

## Appendix 1: Results of ecosystem mapping

Sector	Ecosystem	Year of foundation	Open / closed	What is the ecosystem about?	Partners	Goals/aims	Services/Solutions
Build-up environment	Vastuu Group / Platform of Trust  <b>Sources:</b> Vastuu group, 2020-2020D; Plaform of trust 2020.	2019	Open	Data content and technical interface ecosystem for build-up environment	Many partners, only some mentioned: Aacon Oy, Admicom Finland Oy, Aitio Finland Oy, Alertum Oy, AM Security Oy, Apprix Oy, Atentis Oy, Aventura Oy, Azets Insight Oy, Balance Systems Oy, Bonava, Pajadata Oy, Suomen Säätiöpalvelu Oy, Systemteknik Ab i Eckerö, Taitotekniikka Oy, Takamäki Yhtiöt Ky, Taloustutka Oy, Tamtron Solutions Oy, Tarjova Oy, Tieto Finland Oy, Tietoaika Oy, Tilimanager Oy, Tilipalvelu Eija Mäyrälä Ky, Tilitoimisto Pirjo Gustafsson, Tilitoimisto Raahen Tase Oy, Tilitoimisto Raetsaari Oy, ToP Tunniste Oy, Tunninen, Ulvilan tilitoimisto Oy, Visy Oy, Visma Megaflex Oy, Visma Movenium, Visma Software Oy	Aims to offer reliable platform and intermediary of reliable data for partner companies, so that they can build services for shared clients by using the data.	Electronical services for needs of build-up environment and to help sector companies with their legal obligations
Construction	KEKO  <b>Sources:</b> Hemilä, 2020; VTT, 2020	2019	Open	Ecosystem that focuses on the built-up environment	Kone, YIT, Halton, VTT Research, Netox, Caverion, Nokia, Business Finland	Aims to build new platform-based business models. Aims to make buildings safer, more fluent and productive. Aims to engage SMEs into ecosystem and to co-innovate new concepts in smart building context.	Still very new ecosystem, and the first use cases will be available in 2020
Cross industry	R3/ Corda (CorDapps)  <b>Sources:</b> Corda, 2020-2020b	2016	N/A	Blockchain platform ecosystem	Over 300 companies, global network, but according to one expert interview has also some Finnish companies included. App builders and explorers including technology partners, system integrators, consulting companies, software vendors from many industries.	Offers open source blockchain platform for partners from multiple industries to solve complex business problems. Designed that data is shared only with relevant parties.	Business solutions for partners

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Cross industry	Combient Group  <b>Sources:</b> Combient, 2020-2020e	2015	Closed	Cross industry collaboration network	Includes 30 large enterprises, and universities and startups.  Assa Abloy, Atlas Copco, Autoliv, Electrolux, Epiroc, Ericsson, FAM, Fazer, Fortum, Husqvarna Group, Höganäs, Investor, K Group, Kone, KoneCranes, LKAB, Munters, Mölnlycke, Permobil, SAAB, SAS, SEB, SKP, Scania, Sigma, Stena, Stora Enso, Södra, Vasakronan, Wärtsilä	The leading cross industry collaboration ecosystem group in the Nordics, that includes Combient Spark, Combient Foundary, Combient Mix and Combient Collegial.  Aims to speed up the transformation of parties involved by offering a space where assets can be shared.	The ecosystem has specialized in AI & analytics, open innovation and organization and culture.
Cross industry	Open Ecosystem Network  <b>Sources:</b> Open Ecosystem Network, 2020-2020B	2016	Open	Innovation ecosystem	Hundreds of partners, only a few larger ones mentioned: Accenture, Telia, Nokia, Microsoft, Aalto University, My Metsä, MaaS Global, LUT University, K Group, Business Finland, Kone. Ecosystem originally initiated by Nokia	Goal is to bring together ambitious companies from different industries and individuals to help them innovate, and grow business	Helping companies collaborate, being innovative and interact.
Energy	Flexens / Clic Innovation  <b>Sources:</b> Flexens, 2020; Click Innovation, 2020	2015	Open	Energy ecosystem	ABB, ÅF, Sumitomo, Andritz, Fortum, BMH Technology, Elenia, FCG, Gasum, Metsä Group, Helen, Kemira, Kuusankoski Recycling, Metsäteho, StoraEnso, SSAB, Vapo, Wärtsilä, Pohjolan Voima, Outotec, Neste, UPM, Vaisala, Valmet, Vantaan Energia, NLS, University of Oulu, University of Vaasa, LUT University, University of Helsinki, Aalto University, VTT Research; Åbo Akademi, University of Turku, Tampere University, Finnish Meteorological Institute, Syke Finnish Environment Institute, Luke, GTK	Aims to create breakthrough solutions in bioeconomy, circular economy, and energy systems.  Public-private-partnership ecosystem	Developing and implementing a full society scale demo of the the FLEXe (energy) concept in the Åland archipelago.

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Energy	Gaia / Baltic Offshore Wind  <b>Sources:</b> Gaia, 2020, Business Finland, 2018d	2018	Open	Wind power ecosystem	Arctia, Meritaito, Boskalis Terramare, Pori Offshore Constructions, Prysmian Group Finland, Rajakiiri, Rauma Marine Constructions, Finnish Sea Service, Suomen Hyötytuuli, SSAB, Wärtsilä, Business Finland	Aims to bring together all the relevant parties, e.g. investors, businesses, technology experts, service providers and governmental institutions to create competitive wind power domain in the Baltic Sea with global potential.	Offshore wind power production
Environment	Kompensäätiö sr / Compensate  <b>Sources:</b> Compensate, 2020	2019	N/A	Finnish foundation ecosystem focusing on environmental issues	Werkling, Frantic, Hellon, BCG, Fourkind, Dottir, SEK, Accenture, Kallan & Co., Hopkins, Cocoa, Rastivo.com, Contentful, Koski Syväri  Löyly, Noli, Studios, Posti, YLVA, Finnair, Nordea, Reima, ST1, Tamro, Kyyti, JYY, Jungle Juice Bar, Fleet Innovation	Aims to help stop climate change with offering ways to compensate the emissions.  Aims to develop network that helps to create new products and services.  Aims to pilot their business model and funds carbon capture projects.	Offering service for their partners to compensate their emissions.
Environment	Smart&Clean  <b>Sources:</b> Smart&Clean, 2020-2020b; Sjöstedt, N.A.	2016	N/A	Sustainability ecosystem	Cities: Helsinki, Espoo, Kauniainen, Lahti, Vantaa, Uusimaa regional council  Companies: AFRY, Caverion, Fortum, Gaia, Gasum, Helen, Kone, Lassila & Tikanoja, Neste, Ramirent, Siemens, ST1, Vaisala, YIT  Research organizations: Aalto University, Helsinki University, LUT University, VTT Research  Government organisations and public foundations: Business Finland, Ministries of the Environment, Economic Affairs and Employment and Transport and Communications, Sitra	Aims to offer solutions for mitigating climate change, to boost business and export smart solutions and clean technology.	Aims to offer climate solutions, including mobility, energy, housing, and circular economy solutions.

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Environment	Griffin Refineries / Plastic Waste Refining Ecosystem  <b>Sources:</b> Business Finland, 2018b-2018c; Griffin Refineries, 2020	2018	N/A	Environmentally focused ecosystem	VTT Research, Suomen Uusiomuovi Oy, L&T, Hackl Container, Urbaser, BMH Technology, Conenor, CoolBrook, Pramia Plastic, Muoviteollisuus ry, Metsä Tissue, Reclay Group, Korkia, ÅF, Christof Industries, Business Finland	Aims to combine different experts from Finland and from international markets with offering a platform for them.	The aim is to create new business opportunities from recycling plastic.
Environment	Clic Innovation / 4Recycling  <b>Sources:</b> Clic Innovation 2020; Business Finland 2019C	2019	Open	Environmentally focused ecosystem	Business Finland, Andritz Oy, BMH Technology Oy, Borealis Group, Fortum Waste Solutions Oy, Fortum Oyj, Kemira Oyj, Lassila & Tikanoja Oyj, Metsä Fibre, Metsä Board, Metsäliitto Cooperative, Neste Oyj, Stora Enso Oyj, UPM-Kymmene Oyj and Valmet Oyj, the Chemical Industry Federation of Finland, Finnish Plastics Industries Federation, Finnish Forest Industries	Aims to bring solutions for enhanced recycling of plastics and to activate cross-industry dialogue to create optimal overall material system.  Collects information, connects international actors, forms collaborations, prepares RDI projects etc.	Building solutions for recycling of plastics and developing bio-based materials.
Finance	Marco Polo Network / TradelX and R3  <b>Sources:</b> Marco Polo, 2020	2017	N/A	Trade and working capital finance ecosystem	International ecosystem, that includes some Finnish companies. Only few companies from the ecosystem mentioned:  Danske Bank, OP, Daimler, Mastercard, Oracle, SMBC	Offering software platform for trade and working capital finance for companies and banks.  Aims to improve client experience, with enabling easier data integration and exchange between partners.	Trade and supply chain finance solutions for partners
Finance	Nordea / Nordea Open Banking  <b>Sources:</b> Nordea, 2017; 2020-2020b	2017	Open	Open Banking ecosystem for developers	International ecosystem, open in Finland, Sweden, and Denmark.  Parties include software developers and companies, but they are not named in public.	Offering API platform for software developers and banks. One reason behind this platform is PSD2 law that obliges banks to share their data.	Financial data for partners.

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Finance	OP / OP Developer  <b>Sources:</b> OP, 2017; 2020	2017	Open	Open Banking ecosystem for developers.	Platform for banks, FinTechs and startups.	One reason behind this platform is PSD2 law that obliges banks to share their data.  Aims to offer APIs for fund, holdings information and financial instruments and open new custodies.	Services concerning identity, health, housing, and insurance
Health	HUS / CleverHealth  <b>Sources:</b> CleverHealth Network, 2020	2017	N/A	Health technology ecosystem	BCB Medical, BC Platforms, CGI, Elisa, Fujitsu, GE, Innofactor, Microsoft, Noona, Planmeca, Tieto, Takeda, Productivity Leap and Pfizer	Aiming to bring product and service innovations developed with data.  Aims to be internationally renowned ecosystem.  Offers platform for partners.	Health technology export products for companies
Health	UNA Oy  <b>Sources:</b> Una, 2020	2017	N/A	Development ecosystem in health sector	Owned by 19 hospital districts, municipalities, joint municipal boards, and some strategic partners.	The participants are the main clients of the ecosystem.  The ecosystem offers development and expert services.	Una Ydin – Client data in information management system  Una Lomake – National level service for pleadings  Una Kaari – Information system for client service and resource management
Housing market	DIAS / Aktia, Alma Talent, Danske Bank, OP, S Bank, Tomorrow Tech  <b>Sources:</b> Dias, 2020-2020B	2018	N/A	Digital housing market ecosystem	OP, Danske Bank, Aktia, S-Bank, Nordea, Handelsbank, Savings Banks, POP Bank, Alma, Sanoma, OP Home, Kiinteistömaailma, Blok, Bo LVK, Remax, Neliöt Liikkuu, Change LVK, Premier, Solid House, Huom!, Huoneistokeskus, SKV Kiinteistövälitys, SP Home, Kahdeks8s päivä, Olo LVK, Skanska, YIT, Nettikoti, Visma, PDS, Kivi	Aims to bring real estate agents, banks, and builders on to one platform, to enable digital housing market.  Aims to make housing market work faster, safer, and more flexible, it is no longer location specific.	Housing market services

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HVAC	Tamlink / Indoor Air Quality  <b>Sources:</b> IAEQ, 2020; Business Finland, 2019D	2018	N/A	Indoor air quality ecosystem	Airo, Alme, Dekati, Eagle Filters, Fidelix, Filterpak, Fleetlogis, Fläkt Group, Fogscreen, Genano, Koja, Pegasor, Produal, Ramboll, Realin, Smartwatcher, Tikkurila, TPI Control, Vaisala, Vallox, Vuo Power Oy, Tamlink, VTT Research; Business Finland, Clic, Helsinki Business Hub, Keino, Go4Energy	Offers platform for partners to create new business opportunities and aiming to reach new market segments and areas through collaboration in indoor air sector.	Indoor air solutions
Logistics	Vediafi / Caas-Net (Corridor as a Service)  <b>Sources:</b> Business Finland, 2019B; Vediafi, 2020-2020B; VTT, 2018	2018	N/A	Logistics ecosystem	Finnish Transport Safety Agency, Business Finland, the Ministry of Transport and Communications, the Finnish Transport Agency, the Finnish Meteorological Institute, the Finnish Communications Regulatory Authority and Finnish Customs, VTT Research and Vediafi, Dynniq, Infotripla and Indagon from the business sector. Vantaa, Turku and Tampere cities, the Growth Corridor Finland network and YTL ry	Aiming to build working logistics between Asia and Europe through Finland with combining different parties and by digitalizing actions.	Improving logistics of Finland
Manufacturing	DIMECC / Intelligent industry  <b>Sources:</b> Intelligent industry 2012-2012B	2017	Open	Manufacturing ecosystem	Elekmerk, Fastems, HT Laser, Innofactor, Konecranes, Melkki, Nokia, Prima Power, Raute, TietoEvry, Business Finland, Dimecc.  Also, many international partners	Aims to connect leading equipment manufacturers and digital solution providers in Finland.  Aim is to answer individual client needs, and to sense client expectations.  Keeps Finland involved in the data driven business development.  Boosting SME network.	Finnish Industrial Internet Forum – combines appliers and digital solution providers with research organizations.  DIMECC Demobooster, innovation service model, that aims to connect small and large companies.  Demola, combining organizations with university students.  Machine Learning Academy – aims to increase participants understanding of how AI can be utilized with machine learning and company business.

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Manufacturing	AirFaas / Combi Works  <b>Sources:</b> Business Finland, 2018, Combi Works, 2020	N/A	Open	Platform ecosystem for manufacturing	Manufacturing companies, not named.	Aims to offer production facilities globally by offering portal for it.  Combine accounting, logistics, production, control systems, funding, and insurance systems in manufacturing sector.	Offers access for small operators to larger providers services.  Air FaaS is factory as a service, AirBnB of manufacturing.
Manufacturing	BatCircle / Aalto University  <b>Sources:</b> Batcircle, 2020	N/A	N/A	Circular ecosystem of battery metals consortium	4 universities, 2 research centres, 8 large companies, 15 SMEs, 2 cities Aalto University, Oulu University, University of Eastern Finland, LUT University, Geological Survey of Finland, VTT Research, Boliden Ltd, Finnish Minerals Group, Fortum, Freeport Cobalt, Outotec, Norilsk Nickel Harjavalta, AkkuSer, CrisolteQ, FENNOSCANDIAN Resources, Ima Engineering, Keliber, Latitude 66, Magsort, Mawson, Mine On-Line Service, Mondo Minerals, Suhanko Arctic Platinum, Teraloop, Terrafame, Tracegrow, Vulcan Hautalampi, City of Harjavalta, City of Pori	Ecosystem operating in manufacturing industry, aims to improve the processes of mining, metals and battery chemicals and increase the recycling of batteries.	Aims to make strong bonds between companies and research organizations to find new business opportunities.
Maritime	Dimecc / One Sea Ecosystem  <b>Sources:</b> Dimecc, 2020; One Sea 2019.	2016	Open	Marine transport ecosystem	Almost 80 companies in ecosystem, only few larger ones mentioned: Tieto, Wärtsilä, Rolls-Royce, ABB, Awake.ai, Business Finland, Finnipilot	Aiming to lead the way towards of operating autonomous maritime ecosystem until 2025.  One goal is also to set new standards for the industry and to help the industry digitalize and to create new innovations.  Research collaboration for partners.	Digital, intelligent solutions for marine industry

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Maritime logistics	Awake.AI  <b>Sources:</b> Awake.AI. (2020); Business Finland, 2019.	2018	Open	Maritime logistics ecosystem	Vaisala, FMI, F-Secure, Fleetrangle, Konecranes, DEAL  Ecosystem also includes other parties, such as Business Finland, IMB, Inmarsat etc.	Aiming to bring maritime logistic actors to same platform, to plan, optimize operations and achieve goals and to become the world most trusted AI port platform and build global ecosystem.	Offers digital services, proactive analytics, machine learning models for maritime business.
Metallurgical	AMET  <b>Sources:</b> University of Oulu, 2020	2019	N/A	Metallurgical ecosystem	University of Oulu, Kaltio Technologies Oy, Luxmet Oy, Quva Oy, Sapotech Oy, Sensmet Oy, SSAB Europe Oy, University of Oulu, Åbo Akademi University, Ovako	Aims to enable strategic renewal of metal refining industry, improve the competitiveness of SMEs and aims to promote growth of export business.	Develops artificial intelligence and platform-based solutions in metallurgical industry.
Mobility	Kyyti Group / Smart Mobility ecosystem  <b>Sources:</b> Kyyti, 2018; Kyyti, 2020	N/A	N/A	Mobility ecosystem	LähiTapiola, r2p, PayiQ, Dat.mobility, Helkama, Strafica, Ramboll, Vinka, Fluidtime, Roboride, Aalto University, GreenMobility, Switch, 020202, Vamos, Skoda, Sitra, AVM, VTT Research	Aiming to offer mobility as a service solution for transport operators, corporates, and municipalities.	Offer a platform to plan, book and pay the whole intermodal travel chain.
Mobility	The SmartRail Ecosystem / Skoda Transtech  <b>Sources:</b> SmartRail Ecosystem, 2020-2020c	2019	N/A	Mobility ecosystem	Skoda, VTT Research, Business Finland, 3D Talo, LUT University, Tampereen raitiotie Oy, HKL, Mipro, Mevea, Ambientia, Tamware, DA-Group, EC-Engineering Oy, Lumikko, Teknoware, KAMK, Tampere City, Tampere University, Creanex, Cinia	Aims to bring together the needed partners to be able to deliver transportation service and co-create.	Aims to offer tram-integrated operations and services at the international market.
Mobility	Mobility as a service API / MaaS Global  <b>Sources:</b> Whim, 2020; Yle, 2018.	2015	Open	Ecosystem offering all transport services at one app	Sixt, HSL, Go by Veho, Toyota Rent a Car, Hertz, Taksi Helsinki, Lähitaksi, Tier, Menevä	Aims to offer transportation services at one place (including public transportation, city bikes, car rental, taxi services).	Transportation services for end-customers



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Teaching	DigiOne  <b>Sources:</b> Vantaa, 2020	2020	Open	Platform ecosystem for teaching	Cities, municipality, service providers, technical service providers and other needed partners	Aims to offer more equal starting point for every teacher and student.  Project that aims to collect teaching and learning systems into one nationwide digital platform.	Helps teachers with creating study and new pedagogic plans.  Ecosystem is currently being created.
Technology	ICEYE Oy / Internet of Locations  <b>Sources:</b> Business Finland, 2018B; ICEYE 2018; ICEYE, 2020	2019	Open	Satellite data ecosystem	Information not found	Aims to offer satellite data, that can be tuned into actionable information.	Solutions for many different industries, such as for insurance, financial, energy, utilities, mining, maritime, security industries and for civil government
Technology	SILO.AI  <b>Sources:</b> SILO.AI, 2020; Business Finland, 2018.	2017	N/A	Artificial intelligence ecosystem	Information not found	Aims to build infrastructure where building AI is easier in the future. It contains AI-model library and helps sharing data between partners.	Offers AI solutions for companies from different industries.
Travel and mobility	FIT ME! Co-Innovation  <b>Sources:</b> Trans Digi, 2020	2019	Open	Data sharing platform ecosystem for travel and mobility services.	Information not found	Platform for open data.  Aims to develop sustainable growth of international individual tourism.	Combining different actors from mobility and travel sectors.