong or increasing the number of right choices, it falls short in addressing another important aspect of decision making: trust among the stakeholders involved in a decision. Decision-making structures, a form of organizational structures, have an influence on trust between stakeholders involved in a decision. Thus, our paper investigates how firms shape decision-making structures in order to avoid stakeholder behavior, which might be harmful for trustful relationships. As a result, we illustrate four different approaches for shaping decision-making structures, which can be distinguished according to the locus of decision and the organizational integration among

the stakeholders involved. Each of these approaches entails a different quality of information transfer and propensity of consisting potentially harmful stakeholder influence strategies: (1) "Independent Democracy" (enhanced information transfer, team decision), (2) "Independent Ruler" (enhanced information transfer, single-person decision), (3) "Dependent Ruler" (reduced information transfer, single-person decision), and (4) "Dependent Democracy" (reduced information transfer, team decision). These results extend the current literature on stakeholder management. For this, we illustrate how decision making structures impact stakeholder influence strategies. Secondly, this work extends the current literature on decision-making structures by including a stakeholder management perspective. In particular, the question of how decision-making structures affect stakeholders and their influence strategies is examined. Additionally, we provide practitioners with... [...]

Kay, Neil M. - Heriot-Watt University, Edinburgh and University of Strathclyde, Glasgow, Scotland, UK

QWERTY and the search for optimality

This paper shows how one of the original developers of QWERTY continued to use the trade secret that underlay its development to seek further efficiency improvements after its introduction. It provides further evidence that this was the principle used to design QWERTY in the first place and adds further weight to arguments that QWERTY itself was a consequence of creative design and an integral part of a highly efficient system rather than an accident of history. This further serves to raise questions over QWERTY's forced servitude as the paradigm case for an inferior standard in the path dependence literature. The paper also shows how complementarities in different forms of intellectual property rights protection played integral roles in the development of QWERTY and the search for improvements on it, and also helped effectively conceal the source of the efficiency advantages that QWERTY helped deliver.

Kerr, Clive - University of Cambridge, UK
Phaal, Robert - University of Cambridge, UK

A scalable toolkit platform: Configurations for deployment in technology and innovation strategy workshops

To enable the design and deployment of management toolkits, the conceptual foundation for a scalable toolkit platform has been developed with the necessary flexibility to respond to the breadth of tasks faced within the areas of strategic planning, technology and innovation management. The platform consists of three types of tool (i.e. roadmap, portfolio matrix, interlinked grid) operating at two different levels within a hierarchical definition of the organisational system being addressed. To demonstrate the use of the platform, a series of toolkit arrangements have been outlined for potential deployment in workshop-based engagements (whether they be consulting or corporate in-house applications). It is hoped that these will act as useful reference cases for practitioners and support further applications of the platform.

Klasing Chen, Milena - Mines ParisTech PSL Research University, Paris, France
Hooge, Sophie - Mines ParisTech PSL Research University, Paris, France
Segrestin, Blanche - Mines ParisTech PSL Research University, Paris, France

Creating value for everyone – when product design crafts ecosystem regulations

Value creation and the companies' value propositions have long been the centre of managers' concerns. Although increasing work is done on creating value with the customer, value creation at the ecosystem level is less studied. This is particularly the case in innovation contexts. Through the study of two cases in strongly regulated business-to-business (B2B) markets, one on a public transports operator and one on a systems assembler in the aeronautic sector, we analyse how projects on radical innovations are efficient levers to investigate the mechanisms of value creation for several actors. We propose a model of these regulated B2B markets - complex value networks - and show how the value evaluation framework was changed by a business model innovation, evolving to take into account the value for several actors of the ecosystem. We furthermore describe how major innovation in product design challenges the existing regulations, allowing companies to propose or sustain innovative regulations,

and changes relations in the value network, sustaining the emergence of new partnerships.

Kobe, Carmen - ZHAW School of Management and Law, Winterthur, Switzerland
 Hefti, Jacques - ZHAW School of Management and Law, Winterthur, Switzerland

Knowledge transfer strategies for non-technical research consortia – case study of an energy research consortium

This paper was triggered by the need to develop a knowledge transfer strategy for the research consortium SCCER CREST. SCCER CREST is one of the 8 Swiss Competence Centers for Energy Research (SCCER) initiated by the Swiss Federal Council to support the implementation of the new Energy Strategy 2050. The goal of this paper is not only to develop the knowledge transfer strategy for the research consortium SCCER CREST, but also to develop a reference frame for knowledge transfer strategy for other research consortia.

The paper is structured into a theoretical discussion (about knowledge as transfer object, available transfer channels, the motivation of researchers to supply the different transfer channels, the match between innovation process phases and transfer channels), the reference frame development and the description of the action research case study SCCER CREST. The results of this paper are twofold: a

knowledge transfer strategy for the action research case study SCCER CREST and a knowledge transfer strategy reference frame for non-technical research consortia. The reference frame consists of a list of potential knowledge transfer channels, clusters of these knowledge transfer channels related to transfer goals, and suggestions for knowledge transfer services.

Kranich, Pascal - EBS Business School, Oestrich-Winkel, Germany
 Wald, Andreas - University of Agder, Kristiansand, Norway

The Role of Model Consistency in Business Model Innovation: A contingency-based investigation

Business model innovation does not only require managers to come up with new, but also with viable business models. To this end, it has been argued that business model consistency plays a vital role, reasoning that the internal fit and complementarity of business model elements has a major implication on performance and competitive advantage. Besides analysing the fit between product-market strategies and specific business model design themes, little research has been conducted to measure overall business model consistency and empirically confirm these effects, especially within the context of business model innovation. Business model consistency has therefore been called “the most powerful and neglected aspect of business models” (Casadesu-Masanell & Ricart, 2011, p. 104), and scholars recently reaffirmed the need for more research on consistency of business models and its implications on performance (Zott & Amit, 2013). We tackle this issue by building on contingency-based

research to develop and test a measurement of business model consistency and investigate the relationship between consistency and business model innovation performance along the following research questions: (1) Does business model consistency positively influence business model innovation performance? (2) Does business model consistency moderate the positive relationship between business model innovation and business model innovation performance? (3) Does business model consistency mediate the positive relationship between business model innovation and business model innovation performance?

A major conceptualization of business models is that of activity systems. A high internal fit of activities has been identified as crucial to competitive advantage. The concept of fit is rooted in contingency theory and has a long body of research covering different aspects...
 [...]

Kriz, Anton - The University of Newcastle, Ourimbah, Australia
 Collins, Richard - The University of Newcastle, Ourimbah, Australia

International action research: lessons from linking an Australian cooperative and cluster with potential partners in China

The concept of kick-starting new ventures is receiving increasing attention. This is a difficult exercise with substantive failure rates. Broader initiatives like stimulating clusters similarly have difficulty starting and then sustaining activities. Clusters are known to be an increasingly powerful force in regions. These geographic agglomerations and combinations of enterprises are growth engines for multiple entities. Notably, literature is now talking about combining clusters across international boundaries. Knowledge exchange is challenging enough within firms without adding such complex cross-cultural dynamics. This paper reports on a program of research investigating an Australian manufacturing cooperative and its representative members (part of a broader cluster in Australia) in their efforts to attract mutually ongoing business and R&D opportunities China.

The unit of analysis is predominantly enterprise level but insights from the broad-

er cooperative are also investigated. A key focus is how ideas and knowledge that is less tacit is successfully exchanged. These are essential elements in innovation and R&D which is a major attraction for China. A key lens for observing such behaviours is the Sino-Western adapted industrial marketing and purchasing (IMP) actor bonds, activity links and resource ties (AAR) framework. The main author has been an academic/consultant facilitating this initiative. Accordingly this study is viewed from an "insider" and action research perspective. The paper aims to provide key insights from the literature, the initial research approach and early interventions. The program of research is expected to fill an important gap in understanding of cultural exchange and its implications for succeeding in China.

Kudryashova, Natalia - University of Cambridge, UK

On modelling mobile app ecosystem

Mobile applications are relatively new commercial products, but have swiftly become very popular with the mobile users and given rise to a multibillion market. In order to reach out to the possible end users app developers need the service of the app-store. From the economic point of view, the market of mobile apps, in which the platform (an app-store) aids consumers and apps developers meeting, falls under a broad definition of a two-sided market. This, however, does not reflect complex interconnectedness between an app-store and app developers, which imposes additional technological requirements and impacts the choice of adopted business models. Furthermore, the profitability of both app-stores and apps is ultimately determined by the apps popularity with the users, whose preferences may be strongly affected by network effects and behavioural aspects. Consequently, the app-store's strategies have to rely on the creativity, innovativeness and awareness of the app-developers, whose revenue is

also the major source of their profit, while the advances of the apps developers are largely conditioned by the policies, practices and technological requirements imposed by the app-stores. To reflect these complex relations, strategic optimization of the market players have to be immersed into a "bigger picture" of the mobile apps ecosystem. Using computer and analytic modelling we investigate impact of different 'components' on the pricing strategies of the market players in a competitive and monopolistic environment, and illustrate our finding using several plausible distributions of user preferences.

Kunapatarawong, Rasi - Mahidol University, Nakhonpathom, Thailand
 Martínez-Ros, Ester - Universidad Carlos III de Madrid, Spain

Knowledge sourcing and green innovation

This paper reports research on the relationship between sourcing strategy of a firm and its green innovation. The data is taken from the Spanish Technological Innovation Panel (PITEC) survey during the period of 2007-2011. The uniqueness of the Spanish innovation structure and the increasing relevance of environmental issues for the Spanish economy make it a proper setting to investigate green innovation dynamics. The results from over five thousand firms indicate that large firms are more likely to undertake green innovation than small- and medium-sized firms (SMEs). These firms rely quite equally on all four sources of knowledge – internal, market, institutional and free sources – when deciding to engage in green innovation. The broad horizons with respect to knowledge sources are likely to increase firms' engagement in green innovation. However, the relationship is an inverted U-shape. In addition, we provide the evolutionary nature of firm's innovation search as firms grow in size.

Small firms rely on internal, institutional and free sources rather equally, while market and institutional sources are the most important source used by large firms in driving green innovation. The implication is that, despite the fact that research on green innovation still concentrates in the public sector, firms search from internally or from market sources as well. Customer demands and coordination with suppliers probably allow for easier transfer of knowledge as compared to drawing from universities. A better coordination between private and public sector might help to influence more knowledge transfer from the public sector.

Lauritzen, Dragsdahl Ghita - Technical University of Denmark, Denmark

If you want to benefit from users don't be a chicken!

Evidence shows that user innovation is the next big opportunity to enhance firms' innovation performance. However, firms incorporating users in their innovation activities often experience internal conflicts, unintended user frustrations, and low contribution to innovation. So far, only little is known about effective strategies to overcome internal resistance and constraints when firms introduce user-centric business models. Drawing on theories of organizational dualities, dialectics, and paradox, this article identifies how managers recognize and respond to tensions arising from user communities and suggests new strategic responses. In particular, this article proposes a dynamic model of management that can better uncover the combined role of conflicting demands between firms and users and it explains how a managing-dilemmas paradigm may be insufficient to fully exploit the innovation potential of user communities. Instead, conflicting demands should be managed as paradoxes to benefit from

the distinct characteristics of firms and users and leverage synergies. Suggesting mechanisms to be implemented, this model helps managers to manage paradoxical tensions and avoid feelings of 'stuckness', unintended user frustrations, and psychological issues such as the 'not-invented-here' syndrome. I discuss the impact of integration and differentiation approaches on the innovation process and derive propositions. Finally, I conclude by offering some implications of paradoxical tensions for user innovation practice and research.

Laurson, Linda Nhu - Aalborg University, Aalborg East, Denmark
 Andersen, Poul Houman - Aalborg University, Aalborg East, Denmark

Matching Them and Us: Innovation Events at Unilever, LEGO, HEINEKEN & Novozymes

The question of how to mobilize and match externals' contributions to enhance internal innovation activities is central to current academic discussions about open innovation. Consequently, theoretical knowledge about ways to mobilize external input has been extended to include several distinct approaches, such as innovation contests, communities, platforms and consortiums to supplement internal innovation processes (Pisano & Verganti, 2008). In addition to these approaches, already scrutinized by theory, firms have started to stage 'innovation events', to motivate external support as well as communicate internally the importance of externals as providers to innovation activities. Despite the attention in practice (e.g. SCMR, 2014; Siemens 2014) the concept of innovation events is still relatively unknown in the literature on innovation management.

The present study examines, how four leading firms design and use such particular events to mobilize and match internal

and external knowledge providers. Data is collected through in-depth interviews and participant observations. Based on analyses of four innovation events, we discuss various ways of hosting such events and present three relevant questions for innovation managers to consider before staging such events, respectively: What is the strategic scope? Who to involve? How to involve them? We find that the strategic scope and participants invited are critical dimensions in characterizing distinct types of innovation events and based on this we propose a classification scheme for understanding different types of innovation events.

Lazzarotti, Valentina - Università Cattaneo-LIUC, Castellanza, Italy
 Manzini, Raffaella - Università Cattaneo-LIUC, Castellanza, Italy
 Pellegrini, Luisa - Università of Pisa, Italy
 Rippa, Pierluigi - Università of Naples, Federico II, Italy
 Bengtsson, Lars - University of Gävle, Sweden

Current practices of European Open Innovators

During the last decade, many researchers have claimed that we are in the era of open innovation (OI). However, an extensive picture of the actual implementation of open innovation is still lacking. In order to address this gap, a research project was launched, called Open Innovation Survey, involving four European countries (Italy, UK, Sweden and Finland). The research project is focused on inbound innovation and it is aimed at identifying the OI models through which firms open their innovation funnel to their external partners, by means of an extended survey. The paper presents the first tentative results drawn from the survey, in terms of descriptive statistics (cluster analysis) and regressions, which allow depicting the different OI models actually adopted in the practice of companies. By relying on the conception of collaboration depth with two typical types of partners (scientific and business ones), four OI models are identified (open network innovators, supply chain collaborators, technology

seekers and closed collaborators). Moreover, some determinants of such partner choices are outlined, as factors external and internal to the firms: technological trends are crucial to push firms towards external collaborations, above all with scientific partners; an aggressive innovation strategy, but also goals of innovation process efficiency exert a role. Lastly, the relationships among different OI models and both sides of innovation performance (novelty and efficiency) are investigated. In this regard, the organizational-managerial and social context factors emerge as relevant mediating variables, leading to a strong managerial implication: without an appropriate context, OI is not profitable.

Lazzeretti, Luciana - University of Florence, Italy
 Capone, Francesco - University of Florence, Italy

How proximity matters in R&D networks. Evidence from the high technology applied to cultural goods in Tuscany

The aim of this study is to investigate the dynamics of inter-organisational innovation networks analysing how actors form new network ties according to their proximity. Proximity is intended in a multi-dimensional level considering geographical, cognitive, organisational, institutional and social proximity.

The analysis investigates the cluster of High Technology applied to Cultural Goods (HTCG) localised in Tuscany, who has developed in last decades several innovations for cultural goods and has participated to several innovation policy supported networks. The study applies Social Network Analysis to 42 R&D projects developed in over 15 years (1995-2012) and attracting more than 89 M€, in order to analyse the overall network evolution along time.

The paper deals with how actors in HTCG form ties and choose their partner according to different level of proximity by using a Stochastic Actor Oriented Model. This part focuses on micro-level (actor-

centred) dynamics and analyse how these influence the formation of the overall network along time.

Lee, Carmen - Halmstad University, Sweden

Becoming a Different Company: A longitudinal study of business model innovation

Every business has a business model that embodies the value creation, appropriation and capture mechanisms that allow the business to generate profits in a given environment (Chesbrough, 2007). However, such environments are dynamic and characterized by constant change and once successful business models may fail to generate profits when environments change. Such a perspective has been used to describe the demise of industry powerhouses such as Kodak, Polaroid (Tripsas and Gavetti, 2000) and Motorola (Finkelstein, 2006).

Conversely, new firms adopting different business models may upset the established rules of an industry and enjoy high market success (Casadesu- Masanell and Ricart, 2010; Johnson et al., 2008; Morris et al., 2005), as well as higher profits from their value offers (Chesbrough and Rosenbloom, 2002) for both themselves and their value networks (Amit et al., 2012).

Scholars have therefore argued that business models need to be dynamic (Demil and Lecocq, 2010) and adapt correspondingly to changes in the external business environment (Burgelman, 1994). Failure to do so may leave companies with obsolete business models as external environments change (Markides, 2006; Sosna et al., 2010). Business models also need to adapt to internal changes within the firm itself as obsolete business models may hinder firms from maximizing the potential market value in their innovations (Chesbrough and Rosenbloom, 2002; Johnson et al., 2008). Chesbrough (2010) emphasizes this when he argues that firms need to understand how to innovate their business models and rethink how value is created, appropriated and captured in order to stay competitive or even just to survive.

[...]

Lee, Younghee - Institute for ICT Promotion, Japan
Park, Jun-Seong - Institute for ICT Promotion, Japan

A study of difference in R&D performance by collaborative activity

The purpose of this study is to analyze the difference in R&D performance by collaborative activity. We used SPSS 12.0 for analysis and performed a t-Test. The data for analysis were acquired by a survey whose target was Korean SMEs in the ICT sector. The result of the t-Test shows that the difference between the performance with and without the collaboration activities is significant in the variable of the market preoccupation by commercialization. The performance of the group which did not perform collaborative activities was superior on the average to that of the group which collaborated. One think of SME's as objects to promote rather than those to protect around the world. According to this trend, the government policy of the leading countries is changing its direction toward helping them cooperate with competitive enterprises or academic institutions, not only supporting them financially. Many past researches indicated that the collaborative activities provided most enterprises with strategic

values. However, our research shows that the rule is not always applied for SME's which are capable of R&D in the ICT sector. This study gives useful implication to the SME's which are planning an ICT R&D strategy or the organizations which are preparing policies of the collaboration-based support for SME's.

Lenka, Sambit - Luleå University of Technology, Luleå, Sweden
Frishammar, Johan - Luleå University of Technology, Luleå, Sweden
Parida, Vinit - Luleå University of Technology, Luleå, Sweden

Development of integrated product/service offers through integration, or not? A multiple case study of global manufacturing firms

Traditionally, manufacturing companies primarily offered products to their customers and considered services as a means of supporting the products (Cova et al., 2000; Foster and Whittle, 1992). However, recent trends shows that these companies have increasingly begun to add more and more industrial services, thus creating various combinations of products and services into integrated offers (Ulaga and Reinartz, 2011; Kohtamäki et al., 2013). These combinations of products and services have been conceptualized under different literature streams, such as servitization, integrated solutions, product-service systems, functional products, etc. Across these emerging streams, the underlying driver for product and service integration is the assumption that combined form has key advantages over products and services sold separately, and is imperative for securing strategic differentiation, competitiveness and profitability (Davies et al., 2006; Baines et al; 2007, Windahl and Lakemond, 2010;

Kohtamäki et al., 2013; Smith et al., 2014). Although, advantages of combining products and services are becoming well-documented, recent studies also acknowledges that most companies often find this challenging (Parida et al., 2014; Martinez et al., 2010; Eggert et al., 2011; Aurich et al., 2009). In addition, there are different assumptions as to how these product-service combinations should best be systematically developed. For example, some researchers suggest that there has to be an integrated product-service development process to be able to effectively deliver this combined form (Marques et al., 2013; An et al., 2008; Shimomura et al., 2009; Nakamura et al., 2006), while other researchers maintain that service development follow a different logic (Berry, 1980; Shostack, 1984, 1987; Lovelock, 1983) and is conceptually and in practice very different from the product development (Booz Allen Hamilton, 1982, Cooper, 1990, 1994; Baker and Hart, 1999). [...]

Leonelli, Simona - "G. d'Annunzio" University, Pescara, Italy
 Ceci, Federica - "G. d'Annunzio" University, Pescara, Italy
 Masciarelli, Francesca - "G. d'Annunzio" University, Pescara, Italy

The importance of entrepreneurs' traits in explaining start-ups' innovation

Several studies have proved the existence of a relationship between the personality traits of the entrepreneur and firm performance. However, few of them have focused on how these personal traits can be correlated with innovation performance in start-ups. The decision to focus on start-ups is based on the crucial role played by entrepreneur in these firms: his (her) personality strongly influences business decisions. The aim of this paper is to fill this gap analysing the relationship between start-ups' innovation and entrepreneurs' traits. In particular, it aims to shed light on how narcissism, extraversion, agreeableness, conscientiousness, neuroticism, openness to experience, and locus of control of the entrepreneur impact on start-ups' innovation. Our propositions claim that each trait could have a positive or negative influence on start-ups' innovation. This paper will make significant contributions to three different literatures: entrepreneurship literature, innovation literature, and organizational behaviour literature.

Lim, Dongkyoo - Ajou University, Suwon, Republic of Korea, Korea
 Lee, Sungjoo - Ajou University, Suwon, Republic of Korea, Korea

Identifying business trends in a technology-based service firm: Business method patents analysis

Patent analysis has been carried out by a number of researchers in order to understand technology trends and R&D networks between firms or industries and various analysis techniques have been applied to patents, ranging from bibliometric analysis to citation analysis and text-mining analysis. In particular, business method (BM) patents are getting a lot of attention both in academia and practice with the increase in a technology-enabled business solutions and services. BM patents include not only technological information, but also a defined business method to apply to the real market. Thus, if well analyzed, they can provide valuable information for monitoring competitors' technology-based business trends. However, most of the previous studies on BM patents have focused on the sector-level analysis and few attempts have been made to analyze the data at the firm-level. Therefore, this study suggests a method to examine the evolution of technology-based business at the firm-level and applies it to analyze business strategies of major firms in the healthcare management service sector. BM patent portfolios were developed to analyze the characteristics of technologies in a firm while text-mining analysis was adopted to extract in-depth information regarding business models from patent documents. Time-series analysis was conducted to identify trends. The research results are expected to understand corporate business strategies in the sector and further to monitor and compare competitors' business strategies.

Lindlöf, Ludvig - Chalmers University of Technology, Gothenburg, Sweden
Lantz, Björn - Chalmers University of Technology, Gothenburg, Sweden

Visual planning in a product development context

Product development organizations face increasing uncertainty and in a response to that, they strive to improve their information processing capability. In this endeavour, visualization has proven to be a viable strategy; efforts to visualize products and concepts are increasing along with improving visualization technology. However, visualization has not gotten the same traction when it comes to task communication within development teams. In this study, Visual planning, a method for visual task communication, has been studied through a survey. The purpose is to contrast the different goals and effects of using the method. 321 product development managers were asked to participate in the survey, and 160 did so. Through statistical analysis of the responses, we could conclude that our hypotheses that increased communication within the team would be a significantly more important goal and be significantly more affected by the implementation of Visual planning than other aspects of the method can both

be partly confirmed. The analysis also shows that the respondents perceive that Visual planning affects all the potential goals of Visual planning that have been tested in this study positively. This means that Visual planning seems to enhance certain aspects related to communication and coordination such as increased communication, team alignment, earlier problem solving, resource allocation and follow up on activities, but none of these aspects stand out as significantly more or less important than the other aspects.

Lingens, Bernhard - University of St.Gallen, Switzerland
Moser, Daniel - University of St.Gallen, Switzerland

Disentangling the Value of Technological Platforms in Life Sciences: The Case of Enabling Technologies for R&D at Bayer

Recently, the management and innovation of technological platforms gains increasingly attention by both, practitioners as well as scholars. Moreover, technological platforms are important value drivers in R&D processes, especially in life sciences. Yet, research is lacking deeper understanding on how technological platforms in R&D create value. So far, the platform literature is barely addressing this crucial aspect and mentions certain patterns only incidentally. In this paper, we address this neglected topic while we contribute to research on technological platforms in general and improve the understanding of technological platforms applied in an R&D context in particular.

We first of all summarized the scarce literature on value creation of technological platforms. Subsequently, we analyzed five technological platforms that find application in life science R&D on their value creation for the handler of the platform. On this ground, we were able to describe two core value patterns. Thus, platforms

create value by improving the R&D processes in terms of efficiency and effectiveness leading towards time and cost savings. On the other hand, they can be the basis of the discovery of new compounds resulting in new products. By increasing the scope of the platform application, these values get multiplied boosting the overall value of the platform. Furthermore, we discovered additional value multiplication effects for external R&D platforms, which access an innovation ecosystem of various researchers and platform users. We aggregated our results in a framework being the first authors who describe different dimensions of value creation in life science R&D by technological platforms.

Liu, Yang - University of Cambridge, UK
Liang, Xingkin - University of Cambridge, UK
Shi, Yongjiang - University of Cambridge, UK

Global Integration of R&D Organization in MNCs: A Process Model

Studies on R&D internationalization of multinational corporations (MNCs) identified 'decentralization-recentralization' pattern of evolution. In recentralization stage, MNCs globally integrate R&D activities in order to achieve efficiency. However, when customer requirements across countries are heterogeneous, it poses a challenge and we have limited knowledge on how to integrate R&D organizations under such condition. In this study, we aim to fill this gap through a qualitative case study of a home appliance MNC. We build a three-phase process model of R&D evolution towards global integration: concentration, modularization, and setting up type leaders. We analyzed the relationships among the three phases. This study reveals the complexity of the global R&D integration process under heterogeneous customer requirements.

Loh, Ying Wan - University of Cambridge, UK
Mortara, Letizia - University of Cambridge, UK

How do Companies Measure Technology Intelligence?

Technology intelligence (TI) is an activity that supports decision making at many levels from strategic, to tactical and operational and it is fundamental for the management of firms' innovation processes and decisions about Open Innovation (OI). A number of approaches to TI exist and companies configure their activities in different ways. However, practitioners find that evaluating the quality of TI activities can be very challenging. Whilst several papers in current literature discuss the effectiveness and performance assessments in open innovation, to the best of our knowledge less has been done to specifically address the issue of performance measurement for TI.

This research sets out to start filling this gap by developing empirical evidence about the current evaluation methods adopted in industry and their challenges in assessing TI. A cross-case analysis was performed and a framework was proposed that suggests that the metrics used

for TI follow two logics: on one side they could be either 'activity'- or 'outcome' - based, on the other they could apply to specific projects or to the entire firm. This classification of metrics, could be used as a tool to guide in the identification for the different evaluation approaches. It could also help practitioners structure their measuring and evaluating strategy as well as understanding the challenges and implications within each category of metrics. This work brings together the measuring perspectives from innovation management, performance measurement, knowledge management, information quality and technology intelligence.

Lütjen, Heiner - Kiel University, Germany
 Schultz, Carsten - Kiel University, Germany
 Tietze, Frank - University of Cambridge, United Kingdom

Escaping the commodity trap: Towards service innovation

Many firms operate in commodity markets such as metals (e.g. iron, silver or gold), foods (e.g. wheat, sugar, salt) or fuels (e.g. oil, natural gas, electricity), which are commonly characterized by high volume products that hardly differentiate against competitors. However, often even high margin products such as cell phones, video games or computers evolve into commodities. There appears a phenomenon in evolving markets: the commoditization of industries. Hence many firms try to avoid the “commodity trap” and choosing innovative service offerings as a relevant strategy to cope with declining margins in hardly differentiated markets. Therefore the ability of companies effectively differentiate their products have been an increasing relevance from both the practitioners and scientific view. Accordingly, the aim of this study is to develop a conceptual framework for categorizing different innovation strategies, when firms escape the ‘commodity trap’ and shift to services with a particular emphasis on

commodity provider. The investigation identifies a continuum of four strategy types that commodity companies employ: Conservatives, Value Creators, Learners and Mavericks. Data was obtained from 17 semi structured interviews with municipal utilities in Germany, which either change their corporate strategy towards services or continued their strategic orientation on commodities. Therefore, this study systematically investigates organizational and environmental contingencies to analyze why firms decide for a certain innovation strategy. With respect to the explorative nature of this study, we follow a qualitative inductive research approach.

Mahdad, Maral - Scuola Superiore Sant’Anna, Pisa, Italy
 Piccaluga, Andrea - Scuola Superiore Sant’Anna, Pisa, Italy
 Di Minin, Alberto - Scuola Superiore Sant’Anna, Pisa, Italy

When industry and university live under the same roof: Telecom Italia’s joint laboratories’ initiatives

The purpose of the research presented in this paper is to analyse a method of collaboration that has been adopted by Telecom Italia, namely Joint Open Laboratories. This initiative has been launched by Telecom Italia not only to benefit from universities’ R&D competences but also to foster industrial transfer to the market. These labs were set up within a strategy to further move from a closed model of innovation to an open innovation one. The specific features of these laboratories such as long-term relationship, high commitment of partners, tight interactions of stakeholders, and being an independent entity, provide a fairly original case to investigate.

Beyond a description of the initiative, this study explores advantages and challenges, which occur at organizational level in joint laboratories. The single-case study approach based on in-depth interviews with major stakeholders has been chosen to explore the dynamics and threats in

this particular type of collaboration. Joint laboratories revealed to be advantageous for the different partners in addition to diminish barriers for short-term collaborations. We also discovered that some barriers to university-industry collaboration need to be further explored. Finally, our research validates and contributes to prior works on university-industry collaboration and brings up a new insight for managers and decision makers for the strategic establishment and management of collaboration.

Mahdjour, Sarah - Telekom Innovation Laboratories, Berlin, Germany and Technische Universität Berlin, Germany

Beyond the Growth Doctrine – An Exploratory Analysis of Business Models in the Post-Growth Era

Growth represents one of the dominant performance measures of our economic system. An assumption inherent in this practice is that all economic actors aim to grow. However, past studies have shown that a large proportion of businesses aim to maintain a size that they can manage with few resources. Building on the business model concept this paper analyzes the business models applied by non-growth oriented German ICT firms and explores how these firms survive. Following an exploratory approach, multivariate analysis methods are applied. The results provide evidence that the incumbent non-growth oriented firms in the sample were more likely to establish barriers to competition in order to survive in the long run, while young non-growth oriented firms were more likely to focus on achieving profitability. By embedding the microeconomic perspective on growth intention into the broader macroeconomic discourse, this paper seeks to provide a holistic view on the theoretical and practical relevance of research on growth intention today and contributes to an emerging “sustainable theory of the firm”.

Manetti, Stefania - Scuola Superiore Sant'Anna, Pisa, Italy
Turchetti, Giuseppe - Scuola Superiore Sant'Anna, Pisa, Italy

R&D and innovative health technologies: towards the definition of a methodology for an Early Assessment

The development of new medical devices is complex, costly and an uncertain process, characterized by a high failure rate at each stage of the R&D. Recent evidence indicates agreement with late mature assessment of the potential Cost-Effectiveness (CE) of the new health product. The early Health Technology Assessment (E-HTA) is recognized as an integral part of R&D, but it still requires the definition of a proper methodology. Thus, for an Early Assessment (EA) alongside with the biomedical development process, it is necessary to use different methods than those usually ex-post applied, when the technology has been already developed, and till now directed to both pharmaceuticals and health end-products. Focusing on innovative biomedical devices under development, this systematic review aims at identifying existing applications of (i) the early Health Economic (HE) modeling, and of (ii) relative interactive tools for supporting the implementation process. Related to the period 2000-

2015, published studies in the English language were searched using the most diffused economic and medical/clinical databases. Of 630 articles identified, four studies passed the inclusion criteria, and two were added coming from searching reference lists.

The present work shows that there is a role for the integration of complementary tools like stakeholder-tailored early HE models, and formal belief-elicitation techniques for a more systematic attack to the uncertainty surrounding the early (and probably all the phases) of the R&D process.

Manzini, Raffaella - Università Cattaneo - LIUC, Castellanza, Italy
 Chiesa, Vittorio - Politecnico di Milano, Italy
 Mauri, Fabrizia - Università Cattaneo - LIUC, Castellanza, Italy
 Rovati, Diana - Università Cattaneo - LIUC, Castellanza, Italy

The role of patents in the technology intelligence process

The literature describes many different methods for implementing technology intelligence. Among them, patent intelligence. Several techniques and models for using patents for intelligence objectives are described, most of them quantitative: citation analysis, patent mapping, semantic-based search, data mining, text mining, simple statistic. However, the role of these techniques in the technology intelligence process cannot be understood without considering both the specific aim and scope of the process, and the final use (and users) of the results. This paper is aimed at giving a contribution in this field of study, investigating how to use patent-based indicators and analyses for different typologies of technology intelligence processes, and for different users within the company: R&D managers, IP managers, marketing managers, technology specialists. The case study, together with the literature, allows drawing a first tentative framework that could be used for implementing patent intelligence ac-

tivities within companies. The framework distinguishes three areas of patent investigation, named the “who”, the “what” and the “how” areas, respectively referred to the competitors/ players patenting, the technology being patented and the technical / legal patenting details. It also specifies which of the three areas is of special interest for various users: R&D, marketing, IP managers and technical specialists. Finally, the framework distinguishes two levels of analysis for each area of patent investigation, a first level including very simple indicators, that are easy-to-collect and easy-to-use, and a second level implying for more sophisticated investigations.

Marcone, Maria Rosaria - Polytechnic University of Marche, Italy
 Carminucci, Domenico - Polytechnic University of Marche, Italy

Value creation in research based production systems: an empirical study

This study focuses on Medium-Sized Firms (MSFs) that belong to the sectors of mechanics and electronics and highlights different innovation processes' approaches. Knowledge is a key source of competitive advantage that differentiates firms' performance according to the differences in their knowledge resources, developed in manufacturing and R&D activities. As suggested, the context of value creation is as important to the creation of value as the competences of the participating parties. Knowledge assets are systems which can be both human and technology-based that function to manipulate knowledge resources; knowledge growth processes consist of various configurations of knowledge manipulation conducted by the research oriented works belonging to the productive and R&D activities. As far as the methodology adopted in the development of the research is concerned, we would like to underline the fact that an interpretative, qualitative approach - utilizing selected multi-case study inter-

views such as the primary data collection method - is chosen because it helps to navigate and understand the complex issues that are associated with the data quality concept, and its relation to the factors involving managerial practices to implement facilities in design and marketing activities. This study is the scholarly effort in the direction of illustrating the complete multidimensional theoretical nature of the value co-creation. This would mean that, for smaller businesses, the complex process of 'generation, use, acquisition and dissemination' of technological knowledge would derive both from internal factors and by external sources.

Masior, Jonathan - Fraunhofer Institute for Industrial Engineering, Stuttgart, Germany

Information Process Model for Technology Knowledge Management in the Construction Industry

The architecture, engineering, construction (AEC) industry is characterized by high multidisciplinary collaboration, lengthy and complex projects and fast moving innovations. Important deficits can be found in continuous learning, availability of technology knowledge, support through IT and the competitive advantages it brings. In the last years major developments have been made in the area of Building Information Modelling (BIM) towards the centralization and standardization of data. However, construction companies still stumble to adapt technological innovations. This work aims at developing a concept for construction companies to effectively adapt innovative technologies through the collaborative generation of the relevant technology knowledge. As a result this paper presents a new framework of consistent, interrelating information streams that meet the knowledge demand for technology adaption. It is based on a collaborative approach and purposed to include the

important information sources and user roles. Current web platforms have been analysed, knowledge demand and information streams of relevant stakeholders have been surveyed and the results have been matched to informational outcomes of the technology lifecycle. Through this practical, investigative approach the developed framework ought to find a high acceptance among the using companies.

Massaro, Sebastiano - Warwick Business School, UK
Lorenzoni, Gianni - University of Bologna, Italy

Designing Nanofacilities Platforms

We develop grounded theory on the strategic founding conditions that allow meta-organizations - organizations whose members are organizations, rather than individuals - to emerge. While much research has focused on individual-based organizations, accounts for meta-organizations are still at their nascent theoretical stages.

We collected data from a five-year longitudinal study in the cutting-edge nanotechnology sector and employed a multiple-case research design. Our preliminary findings allow us to identify idiosyncratic patterns of meta-organizational designs. Our contribution proposes relevant implications not only for management theory, but also for practice, in particular for policy-makers.

Matarazzo, Michela - Guglielmo Marconi University of Rome, Italy
 Merola, Biagio - University of Foggia, Italy
 Resciniti, Riccardo - University of Sannio, Italy

The impact of cross border acquisitions on high technology firms: A comparative study in the Italian biotech industry

The increase in foreign direct investment in industrialized countries since the mid-1980s has largely come about through mergers and acquisitions (M&As) and, as a result, the share of foreign ownership in the total population of firms has grown in many countries. According to the UNCTAD (2014) global cross-border mergers and acquisitions activities have risen from \$49.8 billion in 1987 to \$1.04 trillion in 2007. In fast growing markets firms do not always have the time to build up new technological capabilities themselves or to strengthen existing competencies within an appropriate time frame. Technology-grafting acquisitions (Desyllas and Hughes, 2008) provide rapid and exclusive access to technologies and are an attractive tool to enhance existing technology portfolios with assets and capabilities of the acquired firm.

This paper is part of a wider research that aims at investigating the effects of cross border acquisitions of Italian firms, in order to understand if they can be an

opportunity of growth for the Made in Italy or only a cause of pauperization of our economy. It focuses on the impact on R&D activities of the target firms in order to answer these research questions: are these firms in the post-acquisition stage more innovative in terms of improved R&D skills, time to market, product quality and product cost (Capron & Mitchell, 1998; Bresman et al., 1999), R&D intensity, patenting intensity and patent stock? What are the main reasons? Four Red biotech acquired companies are used as multiple case study, chosen for their important technological assets and patent portfolio.

Mazzola, Erica - University of Palermo, Italy
 Piazza, Mariangela - University of Palermo, Italy
 Perrone, Giovanni - University of Palermo, Italy

“Is fairness really improving my challenge success?”. The impact of fairness on the performance of crowdsourcing contest

This research aims to investigate mechanisms available to the seeker to encourage participation of solvers to a challenge. Using a unique database of 1590 challenges gathered from two online crowdsourcing platforms, we provide evidence that specific crowdsourcing mechanisms, reducing the information asymmetry of solvers on the challenge, increase solvers' perception of procedural and distributive fairness and incentive their self-selection process. Moreover, posing problem in an 'open' manner exposes seekers to possible opportunism risks. Thus, seekers utilize many safeguard contractual mechanisms to mitigate these risks and protect the information shared in a challenge. We provide evidence that safeguard mechanisms may have a drawback effect; since they increase information asymmetry of participants on the execution system and the rewarding schema of a challenge, they decrease solvers' fairness and make solvers less commit. Combining previous research from the field of tourna-

ment-based crowdsourcing together with agency theory literature, but 'reversed' so that it deals with the risks the agents (the solvers) face rather than the risk the principal (the seeker) has, this study offers important contributions, both to the theory and the practice.

Mazzoleni, Stefano - The BioRobotics Institute, Scuola Superiore Sant'Anna, Pisa, Italy
Dario, Paolo - The BioRobotics Institute, Scuola Superiore Sant'Anna, Pisa, Italy

Innovation in rehabilitation robotics: education, research and transfer to clinical practice for increasing effectiveness of treatments and improving quality of life of patients

The use of robotic systems and technologies in the domain of rehabilitation is spreading rapidly due to growing evidence of effectiveness reported in several clinical studies published every year in the medical and bioengineering fields.

The synergy among researchers, clinical team and companies active in the rehabilitation sector represents a fundamental prerequisite for transferring outcomes of research activities toward clinical practice, with real advantages for patients in terms of effectiveness of treatments, assistance, quality of life and work re-entry when possible.

Recent systematic reviews have demonstrated effectiveness of upper limb and gait robot-assisted rehabilitation treatments of patients affected by severe motor impairments following neurological (i.e., stroke), neurodegenerative (i.e., Parkinson, multiple sclerosis), muscle-skeletal pathologies and traumatic injuries, in

terms of motor impairment decrease, even if no consistent influence on functional abilities was found. These studies which demonstrate that motor improvements are based on the analysis of the clinical scales scores: recently only few have proposed a quantitative approach to analyze the mechanisms of motor recovery after neurological diseases. The comprehension of such mechanisms assumes great importance in the rehabilitation domain, as it can support the clinical decision process.

The results obtained through clinical trials carried out at the Rehabilitation Bioengineering Laboratory in Volterra (Italy), established in 2011 between Auxilium Vitae Rehabilitation Centre and the BioRobotics Institute, Scuola Superiore Sant'Anna in Pisa, have contributed to such studies.

[...]

Mazzurana, Paola Angela Maria - University of Udine, Italy
Tognazzo, Alessandra - University of Padova, Italy
Lauto, Giancarlo - University of Udine, Italy

Group cohesiveness, creativity and innovation: the case of a technological spin-off founding team

Post-industrial organizations need innovation, discovery and exploration to survive and be successful. Today creativity has a role to play and entrepreneurs must interpret this evolution; new entrepreneurs must be innovators, creative, idealist, and visionary. In most of new technology based firms the founding team has a major role in this process, especially given the limited size of the organization (Amason & Sapienza, 1997).

Although, these processes are critical for firm success and therefore have been a matter of concern for management scholars for many years (Woodman, Sawyer, & Griffin, 1993), research about creativity and innovation belongs to different research streams. Previous work, in fact, has analyzed on one side, the individual (Cameron M. Ford, 1996) as well as his personality, traits, abilities, experiences and cognitive processes (Williams & Yang, 1999) and on the other side the organizational and social context in which the individual creator functions (Burt, 2004;

Hemlin, 2009; Hoegl & Gemuenden, 2001; Hülsheger, Anderson, & Salgado, 2009). Bringing these different perspectives together remains still a challenging task (West & Farr, 1990).

In the present work, by adopting a process perspective based on a theoretical framework owning to different disciplines, we explore how the group cohesiveness that characterized a founding team can effect the innovative performance of the firm, by distinguishing between creativity and innovation. There are three main research traditions that we consider in our analysis: the psychological, the managerial and the sociological one. On the one hand, research in management mainly concentrate on distinguishing the phases of innovation processes (Crossan & Apaydin, 2010), but has never specifically focused on group cohesiveness. Only one theoretical work (Woodman, Sawyer, & Griffin, 1993) proposed that creativity could be influenced by group cohesiveness... [...]

McDonald-Junor, Daniel - Nottingham Trent University, Nottingham, UK
 Ehret, Michael - Nottingham Trent University, Nottingham, UK
 Smith, David - Nottingham Trent University, Nottingham, UK

UK life science company formation: Patterns of growth in UK regions and the role of biotechnology incubators

This study examines the regional distribution of new life science company formation and highlights 'hotspots' of where new activity is relatively intense. The analysis indicates that there are generally two types of region, the first type contains life science clusters that were established during the early 2000s and the second type displayed little or no significant life science activity during this period. This study analyses survey data (n= 580) and evidences new patterns of life science company activity within peripheral UK regions. The study shows that new life science activity is occurring away from the traditional 'Golden Triangle' of London, Cambridge and Oxford. New life science company activity can be found in peripheral regions such as the East Midlands, Yorkshire and Humberside, the North West and in Scotland.

The evidence contained in this study suggests that new UK life science company activity is supported by the presence of

UK biotechnology incubators. During the early 2000s there were only a handful of biotechnology incubators in the UK, by 2012 there over twenty-five. This study provides evidence to suggest that UK biotechnology incubators play an important role in supporting new life science companies. Since the early 2000s, biotechnology incubators have appeared in the same regions that display significant levels of new life science company activity. Furthermore, significant proportions of new life science companies are located in biotechnology incubators within regions that displayed little or no significant life science activity during the early 2000s. This study demonstrates that biotechnology incubators have an important role to play in supporting regional innovation systems, especially within peripheral regions in the UK.

Messeni Petruzzelli, Antonio - Politecnico di Bari, Italy
 Natalicchio, Angelo - Politecnico di Bari, Italy
 Garavelli, Claudio - Politecnico di Bari, Italy

Leveraging radical acquired technologies: The moderating effect of star scientists and upstream strategic alliances

In the current competitive environment, firms are increasingly accelerating the pace of their innovation processes in order to get higher returns from such an innovation effort (e.g., Laurson et al., 2010). Accordingly, firms may speed up their innovation processes by accessing to more and diversified sources of knowledge (Vanhaverbeke et al., 2002), hence relying not only on their in-house R&D activities (Ceccagnoli et al., 2014). Actually, due to the recent evolution of the industrial ecosystem, relying exclusively on the internal R&D resources has become a potential detrimental strategy for innovating firms (Chesbrough, 2003). In fact, in the last decades some emerging trends, such as the opportunities offered by venture capital markets to exploit knowledge, the growing availability and mobility of skilled workers, the rising of IT technologies allowing for easier collaboration with partners, the higher number of opportunities to exploit ideas, the increasing level of system's modularity, and the availability of

specialized suppliers, have been shrinking the benefits of having vertically integrated R&D departments (Chesbrough, 2003). Thereby, the use of externally developed technologies has been emerging as a key strategy for innovating firms (Arora and Gambardella, 2010; Chesbrough, 2003), especially in certain sectors as biotechnologies and electronics (Arora et al., 2001). In particular, participating in markets for technologies, as arenas in which patented technical solutions are exchanged for a price (Conti et al., 2013), offers organizations the opportunity to acquire and exploit externally developed technologies, which may be thus integrated to foster internal innovations' development (Arora and Gambardella, 2010; Ceccagnoli et al., 2014). This open innovation strategy is obtaining increasing significance, as highlighted by OECD (2014) data reporting that the value of intellectual property market transactions, within the OECD area, had been averagely growing by 10.1% per year in the period 2000-2011. [...]

Michelino, Francesca - University of Salerno, Fisciano, Italy
 Cammarano, Antonello - University of Salerno, Fisciano, Italy
 Lamberti, Emilia - University of Rome "Tor Vergata", Rome, Italy
 Caputo, Mauro - University of Salerno, Fisciano, Italy

R&D collaborations in the bio-pharmaceutical industry: a social network analysis based on patent data

The paper aims at providing a methodological framework for defining the network behaviours of 135 top R&D spending bio-pharmaceutical companies, employing objective and standardized information extracted from patent data. Joint patents were exploited for building an innovation network and performing social network analysis. Brokerage roles are investigated within the network.

We uncovered that 66 firms filed joint patents with partners within the sample from 2005 to 2011, 38 of which played brokerage roles. Through the information disclosed in patent documents, such as the technological fields of the invention, we investigated such collaborations, defining 9 different network behaviours deriving from brokerage roles and arguing our interpretation through case studies. Our findings show that each network behaviour is characterized by specific features of companies and explain why firms enter into joint development agreements

with partners within the system of relationships, confirming that social network analysis is an effective instrument for evaluating innovation networks.

Morillo, Marta - Politecnico di Milano, Italy
 Dell'Era, Claudio - Politecnico di Milano, Italy
 Pisanelli, Pierpaolo - Politecnico di Milano, Italy
 Verganti, Roberto - Politecnico di Milano, Italy

Envisioning new futures by discovering quiescent meanings in technologies

In an era of global markets and rapid technological advances, corporations face the need of exploring future possibilities and innovations. The performance of the firm with regards to innovation is directly related to the strategic intent of the company: the more future oriented the vision pursued, the more discontinuous the innovation, the higher the uncertainty and the greater chances for long-term success. Firms often rely on future studies' methodologies for the exploration of the yet-to-come. Traditional approaches such as forecasting or scenario planning often explore holistic societal and technological avenues. Alternative approaches instead explore the possibilities of technology at the micro level (project) and the potential of technology to the envisioning process.

The paper aims at investigating the contribution of technology in envisioning new meanings. More specifically the paper explores the role played by new and

existing technologies in the exploration processes adopted for envisioning futures. We developed a cross-sector multiple case study methodology, selecting three projects developed by companies that operate in different industries (construction equipment, furniture, apparel). Data were collected through interviews, observation and secondary resources. Preliminary findings reveal some strategic implications of exploring new meanings with technology. Our research provides evidence on the different practises in which technology is used to the envisioning of futures, and suggests several forms of contribution at three strategic levels: project, firm, and industry.

Motta, Virna - Strategie & Innovazione srl, Italy
 Amati, Guido - Pirelli Tyre spa, Italy
 Motta, Milena - Strategie & Innovazione srl, Italy
 Tebano, Riccardo - Pirelli Tyre spa, Italy

Technology Roadmapping: integrating technology resources into business decision making. Pirelli Tyre Case Study

The purpose of this paper is to provide a concrete case study of how to integrate a roadmap structure into a supporting tool to support the decision makers about products and technologies in a manufacturing technology based firm.

The process and the tool Pirelli introduced to pursue this scope is a TRM process integrated with the Projects Portfolio Management, providing a map about where R&D organisation is moving and which direction it wants to follow. the fundamental idea is to create a big comprehensive picture of the Pirelli research, innovation and development system articulating in detail all the relevant variables in an integrated system into a relational database system. Activities, ideas and their impacts on products and markets are the components of a system made by entities and relations among them. The resulting map is then full of details and intended to cope with the complexity of the job to be done without reducing or simplifying it.

The approach is bottom-up and is able to determine a technology and product strategy that could be then defined as 'emerging' one, built on the precise mapping of individual customer needs and evolution of technologies in different fields. The suggested approach stimulates communication and knowledge sharing between R&D, Operation, Marketing and Engineering providing a useful guidance to picture shared long term future from different perspectives. The process is particularly indicated for technology based firms with differ development areas focused on satisfying product performances in a particular market segment.

Mousavi, Seyedesmaeil - VU University Amsterdam, The Netherlands
 Bossink, Bart - VU University Amsterdam, The Netherlands
 van Vliet, Mario - VU University Amsterdam, The Netherlands

Knowledge sourcing strategies for firms' sustainable innovations: a review

There has been a large increase of interest in sustainable innovation in the last decade. Hence, firms shift their business focus from competitiveness alone to sustainability and competitiveness. This impacts their capabilities and competences for innovation. It is argued that knowledge is the most strategically significant resource and capability of firms in the development of new products and processes. As sustainable innovation usually involves a departure from the present knowledge base and is "competency-destroying"; therefore, firms need to have or to build up a certain knowledge base in order to be able to do sustainable innovation. The first step of a firm in developing and building his knowledge base for sustainable innovation is to decide the source of knowledge. This paper seeks to explore firms' knowledge sourcing strategies in the development of sustainable innovations. Doing so, we employ the method of systematic literature review. We distinguish three different knowledge sourcing

strategies which are used by the firms for sustainable innovations. These strategies are categorized according to the degree of involvement of external partners in the development of innovations, i.e. 'in-house strategy', 'external strategy', and 'cooperation strategy'. Second, it argues that different knowledge sourcing strategies are complementary for innovative firms that engage in the development of sustainable innovations. Third, we offer some suggestions in order to provide impetus for future research directions.

Müller, Christiana - Graz University of Technology, Austria
 Vorbach, Stefan - Graz University of Technology, Austria

Roles of Business Ecosystem when changing the Business Model

Developments like shorter product and technology cycles or steadily changing customer needs force companies to change their business models and open their boundaries for working together with partners in the business ecosystem. Especially high-technology companies are affected by these developments. Thereby, the business ecosystem does not only trigger changes in the business model, it can take also different roles when it comes to changes in the business model. Thus, the objectives of this research study are to identify, which roles the business ecosystem can capture in business model changeability. Therefore, an exploratory, qualitative study in high-technology branches was conducted. 20 companies participated in this study, and 20 expert interviews were conducted with CEOs, vice-presidents or other managers responsible for developing the business model. In total, six different roles the business ecosystem can incorporate when changing the business model were

identified. The roles cover a wide range of different cooperation types: starting from having an intensive partnership when developing a business concertedly up to being a learning partner. This leads to changes of the business model, affecting both, either single business model elements or the overall business model. The results provide an additional view on business ecosystem roles in the context of business model changeability. In addition, the results emphasize that participants in the business ecosystem are a valuable source of resources and competencies, for exchanging information or pursuing business opportunities together.

Muscio, Alessandro - Università degli Studi di Foggia, Italy
 Quaglione, Davide - Università "G. d'Annunzio" di Chieti e Pescara, Pescara, Italy
 Ramaciotti, Laura - Università di Ferrara, Italy

University regulation and academic spin-offs: a performance analysis of Italian academic departments

In a context characterized by growing concern for academic knowledge transfer, governments in several countries are putting pressure on universities to foster academic entrepreneurship. The economic literature provides rich evidence on the convergence between institutional factors and individual-level characteristics that are influencing university involvement in knowledge transfer activities and spin-off creation, but very little is known about the effects of academic regulation and strategies on academic entrepreneurship. In the case of Italy, spin-off activity from academic institutions has been intensive in the last ten years. Therefore, the large majority of academic institutions now has an official regulation of academic entrepreneurship practices, embodied in the so-called 'regolamento spin-off'.

The aim of this paper is to investigate the impact of the whole set of rules designed by universities' for the creation of spin-offs on the institutional capability to generate new ventures. Furthermore, also the

role played by academic regulation and strategies on academic engagement activities is explicitly investigated, in order to take account of the interdependence existing among the possible knowledge transfer channels. Based on extensive university-level data on academic spin-offs, university funding and staff and research output, we investigate the characteristics of spin-off regulation in Italian academia and determine what norms and incentives influence the probability and the intensity of spin-off activity. We find that rational and monetary incentives for researchers play a significant role, but also that too restrictive university rules on academic engagement activities have negative effects.

Niosi, Jorge - Department of Management and Technology, UQAM, Canada

Business Model Innovation: New ways of developing and analyzing business model innovation

High-tech sectors, such as information technologies, biotechnology, nanotechnology and photovoltaic technologies are evolving in a way that much differs from the traditional evolutionary path of previous technologies before World War II. Until 1940-45, technological change in almost every industry followed the fairly predictable path of technological trajectories and scientific paradigms. The few innovation cascades that took place before the emergence of a new set of science-based industries usually petered out by lack of institutional support, including reduced funding for R&D, serendipity in research organizations, a small number of academic and public sector R&D, and few inducements for private innovation (Mokyr, 1989). Present day innovation cascades in high-tech sectors are anything but predictable, they have many locus of innovation as a growing number of institutions and countries contribute to their development. Also, their systemic effects are increasingly global, as these technologies are easily

transferred from the original innovating nation to the next, and international research collaboration takes off. This paper will focus on the biotechnology innovation cascades that, starting in the 1970s and growing unceasingly up to this day include genetic engineering, bioinformatics and genomics, proteomics, stem cell and pharmacogenomics innovation. It will also analyse some of the dozens of new business models that appeared due to this cascade, and the new, emerging ones, as well as the legal battles about them. The general hypothesis is that scientific and technological innovation nurtures the development of new business models and these, if properly designed, have a feedback effect on innovation.

Nitta, Shigeki - Hiroshima Technoplaza Corporation. Japan
 Zhou, Shuang - Hiroshima Technoplaza Corporation. Japan
 Chao, Yu - Chung Hua University, Hsinchu, Taiwan
 Kawamura, Tomoko - Mazda Corporation, Japan
 Nakamura, Tomoya - Hiroshima University, Hiroshima, Japan

Critical Success Factors for Overseas Business of Small and Medium-Sized Enterprises - Winning Challenge in East Asia

This study focuses on manufacturers to clarify the critical success factors for small/medium sized enterprises in Japan. We propose a unique and unconventional perspective and expand implications especially overseas business in developing countries. In order to deal with the local market saturation/shrinkage and exchange fluctuation, manufacturers in developed countries have faced dramatically pressure to transfer/expand their operation business to the developing countries for sustaining competition and survival. Whether to develop a winning business scenario is critically important especially for the small/medium manufactures with limited resources.

Traditionally business globalization studies targeted large companies and/or just introduce the status of SMEs in detail. Few of them clarified the critical factors common for the successful SMEs. After information collection process, we deploy qualitative comparative analysis to

clarify critical success factors for overseas business. The survey consisted of preliminary interviews to develop a hypothetical success scenario and verify this scenario by the respondents of questionnaire and full interviews.

The survey was conducted for the successful Japanese manufacturers doing business in the growing East Asia, with capital of under a hundred million yen (about 757000Euro) with less than 300 employees. A successful manufacturer was defined as one that continues its business in the local site more than five years.

Among 22 respondents to our questionnaires, 5 companies were selected for interview. All of them deploy business in China. As a result of the analysis, four factors were defined as the success factors: 1) Company owner's strong intention to keep business and take risks, 2) High-level function, quality and productivity technologies...[...]

Nylund, Petra A. - Universitat de Vic, Spain
 Serrat, Núria Arimany - Universitat de Vic, Spain
 Ferràs, Xavier - Universitat de Vic, Spain
 Viardot, Eric - EADA Business School, Barcelona, Spain
 Boateng, Henry - University of Ghana, Legon, Ghana

Financing investments in innovation: Evidence from large European firms

Innovation is an increasingly important antecedent to firm competitiveness. Successful innovation however requires a significant financial commitment and the means of financing accessible to the firm may affect its ability to innovate. We therefore investigate the relation between internal and external financing and the degree of innovation in firms and hypothesize that those firms that are more profitable will be more innovative. We also hypothesize that the internal financing generated by profitability can be boosted by a positive moderating effect from external financing in the form of debt. We carry out an empirical investigation using a longitudinal data set including 167 large, quoted, European firms over five years, resulting in 835 firm years. We apply a generalized least squares (GLS) regression with fixed firm effects to control for firm heterogeneity. The findings support our hypotheses and we conclude that profitability is an important anteced-

ent of innovation, with debt financing as a moderating factor. The hypotheses however only hold fully for capital intensive sectors such as basic materials, manufacture, construction, technology and telecommunications. The model is not valid for the service and energy sectors, which indicates the relevance of other models for service and business model innovation.

Ohara, Kosuke - Tokyo Institute of Technology, Tokyo, Japan
 Tsujimoto, Masaharu - Tokyo Institute of Technology, Tokyo, Japan

Network structure analysis of APIs and mashups: exploring the digital ecosystem

This paper explores the internal structure and the evolutionary process of the digital ecosystem by analysing the relationship between the application programming interfaces (APIs) and the web hybrid applications (mashups). The number of APIs is growing rapidly as web services and mobile applications (apps) have advanced. Successful companies such as Twitter, Amazon, Salesforce, and Google have provided APIs as technological solutions to the public by innovating existing business and creating new business models. These companies are connected with external partners, third-party vendors, and developers through their APIs.

We present our findings from a network structure analysis that visualizes the relationship between APIs and mashups. First, we found that the whole API ecosystem structure consists of four layers. These layers increase gradually as the ecosystem structure becomes more complicated. The distribution of mashups to APIs re-

veals a power-law, which is also known as a 'long tail'. Second, we conducted a network analysis by the category of APIs and found that some APIs are keystones and dominate the ecosystem. This analysis also confirmed that several categories are organized in a layered structure, for example, the mapping, social, entertainment, and e-commerce categories. Previous work has concluded that popular APIs are closer to the centre of the network structure. Third, we observed that category networks have a cooperative relationship in the ecosystem. We found a strong and weak interaction between the networks of the categories. Finally, we observed the evolutionary process of the API ecosystem by focusing on the social category and found that there are four types of species in the ecosystem.

Omri, Waleed - University of Montpellier & University of Limoges, France

Does Individual Innovation Behavior influence SME Performance? The Moderating Effect of Environmental Dynamism

This study explores the relationship between individual entrepreneurial orientation and SME performance to determine empirically whether managers' innovative behavior impacts directly or indirectly on SME performance through innovative output. A proposed conceptual model is tested with the moderating effects of environmental dynamism. An empirical study tests the conceptual model of a multi-industry sample of Tunisian SMEs. For this analysis we apply the Partial Least Squares (PLS) technique using the software package SmartPLS, version 2.0. Empirical findings reveal that innovative behavior acts on innovation output thus having a positive and significant effect on business performance. Direct effect on business performance is found to be positive but weakly significant. These positive relationships tend to decrease when market conditions are highly dynamic.

Orlando, Beatrice - La Sapienza, Rome, Italy
 Renzi, Antonio - La Sapienza, Rome, Italy
 Sancetta, Giuseppe - La Sapienza, Rome, Italy
 Vagnani, Gianluca - La Sapienza, Rome, Italy

How much is the worth of firm history in its innovation commitment? A path dependent view of innovation in large companies in the light of related variety: the interplay between R&D investments and organisational slack.

The objective of the study is to investigate the role played by firms previous investments, adopting a path dependent approach, in leveraging innovation. In particular, we consider a sample of large companies, listed on Euronext 100, and their degree of diversification over-time. We use an entropy measure to express the degree of related variety of each firm in the sample, and their R&D expenditures for a period of time of four years. We observe a reduction of their diversification degree, or in other terms of their related variety, over time. Then, we consider organisational slack as an expression of sunk costs, in relation to R&D dynamics. We observe an ambiguous effect of related variety (or diversification degree) and organisational slack on R&D overall expenditures: while non-related diversification positively affects the innovation process and the slack acts as a reserve

of knowledge, usable to foster the innovation activity; at the same time, the presence of sunk costs, at least, slows down, in the short run, innovation.

Orlando, Beatrice - La Sapienza, Rome, Italy
 Renzi, Antonio - La Sapienza, Rome, Italy
 Vagnani, Gianluca - La Sapienza, Rome, Italy

Uncertainty, sunk costs, and bandwagon behaviours in innovation adoption: an explorative study in the light of the Prospect Theory

This study proposes an original perspective on adoption decisions, that takes into account both the specific role played by sunk costs on perceived uncertainty, and the imitation effect. Sunk costs are those non-recoverable expenses, due to prior investments' decisions. Previous analyses have shown how such costs cause the delay or the rejection of new projects, in favour of the persistence of old decisions over new ones. Although the general role played by sunk costs in investment decision is rather clear; there is a literature gap for what concerns a particular kind of investment: the adoption of an externally generated innovation. In this study we explore the sunk costs effect in relation to innovation adoption, introducing the imitation effect as a further anchoring bias, affecting the prospect. We adopt the Prospect Theory standpoint to view at uncertainty and sunk costs effects on decisions.

In particular, we assume that the decision depends on perceived uncertainty. While the presence of sunk costs induces, at least, a delay in adoption; on the converse, in case of a fade of adoptions (or rejections) within a certain network, the decision to adopt results almost obliged to survive and compete in the industry arena. In other words, in case of innovation adoption and sunk costs, the bandwagon effect is a reducing factor for uncertainty. First, we review the literature on the topic. Second, we integrate the Prospect Theory introducing the bandwagon effect, as an anchoring bias affecting perceived outcomes. Third, we conduct a survey on a sample of volunteers, to explore the uncertainty effect in case of sunk costs when adopting something new. We evaluate three types scenarios: non adoption; adoption; and rejection. Finally, we investigate if emotions, as self esteem and motivation, are influential for risk seeking behaviour in adoption.

Pagani, Roberta - University Carlo Cattaneo, Castellanza, Varese, Italy
 Porazzi, Emanuele - University Carlo Cattaneo, Castellanza, Varese, Italy
 Manzini, Raffaella - University Carlo Cattaneo, Castellanza, Varese, Italy
 Lazzarotti, Valentina - University Carlo Cattaneo, Castellanza, Varese, Italy
 Lettieri, Emanuele - Politecnico of Milano, Milano, Italy
 Foglia, Emanuela - University Carlo Cattaneo, Castellanza, Varese, Italy
 Ferrario, Lucrezia - University Carlo Cattaneo, Castellanza, Varese, Italy
 Garagiola, Elisabetta - University Carlo Cattaneo, Castellanza, Varese, Italy
 Masella, Cristina - Politecnico of Milano, Milano, Italy

Assessing Innovative Healthcare Technologies in Hospitals: Lessons Learnt From an Empirical Experiment

Italian spending review imposed a deep analysis of healthcare expenditures and required paying more attention to the assessment and introduction of healthcare technologies. In this regard, the limited available resources should be allocated to only the most promising healthcare technologies, avoiding waste on innovations that do not generate "enough value" in relation to their cost. As a result, hospital managers, professionals, supplier managers and R&D executives would ground their decision-making, adopting a Health Technology Assessment (HTA) approach. Since the lack in literature of a reference framework, coherent with the regulatory constraints and the organizational hospital setting, the present study

aimed at developing (theory building) and empirically testing (theory testing) a Hospital Based-HTA framework, redesigned from existing models.

As result, it grounded on: 1) Core Model, 2) Multi Criteria Decision Analysis, 3) Lombardy Region Model, developing 8 dimensions, 15 sub-dimensions, giving specific quantitative metrics to be adopted. The model proved to be suitable for application at meso level, in the Italian context, allowing a quick assessment (11.14 working days). Furthermore the proposed framework fully satisfied utility, completeness and appropriateness criteria (an average of 6, in a 7-item scale), being an evidence-based tool (4.26 literature evidences on average).

[...]

Parente, Roberto - University of Salerno, Fisciano, Italy
 Gimigliano, Anna - University of Salerno, Fisciano, Italy
 Fontana, Luciana - University of Salerno, Fisciano, Italy
 Cucino, Valentina - University of Salerno, Fisciano, Italy

The strategic role of CRO in the R&D of life science industry

The issue of vertical integration in Organization's processes has been discussed extensively. According to the Resource-based view of the firm, the more the R&D processes contribute to Competitive Advantage the more a vertical integration approach will be justified. So it might be counterintuitive in an R&D-based industry, as it is in the case for the Life Science Industry, to imagine a substantial de-verticalization of R&D processes of so many strong and large Incumbents, but it is exactly what has occurred in the last decade or so.

The rise of a Contract Research Organization (CRO) Industry, with its capability to offer very specialised services in a flexible and almost custom-based way, played a key role in fostering this huge reorganizational process. CROs development was at the beginning essentially driven by Large pharma outsourcing strategies, but things are changing. CROs, in fact, represent also an ideal ready-to-use technological infra-

structure for small emerging companies with low single R&D budget. In response to this structural market changes, CROs are readjusting their business models. Therefore CROs are playing a strategic role in the passage from a Closed to an Open model of Innovation in Life Science. A group of Italian CROs were investigated to obtain information about their business model, with particular regard to their willingness to act as a co-developers of Biopharma products. Through an exploratory study we have identified three different business models, i.e. transactional outsourcing model, functional outsourcing model and virtual outsourcing model. The business models adopted by CROs can affect the sustainability of Biopharma R&D process and vice versa.

Park, Hyunkyu - University of Cambridge, Cambridge, UK
 Minshall, Tim - University of Cambridge, Cambridge, UK

A bibliometric analysis of research trends in Additive Manufacturing

Using the bibliometric data from 3,056 publications in the field of Additive Manufacturing (AM), this study provides an overview of research trends in AM. In doing so, three main findings are identified: (1) AM research has primarily been conducted in Western Europe, The United States, and East Asia; (2) although the medical, mechanical and manufacturing applications of AM has received much academic attention, there has been a small but growing number of studies on AM uses in other fields, e.g., Aerospace, Architecture and even the Arts and (3) the potential broad reaching problems of AM technologies, such as the management of diverse IP issues, have not been widely or deeply investigated. Based on the findings, we discuss the current and potential AM issues which may result in the creation of research agendas encouraging Technology Management research.

Park, Inchaе - Dongguk University-Seoul, Seoul, Korea
 Jeong, Yujin - Dongguk University-Seoul, Seoul, Korea
 Yoon, Byungun - Dongguk University-Seoul, Seoul, Korea

Identifying Potential Fusion Technologies for Technology Development

Technological fusion between cross industries is one of the solutions for breakthrough in fast-changing business environment. Most of the fusion technologies are derived by domain experts' intuition and insights. The previous studies on fusion technologies focus on industry and macro level technologies. Thus, the fusion technological themes at micro level should be identified by utilizing massive technological information to overcome the limitation of dependency on experts' intuition. This research aims to propose the quantitative and systematic methodology for identifying fusion technology vacuums and fusion possible technology combinations at micro level.

This research consists of three modules- fusion technology vacuums extraction module, fusion possible technology combinations extraction module, technology vacuums-fusion possible technology combinations visualization module. In first module, micro-level technologies

are mapped by generative topographic mapping (GTM) and technology vacuums are identified. In second module, fusion possible technology combinations are identified by calculating potential fusion synergetic linkage strength which is derived from the relation matrix between patent classifications. In third module, appropriate fusion possible technology combinations are matched to technology vacuums and visualized by network analysis. To demonstrate the proposed method, display and organic/inorganic material technologies are selected as an illustration with relevant patent data. We find that the proposed method suggest meaningful results in terms of fusion technology fields identification reflecting the contents in the national science and technology strategy and policy report on core fusion technology of next generation multi-functional material area.

Paskaleva, Krassimira - Manchester Business School, Manchester, UK
 Cooper, Ian - Eclipse Research Consultants, Cambridge, UK
 Lombardi, Patrizia - Politecnico di Torino, Italy

Smart city governance and its implementation in service co-production: an innovation management perspective

Addressing governance-related challenges has been identified as key to effective co-production of smart city services. Yet questions remain about the extent to which well-grounded approaches to governance are being employed in practice. Citizen participation, effective stakeholder collaboration, leadership and private/public partnerships have been already identified as critical factors here. Missing is a cohesive/comprehensive understanding of the governance framework to underpin the innovation eco-systems necessary for nurturing the collaborative processes needed to create new value and construct the services people need. This paper focuses on this relatively understudied area of governance and its alignment with the current conceptual evidence-based literature on smart cities and service innovation. Drawing on key cases that display specific relational understandings, criteria and assessment metrics, the paper shows how governance has been used to ground different approaches to smart

city service co-production - treated as a collaborative, life-cycle, process involving all stages of service development from conception to design, delivery and re-use, integrated by comprehensive and iterative evaluation activities. Evidence is sought of both theoretical and practical advances of effective implementation of governance in smart city co-production processes, particularly where demonstrated through robust evaluation, benefiting management practices. The paper deepens current debates by examining how governance principles and forms are integrated within key conceptual frameworks for smart cities and the quadruple helix model, examining the latter's underlying proposition that, in the smart city, seamless interaction and mash-up of ideas are created through open innovation between government, industry, academia and citizens operating in innovation ecosystems.

Peretti, Alberto - University of Pisa, Italy
 Callaert, Julie - K.U. Leuven, MSI; INCENTIM; ECOOM, Leuven, Belgium
 Appio, Francesco Paolo - University of Pisa, Italy
 Martini, Antonella - University of Pisa, Italy
 Van Looy, Bart - K.U. Leuven, MSI; INCENTIM; ECOOM, Leuven, Belgium

Technological specialization: a pathway to wealth creation?

The impact of the economic crisis is forcing regions to rethink their overall approach to regional economic development. At the basis of regional economic competitiveness and social well-being lays a focus on innovation as a set of territorially grounded policies, multi-level in their governance structure and tailored to the reality of individual regions. Parallel to this emphasis is the strategic allocation of scarce public funds, a European policy that has been labelled as 'Smart Specialization'. Recently this notion has been advanced as instrumental to create economic welfare on the level of regions; its goals are identifying and fostering domains of existing and potential competitive advantage, where regions can specialize in diversified ways compared to other regions ('specialized diversification').

On this line, the aim of this work is to check whether and to what extent different industrial policies of specialization and diversification affect regional

performance; a methodology consisting on patent-based indicators is introduced to compute related variety, unrelated variety, and specialization measures. Using data referring to EU-27 regions at NUTS 2 level is shown the goodness of the technological diversification, and in particular related variety, as driver for developing new growth paths beneficial for regional economy; on the contrary, the technological specialization displays a negative impact on regional performance.

Petraite, Monika - Kaunas University of Technology, Kaunas, Lithuania
 Podmetina, Daria - Lappeenranta University of Technology, Finland
 Soderquist, Klas Eric - Athens University of Economics and Business, Greece

Designing and Developing Organizational Competence Portfolio for Open Innovation

Organization of innovation has been always a tricky question, as the matter is complex, and could be elaborated from the theory of organizations, process management theories, or innovation theory itself. Thus the shift the organizations are experiencing while shifting towards an open innovation management practices are also complex. From the organization management perspective we know, that management, including innovation management, becomes less „organized“ by bureaucracies and administrative tools, and much more impacted by organizational capabilities, competences and hidden, „soft“ routines that bring innovation and creativity to the core of organization. Organizational capabilities, including dynamic capabilities (Teece, 1990) are largely based on the competences and processes that organization is nourishing. The research in the area of organizational competences and skills for open innovation is needed, because the adoption of open innovation practices and new busi-

ness models by companies have brought new professional profiles and roles, leading to creation of new sets of skills and competences that managers, staff and future employees should acquire. According to Mortara and Minshall (2014) there is clear evidence that companies, adopting open innovation have changed the way of recruiting new employees and the skills they are looking for. Once company decides to open up their innovation process, the internal structures change, the new tasks and challenges emerge, and employees are no longer expected to have technical-scientific or managerial expertise only but, in addition, they should possess certain competences and skills (Bredin and Söderlund, 2006; Huston and Sakkab, 2006). However, the description of these required capabilities often remains vague. The questions are of individual and organizational type: what kind of new competences are needed for successful management of open innovation... [...]

Pettigrew, David - University of Technology, Sydney, Australia
 Thurgood, Clementine - University of Technology, Sydney, Australia
 Bucolo, Sam - University of Technology, Sydney, Australia

Design led growth: lessons from Lean

The success of Design Thinking as a business approach for driving innovation is achieving increasing recognition and support as a strategic mechanism to help companies differentiate and compete in global markets. Approaches like Design Led Innovation comprise a central concept or framework driven by design principles, which is supported by a range of design tools and practices such as reframing, narratives, and prototyping. Despite the widespread acceptance of Design Led Innovation as a means for innovating, many commercial organisations struggle with the adoption and application of design thinking concepts in practice. This is particularly the case for small to medium sized firms, which are a key sector in most western economies.

A number of firms implementing Design Led concepts have drawn parallels with Lean Thinking, an expansion of lean manufacturing, which is a management approach adopted and successfully implemented by thousands of firms over the

past 30 years. Lean Thinking or commonly just 'Lean', is a philosophy which takes customer value as its critical starting point. There are a number of similarities between Design Led Innovation and Lean techniques. Both these concepts have an underpinning philosophy, seek growth through significantly improved business competitiveness, focus on customer value, and employ a range of methodologies or 'tools', but are much more than the sum of their toolkits.

In this paper, we argue that by understanding the means by which Lean was successfully adopted as a business growth strategy together with appreciating the similarities and differences between Lean and Design Led Innovation, we can draw insights into how Design Led Innovation can also be successfully adopted by companies. We present findings from a Roundtable discussion with companies who recently participated in a Design Thinking program.

[...]

Phaal, Robert - University of Cambridge, UK
 Kerr, Clive - University of Cambridge, UK
 Ilievbare, Imoh - University of Cambridge, UK
 Farrukh, Clare - University of Cambridge, UK
 Routley, Michele - University of Cambridge, UK
 Athanassopoulou, Nikoletta - University of Cambridge, UK

Self-facilitating templates for technology and innovation strategy workshops

Aligning technology and other functional perspectives for innovation and strategy is challenging. This is compounded by communication barriers arising from high levels of complexity, uncertainty and ambiguity associated with technologically intensive innovation. Conceptual frameworks, tools and methods such as roadmapping, portfolio matrices and scenario planning are used to support the management of technology and innovation activities. These often have a strong visual aspect that helps to address the issues of dialogue exchange and interaction. From a visual perspective, roadmapping is of particular interest given its prominence as a flexible method and highly visual tool. This paper focuses on the mediating role that structured roadmapping templates have during interactive strategy workshops. An experiment comparing the performance of two templates is reported, comparing a 'classic' format

with a new template that was designed to be 'self-facilitating'. This new template incorporates guidance that a facilitator would normally provide, in order to minimise intervention and empower groups to organise their own strategic discussions. The new template is shown to perform significantly better in terms of completeness, consistency, quality and ease of use.

Picone, Pasquale Massimo - University of Catania, Italy
 Damaraju, Naga Lakshmi - Indian School of Business (ISB), India
 Dagnino, Giovanni Battista - University of Catania, Italy

Absorptive Capacity and Performance: The Effect of Diversified Business Group Affiliation

This paper brings two streams of research, i.e., the research on the relationship between absorptive capacity and firm performance and the research on affiliation to diversified business groups and firm performance, together to hypothesize and examine some nuanced relationships. Absorptive capacity is hypothesized to mediate the relationship between a business group's span of diversification and performance. The aforementioned relationships are examined using data from Prowess, the database on Indian companies maintained by the Center for Monitoring Indian Economy, which has been widely used in prior studies on Indian firms (for instance, Khanna & Palepu, 2000).

Pisano, Paola - University of Turin, Torino, Italy
 Pironti, Marco - University of Turin, Torino, Italy
 Beltrami, Maurizio - Strategyn partner, Switzerland

Outcome based business model innovation: rethinking the business model innovation

Even if innovation is a tricky concept to be defined, almost firms need to innovate. Moreover, an innovative approach cannot be limited to the process for developing innovative products, but must encompass the concept of innovating the business model around it. To clarify the concept of business model and identify its main features, this paper proposes a framework based on the application of outcome based innovation model to create innovative business models.

It has been acknowledged that managing innovation is an uncertain practice (Christensen, 2003) surrounded by accidental events, intuition and experience of individual, heavy dose of serendipity and unconventional practices none of which are necessarily relevant. According to the growing importance of innovation, the strategic role of the outcome methodology as alternative methodologies for fostering has been considered (A. Ulwick, 2002).

Even if innovation is traditionally regarded as a matter of technology and products (Norman and Verganti, 2012) business model (B.M.) has started to be recognized as a new area of innovation. B.M. became an important concept for innovation (Amit and Zott, 2010; Chesbrough, 2010; Teece 2010) and some tools based on it were developed to explore new opportunities in uncertain scenarios (Osterwalder and Pigneur, 2010).

These tools help to describe how organizations work and generate revenues. More precisely, they assist managers to conceptualize and communicate the different activities their companies employ to generate value and its mechanisms to create innovative products and services. Thanks to the business model tools as Canvas Business Model (Osterwalder, 2010) B.M. started to be considered as one key business lever that shapes to the overall value delivered to the customer... [...]

Potì, Bianca - CNR IRCRES, Italy
Zanier, Francesca - La Sapienza, Rome, Italy

Academic source of knowledge and the mediating role of academic spin-offs to the local context.

The socio-economic role of universities towards economic growth can be realized through many channels: offering a good endowment of highly educated and productive people; transferring research content and results through patent licenses and new enterprises; attracting talented human capital and high tech enterprises. The academic creation of new enterprises in particular have attracted much attention by economic literature, but it still remains a subject of exploration in Europe, given its relatively recent development and heterogeneity. Understanding the academic spin-off nature can help in understanding its role in wealth creation: is it close to the technical entrepreneur (Oakey, 2003), witnessed by Silicon Valley and other high-tech clusters or is it an “hybrid” academic entrepreneur (Duberley et al., 2007) and which are the possible growth patterns? A relevant aspect is the definition/boundaries of the unit of analysis, since, as many scholars underline, a big problem in spin-off analysis is the

heterogeneity of the subject, which can produce different results.

Our empirical results show that the academic spin-offs, in which the public university has a direct and active role, are mainly “hybrid” companies, where the academic founders are oriented to maintain their position in the university, while playing an entrepreneurial role. They are mainly “soft companies”, with a low need of funding and of managerial skills. In terms of sectors there is coherence with other empirical results: the main sources of knowledge are engineer disciplines, ICT and biomedicine. We find that the academic spin-offs in our sample are concentrated on the less complex activity in terms of resources and support from university, i.e. consultancy and research services, which are closest to the scientific academic work, not demanding patent protection neither significant technological development.

Pries, Fred - University of Guelph, Ontario, Canada
Talebi, Alireza - University of Guelph, Ontario, Canada
Schillo, R. Sandra - University of Guelph, Ontario, Canada
Lemay, M. Amy - University of Guelph, Ontario, Canada

Risk factors affecting emerging technology based industries: The case of the biofuels industry

Governments make significant investments in scientific research and development. But is it businesses that turn the resulting technologies into new products and services. Innovation is risky and these risks come from many sources. Companies attempt to limit and manage their risk, and the perceived risks associated with new technologies will affect the extent to which businesses adopt new technologies. The biofuels industry is an example of an emerging industry in which growth has stalled. The purpose of this paper is to identify some of the barriers to growth in the biofuels industry. We do this by addressing the research question: What are the most important risks facing companies in the biofuels industry?

We analysed 625 risk factors disclosed by 24 publicly traded biofuel companies. We found that the most important risk factors related to management and management processes, and to market conditions and profitability. We found that biofuel companies generally view technological risks,

including those related to intellectual property protection, as less significant. Our study responds to the call for more research on the effect of risk on technological innovation and also has numerous implications for R&D management and for policy makers looking to support emerging technology based industries.

Pucci, Tommaso - University of Siena, Italy
 Casprini, Elena - Scuola Superiore Sant'Anna, Pisa, Italy
 Zanni, Lorenzo - University of Siena, Italy

Firm's innovation and economic performance: an empirical analysis in Life Sciences sector

The aim of this paper is to bridge the gap between internal resources and capabilities and external inter-organizational relationships in order to explain the firm's innovative capacity and economic performance. After a literature review on internal resources (R&D expenditure and level of education of the workforce) and capabilities (managerial capabilities, relational capabilities and technology orientation), we propose a distinction between the locus (local vs. distant) and the scope (operational-oriented vs. innovation-oriented) of inter-organizational relationships, considered as external resources. The conceptual framework sees two stages. First, it looks at the main effect of internal resources and capabilities and (local and distant) innovation-oriented inter-organizational relationships on the innovative capacity of the firm, considering also the moderation effect of local and distant innovation-oriented inter-organizational relationships. Then, it analyzes the main and moderation effect of

local and distant operational inter-organizational relationship on the innovative capability-economic performance link. Two econometric models, first a zero-inflated negative binomial regression model and then an OLS regression models, are developed based on a composite dataset of 151 firms in the life science sector.

The results show that technology orientation and distant innovation-oriented inter-organizational relationships have a positive, main effect on the firm's innovation capacity. Moreover, the distant innovation-oriented inter-organizational relationships also positively moderates the impact of the level of education of the workforce on the firm's innovative capacity. Then, economic performance is positively moderated by the innovative capacity, local operational-oriented inter-organizational relationships and their interaction.

Pugliese, Roberto - University of Udine; Elettra - Sincrotrone Trieste S.C.p.A. Italy
 Zupic, Ivan - University of Ljubljana, Slovenia; COBIK, Ajdovščina, Slovenia

The growth drivers of start-up firms: towards a systematic literature review

In this paper we apply process-based lenses to review 170 studies related to the growth of start up firms. In particular, we classify existing studies in four quadrants, based on the adoption of such studies of a process-based theoretical approach and a process-based empirical method. By doing so we offer an original standpoint from which re-interpreting the results obtained by previous studies and we also highlight potential and real contradictions in the literature.

Rangus, Kaja - University of Ljubljana, Slovenia
 Cerne, Matej - University of Ljubljana, Slovenia
 Maqbool, Saif - University of Udine, Italy

The interplay of microfoundations of open innovation: A multilevel analysis of leadership tactics and employee openness

While open innovation is a well-recognized theoretical concept in the literature, little is known about the human side of those processes. Successful open innovation implementation requires competent and visionary leaders as well as open-minded employees open to leaders' suggestions and ideas. Still, little research attention is paid to the individual- and team-level open innovation. The aim of this study is to explore the influence of leadership influence tactics (in form of building open-innovation coalitions) and employee openness towards others (i.e., other-interest) on innovation performance at the individual and team levels. To test these relationships, we applied a multi-level analysis on a sample of 85 employees and their 15 direct supervisors/team leaders. We find that leaders' building open-innovation coalitions is positively related to employee openness towards others, as well as individual-level innovative behaviour. Moreover, we show that the relationship between employee

openness towards others and individual-level innovative behaviour is moderated by leaders' building open-innovation coalitions. Additionally, the leaders' building open-innovation coalitions variable is positively related to the team-level scope of innovations, as well as the team-level innovation implementation phase. Finally, the implications for theory and practice are discussed.

Rayna, Thierry - Novancia Business School Paris, France
 Striukova, Ludmila - University College London, UK
 Darlington, John - Imperial College London, UK

The Impact of 3D Printing Platforms on Business Model Innovation and Open R&D

Based on 22 case studies of online 3D printing platforms, this paper investigates the impact of this new kind of platforms on business model innovation and open R&D. To do so, a comprehensive business model innovation framework is provided. Based on this framework, the overall impact of 3D printing on business model innovation is assessed. It is shown that 3D printing not only affects a large proportion of business model components, but also enables a rapid reconfiguration of business models, hence potentially increasing the speed of business model innovation. A service-based taxonomy of the 3D printing platforms is built based on the sample platforms. This taxonomy is then used in conjunction with the business model innovation framework to assess the impact of current 3D printing platforms on business model innovation and open R&D. It is shown that, while current platforms support business model innovation, their lack of integration of users in value networks hinders value creation.

Likewise, few of the current platforms are found to be well suited for open R&D. Consequently, 3D printing platforms will have to evolve to fully unleash the potential of 3D printing.

Rizzi, Francesco - Scuola Superiore Sant'Anna, Pisa, Italy
 Pellegrini, Chiara - Scuola Superiore Sant'Anna, Pisa, Italy
 Battaglia, Massimo - Scuola Superiore Sant'Anna, Pisa, Italy

Social finance: customer-oriented innovation or product for new customers?

Over the last decade, a new landscape of social finance has been developing rapidly, yet academic literature on the phenomenon has been limited. The way this manuscript aims to address this gap is twofold: (1) connecting the dots between current theory and different investment rationalities and logics spontaneously adopted by a related variety of SF institutions for creating social and financial value to conceptualize social finance as a pre-paradigmatic field; (2) empirically exploring the institutionalization process occurring in social finance to identify dominant institutionalization patterns. A sample of seventeen social finance institutions in Ireland, Italy and the UK is examined. From the analysis of legitimization dynamics at the organizational, intra-organizational, inter-organizational and institutional level, two forms of social finance, i.e. SII and EB, emerge as leading the institutionalization and paradigm-building process. These forms differ in business models and value proposi-

tion for customers, but they both assume the need for social impact as pressure towards the disruption of traditional financial approaches. Since cultural embeddedness emerges as a main driver of cognitive dynamics, the paper concludes by suggesting convergence of the two dominant models as a desirable development for globalizing the paradigm shift.

Rizzo, Ugo - University of Ferrara, Italy
 Rentocchini, Francesco - University of Southampton, UK
 Ramaciotti, Laura - University of Ferrara, Italy

How to Become a Grown-up: Organisational and Firm Level Characteristics of UK High-Performing Academic Spin-Offs

The engagement of universities in knowledge and technology transfer activities is a topic that has attracted an increasing amount of interest in the last years, both among scholars and policy makers. Governments worldwide have been calling for greater interaction between universities and industry under the rationale that this interaction is instrumental to foster technological development and economic achievements (OECD, 2003; Dutrenit & Arza, 2010) and to strengthen the co-evolution between scientific and commercial opportunities (Rosenberg & Nelson, 1994). Among the wide variety of mechanisms available to Universities to interact with industry, the last two decades have witnessed an upsurge in the creation of academic spin-offs by Universities worldwide in the hope to translate the results of academic research into tangible entrepreneurial results (Lockett et al., 2005).

Academic spin-offs (ASO) are firms created to exploit the results of research con-

ducted in academia (Pirnay et al., 2003). They are considered important for economic growth because of their positive impact on the processes of technological change and economic development (Vincett 2010). This has prompted numerous studies in economics and management that investigate the factors related to the propensity of universities to generate academic spin-offs (Di Gregorio & Shane, 2003; Lockett & Wright, 2005).

Several studies investigate the determinants of ASO creation, at different levels of analysis, and especially at the university/organisational level (O'Shea et al., 2008). The current literature identifies a set of university level factors that influence the generation of ASO firms. These include: research income, especially from industry; the presence, age and expertise of a TTO; experience and frequency of technology transfer activity; university quality and contextual characteristics... [...]

Rodani, Bruno - Wenovate Open Innovation Center, San Paulo, Brazil
 Colonna, Carla - Wenovate Open Innovation Center, San Paulo, Brazil

Open Startups: connecting startups to Corporate R&D

Since Sarasvathy (2001) first developed the concept of effectuation it has attracted a great attention of entrepreneurship research. Nevertheless, it was only when Ries (2011) coined the concept of lean startup and (together with Steve Blank and Alexander Osterwalder) started their movement that some elements of effectual entrepreneurship were rapidly disseminated to practice. On the corporate side, something similar has happened. Despite the work of many of its predecessors on the field of innovation management it was only after Chesbrough (2003) has coined the term open innovation that practitioners started to systematically introduce more distributed innovation processes within their companies. On the past decade we observed a growing number of business plan/startup competitions being reframed around the new set of prescriptions of the lean startup experts. At the same time, it became more and more common to find large corporations launching innovation contests to attract external

ideas as an easy way of 'opening up' their innovation processes. Albeit the popularity of those practices their efficacy both for entrepreneurs (lean startup based competitions) or corporate managers (open innovation contests) is yet to be proven. Interestingly enough, the opening up of corporate innovation and the rising number of startups competitions are naturally linked as they bring new resources to the ecosystem. In this article we present the case study of Desafio Brasil, a 10 year-old Brazilian startup competition, and the emergence of the 100 Open Startups movement, created to develop, test and validate new methodologies on how to systematically connect startup communities and corporate R&D. Together, Desafio Brasil and the 100 Open Startup movement gathered more than 15,000 entrepreneurs, 3,000 projects and engaged more than 50 large corporations in the process. We observed that the lean startup method and the practices commonly found in open innovation... [...]

Rosca, Eugenia - Jacobs University, Germany
 Bendul, Julia - Jacobs University, Germany

Combining Frugal Engineering and Effectuation Theory: Insights for Frugal Product Development in Entrepreneurial Context

Frugal innovations are products or services with new architectures which are developed for specific applications in resource-constrained environments for entirely new customer groups. Effectuation theory and frugal innovation share similar ideas, emphasizing that in certain settings the end goals are shaped by the constraints encountered on the way. Effectuation theory has been employed conceptually for the study of product innovation in resource-constrained environments. This study combines frugal engineering and effectuation theory in order to explore the nature and processes of frugal product innovation in entrepreneurial settings. The distinct contribution of this work is the application of both theoretical concepts to a real case of frugal innovation. The findings reveal strong effectuation influences during early frugal product development stages mainly due to material, financial and affordability constraints. Moreover, insights from the application of effectuation theory comple-

ment the understanding of frugal product development in terms of how available resources shape the product design and why certain decisions are taken.

Russo Spena, Tiziana - University of Naples Federico II, Italy
 Di Paola, Nadia - University of Naples Federico II, Italy

Open Innovation Strategies in the Biopharmaceutical Industry

The paper sheds more light on the relationships between internal capabilities and openness in the Italian biopharmaceutical business. Our results contribute to the emerging and updating debate on open innovation by providing an integrated perspective to the analysis of firm's capabilities as specific antecedents of the open innovation strategy.

Our framework links together the organizational, strategic and entrepreneurial perspectives to advance the understanding of the openness degree of the biopharmaceutical firms. Relying on a set-theoretic approach, we use the fuzzy-set Qualitative Comparative Analysis (QCA), based on Boolean algebra, in order to reveal the effects of the interactions between the three conditions and the outcome. We find that the lack of homogeneity of the R&D human background and the diversity in therapeutic areas influence companies' attitudes toward innovation openness.]

Sachsenhofer, Wolfgang - Vienna University of Economics & Business, Austria
 Kim, Sohyeong - Haas School of Business, University of California, Berkeley, USA
 Miles, Raymond - Haas School of Business, University of California, Berkeley, USA

Leveraging complementary assets within incumbent firms to create business model portfolios and pre-empt disruption

This paper's chief aim is to clarify the relation of business model innovation (BMI) and corporate strategy in large incumbent firms. We describe how incumbent technology corporations leverage complementary assets to create business model portfolios consisting of several (potentially) standalone business models. For this purpose, we employ Teece's (1986) concept of complementary assets and apply it to business models and BMI. Also, we propose to use the Miles & Snow Typology (1978) to outline strategies countering disruptive technologies in business ecosystems - including the use of BMI.

Concretely, we focused on incumbent firms providing individual mobility solutions - a wide ecosystem of players centered around petrol-fuelled cars (including OEMs, differently tiered suppliers, oil companies, car dealers, etc). This ecosystem is currently under threat by other, emerging ecosystems, the most prominent centered around electric vehicles (EVs).

We provide an overview of different incumbent strategies (including BMI) based on the Miles & Snow Typology (1978) and interpret the ecosystem's disruption's state of the art.

Sahasrabudhe, Nikhil - Indian Institute of Management Lucknow IIML, India
Akbar, Mohammad - Indian Institute of Management Lucknow IIML, India

Firm's intent to crowdsource: Does organizational culture matter more than national culture?

The rise of large-scale connectivity of computers, and that of social and virtual networks, is having a significant impact on how firms innovate. Firms are also leveraging a far larger and anonymous crowd of people to augment their pool of innovative ideas as well as to find solutions to business problems. This phenomenon of leveraging intelligence from the crowd is commonly referred to as crowdsourcing.

The rise in interest over the years has also attracted researchers to this area of crowdsourcing. Scholars have indeed studied different aspects of crowdsourcing, and have built up a body of research. However, what has not been adequately researched so far are the factors influencing the focal firm's intent to crowdsource. The motivation for our study was to attempt to address this gap, in part, by viewing firm's intent to crowdsource from the lens of culture. The specific research question that we investigated as

part of this study is: 'What is the relative impact the dimensions of organizational culture have on a firm's intent to crowdsource as compared to the dimensions of national culture?' This study used Cameron and Quinn's orientations of organizational culture to assess the impact of organizational culture, and Hofstede's dimensions of national culture to assess the impact of national culture. A questionnaire was prepared to gather inputs about firms' intent to crowdsource, and about their cultural dimensions and orientations. Data gathered from responses from forty eight firms operating in different countries were used for the analysis. Institutional effects such as legal and regulatory environment were controlled through appropriate variables. Comparative analysis was then conducted to assess whether organizational culture has a larger impact on intent to crowdsource or whether national culture has a larger impact, leading to insightful conclusions.

Salampasis, Dimitrios G. - Institute of Science and Technology, Luxembourg
Mention, Anne-Laure - Luxembourg Institute of Science and Technology, Luxembourg
Torkkeli, Marko - Lappeenranta University of Technology, Finland

Open innovation for "humanly embedded" financial institutions: individuals and organizations at a crossroads

This qualitative empirical paper, by talking across discipline lines and adopting a multidisciplinary approach, aims at shedding light to the highly neglected and under-developed human side of open innovation by bringing insights from the financial industry. It contributes to the limited existing literature, unveiling the peculiarities of the dynamic interconnection between the individual and the organizational spheres. This multifaceted interconnection captures a) the profile of an open innovation leader and b) the organizational ingredients, practices and mechanisms contributing to the creation of an open innovation corporate environment. Primary data has been collected from 21 in-depth semi-structured interviews conducted with C-level Executives of major financial institutions in Europe, Americas and Asia-Pacific. This paper argues that there is an emergent need for sharpening the understanding that for open innovation to be meaningful and successful, in the financial industry, the

human element must be put back on the agenda and strategic intent of the industry, per se, especially in the face of unprecedented global and organizational challenges. This paper shares novel academic and managerial implications on the dynamic co-dependence of the individual and organizational spheres towards embracing open innovation within "humanly embedded" financial institutions.

Schiehll, Eduardo - HEC Montreal, Quebec, Canada
 Hafsi, Taieb - HEC Montreal, Quebec, Canada
 Turkina, Ekaterina - HEC Montreal, Quebec, Canada

Explaining Firms' Innovation: The Role of Board Structure and Board Capital Breadth and Depth

This study examines the association between the diversity and the industry embeddedness of professional qualifications and external ties of board members board capital breadth and depth and firm's R&D intensity. Making use of a longitudinal data set, we also incorporate the notion of organizational life cycle and examine whether these associations change over time. In order to investigate our hypotheses about board capital and firm's R&D intensity, we use a nine-year panel data set (2002–2010) from a sample of 97 Canadian firms operating in the pharmaceutical industry. Our industry specific sample allows better control for the extent to which firms are exposed to similar external factors affecting innovation process, such as economic contexts, technological opportunities, and other challenges. The pharmaceutical industry is also an interesting research setting because of its complex industry dynamics, allowing us to trace how board structure and human capital relate to the resource provision

role and firm's innovation process. Our findings show that there is a significant association between board capital and firm's R&D intensity. In particular, both board capital breadth and depth have a positive effect on pharmaceutical firm's innovation efforts. At the same time, our results demonstrate that board structure negatively moderates the association between board breadth and firm's R&D intensity. We also found that firm's life cycle has a moderating effect on the relationship between board capital and innovation efforts in a way that as pharmaceutical firms become more mature, the positive effect of board capital breadth on firm's R&D intensity is stronger, while the positive effect of board depth which captures board intra-industry embeddedness becomes less pronounced. This study provides several contributions to the governance literature, and more specifically to the resource provision function of the board of directors.
 [...]

Schimpf, Sven - Fraunhofer IAO, Stuttgart, Germany

Insights into the monitoring of disruptive technologies: evidence from a study of global industry leaders from Germany

The identification of disruptive technologies is a key challenge for companies principally based on the fear of being the incumbent who misses a development that disrupts and thereby destroys current businesses. The theory of disruptive technology and innovation has been significantly shaped by Clayton M. Christensen, first through his doctoral dissertation (Christensen, 1992) getting famous through an the article "Disruptive Technologies: Catching the Wave" (Bower & Christensen, 1995) and the following publication of the well-known book "The Innovators' Dilemma" (Christensen, 1997). Compared to radical innovation that is primarily defined through its nature of exceeding a certain degree of innovation, e.g. through an entirely new set of performance features, a performance improvement of more than 500% or a cost reduction of more than 30% (Leifer et al., 2000, p. 5), disruptive technologies are defined by their effect to the market through rendering established technologies obsolete

and thus destroy the value of previous investments from incumbents (Danneels, 2004, p. 248). The prominence of the theory of disruptive technology, despite regular critical discussions (such as Lepore, 2014), is principally based on the high number of examples from different industries where disruptions occurred and lead to the failure of incumbents paired with the establishment of new players (see e.g. Christensen, 2013, Chapter 17.7). Despite the large amount of examples, the key challenge of how companies shall best respond to the danger of being disrupted in their business still remains to a large extend unanswered. Furthermore, the relevance of disruption is rising in today's global and digital economy: enabling technologies such as the internet or low cost sensors and connectivity solutions combined with extensive financing of start-up companies changed the pace at which disruptions can take place.
 [...]

Schrauder, Stefan - FA. Universität Erlangen-Nürnberg (FAU), Nürnberg, Germany
 Voigt, Kai-Ingo - FA. Universität Erlangen-Nürnberg (FAU), Nürnberg, Germany

Business model decision-making in R&D groups: a conceptual model on its antecedents and consequences in the corporate front-end of innovation

The examination of decision-making in business model research is multi-faceted and not sufficiently studied yet. This especially accounts for applying quantitative approaches and studying R&D groups rather than e.g., senior managers of existing firms or start-up entrepreneurs.

Our article builds on a previously derived literature review and conceptual research framework on business model decision-making. It extends this work by introducing a measurement scale for R&D groups' extent of business model decision-making. These groups play a major role at the technology-driven front-end of innovation. While existing theory argues that technology and business model development should go hand in hand, a quantitative examination of the antecedents and consequences of R&D groups' extent of business model decision-making has not been conducted yet.

Our research model proposes that the extent of business model decision-making in R&D groups' early innovation phase is

determined by group and organizational variables (independent variables), moderated by the innovation degree of the projects (moderating variable) and related to front-end performance, product development success and uncertainty reduction (dependent variables).

We contribute to business model research by linking a novel measurement scale for business model decision-making to literature on R&D management and the front-end of innovation. The article provides the basis for investigating drivers and outcomes in a quantitative manner and allows an understanding on the role of business model thinking in front-end of innovation activities.

Schüle, Stephan - Fraunhofer IAO, Stuttgart, Germany
 Schubert, Michael - Fraunhofer IAO, Stuttgart, Germany
 Hoyer, C. - Fraunhofer IAO, Stuttgart, Germany
 Dressel, K. M. - Ifa-Bau Consult GmbH, Stuttgart, Germany

Development of an assessment to evaluate and improve SME business models

The approach presented in this paper addresses entrepreneurs and managers of SMEs in the construction sector that are willing to refine their current business model. It is a well-known phenomenon that, on the one hand, everybody is aware about the need to adapt business practices continuously according to external drivers and circumstances. But, on the other hand, small firms have restricted personnel resources or restricted access to knowledge on business model transformation. This situation impedes plans to change or adapt the business model. However, to remain competitive in many cases there is no other opportunity - companies have to come across external constraints and adapt their business models accordingly.

Some of most important constraints the European construction industry struggles with are factors such as the identification

of their respective unique selling point, the correct strategic orientation to face competition in general and, most of all, price pressure on the European market or the development of service portfolios that satisfy today's customers. The readiness of a business model concerning the mentioned indicators but also others will be tested with the new assessment tool.

In the future, it is envisaged that the assessment, implemented as a self-assessment tool, will be part of a holistic approach that guides SMEs through the challenging journey of business model reconfiguration and adaptation. The work presented in this paper will focus on the initial stage of such a change process regarding the concept, the content with underlying success and performance indicators and procedure of the self-assessment.

[...]

Sedita, Silvia Rita - University of Padova, Italy
 Apa, Roberta - University of Padova, Italy
 Bassetti, Thomas - University of Padova, Italy
 Grandinetti, Roberto - University of Padova, Italy

Is it better to go alone or in good company? Exploring the role of business incubators in shaping the innovation performance of knowledge- and technology-intensive start-ups

The paper aims to investigate the existence of an incubation effect in the determination of the innovative performance of knowledge and technology intensive start-ups (KTISs). In particular, we evaluated the impact of the incubation effect relative to other important factors driving the innovation performance of KTISs. We measured how far the innovative performance is affected by firm-specific characteristics (innovation strategy, marketing, managerial, ICT and technological capabilities) or by the inclusion in favorable contexts such as a business incubator.

Start-up companies constitute an important dimension in the innovation process. The encouragement of the establishment and growth of innovative companies is one of the priorities in the policy of the European Union (Commission of the European Communities, 2000).

Our work focus on firms that have the potential to develop innovation with significant potential commercial application and social value. In particular we refer to start-up that combine newness and smallness, in order to identify which are the factor that positively impact their innovative performance. To analyse innovative performance we refer to the share of sales generated by products new to the market (Schneider and Veugelers 2010).

In many fields, high-technology SMEs have a key role in developing and exploiting new technologies which will play a major role in the generation of new sectors and stir the future innovations of the economy (Baumol, 2002). Large firms are increasingly looking for external sourcing of new technologies and high-technology SMEs are one of the external sources which they aim to access. [...]

Severinsson, Kristofer - Uppsala University, Sweden
 Forsberg, Petter B. - Uppsala University, Sweden

Crafting University-Industry Interactions - the discrepancy between what is valued and what is measured

University-Industry interactions (UI-interaction) - like joint collaboration projects - are currently perceived as one important answer to innovation. Perkmann and Walsh (2007), however, stresses that current research seems to lack deep descriptions and analyses of UI-interactions, especially of universities' efforts to craft such interactions from start, that is, before they are established relationships. Using an embedded case study methodology comprising of participant observation and over 60 in depth semi-structured interviews on two UI-tools deployed by a distinguished Swedish university this paper addresses three research questions concerning 1) what types of UI-interactions are created 2) what perceptions are involved and, 3) what managerial efforts and challenges are there in crafting and measuring UI-interactions

For the first question we identify four types of interaction patterns that we formulate into a typology of UI-interactions comprising of "participation", "coopera-

tion", "collaboration" and "relationship". As for the second question, we find that the perceptions and assessment of the two UI-interaction tools from companies and researchers strongly emphasizes the creation of networks and knowledge exchange rather than concrete tangible outputs. For our third question we first pinpoint that for the facilitation of successful UI-interactions all of the above mentioned interaction patterns needs to be taken into consideration. Secondly we find that there is a delicate balance for university management between formulating measurements that demonstrates towards policy actors a contribution of direct economic growth, i.e. short-term, in order to be able to justify their own existence while at the same time have indicators that capture a long-term perspective of UI-interactions. This create both ambivalence and tension for university management in much of the activities they engage in as the demand from policy is more often than not, rather short... [...]

Shapira, Philip - University of Manchester, UK; Georgia Institute of Technology, USA
 Gok, Abdullah - University of Manchester, UK
 Yazdi, Fatemeh Salehi - University of Manchester, UK

Innovation and business growth in a strategic emerging technology: New methods for real-time intelligence on graphene enterprise development and commercialization

This paper presents the results of research to develop new data sources and methods for real-time intelligence to understand and map enterprise development and commercialization in a rapidly emerging and growing new technology.

Updated and validated information on trajectories and developments in innovation in new technologies is vital today for business, researchers and research managers, sponsors and funders, and policymakers. In the world of innovation, sources of information about business and commercialization strategies are often fragmented. Surveys of businesses have inherent time lags and may not be available on a comparative cross-country basis, while proprietary studies are often selective (and expensive). The analysis of patents is a frequently-used method and although helpful also has well-known limitations, including measuring invention rather than process or downstream product innovation and not capturing the innovation

strategies of smaller technology-oriented companies who may not patent. The strategies of these smaller firms may be especially relevant in promoting discontinuous and more radical approaches to innovation. Paradoxically, increasing amounts of information about such firms is available through unstructured online sources. Yet, processing and analyzing that information can be complex and difficult to manage through reasons of its global scope, sheer size, and unstructured nature.

The paper draws on research that is developing novel and scalable methods to mine and combine information from unstructured online sources including enterprise webpages, established structured databases including data on patenting, and qualitative information.

[...]

Simms, Christopher - University of Portsmouth, UK
 Trott, Paul - University of Portsmouth, UK
 Hultink, Erik Jan - Delft University of Technology, Delft, The Netherlands
 Van Den Hende, Ellis - Delft University of Technology, Delft, The Netherlands

The adoption of new radical technology based product packaging in the FMCG industry

Radical and discontinuous innovations have been identified as critical to the long-term success of organisations, yet studies have tended to overlook the adoption of radical technological developments within low technology and process industries. This study provides new insights by examining the adoption of radical technology-based product packaging within the FMCG industry. The insights are provided from case studies examining the adoption of three radical new packaging technologies. In doing so we provide unique insights into the key role of the supply chain, and particularly retailers, to FMCG manufacturers adoption of new technologies. Further, we reveal a number of unique adoption factors including the significant influence of both actual and perceived costs associated with change in the production line. A number of implications are highlighted for both academics and managers.

Simoni, Michele - University Parthenope of Naples, Italy
Cautela, Cabirio - Politecnico di Milano, Italy

Strategic design options in launching a radical technology innovation

Technology innovation is not value per se. Managers - in launching radical technology innovations - cope with different product design options. Product design is progressively becoming a competitive lever useful to attach new cultural messages and meanings to technology, to entice new customer segments, to extend the life of technologies. The extant literature focuses on the interplay between design and technology highlighting how design can play a sort of marketing role, in addressing different customers with different product styles/languages; on the other hand, design is seen as a tool to support the new technology diffusion in the different technology developmental stages. Notwithstanding different strategic issues about this interplay still remain unclear. One of these aspects pertains how firms explore the untapped market potential of a radical technology innovation through the sequential launch of products based on different new design solutions. In the first years of a new

technology do firms focus on few "pivotal" design solutions or do they rather prefer a proliferation of different product design solutions? Do firms launch over time products design variations that create specific design trajectories or do they opt for punctuated solutions? If firms create specific product design trajectories do they follow some recognizable patterns? To answer to these questions the paper analyses the style-languages of 269 LED-based products developed by 11 firms operating in the decorative lighting industry. A sequence analysis is employed to search for product design trajectories and recognizable patterns. Results show three main patterns characterized by different strategic rationales: the "pure exploitation design approach" made of small variations along the whole product design trajectory; the "exploration-exploitation design approach" made, in the first years, of initial high variations of the product design followed in the last years, by incremental... [...]

Smolka, Christopher - WHU - O. Beisheim School of Management, Düsseldorf, Germany
Hienerth, Christoph - WHU - O. Beisheim School of Management, Düsseldorf, Germany

The Best of Both Worlds: Conceptualizing Design Options between Decentralization and Centralization for Sharing Economy Models

The sharing economy has gained researchers' and practitioners' attention over the past years. It centrally promotes the transformation from privately owned to publicly shared goods, services, and resources. Sharing economy models operate in between a decentralized and centralized spectrum, i.e. between openness and closedness. Openness is based upon the active participation of many individual actors and communities, while closedness relates to more traditional forms of firms organizing sharing activities and revenue generation and controlling resources and processes. Communities share diverse individual assets for the public good. In more traditional firm settings however, assets are generated and shared from inside the organization.

For sharing economy models, open versus closed structure- and market-related design options are traded off against each other. Those trade-offs imply that sharing economy models are complex organiza-

tional forms that can take many different designs and configurations.

Little is known about how such sharing economy models function and what design options influence the degree of decentralization and the relation between the crowd and the firm.

Specific research focus is set on the discussion of the various complex design options for companies to replicate existing or to set up and operate own model designs. Hence, this paper investigates important characteristics and design options under which sharing economy models operate and the effects of such design options for different types of models.

Referring to the emerging literature on sharing economy models and to the established literature streams on open and closed innovation systems, a Sharing Economy Spectrum is developed. The spectrum is a framework of central design options for sharing economy models. [...]

Sobreira Seoane, Juan. L. - University of A Coruña, Spain
 Faiña Medín, J. Andrés - University of A Coruña, Spain

A Temporal Analysis of the Economic Effect of Open Innovation Practices in Enterprises

This paper pretends to compare the effect of Open Innovation in Enterprises under a temporal point of view. This means that techniques of panel data are applied; this techniques offer interesting and real possibilities (i.e. unobservable heterogeneity) that complement the static analysis and invites to study how some event could change or influence in O.I. strategies in enterprises.

Furthermore, due the relevance to contribute to building a better comprehension of the Open Innovation dynamics, and especially to analysing Open Innovation at different levels (Vanhaberbake, Chesborough and West, 2014), this paper has selected one of previous existing static analysis, "Open Innovation Practices in SEMEs and large enterprises" (Spithoven, Vanhaberbeke and Roijackers, 2012). So, several studies has been analysed (Barge-Gil, 2010; Cosh et al. 2011., Gruber &Henkel, 2006 or Spithoven, Vanhaberbeke or Roijackers 2012); the last one has been se-

lected among the others "Open Innovation Practices in SMEs and Large Enterprises" (Spithoven, Vanhaberbeke and Roijackers, 2012. Small Bus Econ). The reasons are the similitudes between the datasets underlying both analysis. Spithoven, Vanhaberbeke and Roijackers use the CIS survey carried out in Belgium; this study uses the technological Innovation Panel (PITEC) which has being carried out by the INE (The National Statistics Institute).

First task of the study has been to match the variables (dependents, independents and controls) used in the above mentioned paper; the most interesting result is that the PITEC dataset allows to replicate the model; this means that results of this study could be used to increase the knowledge about O.I. by answering new questions using similar datasets existing in several countries.

[...]

Søndergaard, Helle Alsted - Aarhus University, Aarhus C, Denmark
 Bergenholtz, Carsten - Aarhus University, Aarhus C, Denmark
 Jørn Juhl, Hans - Aarhus University, Aarhus C, Denmark

Online University-Industry Collaboration: Underlying drivers influencing the likelihood to engage in online community-based problem solving

Extant studies have shown how online communities can promote collaborative and innovative activities in general. Studies on university-industry collaborations have so far focused less on online activities. We therefore set out to examine the individual and organizational drivers and barriers for academics and industrial professionals to contribute to online community-based platforms. We use a mixed method approach using both survey data and in-depth interviews with respondents from the Danish food sector.

Findings show that in line with known studies on online innovation communities in general, the main drivers for engagement are organizational and individual learning, and establishing connections, rather than monetary incentives. In contrast to offline studies on university-industry interactions, well-connected academics are less interested in online communities of academics and industry professionals. Finally, the type of knowl-

edge to be exchanged is important. Problems should not be too complex, the locus of knowledge unknown and in the early phase of development, in order for an online form of interaction to be appealing.

Sorrentino, Mario - Second University of Naples, Italy
 Castaldi, Laura - Second University of Naples, Italy
 Delli Paoli, Angela - University of Salerno, Italy

Factors explaining the growth of small dedicated biotech firms: Evidence from Italy

Small dedicated biotech firms (SDBFs) are entrepreneurial ventures whose core business activities are research and development of products, processes, technologies and platforms based on biotechnology. SDBFs play a central role in the development of the biotech industry as they translate the results of basic and applied research into innovative technologies, processes, products, and applications, of great potential impact on modern society. While SDBFs are proliferating worldwide, many of them still remain very small and face obstacles to growth. Since the 1990s, there has been growing interest in the growth and performance of biotech firms. Although these research efforts have been directed at explaining the dynamic of growth and performance of biotech companies, our understanding of the factors that significantly influence achieving and maintaining sustainable growth specific to SDBFs remains embryonic.

Building on these premises, the goal of this paper is to understand the factors explaining differential growth in SDBFs. Our analysis refers to SDBFs operating in an emerging biotech industry, the Italian one, in which their number has grown at a rapid pace but their performance in terms of growth has been mixed. We tested our hypotheses on a highly representative sample of 55 Italian SDBFs. Results of a regression analysis show that location in science parks, upstream partnerships with universities and research centers, and internationalization of research teams significantly contribute to explain firms' growth. Conversely, alliances with other small biotech companies exert negative effect. This result challenges the general belief according to which partnering among firms in the biotech industry is necessary and also very widespread. Implications for management of small companies in emerging biotech industries as well as suggestions for future research are discussed.

Spanò, Rosanna - University of Naples Federico II, Napoli, Italy
 Sarto, Fabrizia - University of Naples Federico II, Napoli, Italy
 Caldarelli, Adele - University of Naples Federico II, Napoli, Italy
 Viganò, Riccardo - University of Naples Federico II, Napoli, Italy

Measuring performance towards innovation: an adaptation of the Balanced Scorecard for research-intensive networks

Literature claims that the implementation of performance measurement systems plays a central role to support effective R&D activities and innovation. However, while most of studies have focused on individual organizations, the issues relating to networks seem quite neglected, even if these complex organizations represent the best solution to support innovation processes. On this ground, the purpose of this paper is to suggest the adoption of a multidimensional performance measurement tool within innovative networks, in order to achieve an effective interplay between innovation and control. More specifically, building on previous literature, the paper recommends an adaptation of the Balanced Scorecard, through the development of specific key performance indicators to enrich each of the four perspectives with the innovation elements (only implicitly considered in the original model). The paper employs the case study of the network Campania Bioscience to

develop an innovation-oriented Balanced Scorecard to show the practical potential of this integrated theoretical approach to innovation, measurement and control.

Stefan, Ioana - University of Gävle, Gävle, Sweden
 Bengtsson, Lars - University of Gävle, Gävle, Sweden
 Niss, Camilla - University of Gävle, Gävle, Sweden

Potential and realised knowledge integration mechanisms in open innovation

The purpose of the paper is to analyse how the use of knowledge integration mechanisms (KIMs) relates to openness towards external innovation partners, and, furthermore, to identify which of the potential KIMs are effective in leveraging openness into innovation performance. Based on survey data from 415 firms the findings show that the six KIMs investigated (intellectual property protections mechanisms (IPPMs), project management, access to and complementary of resources, and trust) have different effects on enabling knowledge integration in inbound open innovation. Our main conclusion is that the distinction between potential and realised KIMs is elucidating for understanding which and how different kinds of openness could lead to innovation performance.

Stefanizzi, Pasquale - University of Salento, Lecce, Italy
 Elia, Gianluca - University of Salento, Lecce, Italy
 Margherita, Alessandro - University of Salento, Lecce, Italy
 Minutiello, Pasqua Liana - Reconta EY, Milano, Italy

Equity Crowdfunding in Italy: State of the Art and Future Perspectives

Crowdfunding represents a crowdsourcing strategy for collecting from a large audience the financial resources required to launch an entrepreneurial project. It leverages on the power and wisdom of the crowd to identify, select and fund promising entrepreneurial projects. Regardless of its typology (equity, donation, lending or reward), crowdfunding provides a valuable support to sustain innovative ideas and projects, mainly at early-stage, thus contributing to diffuse the entrepreneurial culture worldwide. In particular, equity crowdfunding offers to investors the opportunity to participate actively to the development of an entrepreneurial project. For what concerns the Italian situation, a recent study highlighted three main issues hindering the development of the equity crowdfunding: the relationships with investors, the information asymmetries, and the project reliability. To face these issues, a wide set of norms and laws has been introduced to mitigate the risk and guarantee security and trust.

Framed in these premises, this paper aims at reaching a twofold goal: 1) develop a deeper understanding of the equity crowdfunding scenario in Italy, also by analysing all the entrepreneurial projects submitted to the Italian equity crowdfunding platforms within February 2015; 2) collect and analyse the entrepreneurs' insights and other existing issues, thus making some suggestions for improving the Italian equity crowdfunding system. The results of this study might be useful for policy makers in charge to manage the Italian regulation on crowdfunding, as well as to sensitize potential entrepreneurs in using crowdfunding to finance their startups or to support the arising of innovation and entrepreneurship within their companies. Finally, also private investors and financial operators can be interested in this study to evaluate if entering in this emerging business.

Tamayo, Mery Patricia - Universidad EAFIT, Medellín, Colombia
 Huergo, Elena - Universidad Complutense de Madrid, Spain

Determinants of internal versus external R&D offshoring: evidence from Spanish firms

This paper analyzes the determinants of R&D offshoring of Spanish firms using information from the Panel of Technological Innovation. We find that being an exporter, continuous R&D engagement, applying for patents, being a subsidiary, and firm size are factors that positively affect the decision to offshore R&D. In addition, we obtain that the factors that influence this decision for firms that belong to a business group differ depending on whether the firm purchases R&D services within the group or through the market: the lack of information is an obstacle relatively less important for internal R&D offshoring than for external R&D offshoring, while a higher degree of importance assigned to institutional and market sources of information for innovation as compared to internal sources increases the probability of R&D offshoring through the market.

Tandrup, Thomas - The Technical University of Denmark, Kgs. Lyngby, Denmark

How firms internalize information for external collaborators in NPD: A contingency approach to understanding Open Innovation

The majority of research into the areas of external collaboration has looked at the benefits of including external sources for innovation into the NPD process. External collaborators can then be said to mitigate the uncertainty involved with new products by providing the firm with knowledge and information that makes the NPD more market relevant (Gassmann, Sandmeier, & Wecht, 2006; von Hippel, 2009). However, research into customers as sources for innovation has been divided on their value in promoting very innovative new products (Hamel & Prahalad, 1993; Sandmeier, 2009), and similar discussions are prevailing within research into suppliers as collaborators (Eisenhardt & Tabrizi, 1995; Melander & Tell, 2014; Petersen, Handfield, & Ragatz, 2005). Both of these areas of research have shown mixed result depending on the level of innovativeness and the extent of integration of external collaborators in the NPD project. This indicates that while external collaboration can improve NPD performance it

might also prove a hindrance depending on the level of innovativeness involved in the NPD project. The more innovative the NPD project, the more challenging it is to gather relevant market information and disseminate it internally (Carlile, 2002). To the best of our knowledge, little attention has been given to the information processing capabilities needed to identify, acquire and disseminate information from external collaborators.

To get an understanding of the structures and culture needed to adequately identify and integrate potential collaboration opportunities into the firm's internal NPD processes we turn to market information processing theory (Lim, 1995). When viewing the firm as an information processing system the capability to track changes in the marketplace, alerting the organization about these changes, evaluating their potential effects and acting in anticipation of these changes are central to sustain... [...]

Taran, Yariv - Aalborg University, Aalborg, Denmark
 Nielsen, Christian - Aalborg University, Aalborg, Denmark
 Thomsen, Peter - Aalborg University, Aalborg, Denmark
 Montemari, Marco - Università Politecnica delle Marche, Italy
 Paolone, Francesco - Teramo University, Italy

Business model process configurations: a mapping tool for fostering innovation

Purpose - The paper aims: 1) To develop systematically a structural list of various business model process configuration and to group (deductively) these selected configurations in a structured typological categorization list. 2) To facilitate companies in the process of BM innovation, by developing (inductively) an ontological classification framework, in view of the BM process configurations typology developed.

Design/methodology/approach - Given the inconsistencies found in the business model studies (e.g. definitions, configurations, classifications) we adopted the analytical induction method of data analysis.

Findings - A comprehensive literature review and analysis resulted in a list of business model process configurations systematically organized under five classification groups, namely, revenue

model; value proposition; value configuration; target customers, and strategic partnerships. Based on the list of configurations developed, and the five classification categories chosen, a business model ontology was developed followed by three testable propositions, aimed at facilitating companies in selecting the most applicable business model process configurations, based on their own strategic preference, as part of their business model innovation activity planned.

Practical implications - This paper aimed at strengthening researchers and, particularly, practitioner's perspectives into the field of business model process configurations. By insuring an [abstracted] alignment between the five classification categories chosen by us to map various configurations, and the ontology developed, practitioners will be better equipped to design, evaluate, implement, and innovate their business models.

Tempelman, Erik - Delft University of Technology, Delft, The Netherlands
 Adamovic, Nadja - Vienna University of Technology, Vienna, Austria

Experiences from recent European research projects on the interplay between technology and design

Materials and design are both regarded as major sources of innovation that normally work independently: materials R&D generally works without specific end users in mind, while product design applies existing materials only. The question can however be raised if by cooperating, both sides could not gain advantages in terms of faster development, better products, or both. Two EU funded research projects, conceived in 2012 and currently running, explore this concept of "design driven materials innovation" (DDMI): these are the Solar Design project and the Light.Touch. Matters project, see www.solardesign.eu and www.light-touch-matters-project.eu. This contribution presents the scope and aims of both projects, and discusses the first lessons to learn with respect to innovation theory. Apart from expected barriers in terms of cultural barriers and different timeframes for measuring progress, DDMI practice shows that in particular the management of expectations is a key challenge, and that terms such

as "material properties" or even "material samples" can easily cause severe misunderstandings. Good consortium composition and balancing appears as yet another driver for success. Key to the effective and efficient involvement of designers in materials R&D, and of materials researchers in product design, is that both sides can engage in a productive dialogue. For this to work, a shared vocabulary must obviously be built up first, but seemingly straightforward issues, such as planning of joint events and the formats of presenting, are at least equally important, as is building up mutual respect - which mainly requires time. These conclusions are borne out in both projects, despite the different particulars of scope and divisions of work.

Tosi, Virginia - University of Macerata, Italy
 Fraticelli, Fabio - Università Politecnica delle Marche, Italy; Uni of Lugano, Switzerland

Measuring the impact of personal mastery on organizational innovation in start-ups

Personal mastery is the fine art of managing one's mind (Senge 1990) that allows a personal and professional development (Garcia-Morales et al. 2007). As the product of a creative orientation, personal mastery increases aptitude and personal capability to learn and innovate (Maani and Benton 1999; Senge, 1990). In recent years, authors (Garcia-Morales et al. 2007) found that personal mastery influences organizational performance positively, both directly and indirectly through organizational learning and innovation. The aim of this paper is to look at the impact of personal mastery on a start-up's capability of learning and relating itself to the evolving business network. The results show that in start-ups leaders' personal mastery has a positive impact on start-ups innovation performances, specially in terms of lead time from the kick-off of the new venture and its "first sale". Moreover, personal mastery of leaders seems to be a predictor of success in start-ups.

Tottie, Magnus - LKAB, Malmberget, Sweden
 Lager, Thomas - Université Mohammed VI Polytechnique, Ben Guerir, Morocco
 Nordqvist, Sofia - Luleå University of Technology, Luleå, Sweden

From customer understanding to product understanding: The case of fuzzy front-end innovation at the LKAB company

Product innovation will continue to play a strategic role for companies producing high-quality, functional products for customers in the steel industries. In the future, creating improved or radically new products will necessitate not only the development of product concepts resting more on an applied research knowledge base but also co-creation with customers. LKAB is a world-leading producer of processed iron ore products for steelmaking. The development of next-generation pellet products in collaboration with lead-users presented an opportunity for a single case study of co-development in a B2B context. Two lead-users were customers for present products, while one was a technology/equipment supplier. Using a framework grounded in co-innovation and lead-user development, the mpQFD system (adapted to process-industrial use) was deployed as the development methodology. The "Voice of the Customers" was co-developed and translated into product design requirements in a House of Quality, thus providing a new knowledge base and an improved "customer understanding". Selected design requirements were afterwards progressed into a Product Matrix, where they were related to explanatory inherent product characteristics creating an improved "product understanding". Together with the House of Quality, it will constitute an improved "integrated knowledge platform" for the development of new product and process concepts. It is argued that this development approach also could be applied in other process-industrial sectors serving industrial customers in an open innovation perspective.

Trabucchi, Daniel - Politecnico di Milano, Italy
 Buganza, Tommaso - Politecnico di Milano, Italy
 Pellizzoni, Elena - Politecnico di Milano, Italy

Re-design two-sided markets strategies in high-tech industries

In our globalized world new competitors continuously appear from everywhere at anytime, especially in high-speed changing fields, like e-business and mobile apps. Besides that, consumers are getting used to have free services and companies are not always able to capture the created value. Advertising - a typical two-sided market mechanism - is the primary way that companies use to appropriate value in these environments. In an ever changing world, though, companies need new business models in order to make their services sustainable and profitable in the long-term. This paper aims at showing how to re-design two-sided markets models, understanding which design variables (e.g. actors involved, relationships between players and economics streams) can be leveraged to create and capture value from new technological opportunities.

Through a case studies analysis we show how new technologies enabled a new

strategy to capture value. Leveraging on cross-side network externalities, users can be considered something more than eyeballs to be targeted with advertisements. They can become data providers, while enjoying a free (or almost free) service. By designing and implementing the right business model users can be turned into a data source, providing useful and valuable data that can create another revenue stream.

Tregua, Marco - University of Naples Federico II, Naples, Italy
 Amitrano, Cristina C. - University of Naples Federico II, Naples, Italy
 Bifulco, Francesco - University of Naples Federico II, Naples, Italy

Future internet for knowledge creation in cultural heritage

The increasing importance of technologies in many fields of research is related to the new opportunities offered by Future Internet and its paradigm of Internet of Things, which allows networked interconnections among objects and favours the combination and creation of knowledge and resources among different actors for the creation of innovative services.

One of the main context in which technologies can spread all their potentialities and support in an innovative way both knowledge creation and usage is cultural heritage; the development of ICT platforms for the collection of data is favouring the collaboration of stakeholders through the integration of their knowledge, and enabling new forms of cultural experiences for visitors and users. The achievable actions concerning the safeguarding, valorisation, and fruition of cultural heritage with Future Internet technologies are delineated in this research through a participatory action research study on DATaBenC, an high technology district for

cultural heritage, in order to understand how new technologies can favour the collection, combination, and integration of existing knowledge towards the creation of new and upgraded knowledge and the provision of innovative services thanks to the involvement of the actors shaping the ecosystem. The set of actors shaping the project depends on the technologies held by each of them to support hi-tech-based activities. The results achieved thanks to this research are helpful to depict the effects of the cooperation of all actors through technologies, leading to a series of activities leveraging on knowledge and aiming at renew services proposition in cultural heritage contexts.

Trieste, Leopoldo - Scuola Superiore Sant'Anna, Pisa, Italy
 Pagliai, Teresa - TechnoDeal srl, Peccioli, Italy
 Esposito, Raffaele - Scuola Superiore Sant'Anna, Pisa, Italy
 Cavallo, Filippo - Scuola Superiore Sant'Anna, Pisa, Italy
 Dario, Paolo - Scuola Superiore Sant'Anna, Pisa, Italy
 Turchetti, Giuseppe - Scuola Superiore Sant'Anna, Pisa, Italy

How to design a business model for technology-driven innovations like robots The case of Robot-Era

The article analyses the challenges, uncertainty and problems related to the architecture sustaining the R&D process and the design of the business models for high advanced technologies like robotic platforms.

The presented case accounts for conditions in which the R&D process and the complementary economic and managerial dimensions, as well as communication cannot be oriented or supported by the market trends or indications, being the robotic technology in a too early stage with respect to the capability of human being, and the robotic solution too advanced for the current potential adopters. The paper focuses on the challenges and problems in designing the service and business model for services delivered by robotic platforms (e.g., technology that looks for non still expressed market demand, and

medium-long run high adoption) suggesting new ways to overcome them. The proposed solution is a mix of strategies that integrate three complementary and correlated approaches: participative R&D, disruptive innovation, early and continuous dissemination.

The experience analysed is referred to the Robot-Era project, i.e. a FP7 EU project devoted to the development of three Robotic platforms that help the elderly in indoor and outdoor activities. The project analysed is devoted to the implementation and integration of advanced Robotic systems and intelligent Environments in real scenarios for aging population.

Trieste, Leopoldo - Scuola Superiore Sant'Anna, Pisa, Italy
 Turchetti, Giuseppe - Scuola Superiore Sant'Anna, Pisa, Italy

Assessing the value of the use of diagnostic technology: trade offs for GPs

The paper models the impact of new diagnostic technology on General Practitioners' (GPs) medical decision making. New challenges and advantages for GP's are given in using diagnostic technology. However, there are also some trade offs. The article analyses how the possibility of using diagnostic technology that may signal GP's skills and capability impacts on the actual use of diagnostic technology, itself. This analysis highlights the importance of assessing the value of a technology taking into consideration the users' characteristics, and how this could affect the level of potential diffusion of the technology itself.

When GPs lose reputation for wrong diagnoses (and the loss of reputation for wrong diagnosis using technology is greater than the loss of reputation for wrong diagnosis using not diagnostic technology), they may have not the incentive to use technology. So GP with low skills could be induced to use diagnostic

technology when it is not necessary since the conditions of patient are evident.

However, when the prior choice is to treat (to not treat), there are conditions for which the expected gain of additional information for using diagnostic technology increases (decreases) as the prior probability of disease increases. These results depend on the mutual relationship between sensitivity and specificity of GPs and the magnitude of the loss of reputation for wrong diagnosis in using diagnostic technology. The impact that the incentive/disincentive schemes that the potentialities of a new technology could create to the final users has to be properly assessed in order to facilitate the successful diffusion of a new technology.

Tsujimoto, Masaharu - Tokyo Institute of Technology, Tokyo, Japan

The Inertia of Service Definition: A comparative analysis of the FeliCa ecosystem

Organisational boundaries are shifting today. Organisational network forms are rapidly evolving, while the relationships among actors are becoming more complex. Consequently, the ecosystem approach to business management is of increasing significance. However, consensus has not yet been reached with regard to the most appropriate framework, analysis process, or significance of the ecosystem concept. For this paper, the author reviewed 90 previous works within the strategic management field that used 'ecosystem' as a keyword. Based on these previous publications, the author set out a framework and analysis process for the ecosystem approach. Based on this research process, this paper comparatively analyses FeliCa-based ecosystems in Japan and Hong Kong since the 1980s. Based on a historical analysis of ecosystem creation and evolution, the author finds that service definition has a dominant effect in the design stage of an ecosystem, and that early-stage service definition con-

tinuously and strongly affects the evolution of an ecosystem. The author calls this effect "service definition inertia".

Vanhaverbeke, Wim - Hasselt University, Belgium; ESADE, Spain; NUS
Roijakkers, Nadine - Hasselt University, Belgium
Lorenz, Annike - Hasselt University, Belgium
Chesbrough, Henry - University of Berkeley, USA; ESADE, Spain

Promises and challenges in connecting open innovation to strategy

There is a significant gap in the existing open innovation literature as few papers have been written to date on the role of strategy in open innovation (OI). We first explore how business strategy is shaping open innovation in different ways: Different strategic objectives require different sets of open innovation approaches. We also look at the impact of open innovation on business strategy models, realizing that the classical strategy models cannot adequately account for some of the new open innovation related phenomena emerging in many industries. We provide the building blocks for a new approach that positions open innovation at the core of business strategy. Next, we tie open innovation into corporate strategy. Corporate strategy typically targets different time horizons and OI initiatives have to be organized in line with the different objectives defined for each of these horizons. Differences in types of partners, project timespans, required skills and assets, and

the organization of innovation projects can be explained in light of the strategic objectives managers want to reach through these projects. We argue that the structure and organization of open innovation initiatives to strengthen current businesses is quite different from initiatives that aim to develop new business opportunities in the long term. We illustrate this with examples of the Emerging Business Areas at DSM. We finally show how companies set up new types of specific and hard to imitate relations with external organizations to ensure a significant impact on financial performance through "open strategies".

Vanhaverbeke, Wim - Hasselt University, Esade Business School, NU of Singapore
 Tol, Arie - Philips Intellectual Property & Standards
 Fong, Hoi Yan Anna - National University of Singapore
 Rybka, Joanna - Hasselt University, Belgium

Implementing an intellectual property strategy in large, technology intensive companies

Firms progressively develop an overall IP-strategy to maximize the benefits from their IP-portfolio. We introduced IP value models that represent different ways how companies can create and capture value with their intellectual property. Important determinants to differentiate IP value models are the focus on their own IP or IP of third parties (offensive and defensive use of IP) and the cash or strategic benefits of an IP-portfolio. Creating and capturing value through IP value models can only be realized through IP based agreements. We examine a wide range of IP activities that Philips IP&S deploys to maximize the value of the company's IP-portfolio: R&D collaborations, divestments, corporate spin-offs, IP ventures, asset deals, technology licenses and royalty-bearing license programs. As companies continue to increase their reliance on external technology to develop new offerings and are looking for ways to maximize the value of their IP portfolio, it becomes imperative to understand how IP should be managed in each of these agreements.

Vaquero Martín, María - Technische Universität Dresden, Dresden, Germany
 Reinhardt, Ronny - University of Utah, Salt Lake City, USA
 Gurtner, Sebastian - Institute for Radiooncology, Dresden, Germany

Exploring the boundaries of stakeholder integration in new product development – a systematic review

In this article we develop a model of stakeholder integration in new product development (NPD) that (i) explains the drivers of the process and (ii) proposes a framework of capabilities that firms need for successful stakeholder integration. The focus lies on external stakeholders that directly influence commercialization, purchase or adoption of products. We conducted a systematic literature review and content-analyzed the selected sample of 103 peer-reviewed journal articles. The study was restricted to the medical device industry to enable the use of specific search terms and the consistent categorization of information. In the full paper we dedicate a section to show how the framework applies to other settings. The drivers of stakeholder integration were classified into push factors (i.e.: expected benefits for the focal firm) and pull factors (i.e.: expected benefits for the stakeholders). The capabilities for stakeholder integration were derived from an analysis of the barriers to and success factors of stakeholder integration in NPD. Three related capabilities emerged: stakeholder identification capability, stakeholder interaction capability and stakeholder input integration capability. Our study provides an initial model of how stakeholder integration works based on its drivers. The paper also proposes a description of capabilities for stakeholder integration in NPD, which contribute to stakeholder theory and research on the organization of NPD. The results open new paths for empirical testing to development the proposed framework and offer practical guidance on how to successfully integrate stakeholders in NPD processes.

Vargas-Hernández, José G. - Universidad de Guadalajara, Jalisco, México
 Palafox Alcantar, Pablo Giovanni - Universidad de Guadalajara, Jalisco, México

Strategic integration between U.S. Airways and Iberia in one world

The air transportation is one of the most important international industries, there are three major networks or strategic alliances (One World, Sky Team and Star Alliance). They seek to overcome each other, whilst the members leave the guild and join another. This paper attempts to determine the reasons for the performance of the joint venture and the performance of firms within the alliance.

Venugopal, Aparna - Indian Institute of Management Kozhikode, Kerala, India
 Krishnan, T.N. - Indian Institute of Management Kozhikode, Kerala, India

Exploring the effect of top management team processes on the financial and ambidextrous performance of high technology firms in India

Business organizations need to pursue radical and incremental innovations simultaneously for its long-term effectiveness and to sustain competitiveness in a dynamic environment. Exploitation of existing competencies leads to incremental innovation and exploration of new opportunities leads to radical innovation. Organizational ambidexterity is an organization's ability to simultaneously pursue both exploration and exploitation activities. Past researchers studying organizational ambidexterity have explored its structural and contextual antecedents and/or its relationship with innovation and firm performance. Irrespective of its structural or contextual genesis, researchers agree that the major decisions and tasks related to ambidexterity are made and implemented by the top management team (TMT) of the organizations. Based on previous work, the TMT processes necessary for ambidexterity could be classified under Behavioural Integra-

tion and Top Management Involvement. To the best of our knowledge, no study has compared the effects of these top management processes on ambidexterity and/or firm financial performance. Hence, in the present study we explore the distinct effects of top management behavioural integration and involvement on ambidexterity and firm performance.

Qualitative data was collected via onsite semi structured interviews from the TMT of 60 high technology small and medium enterprises (SMEs) in India. The results from the study suggest that though top management behavioural integration and involvement enhance organizational ambidexterity and firm financial performance, only 'top management involvement' was necessary for enhanced ambidexterity. Also of structural and sequential ambidexterity, only sequential ambidexterity has a positive effect on firm performance in small organizations.

Vera, Juan - Mines ParisTech PSL, Paris, France; Renault SAS, Guyancourt, France
 de Salgueiredo, Camila Freitas - Renault SAS, Guyancourt; IFFSTAR, Versailles, France
 Hooge, Sophier - Mines ParisTech PSL Research University, Paris, France
 Klasing Chen, Milena - Mines ParisTech PSL Research University, Paris, France

Visual Mapping for the management of an innovation field: An application to Electric Vehicle Charging in Renault

Radical innovations can give a substantial advantage to firms; consequently innovation projects play a strategic role for any department of Research, Development or Innovation. Although systematic innovation strategy based on radical innovations might be the key to success (Midler, Beaume, & Maniak, 2012), breakthrough R&D projects are particularly difficult to implement because the emergence or design of ideas is a stage that is proven to be difficult to manage (Backman & Bo, 2007; P. A. Koen et al., 2002; P. Koen et al., 2001). Nevertheless, the innovation strategy starts with the management of an innovation field, i.e. the exploration area for innovative design (Hatchuel, Le Masson, & Weil, 2001). This specific activity requires adapted management tools to the diversity, broadness and flexibility of the generation of innovative ideas and the coordination of simultaneous explorations. Numerous tools have been developed alongside with innovative projects

to communicate, evaluate and make decisions (e.g. the famous stage-gate process (Cooper & Kleinschmidt, 2001)). Thus, every single tool tackles one or several aspects of an innovation field and translates them to a methodic procedure in the form of a strategic plan, a control structure or a visual tool. These procedures are focused on a practical approach that helps managers deploying innovation management strategies. A visual representation has been proven to best articulate an innovation field because visual metaphors have a rich vocabulary in terms of format and content, therefore such a tool enhances the communication efficiency of a firm (Andriessen, Kliphuis, Mckenzie, & Winkel, 2006).
 [...]

Verhoeven, Dennis - KULeuven, Management, Leuven, Belgium
 Bakker, Jurriën - KULeuven, Management, Leuven, Belgium
 Veugelers, Reinhilde - KULeuven, Management, Leuven, Belgium; Bruegel, Brussels; CEPR, London; ECOOM, Leuven

Measuring technological novelty with patent-based indicators

This study provides a new, more comprehensive measurement of technological novelty. Integrating insights from the existing economics and management literature, we characterize inventions ex ante along two dimensions of technological novelty: Novelty in Recombination and Novelty in Knowledge Origins. For the latter dimension we distinguish between Novel Technological and Novel Scientific Origins. For each dimension we propose an operationalization using patent classification and citation information. Results indicate that the proposed measures for the different dimensions of technological novelty are correlated, but each conveys different information. We perform a series of analyses to assess the validity of the proposed measures and compare them with other indicators used in the literature. Moreover, an analysis of the technological impact of inventions identified as novel shows that technological novelty increases the variance of technological impact and the likelihood of

being among the positive outliers with respect to impact. This holds particularly for those inventions that combine Novelty in Recombination with Novelty in Technological and Scientific Origins. The results support our indicators as ex ante measures of technological novelty driving potentially radical impact.

Vigna, Leonardo - University of Oulu, Finland
 Hänninen, Kai - University of Oulu, Finland
 Kaikkonen, Harri - University of Oulu, Finland
 Haapasalo, Harri - University of Oulu, Finland

How to build a well-performing team for rapid development

Companies' ability to innovate and renew themselves is one of the key elements of sustainable competitiveness and growth. In today's highly competitive industrial environment, those who are slow in bringing new products to the market often lose out to those with more agile development processes. A number of new product development frameworks have been developed to satisfy the needs of different organizations operating in different markets. Rapid development is a concept originating from practical challenges and can be considered an alternative development framework supplementing new product development. Rapid development projects have to be structured and managed with a different approach compared to regular new product development projects.

This study investigates how development teams should be organised for rapid development projects. Data was collected from four case companies using a semi-

structured interview protocol. The multiple case study investigated what kind of organizational structures and team designs are set up into the case companies. Results of the semi-structured interviews are presented and discussed. Results show that companies use tailored teams and processes for rapid development projects, but the teams and processes often reflect the regular development processes of the organization including organizational structure and culture. More efficient team compositions could be utilized in order to create rapid development projects more efficiently. The findings help practitioners in establishing managerial practices to support efficient team building to achieve faster product offering. The results supplement current understanding of product development in situations that require a rapid response combined with alternative team structure.

Villarroel, Juan Andrei - School of Management Fribourg, Switzerland
 Estrela, Filipe - Católica-Lisbon School of Business and Economics, Portugal

Investor Motivation in Crowdfunding: Helping Self Or Helping Others?

This paper unveils new understanding on the motivations of individuals to help strangers by providing financial support when there is no monetary return on investment —namely, why individuals provide interest-free monetary support for other individuals located in globally remote areas. There is an established literature on prosocial behavior, which explains the individual's need for helping and other voluntary positive actions towards others, namely disadvantaged individuals (e.g. Eisenberg 1982). Yet, there is little empirical research on the motivations to contribute to crowdfunding (e.g. Gerber and Hui 2014). We present the results of the statistical analysis of a survey on motivation answered by 1,220 crowdfunders on the crowdfunding platform Kiva.org. The novel findings unveiled by this study show that: individual motivations to help are centered in the self to an important degree, as opposed to solely the positive pro-social motivations discussed in the extant literature. On the

one hand, our study finds that individuals contribute more money when they face a greater need to protect their own self. On the other hand, individuals contribute less money when they feel stronger social pressure or moral obligation to help others. These results are robust across seven regression models controlling for demographics and countries of origin.

de Visser, Matthias - University of Twente, Enschede, The Netherlands

The impact of team cognitive styles on financial, temporal and quality performance of radical and incremental new product development projects

Scholars have identified a variety of team input variables that can influence the performance of new product development teams. These NPD team studies mainly focused on team members' functional backgrounds and demographic characteristics. Much less attention has been paid to the project performance implications of team composition in terms of deep-level psychological characteristics. The goal of this study is to explore the effects of NPD team cognitive styles on financial, temporal and quality project performance in radical and incremental NPD projects. Based on survey data from members of 95 NPD teams collected in four Dutch manufacturing companies, hypotheses about the relationships between teams' cognitive styles and project performance of radical and incremental NPD projects are tested. Results of linear regression analyses show that the level of teams' analytical information processing positively affects financial and quality project performance in both incremental

and radical NPD projects. A positive effect of teams' intuitive information processing on temporal project performance was found, whereas the relationship between the level of teams' intuitive information processing and quality project performance depends on the radicalness of the project. These findings contribute to the discussion on team innovation, suggesting that, next to demographic and functional input variables, cognitive styles in teams also significantly influence project performance.

Voßen, Nadine - RWTH Aachen University, Germany
Lahl, Kristina - RWTH Aachen University, Germany
Vossen, Rene - RWTH Aachen University, Germany
Jeschke, Sabina - RWTH Aachen University, Germany

Systematic Business Model Development. Using System Dynamics to create a decision support system for the combination of business model patterns

"Today innovation must include business models, rather than just technology and R&D. Business models matter. A better business model often will beat a better idea or technology." (Chesbrough 2007: 12).

Hence designing business model architecture and figuring out how to capture revenue from offering value to customers is a key element of the business model design process. Furthermore, keeping a business model viable is an essential and continuing task to sustain competitive in the market (Teece 2010: 174 pp). Thus existing methods as the business model canvas (Osterwalder & Pigneur 2005) supports entrepreneurs and managers to illustrate all relevant business model elements but merely visualize the status-quo. Hence, hardly any managerial advice is provided on how to design proper business models not to mention any advice for

necessary business model adaptations. Addressing the practical needs the following submission focuses on the development of a decision support tool to systematically adapt business models. For this purpose we use the approach of system dynamics to illustrate general interrelations and implementation effects of business model patterns. Based on identified reinforcing loops promising points of leverage can be used to make the right business model adaptations.

[...]

Walicka, Monika - Bialystok University of Technology, Kleosin, Poland
 Czemiel-Grzybowska, Wioletta - Bialystok University of Technology, Kleosin, Poland

R&D and technology sourcing at open business model – study of Polish biotech companies

External technology sourcing has become increasingly important because of changes in industry, competition, and technology. We study the sourcing of technology, taking into account where the firms source technology and which channels use. The paper contributes to the literature on technology sourcing, by assessing the importance of national and international linkages.

We focus in this paper on the biotechnology sector in order to study the boundaries of innovative networks and the plurality of actors (e.g. firms, public administration, universities and research centers) involved in innovation. Despite being one of the fastest growing sectors in Poland, biotechnology is still an emerging sector. In the coming years dynamic growth of the domestic biotechnological market is expected, largely thanks to innovative research projects carried out by the Polish biotech companies and academic institutions, as well as by the inflow of

foreign investment into biotech sector. In this paper, the pattern of open business concept in specific context of technology sourcing was analyzed. Authors considered the channels through which companies source technology. Research was focused on technology sourcing behavior undertaken by biotechnology firms. The results present different types of technology sourcing among sample of 160 Polish firms. It was found that biotechnology firms are open for external technology sourcing, and use it by purchasing of R&D from external sources through contracts or other arrangements. Biotechnology firms often show a greater propensity to purchase R&D from foreign sources (USA and EU). Biotechnology firms show a varied pattern of sourcing, in both the types of agents used and the geographic origin of the technology.

Wang, Tang - University of Central Florida, Orlando, USA
 Libaers, Dirk - Northeastern University, Boston, USA
 Park, Haemin Dennis - College of Business, Philadelphia, USA

How Does Product Development Experience And Patent Stock Affect R&D Sourcing Mode?

We explore how a firm's product development experience and patent stock affect its R&D sourcing mode in China. On the one hand, product development experience breadth enables firms to develop greater evaluation and monitoring capabilities to work with external partners and absorb knowledge developed by external partners. As a result, we find that firms with greater product development experience breadth are more likely to rely on external R&D partnerships vis-à-vis internal R&D mode. On the other hand, product development experience depth provides a richer understanding of relevant knowledge sets and their interdependencies, and enhances firms' abilities to contract knowledge development and transfer activities across firm boundaries. Thus, we find that product development experience depth also increases a firm's reliance on external R&D. However, patent stock of Chinese firms, operating in a context where property right protection is relatively weak, weakens the reliance

on external R&D for firms with product development breadth and depth because the flip-side of patenting disclosure of the firm's underlying technologies can be hazardous to knowledge appropriability. Our findings contribute to the growing literature on knowledge governance using the knowledge-based view of the firm and emerging markets as the empirical context.

Winterhalter, Stephan - University of Navarra, Barcelona, Spain
Sauer, Roman - University of St. Gallen, Switzerland
Csik, Michaela - Holcim Technology Ltd., Holderbank, Switzerland

Business Model Transfer to Emerging Markets: A Case in the Construction Business

This study explores in what way ambidextrous firm behavior supported the successful implementation of a business model innovation at a traditional construction material company. We analyze how one of the worldwide leading producers in this industry has launched a novel business model in an emerging market and tapped into the fast road repair market with the offering. The novel business model has become one of the most promising solutions at the Indonesian subsidiary and exceeds the profit level of the conventional business. By analyzing the implementation process of the business model's value chain activities, we explore how a thorough and goal-oriented management of four different modes of ambidexterity, namely contextual, temporal, structural and domain separation became one of the central success factor for this innovation.

Wohlfeil, Florian - Karlsruhe Institute of Technology, Germany
Terzidis, Orestis - Karlsruhe Institute of Technology, Germany

Strategic Approaches for the Realization of Radical Technological Innovations within the Manufacturing Industry

The pace of technological change and ever shorter product life cycles increase the competitive pressure among technology driven companies. In particular, radical innovations enable companies to distinguish themselves from their competitors in the long term. However, the arising challenges that emerge at the realization of these innovations must be interpreted as a complex concept that is influenced by a variety of factors, internal and external to the innovating organization. In a previous study, we have developed a conceptual framework of 28 Critical Success Factors for radical technological innovations and mapped them to three main dimensions: innovation context, innovation process, and innovation success. We refer to it as the Innovation-Context-Process-Success (ICPS) framework.

We stated the hypothesis that based on the Critical Success Factors detailed in the ICPS framework there are different strategic approaches to success. In order

to test this hypothesis, we studied three cases of radical technological innovations within the manufacturing industry: cryogenic machining by SME, P118 gearbox by Pinion, and Friction Disc by SKF. The three cases differed mainly with respect to their organizational background, the characteristics of their target market, the product development strategy, and the commercialization strategy. Depending on the varying innovation contexts, each company followed a distinct and differentiable strategy approach for the realization of their respective innovation. Accordingly, the hypothesis could be retained based on the analyzed case sample. On this basis, we derived an overall pattern that generally emerges, when it comes to radical technological innovations. We manifested this pattern within a theoretical framework with distinct variables, dependencies, and hypotheses.

Yoneyama, Shigemi - Gakushuin University, Tokyo, Japan
Lai Yin, Sarah Cheah - National University of Singapore

Impact of unintended reverse knowledge transfer on R&D performance of parent company

In this paper, we explore the reality of knowledge creation at foreign subsidiary of MNCs and the impact of the transfer of knowledge created there on R&D activities of parent company at home. With reviewing existing studies on reverse knowledge transfer, we addressed the issues which have not been considered thus far; the type of knowledge transferred and the way of transfer from subsidiary to parent company. Especially, we paid special attention to the “unintended” knowledge transfer and its impact on parent company’s R&D activities.

The result of the questionnaire survey to more than 3,000 Japanese companies revealed the following points. Firstly, the degree of knowledge transfer from foreign subsidiary had a significant positive impact on parent company’s R&D activities in all performance measures, regardless of the type of knowledge. Then, the ratio of unintended knowledge transfer from foreign subsidiary had positive effect on

R&D performance of the parent company to a certain point, but it turned to be negative beyond that point. In other words, there was an inverse U-shaped relation between unintended reverse knowledge transfer and R&D performance of parent company. Lastly, the factors affecting the ratio of unintended knowledge transfer were investigated. It was found that the degree of unintended knowledge creation, or the creation of knowledge that was not expected in advance, the ratio of know-how and trade secret in relevant product and service, and the presence of ICT systems for knowledge transfer to parent company had closely related to the degree of unintended knowledge transfer.

Zhao, Bingqing - University of Cambridge, UK
Hirose, Yuta - University of Cambridge, UK
Phaal, Rob - University of Cambridge, UK

A framework for characterising technology ventures for valuation purposes

Valuing early stage technology intensive start-ups is challenging due to significant technical and commercial uncertainties. Quantitative methods require accurate forecasts of revenues and costs, they become problematic to use at earlier stages of the innovation process due to large commercial and technical uncertainties. Qualitative methods are suitable for early stage analysis but are not sufficient for quantitative valuation purposes. In order to establish an integrated framework for valuing early stage technology ventures, it is important to first understand the nature of technology ventures and key aspects that might affect firm value. These paper summaries eight general dimensions for characterising technology ventures, from which six key value-related dimensions are identified based on empirical evidence. The value-related dimensions are then tested by valuation theory to reveal the mechanism behind dimensions and

firm value. The main contribution of this paper is a set of dimensions for characterising technology ventures for valuation purposes. This paper also proposes a new thinking-based way to classify valuation methods. A research and practice gap is identified to develop an integrated valuation approach that can blend qualitative and quantitative methods together to produce an appropriate valuation.

Zijdemans, Erik - University of Southern Denmark, Odense, Denmark
Azimi, Zohreh - University of Southern Denmark, Odense, Denmark
Tanev, Stoyan - University of Southern Denmark, Odense, Denmark
Bailetti, Tony - Carleton University, Colonel By Drive, Ottawa

Early and rapid globalization as part of innovation and growth strategies: Towards a framework supporting the global start of new technology firms

The paper explores the early and rapid globalization of new technology start-ups as an alternative perspective on innovation and global growth. It aims at promoting a specific understanding of the interplay between innovation, strategy and growth by emphasizing the view that internationalization is an innovative act in itself. The motivation behind the topic is that the conceptualization of the ability of new firms to internationalize early as part of their innovation and growth strategies offers an opportunity to develop practical frameworks that could be used in supporting the global start of new technology firms. We adapt a framework linking the ex-ante value of the resources accessible to new technology firms to the ex-post characteristics of successful born global (BG) firms. The main contribution of the paper consists in adapting the framework to the specific context of technology start-ups in order to articulate specific insights that could help the global growth of such firms.

Zimmerling, Eric - Technische Universität München, Germany
Purtik, Henrike - Technische Universität München, Germany
Welpé, Isabell M. - Technische Universität München, Germany

User-centered business model innovation - A comparative case study analysis in the context of electric mobility

While there is a wide amount of literature on user integration in product and service development, the role of users in business model innovation is still unclear. The purpose of this paper is to contribute to fill this gap by analyzing the user-centric development process of two electric mobility solutions in incumbent firms. We outline the methods and underlying rationale of user-centered business model innovation, its impact on the final business model as well as factors that facilitated the user-centered approach. The results of our comparative case study analysis show that the user-centric development approach allowed both companies to overcome risk aversion towards business model innovation and helped them to develop and refine new electric mobility solutions that show a strong product service character. Managers can promote user-centered innovation processes when they create favorable conditions for the formation of independent and cross-functional innovation teams.

Zupic, Ivan - COBIK, Ajdovšina, Slovenia; University of Ljubljana, Slovenia

What Do We Talk About When We Talk About Growth Hacking?

The aim of this research is to analyse the topic structure of growth hacking discourse in www.GrowthHackers.com online community and derive a typology of main techniques growth hackers use to grow internet companies. Growth hackers are a hybrid of marketers and programmers. This new breed of marketers are trying to gain customers for their products with emphasis on quantitative measurement, data-driven experiments, scenario modelling via spreadsheets, and other techniques. Probabilistic topic modelling techniques (Blei, 2012) are used to derive topical structure of the discourse in www.GrowthHackers.com community. Topic models are machine learning algorithms for discovering main themes in large and unstructured collection of documents. The most used topic modelling method is Latent Dirichlet Allocation (LDA). LDA views document as a mixture of related topics. The approach used in this study offers a fresh methodological take on firm growth process. It aims to in-

tegrate demand-side perspective (Priem, Butler, & Li, 2013; Priem, Li, & Carr, 2012) with extant mostly supply-side research on firm growth (c.f. Davidsson, Achtenhagen, & Naldi, 2010). The paper sheds light on the new phenomena of growth hacking and identifies several tactical approaches to grow internet new ventures.

Zynga, Andreas - NineSigma, Cleveland, USA

Lüttgens, Dirk - RWTH Aachen University, and Innovation Management Group (TIM)

Ihl, Christoph - Hamburg University of Technology (TUHH), Hamburg, Germany

Piller, Frank - RWTH Aachen University, Aachen, Germany

Successful and sustainable implementation of open innovation: an empirical analysis

Introducing and implementing a new management method can be a daunting task for an organization. Open innovation is one such management method that requires intensive organizational change in order to implement it successfully. This paper examines the process of implementing open innovation on the basis of a multi-step organizational change management method. Our study leans on the method described by Armenakis and Bedeian (1999) who suggest a three-phase approach for an organizational change process - unfreezing-moving-institutionalizing. We use this three-phase approach as the theoretical foundation for the development of a framework for stepwise implementation of open innovation through the building and utilization of certain management capabilities. Building on the work of Chiaroni et al. (2011) we identify the processes and resources that companies implementing open innovation build up gradually, and then based on a

sample of 756 companies we show empirically that these capabilities are important requirements for the implementation of open innovation. The paper uses established concepts in change management research and expands on them by using data from a survey to show which specific capabilities are built by companies at what stage of the adoption of open innovation as a management methodology. We find that organizations can ensure effective implementation of open innovation by building on four management capabilities at a stage-based level: internal processes to encourage knowledge creation, sharing and utilization within and outside firm boundaries; external networks comprised of known entities external to the organization; global networks for accessing global knowledge through intermediaries, tech scouts, consortia; and capabilities directed toward efficiently leveraging external knowledge and integrating it into the internal R&D activities.

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