



AI and Machine Learning in Intellectual Property

Maximal Challenges, Opportunities, and the Evolving Role of IP Professionals

Dear Reader

Artificial intelligence (AI) and machine learning (ML) are profoundly impacting various industries, including intellectual property (IP). This white paper summarizes key insights from interviews with experts in the field, covering the unique aspects of patenting AI/ML inventions, the integration of AI into IP management processes, the evolution of AI-assisted patent drafting, and the resulting transformation of the IP professional's role.



About the author

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Maximal Challenges, Opportunities, and the Evolving Role of IP Professionals

The Impact of AI and Machine Learning on Patenting and IP Management: Challenges, Opportunities, and the Evolving Role of Professionals

Artificial Intelligence (AI) and Machine Learning (ML) are no longer just buzzwords in tech – they are actively reshaping patent law practice and IP management. Patent attorneys and IP professionals are encountering unprecedented challenges, from drafting and prosecuting AI-related inventions to maintaining confidentiality in AI-assisted workflows. At the same time, these technologies offer powerful opportunities to enhance efficiency in prior-art searches, portfolio analytics, and decision-making strategy. This whitepaper synthesizes key insights from leading experts on how AI/ML is influencing patenting processes and IP management and examines what these developments mean for the future of IP practice.

Patenting AI and Machine Learning Inventions: Navigating Complexity

Drafting patent claims for AI and machine learning inventions involves unique challenges compared to traditional software patents. AI-related inventions often require claims covering data pre-processing, model training, and the inference phase, including the technical applications and effects of these processes. Since AI and ML can be very abstract, it is crucial to properly elaborate on the main technical applications, a task typically handled by a patent attorney.

Sufficiency of Disclosure is a key requirement, especially given the rapid advancements in these fields. Due to the intricate internal workings of AI systems, often described as „black boxes,“ it can be practically impossible to describe all internal details in a patent application. To avoid objections, it is recommended to disclose the structure of the model used (e.g., number of neurons and layers in a neural network and their interconnections), along with at least some training data samples and a suitable training method. This information should enable a skilled person to rebuild the described AI system. While disclosure of training data itself is not generally required, aspects important for putting the invention into effect or achieving a technical effect must be disclosed, as with any other technology.

When arguing for the patentability of AI inventions, it is crucial to demonstrate a **technical contribution** beyond mere mathematical or abstract concepts. This can be achieved by showing that the AI system solves a technical problem in a novel and non-obvious manner. Examples include AI systems that efficiently control manufacturing processes or optimize energy consumption in a smart grid. The plausibility of an alleged technical effect can be supported by test or measurement results. If results are unavailable, explaining how the system’s inputs and outputs correlate can provide clarity on how the intended purpose is achieved.

Global Perspectives on Patentability vary considerably among patent offices. The European Patent Office (EPO) emphasizes the technical aspects and applies established standards for computer-implemented inventions to AI, with specific guidelines in section G-II, 3.3.1. The EPO’s approach assesses patentability primarily under inventive step using the

problem and solution approach, considering only technical contributions. The USPTO tends to focus more on practical applications, while China has a technicality requirement interpreted differently from Europe. In contrast, the UKIPO's approach differs by assessing inventiveness at an earlier stage, focusing on whether the subject matter lies solely in excluded areas like software or mathematical methods. In practice, the UKIPO might be less likely to consider an invention technical in edge cases compared to the EPO, though outcomes are fact-specific. Applicants must be aware of these differences and adapt their applications accordingly, especially for first filings.

Recent legal developments, such as the EPO's G1/19 decision, the G1/24 referral (not yet decided), and the US Alice framework, significantly impact the drafting of AI applications. These highlight the importance of demonstrating **a clear technical contribution** and avoiding overly broad or abstract claims. Future strategies should emphasize providing practical applications and concrete technical improvements. In the UK, the 'Emotional Perception AI' case sparked significant debate over whether neural networks are inherently 'technical.' The Court of Appeal reversed an initial ruling that they were, and the matter is now before the UK Supreme Court – a decision that could align the UK's approach more closely with the EPO's. At the EPO, case law development has been more measured, clarifying disclosure requirements for sufficiency and demonstrating technical effects across the claim scope.

The collaborative nature of AI development impacts the **determination of ownership**. AI projects often involve diverse stakeholders like data providers, algorithm developers, and researchers, raising questions about data ownership and its link to system or IP ownership. To avoid disputes, all parties should contractually agree, before a joint project begins, on who owns each part of the invention and the corresponding rights of use.

Divided infringement is another challenge, occurring when multiple parties collectively perform all steps of a patented method, but no single party performs every step. This is particularly relevant when claims cover steps performed by different entities, like the manufacturer who trains the AI system and the customer who uses it. To mitigate this, claims should be formulated for each set of steps performed by a different party.

Strategic opportunities arise from AI's growing importance, which in turn makes patents in this area highly valuable. Companies should adopt a cost-benefit approach to their filing strategy, considering case law requirements in target countries. This involves deciding which invention disclosures are worth filing and which need further refinement to enhance quality and enforceability. Spending money on drafting applications with a low chance of validity should be avoided. It is also recommended to direct claims to concrete use cases to support arguments for solving a technical problem. Including multiple example use cases in the application allows for filing divisional applications directed to different uses.

Interdisciplinary collaboration is vital for patenting computer-implemented inventions (CII) technologies. Teams with diverse technical backgrounds (mechanical engineering, physics, electrical engineering, chemistry, etc.) working with IP professionals can gain a full understanding of the invention, leading to more robust claims. This ensures all technical and legal aspects are addressed. Collaboration across IP professionals, data scientists, engineers, and business leaders is also crucial for successful AI implementation in IP management.

AI in IP Management and Patent Drafting: Enhancing Efficiency and Strategy

The integration of AI in IP management is driven by a twofold motivation: increasing efficiency and elevating the strategic quality of work. AI is seen as an enabler for more informed decision-making, not just an automation tool. Strategic goals include more effectively supporting business units, accelerating innovation cycles, improving invention disclosures, and enabling precise patent analytics. AI allows systematic monitoring of technological trends and identification of „white spots“ in the IP landscape. It can also help shorten the time from idea to patent filing by supporting structured interviews and invention disclosure formulation.

AI has fundamentally enhanced the way companies observe and navigate the global IP landscape. Internally, it enables more proactive and systematic work through data-driven insights, such as analysing large patent databases faster and more accurately to identify prior art, technology trends, and innovation clusters. Externally, AI tools strengthen the monitoring of competitor activities, tracking new filings, emerging patenting areas, and potential infringements using technologies like image recognition or automated text analysis.

AI is reshaping the role of **IP professionals**. As AI handles repetitive or data-heavy tasks, professionals can focus on high-value activities: identifying innovation potential, advising on strategic positioning, and engaging with inventors and business leaders. This shift necessitates new skill sets, including data literacy, digital tools, and interdisciplinary thinking. The future IP professional will be part strategist, part analyst, and part communicator, with AI as a partner.

Specific AI-driven use cases in IP management include:

- **Prior art analysis:** Scanning literature to identify relevant prior art faster and more accurately, reducing manual workload.
- **Patent monitoring and competitive intelligence:** Tracking new filings and detection of emerging trends or infringement risks in real time.
- **Portfolio optimization:** Clustering patents, detecting overlaps or gaps, and simulating developments for data-driven decisions on investments and alignment with strategy.
- **Invention support:** Assisting creativity techniques, facilitating structured inventor interviews, and improving invention disclosure forms.

In AI tools have evolved significantly. Starting from rudimentary tools, transformer technology (2019) and Large Language Models (LLMs) brought revolutions in text generation. The release of ChatGPT (late 2022) made advanced capabilities widely accessible. Today's tools automate various aspects, generating figure descriptions, supporting claims with benefits and effects, retrieving background information, translating, and creating software flowcharts. This reduces time for tasks from hours or days to minutes and ensures consistency. Future tools aim to streamline complex tasks like EPO intermediate generalizations or adapting US applications for UPC proceedings.

A widely cited concept is that „**AI will not replace attorneys, but attorneys with AI will replace attorneys without AI**“. The synergy between human expertise and machine efficiency is central. While AI automates tasks, it does not replace human judgment. The quality of AI output depends heavily on human input. Patent professionals are needed to capture and refine invention details and interpret prior art beyond literal matches. AI lacks the ability to make wise decisions. Instead, AI serves as a powerful augmentation tool, increasing efficiency and accuracy. Integrating generative AI allows attorneys to focus more on strategic tasks like optimizing claim scope or preparing litigation-ready patents, gaining a competitive advantage. Corporate IP professionals benefit from faster invention harvesting, searches, and analyses, accelerating the innovation cycle.

Regarding the **democratization of AI-assisted patent drafting**, aspects include ease of use, affordability, education, and open access. Some tools provide a rigid structure that can help inexperienced professionals draft basic applications faster. ChatGPT is widely used, powerful, and relatively inexpensive (\$25 per user and month for the Team plan), offering a secure environment with data exclusion from training. Its main drawback is the need for users to master prompt writing. Commercial tools can be expensive, limiting access. There is a gap in readily available educational materials due to the field's rapid development. While concerns exist that only large firms can afford high-end tools, experts believe financial power is not the sole determinant; smaller firms might even adapt faster. Success depends on strong leadership, empowered innovators, a supportive culture, and strategic alignment.

Addressing Security and Confidentiality Concerns

Security and confidentiality are paramount when using generative AI for patent drafting due to the sensitive nature of patent data. Common fears include data theft, leakage, creating unwanted prior art, and compromising client confidentiality. Client confidentiality is particularly critical for patent attorneys due to strict legal regulations. The risk of novelty-damaging prepublication arises if information is exposed via inadequately secured systems. Less common fears include losing control over the drafting process or concerns about bias and errors.

Mitigation strategies involve a multi-pronged approach:

- **Prioritize secure vendors:** Choose vendors with strong security measures like end-to-end encryption, access controls, and clear contractual confidentiality guarantees. Reputable vendors adhere to industry standards and privacy laws.
- **Consider on-premises solutions:** For highly sensitive data, solutions running entirely within the company's infrastructure minimize exposure to external threats.
- **Use robust contractual agreements:** NDAs and privacy clauses should explicitly prohibit providers from storing, sharing, or using user input data beyond immediate processing. These provide a defense in case of data theft.
- **Avoid free or public tools:** These often lack adequate security protocols and may reuse data for training.
- **Embrace human review:** AI-generated drafts should always be treated as suggestions and rigorously reviewed, adapted, and refined by experienced professionals to ensure accuracy and reflect necessary judgment. Ensure input is well-structured and specific to guide the AI.

The key advantage of **locally-run generative AI** is enhanced confidentiality. Data processing occurs entirely on local hardware, never leaving the premises, which is crucial for confidential patent drafts and analyses. This makes using GenAI for sensitive work much more „carefree“. Even technologically advanced cloud models can potentially be used locally. Local models can also offer better cost-efficiency and full control for customization. Best use cases for local models include processing information already available as context (like invention disclosures) and querying documents. For tasks requiring extensive external knowledge, larger cloud models may be needed, ideally for non-secret information or combined with local models using special techniques.

Regulatory Landscape and Guidelines

The global legal landscape is adapting to AI challenges. The European Patent Institute (EPI) has adopted Guidelines for the Use of Generative AI, providing a clear framework for European patent attorneys. The overarching principle requires maintaining high integrity standards, ensuring confidentiality, and prioritizing client interests.

The twelve EPI Guidelines cover aspects such as:

- Understanding AI models, their confidentiality, and hallucination potential.
- Ensuring confidentiality of training data, prompts, and shared content; not using models if confidentiality is uncertain.
- Understanding non-confidential disclosure risks.
- Remaining fully responsible for professional work; AI cannot excuse errors.
- Reviewing AI-generated work to ensure it meets human standards.
- Determining client preferences regarding GenAI use.
- Publicly stating AI tool use if accurate and appropriate.
- No mandatory disclosure of GenAI use to the EPO/UPC unless required by rules or client instructions.

- Establishing independent user accounts for different clients where confidentiality risks warrant it.
- Complying with relevant legislation (e.g., the EU AI Act).
- Considering restrictions from external organizations (regulators, insurers).
- Charging fees that fairly reflect time, effort, difficulty, and risk, including AI setup/review costs.

These guidelines require a fundamental shift in how technology is integrated, demanding that patent attorneys actively inform themselves about AI models, understand how they work, and remain fully responsible for AI-generated work. This necessitates rigorous checking processes and extensive user training. AI must be treated as a professional tool requiring the same diligence and ethical consideration as any other aspect of practice. The enhanced confidentiality of locally-run GenAI is particularly compelling when viewed through the lens of the EPI Guidelines on data confidentiality.

Limitations, Risks, and the Indispensable Human Element

While AI offers significant benefits, it has limitations, especially in high-stakes IP decisions. AI systems excel at data processing and pattern detection, but IP decisions involve strategic nuances, legal interpretation, and business context beyond algorithmic understanding. Questions about portfolio strategy, competitive signals, or claim wording interpretation require human judgment, experience, and intuition.

A key risk is over-reliance on AI outputs without sufficient validation. This is mitigated by a „**human-in-the-loop**“ approach, where AI supports processes, but final evaluation and decisions rest with experienced IP professionals. AI models should be regularly validated, for instance, by benchmarking results against expert-curated findings. Context awareness and using domain-specific or tailored tools are important for relevance.

Another limitation is **bias in underlying data**, which AI may replicate in its recommendations. Diverse and regularly updated data sources are essential. Ultimately, AI helps work smarter and faster, but human expertise remains irreplaceable for decisions with long-term legal, financial, or strategic impact. The combination of advanced tools and professional judgment ensures reliability and high-quality IP decisions.

The Future of AI in IP: Evolution and Preparation

Over the next 5 to 10 years, AI's role in IP management is expected to grow significantly, particularly in innovation-driven industries. Trends include a shift towards **more predictive and prescriptive applications**, supporting forward-looking decisions like forecasting strategically important technologies or simulating strategy scenarios. Further advances are expected in **semantic understanding and contextualization**, allowing tools to better grasp the intent and technical substance behind documents. **Integration** will make AI a native component of enterprise platforms.

To unlock AI's full potential in IP, several capabilities need development:

- **Context-aware reasoning:** AI needs to better understand the „why“ behind a filing, not just the „what,“ grasping technical depth, legal nuance, and commercial relevance holistically.
- **Multimodal data processing:** Tools should integrate and analyze various formats like drawings, reports, sensor data, and text.
- **Intelligent automation of drafting and prosecution support:** Developing reliable, domain-customized tools that truly support professionals throughout the lifecycle.
- **Explainability and auditability:** Enabling decision-makers to trust AI outputs, trace conclusions, understand rationale, and ensure compliance.

The future of patent search will likely transform, moving towards communicating with data using natural language („Ask-your-data“). Using LLMs for drafting will become normal, with AI features assisting workflows. However, fully autonomous patent drafting, including claims, is seen as illusory for the foreseeable future, as it requires considering many stakeholder interests, a task for human professionals. The transition into the „third phase“ of AI, focusing on industrial application, including patent work, underscores the need for practitioners to understand the technology.

AI may also **shape the patent system** itself. A key question is how the increasing adoption of AI tools by practitioners will impact the definition of the „skilled person“ and potentially raise the bar for inventive step. The definition of what is considered „technical“ by patent offices may also evolve. While the patent system is not seen as a tool to regulate AI development, it can enable dissemination of information by allowing control through patent protection.

To stay ahead, patent practitioners must keep up with the latest technology and case law. Developing an understanding of generative AI is essential. Training courses and conferences are helpful.

Advice for corporate IP leaders adopting AI includes starting with purpose, not just technology, and addressing concrete challenges. AI should be viewed as a strategic enabler. Investing in people, building digital literacy, and fostering a culture where AI is seen as a partner is crucial. Leaders should start small with focused use cases, measure impact, and scale what works, being prepared to evolve internal processes. In the fast-paced innovation cycle, AI is becoming a necessity, not a luxury, enhancing strategic IP leadership in a data-driven age.

In summary, the rise of AI and ML is redefining the landscape of patent law and IP management, bringing both formidable challenges and powerful new tools. For IP professionals and patent attorneys, AI's value lies in augmentation, not replacement: these technologies can deliver unprecedented efficiency and data-driven insight, but human expertise and strategic judgment remain irreplaceable. Moving forward, successfully leveraging AI in the IP domain will require mastering the patenting of AI innovations, vigilantly safeguarding confidentiality and security, adapting to evolving legal guidelines, and thoughtfully integrating advanced AI tools into daily practice. Those who embrace and harness AI's capabilities – while maintaining rigo-

rous professional standards – will enhance their strategic impact and leadership in this increasingly data-driven, innovation-focused era.

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