Reflection Paper – Fundamentals of Systems Thinking & Environment

Foremost thoughts and expectations from this course

When I first glanced at my second-semester course list and saw Fundamentals of Systems Thinking listed among the course load, it was indeed an intriguing curiosity for a slight puzzlement. Up that point in time, my academic life as a Computer Science student had been a solid affair: programming, mathematics, and a harder exposure to the fundamentals of electronics. Everything felt structured, straight-lined-a neatly packaged problem with a clearly defined path to arrive at the solution. The thought of "systems thinking" was totally new to me.

Initially, my mind went into absorbing the thought that this class would be more theoretical or perhaps concentrated on soft skills, such as teamwork or communication. I doubted very much that it would hold relevance to my interests in the ubiquitous act of coding and technology. At best, perhaps I could learn a few abstract methodologies on how the components of a software project may or may not align. I certainly wasn't prepared for this entire course to challenge my mindset and reorient how I think about complex issues.

At the beginning of the semester , wondering how this course was going to be presented. Would the student be invited to case studies, juggling abstract theories, and concrete exercises? At the same time, I harbored a few butterflies; stepping outside of my familiar territory to deal with uncertainty and approximate things seemed to be quite an unusual experience for me in much of technical work. However, part of me welcomed the challenge-maybe that is how this course could find the linkage for me among the subjects I was taking in the classrooms, or maybe it would open new avenues for me to look at a problem in computer science. For some odd reason, an initial unfamiliarity with the material was not going to deter me because I believed by that time I would have picked some skills and perspectives that could be complementary to my technical background to nurture my capability to think laterally.

Looking back now, I can see how much my thinking was shaped by the "siloed" nature of my earlier studies. Each subject appeared to be an island unto itself without regard for how its concepts might or might not apply in another area. I was comfortable solving clearly bounded context problems, for which solutions could be clearly delineated. The idea of stepping back to look at the bigger picture tracing connections, feedback loops, and unintended consequences was scary and exciting at the same time. I was walking into the course, carrying with me skepticism and hope, hoping to see if it would truly broaden my perspective or simply remain another box to check off in my curriculum.

Learning Journey and Evolving Perspectives

As the weeks went by, certain concepts really began to stand out-more so Causal Loop Diagrams (CLDs) and the well-known system archetypes. CLDs, in particular, had granted me a new way of seeing and explaining complicated relationships that I had previously found hard to articulate. I started doodling little CLDs in the margins at times when other subjects were proving baffling. The "Fixes that Fail" and "Success to the Successful" archetypes were lightbulb-moment concepts for me; I could suddenly perceive such patterns everywhere, from government policies to the way student clubs function.

The real breakthrough came when Aditya Sir discussed delay in systems. He gave examples of major events like the Bhopal Gas Tragedy and glacier meltdown in the Himalayas. The Bhopal disaster was such that ignoring early warning signals and safety mechanisms resulted in a catastrophic delayed effect. The melting of glaciers was another such problem-solving example that helped us understand how climate change feedback loops work very slowly and cumulatively, real-time and therefore all the more difficult to address. These examples drove home how often delayed consequences are ignored in favor of quick-fix measures that look good on a short-term basis.

My second and equally profound experience came from the team-oriented nature of the coursework. In contrast with my previous experiences, which revolved mostly around individual assignments, systems thinking required teamwork and dialogue. Working in groups, we often discovered that each participant's background and perspective uniquely contributed to understanding a problem. For example, in the study of campus resource allocation dynamics, a classmate from the Department of Finance identified a financial feedback loop I had not considered, whereas another from Psychology pointed out the ecological implications. Those conversations sometimes became a little fiery, which would bring us toward more integrated and creative solutions. This experience ingrained in me the value of diversities of opinions and listening to view points before agreeing to conclusions-skill sets I now acknowledge as truly needed when addressing any complex matter in the real world.

The guest session with Apula Singh was another eye-opener. She broke the intricate web of city systems-transportation, housing, and social equity interlinked with one another. Simply by looking at the CLD on Delhi municipality problems, one could easily see why short-term reliefs might spell more trouble later. Systemic thinking, for the first time beyond academicians, has become a real tool in confronting everyday urban issues.

The simulation exercise with Vensim was quite challenging yet rewarding. The group engaged in modelling the spread and control of malaria in urban areas. At the beginning, we assumed the gradual reduction in spread with more fogging and campaigns. However, once we started simulating the interactions between mosquito breeding cycles, seasonality, and strain on healthcare infrastructure, we began to observe some counterintuitive implications. An example would be aggressive fogging at the onset of the season which reduced immediate cases; however, this also reduced awareness in the community about malaria and weakened immunity among them, resulting in bigger outbreaks later on. Debates within the team regarding these dynamics and allowing the data to dictate conclusions rather than assumptions was the actual learning experience.

Future Application and Relevance

Now, with somebody wishing to specialise in AI and machine learning, I find systems thinking to be very much needed. AI systems do not work in an empty system-they interface with human beings, organisations, and society in multifaceted and often unpredictable manners. Thanks to this course, I have become acutely aware of these far-reaching impacts; one possible direction for my thesis is on feedback loops in AI-based recommendation systems, utilising systems dynamics tools learned.

The last hackathon idea on small sellers and e-commerce finally tied it all together. My team initially considered the problem purely a technology one: small sellers just needed better digital tools. However, after system mapping, we uncovered a network of problems, delayed payments, biased review systems that favour big players, and logistics costs-high costs, all contributing to small sellers' disadvantage. Considering all aspects of the system, we went for a solution concerning seller cooperatives and community trust systems, rather than addressing band-aids.

The entire course changed my mindset on how to tackle issues. Instead of rushing for quick answers, I tend to stop, ask, and consider, "What is the system underlying this problem?" Now, I am more patient and thorough, always on the lookout for and especially interested in feedback loops and unintended consequences. Just last week in a meeting at my startup, I caught myself drawing a Causal Loop Diagram to understand why our engagement among users had been dropping-something I certainly wouldn't have done before.

Looking forth, I am very enthusiastic about applying systems thinking to not only research projects but to everyday life, as well. I have found myself, little by little, observing interconnectedness and feedback loops everywhere-ever since trying to manage my time more effectively and embrace the social dynamics in student organisations. I am very much intrigued by the application of these ideas to the design of an ethical and responsible AI system, where the unintended consequences could be far-reaching. I was able to view messy, ambiguous problems that represent messy dimensions through a systems lens and maintain confidence by breaking them down, mapping relationships, and anticipating ripple effects. I now consider myself a justification for combining technical expertise with a broad systems-thinking mindset, which I consider very useful no matter what path my career should take.

I also feel much more confident about working across disciplines as I have worked with students of different courses and perspective. Systems thinking is a common language between technical and nontechnical areas. I might even take some electives outside Computer Science just as an attempt to broaden my outlook.

AT LAST ,

A huge thank you to Aditya Sir for opening my eyes to this new way of thinking. The expert sessions especially Apula Singh's talk on urban systems and the hands on hackathon really demonstrated to me how powerful and pragmatic systems thinking can be. Not just new tools, I have learned from this course; I have new eyes for seeing and solving complex problems, whether in studies or outside.

THANK YOU

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