

ENSURING EUROPEAN LEADERSHIP IN THE DATA ECONOMY

Ten priorities for the European Union

Kristine Alanko

Specialist, Sitra

Laura Halenius

Project director, Sitra

Kristo Lehtonen

Director, Sitra

Antti Peltomäki

Senior Advisor, Sitra

Reijo Aarnio

Senior Advisor, Sitra

In the race to master the digital world, Europe's trump card has been to build a fairer data-driven economy and society. As the next five-year term of the European Commission approaches, there is a need to launch a debate on the actions that can accelerate the development of Europe's digital single market and improve Europe's chances of becoming a global leader in the data-driven economy.

This working paper provides policy recommendations for the development of a data-driven society in Europe. Its objective is to launch a broad dialogue between different stakeholders on the future direction of the European Data Strategy, to build a fairer and more competitive data economy for the future.

Sitra working paper

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Ensuring European leadership in the data economy

Ten priorities for the European Union

Authors: Kristine Alanko, Antti Peltomäki,
Reijo Aarnio, Laura Halenius, Kristo Lehtonen

Sitra working group: Jyri Arponen, Heikki Aura,
Kirsi Hantula, Veera Heinonen, Tiina Härkönen,
Markus Kalliola, Johanna Kippo, Anssi Komulainen,
Rosa-Maria Mäkelä, Antti Poikola, Taru Rastas,
Juhapekka Ristola, Ilkka Räsänen, Laura Seppälä,
Meeri Toivanen, Jukka Vahti

Layout: Grano Oy

ISBN 978-952-347-365-2 (PDF)

ISSN 2737-1042 (electronic publication)

www.sitra.fi

Sitra working papers provide multidisciplinary information about developments affecting societal change. Working papers are part of Sitra's future-oriented work conducted by means of forecasting, research, projects, experiments and education.

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Foreword

The next five-year term of the European Commission will be a watershed moment for Europe's data economy. The European Union will need to strike the right balance between new and ambitious strategic initiatives on the one hand and the implementation of the existing data legislation by Ursula von der Leyen's Commission on the other. The current Commission's data legislation, such as the Digital Markets Act (DMA), the Digital Services Act (DSA), the Data Act (DA), the Data Governance Act (DGA) and the Artificial Intelligence Act (AIA), was and is historic, but the jury is still out on its ultimate impact, as much will depend on what the next Commission decides to do.

This paper highlights ten priorities and makes 28 policy recommendations on the next steps for the European data strategy to ensure leadership in the fair data economy. These recommendations support the vision of a genuine single market for data and continued efforts to build on what has already been achieved in recent years.

Going forward, the EU must continue its role as a regulatory superpower in the data economy, as it has done since the General Data Protection Regulation (GDPR) came into force in 2016. This role is often criticised on the basis that "referees don't win games", but this view misses the point. As the competition for digital power in our economies intensifies, the world needs fair rules. Even major democratic powers like the US often seem incapable of regulating digital markets, leaving the rule-making largely to powerful corporations. But the EU has shown in recent years, with increased confidence and self-assuredness, that it can pass groundbreaking new laws. By harnessing the power of its internal market and regulating it, the EU can currently claim to be a world leader.

But to move forward, the new legislation must be properly implemented and enforced in a manner that supports the competitiveness of European businesses. Furthermore, as major

economic powers, such as the US and China, continue to pour huge amounts of capital into strengthening their domestic industries, Europe needs to be strategic in its approach. We should therefore resist a full-blown global subsidy race, but neither should we be naïve about the changing geoeconomic landscape.

We propose a strategic approach focusing on the most important critical technologies, such as quantum technologies and generative AI. In addition, the experience of companies – which have been keen to seize the new opportunities offered by the new data legislation – provides some clear lessons. Namely, we need to focus on making compliance much more effortless, even automated. We also need more active measures to reap the benefits of data. Increasing labour productivity and social well-being through the smart use of data, in particular in certain key areas of the data economy such as health and the green transition, is where we need to focus most, based on our experience.

This working paper by the Finnish Innovation Fund Sitra has two goals. Firstly, it offers building blocks for the digital policy areas that need attention. And secondly, it aims to stimulate an early debate among stakeholders on what the continuation of the European data strategy – the Data Strategy 2.0 – should look like. This paper is based on numerous publications (think tank research and development work), pilots and trials, stakeholder discussions, and expert workshops held in Finland, Belgium and Spain. We would like to thank everyone who gave their time, ideas and expertise to this work, and in particular, the European Policy Centre for hosting the discussions with us in Brussels.

23 January 2024

Kristo Lehtonen and Laura Halenius

Kristo Lehtonen is the Director of the Fair Data Economy theme at Sitra. Laura Halenius is the Project Director of the Data and Competitiveness project at Sitra.

Summary

Access to data and the ability to use it are key enablers for innovation and growth in our increasingly data-driven economy. For the European Union to continue to set the ground rules and new policy initiatives for a fair data economy, it needs a common vision and an early identification and response to the trends that challenge Europe. In the race to master the digital world, Europe's trump card has been to build a fairer data-driven economy and society. New measures to promote the data economy must continue to be based on European values.

As the next five-year term of the European Commission approaches, there is a need to launch a debate on the actions that can accelerate the development of Europe's digital single market and improve Europe's chances of becoming a global leader in the data-driven economy.

This working paper has two objectives. First, to provide policy recommendations for the development of a data-driven society in Europe. Second, to launch a broad dialogue between different stakeholders on the future direction of the European Data Strategy. It is structured around three themes that are central to building a fairer and more competitive data economy for the future:

Theme 1: Strengthen strategic thinking in critical technologies. Critical technologies such as AI, semiconductors, 6G, quantum technologies and HPC need to be developed more strategically to realise their full potential in the development of the data-driven economy. This will enhance the EU's economic security, meaning its operational security and competitiveness.

Theme 2: Promoting the digital single market through better implementation and enforcement of data regulation. Focusing on the implementation and enforcement of regulation will be a priority for the next five years of the Commission. A fair data economy needs a functioning regulatory

framework that strengthens the rights of individuals in digital environments. Compliance should be made easy and even automated for businesses.

Theme 3: Strengthening labour productivity and human and environmental well-being through data. Data-driven business models must be harnessed to improve productivity and well-being in society and create better opportunities for people. SMEs should play a key role in this. In addition to clear rules of the game for data, the EU must focus on building the necessary capacity to better use data to increase labour productivity as well as human and environmental well-being.

Under each theme, we describe the desirable future and the challenges we face today to achieve a more competitive digital single market and to strengthen the well-being of people and the environment. Under each theme, 10 priorities have been identified and 28 policy recommendations are proposed for the European Union.

Ten priorities to transform Europe's data economy

1. Leverage investment and boost competitiveness in critical technologies.

The EU needs to work with member states to strengthen critical technologies through policy and funding programmes. These initiatives and programmes should focus on quantum technologies and high-performance computing, artificial intelligence, advanced semiconductor technologies, 6G and cyber security.

2. Make the EU a leader in trustworthy generative AI. The EU should raise its level of ambition and strengthen its strategic autonomy, meaning its ability to act independently in the development of generative AI. The EU should ensure the availability and access to

open-source large language models (LLMs) in all official EU languages. Competitive and trustworthy European large language models are essential for the development of new, domain-specific applications and commercial services. AI developers in the EU should have access to good quality data and access to and skills in the use of high-performance computing to support the development of robust LLMs.

3. Ensure EU leadership in the development of the next generation internet (Web 4.0). Web 4.0, the anticipated next stage of Internet development, seamlessly connects virtual worlds and objects to the real world. The EU should ensure that virtual worlds and virtual economies are developed on the basis of our shared European values, by promoting the fair use of data, openness, interoperability and transparent governance. The EU needs to ensure a strong focus on copyright-protected content, thereby strengthening the rights of users of virtual worlds. The EU must allow decentralised autonomous organisations (DAOs) to register within the EU. The scope of the regulatory sandbox should be extended.

4. Improve the governance model of the new data legislation, the coordination of the development of data spaces and their interoperability. The European Data Innovation Board should require that a harmonised set of rules will be developed for data spaces. The EU must also support the development of rolebooks, which act as a registry of roles and bodies involved in data sharing. Data space development should be supported at national level and this support can be organised, for example, through national hubs or service centres. The EU needs to ensure that the potential of regulatory technologies is exploited in the implementation of data and digital communications regulations, in particular to facilitate compliance by SMEs. The EU needs to improve interoperability by creating technical standards for data.

5. Ensure people's rights in Web 4.0 virtual worlds and other emerging digital domains. The EU should ensure that consumers have the right to control and access their data in new virtual environments. The Commission should ensure that the new data legislation and the General Data Protection Regulation are compatible. The EU should facilitate the movement of data linked to a user's reputation and ensure interoperability between platforms. People's right to control their own data and decide how it is used should be added to the Declaration of Digital Rights and Principles, and it must be ensured that people can and do exercise their rights.

6. Strengthen EU-level leadership in the data economy. The EU needs to ensure that the importance of the data economy for economic and social renewal is understood in all member states. The development of the internal market must be guided and monitored in a timely manner. This monitoring should be supported by common indicators and their development must be supported by cooperation throughout the EU. The development of the digital single market should be monitored by developing indicators for measuring the cross-border movement of data. It is also necessary to ensure that the indicators also monitor the development of data-based applications and services in addition to the pure movement of data.

7. Support people's AI and digital literacy. The EU should ensure adequate support to strengthen people's AI and digital literacy. It should address the threats posed by AI-generated disinformation and continue to work with social media platforms to counter these threats. It should also promote technological innovation that supports democratic values.

8. Encourage SMEs to adopt data-driven business models. The EU needs to increase awareness on the data-driven business opportunities. The EU should provide tools and services to support businesses promote data-

driven business. The creation of innovation ecosystems around new business models needs to be supported.

9. Boost Digital Product Passports as a tool for the twin transition. The European Commission, together with key stakeholders, should prepare the delegated acts to complement the Ecodesign Regulation and present the digital product passports to be introduced for selected product groups. The EU should promote the development of regulatory sandboxes to enable the development and wider uptake of digital passports through testing. Interoperability within the passport system

should also be ensured to allow data sharing between different digital product passport value chains and data spaces.

10. Implement effectively the European Health Data Space. The EU should focus on the effective implementation of the European Health Data Space Regulation and accelerate progress in the single market for digital healthcare solutions through Horizon Europe and standardisation in this area. The EU should harness the potential of the use of AI in healthcare to deliver better technology-enabled digital services to citizens in line with European values.

Tiivistelmä

Datan saatavuus ja kyky sen hyödyntämiseen ovat keskeisiä edellytyksiä innovaatioille ja kasvulle yhä voimakkaammin datavetoiseksi kehittyvässä taloudessamme. Jotta Euroopan unioni voi jatkaa reilun datatalouden pelisääntöjen ja uusien politiikka-aloitteiden laatimista, tarvitsee se yhteistä tilannekuvaa sekä Eurooppaa haastavien kehityslinjojen tunnistamista ja niihin reagoimista varhaisessa vaiheessa. Kilvassa digitaalisen maailman hallinnasta Euroopan valttina on ollut reilumman datavetoisen talouden ja yhteiskunnan rakentaminen. Uusien datataloutta edistävien toimenpiteiden täytyy tulevaisuudessakin perustua eurooppalaiselle arvopohjalle.

Euroopan komission seuraavan viisivuotiskauden lähestyessä on käynnistettävä keskustelu niistä toimista, jotka voivat vauhdittaa Euroopan digitaalisten sisämarkkinoiden kehitystä ja parantaa Euroopan mahdollisuuksia nousta globaaliksi edelläkävijäksi datavetoisessa taloudessa.

Tällä työpaperilla on kaksi tavoitetta. Ensinnäkin se tarjoaa toimenpidesuosituksia datavetoisen yhteiskunnan kehittämiseen Euroopassa. Toisena tavoitteena on käynnistää laaja vuoropuhelu eri toimijoiden kesken Euroopan datastrategian tulevaisuuden suunnasta. Työpaperi rakentuu kolmen teeman ympärille, jotka ovat keskeisiä tulevaisuuden reilumpaa ja kilpailukykyisempää datataloutta rakennettaessa:

Teema 1: Strategisuuden vahvistaminen kriittisten teknologioiden kehityksessä. Tekoälyn, puolijohteiden, 6G:n, kvanttiteknologian ja suurteholaskennan kaltaisia keskeisiä teknologioita tulee kehittää entistä strategisemmin, jotta niiden koko potentiaalia voidaan hyödyntää datavetoisen talouden kehityksessä. Tämä parantaa EU:n taloudellista turvallisuutta eli toimintavarmuutta ja kilpailukykyä.

Teema 2: Digitaalisten sisämarkkinoiden edistäminen datasääntelyn toimeenpanoa tehostamalla. Komission tulevan viisivuotiskauden aikana on ensisijaisen tärkeää keskittyä sääntelyn toimeenpanoon. Reilu datatalous tarvitsee toimivaa sääntelykehystä, joka vahvistaa yksilöiden oikeuksia digitaalisissa ympäristöissä. Sääntöjen noudattamisen on oltava myös yrityksille vaivatonta ja jopa automatisoitua.

Teema 3: Työn tuottavuuden sekä ihmisten ja ympäristön hyvinvoinnin vahvistaminen datan avulla. Dataan perustuvat liiketoimintamallit tulee valjastaa yhteiskunnan tuottavuuden ja hyvinvoinnin parantamiseen sekä parempien mahdollisuuksien luomiseen ihmisille. Pk-yritysten olisi oltava tässä keskeisessä roolissa. Selkeiden dataa koskevien pelisääntöjen lisäksi EU:n on keskityttävä tarvittavien valmiuksien luomiseen, jotta dataa voidaan hyödyntää paremmin työn tuottavuuden sekä ihmisten ja ympäristön hyvinvoinnin lisäämiseen.

Kunkin teeman alla kuvataan toivottavaa tulevaisuutta sekä niitä nykytilan haasteita, jotka ratkaisemalla päästään kohti entistä kilpailukykyisempiä digitaalisia sisämarkkinoita sekä vahvistetaan ihmisten ja ympäristön hyvinvointia. Teemojen alla on tunnistettu kymmenen päätavoitetta ja ehdotetaan 28 politiikkasuositusta Euroopan unionille.

Kymmenen tavoitetta Euroopan datatalouden uudistamiseksi

1. Lisätään investointeja kriittisiin teknologioihin kilpailukykyyn parantamiseksi. EU:n on pyrittävä vahvistamaan kriittisiä teknologioita politiikka- ja rahoitusohjelmilla yhdessä jäsenvaltioiden kanssa. Ohjelmien painopisteen tulisi olla kvanttiteknologioissa ja suurteholaskennassa, tekoälyssä, kehittyneissä

puolijohdeteknologioissa, 6G:ssä ja kyberturvallisuudessa.

2. Tehdään EU:sta edelläkävijä luotettavan generatiivisen tekoälyn alalla. EU:n on nostettava tavoitetasoaan ja vahvistettava omaa strategista autonomiaansa, eli kykyään toimia riippumattomasti luovan tekoälyn kehittämisessä. Euroopassa kehitettyjen avoimen lähdekoodin suurten kielimallien tulee olla laajasti saatavilla eri toimijoille kaikilla EU:n virallisilla kielillä. Kilpailukykyiset ja luotettavat eurooppalaiset kielimallit ovat välttämättömiä uusien sovellusten ja kaupallisten palveluiden rakentamisessa. EU:ssa kehitetyn luovan tekoälyn on oltava riittävän laadukasta ja EU:sta täytyy löytyä luotettavien kielimallien kehittämiseen tarvittavaa osaamista ja laskentakapasiteettia.

3. Varmistetaan EU:n johtava asema seuraavan sukupolven internetin (web 4.0) kehittämisessä. Web 4.0, eli ennakoitu seuraava internetin kehitysvaihe yhdistää virtuaaliset maailmat ja -esineet todelliseen maailmaan saumattomasti. EU:n on varmistettava, että virtuaalimaailmoja ja virtuaalitalouksia kehitetään eurooppalaisiin arvoihin pohjaten eli laajassa yhteistyössä, yhteentoimiviksi ja hallintamalliltaan läpinäkyviksi. EU:n on kiinnitettävä huomiota tekijänoikeus-suojattuun sisältöön ja siten vahvistettava virtuaalimaailmojen käyttäjien oikeuksia. EU:n on sallittava hajautettujen autonomisten organisaatioiden (engl. decentralised autonomous organisation, DAO) rekisteröityminen alueellaan. Lohkoketjujen sääntelyn testi-ympäristön (sandbox) soveltamisalaa tulee laajentaa.

4. Parannetaan uuden datalainsäädännön hallintamallia, data-avaruuksien kehityksen koordinoitua ja niiden yhteentoimivuutta. Euroopan data-innovaatiolautakunnan on edellytettävä, että data-avaruuksille, eli tietoaueille kehitetään yhdenmukaiset sääntökirjat. EU:n on lisäksi tuettava ns. roolikirjojen kehittämistä, jotka toimivat kokoavana rekisterinä datan jakamiseen liittyville rooleille ja elimille. Data-avaruuskehitystä tulee tukea kansallisella tasolla

ja tämä tuki voidaan järjestää esim. kansallisten hubien eli palvelukeskusten kautta. EU:n on varmistettava, että sääntelyteknologian mahdollisuuksia hyödynnetään dataa ja digitaalista viestintää koskevien säännösten toimeenpanossa, jotta erityisesti pk-yritysten on helpompi noudattaa sääntelyä. EU:n on parannettava yhteentoimivuutta luomalla datalle teknisiä standardeja.

5. Turvataan ihmisten oikeudet web 4.0:ssa eli virtuaalimaailmoissa ja muissa digitaalisissa ympäristöissä.

EU:n on varmistettava kuluttajien oikeus hallita ja hyödyntää omia tietojaan uusissa virtuaaliympäristöissä. Komission tulee varmistaa, että uusi datalainsäädäntö ja yleinen tietosuojasetus ovat yhteensopivia. EU:n on helpotettava käyttäjän maineeseen linkittyvän tiedon liikkuamista ja vaadittava alustojen välistä yhteentoimivuutta. Ihmisten oikeus hallita omia tietojaan ja päättää niiden käytöstä on lisättävä digitaalisten oikeuksien ja periaatteiden julkistukseen ja on varmistettava, että ihmiset myös voivat ja osaavat käyttää oikeuksiaan.

6. EU-tason datatalouden kehityksen johtamista on vahvistettava. EU:n on varmistettava, että datatalouden merkitys talouden ja yhteiskunnan uudistamisessa ymmärretään kaikissa jäsenmaissa. Sisämarkkinoiden kehitystä on ohjattava ja seurattava sitä ajantasaisesti. Seuranta vaatii tuekseen yhteisiä mittareita ja niiden kehityksessä on tehtävä yhteistyötä koko unionin alueella. Digitaalisten sisämarkkinoiden kehitystä tulee seurata kehittämällä datan liikkuvuutta rajojen yli mittaavia indikaattoreita. On myös varmistettava, että mittarit seuraisivat myös data-pohjaisten sovellusten ja palveluiden kehitystä.

7. Tuetaan ihmisten tekoäly- ja digilukutaitoa. EU:n on varmistettava riittävä tuki ihmisten tekoäly- ja digilukutaidon vahvistamiseksi. Sen on puututtava niihin uhkiin, joita tekoälyn avulla tuotettu disinformaatio aiheuttaa ja jatkettava työtä näiden uhkien torjumiseksi sosiaalisen median alustojen kanssa. Lisäksi demokraattisia arvoja tukevia teknologisia innovaatioita on vietävä eteenpäin.

8. Kannustetaan pk-yrityksiä data-pohjaisten liiketoimintamallien käyttöön-otossa. EU:n on lisättävä yritysten ymmärrystä datapohjaisista liiketoimintamahdollisuuksista. EU:n tulisi tarjota yrityksille datapohjaisen liiketoiminnan edistämistä tukevia työkaluja ja palveluita. Innovaatioekosysteemien muodostumista uusien liiketoimintamallien ympärille on tuettava.

9. Otetaan digitaaliset tuotepassit tehokkaasti käyttöön. Euroopan komission on valmisteltava yhdessä keskeisten toimijoiden kanssa ekosuunnitteluasetusta täydentävät niin kutsutut delegoidut säädökset ja esiteltävä valituissa tuoteryhmissä käyttöön otettavat digitaaliset tuotepassit. EU:n tulisi edistää sääntelyn testiympäristöjen kehittämistä, jotta digitaalisia tuotepasseja voidaan kehittää

kokeilujen kautta ja ottaa niitä käyttöön laajemmin. Myös tuotepassijärjestelmän sisäinen yhteentoimivuus on varmistettava, jotta tietoja voidaan jakaa eri tuotepassien arvoketjujen ja data-avaruuksien välillä.

10. Toimeenpannaan eurooppalainen terveysdata-avaruus tehokkaasti.

EU:n tulee keskittyä eurooppalaista terveysdata-avaruutta koskevan asetuksen tehokkaan toimeenpanoon ja nopeuttaa terveyspalveluiden sisämarkkinoiden edistymistä Horisontti Eurooppa-ohjelman ja alan standardisoinnin avulla. EU:n tulisi hyödyntää tekoälyn käytön ja koulutuksen potentiaalia terveydenhuollossa, jotta kansalaisille olisi mahdollista tarjota parempia teknologia-avusteisia digitaalisia palveluita eurooppalaisten arvojen mukaisesti.

Sammanfattning

Tillgång till data och förmågan att använda dem är viktiga förutsättningar för innovation och tillväxt i vår alltmer datadrivna ekonomi. För att EU ska kunna fortsätta att sätta grundreglerna och ta nya politiska initiativ för en rättvis dataekonomi krävs en gemensam vision och en tidig identifiering av och reaktion på de trender som utmanar Europa. I kampen om att bemästra den digitala världen har Europas trumfkort varit att bygga en mer rättvis datadriven ekonomi och ett mer rättvist samhälle. Nya åtgärder för att främja dataekonomin måste fortsätta att baseras på en europeisk värdegrund.

När Europeiska kommissionens nästa femårsperiod närmar sig måste en debatt inledas om vilka åtgärder som kan påskynda utvecklingen av Europas digitala inre marknad och förbättra Europas chanser att bli en global ledare inom den datadrivna ekonomin.

Detta arbetsdokument har två syften. För det första innehåller det policyrekommendationer för utvecklingen av ett datadrivet samhälle i Europa. Det andra är att inleda en bred dialog mellan olika aktörer om den framtida inriktningen för den europeiska datastrategin. Det är uppbyggt kring tre teman som är centrala för att skapa en rättvisare och mer konkurrenskraftig dataekonomi för framtiden:

Tema 1: Stärkt strategisk utveckling av kritisk teknik. Kritisk teknik som AI, halvledare, 6G, kvantteknik och HPC måste utvecklas mer strategiskt för att deras fulla potential ska kunna utnyttjas i utvecklingen av den datadrivna ekonomin. Detta kommer att förbättra EU:s ekonomiska säkerhet, dvs. dess operativa säkerhet och konkurrenskraft.

Tema 2: Främja den digitala inre marknaden genom bättre tillämpning av datalagstiftningen. Under kommissionens kommande femårsperiod kommer det att vara en prioritet att fokusera på efterlevnaden av lagstiftningen. En rättvis dataekonomi kräver

ett fungerande regelverk som stärker enskildas rättigheter i digitala miljöer. Efterlevnaden måste också göras enkel och till och med automatiserad för företagen.

Tema 3: Stärka arbetsproduktiviteten och människors och miljöns välbefinnande genom data. Datadrivna affärsmodeller måste utnyttjas för att förbättra produktiviteten och välbefinnandet i samhället och skapa bättre möjligheter för människor. Små och medelstora företag bör spela en nyckelroll i detta. Förutom tydliga spelregler för data måste EU fokusera på att bygga upp den kapacitet som krävs för att bättre använda data för att öka arbetsproduktiviteten och människors och miljöns välbefinnande.

Under varje tema beskriver vi den framtid vi vill ha och de utmaningar vi står inför idag för att uppnå en mer konkurrenskraftig digital inre marknad och för att stärka människors välbefinnande och miljön. Under varje tema har tio huvudmål identifierats och 28 policyrekommendationer föreslås för Europeiska unionen.

Tio mål för att omvandla Europas dataekonomi

1. Öka investeringarna i kritisk teknik för att förbättra konkurrenskraften. EU måste samarbeta med medlemsstaterna för att stärka kritisk teknik genom policy- och finansieringsprogram. Dessa program bör inriktas på kvantteknik och högpresterande datorsystem, artificiell intelligens, avancerad halvledarteknik, 6G och cybersäkerhet.

2. Gör EU ledande inom tillförlitlig generativ AI. EU måste höja sin ambitionsnivå och stärka sin strategiska autonomi, dvs. sin förmåga att agera självständigt i utvecklingen av kreativ AI. Kvaliteten på den AI som utvecklas i EU måste vara tillräcklig och EU måste ha expertis och beräkningskapacitet

för att utveckla tillförlitliga språkmodeller. Språkmodeller med öppen källkod som utvecklats i Europa måste vara allmänt tillgängliga för olika aktörer på alla officiella EU-språk. Konkurrenskraftiga och tillförlitliga europeiska språkmodeller är nödvändiga för att bygga nya tillämpningar och kommersiella tjänster.

3. Säkerställa EU:s ledarskap i utvecklingen av nästa generations internet (webb 4.0). Web 4.0, det förväntade nästa steget i utvecklingen av Internet, kopplar sömlöst samman virtuella världar och objekt med den verkliga världen. EU måste se till att virtuella världar och virtuella ekonomier utvecklas på grundval av europeiska värderingar, dvs. i en styrningsmodell som bygger på brett samarbete, interoperabilitet och öppenhet. EU måste ta hänsyn till upphovsrättsskyddat innehåll och därmed stärka rättigheterna för användare av virtuella världar. EU måste tillåta decentraliserade autonoma organisationer (DAO) att registrera sig på sitt territorium. Tillämpningsområdet för testmiljön (sandbox) för reglering av blockkedjor bör utvidgas.

4. Förbättra styrningsmodellen för den nya datalagstiftningen, samordningen av utvecklingen av dataområden och deras interoperabilitet. European Data Innovation Board bör kräva att det utarbetas en harmoniserad uppsättning regler för dataområden, dvs. datadomäner. EU måste också stödja utvecklingen av ”rollregister”, som fungerar som ett kompendium över roller och organ som är involverade i datadelning. Utvecklingen av dataområden bör stödjas på nationell nivå, och detta stöd kan organiseras till exempel genom nationella nav eller servicecenter. EU måste se till att potentialen hos regleringstekniken utnyttjas vid genomförandet av bestämmelser om data och digital kommunikation, särskilt för att underlätta för små och medelstora företag att följa bestämmelserna. EU måste förbättra interoperabiliteten genom att skapa tekniska standarder för data.

5. Skydda människors rättigheter i webb 4.0 – virtuella världar och andra digitala miljöer. EU måste se till att

konsumenterna har rätt att kontrollera och få tillgång till sina uppgifter i nya virtuella miljöer. Kommissionen måste se till att den nya datalagstiftningen och den allmänna dataskyddsförordningen är kompatibla. EU måste underlätta rörligheten för data som är kopplade till en användares rykte och kräva interoperabilitet mellan plattformar. Människors rätt att kontrollera sina egna uppgifter och bestämma hur de ska användas måste läggas till i deklarationen om digitala rättigheter och principer, och det måste säkerställas att människor kan utöva och faktiskt utövar sina rättigheter.

6. Stärka ledarskapet på EU-nivå inom dataekonomin. EU måste se till att alla medlemsstater förstår dataekonomins betydelse för ekonomisk och social förnyelse. Utvecklingen av den inre marknaden måste styras och övervakas i god tid. Denna övervakning måste stödjas av gemensamma indikatorer och utvecklingen av dessa indikatorer måste stödjas av samarbete i hela unionen. Utvecklingen av den digitala inre marknaden måste övervakas genom att man tar fram indikatorer för att mäta den gränsöverskridande rörligheten för data. Det måste också säkerställas att indikatorerna även övervakar utvecklingen av databaserade tillämpningar och tjänster utöver den rena överföringen av uppgifter.

7. Stödja människors AI och digitala kompetens. EU måste säkerställa tillräckligt stöd för att stärka människors AI och digitala kompetens. EU måste ta itu med hoten från AI-genererad desinformation och fortsätta att arbeta med sociala medieplattformar för att motverka dessa hot. Dessutom måste tekniska innovationer som stöder demokratiska värden främjas.

8. Uppmuntra små och medelstora företag att anta datadrivna affärsmodeller. EU måste öka företagens förståelse för datadrivna affärsmöjligheter. EU bör tillhandahålla verktyg och tjänster för att hjälpa företag att främja datadriven affärsverksamhet. Bildandet av innovationsekosystem kring nya affärsmodeller måste stödjas.

9. Effektiv användning av digitala produktpass. Europeiska kommissionen bör tillsammans med viktiga intressenter förbereda de så kallade delegerade akter som kompletterar ekodesignförordningen och lägga fram de digitala produktpass som ska införas för utvalda produktgrupper. EU bör främja utvecklingen av testbäddar för reglering för att möjliggöra utveckling och bredare användning av digitala pass genom försök. Interoperabilitet inom passsystemet måste också säkerställas för att möjliggöra datadelning mellan olika passvärdekedjor och datalager.

10. Effektivt genomförande av det europeiska hälsodataområdet. EU bör fokusera på ett effektivt genomförande av förordningen om det europeiska området för hälsodata och påskynda framstegen på den inre marknaden för hälso- och sjukvårdstjänster genom Horisont Europa och standardisering på detta område. EU bör utnyttja potentialen hos AI och utbildning inom hälso- och sjukvården för att leverera bättre teknikbaserade digitala tjänster till medborgarna i linje med europeiska värden.

Introduction: Making the European data economy work for business, democracy, people and nature

As technology becomes increasingly integrated into our daily lives, data collection and usage are on the rise. This has sparked debates about the rules of the digital world and the direction of technological development. The European Union faces two possible scenarios in the next five years: either re-emerging as a technological powerhouse or becoming increasingly dependent on foreign data giants.

We see two possible future scenarios ahead for the European Union. In the next five-year term, we may see the re-emergence of the EU as an economic powerhouse in the next stage of technological development. Alternatively, we could see an ever-increasing European dependence on foreign data giants. Unless we continue on the path of strategic action, the EU will find itself on the latter course.

The COVID-19 pandemic and Russia's invasion of Ukraine have taught us Europeans a lesson about critical dependencies. When supply shocks hit certain critical technologies, such as semiconductors, we saw how major economies prioritised the needs of their own industries at the expense of the rest of the world. As technology becomes increasingly central to the economy and society as a whole, we need strategic autonomy in critical technologies to strengthen security of our economy and to allow our companies to compete on a level playing field.

The digitalisation of text, images, music, and video has generated an endless supply of reproducible digital data. We are entering a new phase in this process with the digitalisation of 3D objects. For example, we have recently seen a rapid increase in use cases such as digital twins in optimisation, modelling and documentation.

At the same time, the use of artificial intelligence (AI) is accelerating in all industries

and walks of life. AI is needed both to process the exponentially growing data volume and to recognise patterns in the complex datasets that elude the human eye. The race for strategic autonomy in AI will essentially be a battle for data and the rules for using that data – particularly in generative AI (GenAI).

Digital technologies are essential to support the green transition, productivity and prosperity. However, the digital and green transitions are not automatically linked (as digital technologies currently consume vast amounts of energy and remain a significant source of carbon emissions), and care must be taken when using digitalisation to promote the green transition (Ministry of Economic Affairs and Employment 2022).

Data, not oil, has become the most important and most valuable resource of our time. During the term of the next Commission, we will see technology challenging various strongholds of the European data economy, including industrial and health data. The key question will be about market power: who gets to set the rules?

The tension between authoritarian and democratic values is currently increasing political and geopolitical instability, demanding an ethical approach to technologies and to create space for European values. It is crucial that we ensure that gatekeeper companies (European Commission 2023c) do not hoard

our data in their vaults, or set the rules based on their narrow interests, or abuse their dominant market power to prevent new innovation or new entrants from accessing the market, as has happened in the past.

It is important for Europe that we ensure data interoperability. New data regulations can offer the potential of a new “GSM moment” (global system for mobile communications) for businesses in Europe. The new EU data regulations require that data moves, without stating how. A similar leap was made in telecoms markets decades ago to allow phone calls between different operators. At the time, operators resisted, arguing that this kind of interoperability was impossible because each operator kept track of its subscribers in a different way. However, when this new standard became mandatory, operators had no choice but to adopt the GSM standard, which enabled EU-wide roaming. GSM became a European and then a global standard.

Today, we face a similar situation. The more European companies are involved in shaping future rules, the more likely they are to form the basis of EU and ultimately global rules and standards. New data legislation can re-energise innovation and growth in Europe.

The race for a fairer data economy is therefore not about protectionism. It is about fostering relationships with like-minded international partners, while preserving innovation and fair competition, where the rules are set by democratic institutions. It is about our values, business, democracy, people and natural environment.

We have divided the ten priorities and 28 policy recommendations in this document under three themes, components for the next phase in shaping the future of a fairer European data economy. In each part we introduce the key challenges facing the European data economy and provide policy recommendations to overcome these challenges.

Theme 1: Strengthening strategic thinking in critical technologies: Harnessing the potential of critical technologies, such as AI, semiconductors, 6G, quantum technologies and high-performance computing for the next stage of the data economy, will improve the economic security and EU’s competitiveness.

Theme 2: Promoting the digital single market through better implementation and enforcement of data regulation: A fair data economy requires a well-functioning regulatory framework that is promoting the rights of individuals in the digital sphere and making compliance for companies easy, even automated.

Theme 3: Strengthening labour productivity and human and environmental well-being through data. Data-driven business models need to be harnessed to increase productivity and well-being in our societies and to create better opportunities for citizens. Having clear rules on data is not enough. The EU should focus on delivering the necessary capabilities to enable the better utilisation of data to increase labour productivity and social well-being. SMEs should be at the centre of this.

Theme 1: Strengthening strategic thinking in critical technologies

Harnessing the potential of the most important key enabling and emerging technologies, such as AI, semiconductors, 6G, quantum technologies and high-performance computing for the next stage of the data economy, will improve the EU's economic security and competitiveness.

Strategic autonomy in this paper refers to the EU's ability to defend and promote its values and interests in a world currently characterised by geopolitical tensions and geoeconomic competition between the major global powers. It requires the EU to strengthen its own resilience and to reduce over-dependence on key enabling and emerging technologies that are considered critical for our economy, security or the democratic development of our societies. To address this, the [European Commission](#), in October 2023, identified 10 critical technology areas for the EU's economic security, and started a process with member states to identify vulnerabilities in value chains (European Commission 2023b).

Without a strategic approach to key technologies such as AI, semiconductors, 6G, quantum technologies and high-performance computing, the EU risks missing out on the next wave of innovation in the data economy that will be critical for the age of post-quantum cryptography; the development of cryptographic algorithms that are considered to be secure against attack by a quantum computer ([NIST 2024](#)). Falling behind in next-generation innovation will lead to the EU becoming too dependent on technologies controlled by other countries, such as China and the US.

Despite geopolitical tensions, the EU should remain open to building stronger relationships with like-minded international partners and promoting a global rules-based order, including in areas such as the ethical and trustworthy use of AI. The successful implementation of the Artificial Intelligence

Act (AIA) is seen as a prerequisite for this this (European Commission 2023f).

The EU should actively engage in steering the development of internet technologies as outlined in the Web 4.0 strategy ([European Commission 2023d](#)). The next generation of internet technologies operate from a different paradigm, and are based on a decentralised model, which represents a new opportunity for European companies. These decentralised solutions based on blockchain technology will challenge the power of current gatekeepers as defined by the European Commission ([European Commission 2023c](#)). A decentralised internet can potentially offer a more just and fair future, where the balance of power and wealth is more evenly distributed between different actors.

What is Web 4.0?

Web 4.0, also known as the "Intelligent Web", represents the fourth generation of the World Wide Web, characterised by highly intelligent, interactive, and personalised experiences. In this era, devices and people interact seamlessly in real time, using advanced artificial and ambient intelligence, the Internet of Things, trusted blockchain transactions, virtual worlds with extended reality (XR) capabilities, and a mix of digital and real objects and environments.

The following priorities and policy recommendations aim to leverage investment and boost competitiveness in strategic technologies. Together, these technologies can be seen as the technological foundation of the European data economy and the next generation of internet (Web 4.0).

Priority 1: Leverage investment and boost competitiveness in critical technologies

The US and China are investing enormous sums in order to take the lead in the global technology “arms race” (Bradford 2023). Europe is at risk of falling behind in this technology race and will therefore be unable to compete in the next wave of innovation in the data economy. As a result, the EU and its member states will develop excessive dependencies on non-European entities due to the lack of a strategic approach to critical technologies. A particular challenge for Europe is its ability to turn research, development and innovation (RDI) investments into commercially competitive products and services more effectively, as well as the lack of available venture capital for scaling up businesses.

Policy recommendation

- The EU should aim to strengthen critical technologies through ambitious and coordinated programmes together with the member states, mobilising public and private investment and encouraging venture financing. Key areas of focus should include quantum technologies and high-performance computing (HPC), AI, advanced semiconductor technologies, 6G, and cybersecurity, in preparation for the era of post-quantum cryptography.

Priority 2: Make EU a leader in trustworthy generative AI

European strategic autonomy is also currently challenged by external dependencies on gatekeeper companies in GenAI, which will only increase if no action is taken (European Commission 2021; Bradford 2023). The EU should be able to provide access to high-quality open-source foundation models (text-based, audio, imagery) and the ability to further train these foundation models and build purpose-specific services on top of them. In addition, enabling components, such as access to skills and knowledge in the use of high-performance computing, that enable the development of foundation models, such as robust large language models (LLMs), are equally crucial. For example, in text-based GenAI, gatekeeper companies concentrate mainly on major languages when training foundation models and these services are primarily accessible via application programming interfaces (APIs). This creates the risk of a societal AI divide, leaving smaller and less dominant languages and the companies operating in those languages, at a disadvantage. In addition, the EU has no control over how these gatekeepers might change their terms of services, pricing or method of training their large language models. The value derived from foundation models is generated at the software product level, but these base models must first meet European quality standards (European Commission 2023f; 2023g) before value can be created through downstream applications.

Policy recommendations

- The EU should raise its ambition and prioritise strategic autonomy in GenAI as an explicit policy goal for the Union. It is also crucial that the EU strengthens the availability of ‘in-house’ quality, such as products, services and training data that comply with relevant EU regulations, such as the Artificial intelligence Act. In addition, the access to and skills in the use of high-performance

computing to support the development of robust LLMs is crucial.

- The EU should ensure the availability of and access to open-source foundation models. For text-based GenAI, open-source LLMs should be available in all official EU languages.
- The EU should ensure the development of competitive ([European Commission 2023g](#)) and trustworthy LLMs, which are essential for building domain-specific applications on top of the foundation models. Adherence to the quality and compliance requirements of the AIA will ensure that the technology embedded in products is trustworthy.

Priority 3: Ensure EU leadership in the next generation of internet (Web 4.0)

The US currently holds a dominant position in both investment and the development of the next generation of the internet, as the US is the primary home of gatekeeper technology companies ([European Commission, 2023c](#)). Most virtual worlds are being created by a handful of gatekeeper companies outside the EU, and these companies have extensive technological and human capital resources, as well as significant financial strength. This presents a challenge for Europe: to take a leading role in the development of virtual worlds that respect and promote EU values. Moreover, the tokenisation of financial, virtual and real-world assets has the potential to revolutionise the transfer of value ([Sitra, 2022c](#); [Forbes, 2023](#)), creating a global settlement layer that seamlessly integrates on-chain and off-chain environments. On-chain assets are digital items whose ownership and transactions are recorded on a blockchain, while off-chain assets include real-world assets such as real estate or commodities.

Policy recommendations

- The EU should ensure that virtual worlds and virtual economies put people first and uphold European values by promoting the fair use of data, openness, interoperability, and transparent governance. This approach would avoid the creation of isolated, non-interoperable systems.
- The EU should ensure that there is a strong focus on copyright-protected content in virtual worlds.
- The EU should allow for decentralised autonomous organisations (DAOs) to register as legal entities within the EU on a voluntary basis. The DAO framework is a vital innovation for the governance of virtual worlds.
- The EU should broaden the scope of its current blockchain sandbox programme, European blockchain regulatory sandbox for Distributed Ledger Technologies ([European Commission, 2023e](#)), and expand it into a Web 4.0 sandbox, covering new emerging areas such as tokenisation, the intersection of AI and blockchain and virtual worlds. The sandbox should also permit real-world experimentation.

Theme 2: Promoting the digital single market through better implementation and enforcement of data regulation

A fair data economy requires a well-functioning regulatory framework that is promoting the rights of individuals in the digital sphere and making compliance for companies easy, even automated.

The EU has been working towards a fair data economy by enacting a comprehensive regulatory framework for data. The next challenge is an effective implementation of the legislation in a way that helps, rather than hinders, business competitiveness. Success will depend on the ease of compliance for individuals and companies.

Based on empirical findings from Sitra's studies (Sitra 2022a), the level of complexity associated with the new data legislation is currently seen as too much of a challenge for businesses to navigate. Citizens and companies should not have to be required to understand all the details. Compliance with data sharing rules should be easy and ideally automated.

To build a fairer digital economy, regulation should specifically aim to extend, strengthen and create new rights for individuals. We currently lack control over the data that is collected about us. This was made clear by Sitra's Digipower investigation, which tracked the personal data flows of decision-makers and exposed the huge volumes of data collection, coupled with the unfair, even unlawful practices by data giants (Sitra 2022b).

The concept of data portability was introduced in the GDPR legislation for personal data. This right to data portability (Sitra 2023i), is de facto extended through the implementation of the Data Act (for IoT devices) and sectoral regulations, such as the European Health Data Space (for the secondary use of health data) (Sitra 2020).

In the future, Europe can tap into the potential of making more data available, by

putting individuals at the centre of decisions not only about personal data flows, but also about the data they generate. People's control over their own data goes hand in hand with the exercise of economic rights, such as the right to choose (Sitra 2023i).

Data economy regulation in the EU is now undergoing a major transformation. The EU data strategy and the Digital Decade programme both set a framework and provide an overview of the EU's data economy goals. Building a common situational awareness of the progress of strategic priorities and regulatory processes is key to ensuring that we can proactively define the ground rules and initiatives for the data economy of the future.

What is Sitra's Digipower investigation?

The purpose of the Digipower investigation was to identify new ways to influence and to improve transparency in the use of data. The investigation involved 15 decision-makers from across Europe and shed light on the collection and use of data in online environments. The investigation found that data collected from a single website visit is not only shared with a much wider range of third parties than expected, but also enables users to be profiled in greater detail than previously thought. (Sitra 2022b)

Priority 4: Improve the governance model of the new data legislation, the coordination of the development of data spaces and their interoperability

The level of complexity incorporated into the new data legislation is very hard for businesses to navigate. It becomes even more complicated with the three levels involved – EU bodies, member states and data spaces (Sitra 2023g). Companies' compliance with data-sharing rules should be easy, preferably automated, and not a time and resource consuming research task.

At present, the support for data spaces is organised at the EU level through the Data Spaces Support Centre (DSSC), an EU-funded project in which Sitra is a partner. However, most data space initiatives start within a single member state and need localised support.

Policy recommendations

- In the guidelines for Common European data spaces, the European Data Innovation Board (EDIB) should request data spaces to create a rulebook and include a common principles-based rulebook template that explicitly defines the general principles (ethics, human-centricity, fairness) that are shared by all Common European data spaces.
- The European Commission should support the creation of an open, transparent, and dynamic register of all roles and decision-making bodies involved in data sharing, called a rolebook. This framework should be implemented at the EU and the member state level. The rolebook would take the form of a registry hosted by the Data Spaces Support Centre (DSSC).
- The European Commission should ensure that national-level support for the data spaces is organised through local hubs and networked at the European level. In addition, the Commission should develop new funding models to support the growth-oriented orchestration of data spaces. Funding models

should encourage the joining of data spaces as early as possible.

- The Commission should ensure that innovative regulatory technology (RegTech) solutions are included in the implementation of the current data and digital regulation. This will lead to a simplification of regulatory complexity and improve SMEs' access to digital regulatory tools. This also requires supporting the development of a European RegTech ecosystem.
- The European Union should address the low interoperability by prioritising the creation of technical standards for data. Interoperable infrastructures are also key to speed up the process of the configuration of the European data spaces.

What is a data space?

A data space is an infrastructure based on common principles and rules for the reliable exchange of information in data ecosystems. The data space governance authority, representing all its participants, is responsible for creating, developing, maintaining, and enforcing a governance framework for the data space. This framework is codified in a data space rulebook, which contains the rules for data sharing within the data space and with external parties. The Common European data spaces aims to provide a seamless digital solution for the development of new data-based products and services.

What is a rolebook?

A rolebook is an open, transparent, and dynamic register of all roles and decision-making bodies involved in data sharing. It has been inspired by and adapted from the Legal Entity Identifier (LEI) registry that was created after the 2007–2008 global financial crisis. The rolebook would map EU-level decision-making bodies, member state competent authorities and national sector-specific data spaces. Its purpose would be to facilitate compliance and enable automation with tools such as RegTech built on top of it. (Sitra 2023g)

What is RegTech?

Regulatory technology (RegTech) refers to any use of technology to match structured and unstructured data with information taxonomies or decision rules that are meaningful to both regulators and the firms they regulate, in order to automate compliance or oversight processes (Sitra 2023c).

Priority 5: Ensure people's rights in Web 4.0 virtual worlds and other emerging digital domains

European citizens have little control over the huge volumes of data collected about them by digital giants, or gatekeeper companies, as defined by the European Commission in the Digital Markets Act. Citizens' control over their own data goes hand in hand with the exercise of economic rights, such as the right to choose.

Policy recommendations

- The EU should ensure that consumers' control over their own data, including the right to data portability, is safeguarded in the new virtual environments. Over time, the right to data portability should be extended to all digital data and environments.
- The European Commission should ensure the interoperability of the new data legislation with GDPR. Many companies participating in data spaces are reluctant to use personal data, due to concerns about privacy regulations. While GDPR includes obligations for the EU Commission to periodically report on the evaluation and review of data protection regulations, the EU should extend the scope of this assessment to the new legal framework. Consistency and interoperability between the different laws in force within the EU is crucial for competitiveness.
- The EU should establish a standardised reputation framework to ensure consistency and interoperability between platforms. Reputation portability refers to the ability of a user's reputation, such as ratings, reviews, or 'trustworthiness', to be transferred or recognised across different online platforms and services. The EU should therefore develop a secure protocol for the transfer of reputation data that prioritises user privacy and data security, while at the same time mandating that citizens have control over their own data.

- Citizens' right to self-determination and control over their own data, as well as their economic rights and symmetrical position vis-à-vis data controllers, that determine the purposes and means of processing personal data (European Commission 2016), should be included as part of the European Declaration on Digital Rights and Principles (European Commission 2022a). These rights and principles provide guidance for the EU and individual member states as they adapt to the digital transformation. For citizens these rights, and abilities to make use of them, build trust.

Priority 6: Strengthen EU-level leadership in the data economy

The Digital Decade policy programme (European Commission 2023i) with concrete goals and targets for 2030, will guide Europe's digital transformation. The role of the data economy in achieving these goals is not sufficiently visible in the current digital compass. Considerable progress is still needed to achieve the EU's goal of creating an internal market for data.

Policy recommendations

- The EU should ensure that there is a reliable knowledge base on cross-border data exchange and mobility within single market. One example of a possible indicator for measuring the European data economy would be the extent and seamlessness of the flows of health data between member states, as the free movement of EU citizens is already a reality.
- The EU should ensure that EU-wide cooperation is facilitated to develop data economy indicators. This work could also be linked to the development of indicators for the Digital Decade programme (European Commission 2023i). These new key performance indicators (KPIs) should focus not only on data flows, but also on the value

added by data-driven applications and services. Adopting a more holistic approach (already being piloted in Finland, read more on the Data Economy Monitoring Tool below), is crucial to moving beyond the more 'ground-level' technological indicators of data flows.

What is a Data Economy Monitoring Tool?

The data economy is a new and evolving phenomenon, and therefore information is not yet available on all issues related to its development. The Data Economy Monitoring Tool (Sitra 2024a), developed by Sitra as a part of the work on the national Roadmap for a Fair Data Economy (Sitra 2024b), makes it easier to understand and build situational awareness of the development of the data economy. The tool, based on public data sources, provides answers to several frequently asked questions. These include: Are organisations in Finland already using advanced data technologies such as AI? What is the impact of data on business performance? How much research, development and innovation (RDI) investment is being invested in Finland to grow the data economy, and how much EU funding is being used? The tool is intended as a knowledge base for those interested in the data economy and to support decision-making by business and government experts, developers and policymakers.

Theme 3: Strengthening labour productivity and human and environmental well-being through data

Data-driven business models should be harnessed to increase the productivity and well-being of our societies and create better opportunities for citizens. Having clear rules on data is not enough. The EU should focus on delivering the necessary capabilities to enable the better use of data to increase labour productivity and social well-being. SMEs should be at the centre of this.

Better use and application of data will be key to improving the competitiveness of European businesses and achieving the EU's sustainability goals (twin transition), as well as providing human-centric and trusted public and private services to all citizens.

As the transformation affects people's lives and daily activities in many ways, their skills and agency in the data economy must also be strengthened. Emerging technologies such as GenAI represent not only an opportunity but also a potential threat to European democracy. For example, AI-generated disinformation has already been used to disrupt European elections. The challenge of GenAI disinformation is expected to increase in the future as the technologies mature.

It is therefore argued here that because the root causes of data isolation are quite different in different sectors, there should be a differentiated policy approach to address these challenges.

First, the EU should ensure that it promotes the twin transition in such a way that data is fully exploited in the pursuit of sustainable solutions, such as low-carbon energy sources, products and services and a resource-efficient circular economy. In addition, halting the loss of biodiversity and restoring ecosystems will require an effective and interoperable use of immense amounts of data collected for assessment, monitoring and compliance purposes.

Second, there is significant untapped potential to use data to provide new public and private services throughout Europe. The development of the European Health Data Space has been a long and difficult process, partly because of the private and sensitive nature of the health data itself. However, it is also a promising example that there are ways and means to overcome these difficulties for the benefit of citizens' health and well-being.

Priority 7: Support people's AI and digital literacy

European citizens are at the heart of the data economy: sometimes as targets of influence, often as users of the technology, but not as people with agency; the actors who shape the digital services that affect their daily lives. At present, citizens' views and ideas are not being actively sought or widely taken into account when formulating Europe's approach to new technologies.

Policy recommendations

- The EU should ensure that it allocates time and resources to actors (such as national agencies for education, civic organisations, and fact-checking agencies) that support digital literacy, such as data and AI literacy.
- The EU needs to effectively tackle AI-generated disinformation by continuing to work together with social media platforms and other relevant service providers. More importantly, the EU should encourage the digital industry to create new technological innovations that support democratic values, such as Civic Tech (Heinonen, Vahti 2023). The EU should ensure that citizens have the right to participate in public deliberation, have access to relevant and accurate information, possess the capacity to critically assess the effects of new technologies and have the right to form their own opinions without coercion or manipulation.

What is Civic Tech?

Civic Tech is an umbrella term for a range of digital services to enable citizens to participate directly in decision-making processes, for example by voting, submitting initiatives or participating in debates. Unlike social media, Civic Tech is designed from the outset for the purpose of exercising democracy.

Priority 8: Encourage SMEs to adopt data-driven business models

Encouraging SMEs to adopt data-driven business models is expected to enhance productivity and innovation. This involves support mechanisms, funding opportunities and regulatory frameworks tailored to the needs of SMEs.

Policy recommendations

- The EU should strive to raise awareness of the opportunities offered by data-driven business. Awareness raising will help European SMEs to better understand and use data-driven practices and will increase their capacity to be data-driven.
- The EU should offer data-driven business improvement tools as a service to companies. SMEs in particular need easy and cost-effective ways to renew their business models and the skills needed to create new sustainable data-driven business. In addition, seed funding should be introduced to create innovation ecosystems for new business models, including bold pilots and systematic support for SMEs, to unlock new value from data.

Priority 9: Boost Digital Product Passports as a tool for the twin transition

There is a significant and largely untapped opportunity for digital technologies to advance sustainability goals and transform business models, so that data-driven sustainability becomes a competitive advantage for European businesses. The implementation of a Digital Product Passport (DPP) can significantly support the twin transition by providing transparent and accessible information, thus encouraging and incentivising businesses to adopt more sustainable practices and promoting a circular economy mindset. Several companies and industrial value chains have already shown their willingness to move

forward with Digital Product Passports, both in the pilot stage and in scaling up solutions. Currently, the biggest bottlenecks relate to the maturity of both hard and soft infrastructure, in particular the lack of interoperability between frameworks and standards.

What are Digital Product Passports?

The Digital Product Passport (DPP) is a transparency tool proposed by the European Commission as a way of sharing product information throughout the entire product lifecycle. In the Ecodesign for Sustainable Products Regulation (European Commission 2023h), the DPPs are examples of how to make it compulsory to share product data across the entire value chain to achieve the EU's sustainability goals. At the same time, this progress also helps to advance the data economy.

Policy recommendations

- The EU should work closely with the key stakeholders to prepare and rapidly adopt the first set of delegated acts under the proposed Ecodesign for Sustainable Products Regulation (European Commission 2022b), to introduce DPPs in priority products categories (European Commission 2023h).
- The EU should also use regulatory sandboxes for DPP testing and refining systems, and data solutions in a controlled environment, allowing companies to experiment with innovative approaches.
- The EU should ensure that an interoperability framework for the DPP system with standardised data formats is urgently implemented to ensure that data sharing within and across different DPP value chains and data spaces is possible from the outset.

Priority 10: Implement the European Health Data Space

Member states and European companies building solutions for the health sector need guidance and coordination for the Europe-wide implementation of the European Health Data Space (EHDS). Success in building the health data space would also encourage other sectors. At present, no two member states are alike when it comes to digital healthcare solutions, and solutions are not sold across borders throughout the EU, and even less globally. The current situation is therefore considered as sub-optimal compared to the medical device markets where solutions are sold globally and where European companies have been very successful (Sitra 2023j).

Policy recommendations

- The EU should focus on a harmonised implementation of the EHDS regulation and accelerate the single market for digital healthcare solutions with the Horizon Europe capacity and standardisation. In particular, investment in common data models such as the Open Electronic Health Record (OpenEHR) for the persistence of health data and the Observational Medical Outcomes Partnership (OMOP) for research purposes, would pave the way for common solutions that work seamlessly throughout the EU single market.
- The EU should harness the potential of AI training and use in the health sector. Citizens should be provided with technology-enabled public services that meet the requirements of the Artificial Intelligence Act without compromising European values.

Annex: Summary of themes, priorities and policy recommendations

Theme 1: Strengthen strategic thinking in critical technologies

Priority 1: Leverage investment and boost competitiveness in critical technologies

- The EU should aim to strengthen critical technologies through ambitious and coordinated programmes together with the member states, mobilising public and private investment and encouraging venture financing. Key areas of focus should include quantum technologies and high-performance computing (HPC), AI, advanced semiconductor technologies, 6G, and cyber-security, in preparation for the era of post-quantum cryptography.

Priority 2: Make the EU a leader in trustworthy generative AI

- The EU should raise its ambition and prioritise strategic autonomy in GenAI as an explicit policy goal for the Union. It is also crucial that the EU strengthens the availability of ‘in-house’ quality, such as products, services and training data that comply with relevant EU regulations, such as the Artificial Intelligence Act. In addition, the access to and skills in the use of high-performance computing to support the development of robust LLMs is crucial.
- The EU should ensure the availability of and access to open-source foundation models. For text-based GenAI, open-source LLMs should be available in all official EU languages.
- The EU should ensure the development of competitive and trustworthy LLMs, which are essential for building domain-specific applications on top of the foundation models. Adherence to the quality and compliance requirements of the AIA will ensure that the technology embedded in products is trustworthy.

Priority 3: Ensure EU leadership in the next generation of internet (Web 4.0)

- The EU should ensure that virtual worlds and virtual economies put people first and uphold European values by promoting the fair use of data, openness, interoperability, and transparent governance. This approach would avoid the creation of isolated, non-interoperable systems.
- The EU should ensure that there is a strong focus on copyright-protected content in virtual worlds.
- The EU should allow for decentralised autonomous organisations (DAOs) to register as legal entities within the EU on a voluntary basis. The DAO framework is a vital innovation for the governance of virtual worlds.
- The EU should broaden the scope of its current blockchain sandbox programme, European blockchain regulatory sandbox for Distributed Ledger Technologies), and expand it into a Web 4.0 sandbox, covering new emerging areas such as tokenisation, the intersection of AI and blockchain and virtual worlds. The sandbox should also permit real-world experimentation.

Theme 2: Promoting the digital single market through better implementation and enforcement of data regulation

Priority 4: Improve the governance model of the new data legislation, the coordination of the development of data spaces and their interoperability

- In the guidelines for Common European data spaces, the European Data Innovation Board (EDIB) should request data spaces to create a rulebook and include a common principles-based rulebook template that explicitly defines the general principles (ethics, human-centricity, fairness) that are shared by all Common European data spaces.

- The European Commission should support the creation of an open, transparent, and dynamic register of all roles and decision-making bodies involved in data sharing, called a rolebook. This framework should be implemented at the EU and the member state level. The rolebook would take the form of a registry hosted by the Data Spaces Support Centre (DSSC).
- The European Commission should ensure that national-level support for the data spaces is organised through local hubs and networked at the European level. In addition, the Commission should develop new funding models to support the growth-oriented orchestration of data spaces. Funding models should encourage the joining of data spaces as early as possible.
- The Commission should ensure that innovative regulatory technology (RegTech) solutions are included in the implementation of the current data and digital regulation. This will lead to a simplification of regulatory complexity and improve SMEs' access to digital regulatory tools. This also requires supporting the development of a European RegTech ecosystem.
- The European Union should address the low interoperability by prioritising the creation of technical standards for data. Interoperable infrastructures are also key to speed up the process of the configuration of the European data spaces.

Priority 5: Ensure people's rights in Web 4.0 virtual worlds and other emerging digital domains

- The EU should ensure that consumers' control over their own data, including the right to data portability, is safeguarded in the new virtual environments. Over time, the right to data portability should be extended to all digital data and environments.
- The European Commission should ensure the interoperability of the new data legislation with GDPR. Many companies participating in data spaces are reluctant to use personal data, due to concerns about privacy regulations. While GDPR includes

obligations for the EU Commission to periodically report on the evaluation and review of data protection regulations, the EU should extend the scope of this assessment to the new legal framework. Consistency and interoperability between the different laws in force within the EU is crucial for competitiveness.

- The EU should establish a standardised reputation framework to ensure consistency and interoperability between platforms. Reputation portability refers to the ability of a user's reputation, such as ratings, reviews, or 'trustworthiness', to be transferred or recognised across different online platforms and services. The EU should therefore develop a secure protocol for the transfer of reputation data that prioritises user privacy and data security, while at the same time mandating that citizens have control over their own data.
- Citizens' right to self-determination and control over their own data, as well as their economic rights and symmetrical position vis-à-vis data controllers, that determine the purposes and means of processing personal data should be included as part of the European Declaration on Digital Rights and Principles. These rights and principles provide guidance for the EU and individual member states as they adapt to the digital transformation.

Priority 6: Strengthen EU-level leadership in the data economy

- The EU should ensure that there is a reliable knowledge base on cross-border data exchange and mobility within single market. One example of a possible indicator for measuring the European data economy would be the extent and seamlessness of the flows of health data between member states, as the free movement of EU citizens is already a reality.
- The EU should ensure that EU-wide cooperation is facilitated to develop data economy indicators. This work could also be linked to the development of indicators for the Digital Decade programme ([European Commission 2023i](#)). These new key performance indicators (KPIs) should focus

not only on data flows, but also on the value added by data-driven applications and services. Adopting a more holistic approach (already being piloted in Finland), is crucial to moving beyond the more ‘ground-level’ technological indicators of data flows.

Theme 3: Strengthening labour productivity and human and environmental well-being through data

Priority 7: Support people’s AI and digital literacy

- The EU should ensure that it allocates time and resources to actors (such as national agencies for education, civic organisations, and fact-checking agencies) that support digital literacy, such as data and AI literacy.
- The EU needs to effectively tackle AI-generated disinformation by continuing to work together with social media platforms and other relevant service providers. More importantly, the EU should encourage the digital industry to create new technological innovations that support democratic values, such as Civic Tech. The EU should ensure that citizens have the right to participate in public deliberation, have access to relevant and accurate information, possess the capacity to critically assess the effects of new technologies and have the right to form their own opinions without coercion or manipulation.

Priority 8: Encourage SMEs to adopt data-driven business models

- The EU should strive to raise awareness of the opportunities offered by data-driven business. Awareness raising will help European SMEs to better understand and use data-driven practices and will increase their capacity to be data-driven.
- The EU should offer data-driven business improvement tools as a service to companies. SMEs in particular need easy and cost-effective ways to renew their business models and the skills needed to create new sustainable data-driven business. In addition,

seed funding should be introduced to create innovation ecosystems for new business models, including bold pilots and systematic support for SMEs, to unlock new value from data.

Priority 9: Boost Digital Product Passports as a tool for the twin transition

- The EU should work closely with the key stakeholders to prepare and rapidly adopt the first set of delegated acts under the proposed Ecodesign for Sustainable Products Regulation, to introduce DPPs in priority products categories.
- The EU should also use regulatory sandboxes for DPP testing and refining systems, and data solutions in a controlled environment, allowing companies to experiment with innovative approaches.
- The EU should ensure that an interoperability framework for the DPP system with standardised data formats is urgently implemented to ensure that data sharing within and across different DPP value chains and data spaces is possible from the outset.

Priority 10: Implement effectively the European Health Data Space

- The EU should focus on a harmonised implementation of the EHDS regulation and accelerate the single market for digital healthcare solutions with the Horizon Europe capacity and standardisation. In particular, investment in common data models such as the Open Electronic Health Record (OpenEHR) for the persistence of health data and the Observational Medical Outcomes Partnership (OMOP) for research purposes, would pave the way for common solutions that work seamlessly throughout the EU single market.
- The EU should harness the potential of AI training and use in the health sector. Citizens should be provided with technology-enabled public services that meet the requirements of the Artificial Intelligence Act without compromising European values.

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SITRA WORKING PAPER 23 January 2024

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ISBN 978-952-347-365-2 (PDF)
ISSN 2737-1042 (electronic publication)
www.sitra.fi

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Itämerenkatu 11–13
PO Box 160
FI-00181 Helsinki
Finland
Tel: +358 294 618 991
X @SitraFund