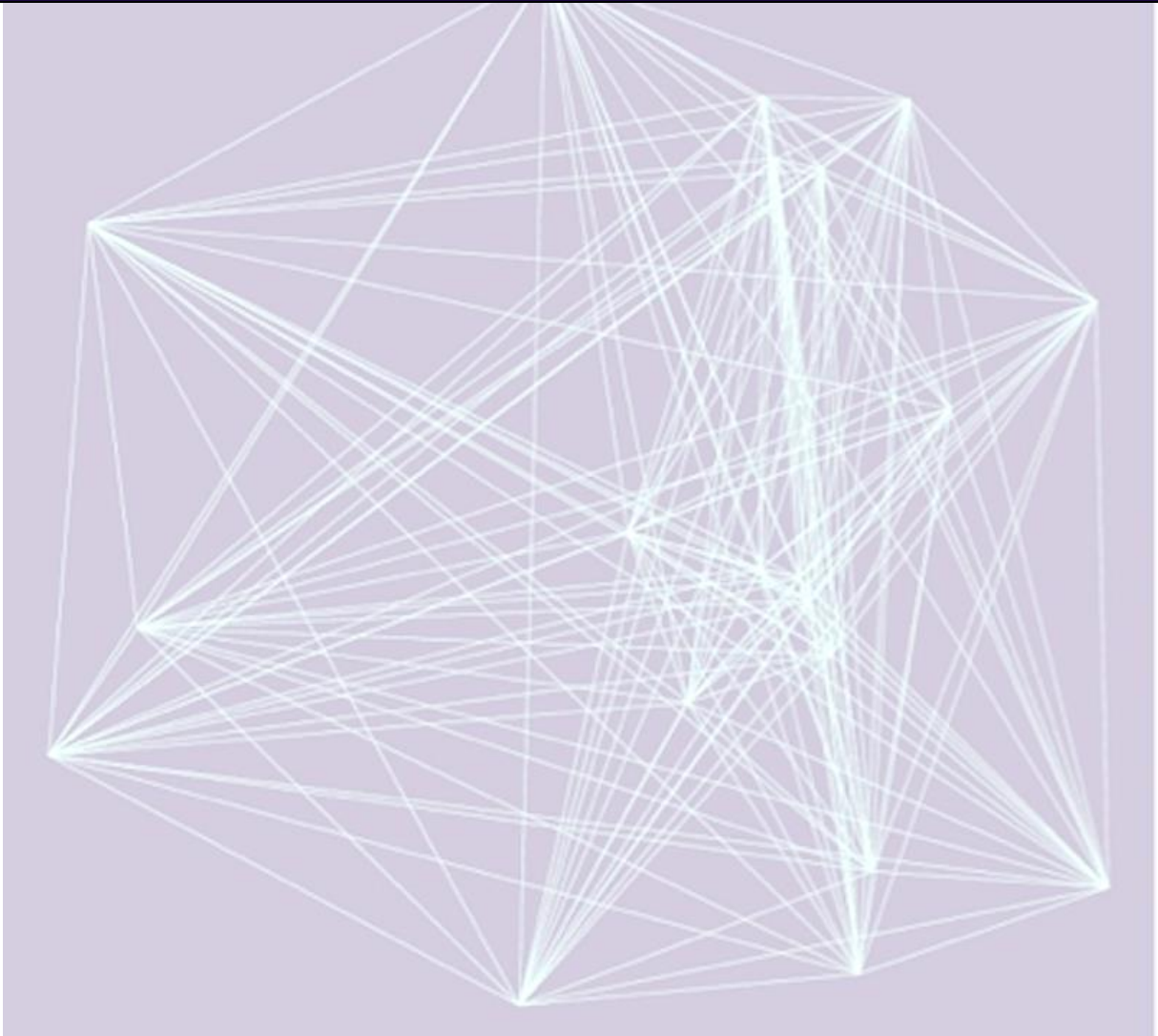# Alliance for IoT and Edge Computing Innovation

Vision for Europe 2024 - 2030

Introduction

The last European elections were held in 2019. The European Commission formed in 2019 set out the ambitious agenda, setting **6 priorities**, including the European Green Deal and Europe fit for digital age. New emphasis was given to the European strategic autonomy and technological sovereignty.

Two unprecedented global crisis emerged since 2020, first global pandemic of COVID-19 and later the war in Ukraine that both emphasised and challenged those priorities and led to the introduction of the Recovery plan for Europe which strengthened the importance of the set priorities, in the green transition and digital, scaling up the joint efforts to achieve objectives set in the Commission priorities 2019-2024.

In addition, in the research and innovation areas, Horizon Europe succeeded Horizon 2020, Digital Europe programme was introduced as well as various partnerships and concept of IPCEI related to strategic priority areas.

The European elections in 2024 will set the agenda for the next 5 years ahead, including new framework research and innovation agenda. AIOTI as an active partner and contributor in achieving the EU priorities want to contribute with a set of thoughts and recommendations to support new vision of Europe, building on the success in the previous 5-year period.

In 1990s and first decade of 2000s there was significant trend of globalisation, which opened markets, spread supply chain and logistics and decrease prices for end consumers. It also brought benefits in increased global collaborations, good example of which is in standardisation (3G and 4G mobile standards).

COVID crisis brought certain rethinking of the globalisation due to supply chain shortages and closed borders during the pandemic.

This trend coupled with concepts of strategic autonomy and new industrial policies brought to certain redesign of the supply chain and discussions of decoupling and re-sharing, while at the same time not harming the global trade. It is to be seen how these will develop, but it is certain it will influence the political debate in Europe and impact priorities of the new European Commission and the Parliament. It is expected to have impact on the industrial policy, competition, public procurement, and research policy in the next mandate (2024-2029).

One of the most urgent and difficult problems in computing is poor interoperability between software and hardware. It is necessary to integrate these disparate but increasingly mutually reliant technologies into a unified and cohesive network for an information exchange that is as coherent with our *logical understanding* of the world as it is with the *physical feature* of the world. With a growing suite of advancing and emerging technologies coming together in all areas of our society and economy, the need to make sense of disparate data has never been greater.

Recommendations

Alliance for IoT and Edge Computing Innovation (AIOTI) was established in 2016 as European Commission initiative to contribute to Horizon 2020 framework research programme. Since then, AIOTI became well established organisation in the European technology and research ecosystem contributing to wide area of policies and domains, including digital transformation and green transition in our agriculture, energy, health, manufacturing, mobility, digital for climate and buildings and communities groups.

We provided our vision before the last European elections in 2019 and we believe that we can provide valuable input to the incoming legislators in the European Parliament (EP) and to the new European Commission (EC), based on the previous and ongoing policy and strategic initiatives and our experiences what could be useful to achieve desired objectives and strengthen Europe, especially in technological, research and standardisation domains.

1. Green transition and energy supply

Introduction

In October 2019, the EC published the **European Green Deal** aimed at driving Europe to reach net-zero global warming emissions by 2050. The goal is to improve the well-being of people by making Europe climate-neutral, protect human life, animals, and plants by cutting pollution and help ensure a just and inclusive transition and put forward a comprehensive, responsible plan to increase the European Union's emissions reduction target for 2030.

In July 2021, the EC adopted a package of proposals to make the EU's climate, energy, land use, transport and taxation policies **fit for reducing net greenhouse gas emissions by at least 55% by 2030**. With these proposals, the Commission outlined the legislative tools to **deliver on the targets agreed in the European Climate Law** and enable the necessary acceleration of greenhouse gas emission reductions in the next decade.

At the same time, developed countries are striving to combine their climate, energy security, and industrial policies into broader strategies. The US' **Inflation Reduction Act** (IRA) is a major example as represents a package of $369 billion in spending on climate and energy policies. In response to that, in March 2023, the EC published a new proposal for regulation called the **Net-Zero Industry Act** as a key part of the **European Green Deal Industrial Plan**. This is new legislative proposal sets a goal for the **EU to domestically produce at least 40% of the technology it needs to achieve its climate and energy targets by 2030**.

Intelligent connectivity is essential for the achievement of the United Nation's (UN's) Broadband Commission agenda for 17 **UN Sustainable Development Goals**, having set deployment targets for 2025 to underline the importance of communication systems and networks on addressing economic growth and addressing social challenges. **Future technological developments** will create a set of strategic choices related to new value networks and ecosystems, influencing how value is created within companies and redistributed among industry players, countries and society.

IoT and edge computing can be used to support the **European Green Deal** and **Fit for 55 package** and decrease energy and carbon footprint of various vertical industries. **Smart use** of **clean digital technologies** can serve as a **key enabler** for climate action and environmental sustainability and improve energy and resource efficiency, facilitate the circular economy, lead to a better allocation of resources; reduce emissions, pollution, biodiversity loss and environmental degradation.

Recommendations

- **Favour cross sectorial technology demonstration projects** that support the green and digital transition, joined with regulatory sandboxes demonstrating interoperability across technology platforms as well as the needed minimum regulatory changes, whether for new mandates on data interoperability as well as for the definition of new roles and responsibility throughout the energy market.

- **Develop demonstration projects** favouring the adopting of IoT architecture into key energy domains, particularly the domain related to the launch of multi sided marketplaces enabling peer to peer flexibility exchanges across the value chain and through prosumer energy community.

- **Focus on existing energy application**s and the opportunity redesigning the European energy landscape accelerating the transition towards a circular, net-zero carbon economy and society, which is the European Union's ambition.

- **Establish global partnerships** to ensure that the EU climate neutrality measures are supported by large parts of the world, including EU, USA, and China, to reach the global climate neutrality targets.

- **Define an EU method of calculating the carbon avoided emissions** in an industrial sector/domain, when ICT is used as an enabling technology in collaboration with the industry and by using for a such European Green Digital Coalition and standardisation bodies such as ETSI and ITU.

- **Focus efforts on in-depth investigation of the link between digital transition and physical world**. Digitalisation requires also significant upgrades of physical infrastructures (for example, upgrades of network equipment, adoption of smart meters for electricity grids). Based on the analysis, the regulatory framework should be adopted to enable the necessary investment in physical infrastructures needed to support the digital transition (or support it via different instruments).

- **Promote the reuse of electronics** through regulatory work to reduce the e-waste and boost the reuse of functioning electronic components. New regulations must incentivise new business cases for adoption of "circular" business models.

- **Focus on IoT and Edge computing as enabling technologies that support the deployment, monitoring, control and maintenance of renewable sources**, like solar panels, solar heating, geothermic heating, HVAC + Heat pumps and **support the increase of energy efficiency** using e.g., monitoring, control and maintenance of energy in most industrial domains.

- **Finalise work on** the **DPP (Digital Product Passport)** by using concepts such as the DPP4.0 concept, based on DNP4.0 (Digital Name Plate 4.0) and AAS (Asset Administration Shell) or such as internationally recognised standards for consumer goods, which play an important role to facilitate interoperability and increased transparency along the chain.

2. European digital policies

Introduction

In March 2021, the EC presented a vision for Europe's digital transformation by 2030 **EU's digital decade** which stands on four main pillars: Skills, Digital transformation of businesses, Secure and sustainable digital infrastructures and Digitalisation of public services. The EC will pursue the EU's digital ambitions for 2030 through concrete terms: projected trajectories at EU and national level, with key performance indicators to track progress towards the digital targets, an annual cooperation cycle to monitor and report on progress and multi-country projects combining investments from the EU, Member States and the private sector.

Following the need for better data management, the **Data Governance Act (DGA)** is the first of a set of measures announced in the 2020 **European Strategy for Data**. The DGA sets the ground for re-use of public sector data and the sharing of personal and non-personal data. it introduces and promotes the notion of "Data altruism", allowing data use by individuals or companies for the common good and the creation of an expert group, the 'European Data Innovation Board', which will work on best practices by Member States' authorities.

In February 2022, the EC published its **Data Act** which aims to remove barriers to access data for both consumers and businesses in a context where the volume of data generated by humans and machines is increasing exponentially. The Data act introduces new rules to facilitate switching between providers of cloud services and other data processing services and put in place safeguards against unlawful international data transfer by cloud service providers. The legislation is currently in trialogue phase.

Cloud computing is a key objective to increase Europe's data sovereignty. Building on the **European Strategy for Data**, the EC has launched a **European Alliance on Industrial Data, Edge and Cloud**, which will feature the development of several work streams such as **Joint Investment in cross-border cloud infrastructures and services, EU Cloud Rulebook** and **a European marketplace for cloud services**.

In April 2021, the EC has published the **so called AI Act** legislative proposal which is now being discussed in the Parliament. The AI Act proposes to introduce a comprehensive regulatory framework for Artificial Intelligence in the EU. The aim is to establish a legal framework that provides the legal certainty necessary to facilitate innovation and investment in AI, while also safeguarding fundamental rights and ensuring that AI applications are used safely.

In December 2020 the EC presented **European Cybersecurity Strategy**, aims to build resilience to cyber threats and ensure citizens and businesses benefit from trustworthy digital technologies. Several legislative proposals were made in the area of cybersecurity: the **EU Cyber Resilience Act (CRA)**, revised **Network and Information Security Directive**, **Cybersecurity Act** and **Cybersecurity Solidarity Act**.

In the area of skills, the EC in April 2023 published **two proposals** address the two main common challenges jointly identified by the Commission and EU Member States: 1) the lack of a whole-of-government approach to digital education and training, and 2) difficulties in equipping people with the necessary digital skills.

Recommendations

- **Strengthen European technological sovereignty** in areas like IoT and Edge Computing) but in the global context, resisting to become too inward-looking.

- **Define "technological sovereignty" strategy** in a clearer and more coherent manner, defining more precisely in which technological areas it makes sense to apply and how.

- **Prioritize simplifying and reducing regulatory burden** for companies, especially SMEs such as commitment to simplify and significantly reduce reporting requirements for companies by 25% as announced by the Commission President von der Leyen.

- **Focus on proper implementation of the existing legislative initiatives**: in technology areas: AI Act, Data Act, CRA, DMA, DSA etc. and assessing their impact before proposing new legislative proposal in the next mandate.

- **Reaffirm commitment to Better Regulation Agenda**

- **Enable and support IoT and Edge technology solutions from a policy perspective**, related to computing continuum.

- **Promote development of training programmes and apprenticeships** (up-, reskilling) to promote digital, entrepreneurial, and transversal skills. Digital skills need to be enhanced and promoted also in education sectors where they played less significant role before (e.g., economy or law studies, but also energy engineering).

3. Research and Innovation

Introduction

IoT and edge computing research and innovation address edge IoT continuum distributed architectures, intelligent connectivity, AI, end-to-end security, heterogenous IoT edge mesh, IoT digital twins and immersive edge technologies, social digital twins deployed at the edge, IoT swarm systems, Internet of Things Senses (IoTS), trustworthiness, verification, validation, testing, standardisation, and the convergence of all the above into the Internet of Intelligent Things.

The evolution of intelligent edge IoT systems accelerates the transition from centralised, cloud-based to decentralised, distributed, and dynamically adapting architectures, providing a novel approach to network and edge IoT applications security, where edge AI devices are independently shielded using security solutions tailored to their processing capabilities, providing more local control, enhanced robustness, and better overall safeguard.

The AIOTI research and innovation strategy addresses the new wave of deep convergence and integration of technologies to accelerate the twin digital and green transitions so to position Europe at the forefront of the new wave of deep-tech advancements to foster a dynamic IoT and edge computing European ecosystem, based on heterogeneous technology integration into digital value chains across various industrial sectors.

Such strategy is constantly updated and periodically consolidated in the **AIOTI Strategic Research and Innovation Agenda (SRIA)** that identifies the technological development, key trends, issues, and challenges within different thematic areas related to next-generation IoT and edge computing advancements while providing several selected research priorities over the 2023-2030 period.

The main aim of the AIOTI SRIA is to support Europe in developing new technologies based on sustainable and trustworthy technologies and applications development to address the most pressing societal challenges, bring them to the market, and position Europe as a leading global research and innovation player.

Recommendations

- **Accelerate** the development of Internet of Things Senses (IoTS), including Tactile IoT, using secure, reliable, robust, intelligent, and cost-effective connectivity solutions and new edge-ready software and hardware for fast and seamlessly collecting, processing, storing, and in real-time analysing the vast amount of data produced by edge IoT devices.

- **Enable** the convergence of edge IoT, AI, hyperconnectivity, and digital twins towards industrial immersive technologies and, moving forward, also virtual worlds, which require cognitive decision-making capabilities by using AI-based algorithms implemented at the edge (e.g., autonomous systems and robotic things) to optimise the real-time data exchange across multiple intelligent edge IoT devices and platforms.

- **Advance** the developments of intelligent edge IoT adapted for new hyperautomation and hyperconnectivity applications, aiming to streamline processes across the operations using edge processing, IoT, AI, robotic process automation, and other technologies to run semi-autonomously and autonomously in the industrial environment, keeping the green transition and the cost-efficiency at the core of all activities.

- **Adopt** new research and innovation methods, approaches, European legislations, and business models to address the intelligent IoT and edge computing technological challenges in dealing with high uncertainty and unpredictability, understanding multiple dimensional operating environments, and adapting to real-time dynamic changes across different scales and levels.

- **Move** the research frontiers for IoT and edge computing research and innovation to scale sustainable solutions across the micro-, deep- and meta-edge continuum allowing the implementation of advanced responsive mesh edge IoT systems.

- **Implement** new research for innovation and sustainability concepts in addressing IoT and edge computing key challenges to safeguard the earth's climate and environment and to promote economic and social development in the European and global context within the framework of the knowledge triangle, where education, research and innovation are parts of an integrated whole.

- **Strengthen** the IoT and edge computing research and innovation by advancing the European Innovation Ecosystems across the EU and linking it with similar initiatives outside of the EU, to support the creation of regional innovation valleys capable of international outreach, activating interregional innovation projects, including deep-tech innovation centres to provide technical solutions for an economy with net-zero greenhouse gas emissions.

4.   European Standardisation

Introduction

EU Standardisation Strategy is a framework that outlines the EU's approach to standardisation to ensure products, services, and processes are safe, reliable, and interoperable across different countries and industries. The EU Standardisation Strategy has several key objectives, including: Promoting innovation, Enhancing competitiveness, Ensuring safety and quality, Fostering sustainability. To achieve these objectives, the EU Standardisation Strategy focuses on several key areas, including Prioritisation, Coordination, International cooperation and Digitalisation.

Overall, the EU Standardisation Strategy is a key component of the EU's efforts to create a single market that promotes innovation, competitiveness, and sustainable development while ensuring that products and services are safe and of high quality.

Recommendations

- **Commit to a more strategic approach to lead on standardisation for new and critical technologies** but should not undermine Europe's commitment to international standardisation in the name of "technological sovereignty".

- **Promote a standardisation policy** that enables market-driven standardisation and involves stakeholders along the way, in particular industry.

- **Anticipate, prioritise, and address standardisation needs in strategic areas** by addressing it through securing full collaboration with ESOs, NSOs, industry, and all other relevant stakeholders in a full multi-stakeholder manner.

- **Encourage active participation and contribution of the industry**, and in particular ICT industry in the High-Level Forum on European Standardisation and the ICT Multi-Stakeholder Platform where we suggest it to continue operating under the Forum, covering the ICT domain.

- **Avoid creation of additional bodies** (such for example EU Excellence Hub) that can lead to creation of parallel standardization activities that will be in competition with ESS.

- **Improve the governance and integrity of the European standardisation system** by supporting increased participation of NGOs, SMEs and EU companies but also accept participation of all other engaged players who are also contributing significantly to the ESS. Engagement of SMEs could also be done via organisations that have their significant representation (for example, AIOTI has about 40% of its members SMEs and startups).

- **Enhance European leadership in global standards by stimulating the contribution of ESS results in international SDOs**. European ESOs should strive to lead initiatives as it was 3GPP as one possible modality of work to ensure leadership in the global standard setting process.

- **Increase further activities into potential of EU-funded research projects** to support early anticipation of standardisation needs through research. We see this as an opportunity and think this coincide well with the ambitions of ESOs to connect research and standardisation closer. We think a standardisation booster and code of practice for SMEs and researchers on standardisation can be of help.

- **Supports efforts to increase number of future generation of standardisation experts** and the fact that this is a rather rare competence which needs to be safeguarded and secured for future. It is also important to highlight that the largest and most available core of standardisation resources and competence comes from industry and will continue to be so, as the industry is also very much involved in the research.

- **Work on an integrated operational framework and system** to contextualize, synchronize and make interoperable disparate data sources about people, places, assets and things for new technologies and protocols that will enable the convergence of autonomous vehicles, drones and bots, IoT sensors, XR, sovereign identity, digital transactions, 5G/6G, and the need for an AI system that can safely orchestrate all their activities. This operational framework needs to be built on new standards while leveraging legacy systems to address new challenges to successfully govern activities in the real and virtual world.

About AIOTI

AIOTI is the multi-stakeholder platform for stimulating IoT and Edge Computing Innovation in Europe, bringing together small and large companies, academia, policy makers and end-users and representatives of society in an end-to-end approach. We work with partners in a global context. We strive to leverage, share and promote best practices in the IoT and Edge Computing ecosystems, be a one-stop point of information on all relevant aspects of IoT Innovation to its members while proactively addressing key issues and roadblocks for economic growth, acceptance and adoption of IoT and Edge Computing Innovation in society. AIOTI's contribution goes beyond technology and addresses horizontal elements across application domains, such as matchmaking and stimulating cooperation in IoT and Edge Computing ecosystems, creating joint research roadmaps, driving convergence of standards and interoperability, and defining policies.
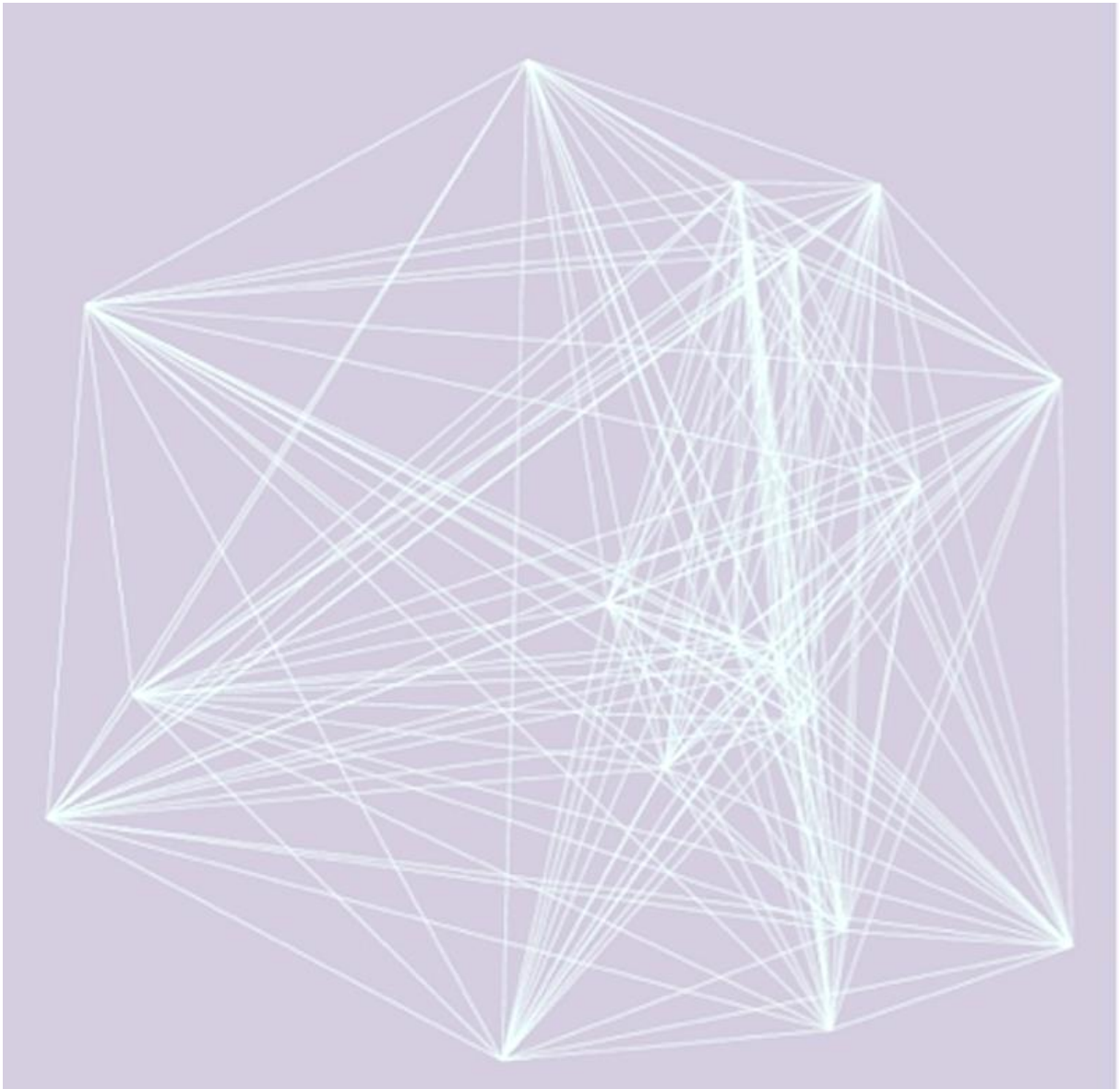
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