



From archival dust to algorithm: Genealogy in the grip of artificial intelligence

dr. Mladen Borovič, mag. Nina Gostenčnik, dr. David Hazemali

20. 05. 2026

The central question

What happens when patience meets prediction?

ARCHIVAL DUST

Slow, material, source-based work.

A finding aid in hand.

A magnifier at the desk.

A register pulled from a shelf.

Patient comparison of one document with another.

ALGORITHM

Fast, scalable, predictive work.

Reading shelves overnight.

Suggesting candidates by the thousand.

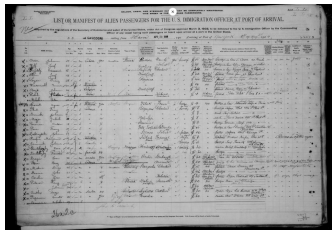
Transcribing handwriting; translating languages.

Proposing links no one researcher could ever notice.

Which questions does the algorithm itself fail to ask?

Genealogy as an archival discipline

Proof emerges from correlation, not from a single record.



Form 199 REGISTRATION CARD No. 199

Name in full: Frank Lozar

Place address: Ely, Minn.

Date of birth: Oct 22 1894

Place of birth: Naturalized Austria

Place of birth (if naturalized): Minnesota

Place of birth (if naturalized): Minnesota

By whom registered: Merchant

Place of registration: Ely, Minn. Supply Co

When registered: 10-22-94

Where registered: Ely, Minn.

Married (check): No

Place of marriage: Caucasus

Place of marriage: No

Place of marriage: No

I believe that I have verified these answers and that they are true.

sa Frank Lozar 18

LOZAR FRANK

Pvt Co E 83 Inf

Ely Minn

no	2 107 486	date	9-14-18	T	136 137
no	10-22-94			H	
no	9-21-17	no	9-13-18	Cl	91 256

U S VETERANS BUREAU

INDEX CARD



Ship manifest

Draft registration

Veterans Bureau card

Obituary

Cemetery record

How do fragments become trustworthy knowledge?

Why this matters for Slovenian history

~ 33 %

of the Slovenian-speaking population

left the homeland by 1914

Slovenian emigration before World War I was one of

Europe's more pronounced proportional outflows.

An archive without borders.

For Slovenians, genealogy is not a leisure pursuit. It is the methodological key to a third of the nation's modern history, which lies outside the present-day borders.

Records of Slovenian lives are scattered across the archives of the Habsburg Monarchy, of the United States, of Argentina, of Germany, of Australia.

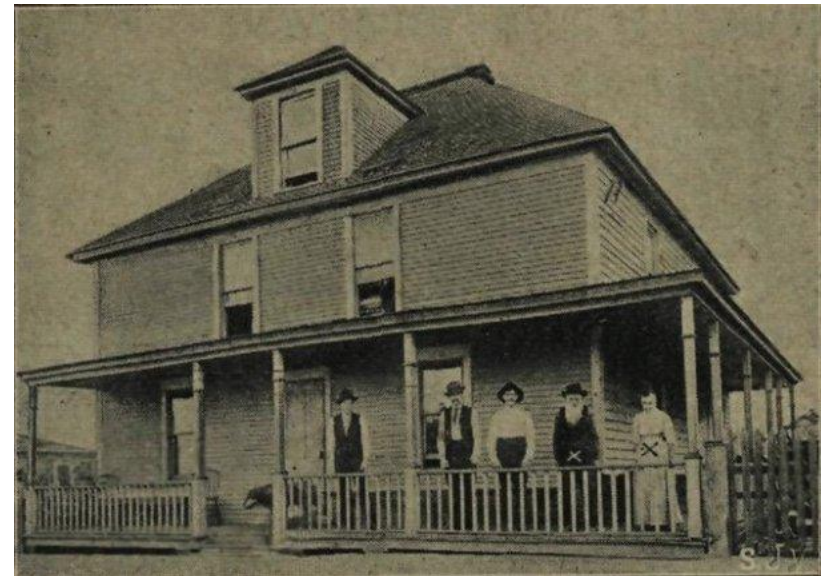
The Ložar family is one trajectory among hundreds of thousands.

The Ložar family: from Prigorica to Ely

Carniola (Kranjska), late 19th century → the Iron Range, Minnesota



Early Ely, Minnesota



The Ložar residence in Ely

Members of the Ložar family helped build one of the oldest Slovenian American communities in the upper Midwest.

Two Franks, one name

Same name, same town, same family. Who is who?



Frank Lozar Sr.

1836 – 1933

Pioneer settler



Frank Lozar Jr.

1894 – 1918

Killed in action, Saint Mihiel

Frank Lozar Sr. (1836–1933): the pioneer



FRANK LOZAR.

Frank Lozar, whose death and burial was announced in these columns last week, owned the distinction of having been the oldest man in Ely. Up to a few years ago he was active in his work of gardening but of late years he lost his eyesight and was practically bed-ridden two years before death. He was 97 years of age. Mr. Lozar lived in one of the first homes built in Ely up to the time of his death, having come here from Tower among the first settlers.

Ely newspaper portrait

**AGED RESIDENT
IS CALLED**

**Frank Lozar, Oldest Resident
of This City, Died at Age
of Ninety-seven.**

Frank Lozar, pioneer resident of this city and probably the oldest person in this section of the country, died Wednesday at his home on East Camp Street. He passed away in a natural death due to old age.

Born in Ribnica, Jugoslavia, ninety-seven years ago, he came to this country in 1881 and settled at Tower. After residing at Tower for one year he moved to this city and has resided here continually for fifty years.

Funeral services will be conducted tomorrow morning from the St. Anthony Catholic church, the Rev. Frank Mihelcic officiating. Interment will be in the Ely cemetery.

Surviving are a sister-in-law, Mrs. Agnes Lozar; two nephews, John and Anton Lozar; a niece, Mrs. Joseph Skala, Sr., and a grand-nephew, Frank Petek, all residents of this city.

Obituary, 1933

Among the first Slovenian settlers in Ely.

Born in Prigorica, near Ribnica, in 1836.

Helped build the early town and hosted his countrymen in his own home.

The Society of Saints Cyril and Methodius, the oldest Slovenian benevolent society in Minnesota, was founded under his roof in August 1889.

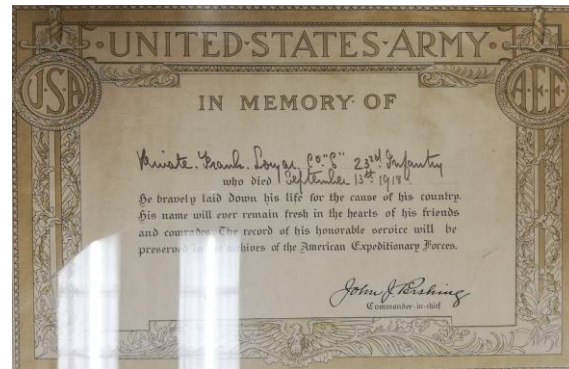
Died in 1933, almost a centenarian.

“The oldest man in Ely.”

Frank Lozar Jr. (1894–1918): the soldier



Pvt. Frank Lozar, 23rd Infantry



Pershing memorial certificate



Ely cemetery: "In our country's service."

Born in Carniola, 22 October 1894.

Naturalized US citizen; merchant at the Ely Table Supply Co.

Enlisted 21 September 1917.

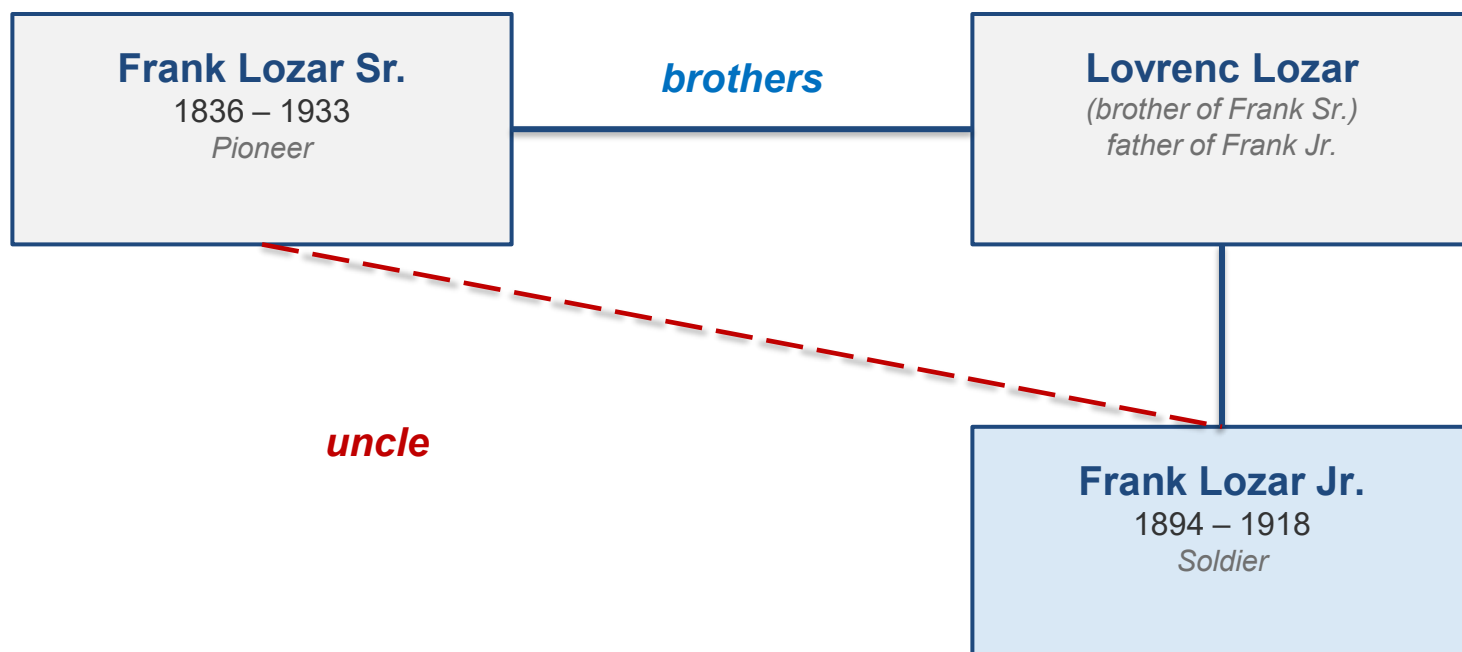
Killed in action near Saint Mihiel, 13 September 1918.

First man from Ely to fall in the Great War.

Posthumously honored as a war hero; American Legion Post 248 named after him.

Family geometry: an uncle and a nephew

A small piece of geometry, behind a much larger archival problem.



Established through correlation of parish registers, ship manifests, and obituary kinship references.

Four archival problems of emigrant genealogy

Difficulties that the Ložar dossier condenses in a single case.

1 Identification

Two men named Frank Lozar in the same town and family. The name alone resolves nothing.

2 Multilingualism & paleography

Slovenian, German, and Latin records; Kurrent script; English transcriptions on the American side.

3 Orthographic variability

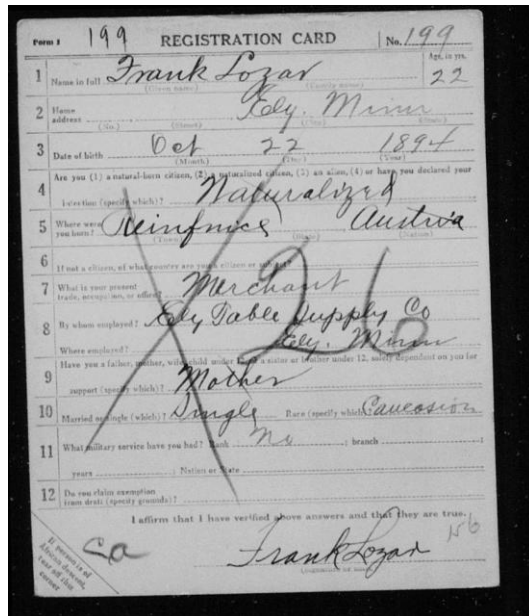
Ložar becomes Lozar; Ribnica becomes Reifnitz. No stable identifier in the documents.

4 Archival dispersion

Parish registers, manifests, censuses, draft cards, newspapers, cemeteries. No master index.

Problem 1: Identification

Two archival identities that partially overlap.



Form 1 199 REGISTRATION CARD No. 199

1 Name in full *Frank Lozar* Age in yrs. *22*

2 Home address *Ely, Minn.*

3 Date of birth *Oct 22 1894*

4 Are you (1) a natural born citizen, (2) a naturalized citizen, (3) an alien, (4) or have you declared your location (specify which)? *Naturalized*

5 Where were you born? *Meinung, Austria*

6 If not a citizen, of what country are you a citizen or subject?

7 What is your present trade, occupation, or office? *Merchant*

8 By whom employed? *Ely Table Supply Co*

9 Where employed? *Ely, Minn.*

10 Have you a father, mother, wife, child under 18, or a sister or brother under 12, wholly dependent on you for support (specify which)? *Mother*

11 Married or single (which)? *Single* Race (specify which) *Caucasian*

12 Do you claim exemption from draft (specify grounds)?

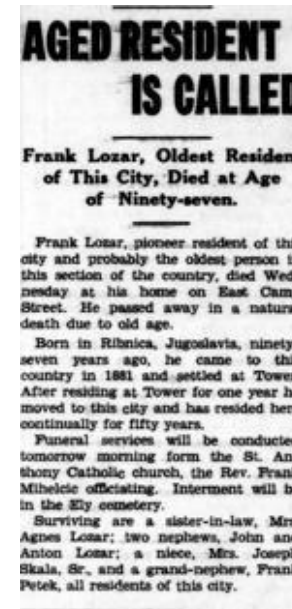
I affirm that I have verified above answers and that they are true.

sa *Frank Lozar* 1917

“Frank Lozar”

Draft registration, 1917

→ the soldier



“Frank Lozar”

Obituary notice, 1933

→ the pioneer

The task is not to find records, but to separate identities.

Problem 2: Multilingualism & paleography

Language is part of provenance. Transcription is interpretation.

Three European languages

Slovenian. German. Latin.

Sometimes shifting within a single parish book.

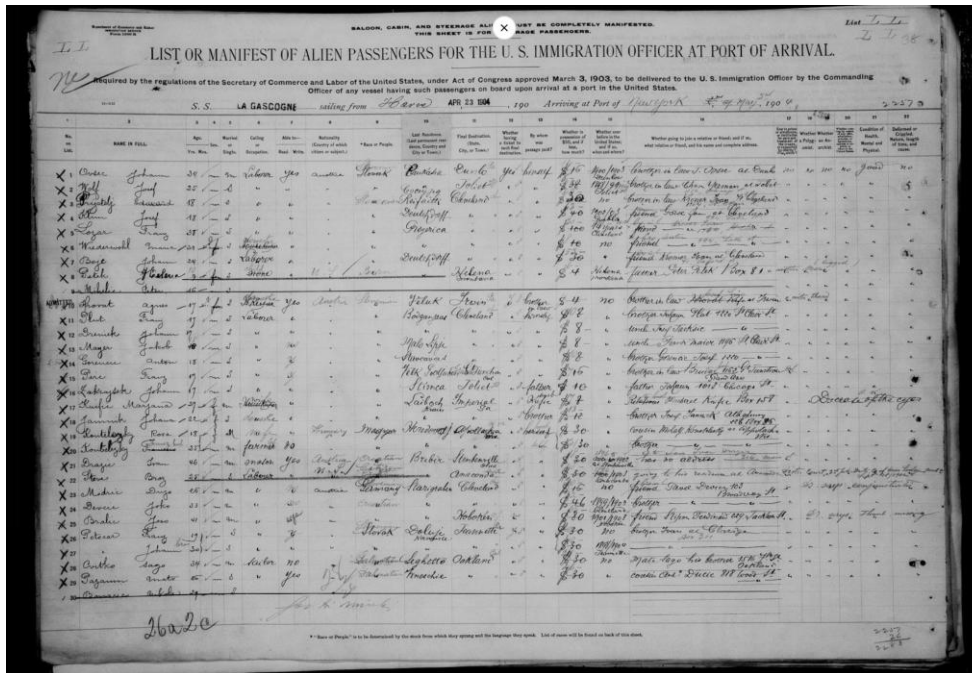
Two writing systems

German Kurrent script, opaque to most modern readers.

Latin cursive across varying clerical hands.

Then English enters

Heard through Slovenian ears, written by American clerks.



LIST OR MANIFEST OF ALIEN PASSENGERS FOR THE U. S. IMMIGRATION OFFICER AT PORT OF ARRIVAL.

Required by the regulations of the Secretary of Commerce and Labor of the United States, under Act of Congress approved March 3, 1903, to be delivered to the U. S. Immigration Officer by the Commanding Officer of any vessel having such passengers on board upon arrival at a port in the United States.

S. S. LA GASCOGNE sailing from LA ROCHELLE APR 23 1904 Arriving at Port of New York MAY 23 1904

No.	Name in Full	Age	Marital	Calling	Profession	Religion	Place of Birth	Last Residence	Final Destination	Whether going to take up abode at present and if so, where and for how long	Whether going to take up abode at present and if so, where and for how long	Whether going to take up abode at present and if so, where and for how long	Whether going to take up abode at present and if so, where and for how long	Whether going to take up abode at present and if so, where and for how long	Whether going to take up abode at present and if so, where and for how long	Whether going to take up abode at present and if so, where and for how long	Whether going to take up abode at present and if so, where and for how long	Whether going to take up abode at present and if so, where and for how long	Whether going to take up abode at present and if so, where and for how long
X1	Andre John	36	m	Labourer	yes	none	Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X2	John	22	s				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X3	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X4	John	32	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X5	John	38	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X6	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X7	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X8	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X9	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X10	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X11	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X12	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X13	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X14	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X15	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X16	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X17	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X18	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X19	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X20	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X21	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X22	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X23	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X24	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X25	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X26	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X27	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X28	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X29	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no
X30	John	35	m				Slovenia	Prace	Prace	yes	long	no	no	no	no	no	no	no	no

Ship manifest, SS La Gascogne, May 1904

Problem 3: Orthographic variability

Identity must be built from context, not read off a string of letters.

Ribnica

= same village

Ritnica

= same village

Rahnica

= same village

Reinfnica

= same village

Reifnitz

= same village

Reifniz

= same village

Same family, two surnames

Ložar

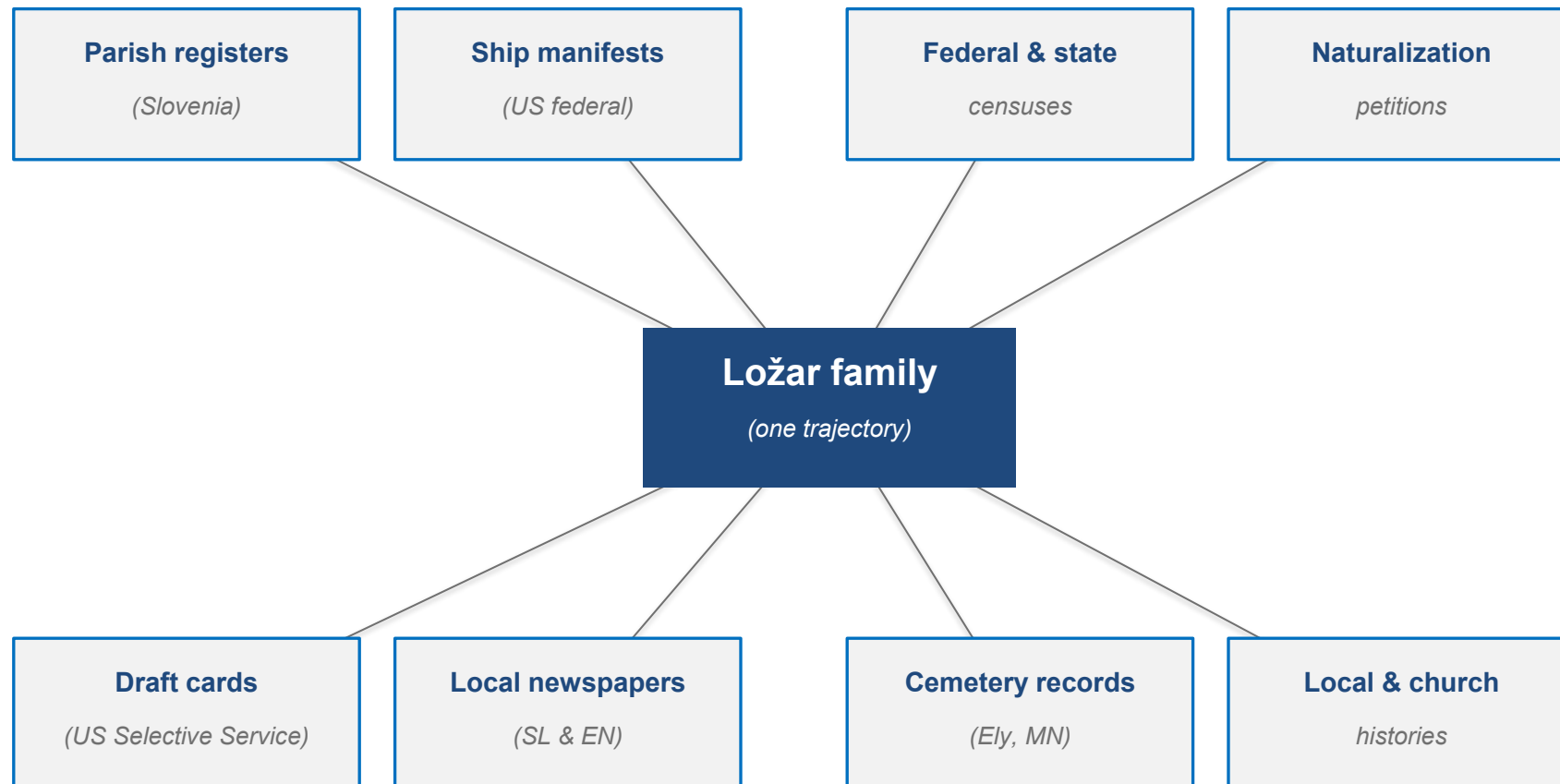
→ *Lozar* (diacritic lost in transit)

What changes in transit

- Diacritics fall away.
- Vowels shift between languages.
- Consonants are heard differently.
- German exonyms replace Slovenian names.
- American clerks invent spellings.

Problem 4: Archival dispersion

An archive of archives. The dispersion is not a flaw. It is the system.





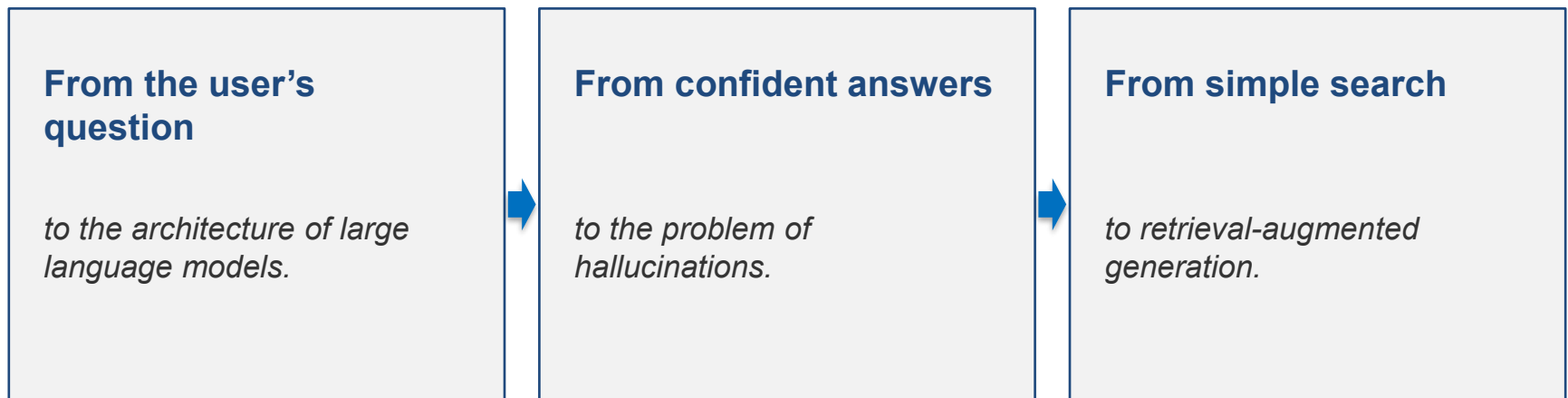
The Genealogical Proof Standard

The archival ethos given a slightly more formal voice.

- 1 Reasonably exhaustive research**
Do not stop at the first hit in a catalogue. Consider the relevant sources.
- 2 Accurate citation**
Tie every claim to a source so precisely that another researcher can return to it and verify it.
- 3 Analysis and correlation**
Read sources against each other, never in isolation.
- 4 Resolution of conflicting evidence**
When records disagree, say so openly and reason your way through the disagreement.
- 5 Sound, written, verifiable conclusion**
Produce an argument others can read and challenge, not a confident guess.

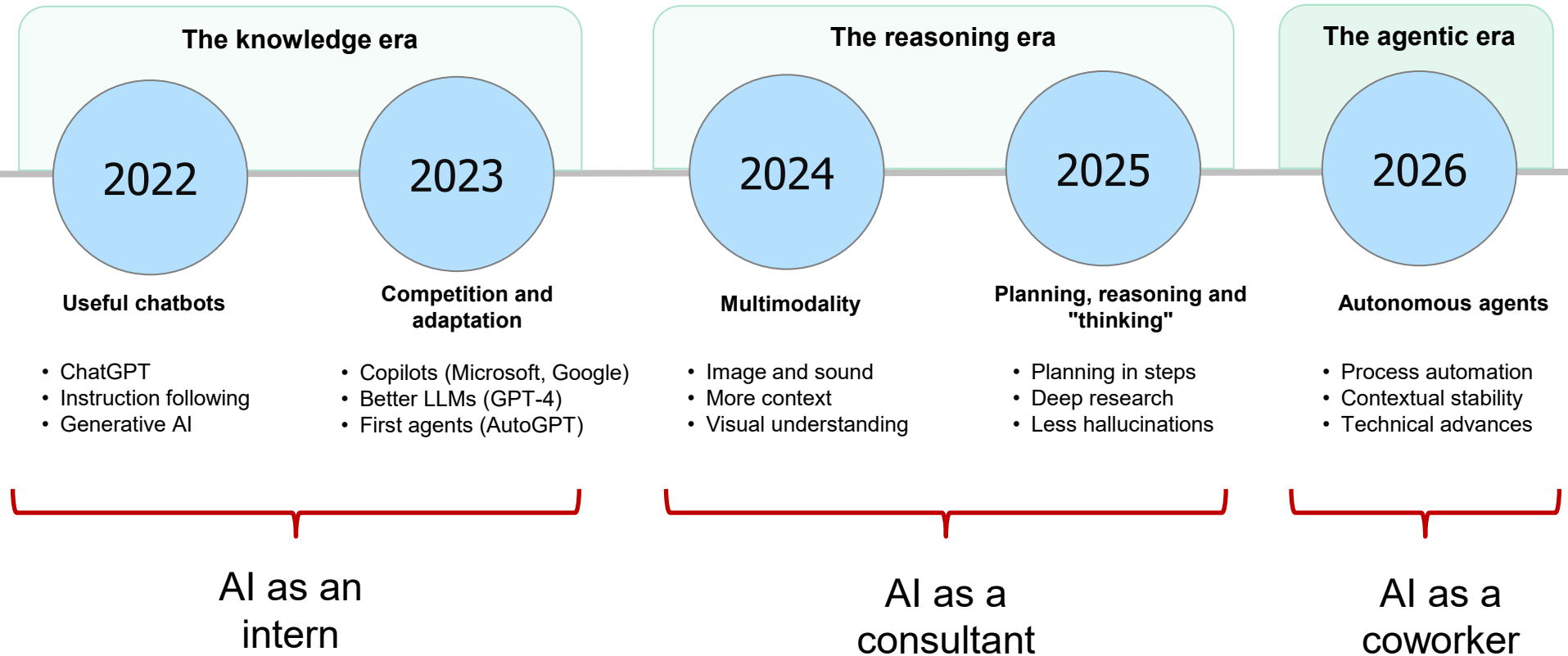
From the reading room to the model

Behind the interface lies an architecture.



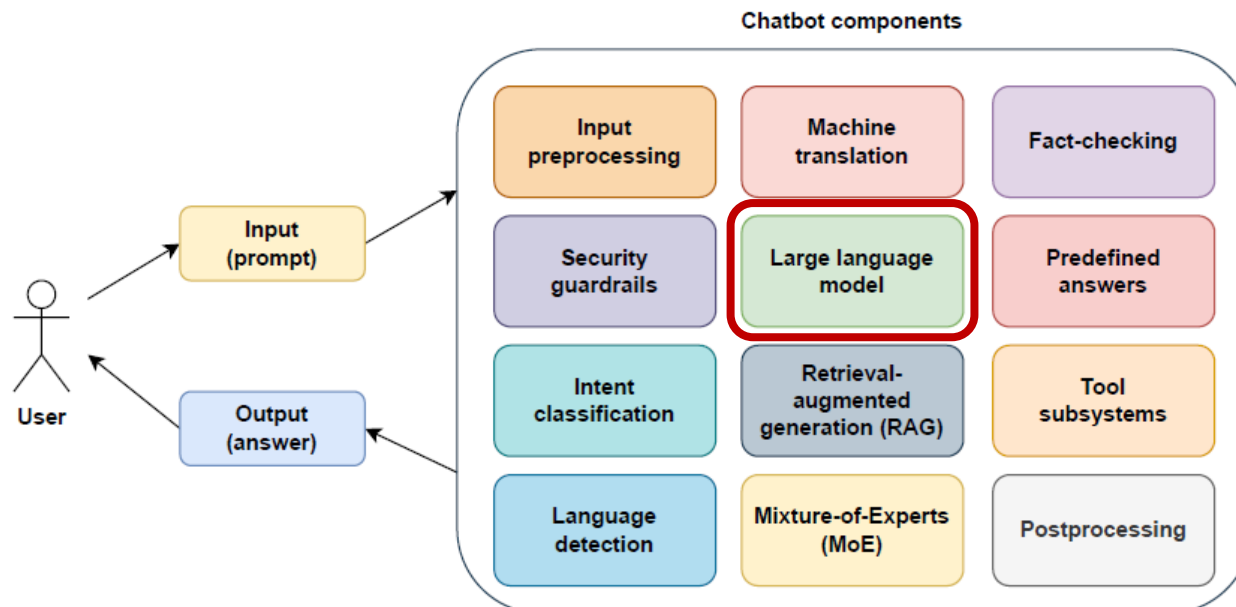
From archival method to algorithmic machinery.

Timeline of recent AI advances



Large language models

- Deep neural networks, that are able to process, understand and generate natural language
- LLMs are components in conversational systems (chatbots)
 - Chatbots are **not** LLMs – they are **applications** that use LLMs!
 - LLMs are **generative components** of chatbots



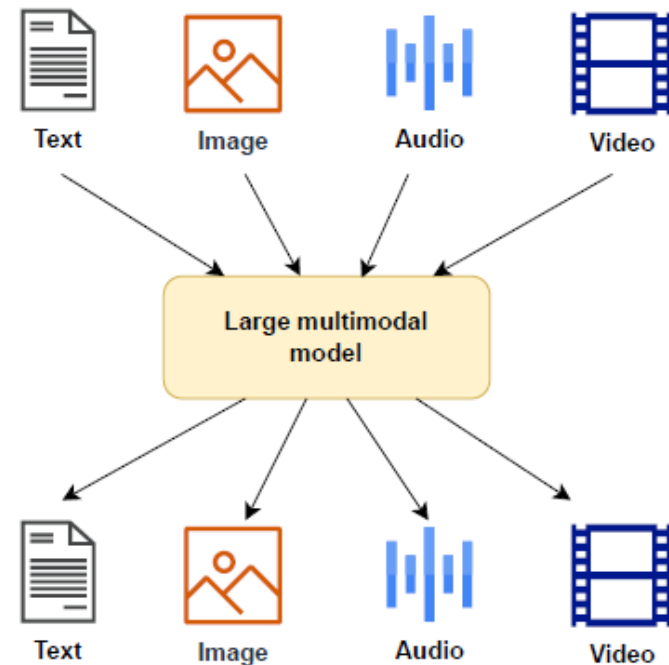
Multimodality

■ Large multimodal models (LMMs)

- Different modalities as inputs and outputs
- Text, images, video, audio, ...
- Most current models are multimodal

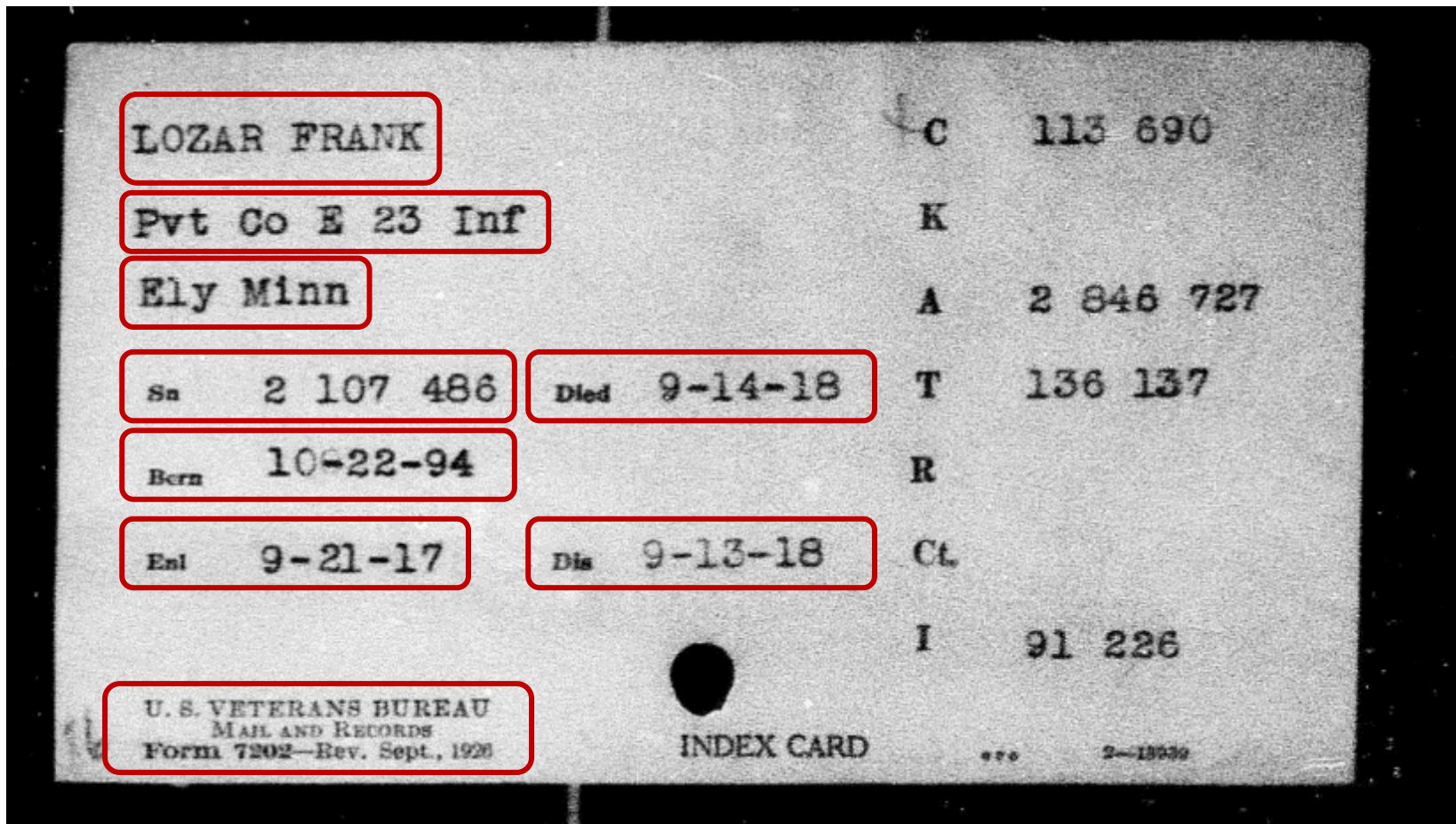
■ Practical implications

- Image search
- Visual question answering
- Image, video and animation generation
- Seamless speech transcriptions
- Realistic conversational chatbots
- Document processing and segmentation



Multimodality

- We can extract important information from images, such as Lozar's US Army card



LOZAR FRANK

Pvt Co E 23 Inf

Ely Minn

Ssn 2 107 486 Died 9-14-18

Born 10-22-94

Enl 9-21-17 Dis 9-13-18

C 113 690

K

A 2 846 727

T 136 137

R

Cl

I 91 226

U. S. VETERANS BUREAU
MAIL AND RECORDS
Form 7202—Rev. Sept., 1926

INDEX CARD

2-18539

Multimodality

- We can extract information from handwriting, such as ship manifests

BALCONY, CABIN, AND STEERAGE ALIENS MUST BE COMPLETELY MANIFESTED.
THIS SHEET IS FOR **SALE PASSENGERS.**

List *L. L.*
L. L. 38

LIST OR MANIFEST OF ALIEN PASSENGERS FOR THE U. S. IMMIGRATION OFFICER AT PORT OF ARRIVAL.

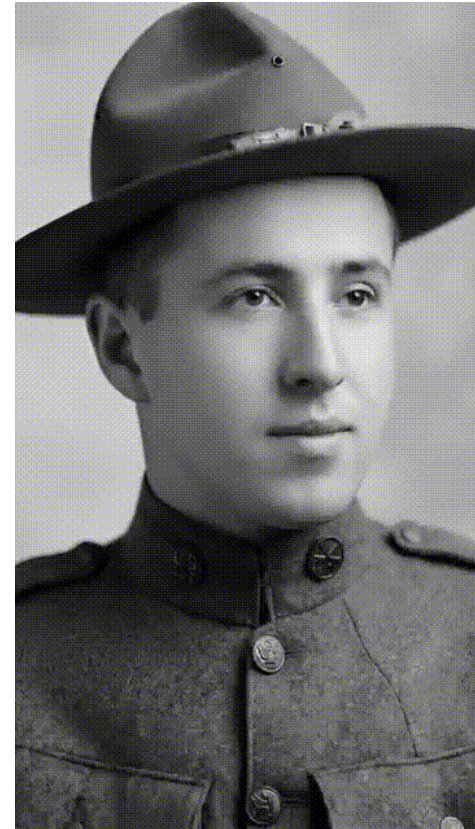
Required by the regulations of the Secretary of Commerce and Labor of the United States, under Act of Congress approved March 3, 1903, to be delivered to the U. S. Immigration Officer by the Commanding Officer of any vessel having such passengers on board upon arrival at a port in the United States.

S. S. **LA GASCOGNE** sailing from *St. Louis* **APR 23 1904** 1904 Arriving at Port of *New York* **Apr 27 1904**

No. on List	NAME IN FULL	Age	Sex	Married or Single	Calling or Occupation	Single or Married	Relationship (Character of which citizen or subject)	*Place of Birth	Last Residence (Last permanent residence, Country and City or Town)	Final Destination (State, City, or Town)	Whether having a ticket to such final destination	By what means	Whether in possession of \$50, and if not, how much?	Whether ever before in the United States and if so, when and where?	Whether going to take a relative or friend and if so, what relative or friend, and his name and complete address.	Has a good character? (If not, state the character of the defect)	Whether a member of a foreign or domestic order, society, or club.	Whether a member of a political party.	Condition of Health, Mental and Physical.	Deformed or Disabled (Nature, Degree of Disability, and Cause).
X 1	Onice Johann	34	m	m	laborer	yes	none	Rouen	Polonia	Quincy	yes	himself	\$16	no	brother in law	no	no	no	no	
X 2	Wolf Josef	35	m	s	"	"	"	Wien	Polonia	Polonia	"	"	\$34	no	brother in law	no	no	no	no	
X 3	Przytocki Bernard	18	m	s	"	"	"	Polonia	Polonia	Polonia	"	"	\$20	no	brother in law	no	no	no	no	
X 4	St. Louis	17	m	s	"	"	"	Polonia	Polonia	Polonia	"	"	\$40	no	brother in law	no	no	no	no	
X 5	Lozar Franz	27	m	s	"	"	"	Polonia	Polonia	Polonia	"	"	\$100	no	brother in law	no	no	no	no	
X 6	Wiedermuller Marie	31	f	w	housewife	"	"	"	Polonia	Polonia	"	"	\$16	no	friend	no	no	no	no	
X 7	Boze Johann	34	m	s	laborer	"	"	"	Polonia	Polonia	"	"	\$30	no	friend	no	no	no	no	
X 8	Batek Helena	3	f	w	child	"	"	"	Polonia	Polonia	"	"	\$4	no	friend	no	no	no	no	
X 9	St. Louis	16	f	w	child	"	"	"	Polonia	Polonia	"	"	"	no	friend	no	no	no	no	
X 10	St. Louis	17	f	w	child	"	"	"	Polonia	Polonia	"	"	"	no	friend	no	no	no	no	
X 11	Blut Franz	17	m	s	laborer	"	"	"	Polonia	Polonia	"	"	\$7	no	brother in law	no	no	no	no	
X 12	Drusch Johann	17	m	s	"	"	"	"	Polonia	Polonia	"	"	\$8	no	brother in law	no	no	no	no	
X 13	Mayer Jakob	16	m	s	"	"	"	"	Polonia	Polonia	"	"	\$8	no	brother in law	no	no	no	no	
X 14	Goussier Anton	18	m	s	"	"	"	"	Polonia	Polonia	"	"	\$8	no	brother in law	no	no	no	no	
X 15	Pere Franz	17	m	s	"	"	"	"	Polonia	Polonia	"	"	\$16	no	brother in law	no	no	no	no	
X 16	Kabrynski Johann	17	m	s	"	"	"	"	Polonia	Polonia	"	"	\$10	no	brother in law	no	no	no	no	
X 17	Kuiper Maryann	17	f	w	housewife	"	"	"	Polonia	Polonia	"	"	\$7	no	brother in law	no	no	no	no	
X 18	Jamnik Johann	21	m	s	carriage	"	"	"	Polonia	Polonia	"	"	\$12	no	brother in law	no	no	no	no	
X 19	Kontulyk Rosa	18	f	w	housewife	"	"	"	Polonia	Polonia	"	"	\$12	no	brother in law	no	no	no	no	
X 20	Kontulyk Franz	25	m	s	farmer	no	"	"	Polonia	Polonia	"	"	\$30	no	brother in law	no	no	no	no	
X 21	Drage Sam	46	m	m	smelter	yes	"	"	Polonia	Polonia	"	"	\$20	no	brother in law	no	no	no	no	
X 22	Hess Roy	25	m	s	laborer	"	"	"	Polonia	Polonia	"	"	\$50	no	brother in law	no	no	no	no	
X 23	Medici Enzo	26	m	s	"	"	"	"	Polonia	Polonia	"	"	\$16	no	brother in law	no	no	no	no	

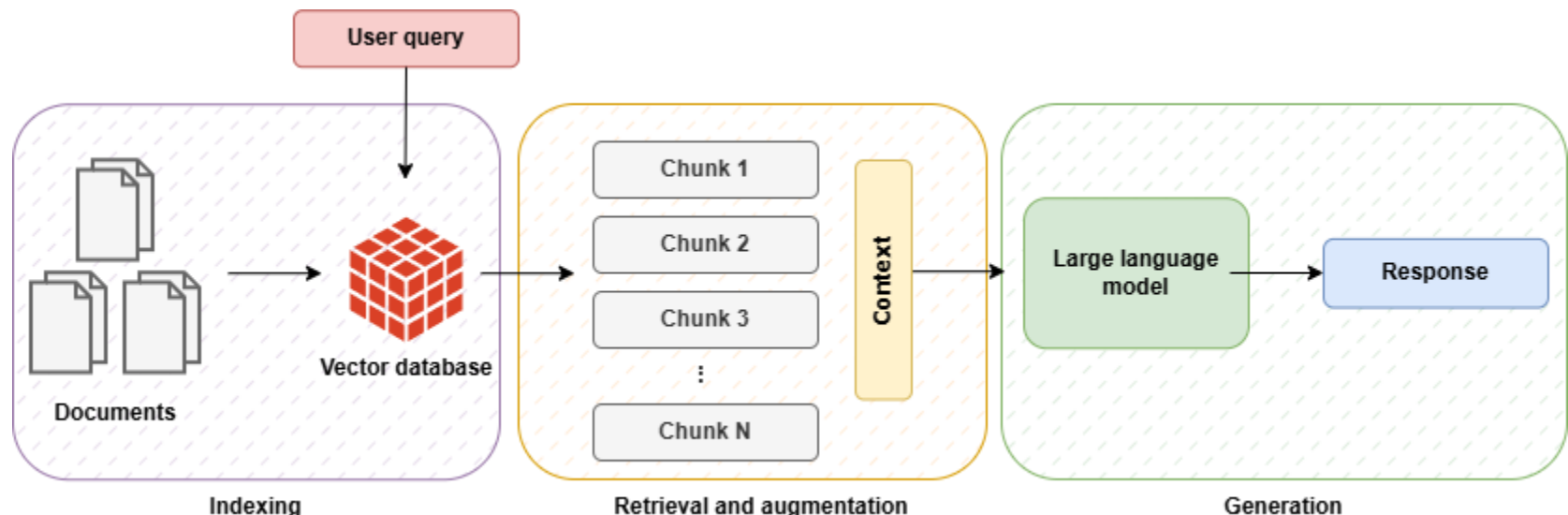
Multimodality

- We can animate Frank Lozar Jr. and make him interactive!

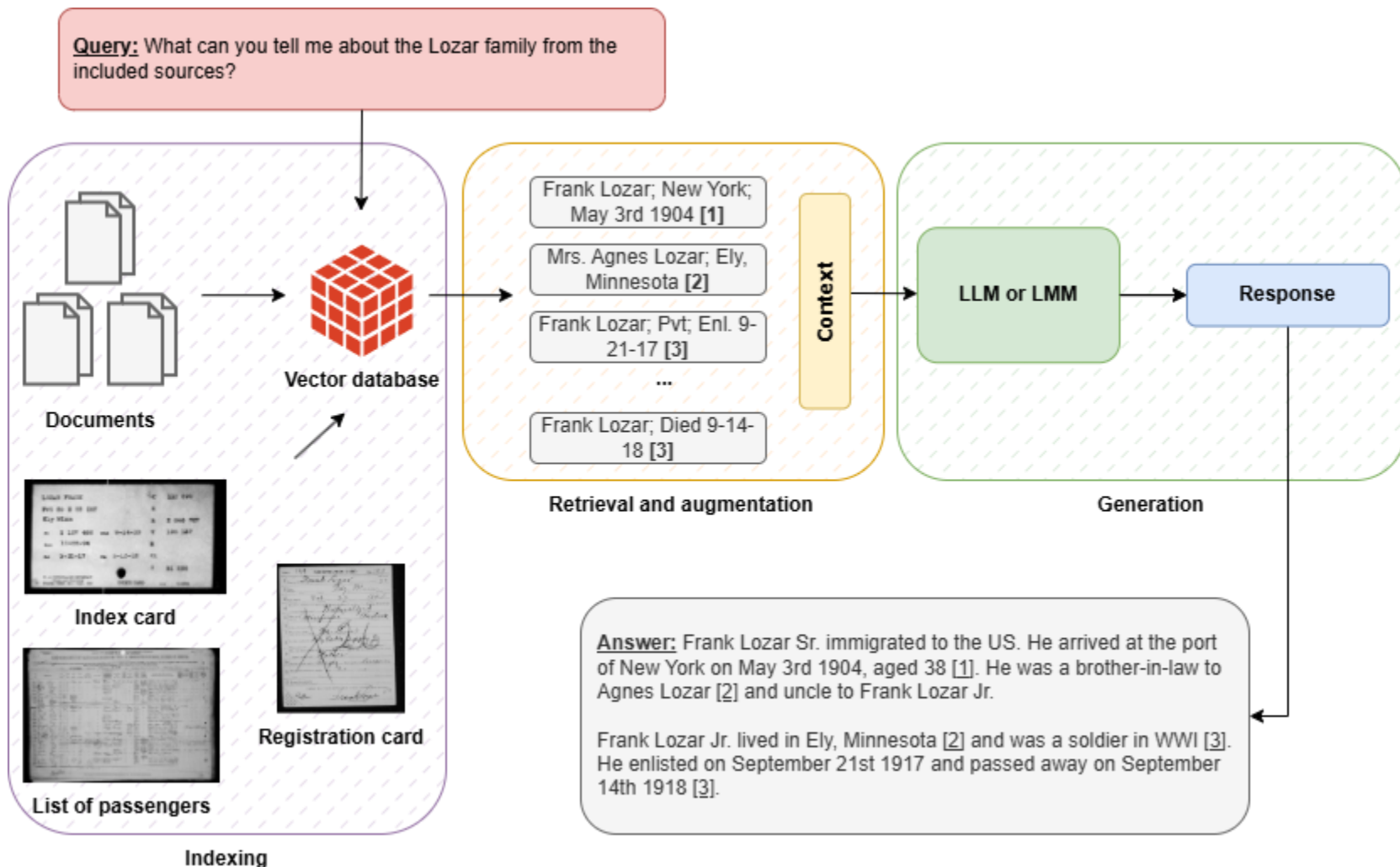


Retrieval-augmented generation

- A three-step approach: **Retrieve, Augment, Generate (RAG)**
 - **Improves context** for the LLM
 - Enables **up-to-date information** from external sources (can be multimodal)
 - Enables **citation**, decreases the rate of **hallucinations**, improves **trust**
- Used in modern search engines



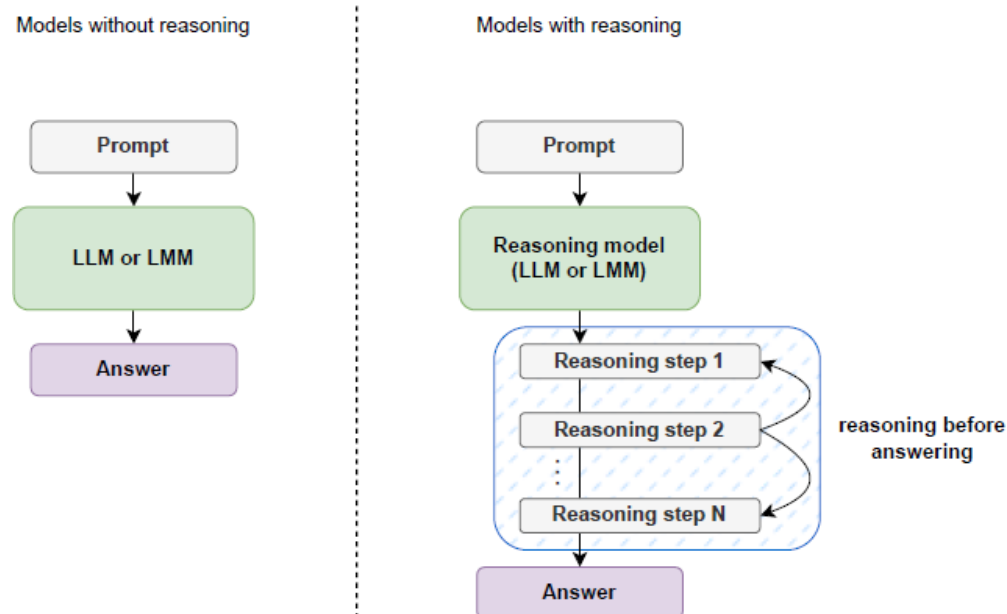
RAG in practice



Reasoning

Reasoning models

- Self-prompting simulates "thinking"
- Planning and step-by-step approach to problem solving
- Best frontier models support reasoning

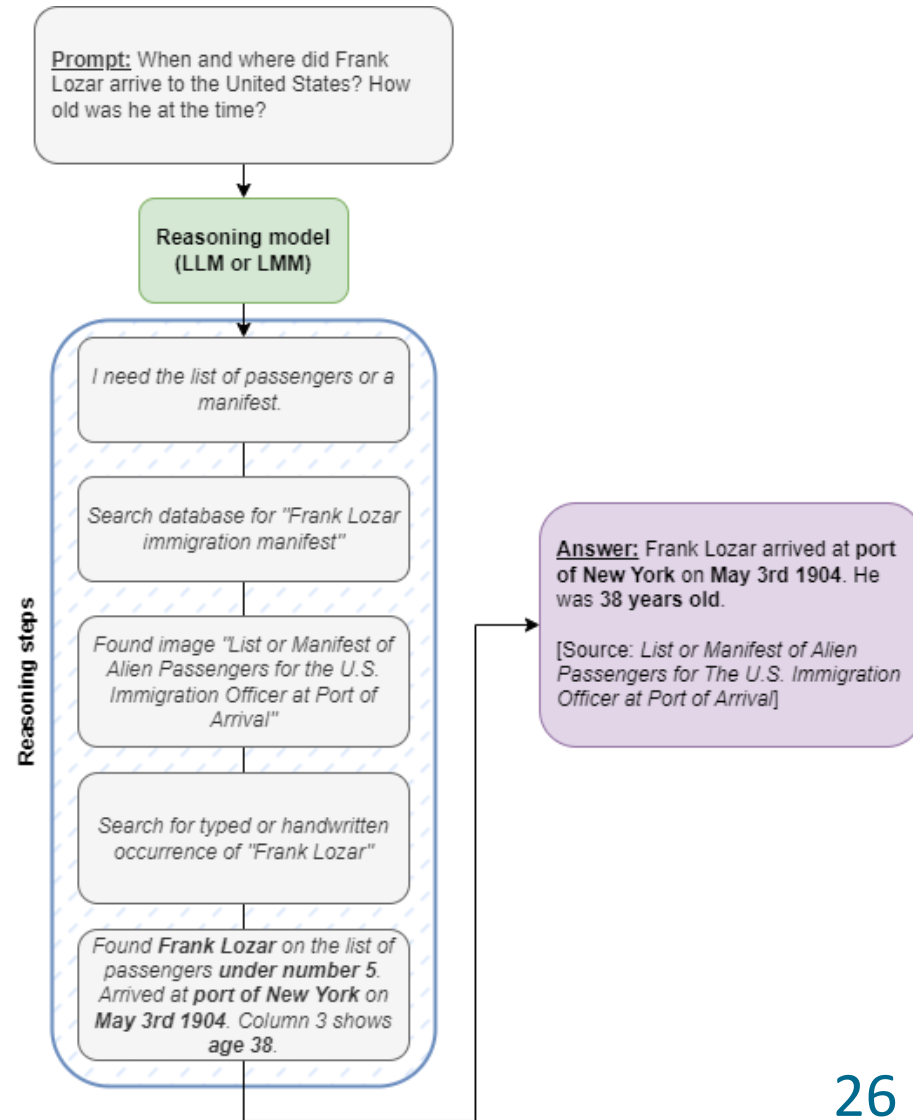


Reasoning

■ Note the Genealogical Proof Standard

- 1 – exhaustive research
- 2 – accurate citation
- 3 – analysis and correlation
- 4 – resolution of conflicting evidence
- 5 – sound written verifiable conclusion

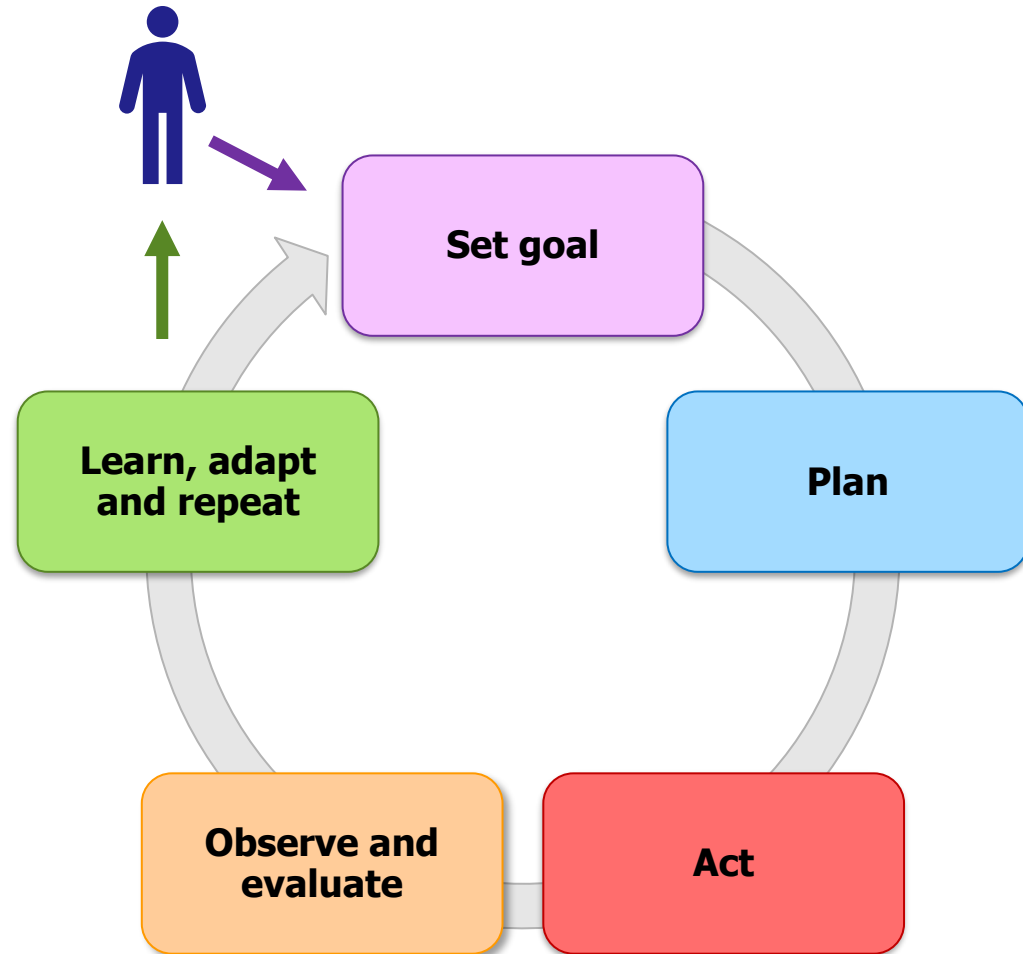
■ Reasoning simulates the research process



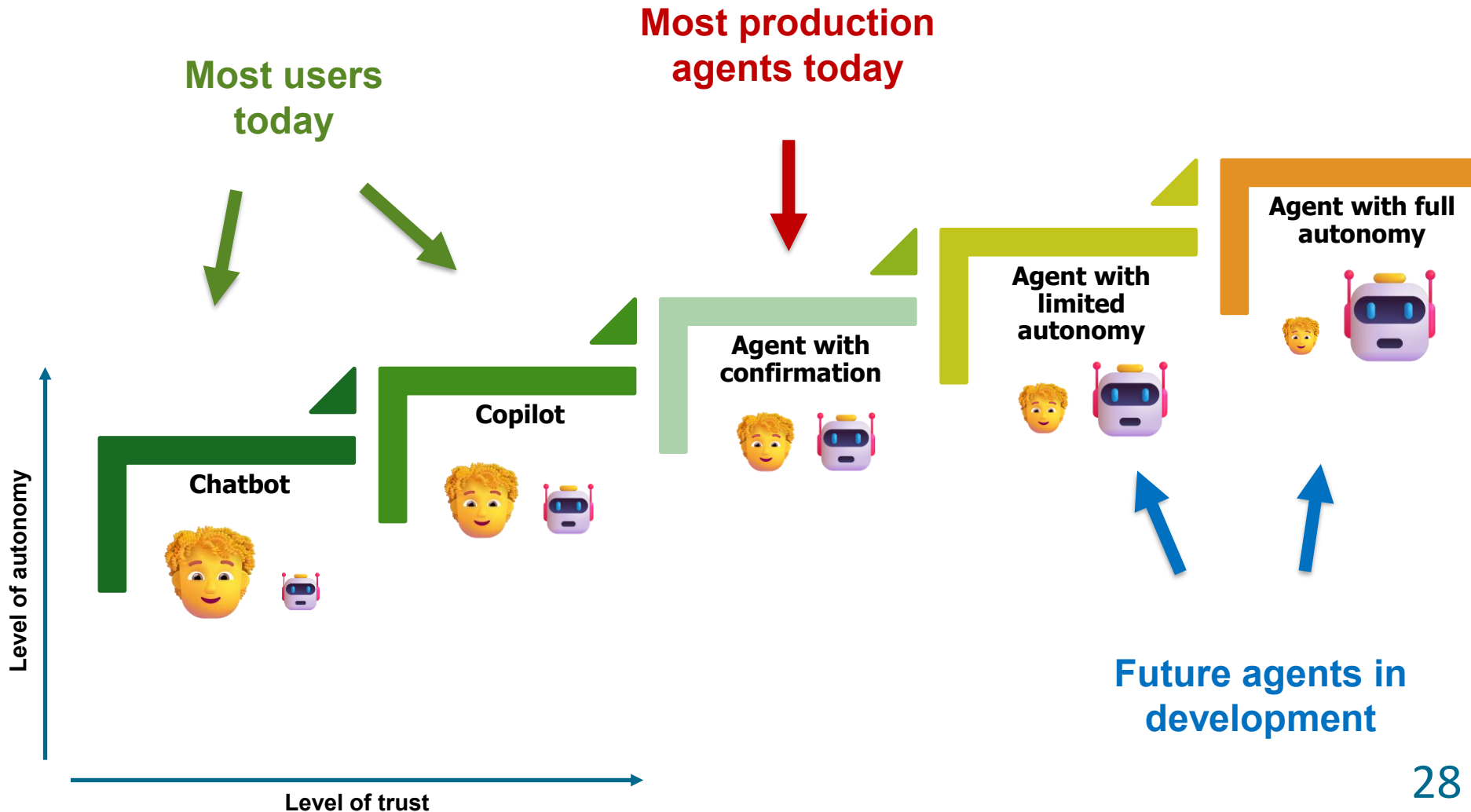
AI agents

- Powered by **reasoning** models
- Agents can be **multimodal**
- Agents can be **specialized**
- Use of **specific tools**, that improve results
- **Agents can work in teams**
- Different **levels of autonomy**

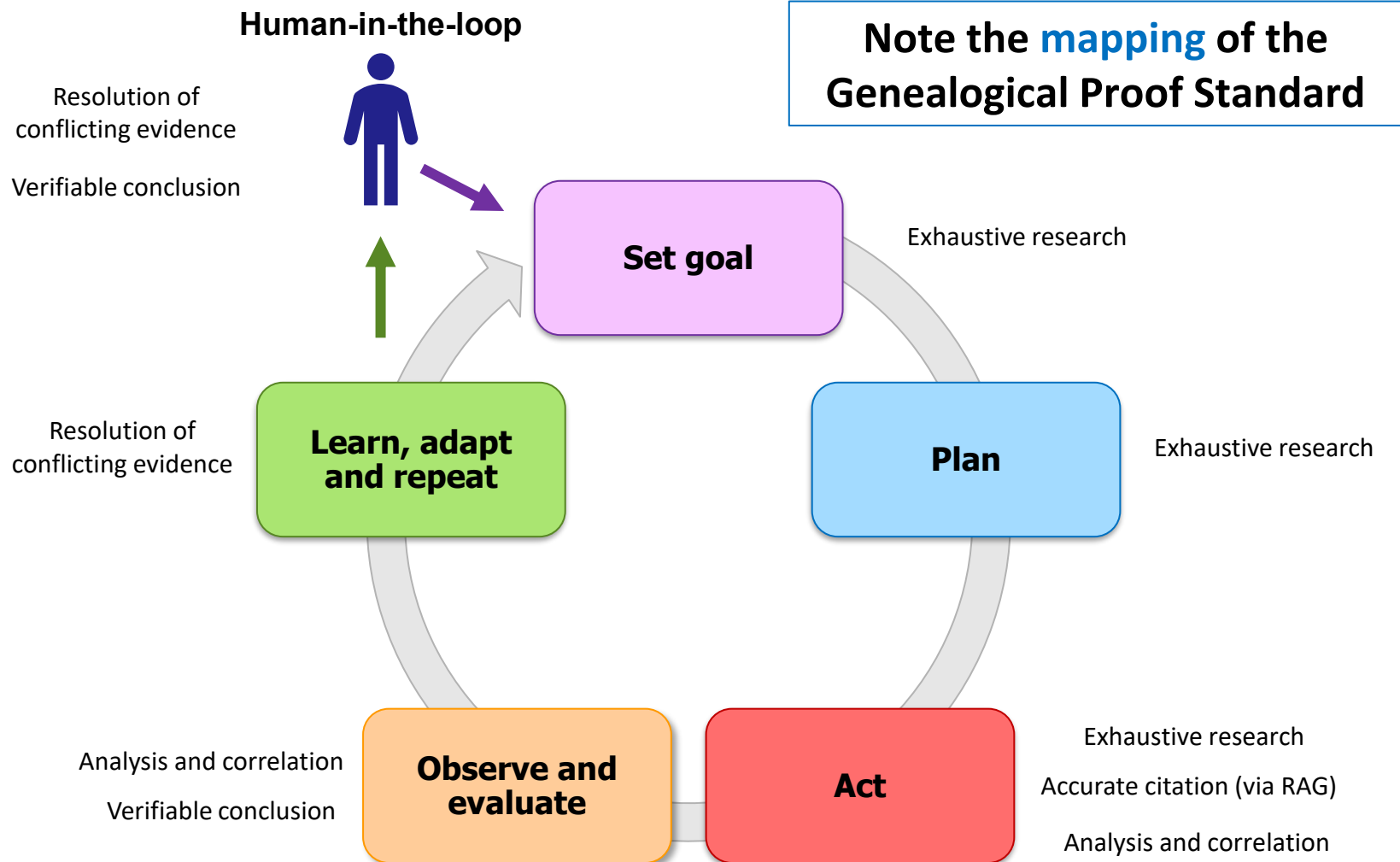
Human-in-the-loop



Autonomy spectrum



AI agents and genealogy



Future trends

- Use of agentic AI is on the rise
 - Model improvements, new methodologies, better tools
 - **Changes in perception:** AI is **not here to replace** people, but to **empower** them
 - **Human-in-the-loop** as a standard approach to processes
- **New applications of AI**
 - Use of multimodality, reasoning and retrieval-augmented generation for a variety of new tools
- Specific to **humanities**
 - Increase of AI use in all disciplines of humanities
 - Gradual adaptation of AI in areas where manual work is still required
- **Regulation of AI**, new laws, recommendations and policies
 - Collaboration of experts within multidisciplinary groups
 - **AI can be effective for everybody, not just for the select few!**

What we have shown together

A single case study, two disciplines, one shared standard of proof.

The Ložar case

One family in Prigorica and Ely. A pioneer and a soldier. Two Franks under one name.

Four archival problems

Identification, multilingualism, orthography, dispersion. The Ložar dossier holds all four.

The Genealogical Proof Standard

Exhaustive research, accurate citation, correlation, resolution of conflict, verifiable conclusion.

What AI now offers

Multimodality, reasoning, retrieval-augmented generation. New leverage on old archival problems.

Human-in-the-loop

AI does not replace the archivist or the historian. It is a coworker, a consultant, an intern.

Computer science × humanities

Our three years of collaboration argue for genuine multidisciplinary practice, not delegation.

From archival dust to algorithm: a method, not a replacement.

Thank you for your attention!