Value Chain Description

Important Project of Common European Interest on Artificial Intelligence (IPCEI-AI)

Please note this document reflects the current stage of deliberation among the participating member states and is subject to change and improvement. It is intended to be used in the national procedures such as calls for proposals or calls of expression of interest.

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Table

1. Political Rationale

1.1 Artificial intelligence as a key factor for economic growth and competitiveness

The European Union as a unique digital single market is challenged by rapid digital developments. The European Union faces double challenges: first, it needs to increase the adoption of key digital technologies in its economy to improve its competitiveness and second, and to do so in a way that strengthens its technological sovereignty and the resilience of its infrastructure and societies. The engine of the next industrial revolution will be artificial intelligence (AI, which is a major paradigm shift and the technological foundation for the development and use of digital solutions today and tomorrow. Europe's industry needs access to the latest software, AI models, high-quality data sets as well as high-end computing resources. Examples of innovative AI solutions include autonomous production lines, precision robotics powered by AI, and AI-assisted product design. Advanced applications such as digital twins and industrial metaverse platforms are also transforming industrial processes. In the telecommunications sector, AI enables the automation and optimization of network management, including predictive maintenance, traffic forecasting, and dynamic resource allocation. Likewise, services can expect similar benefits through AI adoption.

Therefore, European industries need equal access to sufficient computing and data resources for AI to reduce their dependence on non-European solutions and providers. The European industries must have the sovereign choice to increase resilience as well as security. This shall be achieved by combining new and existing European technologies through increased interoperability.

In this context, the European Commission has introduced the AI Continent Action Plan, which is a comprehensive strategy to position Europe as a global leader of AI. One key pillar of the plan is the investment in computing infrastructures, allowing innovators and researchers to train and fine-tune frontier AI models. This includes both, strengthening the network of AI-Factories and establishing AI-Gigafactories. Another key pillar is fostering the sectoral application of AI. Within this pillar, the forthcoming EU Apply AI Strategy aims to accelerate AI adoption and drive innovation while leveraging AI solutions "made in Europe". Complementary to this, the EU Cloud and AI Development Act aims to triple the EU's data center capacity within the next five to seven years.

Therefore, it is necessary to be supported by a comprehensive and integrated Important Project of Common European Interest (IPCEI). This IPCEI is driven by the Member States and ensures the integration of the different national requirements and bundling competences on a European level. Last year, within the Joint-European-Forum (JEF) 19 Member States discussed and identified possible key digital technologies feasible under the IPCEI-Communication of the EU Commission. A group of 13 Member States endorsed two digital IPCEI proposals (IPCEI-AI and IPCEI-CIC) in November 2024, addressing the following challenges.

Prerequisite of the IPCEI-AI is that all projects along the value chain as described below need to have the potential to contribute to the objectives of the IPCEI and to be committed to effectively collaborate cross-border with each other within and across the value chain steps, so to have the potential to make part of the IPCEI. The benefits of the IPCEI-AI projects must not be limited to the undertakings or to the sector concerned but must be of wider relevance and application to the economy or society in the European Union through positive spillover effects.

1.1.1 EU challenges for AI

Global developments in AI solutions are accelerating at fast pace, the sense of urgency is eminent: The European Union must foster an environment in which computing, interconnectivity, cloud, data, AI, and software providers can build and provide AI capacities and services to industries, academia, the public sector, and citizens. This should be achieved through a distributed computing and software

stack, from bare metal solutions to specialized AI services. In this context, the EU needs to address the following challenges:

(1) Low adoption rate of AI solutions:

The EU suffers from low adoption rates of AI technologies in industries due to high ramp-up costs and lack of "plug and play solutions". Additionally, there is a lack of certified trust in AI solutions. Today, most AI solutions are locked in proprietary ecosystems. This results in limited scalability of AI solutions and increased AI divides among Member States, and hence compromising the competitive advantages and productivity gains of AI[1].

(2) Limited availability of compute capacity and high-quality data sets to train AI:

The EU shall seek the opportunity to overcome the dependency on infrastructures and solutions mostly supplied by third-country providers, which bear the risk of lock-in effects. Access to computing capacities, together with the availability of high-quality data is the backbone of AI. Today, Europe lacks the sufficient infrastructure, tailored to the need for AI to address its future needs. At the current stage, 70 % of worldwide AI compute capacity is deployed in the United States while Europe accounts only for 4 %. Moreover, European industrial electricity costs are 1.5–3 times higher[2], limiting the competitiveness of European players in the field.

(3) High fragmentation and lack of state-of-the-art AI and cloud technologies in Europe:

While Europe possesses AI infrastructure capabilities through various national and regional providers, these resources remain fragmented and insufficiently coordinated to compete effectively with the integrated ecosystems of major global players. This fragmentation particularly affects the deployment of AI solutions requiring specialized infrastructure, such as real-time edge computing for autonomous systems or distributed processing for large-scale AI training. The challenge is not an absence of technical capabilities, but rather the lack of a cohesive, interoperable framework that can leverage Europe's existing strengths in computing, connectivity, and data services. Addressing this requires a federated approach, that integrates Europe's distributed capabilities into a more unified and scalable ecosystem, enhancing both competitiveness and strategic autonomy in AI development.

(4) Lack of interoperability of AI solutions:

The integration and interoperability of AI solutions deployed on different computing resources across different European regions and between cloud and edge fragmented infrastructures is necessary but complex and inefficient. Future AI solutions need to be integrated seamlessly to meet the high requirements in terms of e.g. latency, bandwidth, security, reliability, or energy efficiency. Interoperability is a prerequisite for future use cases, e.g. real-time data processing (autonomous trains/ trucks/ cars, smart factories, telecommunications, drones etc.) and is of highly strategic value for the EU.

(5) Insufficient readiness for future AI developments:

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[1] https://www.oecd.org/en/publications/a-blueprint-for-building-national-compute-capacity-for-artificial-intelligence_876367e3-en.html

[2] https://commission.europa.eu/document/download/ec1409c1-d4b4-4882-8bdd-3519f86bbb92_en?filename=The%20future%20of%20European%20competitiveness_%20In-depth%20analysis%20and%20recommendations_0.pdf & https://geopolitique.eu/en/2025/02/10/financing-infrastructure-for-a-competitive-european-ai/

Due to the current lack of European providers to meet the requirements of next generation AI solutions, there is a risk of not keeping pace with the rapid global AI development[3]. For certain future AI related use cases, Europe is lacking the capability to train and run AI solutions on locations where data is generated and stored. Therefore, a federated distributed ecosystem needs to be established. This ecosystem must be based on an intelligent orchestration of distributed computing and connectivity functions allowing for secure and confidential transfer and processing of mass data. This systemic approach is not limited to the infrastructure including storage, network, and compute capabilities but also considers software stacks and support services.

An important success factor in supporting the resilience of the EU is to achieve technological sovereignty by ensuring that AI foundation models and the necessary supporting services are offered by European providers. This implies developing a common infrastructural ecosystem for AI by making computing resources available and optimizing the hardware and software stacks.

Finally, the EU's objectives for digital transition as well as strategic sovereignty shall foster the deployment of AI capacities and capabilities. The aim is to strengthen the development of the sovereign digital value chain and its resilience from data center operators to AI service providers.

2. General Objectives

To comply with the IPCEI communication of the EU Commission, the two proposed IPCEIs (IPCEI-AI and IPCEI-CIC) as state aid instruments shall be designed in two distinct ways: the first focusing on R&D&I and the second focusing on deployment of infrastructure. The common objectives of the IPCEIs on research on Artificial Intelligence (IPCEI-AI) and the IPCEI on deploying a compute infrastructure continuum (IPCEI-CIC) is to boost Europe's competitiveness in the global digital economy by fostering innovation and investment. This shall be achieved by developing AI capabilities and facilitating the access of European companies of all sizes to AI technologies and services. EU stakeholders (whether AI users or developers) deserve a resilient and secure environment consisting of hardware as well as software capabilities. The IPCEIs will enable all Member States to follow up on their respective AI strategies and collectively equip the EU with a next-generation European AI ecosystem that meets the needs of European stakeholders. The IPCEIs shall allow better coordination across providers, companies, academia, and countries to avoid duplication of work and inefficiencies in AI research and development. The IPCEIs should be able to complement the developments by IPCEI-CIS as part of the 8ra-Initiative. They shall adhere to strict ethical guidelines and regulations, such as GDPR, DGA, Cybersecurity Act, and AI Act.

For the European Union, criteria to improve technological and digital sovereignty are of the essence. Therefore, the establishment of a European-wide ecosystem, which assures for users, consumers, and businesses to choose their competent service providers independently and to prevent vendor lock-ins for compute and data (incl. AI and cloud) services, is necessary. In this ecosystem, data shall be processed and transferred according to the users' preferences regarding the scope, duration, subject matter, conditions, and partners of the exchange. Also, data shall be processed and transferred under the latest security and resiliency standards and according to the applicable EU regulations.

The scope of the IPCEI-AI is the development of a next-generation AI ecosystem for the European Union providing latest AI training and development technologies. This requires secure access to high-quality data sets and ensuring the availability of state-of-the-art AI technologies, thereby significantly

[3] https://www.mckinsey.com/capabilities/quantumblack/our-insights/time-to-place-our-bets-europes-ai-opportunity

increasing the adoption rate of AI solutions in European industries by offering easy-to-use AI applications with low ramp-up effort. The project should focus on:

- Development of a first ever next generation AI continuum for the EU that includes:
    - Research and development of open and competitive AI foundation models: New foundational frontier models, next-generation AI model training technologies and methods, incl. innovative post-training techniques, such as fine-tuning for specific sector offerings.
    - Enablement of sovereign European cloud services and essential components for AI training and deployment (including resource management and computation distribution).
    - Development of new energy efficiency technologies to train and run AI models.
- Secure and safe access to high-quality data sets for AI:
    - Development of technologies for the availability and access to high-quality and structured data sets for AI under European data privacy and security regulations.
    - Integration of new solutions for data storage and management, database administration, data processing, and analytics.
- Development of advanced AI-as-a-Service (AIaaS) approaches tailored to the needs of AI developers and users, especially SMEs. This will enable the broad adoption of AI models to address specific use cases across various industrial sectors. This includes:
    - Development of advanced tools and frameworks to facilitate the development process and the deployment of AI models.
    - Creation of a framework enabling access to AI models and end-to-end capabilities through APIs.
    - Development and deployment of next generation inference and AI training services.
- Development of a common open-source framework to ensure security and high interoperability of European solutions. Substantial building block is an active developer community to create and maintain the code for an open-source toolbox to allow for easy creation of highly customisable AI solutions for industries.
- Systematic integration of next generation AI models into applications and interconnection services (e.g. telco network services), addressing common use cases within specific industrial sectors and public administrations.

An aspired effect of the IPCEI which goes beyond the R&D&I activities is the establishment of an "AI-Talent Factory": Developing schemes for training AI skills, which are the essential foundation for successful adoption. Skills are a crucial enabler for the adoption of AI. The range of skills required of workers varies from basic to highly specialized, encompassing technical, cognitive, and managerial competencies but also social skills. It is imperative that micro, small, and medium sized enterprises prioritize the enhancement of these skills, improve AI literacy in its many functions, and actively promote AI knowledge among their workforce and their representatives

3. Description of Value Chain Components

The purpose of the value chain description is to support the scoping of the IPCEI-AI and to be implemented by the participating Member States in the forthcoming competitive, transparent, and

non-discriminatory procedures for selection of the direct participants and associated partners for the IPCEI-AI and to define the scope of the eligible projects.

The structure of the value chain components features technologies, research, and development aspects in a logically combined order. The structure also represents a possible center of gravity for collaboration to build a highly integrated project on a European scale.

The developed results are complementary and must be integrated with each other to achieve a comprehensive approach to enable companies in the European Union to set up sovereign AI services. Prerequisite to achieve this objective is the development of a common technical framework for the design and training of sovereign foundation models. This integrated and common, cross-sectoral approach will allow for the feedback from company- to industry specific models into general models. This will not only substantially improve the quality of models and reasoning but will also accelerate the AI development in general.

In addition, the value chain includes research and development for the “enabling services” that allow to perform the hereafter listed tasks (e.g. cloud services).

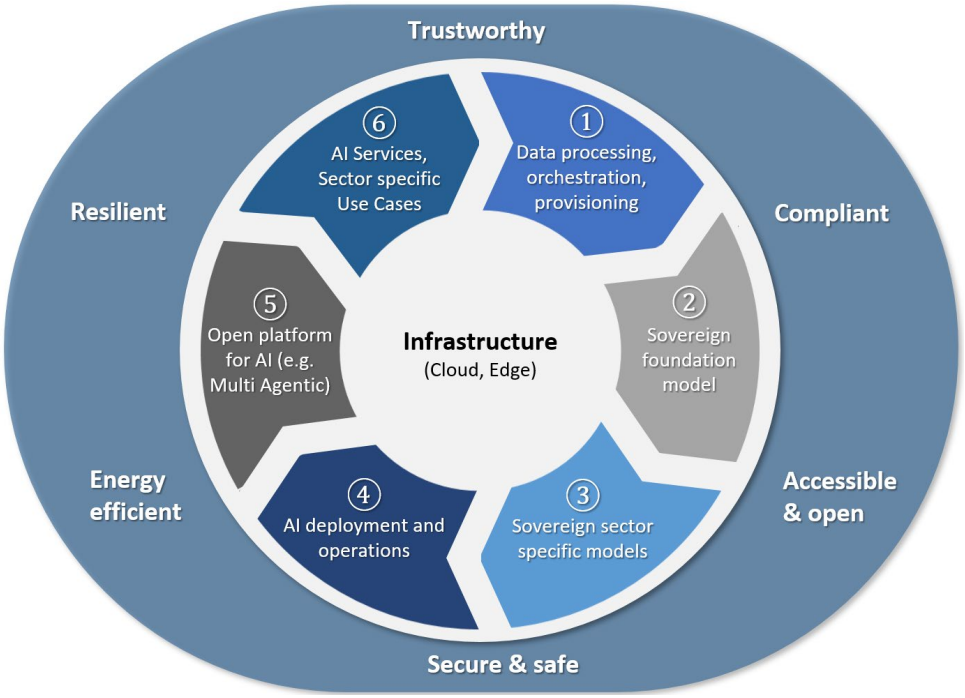

Figure 1: Overview of the value chain components and transversals

3.1 Data processing, orchestration, provisioning

Data processing services are a set of foundational system components that manage, process, and deliver data for AI models. They handle data collection, transfer, storage, labelling, transformation, and access to ensure high-quality, scalable input for training and inference. These services can be used on-prem or through cloud services. Key capabilities of this component are the comprise of data orchestration and provisioning, vectoring of databases, and knowledge graphs. It covers the management of structured and unstructured data, data cleansing, curating, provisioning, data accessibility, and connectivity, etc.

Therefore, the development of solutions for data processing, orchestration, and provisioning are critical for leveraging the full potential of AI, because data is the foundation of any AI system. Without

the right solutions to manage and manipulate data effectively, even the most advanced models will underperform or fail entirely.

3.2 Sovereign foundation model (LLM/LRM)

Large language models are advanced machine learning models with billions of parameters, designed to perform complex tasks like language understanding, image generation, and problem-solving across multiple domains. Examples include GPT, PaLM, and LLaMA.

- A Large Language Model (LLM) is an AI model that is trained on vast amounts of text data to understand, generate, and manipulate human language. Examples include GPT-4, BERT, and Claude.
- A Large Reasoning Model (LRM) is a type of AI model designed to perform complex reasoning tasks—going beyond basic language understanding or pattern matching to draw logical inferences, solve multi-step problems or reason through abstract concepts.

Therefore, the development of sovereign foundation models (LLMs/LRMs) as defined above, is a strategic necessity for beyond-state-of-the-art offerings. Main benefits are:

- Ability to develop, manufacture, and utilize technology independently, including having control over the underlying infrastructure and software.
- Independence from third country technology providers.
- Building on tech providers adhering to IPCEI objectives.
- Ability to customize models to local laws, values, and priorities.
- Reduced risk of geopolitical disruption or sanctions affecting AI capabilities.

3.3 Sovereign industry sector specific foundation model (SFM)

Industry specific foundation models (SFM) can contribute to the decisive key differentiation of benefits for the industry. While LLMs are developing as a commodity, the added value in this area is considered very high. In connection with technologies such as knowledge graphs, models can be developed that produce very high accuracy results. Due to barriers to cooperation, cross-industry developments are difficult and require structured communication and coordination, which can be provided by an IPCEI. Because this data is highly sensitive for companies, a high level of security must be guaranteed.

Industry and sector specific AI models are pre-trained, non-language foundation models based on structured business and machine data. These models are tailored for specific industry sectors, like healthcare, finance, or manufacturing, and are optimized to handle sector-specific data, tasks, and regulations. These models need a wide range of common open-source services and tools to be developed (from compute to model conception and training), that allow IPCEI partners and European companies to access the foundation models at full potential (used on-prem or through cloud services).

Europe needs to leverage AI to maintain its industrial leadership. Europe has strong industrial sectors like automotive, aerospace, pharmaceuticals, machinery, and many more. AI tailored to these domains can:

- Boost productivity and engineering capability
- Improve quality
- Enable new business models

Build the core of a European AI ecosystem (composed of domain-specific models made in the EU.3.4 AI deployment and operations

Deployment and operations (often referred to as AI Ops) involve the end-to-end process of bringing AI models into production and managing them effectively throughout their lifecycle (including maintaining, monitoring, and updating), and can be fulfilled by different means (e.g. cloud services). On the other hand, inference is the execution of that model to generate predictions or outputs from new input data.

Solutions for AI deployment and operations are essential for transforming AI solutions from experimental prototypes into reliable, scalable, and impactful business solutions and indispensable for various reasons, e.g.:

- Ensuring that models are adopted and used in live products and systems.
- Enabling continuous learning and updates to adapt to new data and conditions.
- Supporting automated retraining, evaluation, and redeployment.

3.5 Open platform for AI

An open platform for AI refers to a software or infrastructure ecosystem that is designed to be accessible, extensible, and usually based on open-source software code. This allows developers, researchers, and organizations to build, deploy, experiment with, and share AI models and tools either using on-prem infrastructures or through cloud services. As part of an open platform AI orchestration will be relevant for integrating, managing, and automating workflows, tools, models, and infrastructures required to build, train, deploy, and monitor AI solutions at scale. It also comprises AI containers. As an area of major innovation potential AI agent systems will play an important role as autonomous software entities that perceive the environment, make decisions, and perform actions to achieve specific goals, often using machine learning, reasoning, or optimization techniques.

Open platforms for AI – especially those enabling multi-agentic systems – are increasingly important because they provide the flexibility, collaboration, and composability needed to scale, innovate, and govern AI ecosystems, e.g. to enable agents to interact, share tasks, and build on each other. They allow to combine best-in-class tools, models, or agents without vendor lock-in and encourage rapid innovation by allowing plug-and-play of AI components.

3.6 AI Services and sector specific use cases

AI services and applications are systems that are built upon foundation models and use AI techniques, such as machine learning, natural language processing, or computer vision, to perform tasks that typically require human intelligence. AI applications analyses data, learn from it, and make decisions or predictions with minimal human intervention. AI applications will deliver value to many industrial and service areas, such as agri-food, energy, automotive, the public sector, manufacturing, health, telecom (management and optimization of networks), services, learning/training, consulting, mobility, tourism and travel, finance, operations (monitoring, anomaly detection and management, etc.). AI application platforms provide further tools and solutions, for Application Orchestration, Monitoring, Billing, etc., that are often offered as cloud services.

3.7 Transversal descriptions

Transversals are fundamental elements necessary to operate the value chain components. Transversals need to foster:

Compliance: Compliance related capabilities and initiatives related to IPCEI-AI will ensure that AI solutions adhere to legal, ethical, and regulatory standards, including data privacy, fairness, transparency, and accountability.

Trust and resilience: Trustworthiness related capabilities and initiatives in IPCEI-AI will provide the ability for AI systems to be reliable, transparent, and fair, ensuring it makes decisions that can be understood, justified, and are aligned with ethical standards. Trustworthy AI is a necessary requirement for accepted use. Resilience measures will aim to maintain the performance of AI systems, recover systems from disruptions, and adapt to changing conditions or adversarial threats. The objective is to achieve high resilience throughout the whole AI stack, even if requiring redundancies.

Security and safety: Security in AI refers to protecting AI systems from threats such as data breaches, adversarial attacks, and unauthorized access, ensuring the integrity, confidentiality, and availability of the AI model and its data. Safety in AI refers to the design, development, and deployment of AI systems in a way that ensures they operate reliably, predictably, and without causing harm to people, property, or society.

Energy efficiency: Sustainability in AI refers to designing and operating AI systems in ways that minimize environmental impact, optimize energy and resource use, and support long-term social and economic well-being.

Accessibility and openness (open-source: For IPCEI-AI the adoption of open-source models will be highly relevant:

- to improve sovereignty by reducing reliance on a few dominant players.
- to increase transparency through, where appropriate, open access to model weights and training data.
- to enable reproducibility, crucial for scientific and ethical accountability.
- to empower researchers and developers (also in resource-constrained environments, e.g. SMEs) to create competitive AI applications.

4. Research and development and Innovation (R&D&I) Activities

R&D&I is essential to achieve the aforementioned objectives of the IPCEI-AI. The following chapters describe currently identified R&D&I challenges, which will have to be solved in order to achieve the objectives of a highly integrated project on a European scale. These R&D&I challenges represent the “centers of gravity” during the development and implementation phase. Those “centers of gravity” are complementary build on each other and are all necessary to achieve the common project goal. Those challenges are by no means exhaustive and can be expanded according to actual project proposals. The R&D&I activities in the IPCEI-AI and the projects of the direct participants must be of major innovative nature or constitute an important added value in terms of R&D&I in the light of the-state-of the-art in the sector concerned, i.e. must demonstrate their progress beyond the global-state-of-the-art.

4.1 Data processing, orchestration, provisioning

The objective is to develop a framework for processing of high-quality, harmonized, industry-specific data including encryption, anonymization, access control, and generation of synthetic data in a highly secure manner. This enables confidential sharing of data, distributed AI data processing, such as federated learning and secure multiparty computation, and data collection for general and industry specific benchmarks.

The priority should be on highly automated methods for data curation based on common syntax and semantics to support high-level interoperability, open modular data architecture, and processing pipelines, e.g. automated generation of knowledge graphs. Therefore, methods for leveraging cross-industry equivalences in data and specific foundation models should be developed by enabling processing of multi-modal and cross-sectorial data sources by leveraging data spaces. This will lead to fair accessibility and usability of data in the specific industrial sectors.

4.2 Sovereign foundation model (LLM/LRM)

The objective is to develop common sovereign (large) foundation (LLM) and reasoning models (LRM) as base models, including reinforcement and imitation learning, advanced reasoning and automated verifiers, including technologies to create ensembles of LLMs and LRMs. Prerequisite is research on concepts for data provenance, model alignment, safety, introspection, and explainability of model behavior.

The challenge is the development of methods for feature engineering, training, administration, inference, performance tracking and optimization. Hereby the focus should be on automation frameworks of training processes and life cycle; e.g. feedback loops including human interaction to improve models and the development of evaluation frameworks for assessing model performance, fairness, robustness, and alignment with European values and regulations.

4.3 Sovereign industry sector specific foundation model (SFM)

Key innovation and challenge are the development of common sector specific foundation models that are adaptable for multiple domains and industry-grade security and safety. These models shall be based also on non-language data (tabular, csv, data bases, machine data, time-series, and signal data)e.g. physics-enhanced AI models. Therefore, a common semantic layer to connect the factory with the business data should be defined. This can be achieved by adapting standards to improve interoperability, e.g. for open benchmarks and shared data sets. This way the costs of fine-tuning to adapt foundation models to company data can be lowered.

4.4 AI deployment and operations

The development of an open framework, which provides developers with a base deployment functionality, such as optimization of inference and model ensembles is a challenge. This includes orchestration tools that abstract infrastructure complexity (using a reference architecture) enabling automatic orchestration, lifecycle management as well as adaptation and configuration of foundation models across Use-Cases. Additional tools and solutions for application orchestration, monitoring, billing, and product lifecycle management including continuous updates, security maintenance, and compliance with international standards should be provided, e.g. for reliable deployment of AI models into production lines, especially across hybrid or resource-constrained environments.

It is a prerequisite to develop continuous evaluation and monitoring systems that track model performance, drift, potential biases, and compliance in production environments including availability, SLAs, etc. In addition, this framework should define major efficiency improvements such as:

- optimized coding for less resource demand
- component costs and CO_2 footprint monitoring
- reporting and optimization capabilities for AI models and applications

4.5 Open platform for AI

The objective is to develop an open ecosystem for AI models, applications and components, and tools, e.g. developed in step four of the value chain, to enable easy reuse and integration in a "marketplace" fashion. To achieve this an implementation of a (multi-model) agentic systems framework including explicit knowledge modelling for experts based on a reference architecture/platform for multi-agent collaboration is necessary. This could be leveraged with existing capabilities for AI and evolution of existing software, e.g. evolvement of protocols, such as MCP, A2A and Haystack. Additionally, new concepts for predictable behavior and failure modes, particularly in mission-critical domains need to be developed. This open platform should be deployed with an open-source sharing mindset to support the distribution of sovereign AI services across EU Member States.

4.6. AI services and sector specific use cases

To accelerate the development from prototype to product readiness including demonstrators, it is necessary to successfully deploy and scale-up AI services in production environments. This will serve as reference implementations for end-to-end integration of foundation models into a wide range of scenarios and showcase best practices for globally accepted industry formats.

The focus is on developing AI industrial applications and frameworks in various sectors., e.g. automotive, aviation, aerospace, the public sector, manufacturing, health services, learning/training, consulting, mobility, agriculture, tourism & travel, finance, operations, engineering. To compare these AI solutions across vendors, standardized evaluation protocols are necessary to ensure compliance with industry-specific quality requirements. These solutions should be integrated in a repository of available AI services and be integrated in a fair system to recompense various contributions, especially for SMEs.

5. First Industrial Deployment (FID) Activities

The IPCEI as a state aid instrument (and the projects of direct participants that form part of it) may also include first industrial deployment (FID) activities forming part of the projects in all steps of the value chain. The FID activities involve the upscaling of pilot facilities, demonstration plants, or first-in-kind equipment and facilities covering the steps subsequent to the pilot line, including the testing phase and the bringing of batch production to scale. They need to comply with the conditions of points 23 and 24 of the IPCEI communication. The following is important:

- The FID must allow for the development of a new product or service with **high research and innovation content** or the deployment of a fundamentally innovative production process. Regular upgrades without an innovative dimension of existing facilities, products, or services and the development of newer versions of existing products (or services) do not qualify as FID.
- The FID must **follow on** (i.e. result from) from **a previous R&D&I activity** (that is also described in the projects) and itself must contain an important R&D&I component which constitutes an integral and necessary element for the successful implementation of the project.
- The FID however must **not encompass mass production** and commercial activities. The end of FID is determined by reaching the relevant R&D&I-related performance indicators, as set in advance, that point at the ability to start mass production.

Example:

Inspired by IPCEI-CIS and where applicable to the scope of the projects in IPCEI-AI, additional important R&D will be carried out through the FID activities. This R&D is an integral part of completing the project, and it is necessary to test, scale up, mature, or validate outcomes in real-world scenarios and conditions to meet the requirements for mass production and commercial activities. These include e.g., the ability to operate at scale and efficiency, achievement of the required quality of output, testing and adaptation of the performance of products and services on the basis of the technological feedback obtained from downstream industries and use cases executions, requiring the solutions to be further developed and adjusted). In FID activities, the outcomes of the R&D&I phase of the projects have to be integrated into the FID activities; the FID activities should pose specific implementation challenges, for which innovativeness ambition has to be demonstrated that significantly surpasses the global state-of-the-art in the applicable technologies and their adoption; the FID activities have to have the potential to validate and demonstrate in real-world scenarios and in environments of sufficient technological complexity and scale, the applicability of R&D&I results at the required level of quality and efficiency.

6. Related Initiatives

Initiatives related to the IPCEI-AI objectives should be taken into consideration and linked to improve the efficiency of R&D&I processes. Related initiatives are, e.g.:

- Manufacturing-X
- IPCEI-CIS (8ra-initiative)
- IPCEI-ME/CT
- Deploy AI (AI on demand platform)
- Open EuroLLM
- Catena-X
- EONA-X

7. Roadmap

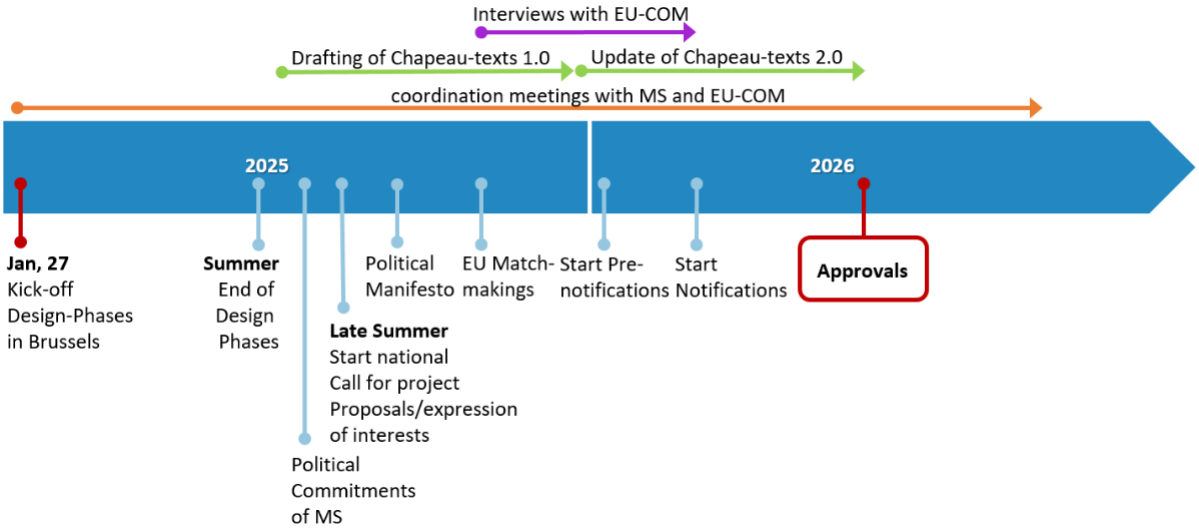

Figure 2: Illustrative roadmap with important milestones of IPCEI-AI; final date for approval depends on further processes