Navigating Ethical Frontiers: Real Estate Appraisal in the Age of Artificial Intelligence

by Jim Amorin, MAI, SRA, AI-GRS

Abstract

Artificial intelligence (AI) is pervasive with no signs of tempering. Use of AI tools is becoming commonplace in all aspects of life. As AI systems become more capable and are deployed in more areas, they have greater potential to impact lives, both positively and negatively. Importantly, AI systems are built by humans and can inherit or be programmed with biases. Identifying and addressing sources of unfairness or discrimination in training data, algorithms, and applications is up to the users. This article investigates ethical concerns that real estate appraisers face when using artificial intelligence tools.

Introduction

In the rapidly evolving world of artificial intelligence (AI), its applications and implications span a remarkably broad spectrum. As this article explores the intersection of AI and real estate appraisal, it is essential to acknowledge the expansive nature of this topic. The influence of AI extends far beyond the confines of any single field, touching upon diverse aspects of technology, ethics, economics, and beyond. This article aims to illuminate the multifaceted ethical issues specific to the use of AI in real estate appraisal, recognizing that these concerns are but a fragment of a larger, complex mosaic.

While AI technologies offer transformative possibilities in accuracy, efficiency, and scalability in real estate appraisal, they also introduce a new set of ethical challenges that warrant careful consideration. These challenges are not isolated but are reflective of broader ethical dilemmas faced in the wider application of AI. In this context, the current exploration is necessarily selective; it is a focused examination of key ethical concerns in AI-driven use in real estate appraisal, rather than an exhaustive treatment of AI's impact across all domains.

This targeted discussion allows navigation of the intricate tapestry of AI's application in real estate appraisal with depth and specificity. It is an invitation to engage with a critical aspect of AI's role in modern society, offering insights that, while specific to real estate appraisal, resonate with broader ethical considerations in the era of AI.

A Growing Tool

Artificial intelligence tools and applications have proliferated exponentially. The growth has taken the conceptual theories of Moore's Law¹ and obliterated them.² For example, ChatGPT,³ an AI chatbot that uses natural language processing to create a human-like conversational

^{1.} According to Moore's Law, the number of transistors on an integrated circuit will double every two years with minimal rise in cost. More recently, this is a more general observation applied to technology and innovation. "Moore's Law," Intel Newsroom, September 18, 2023, https://bit.ly/3wH3zEM.

Raymond Perrault et al., The 2019 AI Index Report, AI Index Steering Committee, Human-Centered AI Institute (Stanford, CA: Stanford University, December 2019), 65, https://bit.ly/4bH2aga.

^{3.} ChatGPT stands for Chat Generative Pre-Trained Transformer. It is an artificial intelligence system developed by OpenAI to be helpful, harmless, and honest through natural language conversations.

dialogue, reached one million users within 5 days of its launch. For comparison, Instagram took 2.5 months and Facebook 10 months to reach that same level.⁴ Anxiety over the pace of change is warranted.

Professional real estate appraisers can use these tools to complement their daily workflow with benefits including enhanced research and analytical capabilities, narrative report writing from structured inputs, and appraisal review automation.

AI tools can enable better decision-making and assist with uncovering valuable insights. But these tools are not without peril. While many industries are facing the same anxiety, this article narrows in on some of the significant ethical considerations in using AI by professional real estate appraisers. These items include bias, transparency, human agency (the capacity for humans to make choices and take actions of their own free will), privacy, and data quality and reliability, all areas where real estate appraisers have personal investment. Further, by addressing the fear and disruption around these tools, appraisers can adopt these AI constructs in their practices to increase efficiency and even address the ethical considerations in meaningful ways.

What Is Artificial Intelligence (AI)?

The seminal definition of *artificial intelligence* as "the science and engineering of making intelligent machines" is generally attributed to John McCarthy, who coined the term *artificial intelligence* in 1955. McCarthy proposed this definition at the Dartmouth Workshop in 1956, which is claimed to be the birthplace of AI.⁵

AI refers to computer systems or machines designed to perform tasks that would otherwise require human intelligence, such as visual perception, speech recognition, and decision-making. Intelligence alone has been defined in at least seventy ways.⁶ An example of a nontechnical definition of *intelligence* that focuses on the synthesizing application and judgment can be seen in Merriam-Webster, which defines *intelligence* as "the ability to apply knowledge to manipulate one's environment or to think abstractly as measured by objective criteria."⁷

AI systems have progressed rapidly in recent years, demonstrating increasing capabilities in focused fields. However, there remain significant limitations that prevent present-day AI from achieving true human-level intelligence and autonomy. Some of these limitations include the inability to learn from data without explicit programming, lack of general sentience, and dependence on large, high-quality training datasets. While AI demonstrates excellence at recognizing patterns in data, the absence of common-sense reasoning skills is a restraint.

Positively, AI algorithms can analyze input data to detect patterns and adjust their behavior. This machine learning enables AI systems to improve at tasks through experience, rather than needing every contingency pre-programmed. However, today's AI does not possess perception or consciousness. Systems for AI are engineered for narrow purposes and lack the generalized reasoning abilities that characterize human cognition.

Additionally, the performance of AI systems depends heavily on training the systems with large sets of high-quality, representative data. The availability of big datasets has fueled recent advances in AI. However, AI algorithms remain limited by the data they are exposed to during training.

In terms of capabilities, AI excels at detecting connections and extracting insights from massive, diverse datasets across things like images,⁸ text, speech, and video. This ability to recognize complex relationships and make probabilistic predic-

7. Merriam-Webster.com, s.v. "intelligence," https://bit.ly/4c1dZOv.

Katharina Buchholz, "Threads Shoots Past One Million User Mark at Lightning Speed" digital image, Statista.com, July 7, 2023, https://bit.ly/45M5ncz.

^{5.} Dartmouth Milestones 1956, "Artificial Intelligence Coined at Dartmouth," https://home.dartmouth.edu/about/artificial-intelligence-ai -coined-dartmouth.

Shane Legg and Marcus Hutter, "A Collection of Definitions of Intelligence," in Advances in Artificial General Intelligence: Concepts, Architectures and Algorithms, Proceedings of the AGI Workshop 2006, ed. Ben Goertzel and Pei Wang (Amsterdam: IOS Press, 2007), 17–24, https://bit.ly/455WE4N.

^{8.} Multiple companies are integrating image analysis and artificial intelligence to indicate change over time. For example, some property tax assessors have adopted these tools comparing imagery from different dates to determine if a property has changed for assessment purposes. These tools are readily available from companies like ESRI, EagleView, and Nearmap.

tions makes AI well suited for a range of real-world applications today. While AI has achieved superhuman performance on circumscribed tasks, researchers continue working to overcome the remaining fundamental limitations.

Search engines employ some AI technology but are not considered true AI systems. Search engines employ techniques like machine learning and natural language processing to understand search queries and match them to relevant information. For example, Google's search algorithm uses AI to analyze the content on web pages and rank results.⁹

Overview of Current Usage

The AI market is poised for robust growth over the next decade. The current market value of around \$96 billion could increase to nearly \$2 trillion by 2030, representing a twenty-fold expansion.¹⁰ AI is being adopted across numerous industries including supply chain, health care, marketing, manufacturing, research, analytics, finance, real estate, and more. Major trends propelling AI advancement include chatbots, image generation, and mobile apps.

In 2022, the release of ChatGPT 3.0 sparked renewed enthusiasm about the potential of generative AI. Google search trends demonstrate rapidly growing interest in generative AI from 2022 to 2023 (see Exhibit 1).¹¹ A high level of interest is expected to continue as ChatGPT and competitors work on enhanced chatbot versions and new generative AI systems emerge.

AI is being used more widely than ever before across industries and applications. According to a McKinsey report, investment in AI grew at a compound annual rate of almost 60% from 2015 to 2021.¹² Usage instances range from business process automation to advanced applications like self-driving vehicles. BlackRock, often touted as the largest asset manager, is using AI to analyze large volumes of data from documents such as news stories and broker reports to make better



Exhibit 1 Google Search Term: Generative AI

Numbers represent search interest relative to the highest point on the chart for the given region and time. A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular.

informed decisions.¹³ The large hedge fund Bridgewater is using AI to automate much of its investment activity in an attempt to eliminate any emotional capriciousness of the traders.

Data analysis and decision-making in real estate have been transformed by AI and machine learning. Algorithms can quickly process large volumes of real estate data to uncover patterns and insights. This empowers professionals to make data-driven decisions about pricing, forecasting, and investment strategies.

A key application is predictive modeling using historical sales data and other relevant information. The algorithms identify correlations and trends that human analysts may miss. For example, some models incorporate nontraditional data like Airbnb listings, car ownership rates, and credit card spending to predict economic growth and real estate demand.

^{9.} Stephen Shankland, "Google Reveals Its AI-Powered Search Engine to Answer Your Questions," CNET, May 10, 2023, https://bit.ly/3VsbKyb.

^{10.} Next Move Strategy Consulting, "Artificial Intelligence (AI) Market Overview," NextMSC.com, June 2024, https://bit.ly/4alBUBn.

^{11.} Google Trends, "Explore," Google Trends, December 1, 2023, https://bit.ly/457ofCH.

^{12.} McKinsey & Company, "Global AI Survey: AI Proves Its Worth, but Few Scale Impact," McKinsey.com, https://bit.ly/3VaVnEV.

^{13.} One interesting data-gathering technique it uses is satellite images that show how full a retailer's parking lot is; that data is then correlated to the company's revenue and stock price.



Exhibit 2 Features Predictive Value

The number of factors influencing property values continues to grow as urban areas develop. While proximity to public transit is an obvious driver, the relationships between variables are complex. Nontraditional factors may have an outsized impact, and variables can interact in unconventional ways. As an example, Exhibit 2 outlines the predictive power of traditional and nontraditional variables in determining value.¹⁴

Sophisticated AI models can parse these complex relationships where traditional linear models fall short. This allows professionals to make smarter decisions amidst an exponentially expanding sea of information.

AI enables automation of tedious, error-prone analytical tasks that require manual work. This reduces mistakes and inconsistencies compared to human execution of repetitive jobs. Additionally, algorithms apply the same logical criteria to every data point without bias (theoretically). In contrast, appraisers may selectively focus on certain data they deem important while overlooking other relevant information. Automation via AI consistently examines all pertinent data.

This allows real estate professionals to focus their efforts on higher-value activities like analysis and decision-making. Rather than getting bogged down running reports and cleaning data, they can dedicate time to deriving implications from algorithmic insights.

For instance, an AI system might uncover that higher rainfall in a region correlates with increased housing prices three months later. This level of nuance is difficult for humans to detect across large datasets. But such granular insights allow professionals to make smarter and timelier decisions.

Another key application of AI is sentiment analysis of social media and news data. Algorithms can rapidly synthesize large volumes of unstructured data from these sources to gauge public perception of general locations or specific properties. The insights derived help real estate professionals understand consumer attitudes and spot new trends that have yet to reveal themselves in traditional datasets.

However, appraisers should exercise caution when relying on social media and news content, as those sources may reflect conscious and unconscious human biases. For example, some neighborhoods or properties may attract more positive or negative attention on social platforms due to socioeconomic factors rather than objective desirability.

Advanced natural language processing can help mitigate these issues by detecting hyperbole, sarcasm, and other linguistic clues within subjective text sources. But professionals should still contextualize sentiment analysis with other data points

^{14.} Data source, Gabriel Morgan Asaftei, Sudeep Doshi, John Means, and Aditya Sanghvi, "Getting Ahead of the Market: How Big Data Is Transforming Real Estate," McKinsey & Company, October 8, 2018, https://bit.ly/3zdTy2O. That study data is not meant to be definitive related to the reported outcomes as metrics about sample size, representativeness, statistical significance, study design, independence, and peer review were unstated. Rather, this study is presented to demonstrate how AI tools can allow an appraiser to analyze properties in new and potentially novel ways that would have been too challenging prior to the use of AI tools. The study's findings should not be generalized without further, more rigorous research.

before using the output. Used responsibly, these algorithms can enhance the appraisal process. But blind trust in their output risks propagating real-world inequities.

In the realm of real estate appraisal and market analysis, advanced algorithms are not impervious to deliberate misinformation campaigns. Sophisticated actors, cognizant of the mechanics of these algorithms, can engineer their inputs—be it textual, visual, or data-driven—to skew sentiment analyses in a favorable direction. This is particularly concerning in high-stakes environments where financial and investment decisions hinge on the perceived value or sentiment around properties and markets. A nuanced understanding of these vulnerabilities is essential for professionals relying on AI-driven insights, necessitating a deeper dive into the mechanisms through which AI interprets and reacts to manipulated data.

To counteract the risk of manipulation, a multifaceted approach is required. Continual refinement of algorithms to recognize and adjust for anomalous data patterns is paramount. Incorporating checks that identify inconsistencies or sudden shifts in sentiment that do not correlate with known market trends could serve as a red flag for potential manipulation. Furthermore, integrating AI insights with human expertise remains crucial. Real estate professionals should employ a synergistic model where AI-driven data is supplemented and validated by human analysis, ensuring a robust appraisal process that leverages the strengths of both AI and human judgment.

Overall, AI augments human analysis through speed, scalability, and perceptiveness. Together, these capabilities unlock insights and heighten predictive power—empowering more agile and informed decision-making. While adoption of AI systems is accelerating, there are still challenges around data quality, model explainability,¹⁵ and AI ethics that impact responsible usage.

Navigating Ethical Considerations

Integrating AI into the rapidly evolving landscape of real estate appraisal presents both unparalleled opportunities and complex ethical quandaries. As appraisers navigate this technological frontier, they find themselves at the crossroads of innovation and integrity, grappling with the multifaceted challenges of bias, transparency, human agency, privacy, and data quality and reliability. Within AI's promise of enhanced efficiency and accuracy, there lies a profound responsibility for appraisers to not only harness the power of AI but also critically examine its impact on their work. This discourse aims to raise awareness among appraisers, igniting a collective vigilance against the subtle AI currents of bias, championing the cause of transparency, and asserting the indispensable role of human agency in safeguarding the public trust that is a foundation of the appraisal process.

Latent Bias in Artificial Intelligence

The ethical concerns about AI are well founded. Artificial intelligence is not necessarily neutral or capable of qualitative assessment. For example, a simple internet search of the "greatest politicians of all time" produces a list of ten world leaders, with only one woman on the list. Ignorantly and shockingly, Adolf Hitler is included—demonstrating that AI requires more specificity to effectively respond to qualitative research questions. Performing a similar search for "greatest leaders in history" and a comparable list is displayed. Switching the search term to "political leaders" yields search results that are much more balanced in terms of men and women.

It is crucial to clarify that this example is presented not to unequivocally declare AI as biased but rather to illustrate how AI is subject to the particular search terminology used and how search algorithms might reflect and perpetuate existing societal biases. The historical predominance of male political leaders is an undeniable fact, and the representation of this reality in search results is expected. However, the inclusion of controversial figures like Adolf Hitler under the label of "great" raises ethical questions about the algorithms' value systems and the data they are trained on.

What does this reveal about search engines, artificial intelligence, and users of these tools? There are opportunities to examine and address latent biases that may emerge in AI systems. These biases stem from broader societal stereotypes and norms that have historically marginalized certain groups. As AI relies on large datasets, it risks propagating such biases if left unaddressed.

^{15.} Explainability refers to the ability to understand why an AI system makes certain decisions or predictions.

Identifying biases in AI systems is indeed challenging, especially for professional real estate appraisers whose expertise lies outside the realm of AI and data science. However, this does not diminish the importance of awareness and vigilance. One practical approach is for appraisers to partner with AI experts to understand the underlying data sources and algorithms in the tools they may use. This collaboration can help appraisers gain insight into potential bias in the data and its implications. Furthermore, professional training and resources need to educate appraisers about common biases in AI systems, enabling appraisers to critically assess the AI tools they may use. This article is one step in that process.

As for the remedy to biases in AI, it is a multifaceted challenge. Complete elimination of biases is probably unfeasible, given that AI systems learn from existing data that inherently reflects societal biases. However, steps can be taken to mitigate these biases. This includes diversifying data sources, implementing algorithmic checks for fairness, and regularly updating models to adapt to changing societal norms. Much of this is already being done at a higher level by firms like OpenAI and Anthropic in the generative AI space.¹⁶ Additionally, human oversight remains crucial; AI should be viewed as a tool to aid, but not replace, the professional judgment of appraisers. For the practicing appraiser, this last step is the most likely intersection. Maintaining a critical eye and questioning results as professionals do when using a software package, internet search results, or comparables from a data service is the professional's responsibility.

It is important to recognize that the field of AI in real estate appraisal is evolving. As AI becomes more prevalent, an ongoing dialogue among appraisers, technologists, ethicists, and regulators is vital. This dialogue should aim to balance the efficiency and insights offered by AI with a professional commitment to ethical standards and market realities.

According to *The Dictionary of Real Estate Appraisal*, seventh edition, *biased* means something that is "not reasonably supported, and favoring or promoting the cause or interest of the client, oneself, or another."¹⁷ Biased information can make its way into algorithms through multiple avenues. Artificial intelligence systems learn by examining training data, which may include biased human judgments or reflect historical injustices, even if potentially discriminatory attributes like gender, race, or sexual orientation are excluded. For example, Amazon stopped using a recruiting algorithm after finding it favored applicants who used phrases that were more common in men's résumés.¹⁸

Another source of bias can arise from flawed data sampling,¹⁹ leading to the over- or underrepresentation of certain groups in the training data. An illustration of this can be seen at MIT, where researchers discovered that facial analysis technologies exhibited higher error rates for minorities, particularly minority women, possibly due to inadequately representative training data.²⁰

One of the most promising strategies for mitigating bias is rooted in the advancement of artificial intelligence. A particularly exciting field is computer vision, which evaluates images to assess properties with minimal human intervention. By excluding unhelpful, potentially prejudicial data like demographics of the owner, the model can (at least theoretically), see the property as objectively as an appraiser would.

This raises an interesting and thought-provoking question: If the market has biases, should these be reflected by the appraiser? This point

^{16. &}quot;Generative AI, sometimes called gen AI, is artificial intelligence (AI) that can create original content—such as text, images, video, audio or software code—in response to a user's prompt or request." See Cole Stryker and Mark Scapicchio, "What Is Generative AI?," IBM, March 22, 2024, https://bit.ly/4aNaEBz.

^{17.} The Dictionary of Real Estate Appraisal, 7th ed, s.v. "biased." See also Appraisal Institute, "Definitions" in Standards of Valuation Practice, November 12, 2021, https://bit.ly/3xeLKgp.

^{18.} Jeffrey Dastin, "Amazon Scraps Secret AI Recruiting Tool that Showed Bias against Women," Reuters Insight, October 10, 2018, https://bit.ly/3KsThev.

Even in large datasets, market data quality of can be negatively impacted by aggregation bias (over aggregation). See Matthew C. Trimble, "Regression Promises and Aggregation Bias Illusions: The Application of Market Delineation to Land Valuation Models," *The Appraisal Journal* (Issue 4, 2023): 245–264.

^{20.} Larry Hardesty, "Study Finds Gender and Skin-Type Bias in Commercial Artificial Intelligence Systems," *MIT News*, February 11, 2018, https://bit.ly/4c1iPey.

touches on a fundamental issue: balancing the ethical imperative to mitigate biases in AI systems against the need to accurately reflect market realities that may themselves be biased.

Appraisers have an ethical responsibility to strive for objectivity and fairness in their appraisals. This principle holds true whether the appraisal is AI-assisted or not. While the market may exhibit biases, the role of the appraiser is not to perpetuate these biases but rather to provide an objective evaluation based on factual data and professional judgment.

Artificial intelligence systems by their nature learn from existing data, which can include historical biases present in the market. Unchecked, these AI systems may inadvertently perpetuate or even amplify the biases. The ethical challenge, therefore, is to ensure that the AI systems used in appraisal are designed to recognize and mitigate any such biases, rather than simply replicate them.

There is a distinction between reflecting market realities and endorsing the biases within them. While it is important for an appraisal to accurately reflect current market conditions, this should not extend to reinforcing discriminatory or unethical biases. The aim should be to develop AI systems that can discern between legitimate market trends and biased practices, ensuring that appraisals are both accurate and ethically sound.

This discussion highlights the need for an ongoing dialogue between AI developers, appraisers, appraisal organizations, and regulatory bodies to continually refine AI in appraisal. The goal is to develop AI tools that are sophisticated enough to understand the nuances of market dynamics without compromising on ethical standards.

It is crucial for appraisers to be educated about how AI tools work and the potential for biases within them. This awareness will enable appraisers to use AI more effectively as a tool in their work, ensuring that their appraisals are both reflective of the market and ethically responsible. Appraisers are concerned about developing objective appraisals. The professional standards for real estate valuation professionals require that they provide "unbiased opinions of value."²¹ The examples mentioned throughout this article demonstrate some of the systemic or latent biases that may be built into AI platforms and tools. As active users of AI tools, professional real estate appraisers should be thoughtful about how they perform their research to ensure it is objective and unbiased.

Transparency

Transparency is another significant element of the ethical challenges facing real property appraisers using AI. For this discussion, it is critical to have a common understanding of what is meant by *transparency*, which Merriam-Webster defines it as "the quality or state of being transparent."²² Additionally, Merriam-Webster defines *transparent* as:

- free from pretense or deceit
- easily detected or seen through
- readily understood
- characterized by visibility or accessibility of information especially concerning business practices²³

For this article, transparency captures the essence of explaining what is happening within the AI system regarding its decisions and predictions. This transparency can help users understand an AI system's strengths and limitations. Transparency can highlight instances where the system's decisions may be questionable or biased. It does not mean that a user can build the system or identically replicate the results. It is acknowledged that true, absolute transparency in AI systems is a challenging endeavor—particularly when employing complex algorithms and deep-learning models. The intricate nature of these systems often leads to what is commonly referred to as the "black box" problem, where the

^{21.} The Preamble to the Appraisal Institute *Standards of Professional Practice* states, "Real estate is one of the basic sources of wealth in the global economy. Therefore, those who own, manage, sell, purchase, invest in, or lend money on the security of real estate must have ready access to the services of individuals who provide unbiased opinions of value, as well as sound information, analyses, and advice on a wide range of issues related to property economics." *Standards* available at https://bit.ly/dbJLIMx.

^{22.} Merriam-Webster.com, s.v. "transparency," https://bit.ly/3XaeyS3.

^{23.} Merriam-Webster.com, s.v. "transparent," https://bit.ly/4ccHk8V.

decision-making process is not fully comprehensible to users or even to some developers.²⁴

In this article, transparency is meant as an aspirational goal rather than a claim of achieving total transparency. The aim is to advocate for and work towards as much transparency as possible within the practical constraints of AI technology.

Appraisers should not take transparency lightly-doing so can be perilous despite intention. For example, in May 2018 Google launched a new product called "Google Duplex." The idea behind this product was that a caller could simply ask Google Assistant to book a reservation at a restaurant. Then, Google's computers called the restaurant and did the rest of the work. By most measures it worked with little human interaction. But the display at the Google developers' conference was met with concern. Likewise, many in the media with the opportunity to experiment with it were very put off by the fact that the "robot" failed to announce it was not a human. By December 2022, Google Duplex was shut down in part due to the experiences and feelings people had about the user experience. This example is not one that likely would have caused great harm to the users, nor were the restaurants' fortunes at stake. But there are other examples where the element of transparency could have resulted in better outcomes for users.

Transparency in AI systems is critical for building trust and mitigating risks. Specifically, transparency helps reduce errors and misuse and provides four important benefits. First, it improves communication between stakeholders. Artificial intelligence models are extraordinarily complex, with multiple teams involved in design, development, and deployment. Clear communication ensures alignment on goals and prevents models from being optimized for incorrect variables. Second, transparency enables proper handling of outputs by documenting model limitations and appropriate usages. Without this, introducing AI can backfire in high-stakes situations. Third, openness about data sourcing and model logic uncovers potential biases. Finally, transparency facilitates auditing and oversight

to identify problems. Although achieving true transparency is an ongoing process requiring care and deliberation, these demonstrated benefits underscore why it must be a priority from the start of any AI initiative.

Consider an AI system designed to analyze x-rays for cancerous tumors and flag x-rays as "positive" for further review by doctors. The doctors then can more efficiently evaluate AI-flagged x-rays instead of individually evaluating all x-rays. There may be additional considerations, however. In developing the model, data scientists might reasonably prioritize minimizing false negatives, even if it increased false positives. If this tolerance is not communicated to the radiologists using the system, however, they will scrutinize the AI-flagged x-rays assuming the technology had detected something they missed. With transparency into the AI system's design, radiologists would know the system favors sensitivity over specificity. Equipped with this knowledge, they would have moved through the flagged x-rays more efficiently, rather than exhaustively analyzing each one. This case illustrates how poor communication and lack of transparency in an AI system's development can lead to suboptimal deployment that frustrates end users and inhibits productivity gains.²⁵

The second benefit to transparency is that it distributes responsibility. Users need insight into model limitations to use products appropriately. Withholding details prevents informed decisions and true accountability. All stakeholders are empowered through access to necessary details for thoughtful decisions about AI systems.

As professionals in real estate and finance increasingly integrate AI into functions and analyses, the allocation of responsibility becomes a crucial ethical consideration. Rather than placing the onus solely on AI developers, responsibility should be shared across the spectrum from developers to users. Appraisers using AI tools in valuation must take accountability for double-checking automated outputs. For example, if an appraiser uses a tool like ChatGPT, verifying the veracity of the output would have similar requirements as

^{24.} As it relates to artificial intelligence, *black box* "refers to Al systems with internal workings that are invisible to the user. You can feed them input and get output, but you cannot examine the system's code or the logic that produced the output." Saurabh Bagchi and The Conversation US (blog), "Why We Need to See Inside Al's Black Box," *Scientific American* (May 26, 2023), https://bit.ly/3VmPVPj.

^{25.} Zubin Damania, "The Ethics of Artificial Intelligence in Medicine," YouTube, December 11, 2019, https://bit.ly/3xoXwVw.

using a sale from the local multiple listing service. It is incumbent upon the appraiser to ensure the data is accurate. Real estate appraisers relying on algorithms to estimate values or other aspects of the appraisal must monitor AI results for fairness across demographics and other potential bias elements. Distributing responsibility across the spectrum of players helps diminish risk and build public trust.

The principle of distributing responsibility refers to equitably sharing decision-making authority among the components of an AI system. In real estate, where AI-driven tools assist in property valuation and investment analysis, distributing responsibility mitigates the risk of algorithmic bias and promotes fair and accurate appraisals. While appraisers may not be asked about how to build the models, appraisers are ultimately responsible for their use when the models become part of the resources they leverage.

In real estate and finance, distributing responsibility also strengthens the relationship between AI systems and human experts. Instead of replacing human judgment, AI complements it by providing data-driven insights, thereby enhancing decision-making processes. This collaborative approach fosters a sense of accountability and trust, both essential elements in domains where the stakes are high, and errors can have far-reaching consequences.

Finally, being transparent expresses respect for people. The restaurants receiving calls from Google's AI system Duplex felt deceived. More importantly, AI can undermine human autonomy—the ability to evaluate options and choose freely without undue influence. In this context, transparency about whether AI is being used, its purpose, and how it functions shows respect for people and their decision-making capacity. The restaurants would have wanted to know they were interacting with an automated system, not a real person. Transparency preserves individuals' agency to make informed choices about engaging with AI, rather than being unknowingly manipulated.

Closely linked with transparency are two adjoining concepts—openness and explainability—that warrant consideration. The concept of openness conveys positive values, as exemplified by information characterized as open data, open source, open code, and open access. These terms refer to information, source code, algorithms, and publications being freely available and accessible to the public. The openness movement promotes transparency by reducing barriers and enabling examination, auditability, and oversight of systems. When data, codes, and other technical details are not proprietary or concealed—but made open instead—transparency is enhanced. An ethos of openness facilitates transparency in AI systems, aligning with ideals of increasing visibility, accountability, and democratization of innovative technologies. Ultimately, openness and transparency are complementary philosophies that focus on revealing, not obscuring, information to empower users and society.

Companies may be reluctant to open source their AI products due to concerns about profitability and competitive advantage. It is important to remember, however, that openness does not necessarily equate to a lack of profitability. Many companies successfully operate on models that combine open-source elements with commercial strategies. For example, some companies release the basic version of their AI tools as open source while offering advanced features, support, or consulting services as paid options.

In professions like real estate appraisal, where AI decisions can have significant financial and social impacts, there may be regulatory or ethical imperatives for openness. Government and industry may mandate certain levels of transparency and auditability in AI systems, which would encourage a move towards more open models.

Explainability as it relates to transparency specifically refers to making AI systems more interpretable and comprehensible to users. Explainability methods aim to address the black-box nature of certain AI models, whose inner workings are often too complex for most people to understand. This inherent opacity poses challenges. Artificial intelligence models are not equation-based but are based on pattern recognition. Rather than being explicitly programmed with rules and equations, AI models like neural networks are trained on large datasets to recognize patterns and make predictions.

Artificial intelligence models like neural networks consist of many simple computational units connected in layers. Each connection has an assignable weight. To train a model, example data is shown, like photos labeled as "cat" or "dog." The model makes predictions on the training data, and the weights are adjusted based on whether it was right or wrong, gradually improving the model's pattern recognition ability. After training on enough examples, the model can recognize patterns in new unlabeled data and make inferences—for example, identifying cats and dogs in new photos. The model itself does not have explicit programmed rules about what features make up a cat or dog. The AI model "learned" based on the patterns in the training data.

Modern AI is heavily focused on pattern recognition from data, rather than hardcoded rules and equations. The models discern statistical patterns to make predictions, rather than logical reasoning. This is an element of why "explainability" is so difficult to achieve. Explainability should not be interpreted as users needing to clarify what happened internally, rather that the relationship of the findings is explainable based on the inputs provided. The degree of explainability also depends on the specific AI approach used. Explainability is especially crucial for high-impact uses of AI like in health care and finance.

The reputation and success of real property valuation professionals rely on integrity, and they must demand that AI models produce credible results. The need for transparency in the AI tools they use is crucial.

Human Agency

After tackling the complex area of transparency, the next area of ethical concern is human agency.²⁶ An overreliance on automated decisions through AI can undermine human autonomy and diminish the ability to make choices. Preserving human discretion and oversight is crucial. As real estate appraisers navigate the terrain of AI-driven advancements, they are confronted with the intricate challenge of preserving their agency while harnessing the benefits of technology.

In the realm of AI—especially in decisionmaking processes like real estate appraisal human agency refers to the capacity of individuals to act independently and freely make their own choices. This is juxtaposed against the increasing autonomy of AI systems, which can potentially diminish the role and influence of human decision-making.

Ethical concerns arise when the autonomy of AI systems encroaches upon or replaces individual judgment. Judgment is particularly relevant in real estate appraisal, where nuanced, contextsensitive decisions are paramount. The key dimensions to ethical decision-making are accountability, fairness, transparency, and a human-centric approach.

- Accountability. When AI systems play a significant role in appraisal, questions about accountability for decisions arise. It becomes ethically imperative to ensure that people remain integral to the decision-making process, preserving their ability to oversee, interpret, and, if necessary, override AI-driven conclusions.
- Bias and Fairness. AI systems, if unchecked, may perpetuate or amplify biases present in their training data. For appraisers, monitoring and correcting these biases is an ethical necessity to ensure fair and impartial appraisals.
- Transparency and Understandability. Maintaining human interaction ensures that AI systems in appraisal remain transparent and understandable to users and stakeholders. This is crucial for trust and ethical integrity in AI applications.
- Human-Centric Approach. Emphasizing human agency does not diminish the value of AI, but injects a balanced synergy where AI enhances, rather than replaces, human expertise and judgment.

Artificial intelligence must not infringe on appraisers' professional discretion or identity. Appraisal requires complex contextual reasoning that AI currently cannot match. Human oversight is expected to ensure appraisals are an objective interpretation of the market.

While AI's capabilities are evident, the implications for appraisers' decision-making autonomy warrant a closer look. For example, appraisers possess a wealth of expertise, local knowledge, and market insights that AI lacks. Maintaining appraisers' agency ensures that nuanced factors, such as market trends and property conditions, are considered comprehensively.

Human agency encompasses ethical considerations, and enables appraisers to make judgment

^{26. &}quot;Agency refers to the thoughts and actions taken by people that express their individual power. ... agency is the power people have to think for themselves and act in ways that shape their experiences and life trajectories." Nicki Lisa Cole, "How Sociologists Define Human Agency," ThoughtCo., January 2, 2021, thoughtco.com/agency-definition-3026036.

calls that align with professional standards. Ethical dilemmas, such as determining property value during market demographic changes, demand human judgment grounded in ethical principles.

Further, professional appraisers are accountable for their valuations and various work products. This fosters transparency and accountability in the valuation process. Human agency ensures that appraisers stand behind their decisions, building trust with clients and stakeholders and protecting public trust.

There are a few initiatives that appraisers can use to maintain human agency while incorporating AI in their practices. A hybrid approach would allow integrating AI into the appraisal process while retaining human judgment. Hybrid models that blend AI-driven analysis with human expertise ensure a balanced consideration of datadriven insights and contextual understanding.

Real estate appraisers must also adapt by enhancing their skills to include understanding AI technologies. This proactive stance enables appraisers to leverage AI as a tool rather than viewing it as a replacement.

While AI promises increased efficiency and accuracy, its implementation raises profound ethical questions. Appraisers must thoughtfully consider how to integrate AI in a way that honors professional values and serves the greater good. The key is for appraisers to focus on developing abilities that AI lacks, like creativity, critical thinking, collaboration, leadership, and responsiveness. Professional appraisers should identify how they can add value in their current role or expand their skill set to take on new responsibilities.

AI Guidance and Rules

There currently are no US national standards for AI, although there have been discussions in this regard. In October 2022, the Biden administration released the "Blueprint for an AI Bill of Rights" (Blueprint).²⁷ The Blueprint did not create any new legal obligations or regulations for AI. Rather, it was designed as a set of best practices or guidelines that companies could choose

to follow voluntarily. It discussed principles for the responsible development and use of artificial intelligence. The Blueprint for an AI Bill of Rights

- outlines five core principles for AI systems: safe and effective systems; algorithmic discrimination protections; data privacy; notice and explanation of AI systems; and human alternatives and oversight.
- focuses on the goal of fostering public trust in AI systems by making them more transparent, fair, and accountable.
- calls on companies and government agencies to conduct impact assessments of AI systems and take steps to mitigate risks.

Critics argued the Blueprint lacked enforcement mechanisms and should have included more robust protection for marginalized groups most likely to be harmed by flawed AI. Proponents viewed the Blueprint as an important first step in starting a conversation about AI ethics and setting standards for responsible AI development.

Following up on the Blueprint for an AI Bill of Rights, President Biden issued the "Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence" on October 30, 2023. It was intended to lead the responsible development and beneficial use of AI in the United States while mitigating risk.²⁸ The executive order defines safety standards for AI development, reflecting an urgency at the national level to steer AI's evolution for maximizing benefits and limiting negative impacts, including those on vulnerable groups and job security. This comprehensive directive includes almost all executive departments and builds on prior commitments by tech companies. The executive order also prescribes eight principles for AI: ensuring safety and security through standardized testing; fostering innovation, competition, and collaboration; supporting workers with training programs; upholding equity and civil rights; protecting user interests; safeguarding privacy and data; monitoring federal AI use; and positioning the United States as a global leader in AI-related progress.

^{27.} Published by the White House Office of Science and Technology Policy, October 2022, https://bit.ly/3KHLtFZ .

^{28.} Available at the White House, https://bit.ly/3VAiudB.

This regulatory initiative extends across various sectors. In health care, it mandates the creation of an HHS AI Taskforce and a strategy for AI in drug development. For financial services and housing, it calls for assessments of AI vulnerabilities and measures to prevent AI-induced discrimination in housing. In energy, AI is seen as a tool for enhancing grid resilience and supporting clean energy. The technology sector is tasked with developing voluntary standards and reporting mechanisms for AI, while telecommunications directives focus on AI's role in network security. The education sector is directed to develop safe AI resources, and the labor directives aim to analyze AI's impact on the job market and worker rights. Transportation initiatives require assessments of AI's implications for emerging technologies, and defense directives emphasize AI's role in national security. Internationally, the United States will collaborate on AI frameworks, aiming for secure, interoperable AI standards. The execution of these directives is to extend into 2025.

Other entities have weighed in on AI guidelines and standards. The Federal Trade Commission (FTC) has provided some guidance on transparency and fairness in AI, but these are not enforceable standards. It is noteworthy that in 2023 the Center for AI and Digital Policy petitioned the FTC arguing that GPT-4 violates the FTC's rules against unfair and deceptive practices.²⁹ In response, the FTC sent an Investigative Demand Schedule to OpenAI, the owners of the Chat GPT platform.³⁰ This investigation is a harbinger of the concern found across constituencies in the AI space and highlights the significance of the ethical concerns raised with AI.

The National Institute of Standards and Technology (NIST) has developed a plan for federal AI standards development.³¹ It aims to help develop consensus standards through a publicprivate partnership. Industry organizations like the Institute of Electrical and Electronics Engineers (IEEE) also have developed standards relevant to certain aspects of AI, such as for self-driving vehicles.³² The US Department of Defense has adopted principles and guidelines for ethical and responsible AI use in defense systems.³³ In 2023, at least twenty-five states, Puerto Rico, and the District of Columbia introduced artificial intelligence bills, and fourteen states and Puerto Rico adopted resolutions or enacted legislation.³⁴

Overall, governance of AI in the United States is still emerging; it is incumbent upon users of these systems to proactively keep current with changes. There are technology-specific guidelines and principles proposed by various governmental and nongovernmental bodies, but no overarching legal framework or comprehensive set of standards is in place. However, efforts are underway to work towards developing more concrete voluntary consensus standards for AI.

As part of a worldwide effort, the member countries of the Organisation for Economic Co-operation and Development (OECD) in 2019 adopted OECD "Principles for Trustworthy AI,"³⁵ the first international standard for AI ethics and governance. The principles aim to promote AI that is innovative and trustworthy, with recommendations around concepts like transparency, robustness, accountability, and human oversight. As an OECD member country, the United States was involved in the development of these principles and endorsed their adoption. However, the OECD principles are nonbinding; they only represent an international normative framework rather than enforceable legal standards.

29. GPT-4 is the next iteration of the underlying engine for ChatGPT. See Center for AI and Digital Policy, "In the Matter of Open AI," August 14, 2023, https://bit.ly/3VGvYVe.

30. Cat Zakrzewski, "FTC Investigates OpenAl over Data Leak and ChatGPT's Inaccuracy," Washington Post, July 13, 2023, https://bit.ly/4chH1cT.

32. "IEEE Standard for Assumptions in Safety-Related Models for Automated Driving Systems," April 22, 2022, https://bit.ly/3x7YyW3.

For an overview, see NIST at https://bit.ly/4c55Dp8. The full report, US Leadership in AI: A Plan for Federal Engagement in Developing Technical Standards and Related Tools (August 9, 2019), is available at https://bit.ly/3Vz5cOp.

^{33. &}quot;DOD Adopts Ethical Principles for Artificial Intelligence," DoD news release, February 24, 2020, https://bit.ly/4aSnrmd.

^{34.} National Conference of State Legislatures, "Artificial Intelligence 2023 Legislation," January 12, 2024, https://bit.ly/3VqCKwO.

^{35.} Available at https://oecd.ai/en/ai-principles.

Various esteemed valuation organizations, such as the Appraisal Institute, the Appraisal Institute of Canada, the International Valuation Standards Council, the European Group of Valuers' Associations, and The Appraisal Foundation have all acknowledged and addressed the application of automated valuation models (AVMs) to varying degrees.³⁶

Broadly speaking, these organizations authorize their members to make use of AVMs, provided they possess a fundamental grasp of the underlying methodology, evaluate the appropriateness of the AVM for the specific task, have confidence in the application of accurate data, and comprehend and can effectively communicate the resulting report. Both USPAP in the United States and the Canadian Uniform Standards of Professional Appraisal Practice do not classify an AVM output, by itself, as an appraisal. However, they concede that it can serve as a foundational element for a "credible" appraisal or review if the appraiser provides input that affects the output of the AVM by applying judgment or experience. This approach is sometimes termed an "appraiser-assisted AVM" and is one used by many valuation professionals.

For professional appraisers, one primary concern lies in confidentiality. Confidential information supplied by clients could escape the appraiser's control, if not careful, when interacting with AI. The Confidentiality section of the Ethics Rule of USPAP states an appraiser must protect the confidential nature of the appraiser-client relationship and prohibits appraisers from disclosing confidential information or assignment results to anyone other than the client, parties specifically authorized by the client, state appraiser regulatory agencies, or third parties authorized by law.

In January 2024, the Appraisal Standards Board issued USPAP Q&A 2024-02 "Artificial Intelligence," which specifically addresses the confidentiality section of the Ethics Rule as it applies when an appraiser is using AI. It states an appraiser must not share confidential information with unauthorized parties. Although an Al chatbot is not a person, creating an inquiry with a chatbot that includes confidential information may allow the chatbot to capture that information for responses to inquiries by other human users, or the chatbot developers.

As the Ethics Rule provides, the appraiser "must act in good faith with regard to the legitimate interests of the client in the use of confidential information and in the communication of assignment results." The appraiser also "must be aware of, and comply with, all confidentiality and privacy laws and regulations applicable in an assignment." The Ethics Rule requires the appraiser to "take reasonable steps to safeguard access to confidential information and assignment results by unauthorized individuals, whether such information or results are in physical or electronic form." Further, the appraiser "must ensure that employees, coworkers, subcontractors, or others who may have access to confidential information or assignment results, are aware of the prohibitions on disclosure of such information or results."³⁷

The Ethics Rule and USPAP Q&A 2024-02 are clear regarding confidential information. Using AI tools within a valuation assignment or practice does not remove the binding nature of these rules. Transparency of the AI tools is the appraiser's responsibility, and if the appraiser is not sure whether an AI tool protects confidential information, then such information should not be shared with those tools.

OpenAI makes it clear in several places that it reviews the conversations users have had with ChatGPT to improve its systems, and it encourages users not to share sensitive information. OpenAI continuously improves its models through research breakthroughs as well as exposure to real-world problems and data. While some of this can be turned off by the user, the takeaway is that if users share confidential information, they should not have an expectation of privacy.³⁸

^{36.} For US appraisers, a potential source of guidance is the Uniform Standards of Professional Appraisal Practice (USPAP) of the Appraisal Foundation's Appraisal Standards Board. A review of the USPAP, the USPAP Advisory Opinions, and USPAP Frequently Asked Questions yields reference to neural networks and artificial intelligence in the discussion of the proper use of AVMs in Advisory Opinion 18 (AO-18). https://bit.ly/3xwpyyF

^{37.} See Ethics Rule, Confidentiality, lines 243–261, Appraisal Standards Board, *Uniform Standards of Professional Appraisal Practice*, 2020–2021 ed. (Washington, DC: The Appraisal Foundation, 2020).

^{38.} There have been some well-publicized examples of employees sharing confidential information with ChatGPT. For more, see Mack DeGeurin, "Oops: Samsung Employees Leaked Confidential Data to ChatGPT," Gizmodo, April 6, 2023, https://bit.ly/4cnZWm7.

Privacy Concerns

In the flourishing AI landscape, privacy is a vital concern, particularly as AI systems often hinge on access to extensive datasets with both public and private information. The intrinsic capacity of AI to parse, analyze, and infer from this data elevates the risk of privacy violations, an issue that transcends mere data security.

The privacy implications of AI are multifaceted starting with the issue of data provenance. AI systems frequently use data from diverse sources, raising questions about consent and ownership. When personal data is involved, this becomes a matter of individual privacy rights. Moreover, AI's predictive capabilities can infer private information from seemingly innocuous data, potentially leading to unintended privacy intrusions.

The deployment of AI in surveillance and monitoring activities is another area of concern. While intended for security or efficiency, such applications can lead to excessive monitoring, infringing upon individual's expectations of privacy. Facial recognition technologies, for instance, have sparked debates around the balance between public safety and privacy.

Furthermore, the convergence of AI with other technologies like the Internet of Things (IoT) amplifies privacy concerns.³⁹ The resultant vast networks of data-generating devices, coupled with AI's analytical prowess, create scenarios where privacy is potentially vulnerable to both systemic failures and deliberate breaches.

Addressing these privacy challenges necessitates a multilayered approach, encompassing robust data governance policies, transparent AI algorithms, stringent regulatory compliance, and an overarching commitment to ethical AI development that prioritizes individual privacy rights.

Data Quality and Reliability

As AI cements its role in various sectors, concerns about its data quality and reliability have increased. The repercussions of errors or malfunctions can be significant, particularly in high-stakes domains such as finance, appraisal, health care, and legal decision-making. The quality and reliability challenges of AI are connected to several factors:

- Data Quality. AI models, especially those based on machine learning, are heavily reliant on the data they are trained on. The adage "garbage in, garbage out" is particularly pertinent here. If the training data is biased, incomplete, or of poor quality, the AI system's outputs will likely be flawed.
- Algorithmic Complexity and Overfitting. Many AI algorithms, particularly in deep learning, are extraordinarily complex and can be prone to "overfitting." Overfitting occurs when an AI test model is too closely tailored to the training data, capturing patterns that do not generalize well in real-world scenarios. This can result in AI systems that perform well in test environments but fail to deliver accurate results in practical applications.
- Dynamic and Unpredictable Environments. While some AI models excel at handling structured and repetitive tasks, AI systems often struggle in dynamic or unpredictable environments. AI's ability to adapt to novel situations or to manage unstructured data can be limited. This limitation is particularly evident in fields like appraisal where contextual understanding plays a crucial role.
- Lack of Transparency and Interpretability. The black box of many AI systems, where the decision-making process is not transparent or easily interpretable, compounds the issue of reliability. Without clear insight into how decisions are made, diagnosing errors or understanding failures in AI systems becomes challenging. This opacity is not just a technical issue but also a matter of trust and accountability.⁴⁰
- Hallucinations. In the realm of AI, "hallucinations" refer to instances where AI systems generate false or nonsensical responses.⁴¹ This phenomenon is particularly prevalent in AI models that process and generate

^{39. &}quot;The Internet of Things (IoT) refers to a network of physical devices, vehicles, appliances, and other physical objects that are embedded with sensors, software, and network connectivity, allowing them to collect and share data." See IBM, "What Is the Internet of Things (IoT)?," https://ibm.co/4aOZbBA.

^{40.} Bagchi, "Why We Need to See Inside AI's Black Box."

^{41.} For additional discussion, see "What Are AI Hallucinations?," IBM, https://ibm.co/4cofID5, and Catherine Thorbecke, "AI Tools Make Things Up a Lot, and That's a Huge Problem," CNN, August 29, 2013, https://bit.ly/3zfXNuv.

human language, such as chatbots or text generators. Hallucinations in AI responses present a significant challenge to the quality and reliability of these systems, impacting their practical applications and user trust. In many cases, generative AI models like OpenAI's ChatGPT, Anthropic's Claude, and Google's Bard do not signify what is verifiable and what is made up. As a result, a critical review of the output is incumbent upon appraisers to ensure accuracy and reliability of their analysis.

To address the quality and reliability challenges, a multipronged approach is required. This includes rigorous testing and validation of AI models in diverse and real-world conditions, continuous monitoring and updating of AI systems, and investment in research to develop more robust and adaptable AI algorithms. Enhancing the transparency and interpretability of AI systems is crucial for users' trust and effective management of AI technology.

The development of standards and guidelines for AI quality and reliability, particularly in critical and sensitive applications, is another essential step. Such standards would guide AI developers and users in assessing and ensuring the reliability of AI systems. However, the user ultimately is responsible for the use of AI output and therefore must apply critical thinking skills.

While AI offers transformative potential across various sectors, ensuring its quality and reliability is paramount. Addressing these challenges requires concerted efforts from technologists, researchers, policymakers, and appraisers with an ongoing commitment to ethical and responsible AI development and usage.

Job Loss Apprehensions

In 1995, an *Appraisal Journal* article on AI stated that "appraisers, especially residential appraisers, are concerned and worried that their primary livelihood is going to disappear. Fear, worry, and paranoia have set in as a result of rumors concerning artificial intelligence computer programs."⁴² This statement could have been written today

as appraisers express similar concerns. Artificial intelligence is advancing rapidly and beginning to transform many industries. While AI promises immense benefits for society, there are understandable concerns about how it may disrupt the job market and cause certain roles to become obsolete. AI-powered tools can now analyze massive amounts of data to recognize patterns and make predictions faster than humans. AI has the potential to benefit appraisers, but there are understandable concerns about how it may disrupt the profession. However, with preparation, real estate appraisers can harness AI in a way that augments human capabilities rather than replace them.

Artificial intelligence and automation have started transforming certain jobs, and this trend will likely accelerate. Jobs involving highly repetitive and routine tasks are most susceptible to automation. Artificial intelligence can now automate certain routine appraisal tasks like data collection and report generation more efficiently than humans. But conducting an accurate valuation still requires critical thinking, market expertise and human perspective. Artificial intelligence may transform the appraiser's role, but it cannot replace human judgment and experience.

Appraisers should view AI as a productivity enhancer rather than a job killer. By automating repetitive tasks, AI allows appraisers to focus on higher-value work like complex valuations, client consultation and quality assurance. Embracing modern technology has always been key to success in real estate, whether it was adopting calculators, spreadsheets, or statistical tools. Artificial intelligence is simply the next progression.

Specific AI tools are already on the market to assist with appraisal tasks:

- Real estate data platforms like House-Canary (www.housecanary.com) and Cherre (https://cherre.com) leverage AI to aggregate listings, tax records, permits, and other data sources into detailed property profiles. This can automatically compile comparable sales reports.
- Some appraisal firms like Reggora (www .reggora.com) use AI to review appraisal reports for errors and compliance issues. This helps improve report quality and consistency.

^{42.} William B. Rayburn and Dennis S. Tosh, "Artificial Intelligence: The Future of Appraising," The Appraisal Journal (October 1995): 429–435.

- Commercial real estate firm Reonomy (www .reonomy.com) leverages its platform to predict what will sell next and to determine if a roof or parking lot needs repair. This product allows users to gain asset-level and market-level insights with extensive property data for more than 54 million commercial properties, including ownership, sales, tax, debt, and demographic data.
- Some tools, like those by Quantarium (www.quantarium.com/valuation-models), can estimate property values using automated valuation models (AVMs). The Quantarium algorithm has access to data of more than 150 million households with more than 900 data points. This allows appraisers to validate their own valuations.
- Software in mobile apps such as Anow (https://anow.com) streamlines processes for data collection, form filling, and client communication. This simplifies appraisal workflows.

This partial list is specific to appraisal, but there are hundreds of more general applications that could be used by real estate appraisers. The list outlines those tools that touch on report generation and analytics, but there are also many other tools that allow for productivity boosts, project management, image recognition, marketing, social media, research, learning, website building, enhanced engagement with clients, and other business elements.

Refusing to adopt new technologies is not a viable solution. Artificial intelligence is here to stay and will only grow more advanced. The prudent path is adopting AI as a tool, not a replacement. To prepare for the future, appraisers need to build technical skills, as well as expand into areas like data analytics, critical thinking, and communication. Gaining expertise in AI tools can help guide optimal implementation. Using AI to expand services into real estate consultancy or specializations could open new revenue streams.

Appraiser associations like the Appraisal Institute need up-to-date training programs to help appraisers gain AI experience. They also need to establish protocols to ensure human oversight as AI is responsibly integrated.

By proactively adopting AI tools, real estate appraisers can improve productivity, providing faster, higher-quality services to clients. The future remains bright for appraisers who evolve with the changing technology.

The key is maintaining a balanced perspective. Being resistant to any change leads nowhere. But being realistic about upcoming challenges allows professionals to take wise steps to integrate AI in a way that creates opportunities.

Case Study Example: AI in Professional Practice

To better understand the transparency of systems like OpenAI's ChatGPT (https://chat.openai.com) platform, consider the following example to see about the application's inner workings. The free version of ChatGPT (GPT-3.5) was used for this example as it is readily available and is likely something appraisers have already experimented with. While generative AI like ChatGPT is only a thin slice of available AI tools, it shows one of the more popular tools and areas to be aware of with its use.

If you are new to ChatGPT,⁴³ using it is much like conversing with a person. You pose questions and follow-ups and in return you receive responses built upon these interchanges. OpenAI describes ChatGPT as a language model trained to produce text by using reinforcement learning with human feedback.⁴⁴

In terms of transparency, the disclaimer fine print on the ChatGPT screen states, "Free Research Preview. ChatGPT may produce inaccurate information about people, places, or facts." So that is immediately an indication that the user should exercise caution. The following table shows how one brief conversation went.

^{43.} For an excellent discussion of ChatGPT as a tool, see R. Wayne Pugh, "ChatGPT Is a Revolutionary Tool. Just Don't Use It to Write Appraisal Reports," Valuation (Spring 2023): 36.

^{44.} See "What Is ChatGPT?," OpenAI Help Center, last modified August 2023, https://bit.ly/4cqVaVL, and Dave Bergmann, "What Is Reinforcement Learning from Human Feedback (RLHF)?," IBM, November 10, 2023, https://bit.ly/3VQOsSV.

This exchange is an example of what a user may find, and I encourage inexperienced users to follow a similar pathway before using these tools. Ultimately, an appraiser's level of comfort will be tied to how confident the user is in the output and how much additional research or synthesis

Example ChatGPT Conversation

will be needed to transform the output into something meaningful for the intended use. There are multiple AI tools available and more coming regularly. What may be lacking or insufficient today in terms of capabilities soon may evolve or mature into an indispensable tool.

Conclusions: What Is the Path Forward?

The pace of advancement in artificial intelligence has been astonishing, far exceeding even the expected typical exponential growth espoused in Moore's Law. While tools like ChatGPT demonstrate the power of AI, their rapid emergence also prompts valid ethical concerns. For real estate appraisers, AI brings useful capabilities in research, reporting, and review automation, complementing daily workflows. However, appraisers have vested interests in addressing ethical considerations like bias, transparency, and human discretion.

Thoughtful integration of AI can increase efficiency while upholding professional values. By tackling concerns head-on, appraisers can adopt AI constructs beneficially, overcoming ethical pitfalls to harness AI's potential for enhanced decision-making and insight. The future need not be one of fear or concern but can incorporate savvy strategies and thoughtful integration of AI.

The path forward is to integrate AI with wisdom. Let algorithms do what they do best—crunch data at scale—but leave room for human perspective, based on ethics and experience AI does not possess. The future path is for an appraisal profession strengthened by technology, while grounded in the values that make valuation important.

The key is for appraisers to focus on developing abilities that AI lacks, like creativity, critical thinking, collaboration, leadership, and responsiveness. Professional appraisers should identify how they can add value in their current role or expand their skill set to take on new responsibilities.

About the Author

Jim Amorin, MAI, SRA, AI-GRS, CDEI, CAE, ASA, has been engaged in the real estate appraisal and consulting arena since 1988. Amorin authored the seminal text *The Generative Shift: Preparing Appraisers for Artificial Intelligence Models like ChatGPT* (2024). He has developed and reviewed numerous seminars for the Appraisal Institute, including *Market Analysis and the Site to Do Business, What Clients Want, Advanced Spreadsheet Modeling for Valuation Applications, Using Spreadsheet Programs in Appraisals, The Lending World in Crisis, and Introduction to Valuing Commercial Green Buildings. He received the Appraisal Institute President's Award for his work related to the Institute's Capstone programs. He holds a bachelor of business administration degree in finance and a bachelor of business administration degree in real estate and urban land development from the University of Texas at Austin. He has testified before the US Congress and presented to the United Nations on real estate valuation, and he has served as a resource in the national press for stories in <i>The New York Times, National Mortgage Professionals, Housing Wire*, CNBC, CNN, *The Wall Street Journal*, and many other publications. He has instructed courses and seminars and provided lectures in forty states and numerous countries/ territories including Italy, Germany, Portugal, the People's Republic of China, Saudi Arabia, United Arab Emirates, Romania, Japan, Mexico, and Canada. He served on the national board of directors for the Residential Energy Services Network (RESNET) from 2017 through 2023. Amorin served as national president of the Appraisal Institute in 2009 and 2017 and as the Appraisal Institute CEO during November 2017–February 2023. **Contact: jamorin@me.com**

Additional Resources

Suggested by the Y. T. and Louise Lee Lum Library

Appraisal Institute

Education—Artificial Intelligence, Blockchain, and the Metaverse: Implications for Valuation

Essentials News—AI Essentials: Latest Artificial Intelligence Articles

https://essentials.news/ai

Fannie Mae

- Mortgage Lender Sentiment Survey: Artificial Intelligence and Mortgage Lending
 www.fanniemae.com/media/49231/display
- Perspectives Blog: "Mortgage Lenders Cite Operational Efficiency as Primary Motivation for Al Adoption" www.fanniemae.com/research-and-insights/perspectives/lenders-motivation-ai-adoption