# Cultivation and Incentivization of HCI Research and Community in China: Taxonomy and Social Endorsements

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## ABSTRACT

In this position paper, we discuss the current status of human-computer interaction (HCI) academia-industry partnership, and existing lack of HCI research awareness among Chinese researchers. We present two symbolic case studies of automotive and virtual reality communities in China and EU. Then we propose a closed loop incentivization for government, enterprises and scholars that facilitates the existing Chinese HCI communities.

## CCS CONCEPTS

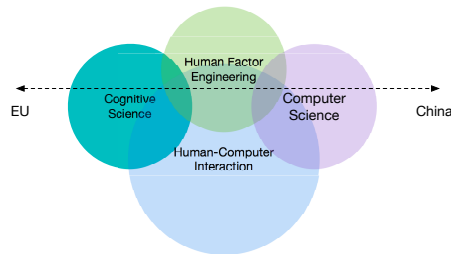• **Social and professional topics** → **Sustainability**.

**Figure 1: The taxonomy field of HCI in Europe and China: HCI research in EU focus more on human side, however Chinese researcher focus more on technical side.**
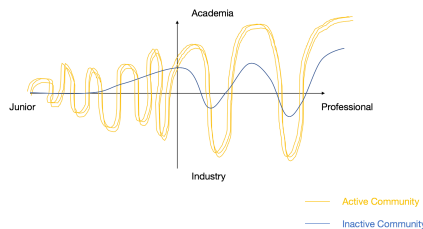


**Figure 2: The sketch indicating the different effects of active and inactive communities on researcher's career development.**

## KEYWORDS

community, sustainability, human-computer interaction

## INTRODUCTION

Human-computer interaction (HCI) research focus on the interfaces between people and computers. Sustainable HCI research gains its popularity, therefore large discussions has opened in the past years, for examples resolving refugees through HCI research[1], policy impacts from HCI research [5, 13], as well as research ethics [7]. The discipline of HCI is situated at the intersection of computer science, cognitive science, human factors engineering, and several other fields of study, as shown in Figure 1.

Currently in China, research publication authors and reviewers focus on technical details. The research community of HCI professionals remains small in China [4, 6], which isolated from the rest of our world. They mainly focus on designing and applying approaches of sophisticated engineering. However, the mainstream HCI communities collaborate with different fields of study or work with other researchers with related goals, such as psychology concerns in uncertainty human behavior modeling [10] and quantitative user experience design[14].

This position paper firstly discuss the existing relationships in Automotive and VR communities. Then, we conceive a closed-loop concept regarding how to deal with the relationship among government, enterprises and researchers.

### Case Studies

The ACM SIGCHI German Chapter was founded in 2017 [3], which is relatively much later compared to the China Chapter, founded in 2005. However, the HCI community in Germany has grown up at a fast pace and been successful in offering an active local society for professionals, academics and students who volunteer to share their expertise and knowledge in HCI. Within such an active community, researchers form different career stages are entitled equally to participating in broad spectrum of fields, i.e. from academia to industry. Contrarily, researchers from inactive community may face with difficulties in acquiring collaboration opportunities at the beginning of career, as illustrated in Figure 2. One reason behind it, could be the sustainability of HCI communities in Germany, which plays an important role in various domains, such as automobile and VR.

*Example: Automotive Communities.* In the automotive field, the role of industry is as crucial as academia. It is mainly because of sophisticated driving test systems, including high-fidelity autonomous driving simulator, which are implemented in automotive industry to evaluate an early-stage concept before its market launch[9]. Aforementioned industrial level equipment is hardly affordable for individuals or even some research institutes. Meanwhile, the automotive industry requires huge number of professionals in diverse fields, in order to form a closed loop from innovation towards interests. Becker et al. pointed out[2], joint research and development (R&D) in Germany benefits the industry with additional innovation resources, while the intensive internal R&D provokes the opportunity of joint R&D. The fostering cooperation between automotive industry and academia creates a win-win situation.

For example, Ph.D. candidates in EU, e.g. Germany, who are interested in automotive domain are offered three ways to further their studies. Firstly, they can look for joint projects hold by university and company on the website of HCI research group at university; secondly, they can search for vacant positions on the website of company;Thirdly, they can visit the website of research institute.Ph.D. candidates in join R&D usually carry out their research ideas and fit into the needs of company and research institute at the same time. Compared to the individual research at university, they profit more from networks and opportunities in industry and market.

Meanwhile, the automotive industry in China has realized the necessity of joint R&D with the academia. Increasing number of cooperation with various forms has been set up rapidly, such as the Seminar "National Engineering Practice Education Center" that held by Tongji University and SAIC Volkswagen[24], the joint research of autonomous driving between FAW and National University of Defense Technology [11], and the research contract between GAC and Chinese Academy of Science [18]. However, in terms of the chances for Ph.D. candidates to conduct their researches within industrial projects from early stage till future career, there are still much room for improvement.

In addition, a new form of cooperation aroused in autonomous cars where comes from Tencent, Alibaba and other Chinese internet giants [20]. Compared to traditional collaboration between the automotive industry and academia, the research project led by internet companies features fast iteration speed and shortened research cycle [19]. However, building safe vehicles to contribute to the worldwide transportation is far more challenging from writing an app and releasing it online. Along with the consistently developing autonomous driving technology and standards, the sustainable HCI, which helps to ease the tension between technological novelty and sustainability goal [23], is under urgent need in automotive communities.

*Example: VR Communities.* The current active VR communities profit from the improvement of computing power brought by Moore's Law and the popularization of mobile technology. In recent years, its community has obtained very different outcomes in the EU and China respectively.
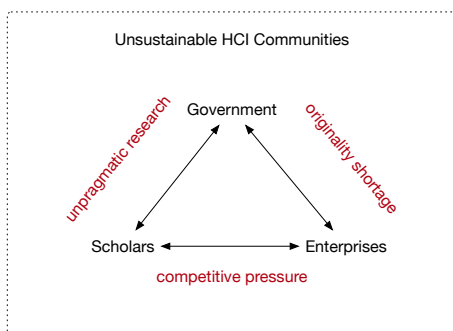
**Figure 3: Issues appear in triangular partnership of the three, any strong connections of two entities obstruct the developing of the third one**
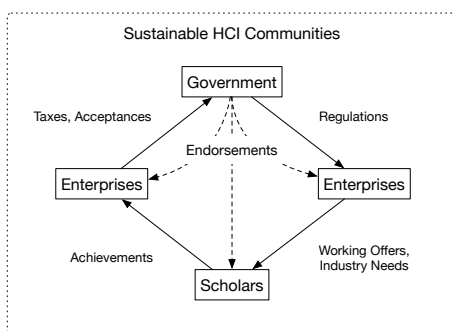


**Figure 4: A closed loop as incentivization among government, enterprises and scholars in HCI value oriented research. Scholars do not interact with governments directly, however cooperate with enterprises and report achievements directly then. As endorsement, government regulations forces the obligations between enterprises and scholars.**

According to social commentary[22], "we believe that VR is the next generation of general-purpose computing platforms; we believe that Head Mounted Display is the last screen of humanity". The trend of VR investment in China has gradually emerged from the end of 2015 and 2016 to 2017. A review of the 2017 VR-Year [12] shows that global VR applications (games) total consumption reached $417 million in 2017, and the global VR head-mounted capacity reached 13.1 million units by the end of 2017. Over time, due to the lack of phenomenal VR content, shipments, and investment in this field, another winter has rapidly arrived in the VR industry of China, which is yet another blow to the confidence of scholars and the application of government funding [16]. Until the present days, according to a VR patent report[15], China has accumulated only a small amount of technical research and value research that does not sustain and support building its community of VR in the near future. The capital is turning the wind to other areas.

In turn, the EU scholars and their achievements is progressing steadily, and more research on the consequences that brought by VR technology have been proposed recently. For examples, trust of strangers in an immersive VR environment [8], review of challenges and opportunities in cinematic VR [21]. These studies provide a positive discussion atmosphere for this particular community of HCI, and their research have also begun to be applied in the industrial field, for instance, Microsoft HoloLens 2 [17] has released as a commercial successor comparing to its first release.

## ENDORSEMENTS AND OBLIGATIONS

From the two case studies above, it is not difficult to figure out that value-oriented HCI research are lacking in China. As illustrated in Figure 3, the reasons are: 1) academic researchers, involved with the mainstream computer science, value in technical details rather than social concerns. 2) there is no relatively benign cycle of government, enterprises and scientific research institutes. 3) the direct connection between the government and scientific research institutes has made it difficult for researchers to understand the status quo of the industry. A large number of valuable research results have become short-term projects since they are not noticed by industries in China. In general, coordinating the relationship or partnership among government, business and scientific researchers is one of key issues in how we can communicate and develop the interaction between Chinese HCI communities and other HCI communities. In this section we discuss a possible concept so that the three could achieve a benign closed loop in the cultivation, construction and development of our HCI communities. As shown in Figure 4.

*Government.* should shift more focus on the interdisciplinary and application HCI research, apart from the computer-technology-based. The pragmatic application of novel technology in proper user case, will bring much more enormous fortune and benefits towards the society. In the meantime, the government should cultivate a long-term sustainable goal into the future, instead of being obstructed

by temporary technical bottlenecks, especially in the current fast changing world. Furthermore, we suspect that, to avoid business oligarchy and short-term research projects, the government should strengthen the endorsement of collaboration between industry and academia, specifically in aspects of sharing expertise, apparatus and opportunities.

*Enterprises.* play a critical role in HCI study and they can provide more funding for researchers or institutes to continue their research. In universities or institutions, these capital will be used to enable researchers to carry out novel ideas and prototypes in the HCI study, meanwhile technical innovation will help the companies acquire much more competitiveness. Besides, with limited number of HCI research teams, it is challenging for companies to perform leading research and develop creative products. Thus, the companies should apply for the funding from the government according to their proposals and provide enterprise funding to participated scholars.

*Scholars.* do not directly establish connections with the government funding. On the contrary, government departments that endorse trust have adopted regulations to ensure closer cooperation between scholars and enterprises. On the one hand, the employment problem of highly professional scholars can be solved through open recruitment, and on the other hand, scholars can also actively choose enterprises due to the support of laws and regulations.

## CONCLUSIONS

This position paper discusses the HCI community in EU and China from the perspectives of the taxonomy and society endorsements of HCI disciplines, as a field of applied disciplines that intersects with many basic subject areas.

We argue that our closed loop: 1) eliminates weakness of value-oriented HCI academic achievements in Chinese society, by eliminating the isolated status among enterprises, government, and scientific institutes. 2) reduces the pressure of opportunities between oligarchs enterprises and researchers by government endorsement and obligations in all companies. 3) expands the communication between the Chinese HCI community and other worldwide communities, since it also creates more opportunities for researchers to observe and cooperate through the actual needs of enterprises, thereby increasing their stakeholder background and producing more research for the future.

HCI, as a discipline connecting people and computers, it builds ideas using existing computing technologies for a distant future. As a rising star, Chinese government should not only focus on our existing investments in theory and technology accumulation, but also encourage and incentivize researchers and stakeholders while focusing on the research of our society construction. Such an approach exploiting the closed loop of the three is possibly the only chance to build healthy and sustainable HCI community in our future.

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