Amsterdam: AI Technology for People

AI is changing the world – rapidly and in many ways. Amsterdam focuses on developing and deploying responsible AI technologies to optimally serve people working in three areas: health, business innovation and citizen support. With people being central to our approach, we believe it's of utmost importance to develop these technologies in an accountable manner. In short, the Amsterdam approach drives **AI Technology for People**. The key to continuing this purpose-driven development is to attract, develop and retain talent.

Amsterdam has the largest science and innovation ecosystem in the Netherlands. Over 100,000 students attend local knowledge institutions, which have roughly 10,000 employees and 5,000 PhD students. With a long tradition of public-private partnerships, the region has many long-standing collaborations between academia and the private sector. In the field of artificial intelligence, the Amsterdam region builds on three decades of research, education and innovation. To further boost AI developments in the Amsterdam region, joint knowledge institutes have committed themselves to ambitious targets for the next ten years:

- At least 1 billion euros in financial resources committed to AI
- At least 800 people working in AI education, research and innovation
- At least 5,000 students trained in AI technology at the BSc, MSc and PhD levels
- At least 10,000 students following an AI minor
- At least 100 SMEs impacted through collaborative spin-off projects
- At least 100 AI startups

We identified **three key intertwined technologies**, on which we are academic leaders in the Netherlands, that will drive future AI developments, and are expected to have a positive societal and business impact:

1. **Machine learning** has been a main driver in the emergence of AI – and will continue pushing it forward. Relevant techniques include data-driven deep learning methods for computer vision, text analysis and search approaches that make large datasets accessible. Other related activities include the analysis of complex organisational processes, and knowledge representation and reasoning techniques to work with symbolic information.
2. **Responsible AI** is key to assuring that technology is fair, accountable and transparent. Methods should prevent bias and all outcomes should be explainable through the identification of comprehensible parameters that decisions are based on. When high-impact decisions are involved, the reasoning behind them must be understandable to allow for ethical considerations and professional judgements.
3. **Hybrid intelligence** combines the best of two worlds. It builds on the superiority of AI technology in many pattern recognition and machine learning tasks and combines it with the strengths of humans to deploy general knowledge, common sense reasoning and human capabilities such as collaboration, adaptivity, responsibility and explainability. Therefore, we combine human and machine intelligence to expand on human intellect instead of replacing it.

Within AI, we observe that the classic juxtaposition of fundamental research vs applied research is fading. While there is ample opportunity for fundamental research across these three key technologies, we see that practical application strengthens the learning processes. In AI Technology for People, we concentrate on **three application domains**:

AI for business innovation: Excellence in research has already inspired several international partners to start research labs in Amsterdam within ICAI. Other companies, both regional and international, continue to follow suit. As Amsterdam hosts the headquarters of major companies that rely on AI to innovate, many small- and medium-sized high-tech AI businesses and a strong creative industry, the city is in an ideal position to push forward business innovations both small and large.

AI for citizens: With its multitude of cultures, large numbers of tourists, rich history, criminal element and intense housing market, Amsterdam has all the challenges and opportunities of other major world cities, but in a far smaller area. With the excellent availability of open data in the city, AI can be directly applied to improve the wellbeing of citizens – with the city itself becoming a living lab.

AI for health: Here, we are building on the work of renowned medical research organisations such as Amsterdam UMC, NKI, Sanquin and the Netherlands Institute for Neuroscience. The cross-sectoral health-AI collaboration has also been institutionalised in other ways, such as through ecosystem mapping and Amsterdam Medical Data Science meet-ups, with all initiatives being bundled under Smart Health Amsterdam.

Some factors that help foster further development include:

- **Infrastructure**: The city boasts great infrastructure for enabling AI innovation. This includes technical infrastructure (e.g. high performance computing and Internet capabilities at SURFsara and Amsterdam Internet Exchange, access to European computing nodes), institutional infrastructure (e.g. CWI, eSciencecenter, UvA, VU and HvA), and network infrastructure (e.g. AmsterdamDataScience and Amsterdam Medical Data Science).
- **Value creation support**: The city's two universities have strong academic expertise regarding the judicial, ethical and social aspects of AI, and active networks and institutions to guide innovation and facilitate societal value creation. We have a range of related services and offerings, including academic technology assessments, platforms such as TADA – open about data, the development of new and improved regulations, and arenas that support public-private experimentation, such as Amsterdam Smart City.
- **Public-private partnerships**: There is an ever-increasing number of long-lasting, high-impact collaborations between academia and different organisations, with many of them involving the Innovation Centre for Artificial Intelligence. Examples include providing support for police investigations, the AIM lab for medical imaging, AI for Retail (AIR) with Ahold-Delhaize, labs with Bosch and Qualcomm focused on computer vision and machine learning, Elsevier's innovations in publishing and TomTom's creation of high-quality maps.
- **National and international collaboration**: Amsterdam is home to the NWO's 'Zwaartekracht' programme on hybrid intelligence (HI), a large, nationally-funded academic research project. Amsterdam is also home to the international network TNW (which reaches over 10 million techies worldwide) and World Summit AI. The region has an ELLIS (European Laboratory for Learning and Intelligent Systems) unit and participates in CLAIRE (Confederation of Laboratories for Artificial Intelligence Research in Europe).
- **Business**: Amsterdam has a vibrant startup and scale-up scene, with academic incubators such as ACE, and CWI Inc, as well as private ones such as TQ, all backed by a healthy investor climate. It has a thriving private sector of companies reliant on data and AI, including Booking.com, Adyen and Tiqets (the latter two were founded in Amsterdam) as well as a data-intensive and agile financial sector that includes ING and ABN AMRO, in addition to multinational companies such as Philips, IBM and Databricks.

To top it off, Amsterdam is also a great place to work and live and has an excellent quality of life, highly-connected infrastructure and a diverse, globally-minded population. Amsterdam consistently ranks amongst leading cities in terms of innovation, tech savviness, English language skills, friendliness, entrepreneurial spirit, equality and inclusiveness, and is often named as one of the best places to live.

Our past investments and successes have created a great AI ecosystem, but in this highly competitive world, we must continually foster it and assure we educate and attract top talent and remain in control of the development of advanced technology while adhering to our national and European values. This is why we are asking you to join us and develop solutions that will drive your success and empower people. Come and connect with the age-old Amsterdam tradition of public-private collaborations and work with the brightest minds on meaningful innovation. Bring your ideas, talent and resources, and become part of Amsterdam's **AI Technology for People**.