

UNITED STATES
PATENT AND TRADEMARK OFFICE



AI Innovation at America's Innovation Agency

AI in Government

May 2021

UNITED STATES
PATENT AND TRADEMARK OFFICE



Overview

1. What *is* the USPTO?
2. What does the USPTO have to do with AI?
3. Where does AI fit into the lifecycle of a patent or trademark application?
4. What issues arise in our AI development?
5. How will AI steer the global future of intellectual property?



**The USPTO: engine of America's
innovation economy**

What we do

- U.S. Patent and Trademark Office:
America's Innovation Agency
- Promote economic growth and scientific progress in U.S. and worldwide by:
 - Granting patents
 - Registering trademarks
- We give the American people a superpower:
Investing in *ideas*



The Congress shall have Power ... to **promote the Progress of Science and useful Arts**, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries;



The United States.

To all to whom these Presents shall come, Greeting.

Whereas Samuel Hopkins of the City of Philadelphia and State of Pennsylvania hath discovered an Improvement, not known or used before such Discovery, in the making of Pot ash and Pearl ash by a new Apparatus and Process, that is to say, in the making of Pearl ash 1st by burning the raw Ashes in a Furnace, 2^d by dissolving and boiling them when so burnt in Water, 3^d by drawing off and settling the ley, and 4th by boiling the ley into salts which then are the true Pearl ash; and also in the making of Pot ash by fluxing the Pearl ash so made as aforesaid; which Operation of burning the raw Ashes in a Furnace, preparatory to their Dissolution and boiling in Water, is new, leaves little Residuum; and produces a much greater Quantity of Salt: These are therefore in pursuance of the Act, entitled "An Act to promote the Progress of useful Arts", to grant to the said Samuel Hopkins, his Heirs, Administrators and Assigns, for the Term of fourteen Years, the sole and exclusive Right and Liberty of using, and vending to others the said Discovery, of burning the raw Ashes previous to their being dissolved and boiled in Water, according to the true Intent and Meaning of the Act aforesaid. In Testimony whereof I have caused these Letters to be made patent, and the Seal of the United States to be hereunto affixed. Given under my Hand at the City of New York this thirty first Day of July in the Year of our Lord one thousand seven hundred & Ninety.

G. Washington

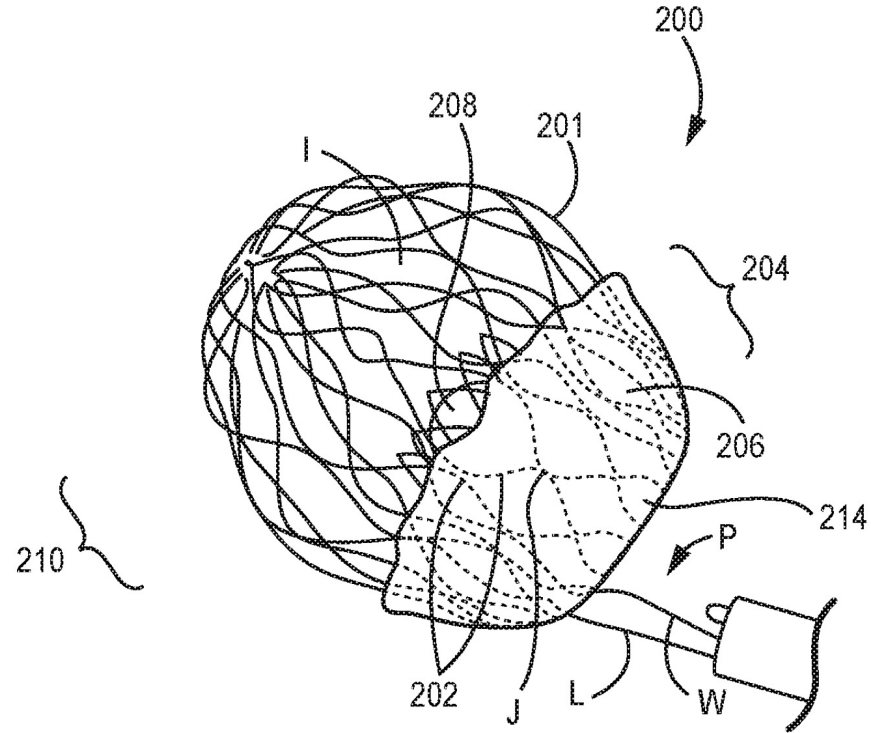
City of New York July 31st 1790. -

I do hereby certify that the foregoing Letters Patents were delivered to me in pursuance of the Act, entitled "An Act to promote the Progress of useful Arts"; that I have examined the same, and find them conformable to the said Act.

Edm: Randolph Attorney General for the United States.

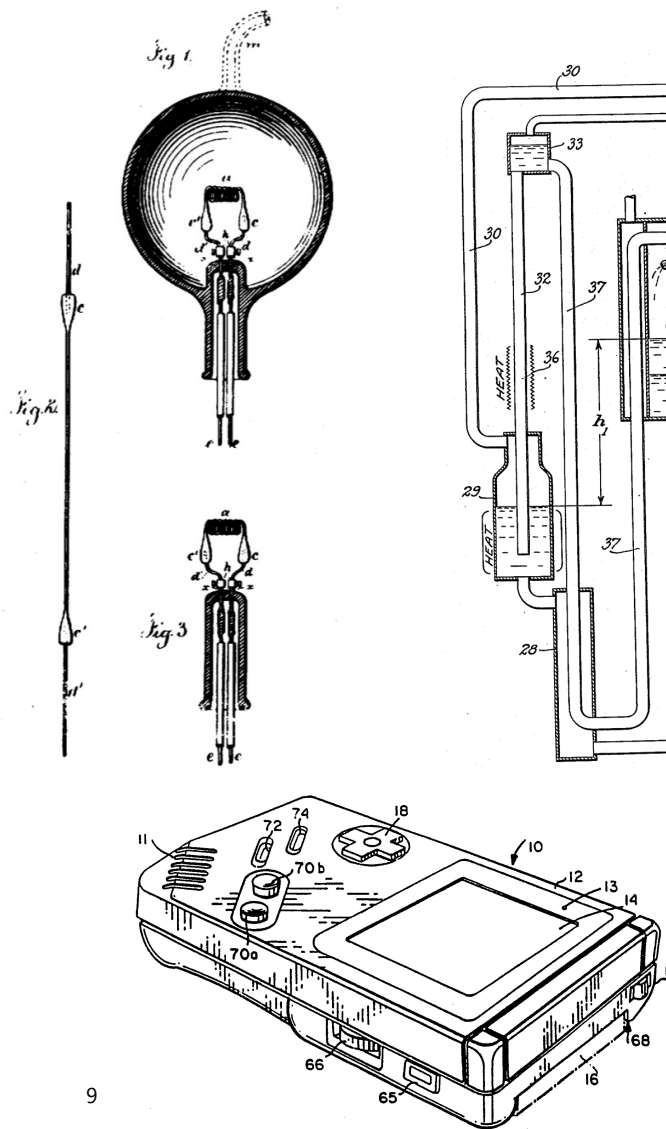
U.S. Patent X1
(Hopkins, 1790)

uspto



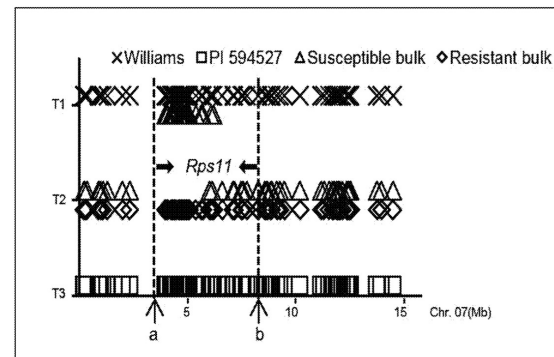
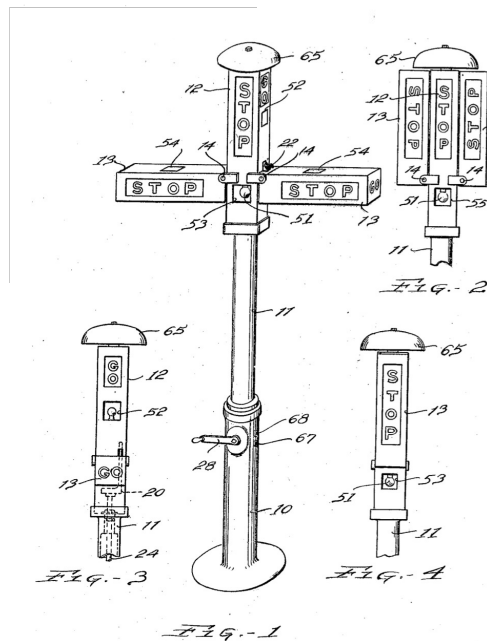
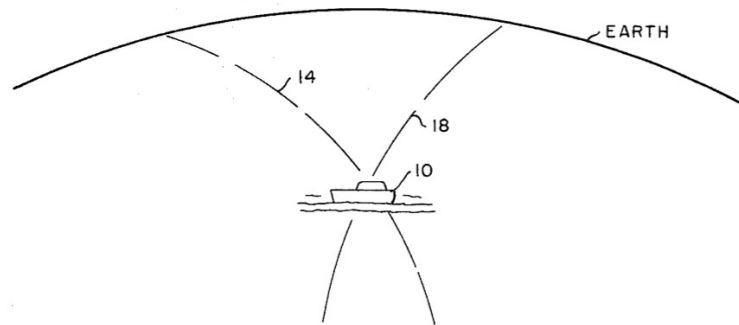
U.S. Patent **11000000**
(Diedering & Kumar, 2021)



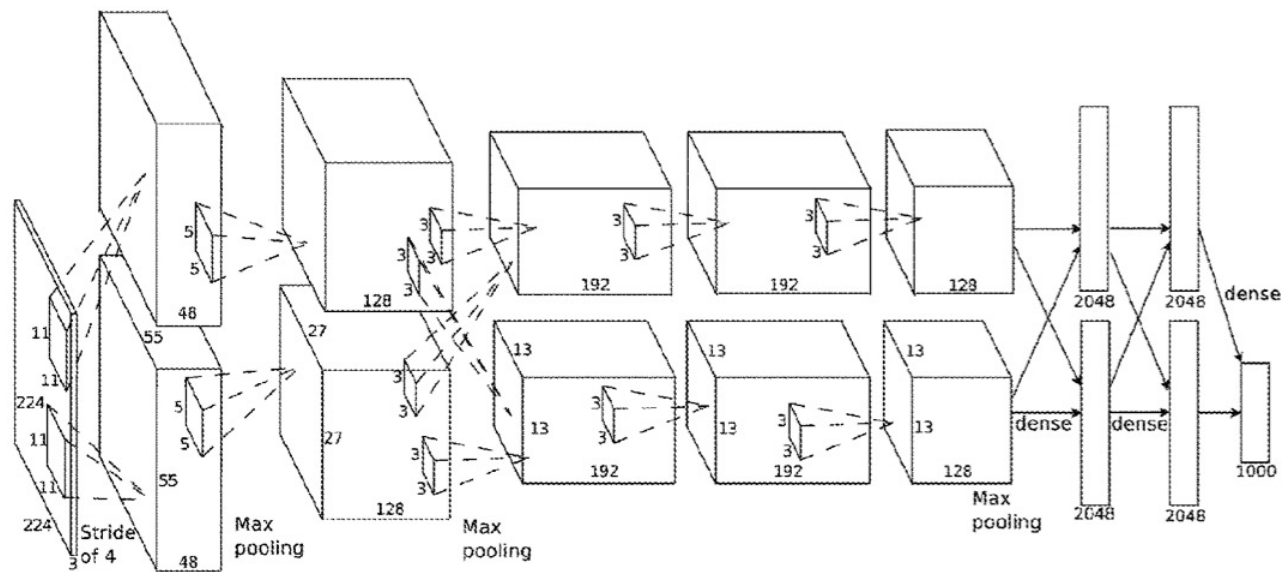


12
SATELLITE

16
EARTH

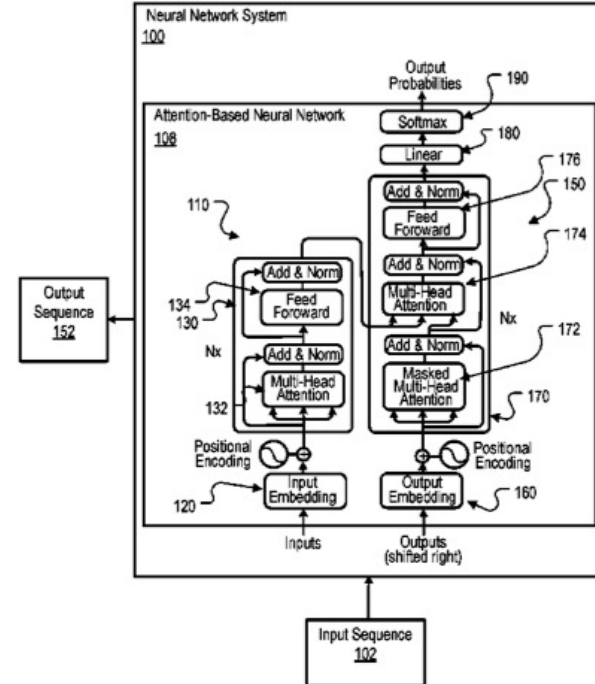
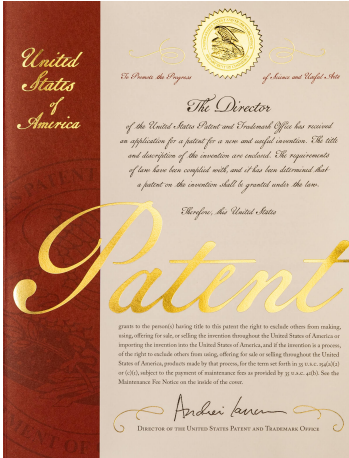


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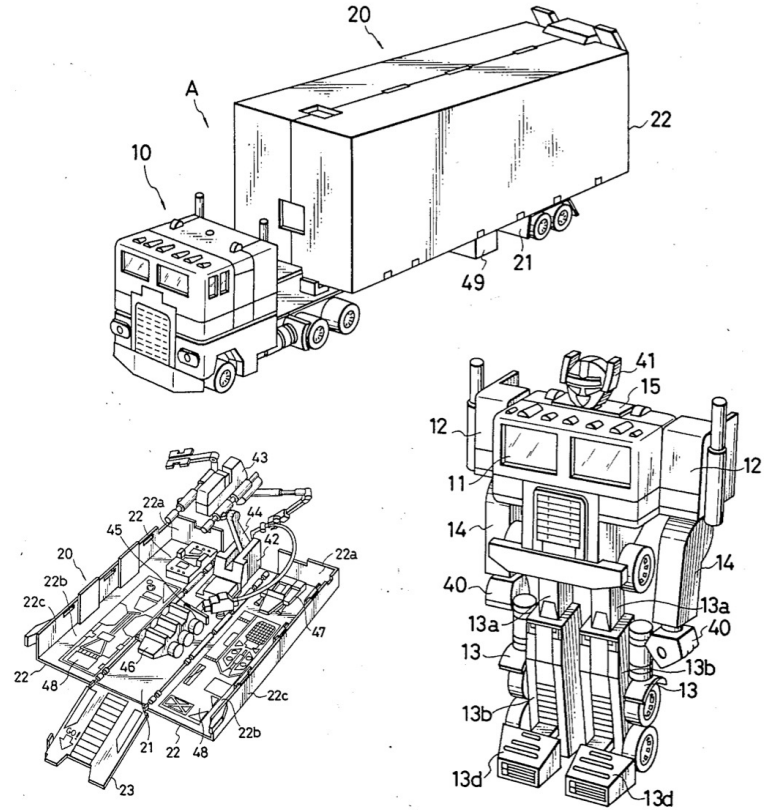
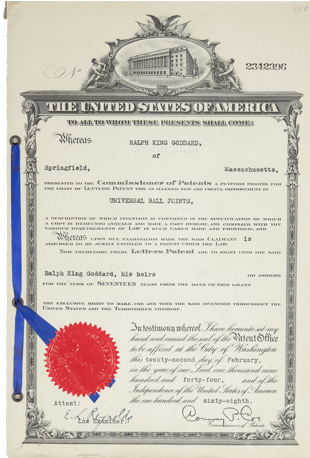
U.S. Patent **10635966**
(Krizhevsky et al., 2020)



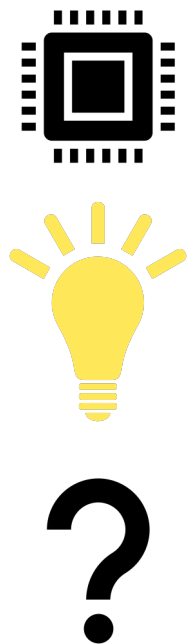


U.S. Patent **10956819**
(Shazeer et al., 2021)





U.S. Patent **4516948**
(Obara, 1984)



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**The USPTO & AI:
influencer, consumer, contributor**

AI influencer

- Constitutional and statutory mandate: **secure IP rights to innovators.**
 - IP: foundation of the innovation economy.
 - USPTO's goal: provision timely & reliable IP rights.
- Office of the Under Secretary of Commerce for Intellectual Property
 - Principal policy advisor to the Administration on all IP matters—including AI & IP.



AI consumer

- Our examiners have **one of the hardest jobs in the world**—and it's only getting more challenging with each day.
- More on this later.

AI contributor

- [USPTO Open Data](#)
 - Hundreds of terabytes
 - Remarkably rich data on our nation's scientific advances and commercial history.
- [The Pile](#) (Gao et al., 2020)
- Small but growing ecosystem of "AI for Patents" technologists



AI for examination

Why we examine

- Examination: ensure that a patent or trademark application satisfies the statutory requirements.
- Patents must:
 - Have eligible subject matter.
 - Be novel and non-obvious.
 - Disclose the claimed invention well enough to (1) show possession, and (2) enable others to use it.
- Registered trademarks must:
 - Be (or will be) used in commerce.
 - Be distinctive.



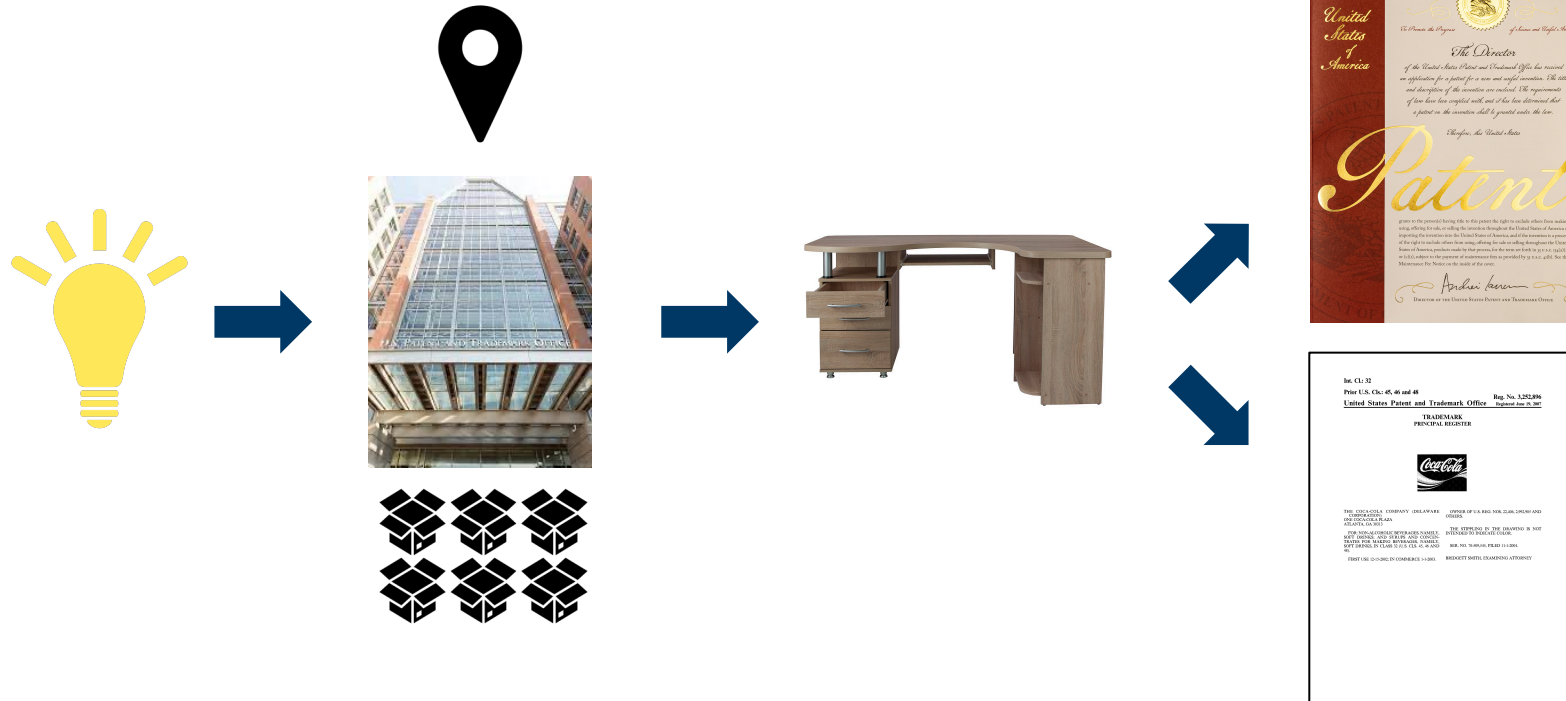
Lifecycle of an application



Step 0: Turning Ideas into Applications



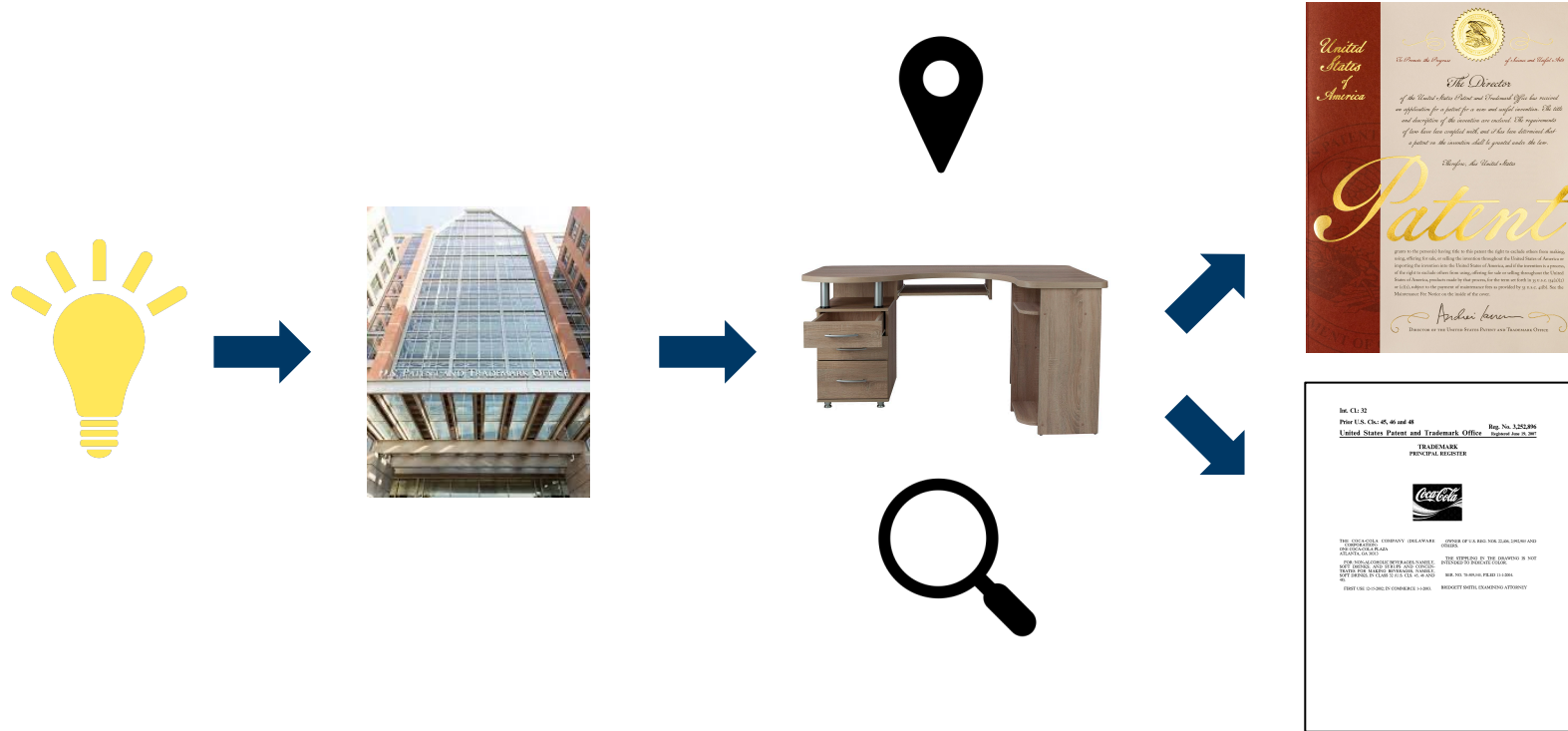
Lifecycle of an application



Step 1: Preprocess the Application



Lifecycle of an application



Step 2: Examine the Application



Lifecycle of an application



Step 3: Issue and Beyond



**Examination is one of the hardest
jobs out there!**



Patent Examining Corps

- Over 8,500 USPTO Patent Examiners!
- Each is a technical expert in their domain.
- Goal: ensure that patent grants from the USPTO are reliable.
- How?
 - Develop comprehensive understanding of the claimed invention.
 - Make sure it's patentable and described in sufficient detail.
 - **Ensure it hasn't been done before.**
 - Apply the facts, law, and judicial precedent to determine whether a patent should be granted.



Trademark Law Offices

- Over 600 USPTO Trademark Examining Attorneys!
- Each is a skilled trademark law practitioner.
- Goal: ensure the integrity of the U.S. trademark register.
- How?
 - Verify applicants' assertion that a mark is used (or will be used) in commerce.
 - Make sure that the mark won't be confused with other marks used in United States commerce.
 - Apply the facts, law, and judicial precedent to determine whether a trademark should be registered.



Experts: necessary but insufficient!

- USPTO invests in recruiting top-tier talent.
 - But examination is hard even for them!
- How do you prove that something *doesn't* exist without trudging through everything that *does* exist?
- ~~Needle in a haystack~~
Needle in 1000 haystacks.



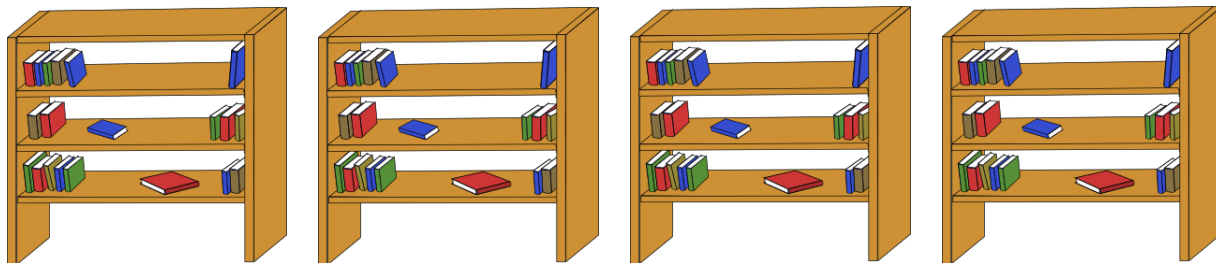
Progress makes their jobs harder!

- Economic growth & technical innovation: great for the world.
- Makes examination even *more* difficult!
- A lot has changed in 231 years.

1790



2021



bioRxiv

THE PREPRINT SERVER FOR BIOLOGY

medRxiv

THE PREPRINT SERVER FOR HEALTH SCIENCES



Why AI is hard—and what to do about it.

AI @ USPTO: incredibly domain-specific

- Many AI solutions being marketed to federal agencies.
 - Pretrained models.
 - Question answering.
 - Image classification & segmentation.
- Problem: patent examining isn't your typical business.
 - Nor is bank regulation.
 - Nor public health and disease prevention.
 - Nor national security and defense.
- We need **domain-specific solutions** to solve highly specialized problems.
 - Patent models trained on patent data using patent-appropriate metrics.
 - Trademark models trained on... you get the drift.



Proof of existence

- Mature technology considerations:
 - Cost, speed, resiliency, interoperability, security.
- AI: all of the above, but also:

Can it be done at all?

- If yes, how?
- If no, when might technology catch up?
- Standard procurement models: great for executing known solutions.
 - But much riskier to attempt “discovering the unknown”.

Getting it done

- Great, a solution exists...
Can your organization make it happen?
 - Workforce skills?
 - Infrastructure?
 - Change management?
 - Feedback loops?
 - Business alignment with customers?
 - Leadership alignment?

Current and future strategies

- **Current**
 - Collaborations with industry leaders.
 - Prototyping pilots and cloud sandboxes.
 - User engagement—taken to the next level.
- **Future**
 - Open challenges.
 - Staged procurement.
 - Resource reuse.

AI & the global future of intellectual property

AI inventions

- How do we best support AI innovators?
- What's special about AI inventions?
 - Complex and often-ambiguous technology.
 - Disclosure requirements.
 - Subject matter eligibility.

AI *for* invention

- What role will AI play *in* invention?
- Idle daydream? Well...
 - Technology: night and day between 2016 and 2021. What will 2026 & beyond bring?
 - Legal: we're already there.

Inventing with AI

- **Spectrum of AI involvement:**
 - From tab-autocomplete (e.g. Gmail, MS Word)
 - To full-on document generation models.
- **Generative models:**
 - Adequacy of disclosure?
 - Novelty & non-obviousness?
 - Attribution?

We're barely scratching the surface...

...of AI innovation.

...of AI for USPTO examination.

...of AI & IP.



USPTO AI engagements

- Industry practitioners & researchers.
- Federal agencies.
- IP Offices.
- International bodies & forums.
- Public stakeholders at large.

AI & IP events

- [June 25] [AI & Patents @ ICAIL 2021](#)
- [October 21] [AI in Government](#)
- [Quarterly] [Patent Public Advisory Committee](#) (AI subcommittee)
- Expect continued engagement from USPTO on AI.
 - [AI Landing Page @ USPTO](#)





Thank you!

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U.S. Patent and Trademark Office

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www.uspto.gov