5G Open Innovation IPZ Business Plan

| MISSION |

The 5G Open Innovation IPZ is led by the 5G Open Innovation Lab, T-Mobile, the University of Washington and the City of Bellevue. The City of Bellevue is the home base for the 5G Open Innovation Lab and Ecosystem program spurred by investment support from private sector venture capital firms.

The 5G Open Innovation IPZ's mission is focused on incubating 5G use cases by unify developers, startups, investors, telecommunication companies global tech corporations, (domestic and international), researchers and public sector agencies.

The IPZ boundaries encompass the 5G OI Lab – a physical space to incubate startups, provide the ecosystem with 5G product and service testing facilities, and house community events in – as well as the 5G relevant activities of the partner entities listed above. The IPZ will also promote and facilitate other forms of state based innovation, including core research and development (within academia and corporates), technology transfer to the corporate sector, and relevant education and training.

| WHO |

Seattle stands uniquely alone as the global tech hub for 5G because of native tech players in wireless, cloud computing, and silicon.

The opportunity is in organizing an open community attracting the best developers, startups, academics and students, industry thought leaders, and Independent Software Vendors (ISVs) to build their innovations here.

The 5G Open Innovation IPZ is the home base for the ecosystem.

| WHAT |

The 5G Open Innovation Lab will incubate early and late stage enterprise startups launching innovative products, services, and technologies dependent on future 5G networks.

Through the incubator program commencing in November 2019, and operating 2 to 4 cohorts per year every year thereafter, the IPZ and its partners will actively develop, test and validate new business ideas, and bring in further investment into the region.

The 5G Open Innovation IPZ will grow new companies, lead to the development of new products, and increase venture investments which will lead to job growth.

| WHY |

Qualcomm have projected 5G as a $3.7 trillion opportunity. Because of the nature of 5G standards – supporting the growth of data and devices – there are significant B2B opportunities as these networks continue to be deployed around the US and across the globe.

Priority verticals include: mobile edge computing, intelligent networking, enterprise security, smart cities, massive Internet of Things and autonomous connectivity.

The 5G Open Innovation IPZ will create economic value and solidify the region as internationally recognizable.

| GOALS |

There are 5 goals which guide the strategies, activities and outcomes of the IPZ. They are:

1. **Attract and educate venture, corporate and federal funds to support 5G innovation in the IPZ**
   We will syndicate deals and educate private and corporate VCs on the investment opportunities of new 5G technologies, products and services.

2. **Support students, developers, and startups in their development of new 5G software and hardware**
   Backed by technology innovators like T-Mobile, Intel, NASA, and others we will support the development of new hardware and software tools for developers to test and prototype on.

3. **Support both private and public sector research and development efforts within the IPZ including technology transfer**
   We will provide access to various 5G testing facilities across the state and country, and enable adoption of the latest 5G research by the IPZ partners and startups.

4. **Accelerate 5G Products and Services**
   We will deliver programming to attract and incubate promising teams and founders, linking them with investment that creates new jobs.

5. **Seed the Future 5G Workforce**
   Through our partner's public events and digital communications, we will educate, train and offer opportunities to interested members of UW and the public.

| LEADERSHIP & GOVERNANCE |

| MANAGEMENT TEAM AND ROLES |

The IPZ, and its specific activities, will be managed by a group of partnering entities - 5G Open Innovation Lab LLC, the City of Bellevue, T-Mobile, Inc., and the University of Washington. Each partnering entity holds a single seat on the 5G Open Innovation IPZ Management Committee. This Committee will meet, plan and deliver on the IPZ's goals and reporting obligations. The Committee also has an additional seat for a secretary.

The Committee will formally meet quarterly and each member holds a leading role in up to 2 of the IPZ's goals. This leading role requires the Committee Member to drive forward the delivery of the goal, including any relevant data collection and analysis as discussed in the Measurement and Reporting section of this business plan.

The Committee will also host an annual meeting and luncheon for the broader ecosystem of partners affiliated with the Lab program. This will be an opportunity for the Committee to showcase major developments in the previous year's operations, and see support for upcoming activities. Attendees include developers, startups, investors, telecommunication companies global technology corporations (domestic and international), journalists, researchers and public sector agencies.

| PARTNER INVOLVEMENT AND INVESTMENT |

Mr. Jim Brisimitzis, General Partner, 5G Open Innovation Lab, LLC

Mr. Brisimitzis will provide strategic guidance to the operation of the IPZ, including bringing his extensive experience and professional network from his 19-year career at technology firms such as Microsoft, Oracle, PeopleSoft, and Nortel Networks.

Mr. Brisimitzis will lead (Goal 1) *efforts to attract external funding into the IPZ* (and State) along with (Goal 4) *building out programming within the Lab that accelerates new 5G products and services* as core to this IPZ Business Plan. This will involve managing and leading the 5G Open Innovation Lab, seeking and enrolling startups into each cohort of the 5G Open Innovation Lab's incubator, and recruiting technical, business and community partners as well as international telecommunication companies. He will also educate and engage local national and international venture capital firms, angel investors and merger and acquisition service providers on 5G investment opportunities. This includes startups utilizing technologies such as massive Internet of Things, Artificial Intelligence and edge computing. He will also lead all public relations, media interviews and public appearances on behalf of the IPZ.

Mr. Rick Balakier, Director, Corporate Strategy and Strategic Partnerships, T-Mobile

Mr. Balakier will provide industry knowledge and strategic leadership to the operation of the IPZ. As Seattle's most important telecommunication provider, and as the country's third largest carrier, T-Mobile provides a strong foundation from which to develop a 5G ecosystem and IPZ. Mr. Balakier will provide the IPZ with resources and relationships to hasten the development of new 5G products and services.

Mr. Balakier will lead (Goal 2) *Develop 5G Hardware and Software Platforms* as part of the 5G Open Innovation IPZ Business Plan. This focuses on building the necessary resources (hardware kits, software tools, APIs and training materials) for developers and students to test, make and prototype 5G innovations.

Professor Sumit Roy, Integrated Systems Professor, Department of Electrical and Computer Engineering, University of Washington.

Prof Roy will provide academic rigor, education resources, research and testing facilities and relationships to the operation of the IPZ. Through the Department of Electrical and Computer Engineering, Prof Roy will provide access to academics, researchers and students. In his role on the board of the National Spectrum Consortium, he will provide guidance on the development and impact of wireless standards, spectrum usage and relationships to relevant federal government agencies.

Prof Roy will lead (Goal 3) *Perform Core 5G R&D and Promote Technology Transfer* and (Goal 5) *Seeding the Future 5G Workforce* as part of the 5G Open Innovation IPZ Business Plan. Goal 3 will involve Prof Roy leading an application to install 5G equipment including a test-bed facility for UW academics, researchers and students to build and test off. This provides new 5G related research and knowledge translation opportunities. He will also act as a channel for UW students who are interested in jobs, training and experiences in 5G, and identify any lecturing opportunities for the IPZ's partners and broader ecosystem to educate the broader university community on 5G.

Mr. Jesse Canedo, Chief Economic Development Officer, City of Bellevue, Washington
Mr. Canedo will act as the IPZs Zone Administrator and provide expertise in public private partnerships and tactics for securing economic development outcomes as a result of the 5G Open Innovation IPZ and its activities. Through the City of Bellevue Mr. Canedo will provide input and introductions to various City boards and committees who have oversight over 5G, workforce training and development and startups. He will also seed possible use cases for 5G by the City and its jurisdictions, including utility and waste management.

Mr. Canedo will lead (Goal 4) *Accelerating new 5G Products and Services* and (Goal 5) *Seeding the Future 5G Workforce* as part of the 5G Open Innovation IPZ Business Plan. This will focus on bringing together public and private stakeholders in Bellevue who can assist with and contribute to the IPZ's goals of developing new 5G use cases, products and services, and growing a future workforce.

Ms. Alexandra Iljadica, Principal, 5G Open Innovation Lab
Ms. Iljadica will act as the secretary of the Management Team listed above in order to manage, track and report against the IPZs performance.

Ms. Iljadica will also lead the implementation of community events and the incubator program as part of (Goal 4) *Accelerating new 5G Products and Services* and (Goal 5) *Seeding the Future 5G Workforce* of the IPZ Business Plan.

| 4 YEAR SUSTAINABILITY PLAN |
Given the time scale for 5G hardware and software infrastructure to be developed and deployed on a national and international scale, all Partner organizations are committed and invested for the long term. Crucially, Partner organizations have been selected as a result of the strategic importance 5G plays to the short and long term success of their institution or business.

Initially, IPZ activities and outcomes will center around the 5G Open Innovation Lab. Below outlines a timeline of activities in the first year of operation (figure 1). It is important that IPZ activities begin and have room to evolve over time as the technology is utilized by various stakeholders such as startups, engineers, students and researchers.

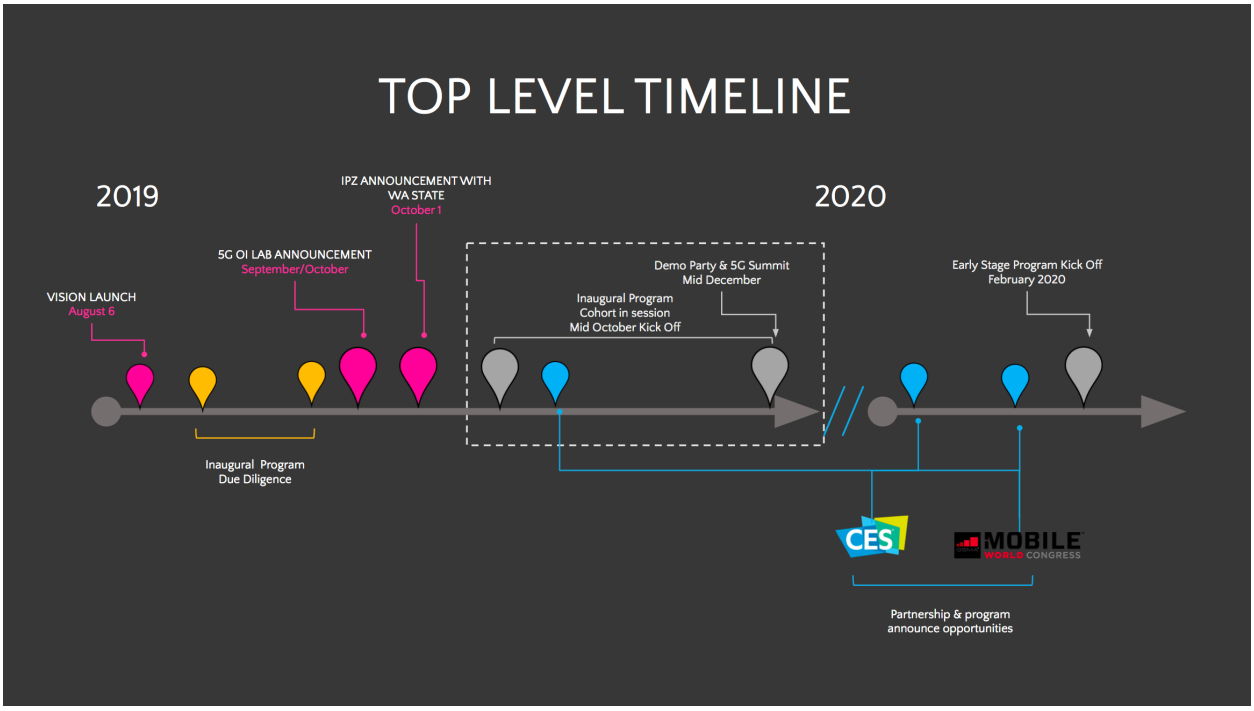

Figure one: 5G Open Innovation Lab activities 2019-2020.

By having a cadence of quarterly meetings, the Committee will have ample time to replace members in the event that an individual is changing roles or organizations. Current Committee members are responsible for identifying suitable replacement members within their institution who has the authority to secure resources and advance the IPZ's goals. In addition, annual meetings are a meeting point for key stakeholders in the broader ecosystem we are growing to promote and share 5G relevant opportunities. This is also an opportunity for seeding interest in future membership to the IPZ Committee.

| STRENGTHS OF THE IPZ |

Today, large scale innovation is secured through strategic collaborations or partnerships or via ecosystem strategies. Accenture in 2018 noted that an ecosystem of cross-industry players allow businesses to grow, innovate or simply compete in their given markets. This is a core strength of our IPZ, and of the success of 5G innovation centered in the Seattle region.

The 5G Open Innovation IPZ, created by leading technology, community, academic, and public sector agencies, is the center point of ecosystem development. The 5G Lab is a focal point for the community to immediately build, research, and create new technologies, applications, and ultimately use cases harnessing the full potential of 5G networks. Outside of the Lab the IPZ and in particular the University of Washington will seek corporate and federal funding for new 5G research projects, and will drive the inclusion of 5G relevant teaching materials into courses and public events hosted at the University.

| TARGET AUDIENCES |

i. **Founders** working with technologies relevant to 5G as core to their product or service. This includes IoT and sensors, AI, edge computing. These founders will largely be based in the united

states. We will also target founders/developers internationally in cities where our partners have a presence.

ii. **Developers and makers** who are creating new hardware products and new software that leverage the capability of 5G. This includes IoT and sensors, AI, edge computing. These developers will largely be based in the united states. The level of knowledge of 5G and how to build with it in mind will vary. We will have an active role in engaging them, educating them and providing them space to test and build off a 5G network.

iii. **Investors** (angels, VCs, CVS's and PE) **and grant makers** who are funding IoT, AI and edge computing and are aware of the opportunity that 5G brings. They will largely be SAAS and B2B focused investors, they may come from a telecommunications/wireless background. The corporate and government funders will have a more strategic innovation intent behind their investments and are more likely to have a understanding of 5G and what capabilities it brings to wireless networks, whereas angels and VCs will be seeking pure financial ROI.

iv. **Researchers and students** who are in engineering, computer science or business and leading empirical and applied research with industry around 5G technologies. Training and educating these individuals about the possibilities 5G presents is important as this target group become the future founders, developers and analysts.

Developer communities thrive when they organize around platforms. Such is the case for mobile (iOS & Android), public cloud services (AWS, Azure, GCP, IBM Cloud, etc.), and personal computers (Windows, MAC, Intel, Linux). What's missing is a carrier platform harnessing the forthcoming 5G capabilities in an easy to use developer experience. This opportunity is where T-Mobile will play a leading role.

The strength of the IPZ to create a sustainable and enduring ecosystem from Seattle is to facilitate the development, support, and global access of a new community working together to build new end user value and experiences across commercial and consumer markets.

| TECHNOLOGY |

Fifth generation (5G) wireless technology and the products and services they will enable may be as important a leap in technology as the steam engine or telegraph, allowing us to bridge the physical and digital worlds, where the very environment we live and work in will become the network.

With enhancements to the network from cloud to core and edge, the telecommunications and technology sectors have a unique opportunity to develop new platform services that enable secure, ultra-low latency connectivity, data movement and processing for use cases involving IOT and edge computing.

The emergence of 5G wireless networks promises less than 10 millisecond latency performance, peak bandwidth speeds of up to 1+ gigabit per second and the ability to connect billions of devices significantly surpassing limitations with current fourth generation (4G LTE) networks. These speeds are close to human reaction times. But the real power of 5G lies in its ability to create a new ecosystem of applications and services that were once impossible.

Current 3GPP standards demonstrate just how much is changing as carrier networks globally begin their migration efforts from 4G LTE to 5G. Migration to the new standard will likely begin with Non-Stand Alone (NSA) architectures eventually moving to Stand-Alone (SA) architectures overtime. This is critical because the significance of 5G isn't improvements in New Radio, Radio Area Network (NR-RAN) cells, but rather the combination of RAN and Evolve Packet Core (EPC) to a 5G Core (5GC) enabling much more dynamic control and virtualization. The network is getting more complex and more dynamic. In short, we will need

virtualized, scalable networks with open-source software at its foundation to enable the full promise of 5G services.

We know that 5G will make it easier to deliver IoT and realize applications in manufacturing, entertainment, healthcare and security. Our shared vision for self-driving cars, smart cities and connected homes will be realized, in part, because of the 5G revolution. But 5G is much more. 5G will enable wireless networks to achieve a new level of intelligence. In particular this is important in physical spaces that don't presently have wired infrastructure. Land used for farming, ports, and high traffic corridors are some examples where 5G will enable mass machine to machine communication to bring new levels of productivity. By enabling the faster computation and analytics of massive amounts of data in the location where the data is produced, 5G will deliver access to business intelligence everywhere and anywhere.

This vision is fast becoming a reality. Within the next 5 years, the ability to capture data from the environment through sensors, process it and transform it into information will become pervasive. 5G will enable the network to synthesize new knowledge, connect people and devices and learn from both human and machine behaviors.

| HUMAN CAPITAL |

A technological tool as ubiquitous as 5G cannot be championed by one company or one government. The implementation and commercialization of 5G requires stakeholders from across public service, corporations, academia and investors to work together to share use cases and opportunities to fast-track 5G deployment.

The primary goal of the 5G Open Innovation IPZ is to develop and grow the ecosystem – a community committed to innovation and working together to prove use cases and validate capabilities – and through this ecosystem we will build momentum behind 5G technology.

Each IPZ Partner will provide access to human and financial capital as needed to operate and execute on the IPZ's goals. Beyond this core group, the 5G Open Innovation Lab has an ecosystem of partners and sponsors contributing to the Lab. Leveraging the expertise and resources of this broader group of corporate, community and public service organizations is key to the ecosystem's beginning and long term success. Below outlines the Lab's partners and their role:

Founding Partners are leaders from technology, public sector and academia and is led by such organizations as by **Intel**, **T-Mobile**, **NASA, ARM, Nokia, Ericsson and General Motors**. They provide human, financial and intellectual capital in order to catalyze the ecosystem.

Technical Partners provide expertise, products and services across mobile edge computing, artificial intelligence, private LTE networks, radio configuration as well as the operational and sales skills required to establish and grow these offerings.

Business and Accelerator Partners equip the ecosystem, in particular startups, with the core resources needed to address hurdles to growth. This includes financial and accounting, marketing and legal services, as well as venture and investment.

Community Partners bring highly engaged and trusted communities reaching our target audiences of founders, developers, makers and students. This includes organizations specifically targeting hardware and software developers and female founders.

Our **Customer Advisory Board** and **International Telco Partners** will give the 5G OI Lab immediate use case problem statements and reach into international markets respectively. Through these groups we are building pathways for startups, technical and founding partners to build, prototype and deploy 5G use cases today.

| INFRASTRUCTURE |

The central meeting point of the IPZ will be 5G Open Innovation Lab which is operated by 5G Open Innovation LLC and hosted at T-Mobile's campus in Bellevue. This space will be fitted out with 5G testing and prototyping facilities as well as event space, meeting rooms and a co-working space. In addition to this, facilities at the University of Washington will be provided for research and development, and technology transfer activities.

Commencing in October 2019, the 5G Open Innovation Lab will operate a startup incubator program targeting all stage startups. This program will seek to enable 5G proof-of-concepts (POCs), commercial sales/deals by startups in the program, and provide startups and their CTOs with the technical expertise needed to develop 5G capable products and services.

Through the IPZ we will aim to fast-track and advance technology transfer and commercialization efforts by the IPZ's partners. This includes partnering on and performing core research and development at IPZ partner institutions.

Through the 5G OI Lab, we will attract and educate investors from angels, through to private and corporate venture capital, on the latest 5G related technologies, and facilitate investor introductions and qualified deal flow. We will seek funding from all relevant sources - federal, corporate as well as venture-backed for the IPZ's activities.

| LONG-TERM MARKET GROWTH |

As carriers evolve their networks, an innovation race is unfolding for global 5G dominance that is poised to create trillions of dollars of new market opportunity. The leaders of this race will influence global markets, attract substantial investments, deep technical talent, and generate significant market wealth.

Since the mid-1990s the collective market capitalization for FAANG (Facebook, Apple, Amazon, Netflix, and Google) has reached $2,976.85 trillion dollars thanks largely to the billions of people their products reach overwhelmingly over wireless carrier networks. Each of these players including Microsoft, Salesforce, Amazon, Google, and others have become enormous developer and channel ecosystems, and have created trillions of dollars of incremental revenue. Revenue that wireless carriers have historically struggled to capture.

According to a report published by Accenture in 2018, over $275B will be invested by carriers to build nationwide 5G networks over the next 7 years. Intel's study published in October 2018 found that Media and Entertainment sector stands to generate $1.3 trillion in new revenues over the next 10 years enabled by 5G. According to Motley Fool, the 5G opportunity can be summarized by referencing three important forecasted trends: (1) $2 trillion in spending on Smart Cities globally by 2025 including $320 billion in China alone; (2) data from connected cars generating $750 billion in value; and (3) IDC's forecast for $2 billion in global IOT spending combined with ABI's forecast for 47 billion IOT devices deployed globally by 2020.

5G is more than just a faster network. Research will enable, startups will build, enterprises will adopt, and consumers and the public sector will embrace what's to come. Apps from independent software vendors (ISVs) will continue to drive growth in all devices, creating new experiences inspiring new industries and accelerating existing innovation.

The value that the 5G Open Innovation IPZ bring is in coordinating and organizing the various stakeholders and interested to more quickly develop 5G proof-of-concepts, new products/services, and revenue. Our focus is bringing together founding partners, international carriers and forward-thinking customers from industries such as media and entertainment, transportation, oil and gas, manufacturing, and retail. The Lab will become a hands-on experience for digitally-transforming enterprises, making bets on future 5G capabilities and startups looking to fill important gaps between market demand and technology development.

| ENTREPRENEURIAL CLIMATE |

Seattle has a growing entrepreneurial and innovation climate as it is home to the two largest public cloud service providers, third largest wireless carrier in the US and a host of innovative startups both established and recently launched. The Seattle region (including Bellevue, Redmond and University District) continue to attract technical talent and interest from Silicon Valley-based firms like Apple, Facebook, Google, and others.

In November of 2018, GeekWire reported that Facebook was expanding its Seattle engineering center by adding an additional 1.13 million square feet of office space to its portfolio. They, along with other firms, are keen on attracting talent from homegrown conglomerates like Microsoft and Amazon in addition to attracting new talent graduating from the University of Washington. It's Computer Science program was recently ranked 6th nationally behind programs from Carnegie Mellon. MIT, Stanford, UC Berkley, University of Illinois, and tied with Cornell.

Our plan for building a 5G ecosystem plan is uniquely Seattle and globally accessible. No other location in the world is home to such platforms as AWS, Microsoft's Azure, and T-Mobile. Together these platforms offer researchers, academics, startups and enterprises scale and global reach.

The 20+ year goal is to evolve Seattle into a global destination and hub for converged wireless and cloud innovation backed by global platform partners, academics, the state, and a host of current and future startups.

| MEASUREMENT & REPORTING |

Developed indicators and metrics allow us to measure and track performance against the IPZ's 5 goals. Explicitly articulating these indicators and establishing the data collection methods will be a priority agenda item for the Committee once the IPZ is granted. Preliminary discussions have elicited the following indicators and data sources:

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GOAL	INDICATOR(S)	DATA SOURCE
Attract and Educate Venture, Corporate & Federal Funds	• Number and value of grants secured • Number and value of commercial research contracts secured • Money raised by startups in the 5G OI Lab • Number of engaged investors	• Committee members self-reported successesˆ • Committee members self-reported successesˆ • Startup up Program Exit interview & Annual survey. • Self-identified subscribers and event attendees
Develop 5G Hardware and Software Platforms	• Number of open source projects contributed by Partners • Number and scope of new tools launched • Number of prototypes developed during IPZ hosted activities	• Committee members self-reported projectsˆ • Committee members self-reported launchesˆ • Hackathon follow up survey
Perform Core 5G R&D and Promote Technology Transfer	• Number and scope of new research projects • Number of commercialized or transferred technologies • Number of research students • Number of public lectures/events	• Committee members self-reported projectsˆ • Committee members self-reported projectsˆ • University of Washington ECE • Committee members self-reported successesˆ
Accelerate 5G Products and Services	• Number of startups in Lab • Industries represented by Startups in Lab • Number of community events hosted by IPZ Partners • Number of invited talks/lectures	• Application form and interview • Application form and interview • Committee members self-reported successesˆ • Committee members self-reported successesˆ
Seed the Future 5G Workforce	• Number of education and training sessions • Number of engaged students • Number of 5G related student interns at Partner organizations • Number of new advertised roles with 5G in the title or description	• Committee members self-reported successesˆ • Self-identified subscribers and event attendees • Committee members self-reported numbersˆ • Indeed job listing alert for Seattle, Bellevue, Redmond etc.

ˆ Data collected during quarterly IPZ Committee meetings and held in our Impact Tracker.

Beyond these goal specific metrics, we will also capture data around the size and strength of the ecosystem. This includes indicators such as:

- Audience size: subscribers, event attendees and % increases on these year over year
- Audience demographics: target audience breakdown
- Media coverage: articles, mentions, social media followers/likes.
- Thought leadership: speaking engagements, white papers/articles published.
- Sentiment and value: annual ecosystem survey, event follow up survey, cohort company interviews