PLUG AND PLAY
MOBILITY

INNOVATION PARTNERSHIP
SUCCESS STORIES

The Success Story of SEKISUI & META

How SEKISUI uses META's mature metamaterial technology to improve communication infrastructures

Plug and Play's batch startup META joined forces with SEKISUI, a leading global manufacturer of high performance plastics. Integrating META's metamaterial in SEKISUI's advanced plastic product solves the pressing issue of 5G/6G indoor connectivity.

The Innovation Partnership Success Stories is a series that focuses on key projects that emerged through our Smart Cities platform.

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SEKISUI

META™

The Parties Involved

The Corporate Partner

SEKISUI CHEMICAL is a plastics manufacturer with head offices in Osaka and Tokyo, Japan, with an innovation team in Silicon Valley. The company owns a plethora of subsidiaries engaged in a variety of businesses. They develop and provide high-performance materials, that take customer products even further. SEKISUI has over 26,000 employees in more than twenty countries worldwide.

SEKISUI builds and sells prefabricated modular houses in addition to parcels of land. The Company also manufactures and sells polyvinyl chloride and other plastic products used in, for instance, drainage pipes and bathtubs. Moreover, the company is engaged in the production and sale of high-performance plastic films, tapes and sheets.

The Startup

Metamaterial Inc. (META) is a developer of smart materials specializing in nanofabrication. They design and produce highly functional products that master and manipulate light, and apply this technology to revolutionize everything from mobility solutions to aircraft safety to wearable tech to automotive lidar.

The core technologies of rapid metamaterial design, holography and rolling mask lithography have enabled scientists and engineers to produce the world's largest and most advanced library of metamaterials.

META develops new materials at "The Speed of Software", a proprietary design methodology which controls the combination of materials and micro/nanostructures offering the power to optimize those combinations without spending months and millions of dollars developing chemistries with incremental performance gains. Many of their solutions are designed for more efficient use of light and other energy forms.

Background

Initial Objectives

Telecommunication has its difficulties - connectivity is blocked by walls or objects, giving network users a stressful time due to insufficient coverage. As radio waves become higher frequency, such as 5G and 6G, these waves are even harder to reach due to their high directivity and easy attenuation.

SEKISUI's overall innovation goal is to cultivate a new 5G/6G communication market by developing cost effective radio wave control products using metamaterial technology. With that they want to improve the performance and coverage of high-speed, 5G and future 6G networks, indoors and outdoors.

They reached out to Plug and Play to identify startups that possess metamaterial technologies with high synergy to SEKISUI. They did not have any basic technology or knowledge about metamaterials, so they were seeking an integration of their strengths in plastic processing technologies, such as film molding, and the startup's metamaterial processing technologies for films.

What are Metamaterials?

Metamaterials are a subset of functional materials. They are composite structures, consisting of conventional materials such as metals and plastics, that are engineered to exhibit new or enhanced properties. They typically consist of a multitude of structured individual elements. Some examples of available metamaterials are negative index metamaterials, chiral metamaterials, plasmonic megamaterials, photonic metamaterials, etc.

Project Kick Off

Plug and Play organized a Dealflow on the topic of Metamaterial Technology Exploration in November 2019, presenting more than 5 startups in that area, one of them was Metamaterial Inc. (META). What distinguished META from the others was the maturity of their technology and their plan for mass production. This is when SEKISUI decided to move forward with META.

The Project

SEKISUI's vision of a new product was based on the idea that a metamaterial layer in their plastic films would enable a reflective property of the films that redirects high frequency radio waves into areas of bad connectivity. They wanted to conduct a Proof of Concept (POC) with META about the properties of their materials, as it was also a new use case for META. So SEKISUI established an evaluation system based on whether or not the initially expected characteristics could be achieved and started to look into the appropriate product design. But SEKISUI's innovation team in Silicon Valley did not have the testing facilities or equipment to execute tests with such prototypes, so they reached out to the R&D team in Japan for support.

The POC was led by the R&D team in Japan, supported by the innovation team in Silicon Valley. For the POC, META sent sample sheets of their metamaterial to SEKISUI. The data and computer simulation results were very convincing and the desired characteristics were already achieved with the first prototype.

Outcome

By combining META's special metamaterial layer with SEKISUI's plastic films, they developed an innovative thin, transparent and flexible radio wave reflection film that can be attached to any surface and can reflect radio waves in the Sub 6GHz and millimeter wave ranges. The surface reflects and redirects 5G/6G radio waves, improving connectivity immensely and replacing metal reflector which normally require power supply. This new innovative product eliminates network users' stress and blindspots in communication, supports IoT transformation, and significantly improves communications infrastructure. The ultimate customers for this new product are electronic telecommunication conductors, general contractors or subcontractors and telecommunication companies.

SEKISUI and META are in preparation for a full commercial deal. In order to realize that META is further developing their technology based on the current feedback and is working on mass manufacturing to support SEKISUI's ambitious goals.

Timeline

November 2019:
SEKISUI launched a Dealflow about Metamaterial Technology Exploration with Plug and Play and meets META for the first time

December 2019:
Quickly after the Dealflow, SEKISUI and META had their first private follow up meeting to introduce SEKISUI's goals and discuss the broad terms of a collaboration. META confirmed their technology could help SEKISUI

Spring 2020:
SEKISUI used the time to prepare for a holistic technology testing by establishing an evaluation system and identifying the appropriate test facilities and equipment. COVID-19 significantly slowed down the project which caused a delayed start of the POC to September 2020

September - December 2020:
Execution of the POC: SEKISUI's R&D team ran the material tests. They ran efficacy tests around the use case of 5G/6G connectivity in indoor spaces. SEKISUI extrapolated the raw test data to demonstrate the telecommunications use case

February 2021:
Presentation of results: SEKISUI was invited to docomo's Open House event to showcase new technology solutions in the telco space, where they presented their new product

March 2021:
SEKISUI and META launched their web site & announcement of the collaborative relationship. A commercial deal is in preparation

Take Aways

Focus on Scalability

While many open innovation strategies are focusing on unique technologies, SEKISUI is seeking solutions that match their growth strategies. So they are looking for products, services and business models that have the relevant maturity and can scale together with SEKISUI. Especially in hardware, it is worthwhile reaching out to later stage startups that can support mass production.

The Pitcher-Catcher Relationship

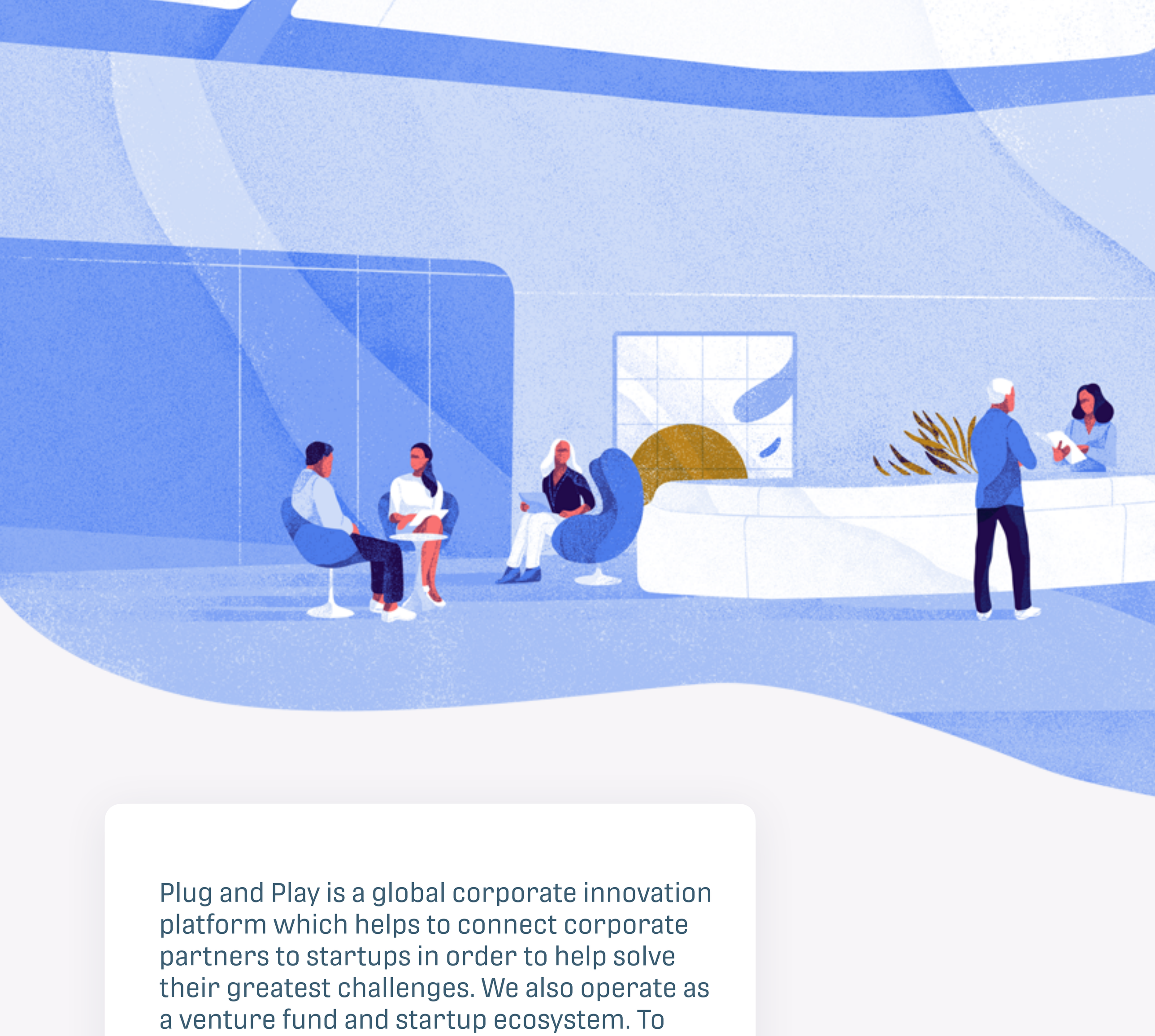
SEKISUI, similar to many other Japanese companies have a Pitcher-Catcher setup between the Japan side and the Silicon Valley innovation outpost. That means that the Pitcher is scouting new technologies, solutions and interesting startups in Silicon Valley, and hands over the findings to the Catcher at the Japan side. It is important that the relationship building leads to a strong pull effect from the Japan side so that project execution works smoothly

Move fast, with Support

The innovation team brought the idea about radio wave control products in front of the Board very early and convinced the executive team to support the investigation of the opportunity. With that early buy-in, decision making was really fast and it took SEKISUI only 2 months from POC to published announcement. The speed of collaboration in this project is considered a great prototype for further innovation projects and will serve as an example for the future.

How We Can Help

We are the ultimate innovation platform, bringing together the best startups and the world's largest corporations. Collaborating with startups is a great source of inspiration and innovation … but can be a challenge. Let us show you how to adopt the concept of open innovation to help your business succeed.



Plug and Play is a global corporate innovation platform which helps to connect corporate partners to startups in order to help solve their greatest challenges. We also operate as a venture fund and startup ecosystem. To date, we have helped over 3,000 early-to-growth stage startups raise over $3.5 billion. Plug and Play is consistently ranked among the most active VCs in Silicon Valley.

For additional information, please contact mobility@pnptc.com

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We connect the best technology startups and the world's largest corporations.

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WE HELP YOU IN EVERY STEP OF YOUR INNOVATION JOURNEY

Partnering with the largest organizations worldwide gives us a line of sight to identify the main pain points affecting each industry. We then focus on sourcing the best startups that can provide the best solutions to these challenges.

By collaborating with startups, corporations increase operational efficiencies, lower costs, find new product lines, and become more innovative from the core.

30,000+

Carefully-curated international startups in our network

500+

Corporate Partners

30+

Offices Worldwide

Meet the right startups

Gain access to a strategically-aligned selection of startups that meet your tech interests.

Network with peers

Meet industry peers and learn best practices at over 1,000 vertical-focused events every year.

Access the latest trends

We will share with you the latest trends and make sure that you're at the forefront of digital transformation.