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Conference Paper

Working with Academic Partners Effectively in the Context of Open Innovation: The Practice of Huawei

29th European Regional Conference of the International Telecommunications Society (ITS): "Towards a Digital Future: Turning Technology into Markets?", Trento, Italy, 1st - 4th August, 2018

Provided in Cooperation with:

International Telecommunications Society (ITS)

Suggested Citation: Furner, Adrian; Xu, Yan (2018) : Working with Academic Partners Effectively in the Context of Open Innovation: The Practice of Huawei, 29th European Regional Conference of the International Telecommunications Society (ITS): "Towards a Digital Future: Turning Technology into Markets?", Trento, Italy, 1st - 4th August, 2018, International Telecommunications Society (ITS), Calgary

This Version is available at:

<https://hdl.handle.net/10419/184940>

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Working with Academic Partners Effectively in the Context of Open Innovation: The Practice of Huawei

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Abstract

Huawei's Huawei Innovation Research Program (HIRP) has contributed to the development of Huawei from a Chinese start-up to a global ICT leader by leveraging its cross-border and cross-cultural network connecting world-class scholars. With the help of HIRP, Huawei has achieved a large number of breakthroughs in both fundamental research and technology applications. The HIRP has acted as a systematic and transferable model to address the challenges of Academic-Industry partnership, with three consistent and consecutive approaches, ***namely shared objectives; relationship multiplier and portfolio-level connections***. Our focus on the relationship as a key value differentiator has reduced the mismatch between Huawei and academia. This enhanced access to high quality academic partners enables the innovation of many game-changing technologies and leads to a Better Connected World.

Introduction

Our company moves forward on two wheels: technology innovation based on customer needs, and scientific exploration into the longer future. Huawei must have the courage to embrace disruptive innovations through self-reinvention and self-criticism.

Ren Zhengfei, Founder and CEO of Huawei

In just 30 years Huawei has developed from a startup to a global leader in Information and Communication Technology (ICT) solutions provision (<http://www.huawei.com/en/about-huawei>) helping society create and leverage a [Better Connected World](#)¹. However, in today's competitive ICT sector, technology is invented, developed and implemented at an accelerated speed. Therefore, global collaboration is required to solve problems, accelerate innovation, and set standards.

The ability to predict trends, harness creativity, and tackle problems through academic collaboration is fundamental to the success at the technological frontier. Engaging academic partners is therefore of vital importance for companies. Huawei has clearly realised this importance and has set up the Huawei Science and Technology Fund (HSTF) and started working with top universities in Mainland China as early as 1999. However, in addition to failing to attract overseas academic elite, this initiative has met tremendous challenges.

The Challenges

The partnership under HSTF has faced challenges from mismatched expectations and motivations between enterprises and academia, including:

1) Aligning Objectives

- Academia aim for academic merit. They prefer free exploration in novel areas which can lead to paper publication, whereas enterprises have various realworld problems which embedded in its context vaguely and cannot easily identify its academic merit.

- Without shared goals and outcomes, trust and collaboration is compromised.

2) Weak Relationships

- Inadequate networking and cooperation lead to information asymmetry and unbalanced partnerships. Due to the

¹ A Better Connected World is Huawei's core strategy. <http://www.huawei.com/better-connected-world/en/index.html>

absence of a wellknown platform and a mechanism in evaluating scholars, academic scholars don't know how to approach Huawei for grant application, while Huawei doesn't know exactly who is the right scholar to work with.

3) Contradictory worldviews

- Enterprises seek holistic, birds-eye-view solutions, while academia develop expertise in a single discipline (with limited access to alternative angles for development from cross-discipline connections)

Huawei's journey to global technology leader is about overcoming obstacles. Its research partnership initiatives must overcome the abovementioned issues, which have been compounded by cultural, institutional and geographic challenges, in order to progress in technologies and areas of mutual interest in a global rather than local context.

HIRP: A Systematic Approach

We want to develop HIRP into an open innovation brand of Huawei that is well known amongst industry, research institutes and universities.

Zhijun Xu, rotating CEO of Huawei

Huawei has always acknowledged that in the fast-moving ICT market, whilst it has many skills, there are many more that it needs to access through Open Innovation. In 2010, HSTF was rebranded as Huawei Innovation Research Program (HIRP) to reflect Huawei's position as open innovation-oriented.

HIRP is Huawei's mechanism for developing and accessing the benefits of a network of global academic partners in a way that develops long-term win-win relationships. It has been designed to balance success for both Huawei and its partners, as part of Huawei's initiative to move the industry forward, <http://www.huawei.com/en/industry-insights/moving-forward>.

HIRP is made up of three key stages: requirement development(selecting the right projects), collaboration development (finding the right partners); and co-creation (delivering for success). A short introductory video to HIRP can be found at <http://innovationresearch.huawei.com/en/index.html>. Figure 1. shows how the HIRP acts as interface between the business and academia.

The HIRP is underpinned by three consistent and consecutive approaches that have been developed to address the challenges of enterprise-academia collaboration, ***namely shared objectives; 2) relationship multiplier; 3) and portfolio-level connections.***

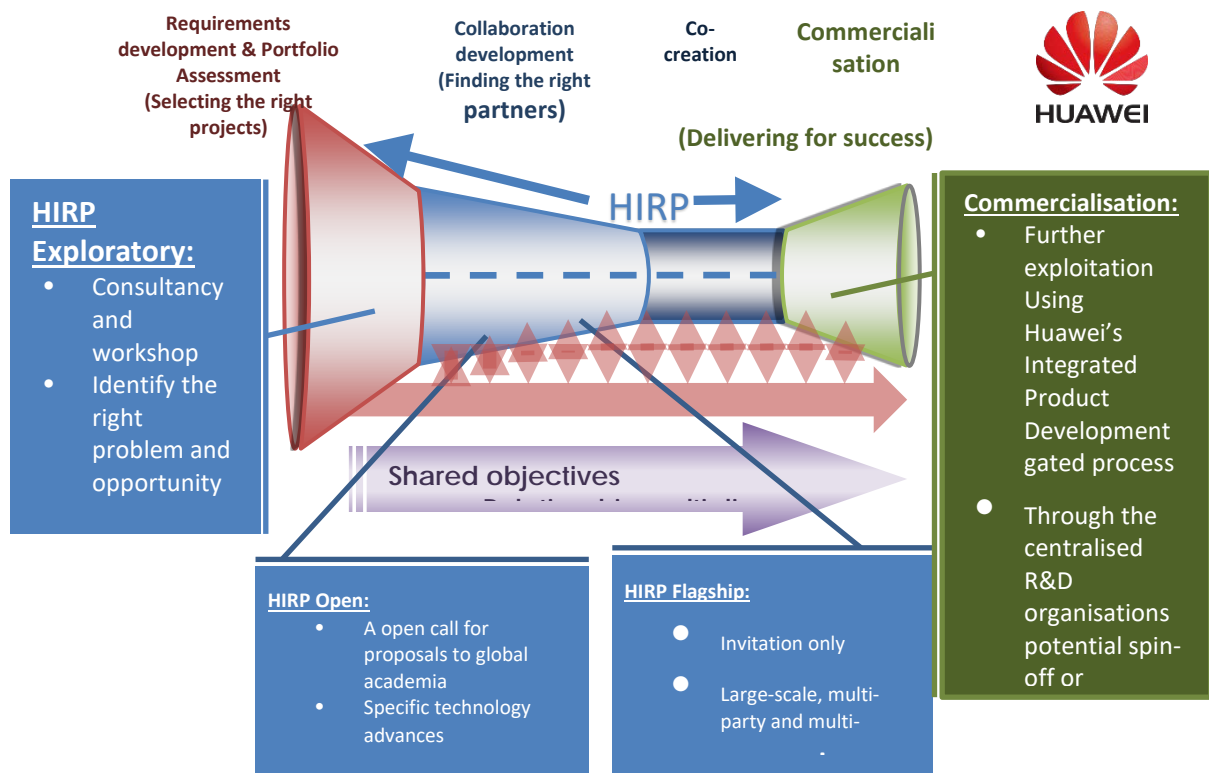


Fig. 1 The Structure of HIRP

Selecting the Right Projects (Requirements Development & Portfolio Assessment)

Long-term win-win relationships are core to HIRP. The building of the relationship in advance of a transaction is embedded in Eastern cultures and business. For HIRP it enables partners to participate in project planning, and help to “do the right things”.

Shared Objectives – strategic linkage and conscious collaboration portfolio blend

Requirements development is driven by the businesses and focused on Huawei's strategy. Any R&D engineer, at any level in the company, is empowered to initiate requirement(s) that support delivering their individual targets flowed down from the company strategy.

Requirements are grouped into portfolios based on strategic technology routemaps, with the collaboration portfolio mix consciously planned and resourced, considering both the market, and the available competencies, as in the following diagram (Fig. 2):

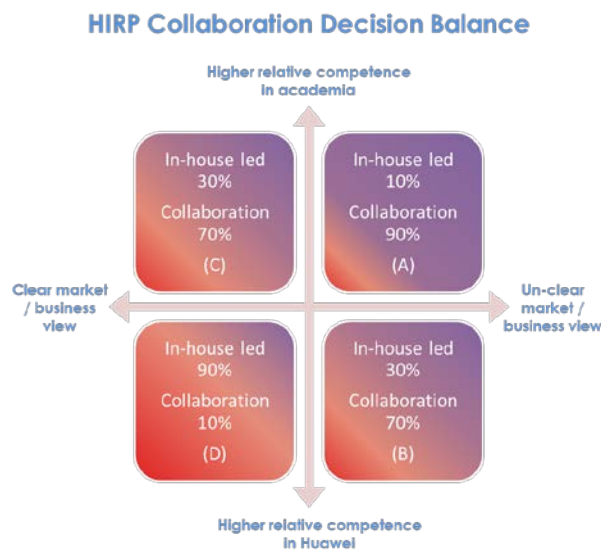


Fig. 2 HIRP Collaboration Decision Model

Considering the portfolio at this stage is key to ensuring that requirements flowed into HIRP are consistent with business strategy, and that clear shared objectives are developed.

Finding the Right People & Partners - Collaboration Development

Shared Objectives – a blend of push & pull

Whilst many of the requirements are articulated to Flagship partners, or submissions sought through calls on the HIRP portal, (both pull mechanisms), Open also encourages submissions from academic partners who have research ideas that they believe of interest to Huawei (push). This blend of push/pull allows for new ideas that Huawei may not have identified to be sourced. In the 2015 call, the project split between pull and push was 85%:15%. In the case of ‘push’ projects, ideas are matched with businesses and strategic linkages made to create shared objectives.

Through HIRP and its predecessor Huawei Higher Education Foundation, Huawei has learnt the importance of understanding and accepting that there are often differences in the desired outcomes between an enterprise and academia. Developing the project approach is a key collaborative, and iterative activity, focusing heavily on developing a set of deliverables that will both achieve its desire for timely commercial outcomes, along with the academic desire for robust, repeatable, publishable research outcomes.

Relationship Multiplier – the power of relationships and networks

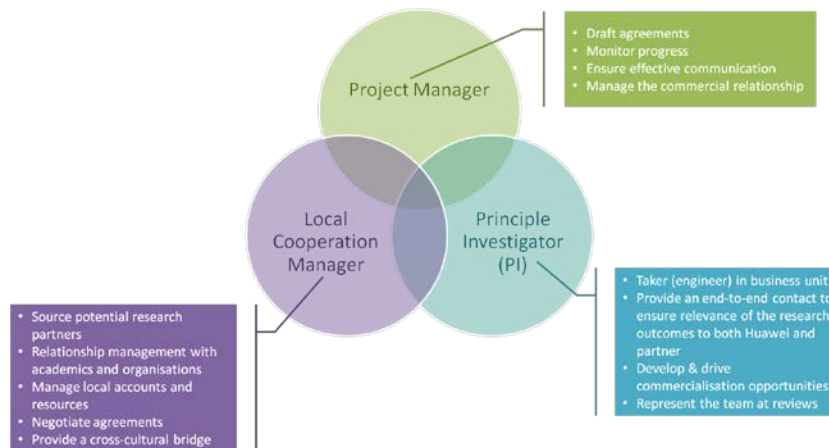
In addition to building on the win-win benefits above, this stage focuses on the belief that long-term relationships, and networks of relationships, provide a multiplier effect for all involved. HIRP leverages this approach by devoting considerable time and effort into:

- a) selecting the optimum HIRP team;
- b) selecting the most appropriate partner(s) for a project;
- c) building the relationship as a part of the refining and agreeing the shared objectives.

HIRP considers the relationship to be a differentiating driver of performance, with selection of the right team critical. All HIRP projects, irrespective of size, will have at least three managers assigned to them as described below. On

larger projects this is further supplemented. Collaboration skills are core skills and developed in the individuals who will be involved.

A Balanced Team Focused on Driving Successful Collaboration



When selecting partner(s) HIRP uses a blend of approaches, including the HIRP Collaboration Decision Balance, and a blend of assessments, to feed into a partnering relationship assessment, and which uses previous HIRP experience to consider both, the availability of funding, and the quality of research, to assess the technical and relationship benefits and costs.

The HIRP network of partners is increasingly providing personal recommendations of potential new partners. This supports the assessment as these new partners are already partially assessed by the personal recommendation.

By investing considerably in selecting the most appropriate partners for each project, it helps drive long-term relationships and the relationship multiplier. Huawei considers that through its long-term win-win relationships, it invests in partners as people, as much as the research that they bring. In many cases Huawei has supported partners in their academic development as they have developed their careers and moved between boxes above.

Once the partner is selected, the team of collaboration project managers actively develop the relationship(s) through a collaborative and holistic approach to refining and agreeing the: a) shared objectives and goals; b) relationship approach; c) commercial Terms and Conditions.

As a part of the development the routemap at the portfolio level will be shared with the partner(s) to identify appropriate portfolio-level connections to incorporate.

Delivering for Success - Co-creation

Relationship Multiplier & Portfolio-level Connections – making $1 + 1 > 2$

HIRP accepts that developing the right relationship is key to delivering the shared objectives. There needs to be flexibility of attitude towards co-creation, even enduring temporary failure, but equally there needs to be a focus on performance.

A 'one team' approach is taken to all projects with the Huawei team expected to work closely with the academic partner to ensure that there is collaborative learning. This close co-creation enables the cooperation managers to deliver a key responsibility of their role, the creation of portfolio-level connections.

They do this using multiple mechanisms including: calls, visits, workshops, salons, funded integration and/or engineering support and projects. Portfolio-level connections are mapped, monitored, and reviewed through a reporting hierarchy that ensures compability between what the senior business representative oversees and the overall project map.

The mixture of collaboration skills in the team, with the importance of portfolio-level connections, often cross-discipline in nature, helps unlock the relationship multiplier for Huawei and the partner, allowing the ‘whole to be significantly greater than the sum of the parts’.

Huawei understands that ‘many innovations don’t come from the day one plan’. Only by taking a systematic approach to enabling long-term win-win relationships can HIRP also flex with the projects to adjust course as necessary, allow built-in flexibility, and unlock innovation that is today unknown.

Delivering for Success - Commercialisation

Shared Objectives – assessing success

A key contributor to success is the project completion review which includes key stakeholders from relevant customer facing businesses. Each project is reviewed from a ‘one team’ perspective with success and recognition attributed on this basis. Each collaboration is reviewed for progress against: a) shared objectives; b) research outcomes; c) commercial potential; d) team performance and relationship.

The outcomes from this review are fed back into the partner selection process, the requirements development process, and the portfolio-level routemaps.

HIRP also performs a 3-year review to determine and measure commercialization.

Portfolio-level Connections – driving multiple exploitation paths

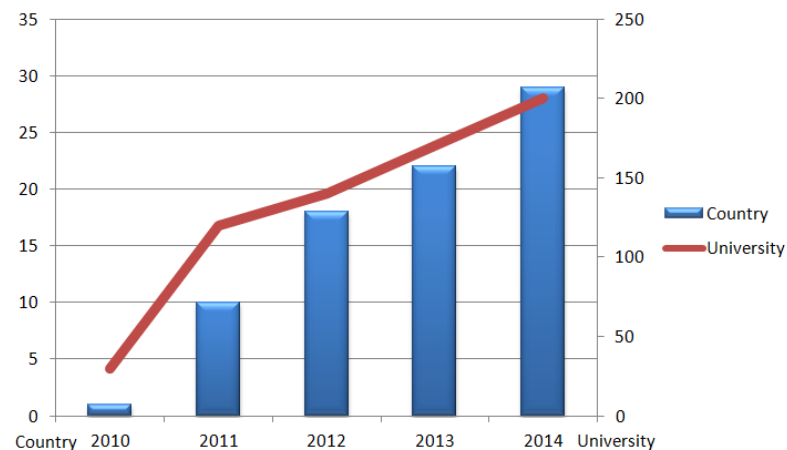
Huawei’s R&D is organised through a centralised organisation. This centralised approach enhances the embedding of innovation into new and existing products and the sharing of innovations across multiple business areas.

The approaches may look simple in isolation, however, they are made up of many individual actions, interactions, and decisions, which when combined have allowed Huawei to significantly break down the barriers that have traditionally challenged enterprise-academia value creation.

It has allowed Huawei to create disproportionate value from the resources available internally and externally, ensuring that it’s able to both better unlock value for both itself and the wider society through a Better Connected World.

Early achievements

Since 2010, HIRP has gone from projects solely with the top 30 Chinese universities, to almost 200 universities in 29 countries, and areas covering over one hundred Fellows of IEEE/ACM, representing an almost exponential rise in complexity.



For a China based company, achieving a network of such diversity from nothing in 6 years has been a significant challenge requiring Huawei to build trusted relationships, overcome language and cultural differences, and the industry – university mismatches. Without the focus on the relationship as a key element in unlocking shared outcomes, creating a relationship multiplier, and demonstrating additional value of the portfolio-level connections that HIRP can bring, it is highly unlikely that Huawei would have achieved such success.

Our growing global network of partners come back multiple times to work with us, creating long-term win-win relationships. Each time, the deeper relationship creates an enhanced multiplier as it becomes easier to collaborate and make portfolio-level connections. This is further demonstrated by the increasing number of personal referrals that our current partners make of potential new partners who then join through Open initially, often getting involved in Flagship also.

This increased access to high quality academic partners enables the innovation of many game-changing technologies which when, utilised in products and solutions, have the potential to unlock significant benefits at the societal level through a Better Connected World. Below is an insight of a small number of technologies, the products that they contribute to, and the benefits that we experience or will experience in the future.

HIRP Technologies	Products / Solutions delivering a Better Connected World & contributed to by HIRP technologies	Society uses enabled
Optical Technologies: A variety of technologies including: <ul style="list-style-type: none"> • Novel space optical structure • LCOS chip technology Winning 2 nd prize in 2015 in the State Scientific & Technical Progress Award – the highest highest honour in China in science and technology	Optical Transmission Networks: Highest performing optical switch for Optical Transmission Networks (OTN) – increasing the bandwidth from 100G to 400G to 1T to provide a faster broadband backbone for clients whilst reducing the power consumption	High-Speed Broadband: Fast broadband for consumers and businesses allowing: <ul style="list-style-type: none"> • Improved access to the digital economy (businesses) • Ability to access 4K/HD video streaming (business and consumer)
5G Wireless Technologies: 5G air interface algorithms: <ul style="list-style-type: none"> • SCMA – Sparse Code Multiple Access technique which can improve spectral efficiency of wireless radio access • Polar code - Polar code has better performance than all the codes currently used in the 4G LTE systems, especially for short code length • F-OFDM – Filtered Orthogonal Frequency Division Multiplexing where the assigned bandwidth is split up into several sub-bands, and different types of services are accommodated in different sub-bands with the most suitable waveform and numerology, leading to an improved spectrum utilization 	5G Wireless Networks: 5G wireless standards that will become key to delivering 5G requirements of: <ul style="list-style-type: none"> • Ultra capacity • Ultra high rate • Ultra low latency • Massive connectivity • Ultra low energy consumption 	Future Mobile Connectivity: For network operators: <ul style="list-style-type: none"> • Easy deployment & maintenance • Differentiated, rapidly adaptable tailored service offerings For society: <ul style="list-style-type: none"> • Universal consistent experience in relation to opportunities related to IoT e.g. autonomous vehicles
4G Wireless Technologies: <ul style="list-style-type: none"> • Key Component Behavior Models - working with European universities over 4 years to research an approach that improves the efficiency of power amplifiers in base stations. 	Micro-Base Station Deployment: To address the dense deployment of base stations in the future, Huawei has explored developing a business model for crowdsourcing-based network construction in micro base stations integrated into intelligent street lighting.	High Speed Mobile Internet: Pervasive high speed internet enabling: <ul style="list-style-type: none"> • smart cities • autonomous vehicles

Conclusion

HIRP has contributed to the growth of Huawei from a Chinese start-up to a global ICT leader through its cross-border and cross-cultural network that innovates both fundamental research, and applied technologies. This network has allowed Huawei to contribute and influence the rapidly evolving ICT space.

Our focus on the relationship as a key value differentiator has reduced the mismatch between Huawei and academia. Our fair and balanced approach leverages the collective intellect for our joint benefit and the benefit of society. We have created a systematic and transferable model to address the challenges. Years of practical experience and achievement have proven our approach to be useful and effective. We believe it is novel that the consistent, systematic resourcing, and focus on the relationship, from the smallest project to the largest, drive shared objectives, leverage a relationship multiplier, and leverage portfolio-level connections.

We believe that future innovation will come from open collaboration and partnership between industry and universities. This isn't just a luxury, but a vital catalyst to spark the innovation that will keep our technologies, and thus our societies, progressing. HIRP is a key strategic enabler to this progression as a part of the Huawei innovation ecosystem.

External Validation of HIRP



During China's President Xi Jinping's visit to Huawei on Oct 23, 2015, Huawei and the University of Manchester officially announced their cooperation through a **HIRP FLAGSHIP** project in the field of Graphene. This cooperation was also recognized by George Osborne, Chancellor of the Exchequer of UK who accompanied the President.



Ms. Chen Lifang (Huawei board member and senior vice president) announced **HIRP** as one of the two initiatives promoting ICT education in Europe at the Enterprise 2020 Summit in Brussels, Belgium on November 17th, 2015.



At WOIC 2016, **HIRP** was brought up in the keynote topic, as a demonstration of Open Innovation activities in China. During the conference, the practices were orally shared and acknowledged among both managerial academia and industrial practitioners.



HIRP has been selected as a case study of Open Innovation and Innovation Management by the School of Business, Hong Kong University (Ranking #14 in 2015 and #12 in the past 3 years globally) and the Tsinghua University School of Economics and Management.