IE 101 | Innovation and Entrepreneurship 101

Author: Ikhlaq Sidhu

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Case Study: Data-X, A Precursor

Fostering the entrepreneurial process in data science innovations Data-X is a course at UC Berkeley developed and led by myself and Alex Fred Ojala launched in 2016. The Data-X class is an example of an applied data science course that was specifically designed to address the big picture needs of industry. It relates to the emergence of AI in different verticals, while also adopting lessons learnt from the Berkeley Method of Entrepreneurship (BMoE). The BMoE principles, which form the foundation of the Data-X program, stress the development of the right mindset for incorporating innovation with technology, which is not accounted for in most entrepreneurship curricula in academia. Later, concepts from this program were incorporated in the Innovation Engineering framework. Data-X Was Originally Designed to Address these Fundamental Problems:

1. A lack of applied or real-world experience in teaching data science

2. A lack of focus on implementation and powerful tools

3. A lack of integration between theory and practice

4. Correcting the mindset and behaviors required for innovative, technical projects Data-X was a Precursor to Innovation Engineering: In designing the Data-X class, we hypothesized that data science applications are very similar to entrepreneurship. There are no

specific rule-based methods enlisted in a book that can be used to derive value from data. The idea is bigger than teaching data science alone. Creating solutions and transformation of processes in the real world using data science are the innovation problems. To engender innovation in addition to technical skills, we need to train mindsets and behaviors of the individuals working on data science problems. We believe experiential training is the key additive ingredient in training mindsets and behaviors. The Data-X class ties to the ideas of BMoE which qualifies inductive teaching methodology to be more successful in teaching subjects that involve skill and mindset. Mindset, tactics and infrastructure are the three main components encompassed by BMoE. This method uses experiential teaching tactics that help students understand general concepts through practice, observation, critical thinking, and games. This method has been used at UC Berkeley in teaching entrepreneurship for the past four years. It has produced thousands of students as innovative leaders in developing entrepreneurial startups or innovation in big companies. In Data-X, we have attempted to use the BMoE method to teach innovation using Data Science. Data-X Methodology The figure below summarizes the data-x model, note the two simultaneous paths running throughout the course, one for learning concepts and tools and the other is the collaborative application of concepts and tools on the projects. The content covers math theory and computer science tools, yet at the same time, it includes a project which is developed from an insightful story and uses agile methods to create a solution. The idea is to make students aware of the state of art methods and tools used in the real world and let

them work in teams, think about problems in hand with different perspectives and create an insightful story to arrive at a solution. The Data-X Framework shows that story is developed prior to implementation in this early version of Innovation Engineering Data-X Results The result of combining story in the form of a low-tech demo along with theory and an execution while learning style including agile sprints has been effective. Data-X represents a model which is an early form of the Innovation Engineering framework The key results in the first two years have shown the following: 1. Delivery time of complex projects in shortened timescales of 13 weeks. 2. Demand of the course increased exponentially within 2 years.

3. Demonstrable applicability to job placement. 4. Development of innovative mindset and behaviors within a technical course. Project Case Examples: Data-X projects are publicly available and posted at the site: See https://datax.berkeley.edu/ The case examples that follow demonstrate a combination of story and agile implementation in a period of 12 weeks.