

TUM School of Management Schöller Chair in Technology and Innovation Management Prof. Dr. Joachim Henkel

The Schöller Chair in Technology and Innovation Management (Prof. Dr. Henkel) offers a Master's Thesis with the following topic:

## **Network Externalities in Synthetic Biology**

## Background

Over the past few decades, biotechnology as an industry has skyrocketed and branched out into many different fields. Biotech's latest brainchild comes in form of synthetic biology (SynBio). The goal of synthetic biologists is to standardize biological parts and to combine these parts like pieces of Lego®, to program living organisms like computers. The SynBio market in itself is estimated to reach a size of USD 10,8 billion in 2016, and the overall market for this next generation of biotechnology is estimated to a size of up to USD 1,6 trillion in 2025. The scope of applications and their potential encompasses a vast number of industries varying from producing new medicaments, therapies, environmental biosensors to novel methods of creating food, drugs, chemicals and even energy.

One product in SynBio can involve hundreds of parts. Some of these parts can be exchanged with other parts with a similar function. It has been shown that the value of biological material is increased with its use by scientists. That leads to re-use by the scientist, his research group, and the research community worldwide. Lock-in to these parts, due to switching costs or network effects may lead to monopolies. Therefore, it is important to understand why scientists prefer some parts and use these instead of choosing other parts.

Since many of these parts are substitutes for one another each of the standardized parts that scientists use is, a choice among a set of parts. Considering the use and re-use of standardized biological parts as a selection among other parts provides a rich dataset of observations for econometric analysis that can be used to identify network effects in Synthetic Biology.

## **Objectives**

In order to analyze the current use of biological parts the objective of this thesis consists of two main tasks:

- 1. Gather information from the most prominent biological repositories in SynBio, namely the Registry of Standard Biological Parts (the data collection follows a tested approach).
- 2. Use the data for an econometric analysis to identify network externalities in SynBio and the respective drivers for these externalities.

## Contact

In case of interest or further questions, please contact **Philipp Pfingstag** (philipp.pfingstag@tum.de). Your application should include a **CV**, a current transcript of records, and a Bachelor certificate. For more information on our general requirements, the application procedure, and the style guidelines please go to http://www.tim.wi.tum.de/index.php?id=210. The thesis can be done either in English or in German.