



A developing mode of Scientific and
Technological Achievements Transformation
according to the cooperation of ZJU-China and
Acon-biotech

FROM A PERSPECTIVE OF IGEM

ZJU-CHINA 2018

ABSTRACT : Combined with integrated Human Practice, iGEM (the International Genetically Engineered Competition) requires teams to perform any forms of investigation and cooperation to find out practical social problems and listen to the concerns from experts, publics, even government. Here, ZJU-China summarizes their monthlong cooperation into a developed mode of transformation of scientific and technological achievements based on the previous modes of technology transferring.

KEYWORDS : *Process Analysis, Technology transferring, iGEM*

| INTRODUCTION

1. Definition of Scientific and Technological Achievements Transformation

In this article S&T achievements transformation (science and technological achievements transformation) refers to the scientific research and technology development of practical science and technology achievements of follow-up tests, development, application and promotion until the formation of new products, new technology, new materials, development of new industrial and other new activities.

2. Outstanding importance of S&T achievements transformation in iGEM

As science technology develops along with research and development (R&D), only when S&T achievements could be transformed, in reality, to productivity and a kind of competitiveness, social economy and civilization of beings is able to get promoted. From a view of iGEM-wide, the transformation of S&T achievements indicates a value of creativity within social activities. According to iGEM startup website ^[1], total 33 teams start their companies based on their research achievements and their engineering mindsets to solve actual social problems.

iGEM competition requires teams to conduct investigation in order to drive their projects in a more pertinent way. For specific performances of the investigation related requirements, there exists a requirement for Gold Medal criterion that teams need to convince judge that the team had conducted an integrated Human Practice to investigate the exact problem in industry, hospital, social welfare business, daily life, environment, et. The consideration of integrated human practice contains 3 aspects: industrial application, biosafety, ethics. Hence, Integrated Human Practice is recognized as the process of getting feedbacks from society. During the integrated Human Practice, teams have to demonstrate how society influence their work and how their ideas and designs influences the direction of the social problem being solved. More than a decade of competition history has given us a lot of experience in conducting integrated Human Practice.

Heidelberg University, who won an award grand slam in 2017, showed an advanced concept in integrated Human Practice. They created and emphasized an extended engineering cycle ^[2] to reflect their integrated value and to conduct their integrated Human Practice in a more complete way. Heidelberg-iGEM 2017 conduct their "Extended Engineering Cycle" through interviewing social groups directly or indirectly related to their project topic: Evolutions. By this way, they have their fundamental researches more reliable and closer to social concerns in reality. This is a sophisticated and feasible mode for teams that perform fundamental researches while conducting their integrated Human Practice.

Additionally, Cornell-iGEM 2017^[3] developed a detailed business plan for their project design, hence, they got the Best Entrepreneurship. A general clue for their entire project was clear: Cornell-iGEM 2017 revolve their entire project around the commercial nature of their product, which was called the "Oxyponics". Cornell-iGEM 2017 constructed the "oxyponics" to fill the void among Deep Water Culture (DWC) and Nutrient Film Technique (NTF). Market analysis had been applied through SWOT Analysis in order to have a preliminary understanding on their strengths and weakness directed against their expected products. A detailed business plan in the middle term of your project helped team to present your project in a comprehensive perspective. But behind the business plan, the idea of commercialize iGEM project did help teams to have a clear orientation for you teams, which means the team considered more than the basic requirements of integrated Human Practice and make full use of it.

In a summary, the integrated Human Practice provides necessary requirements for teams to take further steps in realizing social value of their ideas and designs. Especially for those outstanding projects, the exemplary role is even more important. This year,

ZJU-China summarized a developed mode of S&T achievements transformation for iGEM teams, especially for the “New Application” track and teams who plan to have field visits to commercial companies. The mode was developed based on the typical mode which will be discussed in the part of “Analysis and Discussion of S&T achievements transformation modes”.

| OVERVIEW

Analysis and Discussion of S&T achievements modes from a perspective of combination of scientific researches and enterprise

1. An analysis of S&T achievements mode from Social Physical perspective

According to An Liu^[4], 2013, the process of transformation of scientific and technological achievements can be divided into 3 stages: the generation of the scientific and technological achievements, the transformation of the scientific and technological achievements, the application of the scientific and technological achievements. This mode of S&T achievements transformation is one of the most typical technological transformation modes which contains almost potentially related factors.

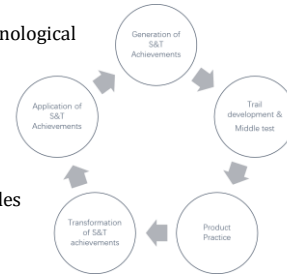


Figure 1. A cycle shows typical mode of S&T achievements transformation.

Such mode is relatively more comprehensive but more complicated, hence, the mode can be easily explained by Mathematic model in the perspective from Social Physics. This mode is often used as a reference for policy making and provided as a full mode for generated S&T achievement transformation model. But this general mode shows its disadvantages when it comes to be truly applied. The unclear and undetailed steps description gives both the governments and the researchers an equivocal solution to perform, which increases the execution cost inadvertently.

2. Mode of docking of researchers and small-medium enterprises [5]

Due to series of macro-control policies that encourage transformation of S&T achievements, a number of institutions have emerged to transform scientific research achievements. According to the Ministry of education and Economic and information Technology Commission about structures and efficient services to small and medium enterprises cooperation spirit, “strategic industry cooperation agreement” has been signed and reported. It has been believed that this mode is a win-win cooperation since the mode directly connect the gap between the scientific researches and the practical applications.

| The developed mode of S&T achievements transformation between ZJU-China and Acon-Biotech

This year, ZJU-China built cooperation with Acon-biotech Company to have the commercial part of integrated Human Practice. Through frequent communications and close cooperation, we construct a developed mode for iGEM teams to have their integrated Human Practice in a more profound way. Here, we introduce the developed part of this mode in detail and recommend vital aspects of ideas of our cooperation mode, or more exactly, the developed mode of S&T achievement transformation.

The developed part of this mode is designed from a relatively comprehensive perspective, which goes through the whole integrated Human Practice process. This developed mode requires teams to contact their docking company in a more frequent way. Communication can take many forms, but make sure it is fine-tuned rhythmically. Docking of iGEM teams and companies not only can direct the entire project in a more practical way, but also help teams ensure the project be adjusted timely. The core consideration of this developed mode is divided into 3 aspects and being concluded:

1. Policy & Patent

From the perspectives of policy and patents, we focus the legality and policy adaption of our project. Effective transmission of policy

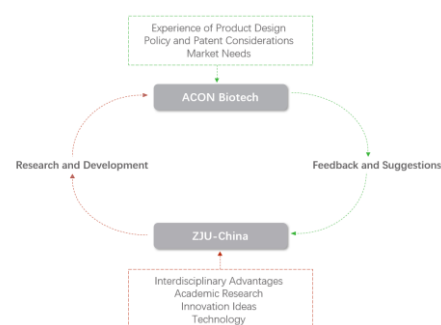


Figure 2. A cycle shows the developed mode of S&T achievements transformation inspired by the cooperation of ZJU-China and Acon-Biotech.

information and spirit should be conducted and integrated by the docking company.

Valid information in policy can help the team grasp the current trend and have a better understanding on their expected production. Take In-vitro diagnostic devices for example, due to the specialization of medical devices, the policy contents are mainly related to regulatory regulations, examination and approval regulations and industrial development. For an instance, the regulatory regulation should be referred to "In vitro diagnostic reagent quality assessment and comprehensive management program", which is contained in the higher ordinance.

Patent also should not be ignored for its vital part for teams to transform their S&T achievements. In Zhejiang University, according to "Patent right protection in Zhejiang University" [8]: for the patent transfer fee, if the patent owns to undergraduate students, only 1 yuan will be charged from Zhejiang University. Such favorable patent policies are designed to encourage students to make scientific innovation, which is also applicable to undergraduate research teams to apply this "Docking of gem teams and small-medium company mode".

2. Suggestions from Market Analysis

Market Analysis were integrated and provided by Acon-Biotech, for reason of confidentiality, we only presented suggestions and brief explanations here.

2.1 Focus more on health monitoring for the elderly.

Social concerning on the elder health caring is up with the increasing proportion of aged population. In-vitro diagnostic device reduce the cost on monitoring the health of the elderly since the elderly population is a major disaster area for chronic diseases which are not easy to be perceived in the early stage.

Here, according to their suggestions, we decided to focus more on the elderly population by collecting data of the elderly in Run Run Shaw Hospital. (See more on our integrated Human Practice page – Sir Run Run Shaw Hospital)

2.2 Start with the diagnosis of common diseases

The prevalence of common chronic diseases such as diabetes, heart disease and hypertension continue to rise, which makes the traditional demands of in-vitro diagnosis in the common diseases keep increasing.

Here, we adjust the design of our project by choosing the common indicators corresponding to the common diseases. In some cases, it is a win-win solution for our project since the common indicators are much easier and more reliable to perform with previously theoretical and industrial work. (See more on our Project Design page)

3. An outlook of series of downstream products

Nowadays, to win a place in a mature market such as the in-vitro diagnostic device, only with a single product will be negligible for your product to compete with others. Hence, the downstream products designing would really matter. Here, according to Acon-biotech, ZJU-China initial with this idea by improving the flexibility of our diagnostic device. More details will be presented after iGEM.

| CONCLUSIONS & DISCUSSIONS

Cooperation between ZJU-China and Acon-Biotech is a win-win solution. We summarized this developed mode for the next generation of iGEM teams to take a further integrated Human Practice and a typical but reliable way to transform their iGEM projects. During the interaction between ZJU-China teams and Acon-Biotech, we noticed some points of view that can be applied by other iGEM teams:

1. Most of iGEM teams aim to solve some practical problems which means teams can combine their integrated Human Practice with a concept of technological transferring to have further considerations and constructions in order to make their products more practical.
2. Summarize the mode of your integrated Human Practice. The mode of your integrated Human Practice includes how you built your connection with the docking of social organizations and government and how you think out of the Gold Medal Criterion Box. Actually, modes of different types of social concerning, research preferences help next generations of iGEM teams to improve their social activities and expanded the spreading of concepts extended from the Human Practice activities and requirements with the considerable influences of iGEM competition.

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