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ARTIFICIAL INTELLIGENCE PRESENTS NEW OPPORTUNITIES FOR HEARTLAND STATES

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Heartland-based firms are finding a friend in AI – one that helps them introduce advances more on pace with the nation’s coastal tech centers.

Further, being able to rapidly absorb knowledge has cut deeply into the insider advantages of physical proximity. Heartland tech businesses can now access noncodified, tacit information so quickly that there’s little advantage of being densely clustered with highly specialized human capital.

Whether their business is biopharmaceuticals, advanced agriculture, supply chain management, logistics, manufacturing, financial services or energy efficiency – heartland firms and communities can innovate, deploy, and grow faster.

Our piece last October on [what the heartland has to fear from AI](#) explained that having a lower concentration of knowledge-based jobs means fewer projected AI-related layoffs. We have already experienced the creative destruction¹ of aging industries amidst increased automation and the advent of the internet.

But what fresh opportunities are at hand? Futurists continue to grapple with what grand changes AI may eventually bring. But today, we will focus on its more immediate impact.

Innovative heartland firms are using AI to serve business needs and improve products and processes

We often [encourage state and local policymakers](#) to target and foster economic clusters that build on existing expertise and competitive advantage. Proven strategies to bolster a regional economy frequently involve supporting established industries to embrace new sources of growth and helping them become sustainable. This approach also holds true for implementing AI-related strategies.

The [AI Index 2023 Annual Report](#), based on research conducted in 2022 at Stanford University, states that approximately 31% of U.S. AI-related jobs were posted in the 20 heartland states. This share of national postings roughly equals the total for California, New York, Massachusetts, and Washington – four states with established tech hubs.² Within the heartland, Texas – also home to a major tech hub – accounted for 8.37% of AI job postings, while other heartland states saw much smaller shares.

Existing tech hubs are projected to house the majority of jobs linked to the direct development of AI; however, as a general-purpose technology, AI can support innovation through users deploying it in novel ways.³ Building on existing industries and collaborating to meet their needs is one such area of opportunity. Developing business applications that use AI to solve problems for customers in industries concentrated in the heartland would harness the tacit knowledge of practitioners and potential users alike, and both groups would benefit from the co-location of research and production. Supply chain management, transportation and logistics, agriculture, and manufacturing all present fertile ground for heartland-based innovation. The prediction that the next big leaps will arise from better processing of sensor and usage data (information generated by the Internet of Things) rather than consumer-generated data (emails, articles, photographs, and video on the internet, for example) creates space for firms outside the tech industry to lead. Training and customizing AI models to serve specific industries and local contexts positions heartland firms to showcase their expertise by honing general models into a valuable resource for local clients.

The ability of AI to customize products to specific consumers opens a lot of doors across a wide range of sectors. Regulation will determine which data these tools can access and under what circumstances, but firms are already using data mining and machine learning to build user profiles and deliver personalized

advice on matters including advertising, education and training, health care, and finance. This projected availability of products and services that better fit customer needs and wants is projected to increase consumer demand across a wide range of services, creating new economic opportunities.⁴

The improved matching of consumers with needs and potential problem solvers could also speed innovation. AI-savvy companies can identify relevant patents and products more quickly during the development process, even outside the patent filing or product description. By presenting users – students, shoppers, researchers, etc. – with the ability to ask questions about a product and better understand how it might meet their specific needs, AI can improve their experience and help optimize their investment of time and money.

Embracing the potential of AI to supercharge heartland industries

There is exciting potential for AI to transform and greatly accelerate development of **pharmaceutical products**. For example, Indiana-based Eli Lilly last year partnered with XtalPi in a \$250 million deal to generate potential drug candidates using AI.⁵ Eli Lilly plans to use these candidates to accelerate their research and development cycles, – and, hopefully, fuel economic growth – as well as more quickly deliver innovative treatments to patients. Diagnostic tests, along with AI-equipped monitoring and support devices, have drawn investments from firms like Michigan-based Merative, spun out of IBM's Watson Health business. Research shows that firms that invest more in AI have seen higher levels of product innovation as measured by increased patents and trademarks, for example.⁶ These firms also have grown accordingly and are assets to heartland economies.

Farmers' growing adoption of sensors and digital monitoring to optimize use of water, fertilizer, feed, and pesticides highlights AI's potential for improving yields in **agriculture**, using data already being generated. Additional AI modeling around weather patterns, risk of fire, or flooding could also help improve precision agriculture in the heartland. Initiatives like [Innova Memphis](#) are investing in seed and early-stage AgTech in the heartland with an aim

to cultivate successful firms locally. As heartland universities build upon research around new seeds and crop management, the additional environmental control that AI offers may make the cultivation of more sensitive crops with higher yields feasible. Similarly, early intervention to manage pests could reduce losses in the fields. The USDA's [National Institute of Food and Agriculture](#) offers grants for research into the use of AI in agriculture, including a focus on the economics and rural applications of AI.

Digital twin software – in which virtual models of industrial processes, machinery, or plants are fed with data generated by the real-world versions – also leverages AI to optimize resources, especially in **manufacturing**. This model can be tuned to reflect the tacit knowledge of operators and the site-specific installations and conditions that affect the system. Changes in plant operation can be simulated and fine-tuned before deployment, and AI can better predict maintenance needs to avoid breakdowns and improve safety. At its Dearborn Research and Engineering Campus Central Energy Plant (CEP) in Michigan, the Ford Motor Company uses a digital twin to [more efficiently manage both operational risks and energy consumption](#).

Because it is tightly governed by complex and evolving regulations, the **financial services** industry has traditionally had high barriers to entry. AI tools could lower the cost of accessing expert advice and ensure that purveyors of financial services remain up to date and comply with regulatory requirements. This could empower smaller financial institutions and those outside legacy financial hubs to embrace new services and confidently offer them to local clients. A great example is St. Louis-based Edward Jones. The financial advisory and wealth-management giant has strong relationships with communities in the heartland and across America. Edward Jones initiated a program to be a first adopter of generative AI that helped its financial advisors witness its benefits in financial-management techniques. This will ameliorate the advantages of having specialized quants with Ph.D.s in physics on Wall Street in rapidly recognizing market patterns and putting them to work for their clients.⁷ Combining the expertise of heartland bankers with new financial tools could offer a real benefit to regional businesses.



Bolstering skills in our heartland workforce using AI

AI tools could also help close some of the experience and skills gap for workers in the heartland – a process known as **upskilling**. They can provide individualized training, as well as enhance the performance of lower-skilled workers. Access to a skilled workforce is cited as a [top concern](#) by employers, and AI presents a cost-effective method to address this challenge. MIT researchers found that using ChatGPT “helped the least skilled and accomplished workers the most, decreasing the performance gap between employees.”⁸ The study also found that the quality of the work product of employees categorized as low skill improved when using AI, while workers considered high skill simply finished their tasks more quickly.⁹

Additionally, AI has the potential to positively affect a population’s well-being by supplementing the services offered by in-demand healthcare workers.

By enhancing the skills and efficiency of medical professionals, AI tools could improve access to health care in underserved regions. As we heard from heartland communities during research for our 2022 study of [Health Care Access in the Heartland](#), accessing quality medical care is a major challenge in rural areas. This affects both quality of life and the economy, as people often underperform, miss work, or leave the workforce entirely to address their own medical issues or those of family members. AI makes telehealth more effective and improves remote diagnostics, and its tools could be used to expand the services of a nurse or nurse practitioner in underserved areas by enhancing their expertise and validating their assessments. Policy discussions on growing the scope of services that these regulated medical practitioners are licensed to provide are ongoing, and heartland states have much to gain from safely increasing access, with AI tools providing additional support.

The productivity gains expected from the use of AI or AI-powered software (including in business tools like spreadsheets and software that manages industrial processes) have the potential to help lessen the impact of demographic changes as aging workers in heartland states retire. The remaining workers would likely be able to do the same work, or perhaps even more, with a reduced workforce. Advocates say using intelligent automation to address many routine tasks frees up workers to take on more interesting strategic and creative work. Through customized training, AI can also facilitate workers moving between industries and occupations by translating their existing expertise into the jargon and specialized knowledge of their target sector.

Tradeoffs and future potential

The widespread adoption of AI will involve tradeoffs, and choices we make now will have long-term implications. Jobs will be lost through increased productivity and substitution, and new positions and industries will emerge as we find new applications for AI. Similarly, the additional processing power required for AI-based software could [increase electricity consumption significantly](#), and researchers are

examining ways to [design and implement hardware and systems efficiently from the outset](#). Models that manage energy consumption in buildings and complex systems of all types could also be made more efficient using AI – enhancing the performance of technology like smart meters and other adaptive devices, while reducing electricity usage. A leader in IoT-based, building management energy-system efficiency is Minneapolis-based 75F. The firm uses sophisticated AI-based algorithms to process building data; projections made every 60 seconds are analyzed and micro-adjustments are deployed.¹⁰

The future is uncertain regarding what AI may actually bring; however, heartland states can position themselves to benefit from this growth by building up their capacities for innovation and entrepreneurial efforts, using a nimble regulatory environment to respond to change as it arises, and fostering the workforce, firm, and community capacity to meet the needs of new industries.

ENDNOTES

¹ Creative destruction is the term used to describe the effects of innovation and technological change on economies as some products and industries become obsolete and new industries emerge.

² Nestor Maslej, Loredana Fattorini, Erik Brynjolfsson, John Etchemendy, Katrina Ligett, Terah Lyons, James Manyika, Helen Ngo, Juan Carlos Niebles, Vanessa Parli, Yoav Shoham, Russell Wald, Jack Clark, and Raymond Perrault, “The AI Index 2023 Annual Report,” AI Index Steering Committee, Institute for Human-Centered AI, Stanford University, Stanford, CA, April 2023.

³ <https://www.brookings.edu/articles/new-data-shows-that-without-intervention-generative-ai-jobs-will-continue-to-cluster-in-the-same-big-tech-hubs/>

⁴ <https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf>

⁵ See “XtalPi Announces Collaboration with Lilly, Using AI + Robotics to Uncover First-in-class Therapeutics” <https://www.prnewswire.com/news-releases/xtal-pi-announces-collaboration-with-lilly-using-ai--robotics-to-uncover-first-in-class-therapeutics-301837142.html>

⁶ Babina, Tania and Fedyk, Anastassia and He, Alex Xi and Hodson, James, Artificial Intelligence, Firm Growth, and Product Innovation (May 18, 2022). Journal of Financial Economics (JFE), Forthcoming, Available at SSRN: <https://ssrn.com/abstract=3651052> or <http://dx.doi.org/10.2139/ssrn.3651052>

⁷ <https://www.techtarget.com/searchenterpriseai/feature/Generative-AI-as-a-copilot-for-finance-and-other-sectors>

⁸ https://economics.mit.edu/sites/default/files/inline-files/Nov_Zhang_1.pdf

⁹ <https://www.technologyreview.com/2023/03/25/1070275/chatgpt-revolutionize-economy-decide-what-looks-like/>

¹⁰ <https://www.75f.io/about-us/#leadership>