**Title:** Unravelling Software Innovation: Insights from GitHub Data

**Supervisors:** Dr Steven Bickley (Primary Supervisor), Dr Ho Fai Chan (Associate Supervisor)

**Overview:**

In the fast-paced and ever-evolving world of software development and engineering, understanding the mechanisms that drive technology creation and evolution is crucial. This VRES project aims to empirically test the theories and ideas of technology development proposed by Brian Arthur, focusing on combinational creativity and goal-oriented programming and software development/engineering. Using a comprehensive dataset of GitHub repositories, this study will analyse the historical data on contributions, forks, likes, and other metrics to uncover patterns and insights into how software technologies evolve and innovate.

The dataset, which includes information on several hundred to thousands of GitHub repositories, provides a unique opportunity to explore the dynamics of technology development through the lens of network science and econometric analysis. By examining how different software components interact and combine, this project seeks to shed light on the processes of technological innovation and the factors that drive successful development.

The expected impact of this research is significant, with potential applications in policy development, innovation, and entrepreneurship studies. By understanding the underlying mechanisms of technology evolution, policymakers can design better support systems and interventions to foster innovation. Additionally, insights from this study can inform best practices in software development and engineering, ultimately contributing to the growth of the technology sector.

The ultimate goal is to generate insights that can inform policies and support systems within the software development and research communities, fostering a healthier and more productive environment for software engineering and innovation. Through this research, you will contribute to cutting-edge knowledge at the intersection of social science, human behaviour, and online studies/data analysis. Additionally, there is an option to co-author and submit the manuscript to an academic journal (see ‘Outcomes’ section below).

**Research Activities:**

* Conduct an extensive review of existing literature to identify gaps and contextualize the current study.
* Work on real-world data using quantitative data analysis techniques.
* Document the findings of the study, interpreting the data and drawing conclusions based on the analysis.

**Outcomes:**

* The project aims to produce a draft manuscript that includes the following:
  + **Introduction (1-2 pages)**: Overview of the study's background and significance.
  + **Literature Review (3-5 pages)**: Detailed analysis of existing research and identification of gaps.
  + **Research Aims/Objectives and Questions/Hypotheses (1-2 pages)**: Clear articulation of the study's goals and hypotheses.
  + **Methodology (2-5 pages)**: Description of the data collection process and analysis methods.
  + **Results and Discussion (5-8 pages)**: Presentation and interpretation of findings.
  + **Conclusions and Future Work (2-4 pages)**: Summary of key insights and recommendations for future research.
  + **Reference List/Bibliography**
  + **Appendices (optional)**
* Generate a brief, 2-3 slide presentation to present your research at the Faculty of Business and Law VRES Showcase to conclude the program.
* (Optional) The student will be eligible to present the findings to an audience of 100+ academics and industry partners in the annual BEST conference in February/March 2024.
* (Optional) The ultimate goal is to co-author and submit the manuscript with the student to an academic journal, provided the student is keen and interested. However, it should be noted that the primary deliverable is a final draft manuscript. As it is not certain that the student will be paid beyond the completion of the VRES program in early 2025, any further work on the paper would be entirely voluntary and optional for the student.

**Skills and experience:**

* Some proficiency in data entry, data analysis, and statistical techniques
* Experience using software such as STATA, R, python and/or an interest in software development/engineering, programming, computer science, and Artificial Intelligence (AI) research would be beneficial for this role.
* An interest in behavioural economics, science of science, data analysis, network science, innovation, and technology change would be beneficial.

**Keywords:**

* Technology Development
* Combinational Creativity
* Goal-Oriented Programming
* Software Development
* GitHub
* Network Science
* Data Analysis
* Science of Science
* Behavioural Economics
* Innovation Studies
* Data Analysis