

McKinsey
麦肯锡



麦肯锡人工智能报告：

五大实操秘诀抢夺千亿市场

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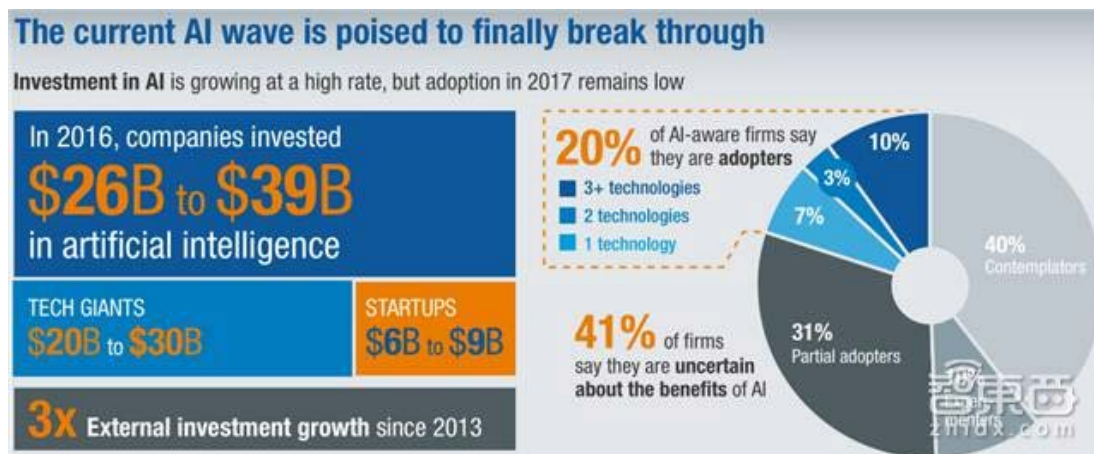
没赶上数字化转型的快车，是不是没救了？从实用价值的角度解读企业 AI 市场份额、收入和利润池等动态、投资环境和风险。

企业数字化转型已经帮助很多企业实现了弯道超车，建立基于专业数据库的数据壁垒，在激烈的市场竞争中脱颖而出，高效运作，降低成本。随后，算法和计算芯片驱动的人工智能呼之欲出，企业智能化转型将能够进行更高的数据吞吐量，改善预测模型，提高结果的准确性，实现决策优化。

本期的智能内参，我们推荐来麦肯锡联合巴黎综合理工学院的人工智能行业独立调研报告，报告关注的为机器人技术、自动驾驶，计算机视觉，语言，虚拟代理和机器学习等面向企业应用的 AI 技术，就相关市场份额、收入和利润池等动态、投资环境和风险，以及企业应用价值的角度解读企业 AI 产业生态。

以下为智能内参整理呈现的干货：

AI 企业动态：百亿美元催化的竞争差距扩大

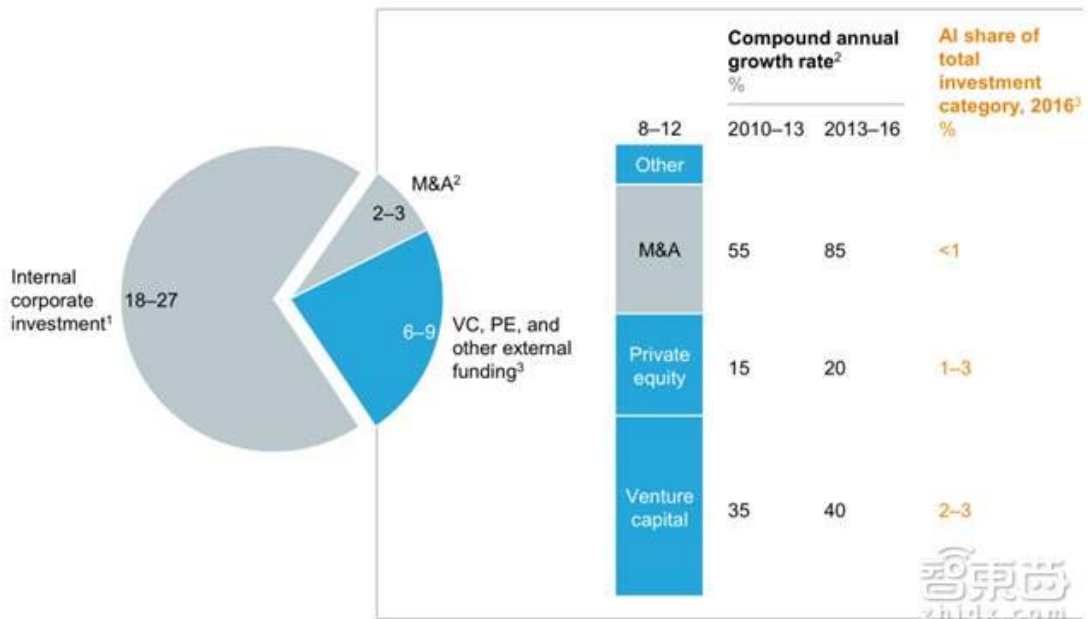


*AI 投资疯涨，2017 年收购案增长放缓

Technology giants dominate investment in AI

Investment in AI, 2016¹
\$ billion

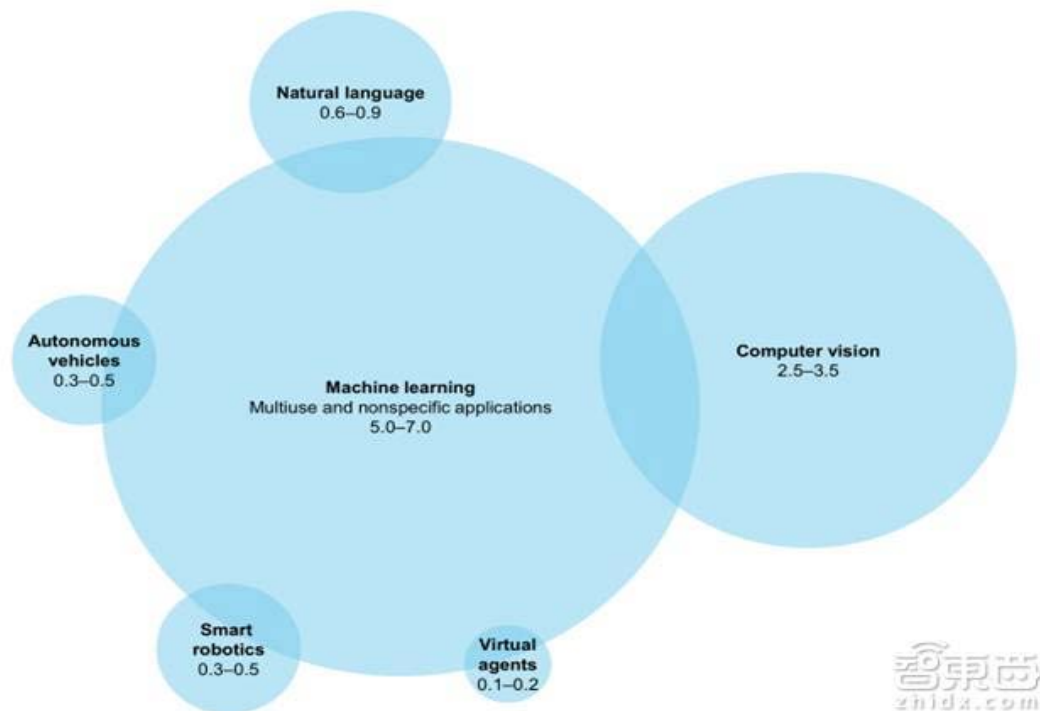
■ Investment by tech giants and other corporations



*2016 年科技巨头 AI 产业资本投入的组成

Machine learning received the most investment, although boundaries between technologies are not clear-cut

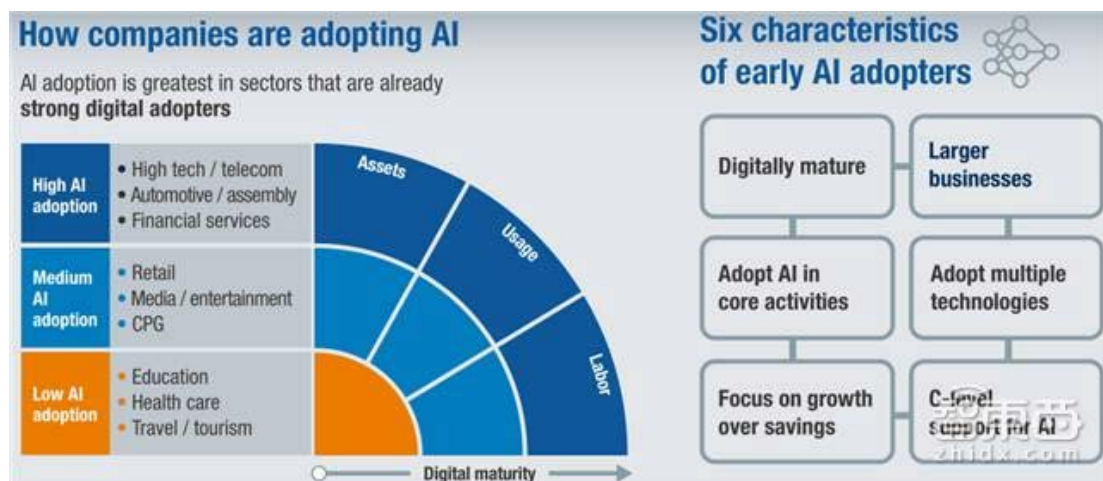
External investment in AI-focused companies by technology category, 2016¹
\$ billion



*不同 AI 技术种类的投资占比 (单位: 十亿美元)

2000 年的机器学习引爆了人工智能（AI）的发展，接着芯片计算能力和数据生态的推动下，AI 现在被认为是下一个数字浪潮，企业应当为此做好准备。IBM（沃森/物联网）亚马逊（语音识别、虚拟代理）、传统汽车商（自动驾驶）、电信/工业巨头（机器人技术）、苹果（内部技术套件研发）、百度（内部技术套件、百度风投）、Facebook（AI 实验室）、英特尔（AI 实验室）和谷歌（内部技术套件）等巨头都将数十亿美元投入到各种 AI 研发，人才招聘和并购案的投入也达到了百万美元级别。

2016 年全球范围内，科技巨头在 AI 上的相关投入已经达到 200 亿到 300 亿美元，其中 90%用于技术研发和部署，10%用于收购；总体的 AI 企业并购复合年增长率超过 80%；此外，面向初创公司的 VC 和 PE 投资也快速增长，组合总计 60 亿到 90 亿美元，虽然仅占到总投资的 1-3%，但却是 2013 年的三倍多，这三年间的外部投资年增长率接近 40%。



*不同行业的 AI 技术采用率/成熟度（评估标准包括数字化成熟度、商业规模化应用、核心业务应用、技术多元化、投资回报及成本节约情况、高管态度六点）

目前的市场动态是，除了高科技/电信、自动化/装配、金融服务行业，AI 技术在其他行业的应用还处在比较早期的阶段，或者说试验阶段。麦肯锡调研了 10 个国家 14 类行业的 3000 名高管，其中仅 20%表示已经开始使用 AI 技术，更多的态度（41%）是，对于将 AI 大规模应用于核心业务保持观望，因为商业案例以及投资回报的不确定性。此外，针对 160 个商业案例的调研发现，AI 技术的身影只出现在其中的 12%，这主要是 AI 缺乏技术协议，因此推广进程有所差异，不同的市场预测认为，到 2025 年，AI 市场规模从 6.44 亿美元到 1260 亿美元不等。

Four areas across the value chain where AI can create value



*AI 四大实用价值链（智能化项目、生产过程优化、目标化营销、加强版用户体验）

Machine learning¹

- Autonomous vehicles
- Smart robotics
- Natural language
- Computer vision
- Virtual agents

Applicability

- High (Dark Blue)
- Medium (Light Blue)
- Low (Very Light Blue)

	Applicable technologies	Project	Produce	Promote	Provide
Retail		Enlightened R&D, real-time forecasting, and smart sourcing Anticipate demand trends, while optimizing and automating supplier negotiation and contracting	Operations with higher productivity, lower cost, and better efficiency Automate warehouse and store operations; optimize merchandising, product assortment, and microspace	Products and services at the right price, with the right message, and to the right targets Optimize pricing, personalize promotions, and tailor website displays in real time	Enriched, tailored, and convenient user experience Personalize tips and suggestions, offer immediate assistance with virtual agents, automate in-store checkout, and complete last-mile delivery by drones
Electric utilities		Enhance demand and supply prediction, assess reliability of integrated generation assets, and automate demand-side response	Optimize preventive maintenance, improve electricity production yield, reduce energy waste, and prevent electricity theft	Optimize pricing with time-of-day and dynamic tariffing; match producers and consumers in real time	Automate supplier selection, provide consumption insights, automate customer service with virtual agents, and tailor usage to consumer's preferences
Manufacturing		Improve product design yield and efficiency, automate supplier assessment, and anticipate parts requirements	Improve processes by the task, automate assembly lines, reduce errors, limit product rework, and reduce material delivery time	Predict sales of maintenance services, optimize pricing, and refine sales-leads prioritization	Optimize flight planning and route and fleet allocation; enhance maintenance engineer and pilot training
Health care		Predict disease, identify high-risk patient groups, and launch prevention therapies	Automate and optimize hospital operations; automate diagnostic tests and make them faster and more accurate	Predict cost more accurately, focus on patients' risk reduction	Adapt therapies and drug formulations to patients' risk reduction, use virtual agents to help patients navigate their hospital journey
Education		Anticipate job market demand, identify new drivers of performance to assess students, and help graduates highlight their strengths	Automate teachers' routine tasks, identify early disengagement signs, and optimize group formation for learning objectives		Personalize learning, shift from stop-and-test model to continuous learning cadenced by virtual coaches and real-time student self-awareness

*各领域 AI 实用价值链详解（智能化项目：研发、预测、采购；生产过程优化：高效生产力和低成本；目标化营销：合适的价格，正确的信息，正确的目标；加强版用户体验：内容丰富且定制）

	Project	Produce	Promote	Provide
	Accurate demand forecasting, smart sourcing, and enlightened R&D	Higher productivity and minimized maintenance and repairs	Products and services at the right price, with the right message, to the right targets	Enriched, tailored, and convenient user experience
Retail	<ul style="list-style-type: none"> 1–2% EBIT¹ improvement using machine learning to anticipate fruit and vegetable sales 20% stock reduction using deep learning to predict e-commerce purchases 2 million fewer product returns per year 	<ul style="list-style-type: none"> 30% reduction of stocking time using autonomous vehicles in warehouses 	<ul style="list-style-type: none"> 50% improvement of assortment efficiency 4–6% sales increase using geospatial modeling to improve micromarket attractiveness 30% online sales increase by using dynamic pricing and personalization 	
Electric utilities	<ul style="list-style-type: none"> Objective to cut 10% in national electricity usage by using deep learning to predict power demand and supply 	<ul style="list-style-type: none"> 20% energy production increase using machine learning and smart sensors to optimize assets' yield 10–20% EBIT improvement by using machine learning to enhance predictive maintenance, automate fault prediction, and increase capital productivity 		<ul style="list-style-type: none"> \$10–\$30 savings on monthly bills by using machine learning to automatically switch electricity supply deals
Manufacturing	<ul style="list-style-type: none"> 10% yield improvement for integrated-circuit products using AI to improve R&D process 39% IT staff reduction by using AI to fully automate procurement processes 	<ul style="list-style-type: none"> 30% increase of material delivery time using machine learning to determine timing of goods' transfer 3–5% production yield improvement 	<ul style="list-style-type: none"> 13% EBIT improvement by using machine learning to predict sources of servicing revenues and optimize sales efforts 	<ul style="list-style-type: none"> 12% fuel savings for manufacturers' customers, airlines, by using machine learning to optimize flight routes
Health care	<ul style="list-style-type: none"> \$300 billion possible savings in the United States using machine learning tools for population health forecasting £3.3 billion possible savings in the United Kingdom using AI to provide preventive care and reduce nonelective hospital admissions 	<ul style="list-style-type: none"> 30–50% productivity improvement for nurses supported by AI tools Up to 2% GDP savings for operational efficiencies in developed countries 	<ul style="list-style-type: none"> 5–9% health expenditure reduction by using machine learning to tailor treatments and keep patients engaged 	<ul style="list-style-type: none"> \$2 trillion–\$10 trillion savings globally by tailoring drugs and treatments 0.2–1.3 additional years of average life expectancy
Education		<ul style="list-style-type: none"> Virtual teaching assistants can answer 40% of students' routine questions 	<ul style="list-style-type: none"> 1% increase in enrollment by using a virtual assistant to follow up with applicants 	<ul style="list-style-type: none"> 85% match with human grading, using machine learning and predictive modeling

*各领域 AI 实用价值链成效详解

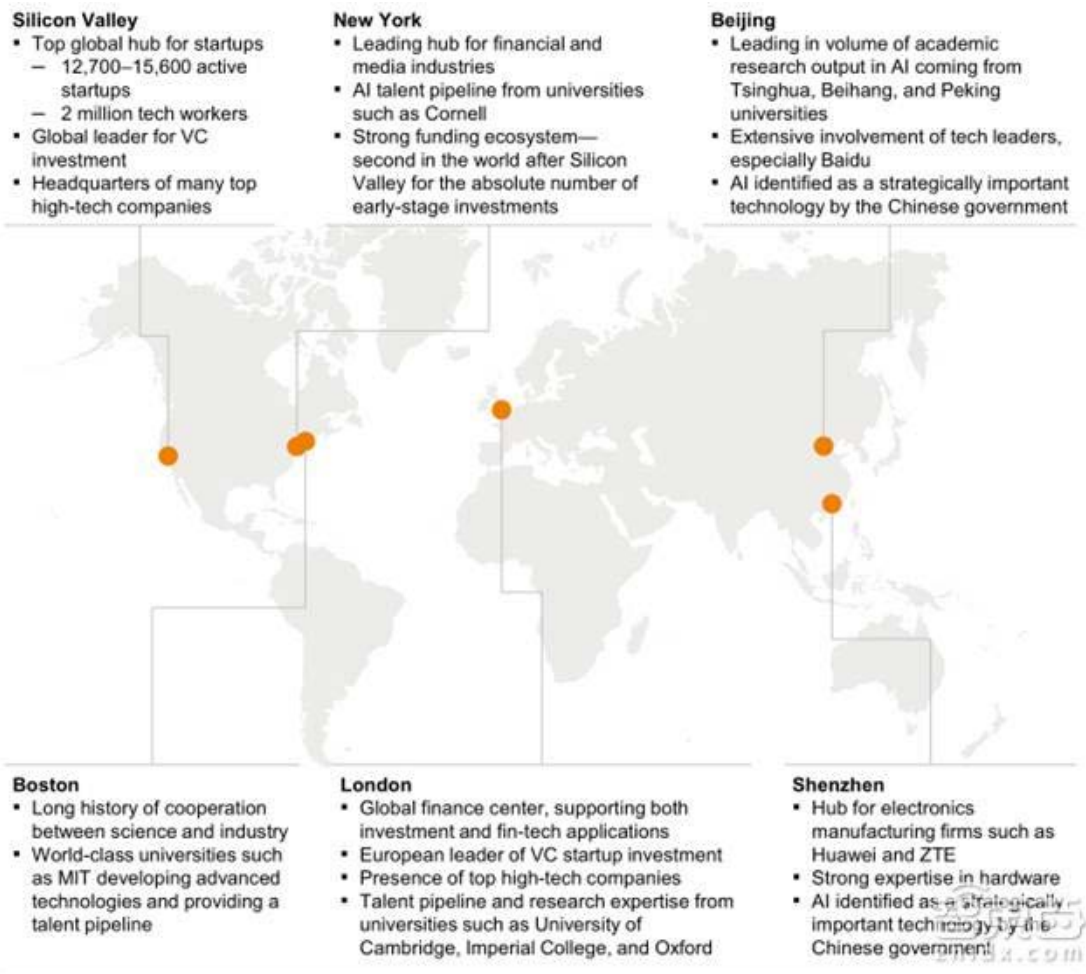
对于 AI 技术的不同态度，导致公司之间的数字化差异越来越大。科技、电信或金融服务行业的用户往往表现出比较强的 AI 投资意向，并倾向于将其部属于核

心业务。以汽车公司为例，AI 被用于自动驾驶技术以及车辆操作系统改进；金融服务方面，AI 则嵌入客户体验环节。

被调研的 AI 技术发展前期的商业用例，包括零售、电力公用事业、制造业、卫生保健和教育行业，表明，AI 是具备实际价值的，并对商业竞争环境有比较大的冲击，具备 AI 战略前瞻性的公司相比而言能获得更高的利润率，其行业竞争力的提升也超出了预期。这些行业对于 AI 技术的要求是，优化预测模型和自动化操作，并开发应用潜力，制定针对性的市场营销和定价模型，强化用户体验。

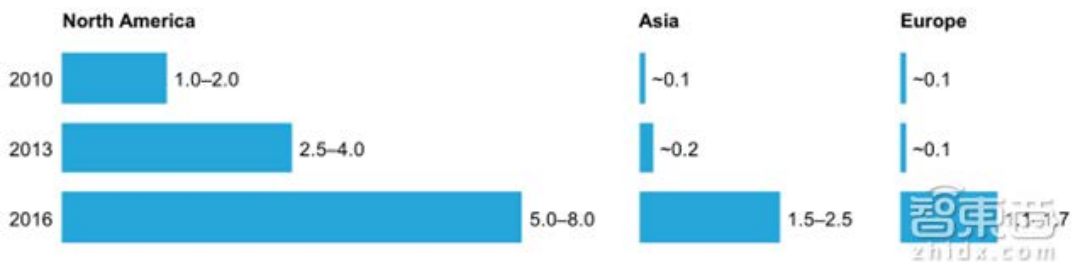
对于从零开始部署 AI 的公司而言，最重要的则是踏踏实实的构架数字生态系统，因为 AI 的本质是数据训练驱动的，没有捷径可走，因此早期先发优势会比较明显。如果不想花大把精力构建数字生态，则可以考虑购买工作流程、计算能力以及知识背景相合适的 AI 工具。总是还是要强调一点：无缝的数据访问是推动 AI 商业化应用的关键。

最后来谈谈 AI 社会效益，也就是政府和劳动力市场的问题。首先，劳动力市场不要想着跟 AI 正面竞争，而是要考虑将其融入已有的生态并尝试激发新的工种；再说政府，目前全球都在试图建立 AI 中心，美国强大的投资环境和科学界和工业界历史优势明显，中国方面，高等学府（清华、北航、北大）科研成效显著，政策支持下产业（百度、中兴、华为）和投资环境也比较乐观。麦肯锡指出，政府需要设定政策吸引 AI 人才和投资以加强全球竞争力，并在道德和法律方面加强监管力度。



... and the external investment behind their growth¹

\$ billion (estimate)



*全球各地的智能化发展示意及其外部投资增长情况（六大 AI 中心，北深上榜）

企业 AI 转型早期的阶段性策略



*AI 技术采用更多的出现在数字化部署比较成熟的行业

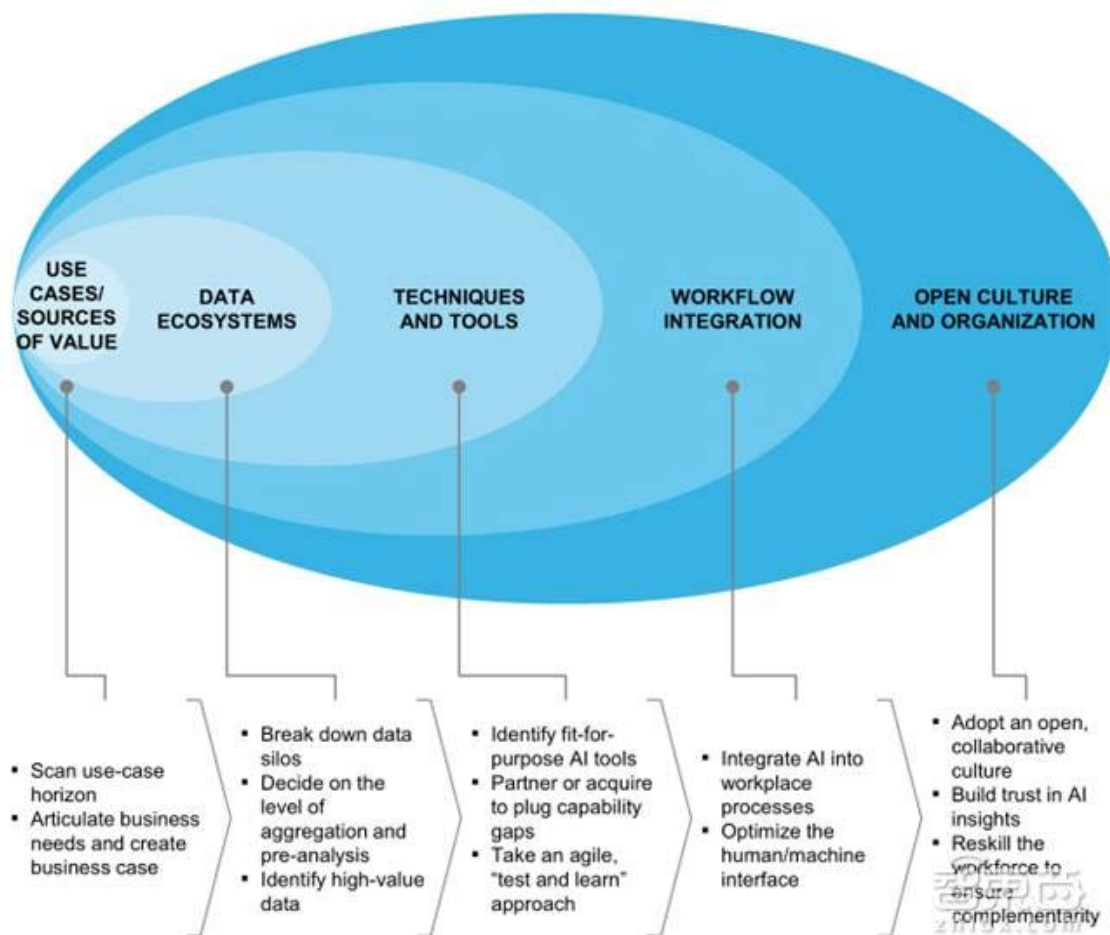
如前所述，AI 的投资金额这三年来保持一个高速增长，这也意味着它从一个实验室技术逐渐成长具备商用潜力的焦点。与此同时，AI 实际的商用案例却并不多，因此，早期 AI 商用的阶段性特征可以说是一种前沿数字化，是企业数字化转型与智能化转型的过渡期。因此，AI 技术采用更多的出现在数字化部署比较成熟的行业，而监管方面的担忧也是医疗保健领域从业人员望而止步的原因。这一阶段的企业部署非常关键，数字鸿沟将进一步扩大，AI 优先的企业更容易获得结构化数据，帮助员工剖析商业案例增强业务收入，吸引投资和供应商，强化技术技能，降低固定成本，决定智能化后续发展的市场竞争力差距。

那么，早期 AI“冒险家”都是怎么做的呢？



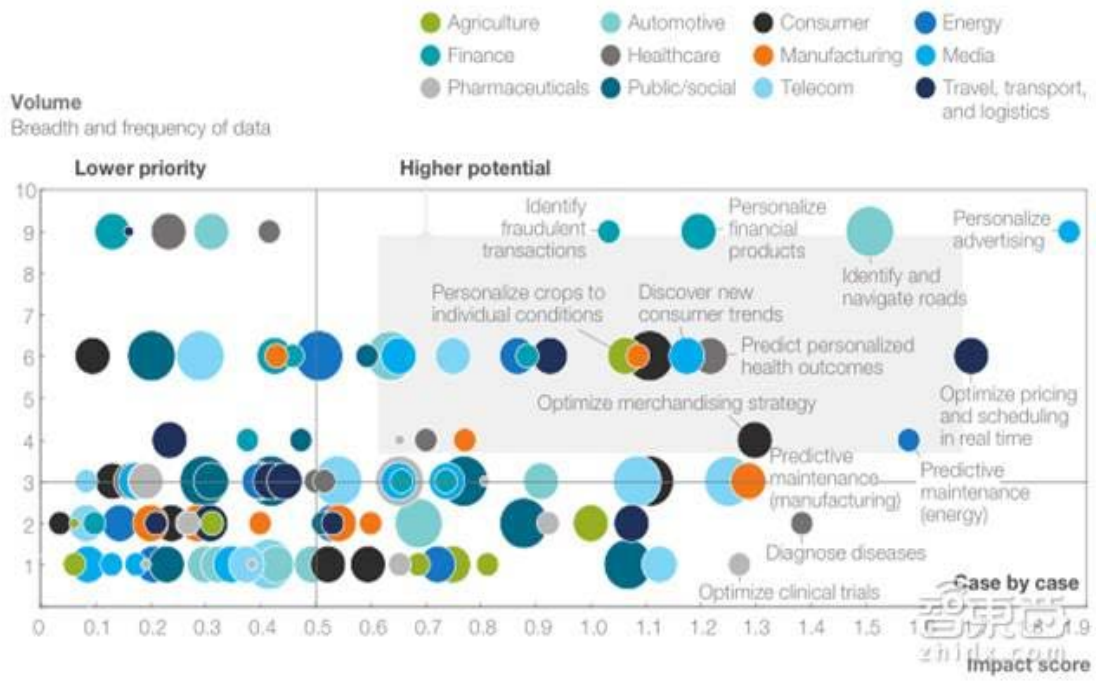
*企业 AI 转型的五大关键（成功用例、数据生态、技术工具、无缝接入工作流程、开放的文化和组织）

Successful AI transformations require elements similar to those found in successful digital and analytics transformations

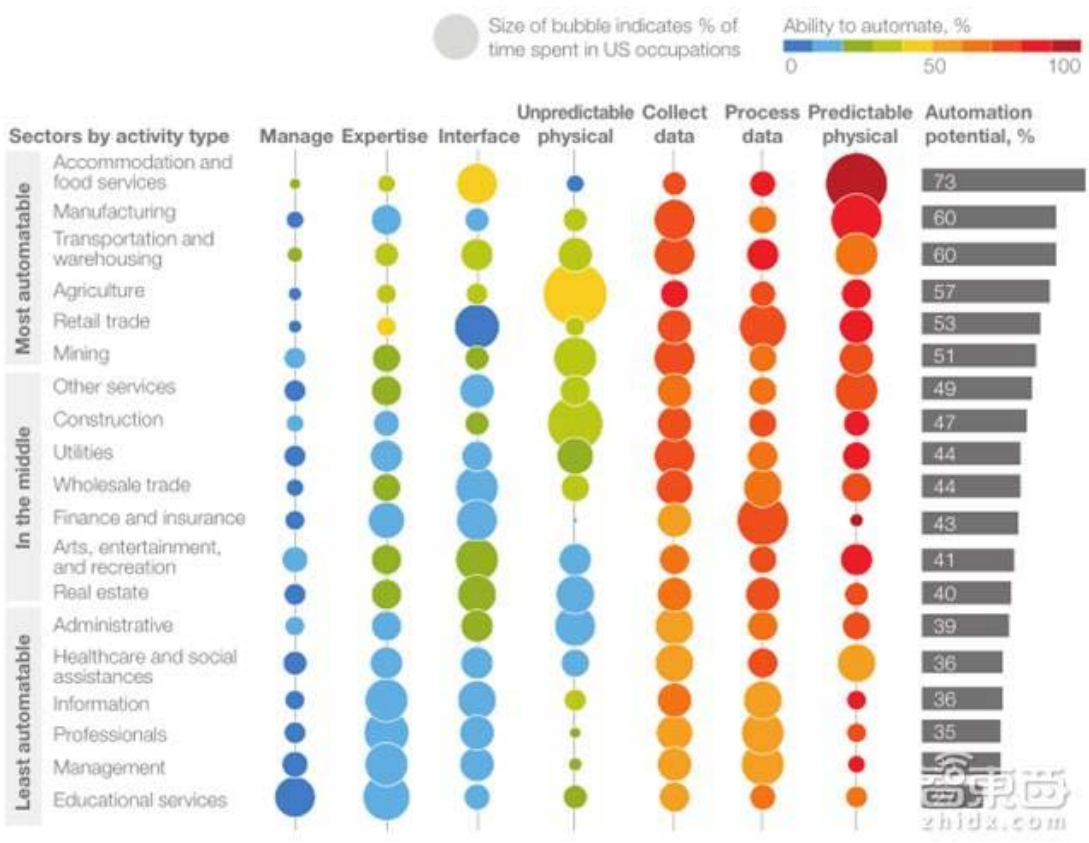


*企业 AI 转型的五大关键详解

调研发现，大部分的企业在采用 AI 技术的时候会采用更多元的工具，而不是押宝一种技术，这与当年数字技术发展前期是类似的。这种多元策略是很常见的，也是针对不同行业领域有所调整的，比如医疗领域就更倾向于将语言技术整合到核心业务中。而价值链应用方面，AI 模式则主要表现在客户服务，诸如销售和市场营销，以及运营和产品开发等功能，财务管理应用相对落后，这与数字技术应用早期又是相似的。



*机器学习在各个行业中的应用潜力（色块代表不同行业）

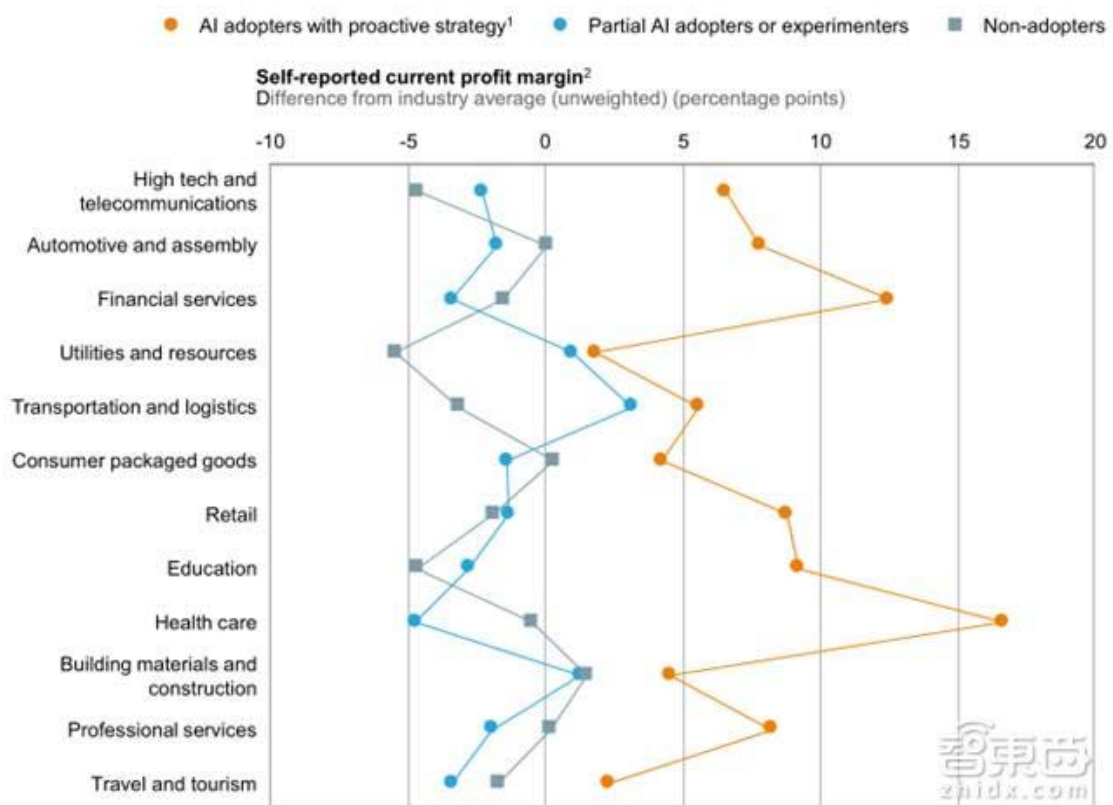


*不同行业的不同部门具有不同的自动化潜力

AI 早期与数字技术应用早期不同的点在于，企业更倾向于将 AI 应用于核心业务，扩大行业价值的广度和深度，比如汽车制造就将它用到制造环节、系统开发环节。而数字技术早期，企业的态度是追求保持利润率，并不会直接在核心业务上进行整合尝试。

很多企业因为追求创收而采用了 AI，结果发现投入技术整改的成本要少于预期。调研显示，被我们评为 AI 技术采用先驱的公司比之其他态度更为谨慎的公司，在市场扩张机会上强了 27%，并在市场份额扩张机会上强了 52%，利润率这比大多数行业的行业平均水平高出 3 到 15 个百分点，投资方案也显得更成熟。从另一个角度看，平均营收所需投资的成本减少了。

AI adopters with a proactive strategy have significantly higher profit margins



*各行业不同 AI 采用率企业的利润率调查（橙点为 AI 采用先锋，对应更高利润率）

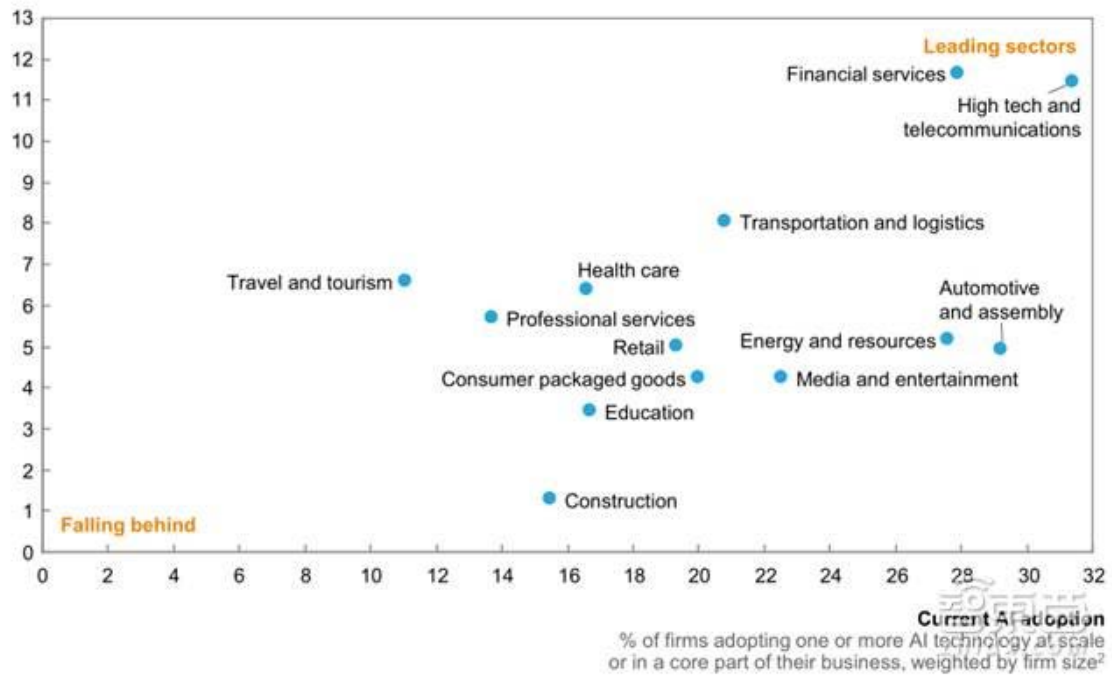
各行各业都要面对的三个挑战

调研还显示，AI 技术采用对高管，包括总裁和 IT 高管，的战略眼光提出了比较高的要求，他们需要执行套件来生成需要，并提供强有力的支持。AI 技术增长还取决于各部门和企业能否克服技术、商业和监管方面的问题，这也就是为什么金融服务、零售、医疗保健和先进的制造业的 AI 化会走在各领域的前列。

Sectors leading in AI adoption today also intend to grow their investment the most

Future AI demand trajectory¹

Average estimated % change in AI spending, next 3 years, weighted by firm size²



*不同领域的 AI 投资意向（横轴为目前 AI 采用率，纵轴为未来采用趋势）

技术挑战是行业之间的一个重要的差异化因素，需要针对目标工程案例调整，涉及大量数据人才。金融服务、高科技和电信等行业已经产生了存储了大量结构化数据，但是其他的领域数字化就不是发展的很成熟。

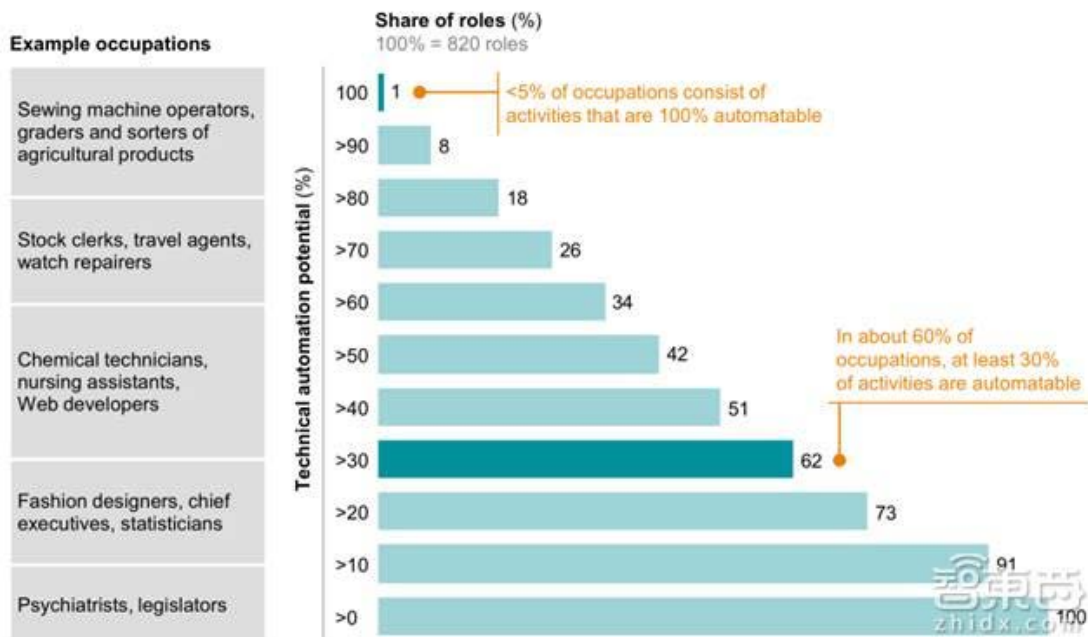
商业潜力的差异也存在于各个行业，比如金融服务由于智能化的结构数据带来信息透明和高效安全运作，自然衍生出了模型预测，快速和准确的决策，个性化的客户联系等服务，被预测将发展成 2020 年 30 亿美元规模的市场。对于零售业，AI 商业潜力主要表现在库存预测，医疗领域则表现在诊疗系统优化带来的成本节约和诊疗准确性。

监管的问题则具有用例针对性，要考虑社会障碍、数据隐私安全、伦理问题、算法透明度、产品责任制，甚至机器人税等。对此，麦肯锡建议我国政府采取 5 个优先级战略：

- 1、构建一个健壮的数据生态系统：采取数据标准，公开公共部门数据，鼓励国际数据流交换；
- 2、在传统产业中扩大人工智能：用税收抵免和补贴工具，以及在政府事务中开拓创新的方式应对传统行业战略意识缺失以及成本考量问题；
- 3、加强专业人工智能人才的建设：为了解决中国的人工智能人才缺口，政府需要投资与教育相关的教育研究项目，重新定位教育系统，使其更注重创新数字技能，并制定移民政策以吸引最优秀的全球人才；
- 4、密切合作职业培训学校，确保教育和培训系统的准备工作，保留劳动力市场；
- 5、在道德和法律层面建立框架，监督和管理人工智能活动，并带头成立一个国际治理机构来促进和平，人工智能技术的包容性和可持续发展。

While few occupations are fully automatable, 60 percent of all occupations have at least 30 percent technically automatable activities

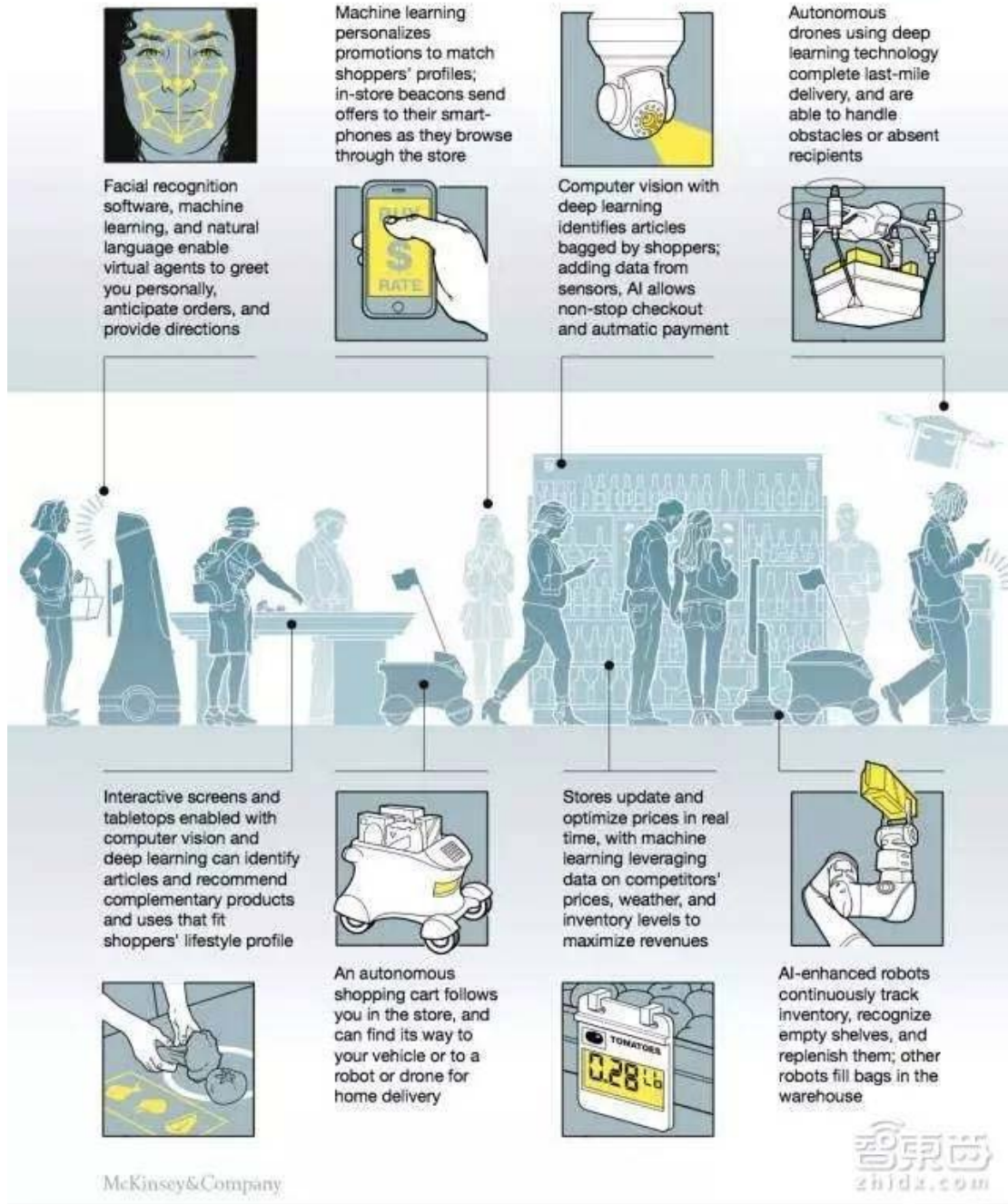
Automation potential based on demonstrated technology of occupation titles in the United States (cumulative)¹



*职业自动化潜力（AI带来的就业和生产问题）

附：AI 用例示意

Retailers can know more about what shoppers want—sometimes before shoppers themselves



*AI 零售（面部识别、移动支付、自动化支付、无人机交付、生疏分拣、智能物流、数据化仓库、物流机器人）

AI can make the smart grid smarter and reduce the need for utilities to add power plants



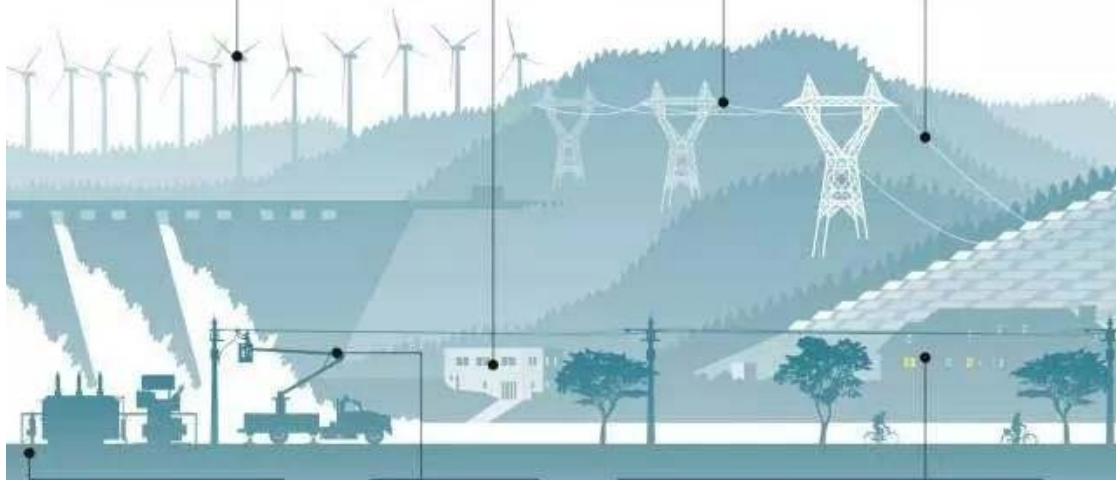
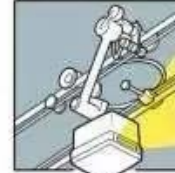
Sensors and machine learning allow for by-the-minute adjustments to maximize generation efficiency by adjusting to changes in wind conditions, for example

Machine learning-enabled forecasting anticipates supply and demand peaks, and maximizes the use of intermittent renewable power

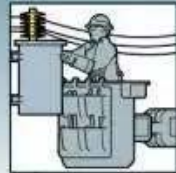


Smart wires combine with machine learning to enable real-time power dispatching, and optimize it to current grid load and to buildings' asset portfolios

Drones and insect-size robots identify defects, predict failures, and inspect assets without interrupting production



Few technicians remain, but they spend more time on problem solving; in place of logging inspection status by hand, documents are automatically logged and routed



Virtual agents automate call centers, and automatically segment consumers based on service history; machine learning offers early warning of bad debts



Field workforce receives real-time updates to decrease response times and reduce the impact of outages



Smart-meter data and machine learning enable utilities to offer services based on usage, weather and other factors

McKinsey&Company

智东网
zhidong.com

*AI 能源、生产（基于算法的能源信息传感和传输优化、工作机器人、AR 辅助型工作、安全辅助、数字身份、精确测绘）

AI in health care: quicker diagnoses, better treatment plans, and improved health insurance



Machine learning program analyzes patients' health remotely via mobile device, compares it to medical records, and recommends a fitness routine or warns of possible disease

Autonomous diagnostic devices using machine learning and other AI technologies can conduct simple medical tests without human assistance, relieving doctors and nurses of routine activities



AI-powered diagnostic tools identify diseases faster and with greater accuracy, using historical medical data and patient records

AI algorithms optimize hospital operations, staffing schedules, and inventory by using medical and environmental factors to forecast patient behavior and disease probabilities

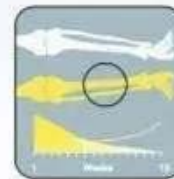


AI tools analyze patients' medical histories and environmental factors to identify people at risk of an illness and steer them to preventive care programs



Virtual agents in the form of interactive kiosks register patients and refer them to appropriate doctors, improving their experience and reducing waiting time

Personalized treatment plans designed by machine learning tools improve therapy efficiency by tailoring treatment to specific patients' needs and medical



AI insights from population health analyses give payers an opportunity to reduce hospitalization and treatment costs by encouraging care providers to manage patients' wellness



*AI 医疗（可穿戴设备、药物测试、智能诊疗、药物使用建议、医疗图像识别、个性化治疗、健康数据分析）

智东西认为，数字化转型的成功示例告诉我们，智能化转型势在必行。而目前，也就是企业 AI 改革的初期，技术转型过渡期，本质也就是数字鸿沟扩大

期。麦肯锡的行业调研明确指出，结构化数据对于企业利润率提高、市场竞争力提高、市场广度和深度提高，有着非常显著的作用。

对于处在急流正中的高科技行业、电信行业、装配/制造业、金融服务业而言，就必须小步快调，尝试将多元的 AI 技术整合到核心业务，扩大试点应用规模，保持灵敏嗅觉以发现新的赢利点，契合现有的工作流程，制定适合产业、业务特征的战略计划。而对于在数字化转型落后的企业而言，不要想着走捷径，首先还是要踏踏实实构建数字生态，或者掏钱买工具。

