CISCO

Real Product Design

1469A – It Is What It Is
Northridge, CA

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Why this Company?

Pivotal to the internet boom, Cisco Systems spearheaded modern networking and telecommunications. Sparked by Stanford graduates Lean Bosack and Sandy Lerner in 1984, the company catalyzed the technological world. Today, Cisco is a multinational corporation that manages 85% of internet traffic, focusing on routing, communications, switching, and security. Cisco permeates into the STEM field and facilitates the platforms for a plethora of STEM communities, including for the VEX Robotics Competition (VRC). Given such rich history and modern prominence, we were enticed to delve further. By researching Cisco's design process, we provided insights to improving our own design processes.

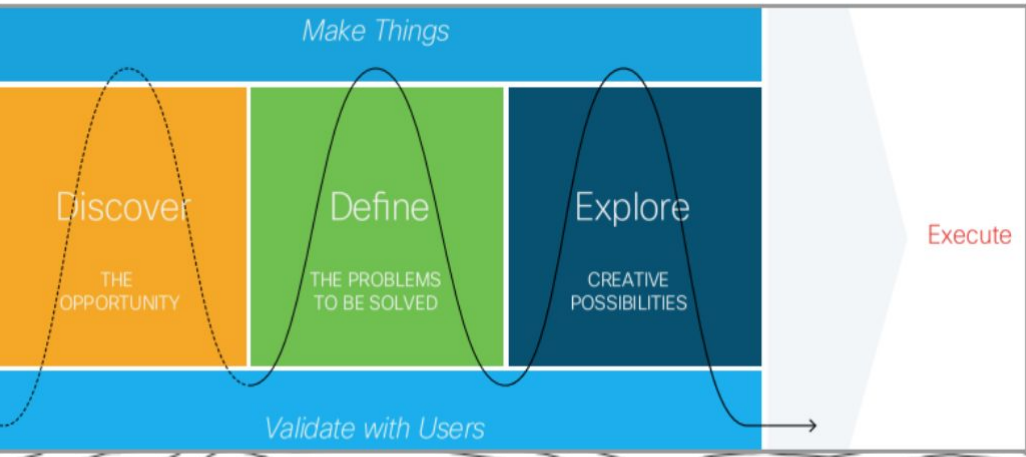
To uncover the Cisco design process, we analyzed several resources. For general context, we explored the company's website. Contacting a Cisco technical solution architect**,** Jonathan Roberts, we obtained detailed documents of their step-by-step product design process, particularly the *Getting Started with Cisco Design Thinking* book and presentation. Analyzing further, our team also interviewed Jonathan Roberts and discussed the link between Cisco product design and VEX robotics design.

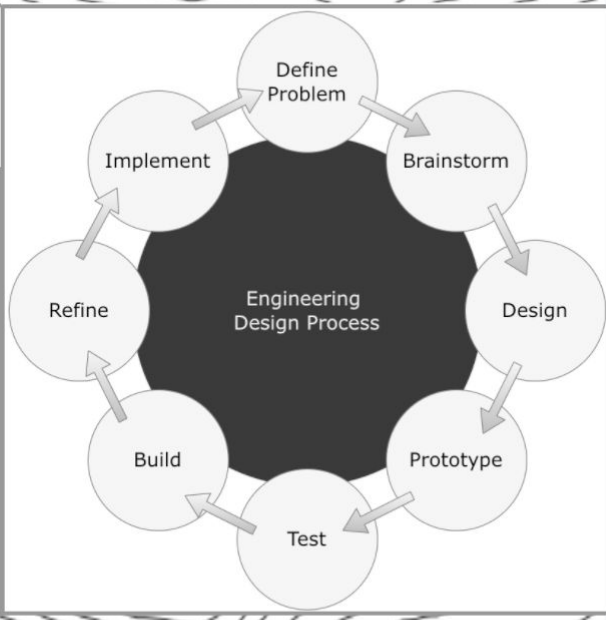
Figure 1: Cisco Logo from Mobile World Congress (Barcelona)

The Design Processes

The essence of design is problem-solving. That be it constructing robots or manufacturing products, design processes pave efficient pathways of project construction. As introduced in the *Getting Started with Cisco Design Thinking* book, the process guides engineers to "creatively solve problems… Smarter. Better. Faster. Together" (Riley 3). While Cisco employees implement the Design Thinking Framework, robotics students employ the Engineering Design Process, only differing in how steps are deconstructed. As seen in Figure 2, the Design Thinking Framework has four notable phases: Discover, Define, Explore, and Execute. Although the Engineering Design Process covers more steps, both encompass the same function.

Figure 2: Cisco's Design Thinking Framework (Left) versus Vex's Engineering Design Process (Right)





Discover

THE OPPORTUNITY

Before committing to a project, teams must formulate ideas. For our VRC team, the defined problem was the Tipping Point competition; we needed to score rings, transport mobile goals, and balance on a platform. Though, there is a commonly overlooked component: understanding the user. As revealed in the first phase of the book, "By empathizing with users and truly understanding their core needs, current frustrations, and related pain points, you can uncover the valuable opportunities that drive true innovation" (Riley 14). Implementing the Cisco Opportunity Statement, our user validation is depicted in Figure 3**:**

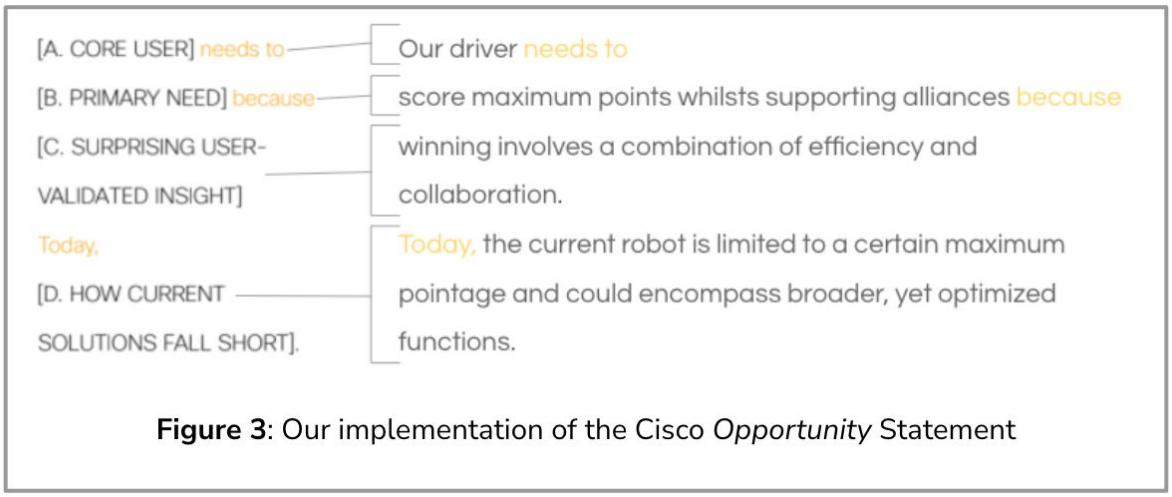


Figure 3: Our implementation of the Cisco *Opportunity* Statement

While Cisco engineers work with users of their product, we cooperate with our driver. We also collaborate with our local VRC community through events like "Robot in Three Days" to gain further insights and construct raw ideas. Overall, the Discover phase fits the Engineering design process.

Define

THE PROBLEMS
TO BE SOLVED

In essence, Cisco requires in-depth planning of designs, identifying and optimizing solutions to problems. The Cisco Design presentation labels these as primary, secondary, and tertiary problems (Munguia). Our team follows this Cisco outline as visualized in Figure 4:

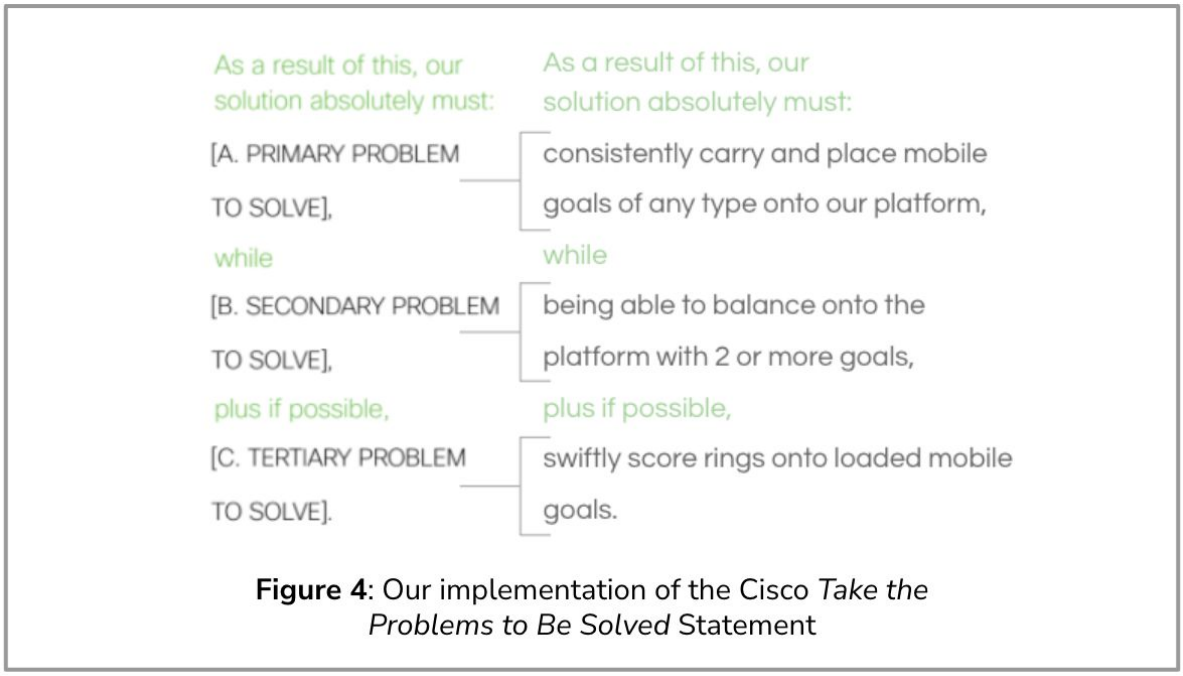
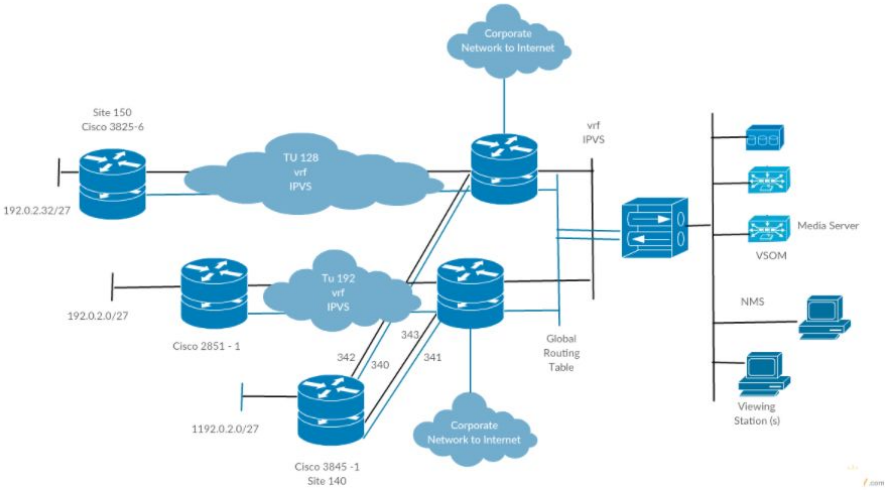


Figure 4: Our implementation of the Cisco *Take the Problems to Be Solved* Statement

Just as Cisco deconstructs problems for their products, we attempt the same. This breakdown allows us to focus on optimized designs. As illuminated in the book, “focus on doing something important really well, rather than partially solving a broad range of less critical issues” (Riley 29). Instead of encompassing all game functions, our robot specializes in specific, optimized strategies like scoring goals. Comprehending the intricate problems, we can then visualize our design.

Explore

CREATIVE POSSIBILITIES



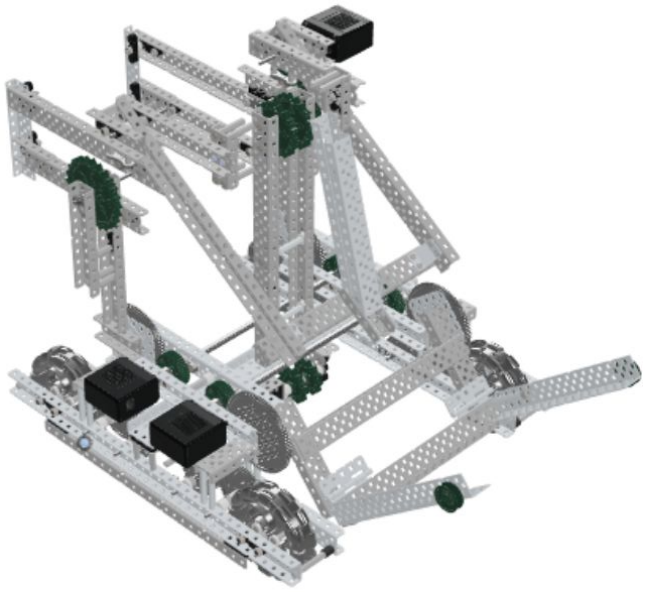


Figure 5: Types of Prototyping: Cisco network topology diagrams and our former CAD design.

In this phase, ideas are tested and refined. In our interview, the Cisco employee describes this process as “highly iterative, as you have to visualize and improve your designs” (Roberts). Cisco completes this task through sketched, low-fidelity concepts and interactive prototypes. Our team does the same through our CAD designs, as seen in Figure 5. Following the methods of Cisco engineers, we validate ideas with our users (our driver) and collect data to upgrade our robot. Their book defines this fittingly: “Your team has come up with many ideas, built things you weren’t sure would work, tried them out with users, had some failures, and had some triumphs.” (Riley 38). Once refined, we transition our designs to implementation.

Execute

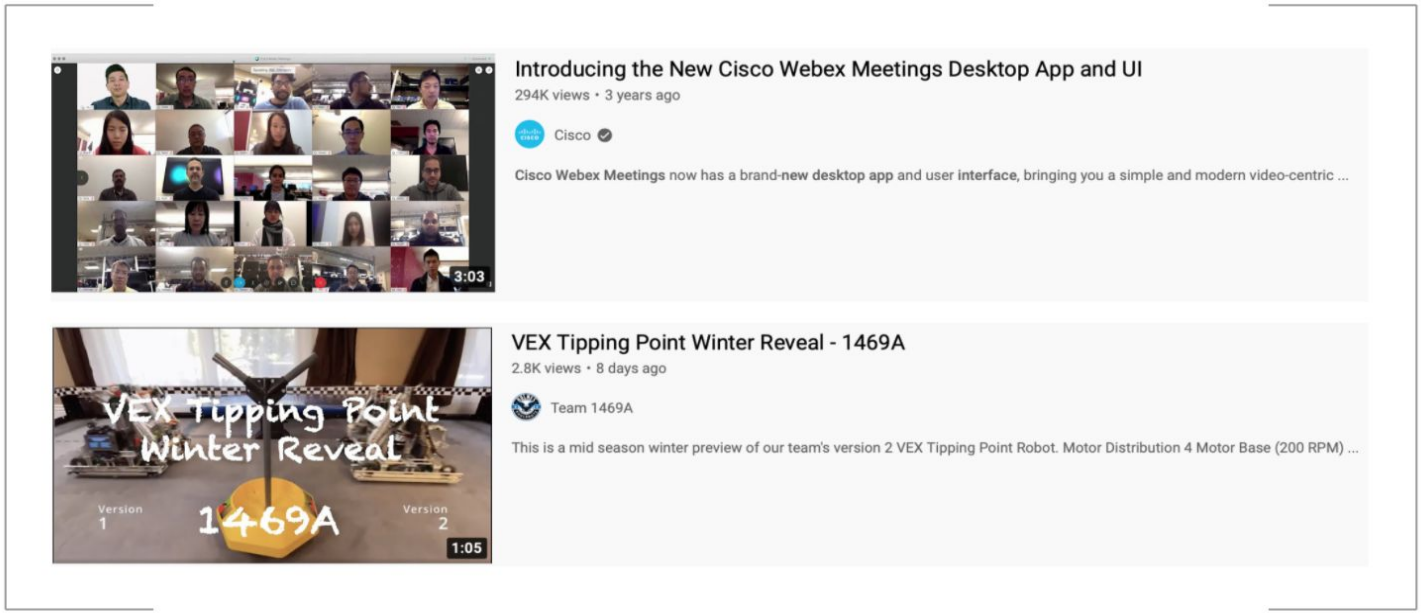


Figure 6: Presenting executed designs through Youtube

At this phase, we can now actualize our design. The book emphasizes that "concept development is an ongoing, iterative process. Things can change during the engineering process — and often do" (Riley 41). Just as Cisco engineers continuously improve their products, our team constantly improves our robot post-competition and post-testing. During this phase of execution/implementation, both Cisco and our team also consider costs. Cisco defines three central adverbs: "Efficiently. Effectively. And elegantly " (Riley 6). Though less funded than Cisco, managing costs is still integral, be it reimplementing designs or acquiring sponsors. Our team also has a marketing aspect. As compared in the interview, "Alliances are a lot like consumers" (Roberts). By scouting teams and publishing Youtube videos, our team reaches these bases to execute our endeavors, completing the design process.

Career Implications

Researching the design process behind Cisco, we unveiled fundamentals for success in STEM careers. Through participation in VEX robotics, students build and hone essential skills. Of course, students continuously practice technical skills, whether it is using tools and machinery to construct robots or technology to code complex autonomous commands. Research into the Cisco company reveals two other facets: management and socialization.

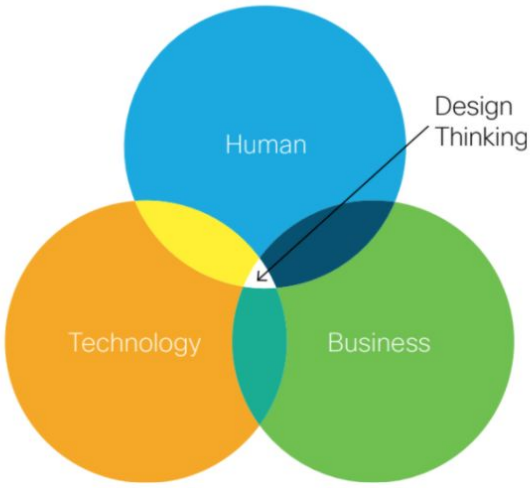


Figure 6: How to approach design in STEM

Though less STEM-oriented, management and socialization are central to future careers. As underscored by Cisco's book, “Thinking best practices to the unique context of Cisco’s global workforce, heritage, technology portfolio, management culture, and our partner and customer relationships” (Riley 9). We practice management through our Engineering notebook, implementing various documentations. For budget management, we have cost analysis sheets to optimize our parts usage. For time management, we have Gantt charts to timeline future goals. In our interview with Roberts, he likened our Gantt charts to his company’s “Execution commits,” project outlines that track benchmark dates (Roberts). VEX also opens opportunities to delve into socialization. Through team collaboration, we transform driver inputs into ergonomic designs. At competitions, we strategize with our alliances to succeed. Even the judging interviews prepare us for future careers, foreshadowing STEM interviews and presentations where we must methodically explicate our projects and ideas. Through VEX, we acquire crucial tools for STEM careers, tools that are quintessential to solving real-world problems.

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Thank you for Reading!