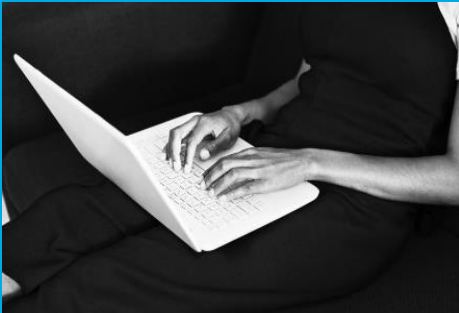**iShares**®

by **BlackRock**

AI: THE OPPORTUNITY IS ANYTHING BUT "ARTIFICIAL"

Is Artificial Intelligence the next big thing?

A trip down memory lane...

90's/2000's
The rise of the internet

2010's
The smartphone becomes ubiquitous
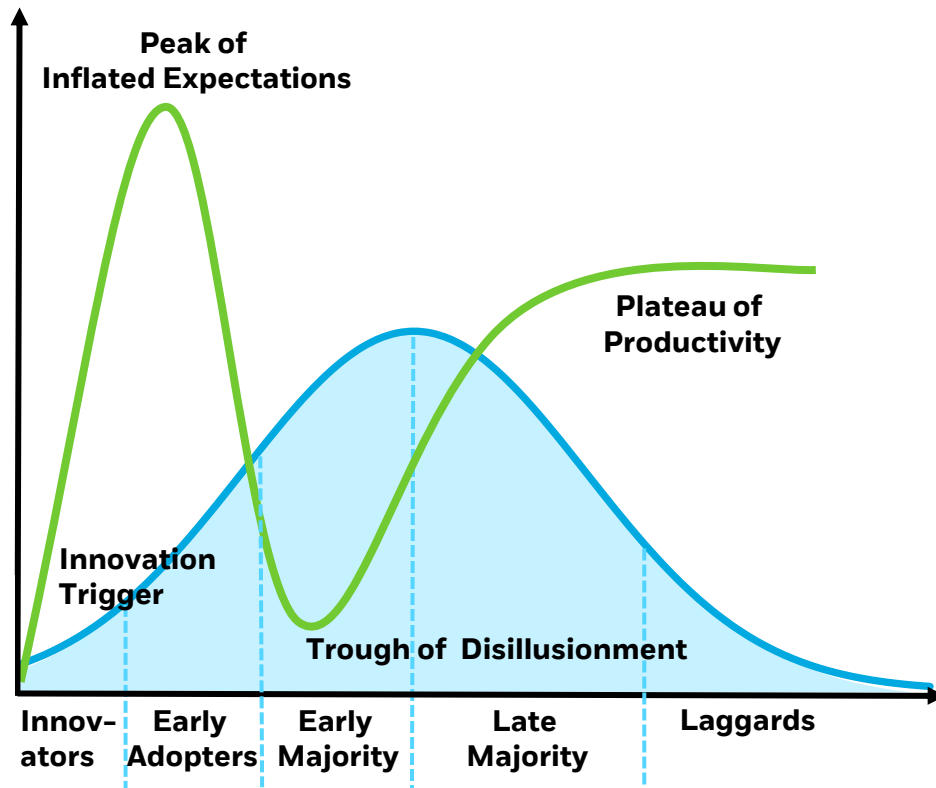
2023
AI enters the mainstream

Or is AI just another fad?

The past few years has seen the market become over exuberant about certain technologies.

New technology can get hyped up before actual adoption occurs

● Hype Cycle VS ● Adoption Curve

Peak of Inflated Expectations

Plateau of Productivity

Innovation Trigger

Trough of Disillusionment

| Innov-ators | Early Adopters | Early Majority | Late Majority | Laggards |

Disruptive Technologies

2015
"My guess for when we will have full autonomy is approximately three years."
– **Elon Musk**

2020
"Bitcoin reminds me of gold."
–Paul Tudor Jones

2022
"Metaverse isn't a thing a company builds. It's the next chapter of the internet overall."
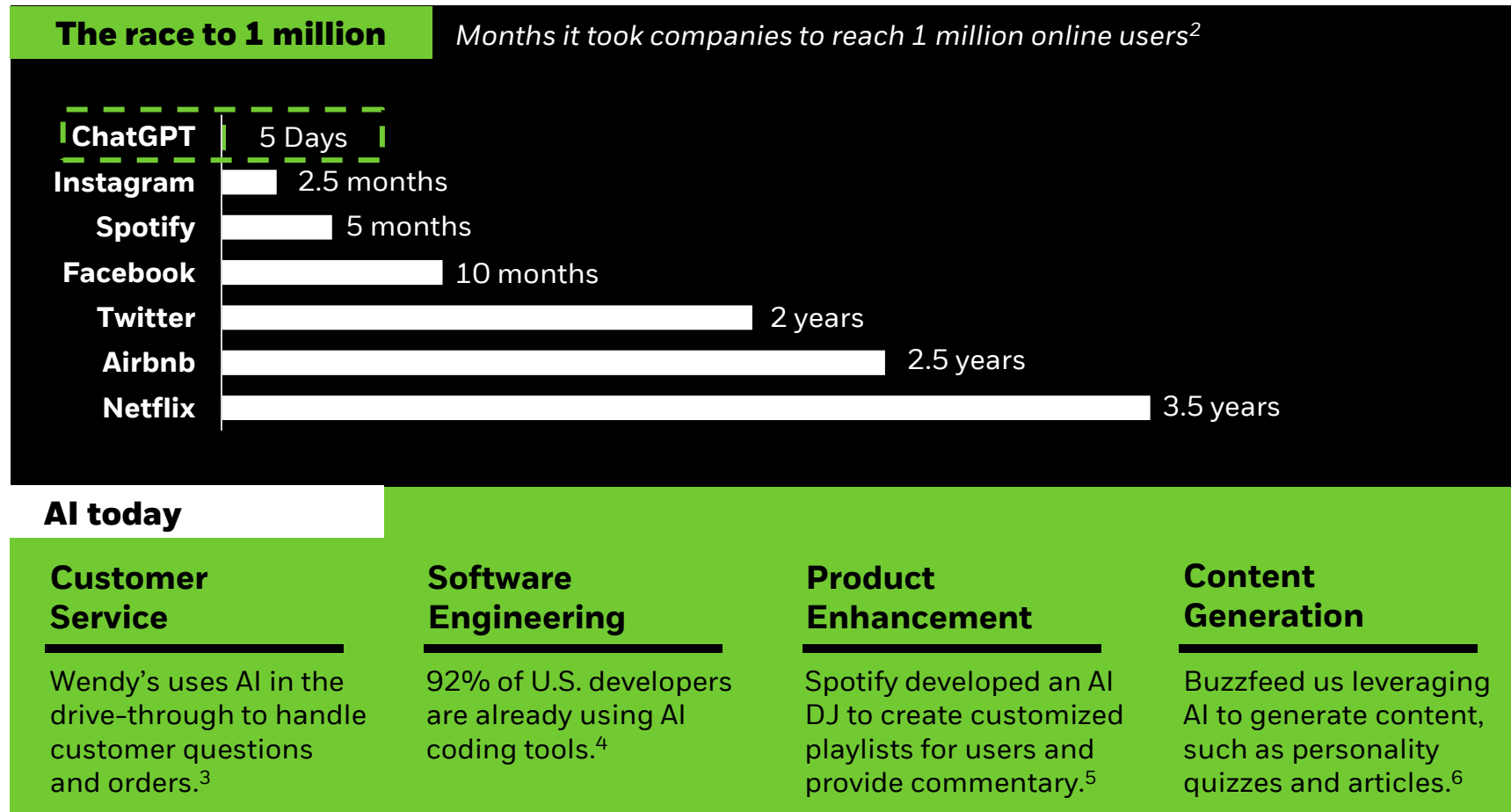– **Mark Zuckerberg**

2023
"[AI] will change the way people work, learn, travel, get health care, and communicate."
– **Bill Gates**

Source: Gartner, "What's new in the 2022 Gartner hype cycle for emerging technologies"

AI – more than just a fad, it's reality.

Artificial intelligence (AI) is disrupting the way we do things – in a good way. The Generative AI market is expected to grow from $40 Billion in 2022 to **$1.3 Trillion in 2032**[1].

The race to 1 million
Months it took companies to reach 1 million online users[2]

Company	Time
ChatGPT	5 Days
Instagram	2.5 months
Spotify	5 months
Facebook	10 months
Twitter	2 years
Airbnb	2.5 years
Netflix	3.5 years

AI today

Customer Service
Wendy's uses AI in the drive-through to handle customer questions and orders.[3]

Software Engineering
92% of U.S. developers are already using AI coding tools.[4]

Product Enhancement
Spotify developed an AI DJ to create customized playlists for users and provide commentary.[5]

Content Generation
Buzzfeed us leveraging AI to generate content, such as personality quizzes and articles.[6]

1 Bloomberg, "Generative AI to become a $1.3T market by 2032, research finds", 6/1/23 **2** Source: Source: Statista, with data from company announcements via Business Insider/LinkedIn, as of January 24, 2023. Airbnb measuredas one million nights booked, Instagram measured as one million downloads **3** Wendys.com, "AI and Beyond", 6/2/23 **4** Github, "Survey reveals AI's impact on the developer experience, 6/13/23 **5** TechCrunch, "Spotify launches "DJ", a new feature offering personalized music with AI-powered commentary, 2/22/23 **6** CBS, "BuzzFeed to use OpenAI technology to create content", 1/26/23

It's been a long time coming...

1950

Turing Test: Computer scientist Alan Turing, introduced the "Turing test", which measures a machine's capability to mimic human conversation.[1]

1997

Deep Blue: IBM's chess-playing computer, Deep Blue, defeats chess world champion Garry Kasparov.[3]

2022

ChatGPT + Dall-E2: These two deep-learning models capture the world's attention, with GPT seeing one million users in just five days.[5]

The history of AI is longer than you may think!

1959

Unimate: General Motors develops Unimate, the first industrial robot, which is leveraged on assembly lines.[2]

2011

Siri: Apple acquired Siri, the developer of a virtual assistant app. Siri is integrated into the iPhone 4S the following year.[4]

1 ThinkAutomation, "The History of the Turing Test" **2** Automate.org, "The First Industrial Robot" **3** History.com, "This day in history" **4** TechCrunch, "Confirmed: Apple Buys Virtual Personal Assistant Siri", 4/28/10 **5** Reuters, "ChatGPT sets record for fastest growing user-base", 2/2/23

Pop quiz: which image is real?

1.

2.

3.

Generative AI: an overview

Generative AI describes algorithms that can be used to create new content, including audio, code, images, text, simulations and videos.*

Companies are spending big to redesign their tech

Large Language Models (LLM) require many resources to be built, look at Chat GPT for example:

Data inputs needed for Chat GPT................................ **175 billion inputs**

Estimated annual cost to power Chat GPT[1]............... **$250 million**

GPUs required to build Chat GPT[2].............................. **20–30 thousand GPUs**

Rough estimate of cost to build Chat GPT................ **$200 million**

36+ different generative AI tools across image, music, video, text, etc. are **already in the market**

Generative AI: Why now?

Why now?

1 **More data available**
Between 2018 and 2020, more data was created than all prior human history.[1]

2 **New, user-friendly interfaces**
Text-based interactions with AI enables non-coders to harness its capabilities.

3 **Faster & smarter GPUs**
Today's AI models require 600,000x more processing power than cutting-edge models from 10 years ago.[2]

The difference: new capability

Recurrent Neural Network (RNN)
RNN's leverage information from previous steps to influence future outputs. RNNs are particularly strong at understanding context, making them useful in areas like natural language processing and speech recognition.

English ———————————→ *French*

The general advanced his **tanks**   **Chars**
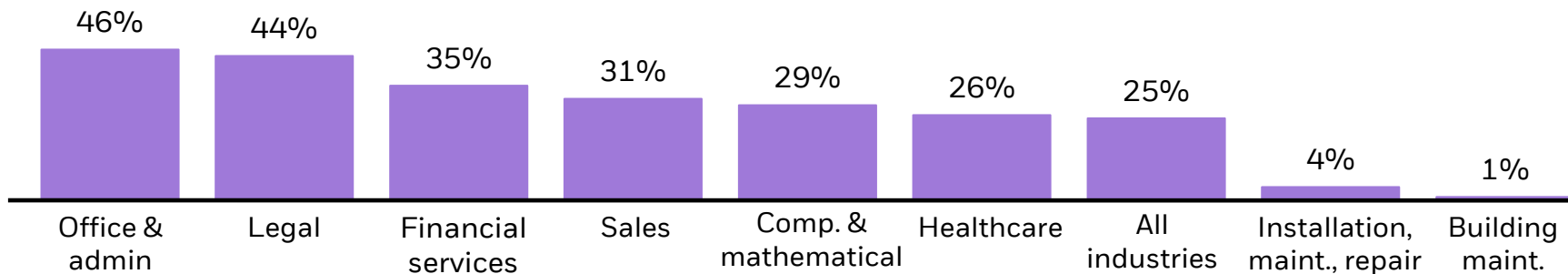
The boat refilled its water **tanks**   **Réservoirs**

1 Georgetown Center for Security and Emerging Technology, "AI and Compute", Jan 2022

AI's impact

AI touches the entire economy, from legal to healthcare

Share of industry employment exposed to automation in the U.S.[4]

Office & admin	Legal	Financial services	Sales	Comp. & mathematical	Healthcare	All industries	Installation, maint., repair	Building maint.
46%	44%	35%	31%	29%	26%	25%	4%	1%

A closer look at well-known industries:

Healthcare

AI has increased breast cancer detection accuracy by 37%, while reducing the number of biopsies taken by 27%.[3]

Investment implications:
Genomics, biotechenomics, medical devices, neuroscience

Legal

Some experts believe AI can automate up to 25% of a lawyer's daily tasks.[1]

Investment implications:
Software

Financial Services

Could generate an additional $340B in total revenue from leveraging AI.[2]

Investment implications:
Fintech, blockchain

How BlackRock leverages AI for investing

BlackRock Systematics' earnings call model has been fine-tuned to predict post-earnings market reactions with a high level of accuracy.

**Predictive performance of OpenAI GPT models
VS. BLK proprietary models**
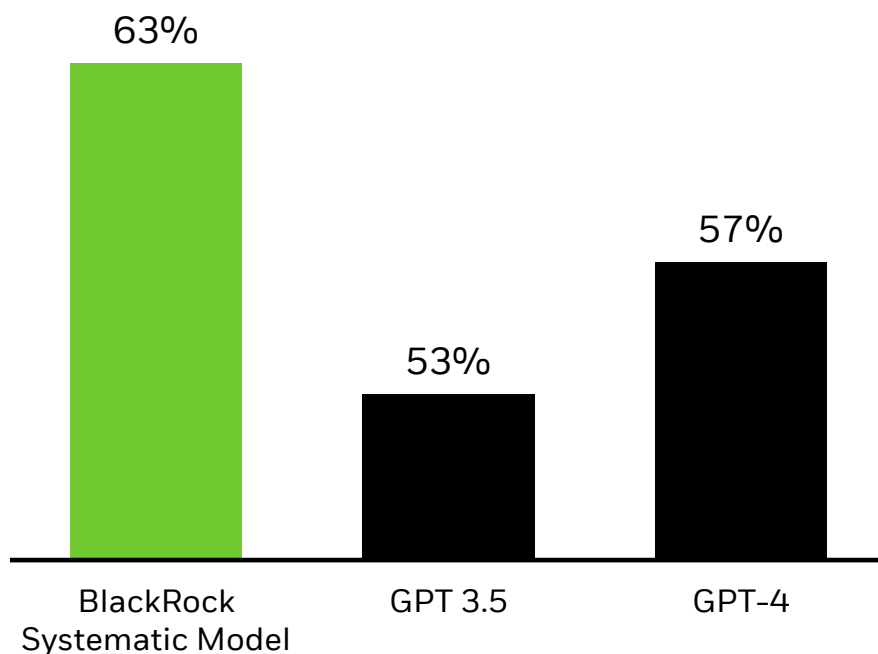
- Select a random sample of company earnings calls in 2022

- Feed earnings call transcripts to GPT and ask for forecast of market reaction

- Compare with SAE's proprietary earnings call model, fine-tuned on ~30GB of financial text to forecast post-earnings market reaction

⚠ AI challenges to be aware of

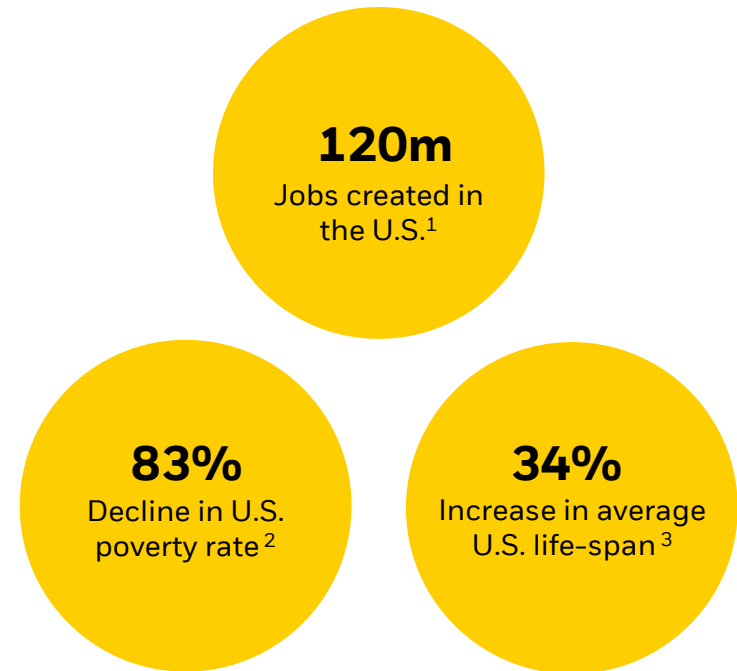| 1.	2.	3.
Regulation	**Cyberthreats**	**Ethical concerns**

AI fearmongering is not new

Thoughts on new tech 100 years ago
1921 New York Times Article

What really happened over the last 100 years?

120m
Jobs created in the U.S.[1]

83%
Decline in U.S. poverty rate[2]

34%
Increase in average U.S. life-span[3]

AI fearmongering continues still

Thoughts on AI in current times
2022 New York Times Article

OPINION

Does ChatGPT Mean Robots Are Coming For the Skilled Jobs?

Why shouldn't you worry now?

90%
Potential reduction in accidents due to self-driving cars[1]

1.5%
Projected growth in annual labor productivity due to AI[2]
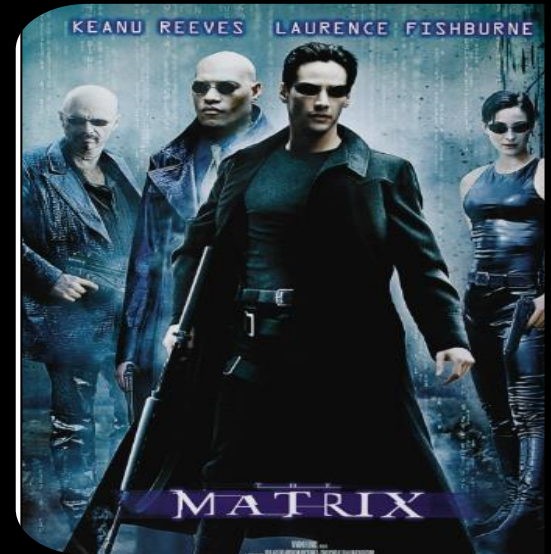
+12M
Net jobs expected to be created by AI through 2025[3]

1 University of Michigan, Autonomous Vehicles Fact Sheet, accessed on 9/6/23 **2** Goldman Sachs Top of Mind, "Generative AI, Hype or Truly Transformative" **3** USA Today, "Is AI a threat to the job market? Not necessarily and here's why", 8/15/23

Could ChatGPT be the next "Skynet"? Do we need Neo?

Multi-modal AI in action today

To celebrate the 20th anniversary of his talk show, Jimmy Kimmel uses the power of AI to talk to his 2003 self revealing a glimpse into the possibilities of AI already in use.

What's next for generative AI?

Generative AI as a service

Cloud-based generative AI services will allow business to access AI tools without the significant upfront investment in infrastructure.

LLMs trained on private data

Industries ranging from healthcare to retail to finance have vast data sets which can be leveraged for AI tools which can understand industry specific terminology.

Enterprise Adoption

Employers are looking for ways to make their employees more productive. AI powered search, chat and office apps are rolling out.[1]

Multi-Modal AI

Systems can process and integrate inputs from multiple modalities such as text, images and sounds, allowing for more customized content development.

1 Microsoft, "Furthering our AI ambitions", 6/18/23

AI is a double-edged sword

While AI has many positive use-cases, its power can be dangerous if unchecked. Many tools are being developed to help us all keep AI in check:

Deep-fake detection

Deep-fake videos have proliferated, ranging from goofy to dangerous. Intel's "fake catcher" can detect fakes with a 96% accuracy rate.[1]

Plagiarism detection

Maintaining the integrity of our classrooms is crucial. A team of researchers from the University of Kansas has developed a tool that prove AI detection in papers with 99% accuracy.[2]

Bias detection

AI auditing startups are a burgeoning industry, as cities like New York have passed laws that require AI companies to secure "bias audits" of their algorithms.[3]

Privacy protection

Deep learning models require significant dataa inputs. In sectors like healthcare where data is often personally sensitive, technologies such as federated learning allow data to be anonymized and aggregated.[4]

1 Intel Newsroom, 11/14/22 **2** Forbes, "New tool can tell if something is AI-written with 99% accuracy", Ariana Johnson, 6/7/23 3 Protocol, "A new wave of AI auditing startups wants to prove responsibility can be profitable", 1/3/22 **4** IBM, "What is federated learning", 8/24/22

Impacts of AI

1ST ORDER BENEFICIARIES

AI developers

such as those companies building LLM models, developing predictive analytics, or creating new neural networks.

AI enablers

such as semiconductor companies, whose chips are powering deep learning models. ChatGPT required up to 10K chips during training.[1]

Digital infrastructure

85% of companies say AI and machine learning infrastructure spending will increase, companies such as data centers and cell towers may benefit.[2]

2ND ORDER BENEFICIARIES

Software companies

may benefit as programs automate data entry & analysis. AI software will grow 50% faster than overall software market over the next two years.[3]

Healthcare

as drug discovery timelines are condensed down from the current twelve-year period it takes for drugs to move from lab to patients.[4]

Media & marketing companies

with 30% of outbound marketing messages synthetically generated by 2025, up from 2% in 2022.[5]

Key takeaways

1
___

AI is not a fad

2
___

AI has recently taken a significant leap forward

3
___

AI is still in early innings

APPENDIX

What are mega forces?

Mega forces are the long-term, transformational themes driving our global economy & society

AI & Digitalization

Demographic Divergence

Geopolitics & Economic Competition

Transition to a Low-Carbon Economy

Future of Finance

Important Information

This material is provided for educational purposes only and is not intended to constitute investment advice or an investment recommendation within the meaning of federal, state or local law. You are solely responsible for evaluating and acting upon the education and information contained in this material. BlackRock will not be liable for direct or incidental loss resulting from applying any of the information obtained from these materials or from any other source mentioned. BlackRock does not render any legal, tax or accounting advice and the education and information contained in this material should not be construed as such. Please consult with a qualified professional for these types of advice.

Prepared by BlackRock Investments, LLC, member FINRA.