

Understanding health data

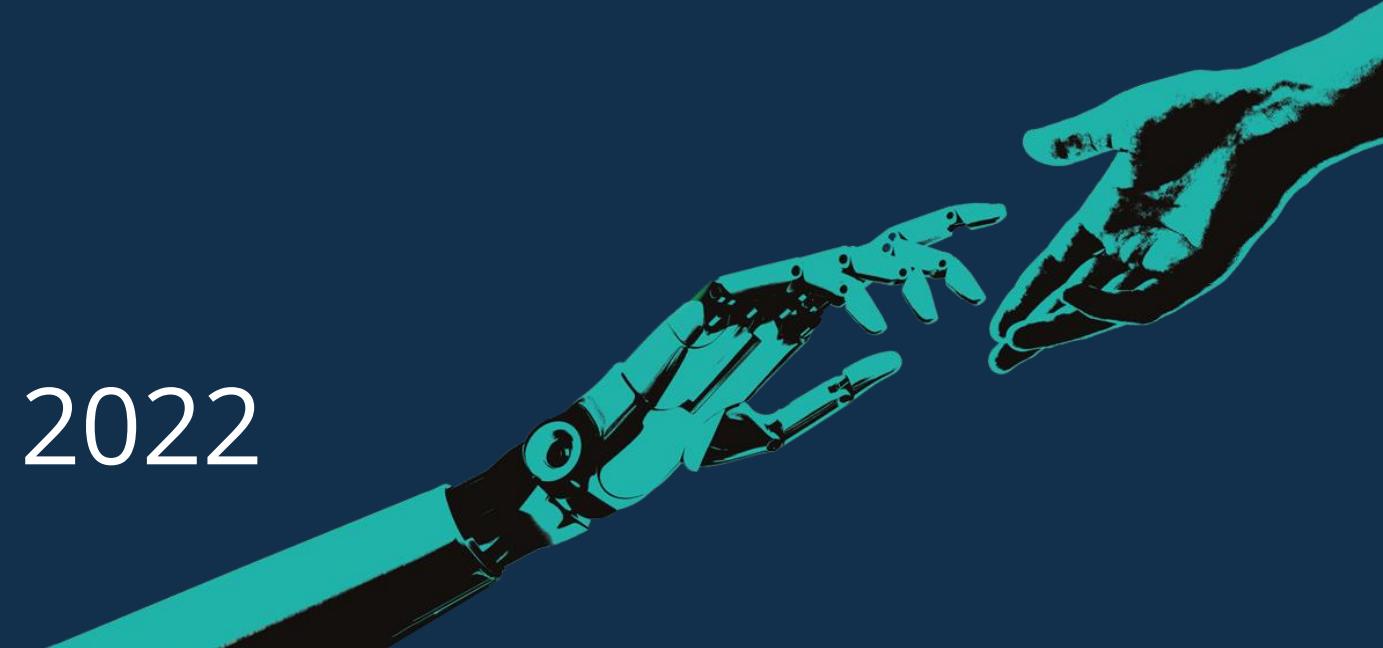
Perspectives from epidemiology research



Session organized by
PandemiX Center, Roskilde University

10:00 – 11:15
October 26th, 2022

Digital Tech Summit 2022



Overview of this session:

Maarten van Wijhe - Assistant professor, Roskilde University
Pandemic research: digging through books and bytes

Søren Poder - Ph.d.-student, Roskilde University
Extracting historical data through Collective Intelligence

Anders Gorm Pedersen - Professor, Technical University of Denmark
Was the 1889 "Russian Flu" actually a coronavirus pandemic?

Thea Kølsen Fischer - Professor, Nordsjællands Hospital
Telemedicine solutions – building our pandemic preparedness and response resilience

Debate
*Preparing for future pandemics:
What did we learn from Covid-19 and what lies ahead?*



The Pandemix research Center

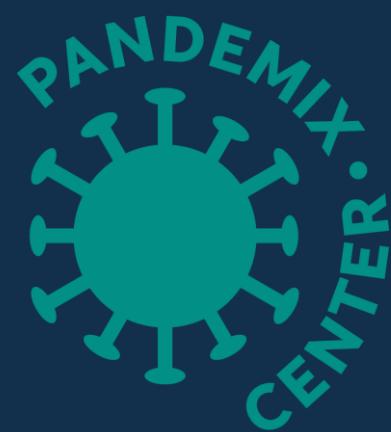


Made possible thanks to:

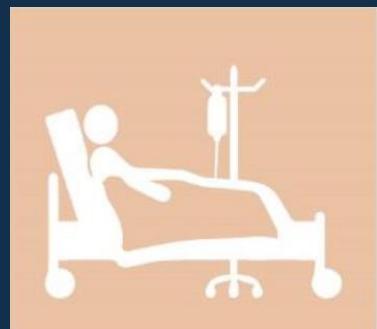


The PandemiX research Center

Infectious
disease
modelling



Clinical
research



Historical
epidemiology



Bioinformatics

The PandemiX research Center

1918 Influenza A / H1N1 Pandemic



SARS-CoV-2 (2019-)



Understanding health data

Perspectives from epidemiology research

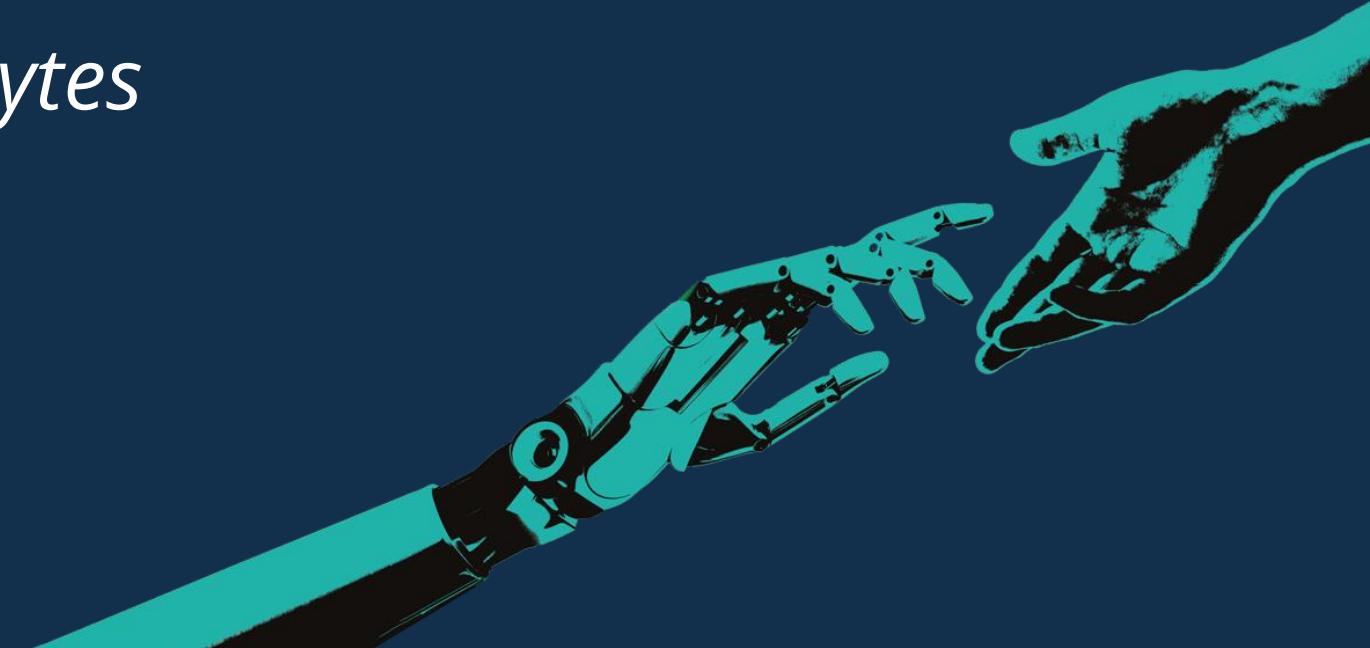


Maarten van Wijhe

Assistant professor, Roskilde University

*Pandemic research:
digging through books and bytes*

Digital Tech Summit 2022

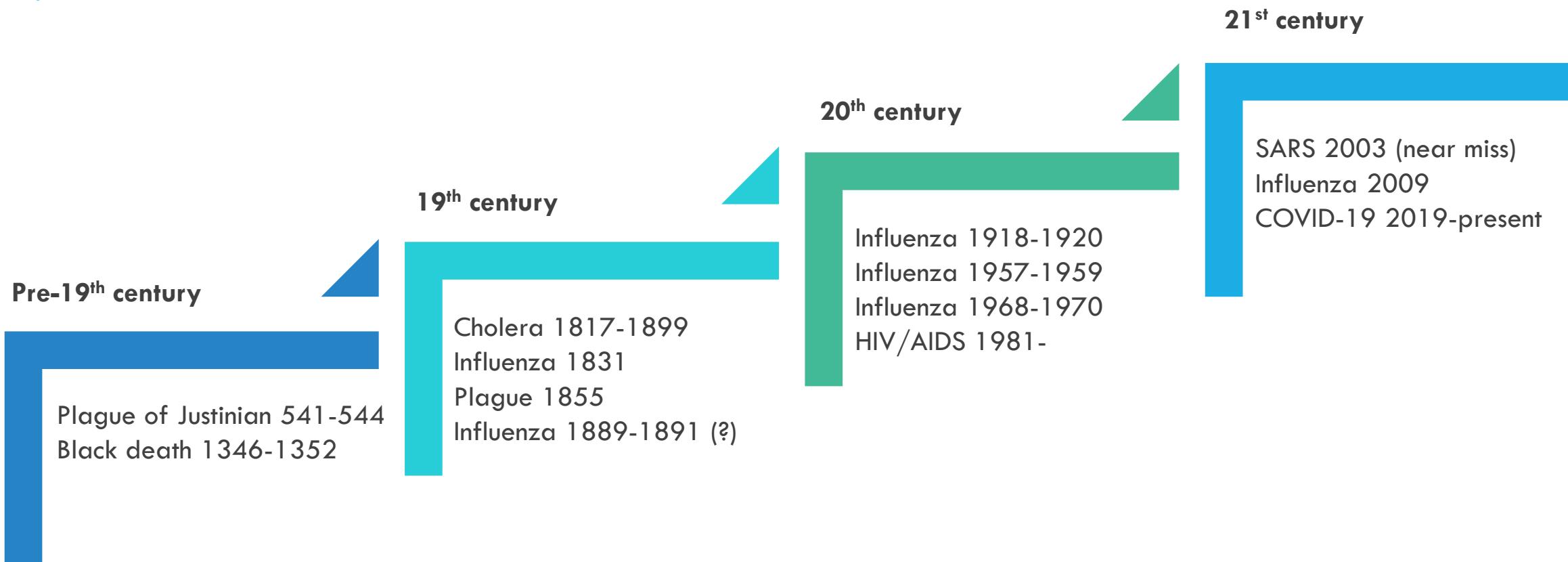




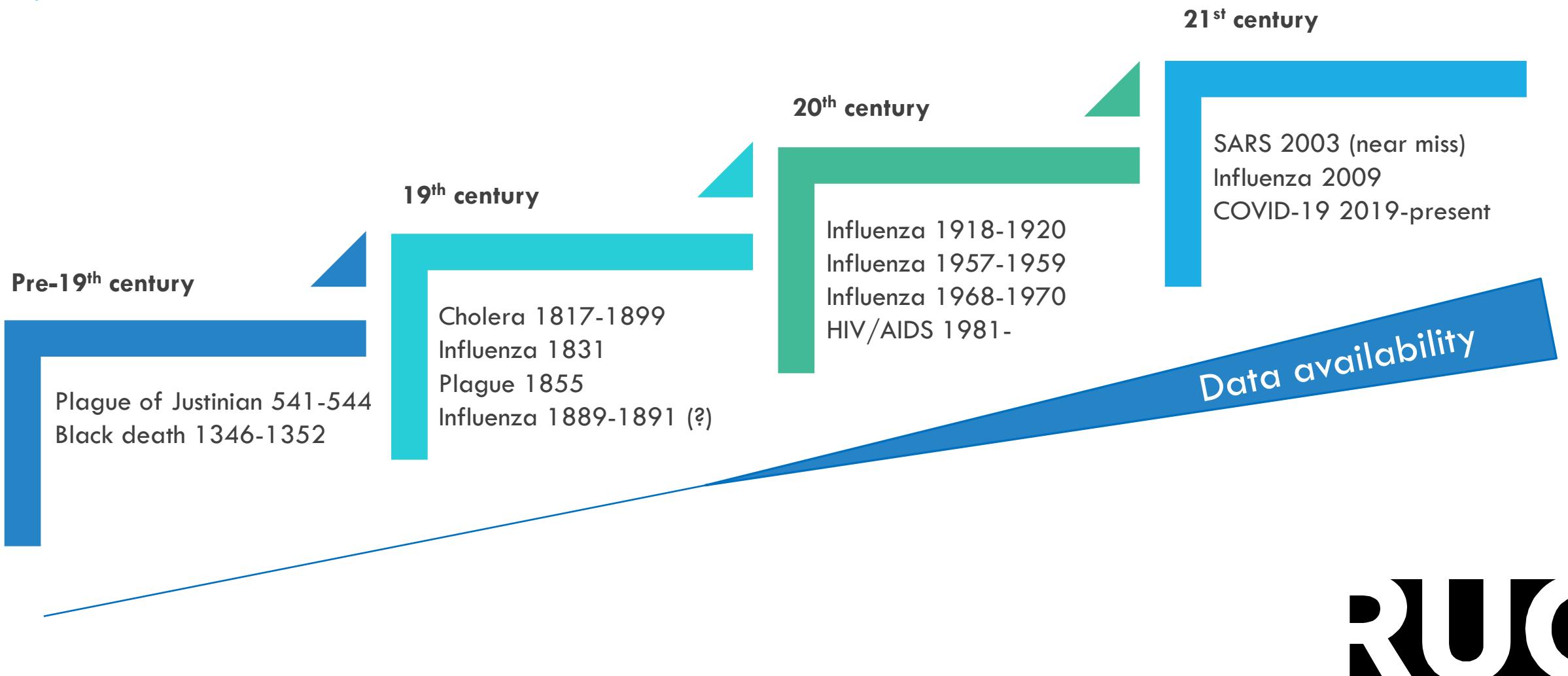
Another pandemic is coming
Corona was not the last, just the latest.

RUD

OUR LONG HISTORY WITH PANDEMICS



OUR BRIEF HISTORY WITH PANDEMIC DATA



WHAT CAN PAST PANDEMICS TEACH US?

01

Signature features

Each disease has its own characteristics; age patterns, seasonality, infectivity,

02

Unsolved mysteries

Mysterious outbreaks with high impact of which we do not know the cause... but may hold vital information for the future (climate change, re-emergence)

03

Critical questions

Why were the elderly spared during the 1918 pandemics?
What can we expect from mitigation strategies?

04

The coming storm (again)

We know another pandemic is coming, how can we best prepare, how can we make better models?

Analysis_

2020 versus 1919: is COVID-19 as bad as the 'Spanish' flu?

27 May 2020

Source: Sydney.edu.au

What Can We Learn from the Spanish Flu Pandemic of 1918-19 for COVID-19?

June 01, 2020

Source: stlouisfed.org

A peculiarity of Spanish flu may shed light on covid-19

Age-related mortality is not always what might be expected

Source: economist.com

Coronavirus: How they tried to curb Spanish flu pandemic in 1918

© 10 May 2020

Source: BBC.com

How the Spanish flu differs from the Coronavirus outbreak in 2020

Source: ourworldindata.org

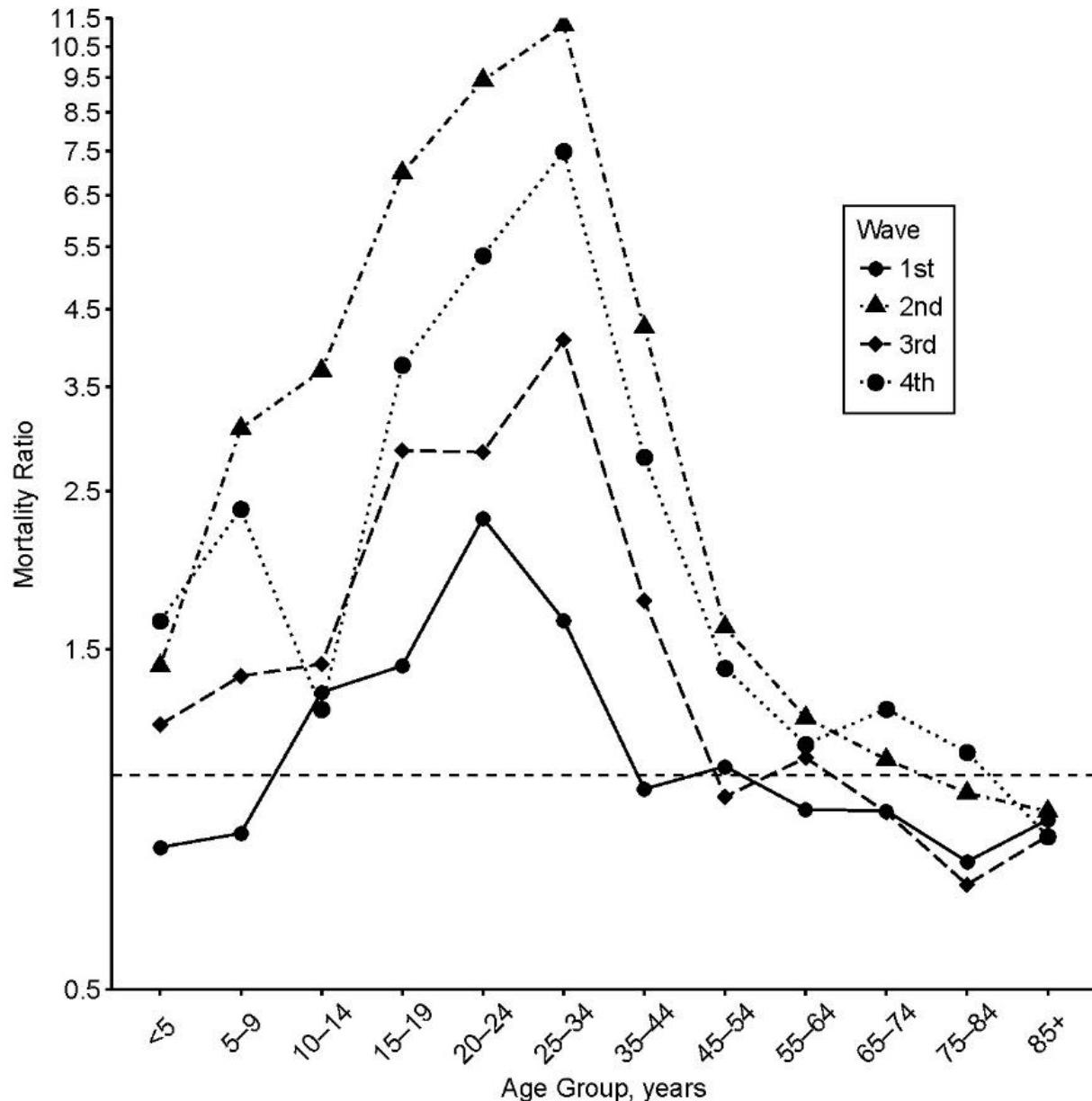


Excess mortality 1918 pandemic, Copenhagen

Peaks around 25-34 years of age, and drops to near zero around 45. Elderly are spared... But why?

Possible protection from previous pandemics?

Russian flu in 1889-1890?
Poultry outbreak in 1872?



	Januar.		Februar.		Marts.		April.		Maj.		Jun.		Jul.		August.		Septbr.		Oktober.		Novbr.		Decbr.		Summa.				
	Kjst.	Ld.	Kjst.	Ld.	Kjst.	Ld.	Kjst.	Ld.	Kjst.	Ld.	Kjst.	Ld.	Kjst.	Ld.	Kjst.	Ld.	Kjst.	Ld.	Kjst.	Ld.	Kjst.	Ld.	Kjst.	Ld.	Kjst.	Ld.			
Kjøbenhavn	3272		574		363		164		67		25				12		8		65		157		310		320		5337		
Sjællands nord. Fysikat	1202	5297	261	2200	116	810	14	238	1	67	3	38		3	24	"	17	1	23	1	56	4	74	1	97	1607	8941	10548	
Sjællands sør. —	1611	2508	418	1555	170	681	31	115	12	85	4	13		3	2	"	1	"	5	5	"	3	6	14	2260	4932	7192		
Bernholms —	503	163	118	126	3	5	"	1	"	"	"	"		"	"	2	"	"	"	"	"	"	"	"	626	293	919		
Lolland-Falsters —	1960	2786	227	814	64	142	32	51	18	44	2	11		3	3	8	12	15	15	8	9	8	22	15	28	2360	3937	6297	
Fyens —	2853	1901	723	1873	298	717	123	225	21	65	17	41		7	19	6	4	1	2	2	8	15	8	14	11	4080	4874	8954	
Aalborg-Hjering —	2895	1469	422	1059	80	190	12	55	1	33	"	14		"	2	"	6	"	15	"	10	"	14	"	7	3410	2874	6284	
Aarhus-Banders —	3601	2773	373	645	83	154	26	39	8	17	1	8		2	2	6	1	9	"	1	"	24	55	30	28	4164	3717	7881	
Viborg-Thisted —	1254	1435	292	869	45	161	12	68	3	24	"	41		1	7	"	10	"	3	7	8	20	15	5	17	1639	2656	4295	
Vejle-Skanderborg —	4210	2608	372	744	290	187	138	89	4	9	8	11		1	9	6	1	35	4	14	20	1	25	1	37	5080	3744	8824	
Ringkøbing —	547	1256	129	578	28	175	8	53	1	10	"	68		2	16	"	28	2	8	2	13	17	12	2	18	738	2225	2963	
Ribe —	460	787	100	278	14	85	11	29	12	26	1	14		"	3	"	"	"	1	"	3	"	6	"	9	598	1241	1839	
Køge, —	1096	22968	3435	10741	1191	3308	40							36	254	22	87	28	80										
Hele Kjøn —		47351	14750		4862									315	121	***	121	***	121	***	121	***	121	***	121	***	121	***	121



Find old data in libraries and repositories

Often these data are in paper reports, or scanned documents online.

Digitize relevant data

Using excel and OCR programs we digitize any data that may be relevant for the topic.

Curation and management

Data is cleaned of errors and readied for analyses.

Data analysis

Using mathematical and statistical tools from epidemiology and demographics.

SCHEMATISK SYGELISTE FOR 1872. (BY)												
PÅ UDEBETEGNELSE												
Sygelemer	Antal											
Bystadient.	3.	14	7	8	6	6	8	3.	4.	5.	10	7
Lægebetjente								1.				
Husmænd												
Parasage												
Kjøkken												
Blomster og Fruer	1.		1.	1.	1.	1.	1.	1.	2.	4.	3.	
Husliger												
Køpere												
Stadsbørger												
Stadsbønder												
Kalvær	1.	3.	1.				1.	1.	1.	1.	3.	6.
Gonok og typhol Fruer		1.	1.	1.			2.		1.	2.	3.	1.
Hedning (Byenske)												
Dame	1.	1.					1.	1.	1.	1.	3.	
Kidne							2.	1.	1.	1.	5.	2.
Stænkede												
Boplækkelse												
Arsdig- og anden Vinduerne												
Bundstør												
Rijelag												
Grenader												
Værkt for båd Chalot							1.		1.		2.	
Erlæmmet Sygelse*												
* Hvorfor ikke se Annonce om 1. Annonce datoen												
Summa	7	17	10	11	8	9	11	10	11	8	17	13.
												30. 96 2. 28. 21.
												129.

2^{de} Antal forskellige Systemer som: Antal Koler, Infus, 30-dørsys, Oedelemok, Nervoset, Røgelse, ...
Antal med en betegnelse per melle dage.

Liste over de fra 5. Feb til 11. Mar fra Københavnskelet ad.							
Lobes-Rummer	Navn og Stilling i Samfundet	Alder	Om fra et Hospital, med tilført Bevælt	Overlange syg	Mødtager	Om og naar vaccineret og efter Aret, af hvem	
123.	Carl Lin. Løvius, fædig. Pysk. ved Københavnskeleto. Samfund.	14 år.	Lette Hadspræde No. 98.	5 dage.	2. 15 Jan.	Vaccineret.	
129.	Walter Levin, oomfælten der Broder.	11 år.	Januar 11. d.	5 dage.	2. 27 Jan.	Vaccineret.	
132.	Johannes Michaelson, fædig. Bøge.	6 dage.	alle Brøndbygade No. 107.	3 dage.	2. 23 Jan.	Ikke vacc.	
130.	Hansini Sime. Hærke. Tjenestepiger.	20 år.	Paragoner aalevej. Mandt 10. 15. g.	6 dage.	2. 27 Jan.	Vaccineret.	
135.	Peter Petersen. Landstændsgang.	24 år.	Sprøjtegade No. 14	3 dage.	2. 28 Feb.	Ikke vacc.	
131.	Glyptes Carl. Valdemar. Øregade. Nr. 14. St. Forts. Skatbæks Regiment.	16 år.	Garnisonskøbghuset 2. dage.	Jan 29.	vaccineret.		
136.	Georg Jørgensens Røgelse. Møng. af Selsk. Børts. Skatbæks Regiment.	25 år.	Garnisonskøbgh. 2. dage.	Jan 31.	vaccineret		
140.	Fredrik Gjøg	12.	Søbækken No. 11	2 dage.			

Odense

1872, city

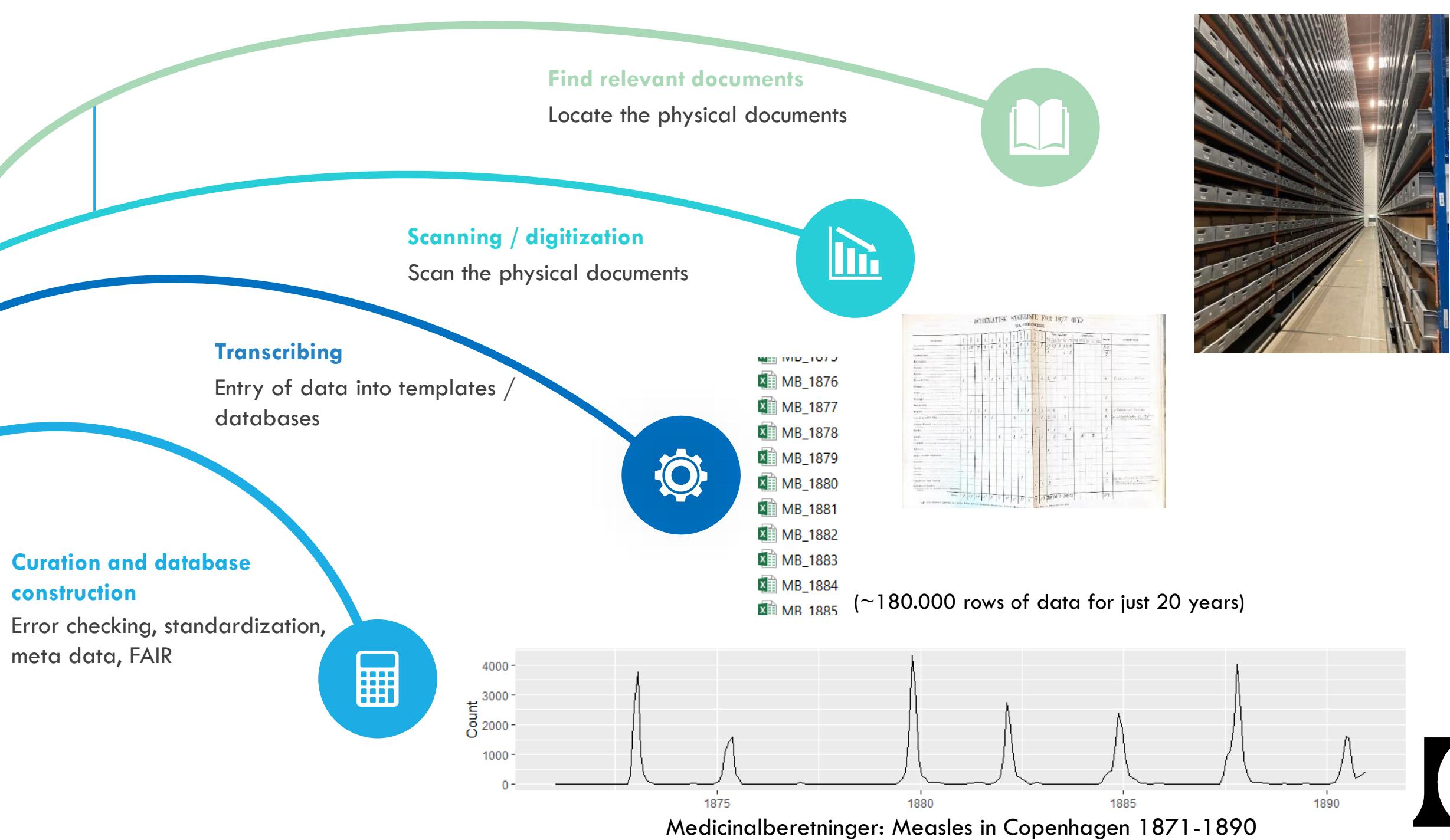
Sometimes the records contain
handwritten notes.

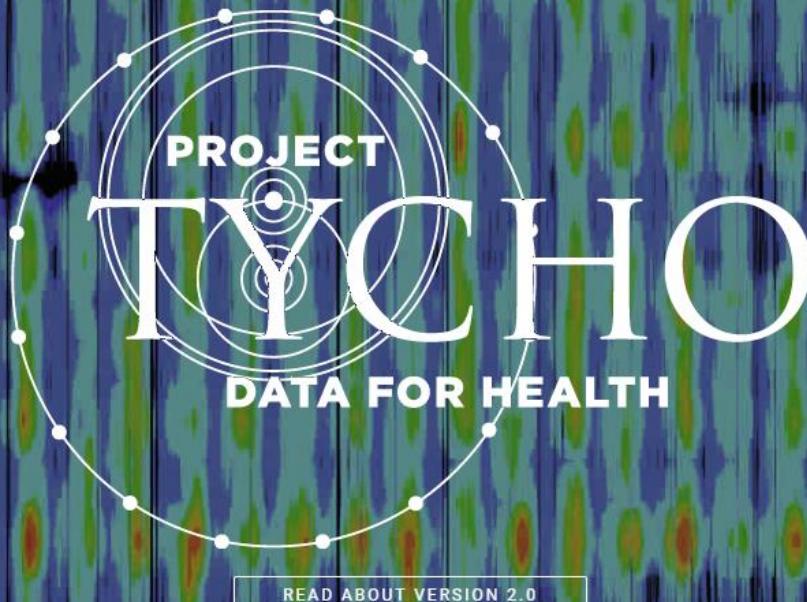
Søkvæsthuset, CPH

1826-27, smallpox hospital

Admitted patients, handwritten
but structured.

RUC





Weekly notifications of diseases from US cities 1888 - 2017

Digitized by hand, 35000 excel spreadsheets, 6300 files, 200 million keystrokes

All available online, updated continuously

As of 20-10-2022: 23500+ downloads, 75+ publications, 1.300.000+ API calls.

RUC

There are only so many pandemics to study, only so many to learn from...

But databases with historical data are still lacking



- Technical solutions to data entry. How can we make this process easier? OCR?
Citizen Science?



- A need for open-access repositories



- Funding...

Understanding health data

Perspectives from epidemiology research

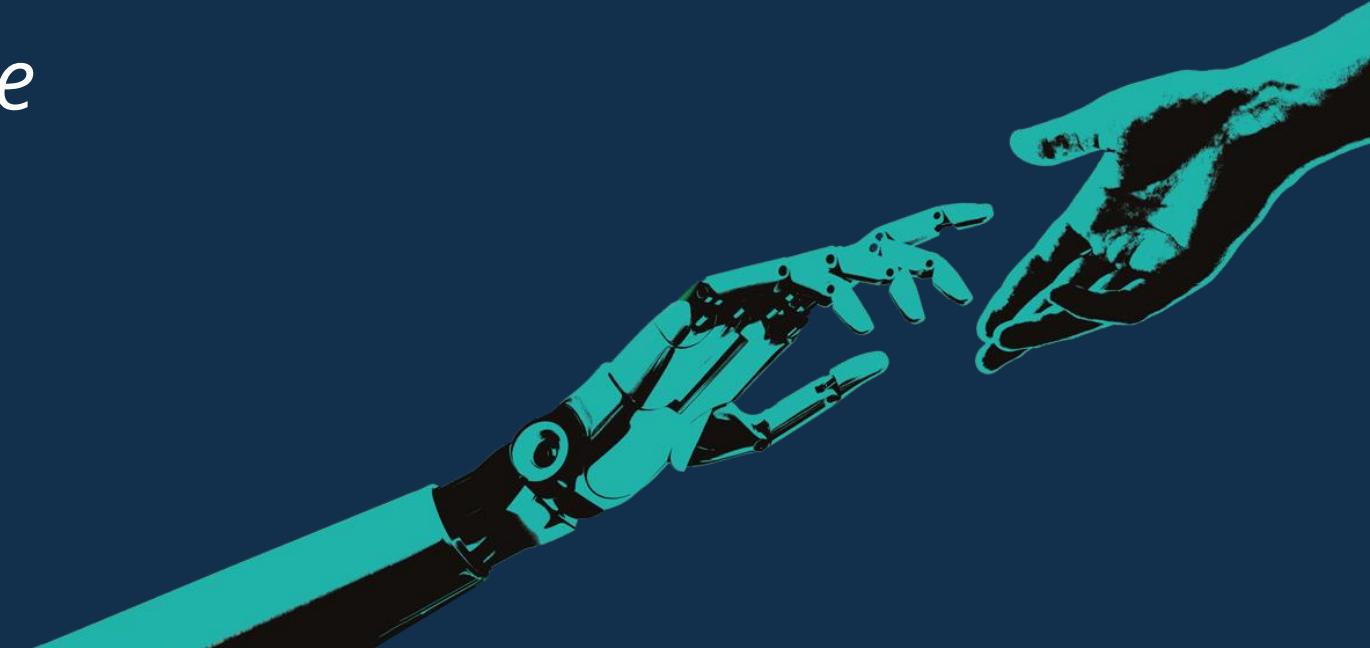


Søren Poder

Ph.d.-student, Roskilde University

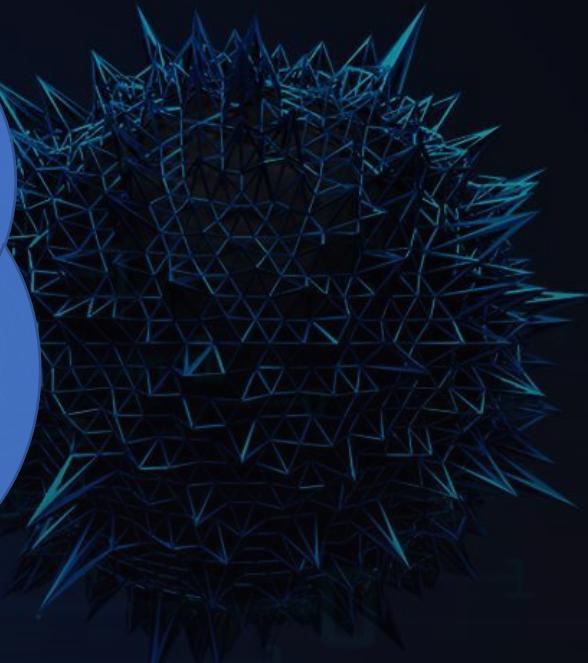
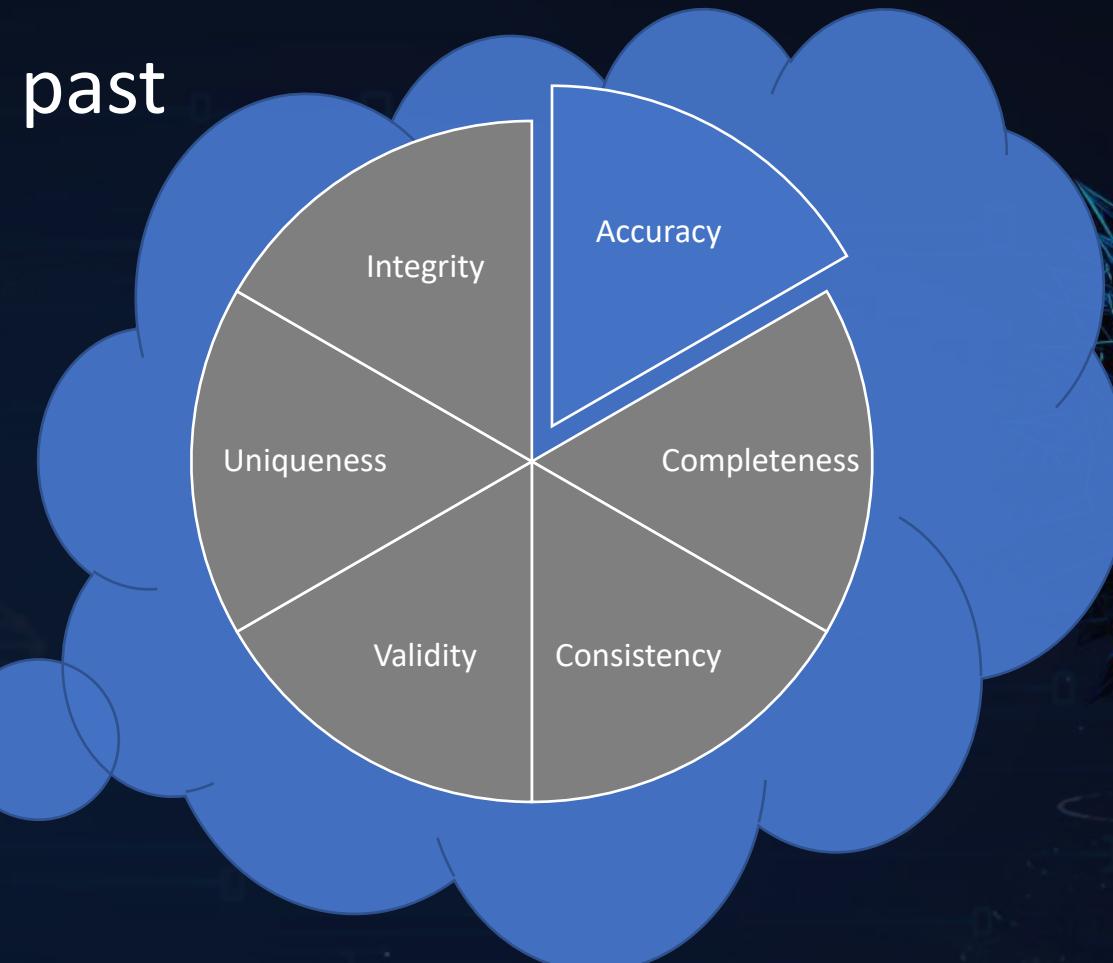
*Extracting historical data
through Collective Intelligence*

Digital Tech Summit 2022





Imagine a digital past



We Wish



When I say “We”



Christian Møller Dahl. Professor of Economics
Co-founder & COO at Rooftop Analytics ApS.
University of Southern Denmark



Jacob Sherson. Professor MSO.
Founding director of Center for Hybrid Intelligence and
ScienceAtHome.org, Prof. MSO
Aarhus University

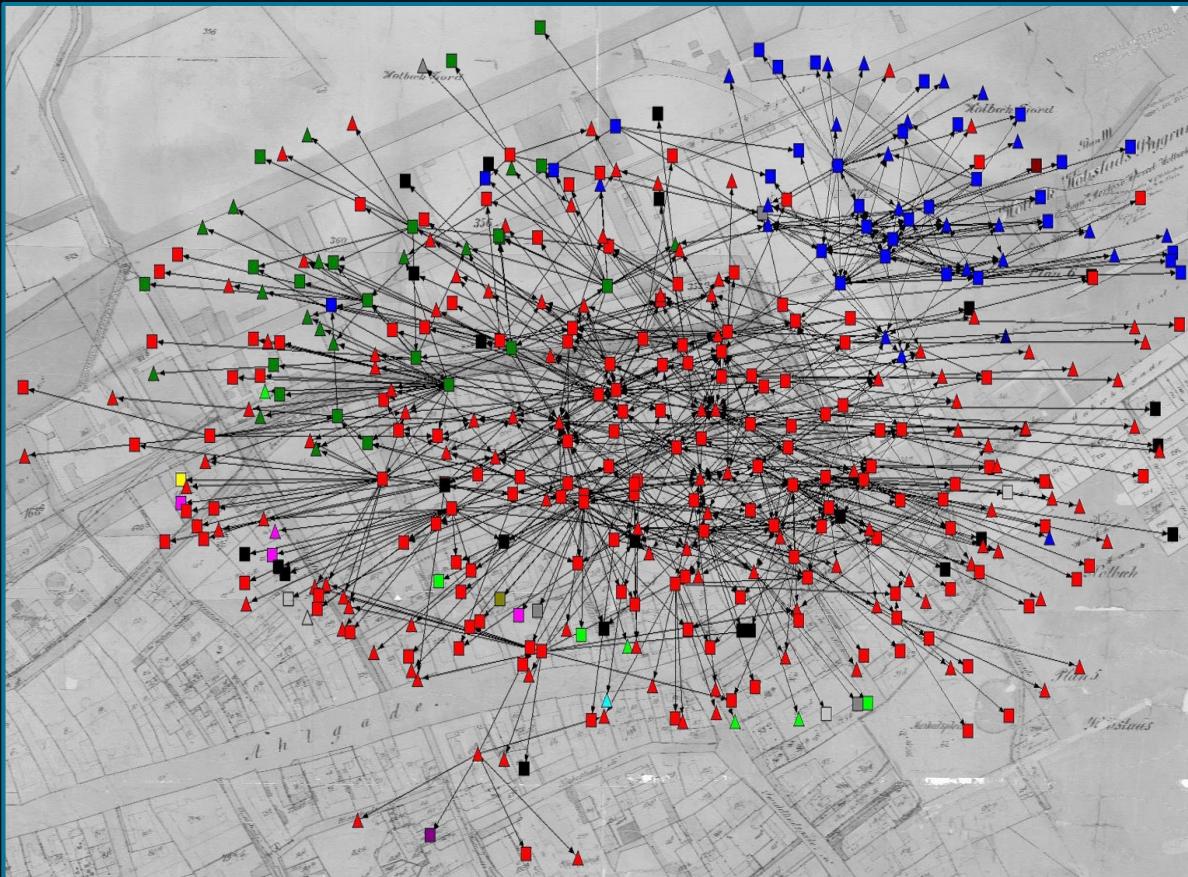


Søren B. Christensen. Municipal Archivist, Ph.D.
Aarhus City Archives
External lecturer
Aarhus University





The 1918 Pandemic



Lessons Learned from 1918



Collecting and Linking the Data

- 200 Medicinal reports
- 1500 Pages of tabulated incidents rapport
- 3.500 Deaths certificates
- 4.000 Hospitals Admissions
- 7.000 Patient Records
- 4.500 Household Statement (~74.000 individuals)
- 14.000 School Admissions

Entities to be transcribed:
>> 500.000





Take One

Patientjurnaler 1918-20

Aarhus Kommunehospital. Med. Afd.

Navn: *Suzanne Keldgaard* | 584

Alder: 33 år | Stilling: *Hospitaleuse*

Bopel: *A.F.A.W's Soldatenhus* | Indlæggelsesnummer: *584*

Indlagt af: *Rikkeff* | Indl. d.: 12-9-1918 Kl. Form. Emt.

Indlagt for: *abnorma* | Udskr. d.: 22-10-1918

Sygedagernes Antal: *77.*

Journal optaget af: *Suzanne Keldgaard*

Særlige Bemærkninger: Wassermanns Reakt. d. / : Røntgenundersøgelse d. /

Diagnose: *Musostomie* *Tissue ani* *Urocesens ad annum.*

Start Log ud

146 Jurnaler tilbage i serien! 584

Fuldeavn → Alder → Stilling →
Sygedavn → Mdr → År →
Indlæggelsesnr → Indlæggelsesnr →
Indlagt af → Indlagt af →
Indlagt for →
Indlagt den: dd mdr År
Udskrevet: dd mdr År
Sygedage: Antal
Påny indl. dd mm År
Diagnose:

Gem og næste

billedfil_sy-001-12_0107.jpg; filidfil_sy-001-12_0107.jpg

Entities to be transcribed:

> 500.000

If Accuracy is an Issue

> 1.000.000 individual tasks





Accelerating Return on Investment ...



... without compromising data accuracy



Take Two

B.		Dødsattest udstedt af en Læge.	
(Denne Billedt maa børnes i Mine ruter 1. Ans. tyldes 1. Tidsskrift af Dødsattest efter Død ved sygdom Hændelse - jn. Law of 4. Maj 1872.)			
<p><input checked="" type="checkbox"/> Første Navn der døde. Adskil med et stort mellemrum Hans Christian Andersen Kongens Nytorv, København, Danmark</p> <p><input type="checkbox"/> Andet Navn der døde.</p>		<p><i>Hans Christian Andersen</i></p>	
<p><input type="checkbox"/> Født.</p>		<p>Fødested og dato <i>5/1/1861</i></p>	
<p><input type="checkbox"/> Døde og nærmeste. Ømmer, Kvindelæge, etc. der har været ved døden. Indskriv med en afdækning af dødens hændelse, og med navn og adresse af den læge, der har udstillet dødsattesten.</p>		<p>Fødested og dato <i>Kongens Nytorv, København, Danmark</i></p>	
<p><input type="checkbox"/> Bogen kontroller først og senere.</p>		<p>Med. Nr. <i>1234567890</i></p>	
<p><input type="checkbox"/> Dødt.</p>		<p>Dødsdato <i>Yr. 17</i></p>	
<p><input type="checkbox"/> Dødsattest fra Dødelig hændelse ved sygdom, skade, etc.</p>		<p>Dødsattest (Overordnet) dato, Management, Sted <i>Beckins borg' mndt 4/4 Beckins</i></p>	
<p><input type="checkbox"/> Dødelig hændelse ved sygdom, skade, etc.</p>		<p>en Mine læge ved sin beboede sted. af Mine læge ved sin beboede sted. af Mine læge ved sin beboede sted.</p>	
<p><input type="checkbox"/> Dødelig hændelse ved sygdom, skade, etc.</p>		<p><i>1/1/18</i></p>	
<p><input type="checkbox"/> Dødelig hændelse ved sygdom, skade, etc.</p>		<p>Underordnete Læge her i. <i>1/1/18</i> over Læge af <i>Beckins</i> <i>Sjælsskab</i></p>	
<p><input type="checkbox"/> Dødelig hændelse ved sygdom, skade, etc.</p>		<p>og bestyrelse af næsten døgnes døde og dødelige hændelser.</p>	
<p><input type="checkbox"/> Dødelig hændelse ved sygdom, skade, etc.</p>		<p><i>Beckins borg' mndt 4/4</i></p>	
<p><input type="checkbox"/> Dødelig hændelse ved sygdom, skade, etc.</p>		<p><i>Beckins borg' mndt 4/4</i></p>	
<p><input type="checkbox"/> Dødelig hændelse ved sygdom, skade, etc.</p>		<p><i>156</i></p>	
<p>Se Anmærkninger på Bagdelen.</p>			

Segmentation

Henrik Peter Hansen
 Faderdødelig og Arv.
 År 1851
 g. Hansen
 Kærligst. (Hundesløjfsted): Gade, Husemølle, Elsgade
 Peter Hansen, Kongens Lyngby, 44
 Nørrebrogade 26 b
 Døde 18
 Kærligst. (Hundesløjfsted): Gade, Husemølle, Elsgade
 Peter Hansen, Kongens Lyngby, 44
 Nørrebrogade 26 b
 Døde 18
 a) Hvis Lægen selv har behandlet afslutte: *Læge - Præmierne*
 b) Hvis en anden Læge har behandlet afslutte:
 c) Hvis ingen Læge har behandlet afslutte:
 Hændende af Røg- og Cigarrabrics. Røger,
 Nørre
 Understegnede Læge har d. 1/2 18
 nyget Liget af *Henrik*
 Peter Hansen
 og forehandet

Metadata

Segment: Person
DocumentID 123456
Type: DeathCertificate
Coordinates: X,Y
Value: Henrik Peter Hansen

“Free information from the container it came in”



Take Two - Frontend

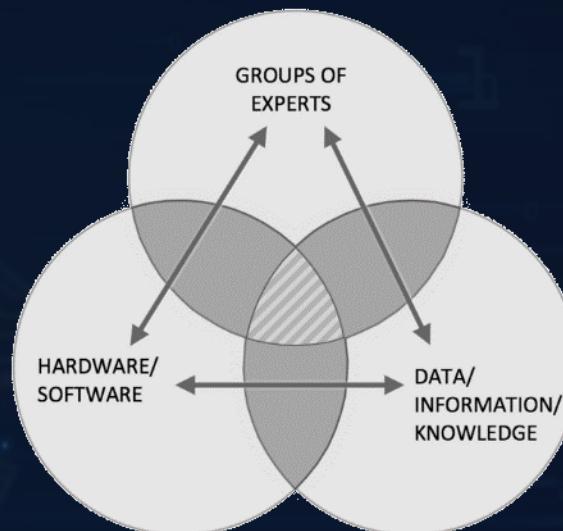
Specific
Measurable
Achievable
Realistic
Timebound

Microtasks!



Human-Computer-Interaction: Collective Intelligence

individual



and perpetual learn from each other

“A process by which a large group of individuals collaborate with machines to gather and share their knowledge, data and skills for the purpose of solving societal issues.”



Thank You

Søren B. Christensen, Municipality Archivist, Ph.D.
Aarhus City Archives
Associate Professor
Aarhus University

Christian Møller Dahl, Professor of Economics
University of Southern Denmark
Co-founder & COO at Rooftop Analytics ApS.

Jacob Sherson. Professor MSO.
Founding director of Center for Hybrid Intelligence and ScienceAtHome.org
Aarhus University

Lone Simonsen, Professor, **Department of Science and Environment**, Mathematics and Physics (IMFUFA)
Founder and director of PandemiX Center

Ole Sonne. Associate Professor Emeritus, Med.Sc.D. Ph.D.
Aarhus University

Anne Thomassen, Former Medical Director
Aarhus University Hospital



AUGUSTINUS FONDEN



MICA Fonden

AARHUS BYHISTORISKE FOND
Køb historiske bøger om Aarhus



Aarhus Universitetshospital

Understanding health data

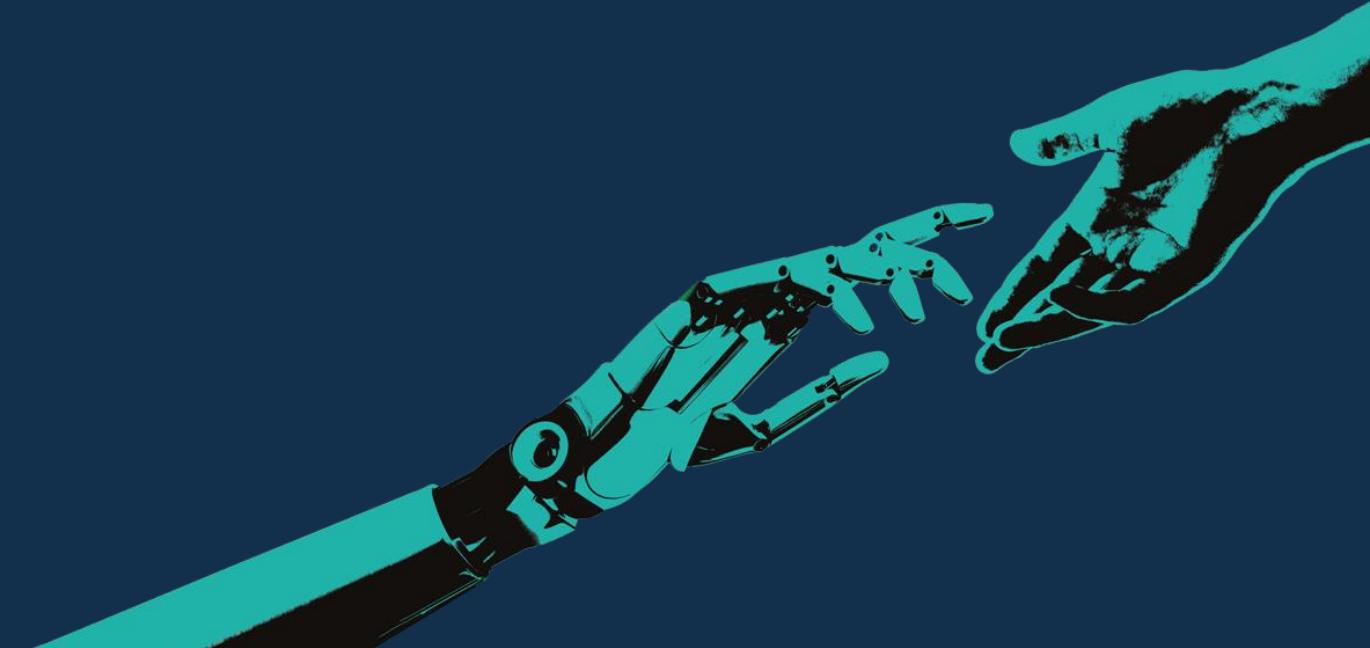
Perspectives from epidemiology research



Anders Gorm Pedersen
Professor, Technical University of Denmark

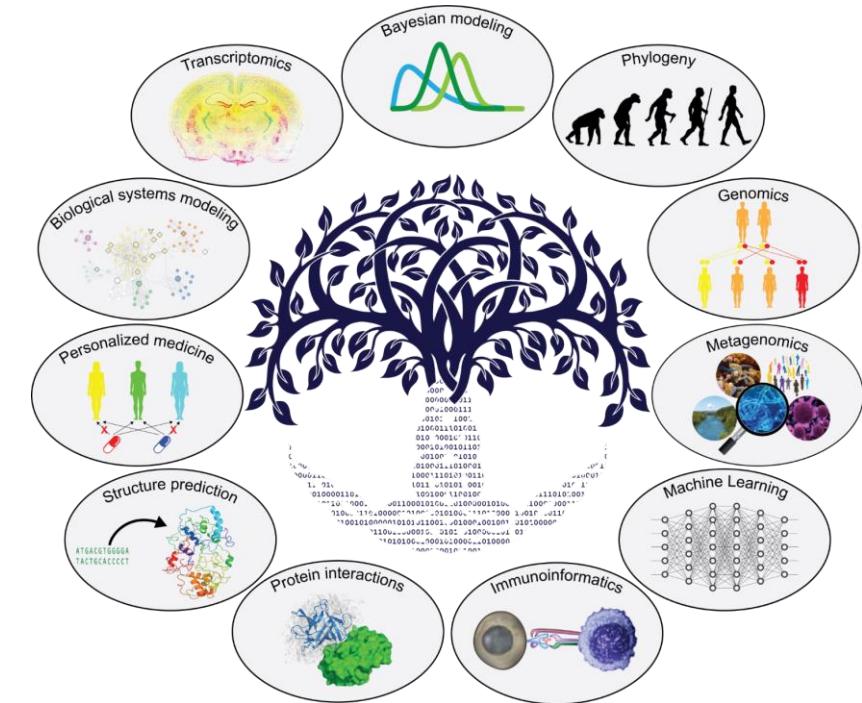
*Was the 1889 "Russian Flu" actually
a coronavirus pandemic*

Digital Tech Summit 2022



Molecular clock dating of a zoonotic event: From pandemic to the common cold

Anders Gorm Pedersen,
Professor,
Section of Bioinformatics, Dept. Health Technology
Technical University of Denmark



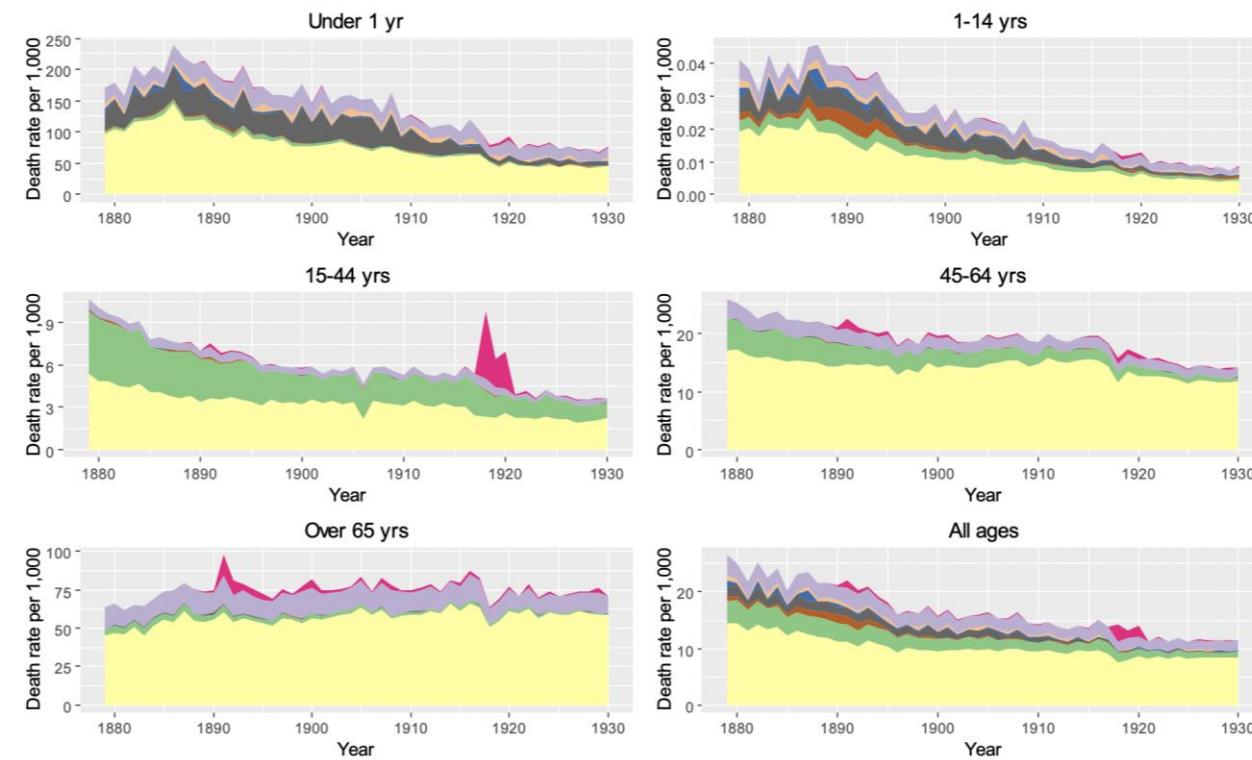
Russian Flu

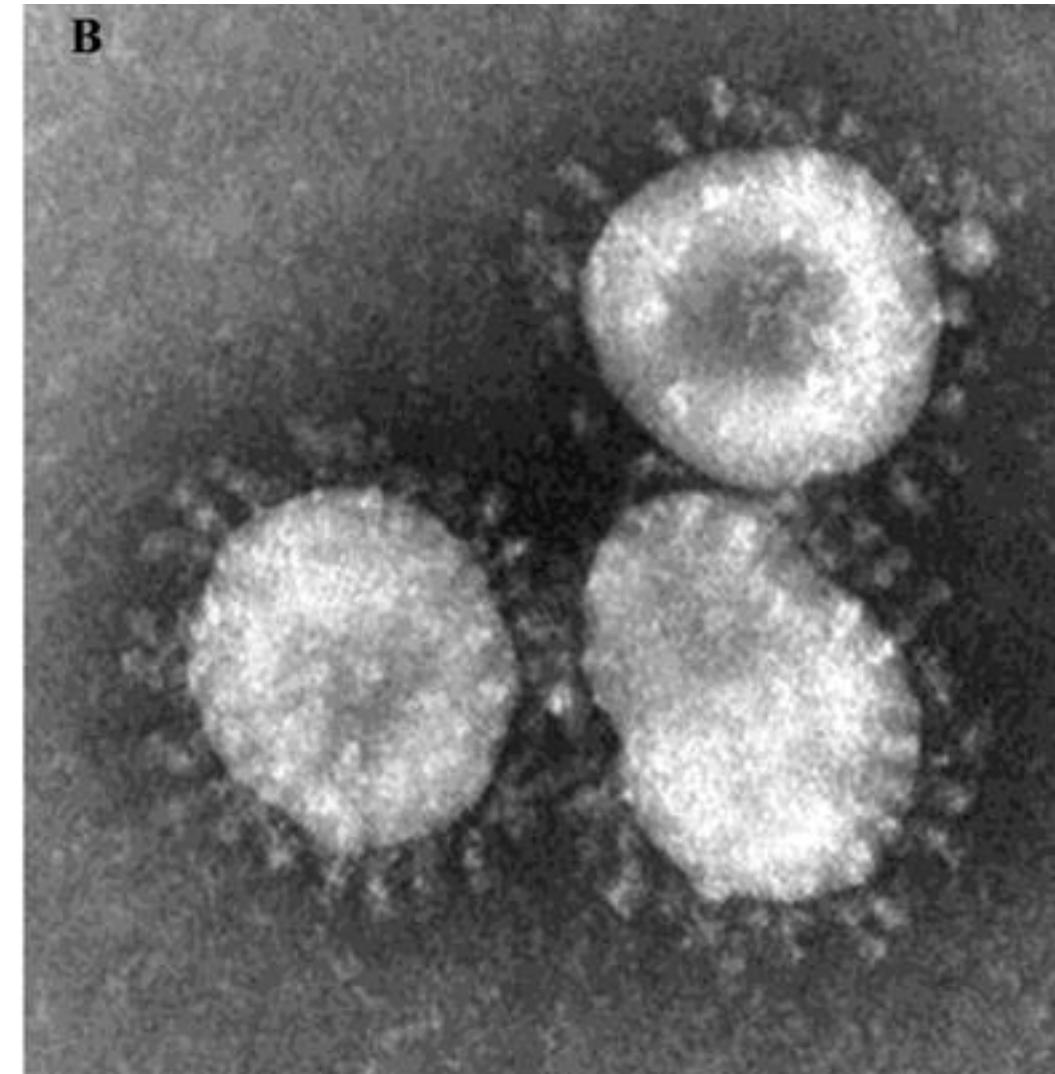
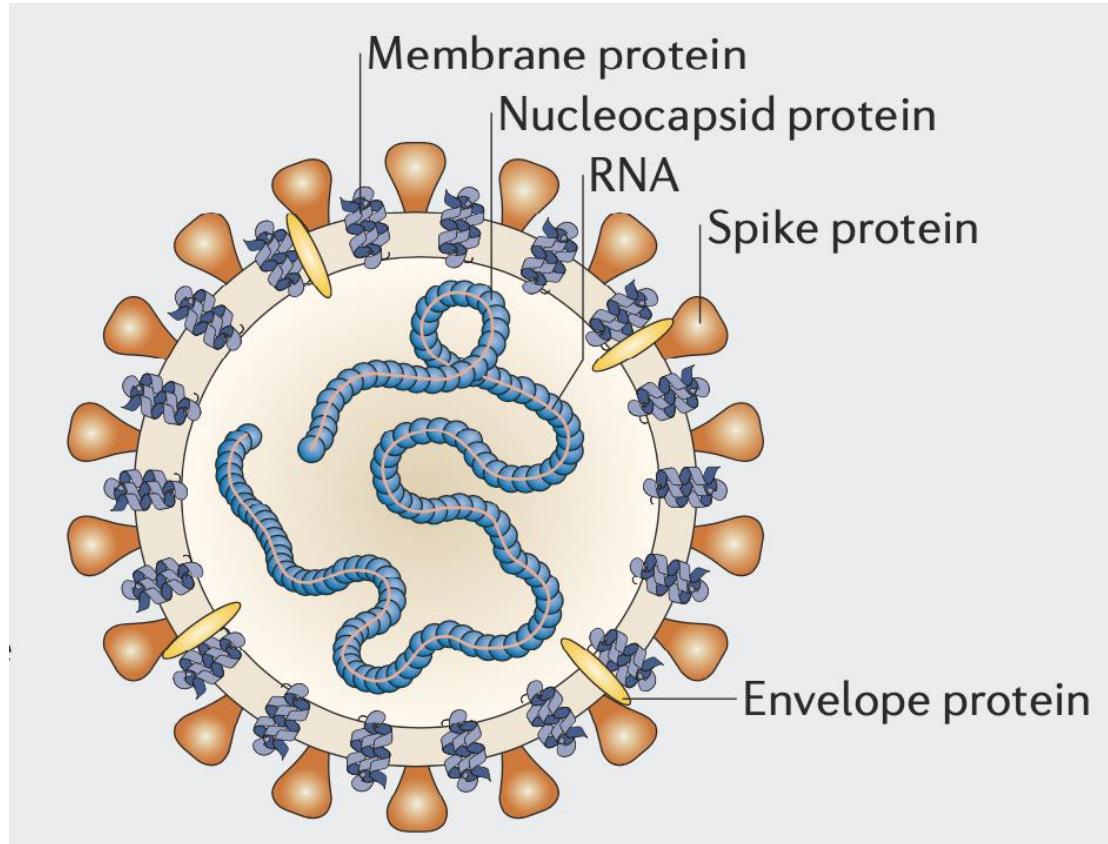
- 1889–1892 flu pandemic, also known as the "Asiatic flu"
- First reported in the Central Asian city of Bukhara in the Russian Empire, in May 1889, with up to two-thirds of the local population dying
- In four months it had spread throughout the Northern Hemisphere.
- Deaths peaked in
 - Saint Petersburg on 1 December 1889
 - In the United States 12 January 1890
- Killed about 1 million people worldwide.
- Commonly believed to be caused by an Influenza virus



Russian Flu

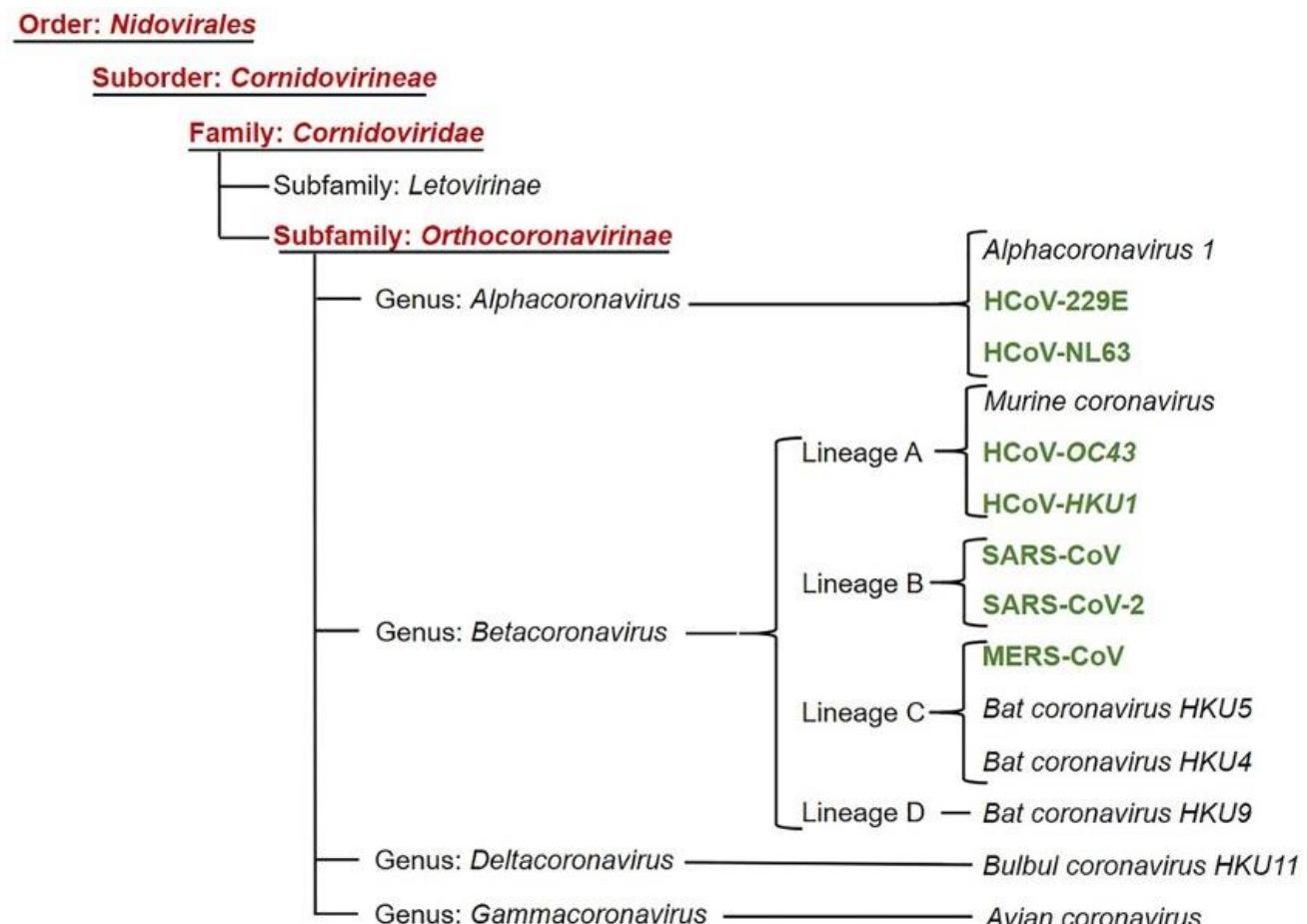
- Lone Simonsen group investigated historical records for Denmark ("Ugelisterne") around 2010
- Model-based estimates of mortality along with those caused by other important infectious diseases: measles, pertussis, diphtheria, and diarrhea
- High attack rate: 40% to 75%
- High(ish) mortality:
 - Average about 0.4%
 - Higher among elderly
- Many features not quite fitting influenza hypothesis: death more widespread among elderly, symptoms different, ...
- Put project aside without publishing





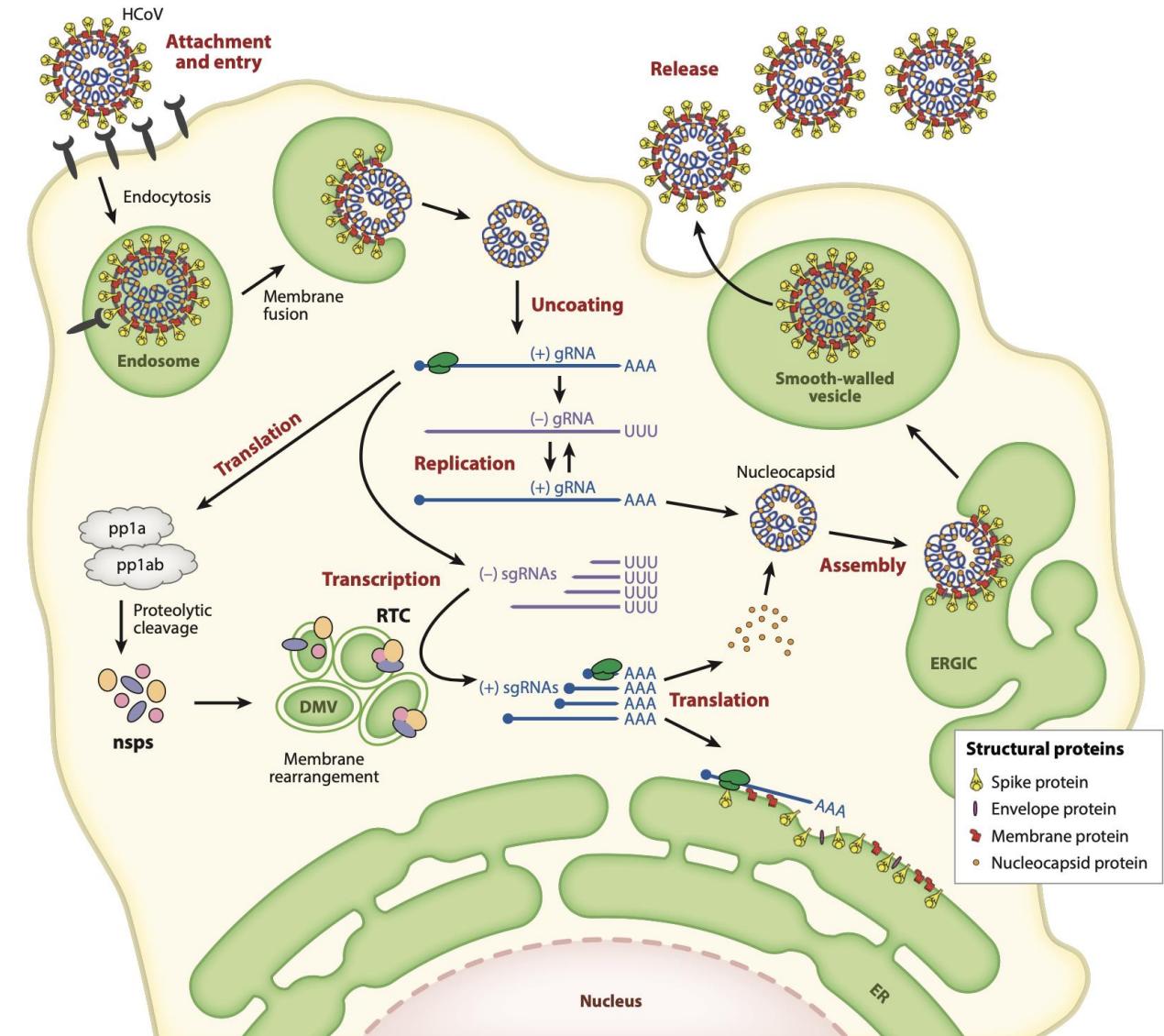
Corona virus taxonomy

- First discovered and named in the 1960s
- Large family of viruses that usually cause mild to moderate upper-respiratory tract illnesses, like the common cold
- Human corona viruses discovery timeline:
 - 229E (1966)
 - OC43 (1967)
 - SARS (2003, 10% case fatality)
 - NL63 (2004)
 - HKU1 (2005)
 - MERS (2012, 35% case fatality)
 - SARS-CoV-2 (2019, 1-3% case fatality)

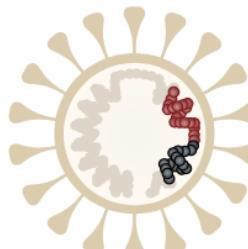


Replication cycle of human coronaviruses

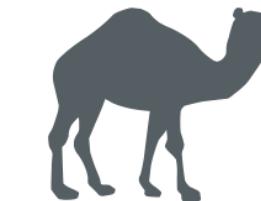
- Enveloped viruses with positive-sense single-stranded RNA genome
- The genome size of coronaviruses ranges from approximately 26 to 32 kilobases, one of the largest among RNA viruses.



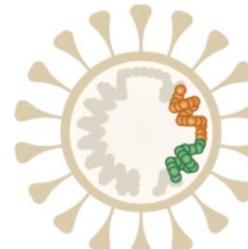
Pandemic corona viruses are zoonotic



SARS-CoV



MERS-CoV



?

SARS-CoV2

Non-pandemic human corona viruses are also zoonotic

HCoV-229E

Possible origin: bats
Intermediate host: camelids?
Clinical features: Usually self-limiting respiratory infection. Pneumonia has been reported in immunocompromised patients

HCoV-NL63

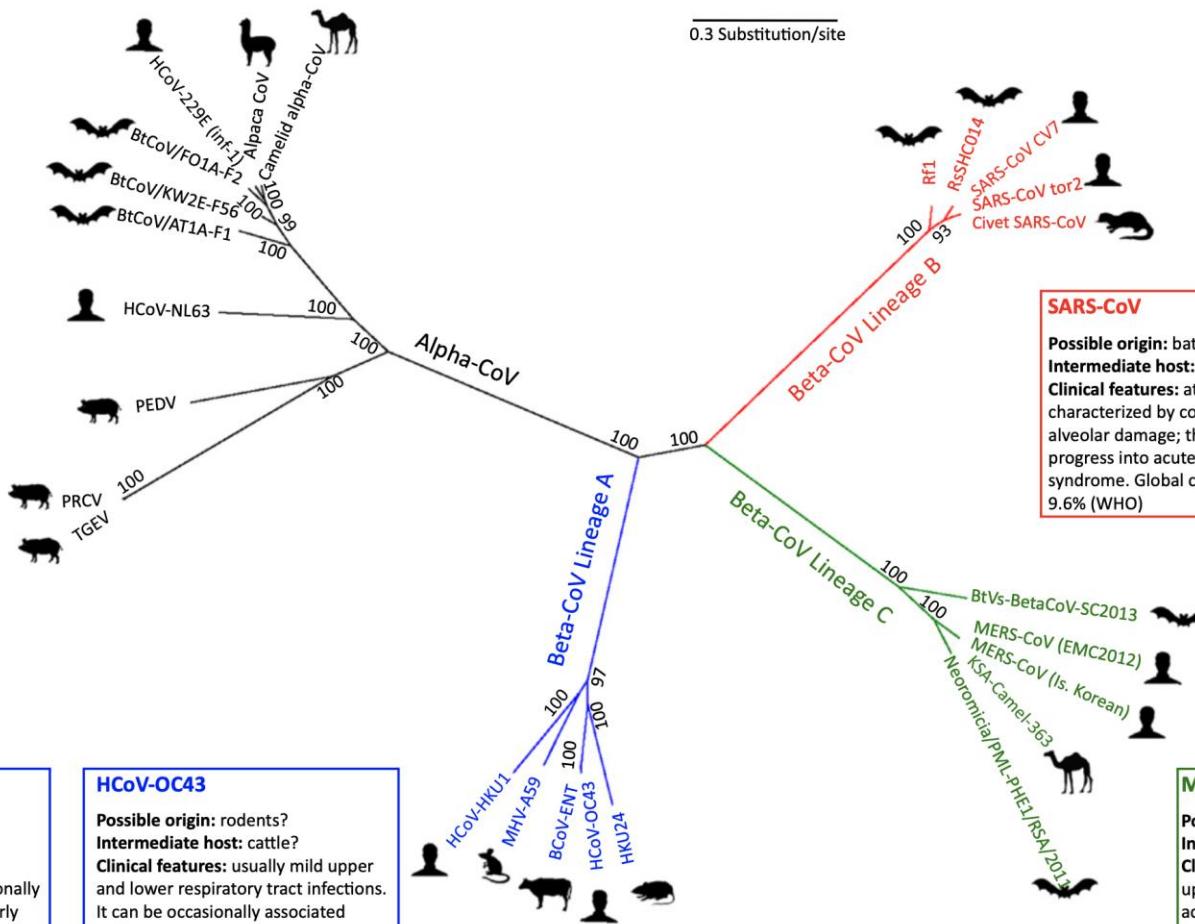
Possible origin: bats?
Intermediate host: unknown
Clinical features: usually self-limiting respiratory disease with rhinorrhea, cough, and fever. It can be associated with obstructive laryngitis in children

HCoV-HKU1

Possible origin: rodents?
Intermediate host: rodents?
Clinical features: usually mild respiratory disease; it can occasionally cause pneumonia in infants, elderly subjects, and immunocompromised patients. Gastroenteric symptoms have also been reported.

HCoV-OC43

Possible origin: rodents?
Intermediate host: cattle?
Clinical features: usually mild upper and lower respiratory tract infections. It can be occasionally associated with pneumonia



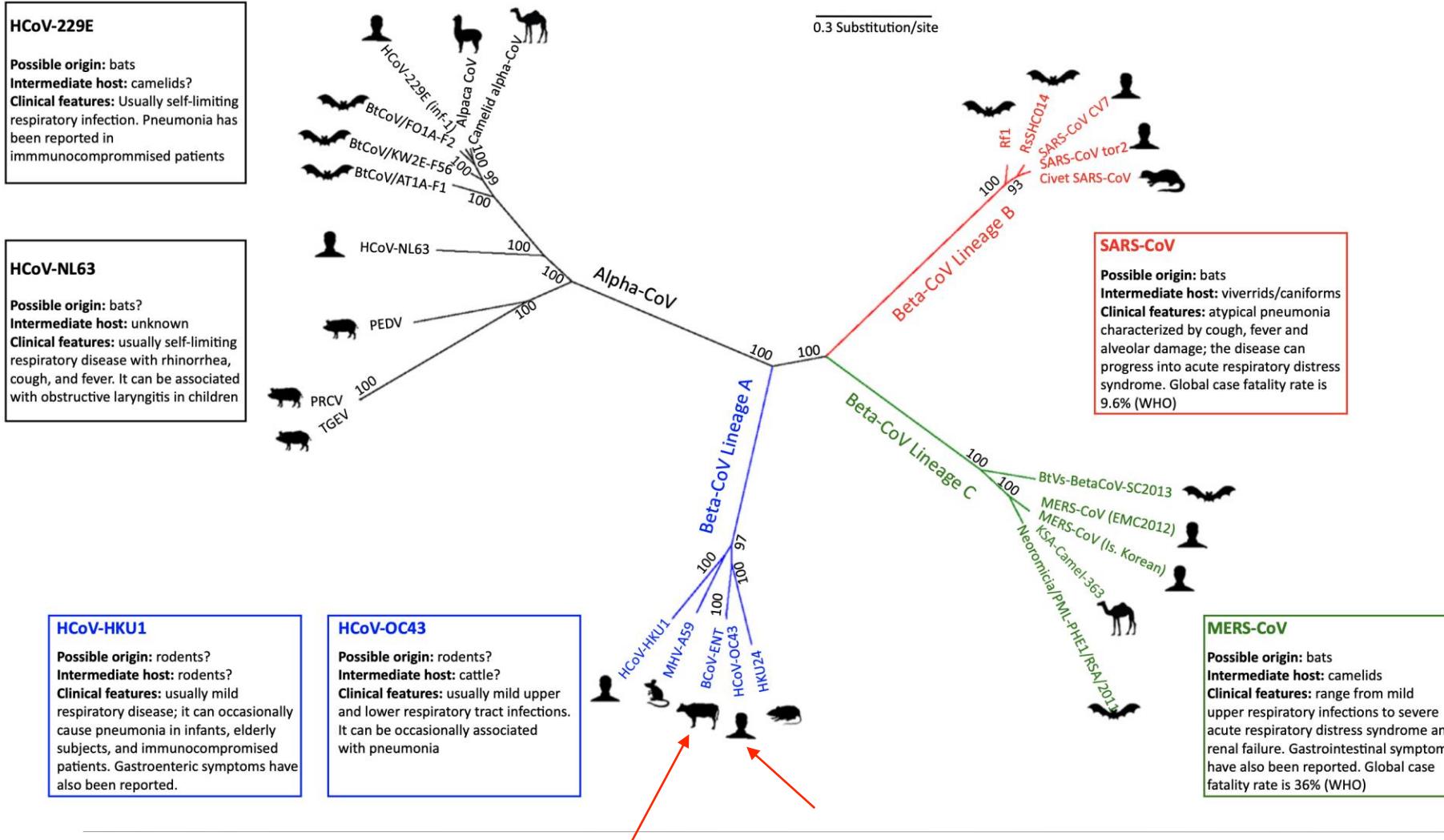
SARS-CoV

Possible origin: bats
Intermediate host: viverrids/caniforms
Clinical features: atypical pneumonia characterized by cough, fever and alveolar damage; the disease can progress into acute respiratory distress syndrome. Global case fatality rate is 9.6% (WHO)

MERS-CoV

Possible origin: bats
Intermediate host: camelids
Clinical features: range from mild upper respiratory infections to severe acute respiratory distress syndrome and renal failure. Gastrointestinal symptoms have also been reported. Global case fatality rate is 36% (WHO)

Closest relative of non-pandemic corona virus OC43 is a cow virus



JOURNAL OF VIROLOGY, Feb. 2005, p. 1595–1604
0022-538X/05/\$08.00+0 doi:10.1128/JVI.79.3.1595–1604.2005
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Vol. 79, No. 3

Complete Genomic Sequence of Human Coronavirus OC43: Molecular Clock Analysis Suggests a Relatively Recent Zoonotic Coronavirus Transmission Event

Leen Vijgen, Els Keyaerts, Elien Moës, Inge Thoelen, Elke Wollants, Philippe Lemey,
Anne-Mieke Vandamme, and Marc Van Ranst*

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Received 14 June 2004/Accepted 16 September 2004

Hypothesis about OC43 as cause of 1889 pandemic

- “Interestingly, around the period in which the BCoV interspecies transmission would probably have taken place, a human epidemic ascribed to influenza was spreading around the world.
- Absolute evidence that an influenza virus was the causative agent of this epidemic was never obtained, due to the lack of tissue samples from that period.
- However, postepidemic analysis in 1957 of the influenza antibody pattern in sera of people who were 50 to 100 years old indicated that H2N2 influenza antibodies might have originated from the 1889–1890 pandemic.
- However, it is tempting to speculate about an alternative hypothesis, that the 1889–1890 pandemic may have been the result of interspecies transmission of bovine corona-viruses to humans, resulting in the subsequent emergence of HCoV-OC43”.

1602 VIJGEN ET AL.

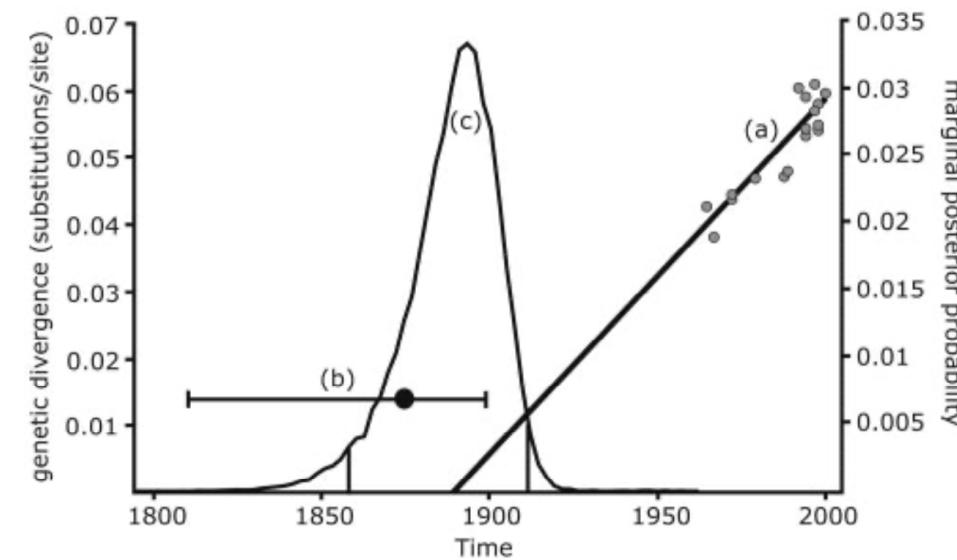
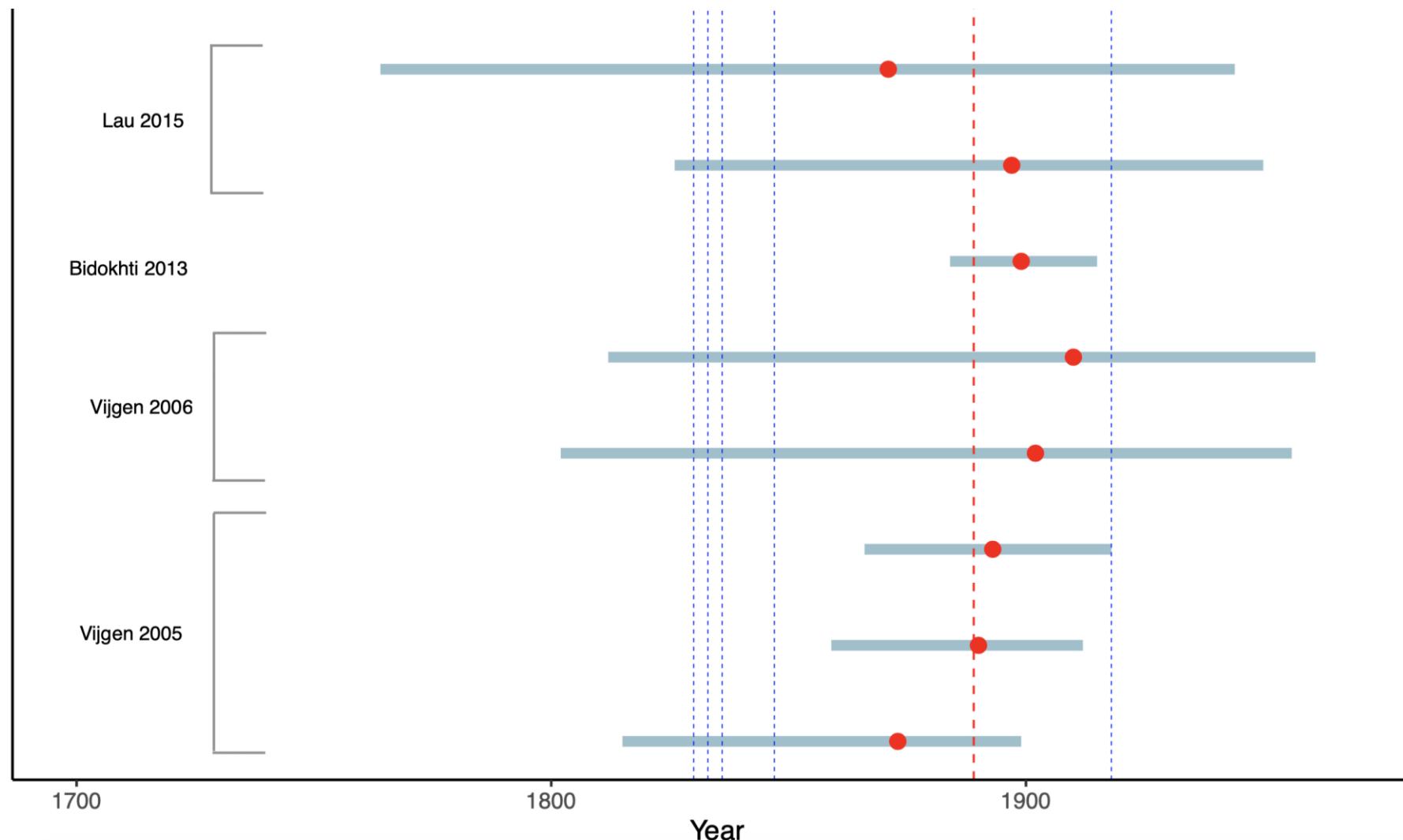


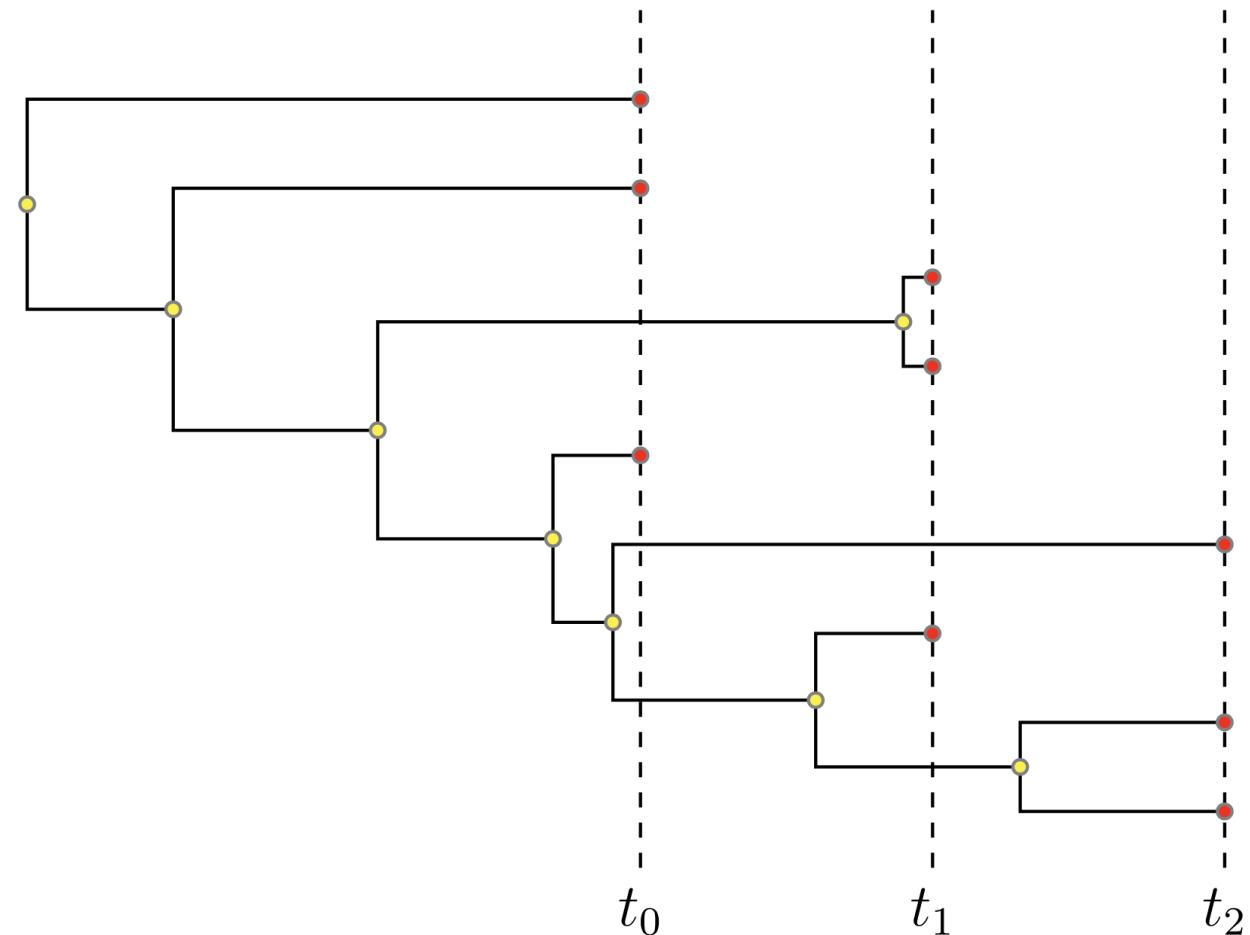
FIG. 6. Results of the evolutionary rate analysis. Line a, linear regression of root-to-tip divergence (y axis) versus sampling time (x axis). The point at which the regression line crosses the time axis indicates the TMRCA (1891). Line b, maximum-likelihood estimate (1873) with 95% confidence intervals (1815 to 1899) for the TMRCA. Curve c, marginal posterior probability (right y axis) for the TMRCA obtained by using the Bayesian coalescent approach. The vertical bars in the distribution represent the 95% highest posterior density interval. Dates of isolation of HCoV-OC43 and BCoV strains are indicated by grey dots.

Estimation of age of OC43 / BCoV ancestor in other people's work



Bayesian phylogenetics: Estimating the age of ancestral nodes in tree from dated samples

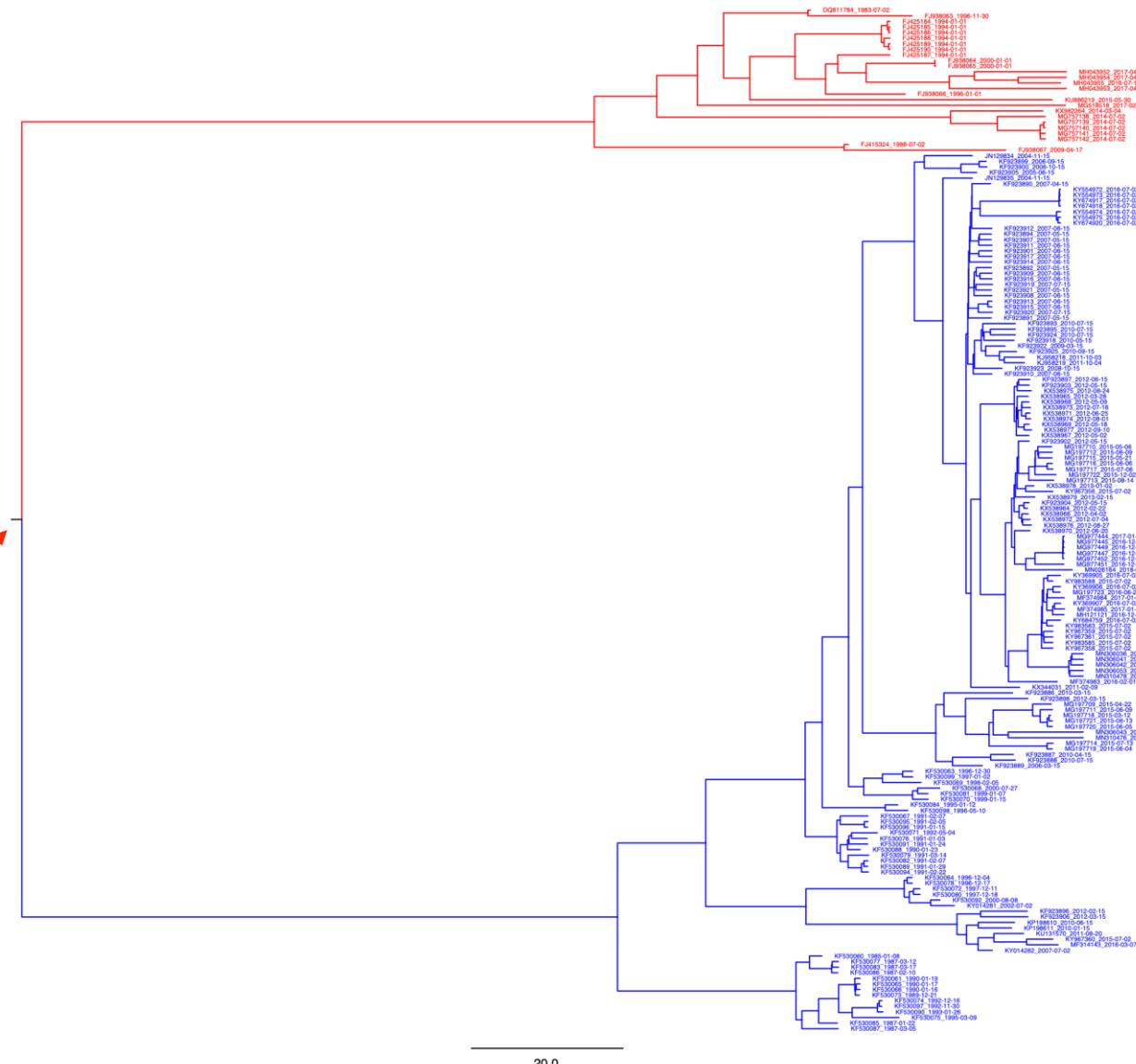
- Virus sequences evolve rapidly
- Measurable evolution over short time spans (months or years)
- “Heterochronous” (non-simultaneous) samples allow us to infer absolute rate of evolution
- Knowing the rate allows us to infer the age of ancestral nodes in tree
- We collected large set of whole-genome sequences for OC43 and BCoV with known sample dates



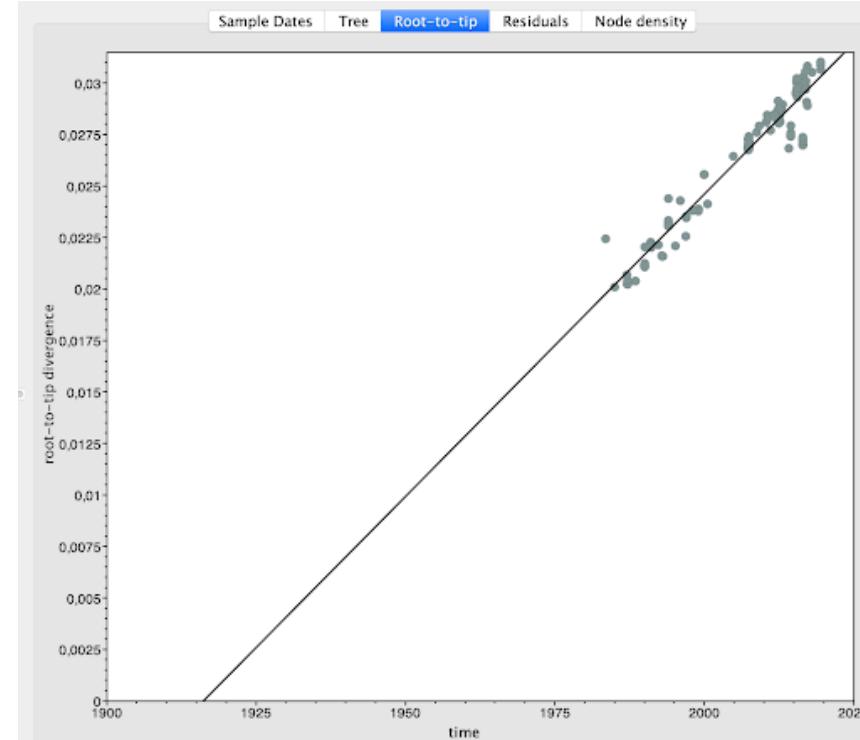
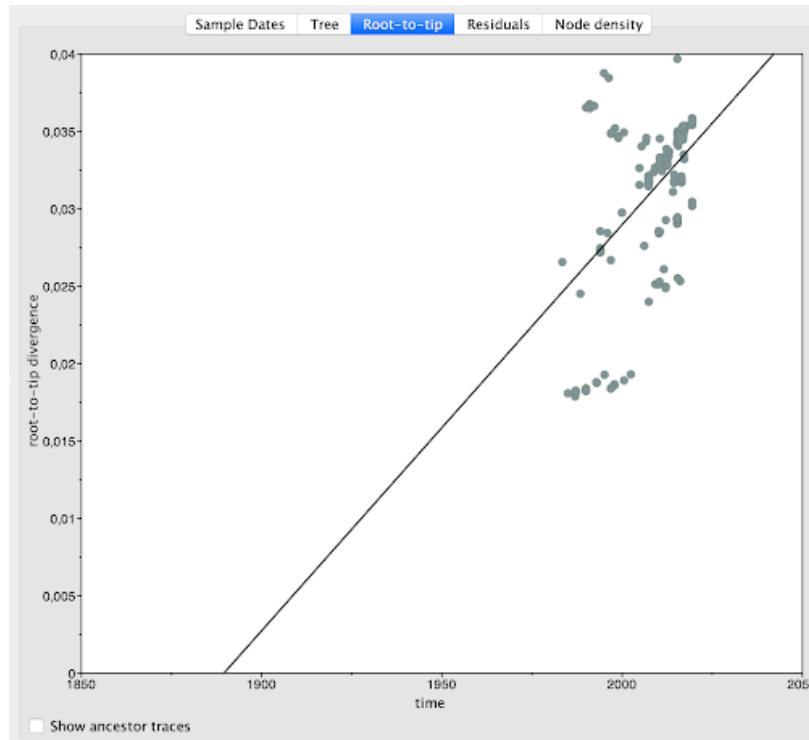
Estimating date that OC43 corona virus jumped from cows to humans

- Bovine Corona virus
- Human OC43 virus

Common ancestor
around time of species jump

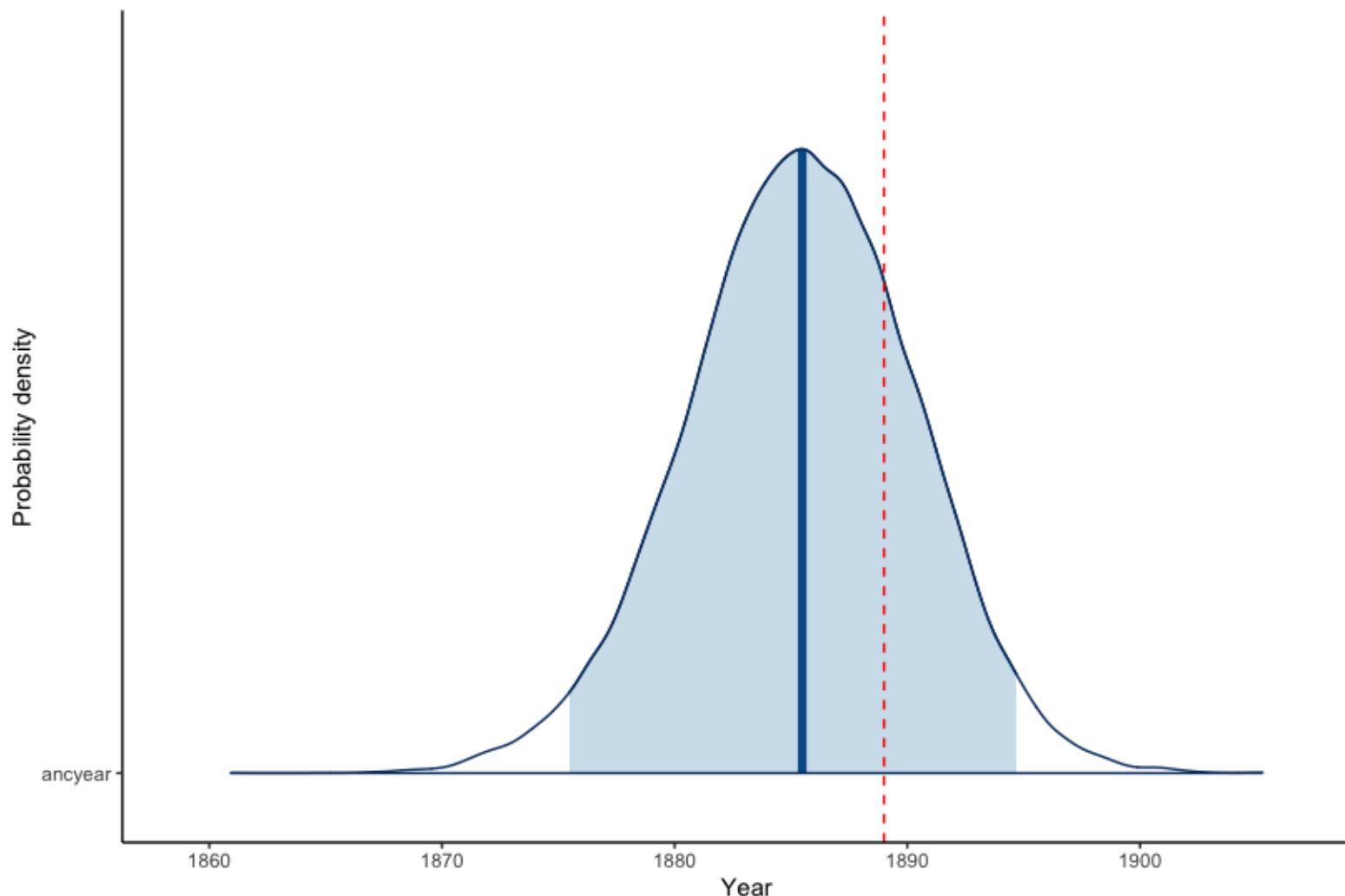


Bayesian phylogenetics: Removal of recombinant sequences

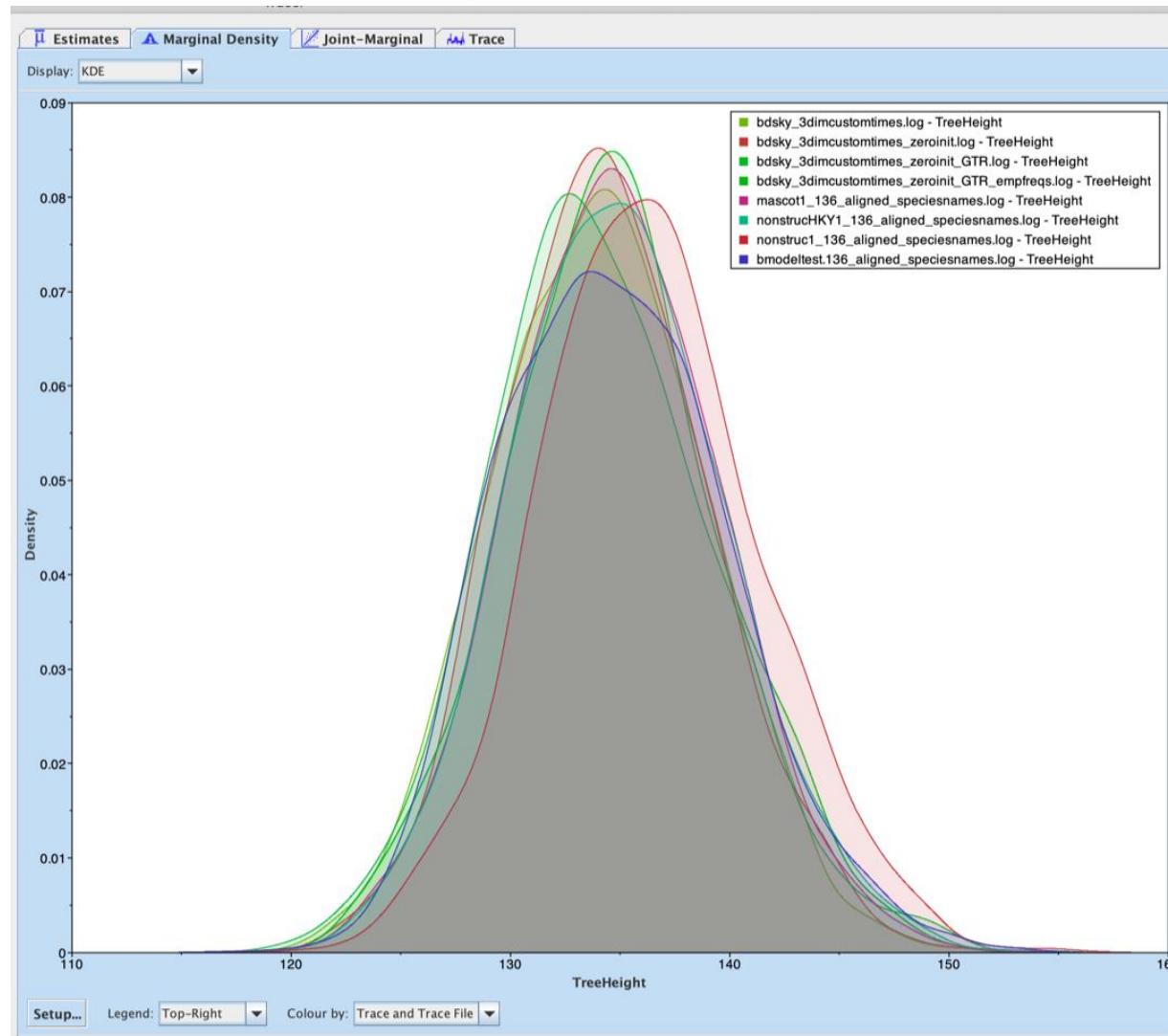


- Recombination detection tool RDP4 was used to detect and remove sequences containing possible recombination events.
- Final dataset consisting of 112 HCoV-OC43 and 24 BCoV sequences.
- Removal of recombinants resulted in a strong improvement of temporal signal
- Before: $r^2=0.23$. After: $r^2=0.93$

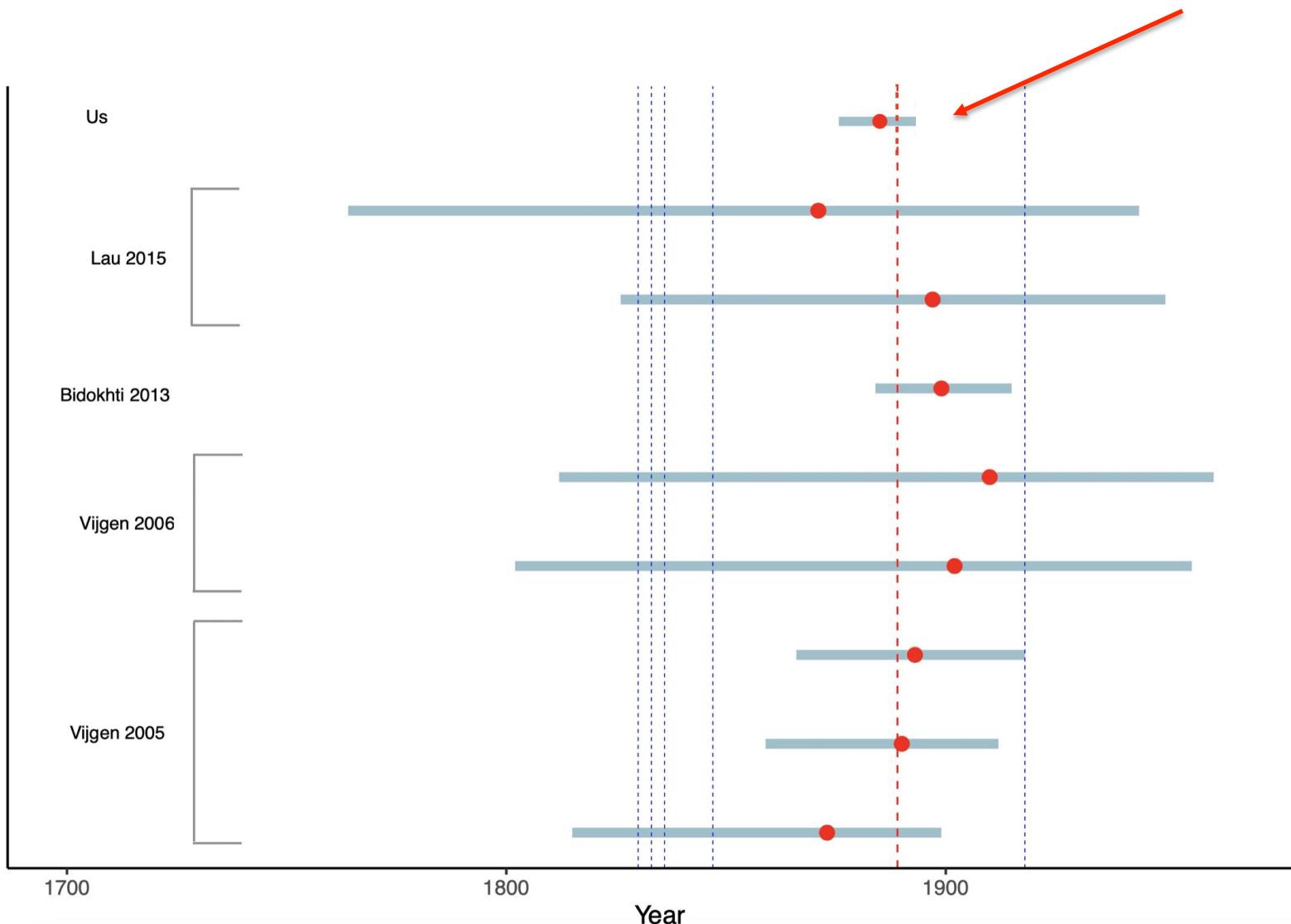
Timing: very close to 1889, with little uncertainty



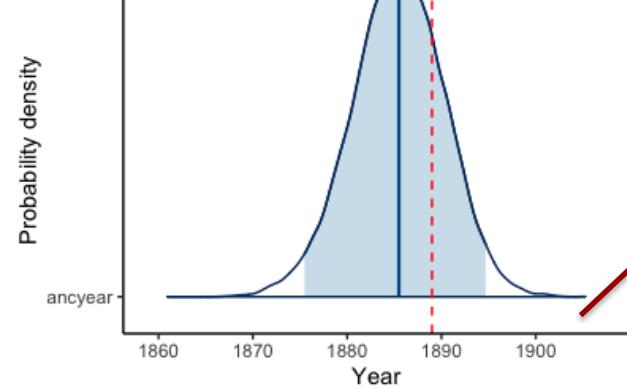
Different model assumptions lead to same estimated date



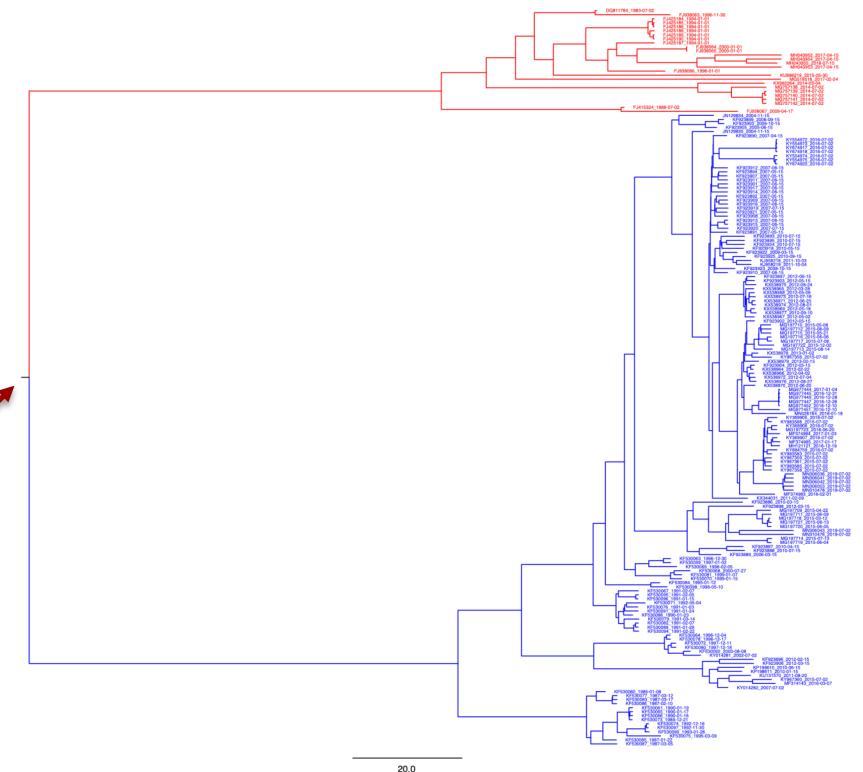
Timing: very close to 1889, with little uncertainty



1889 “Russian Flu” was early corona virus pandemic, now evolved into seasonal cold virus



- **Bovine Corona virus**
- **Human OC43 virus**



Acknowledgements

Amanda Gammelby Qvesel¹, Maarten van Wijhe¹, Alex Vincent Thorn¹, Cécile Viboud², Robert Taylor¹, Viggo Andreasen¹, Lone Simonsen¹, Anders Gorm Pedersen³

¹Department of Science and Environment, Roskilde University, Denmark

²Fogarty International Center, National Institutes of Health, USA

³Department of Health Technology, Section for Bioinformatics, Technical University of Denmark

Understanding health data

Perspectives from epidemiology research

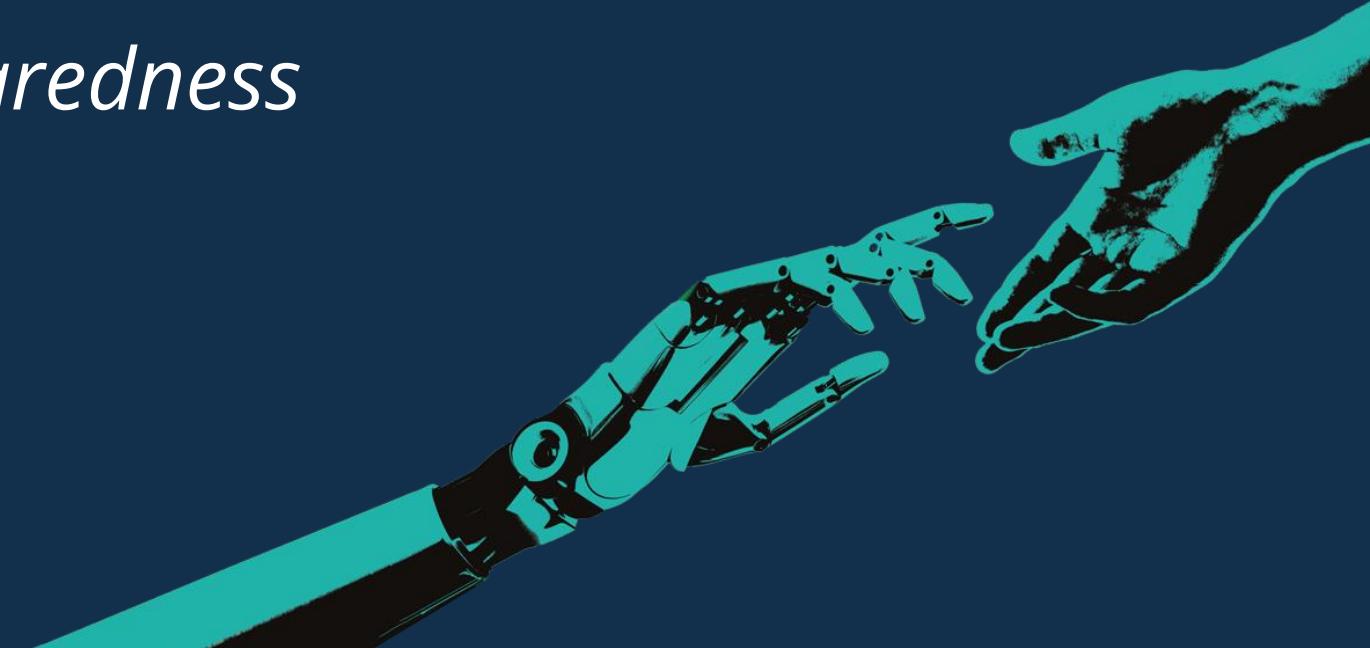


Thea Kølsen Fischer

Professor, Nordsjællands Hospital

*Telemedicine solutions –
building our pandemic preparedness
and response resilience*

Digital Tech Summit 2022



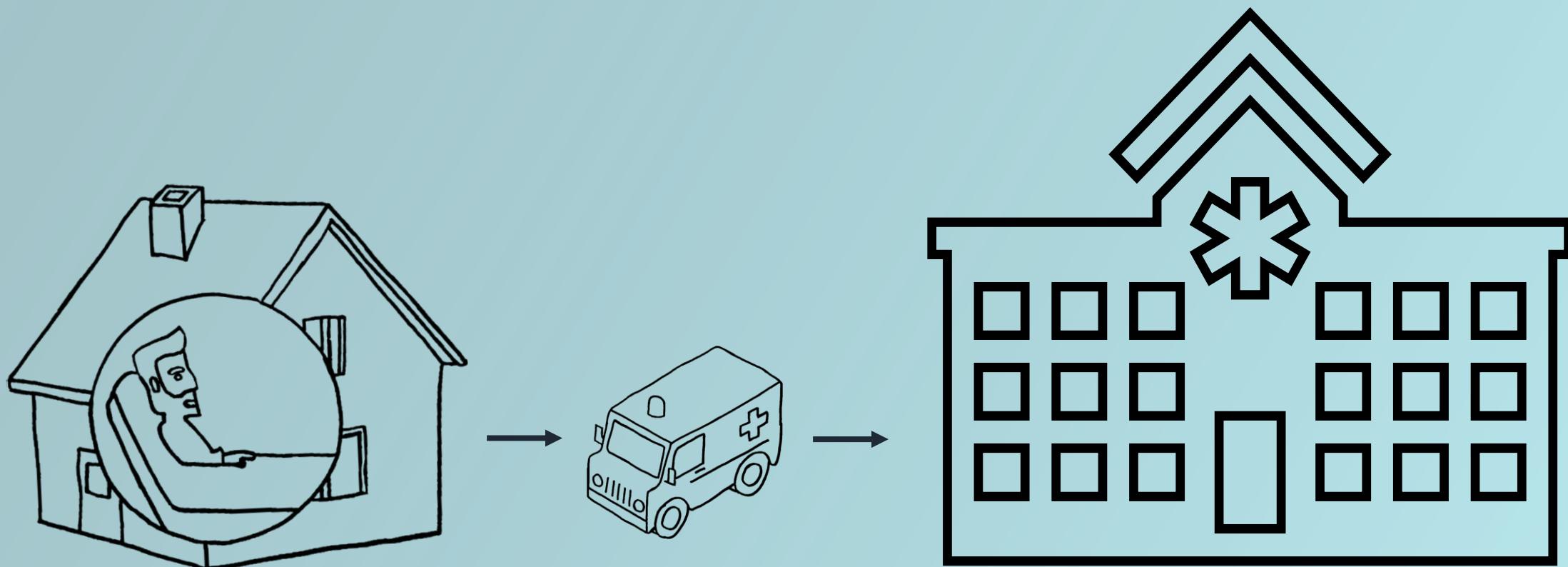


Influenz-er

Hospital-at-home

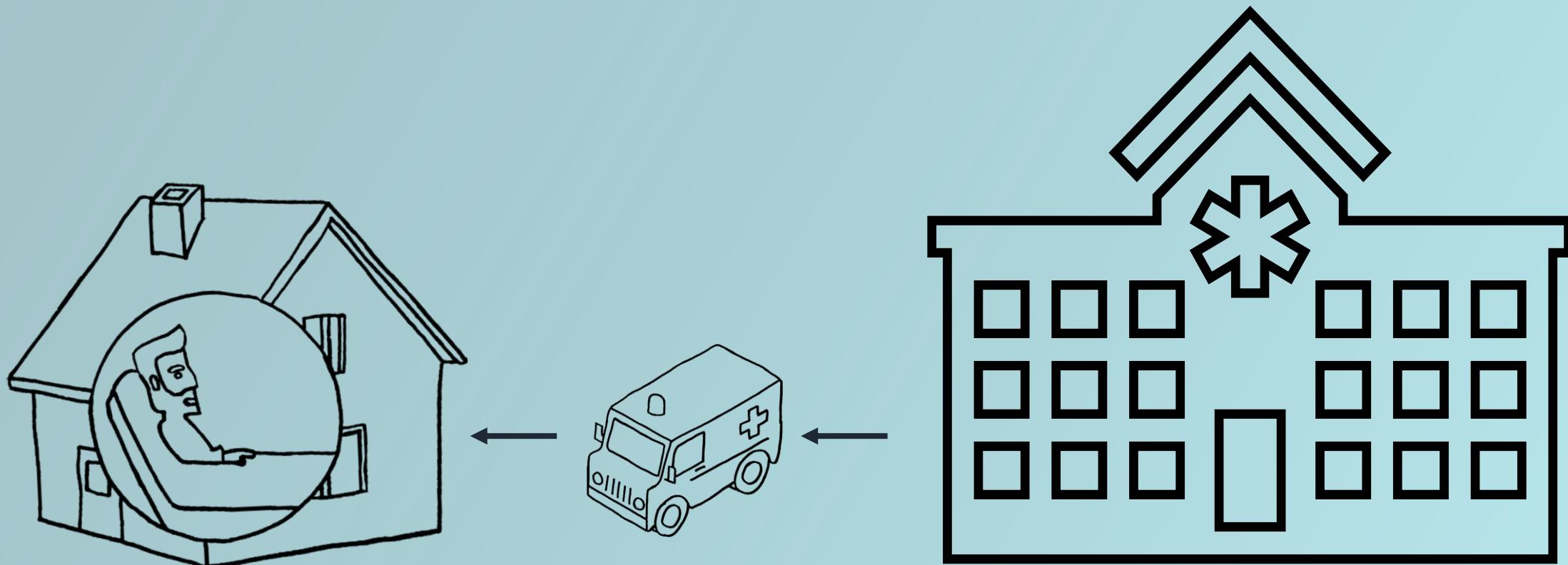
Thea Kølsen Fischer,
Professor, Director of Research
Dept of Research, Nordsjællands Hospital

Paradigm Shift



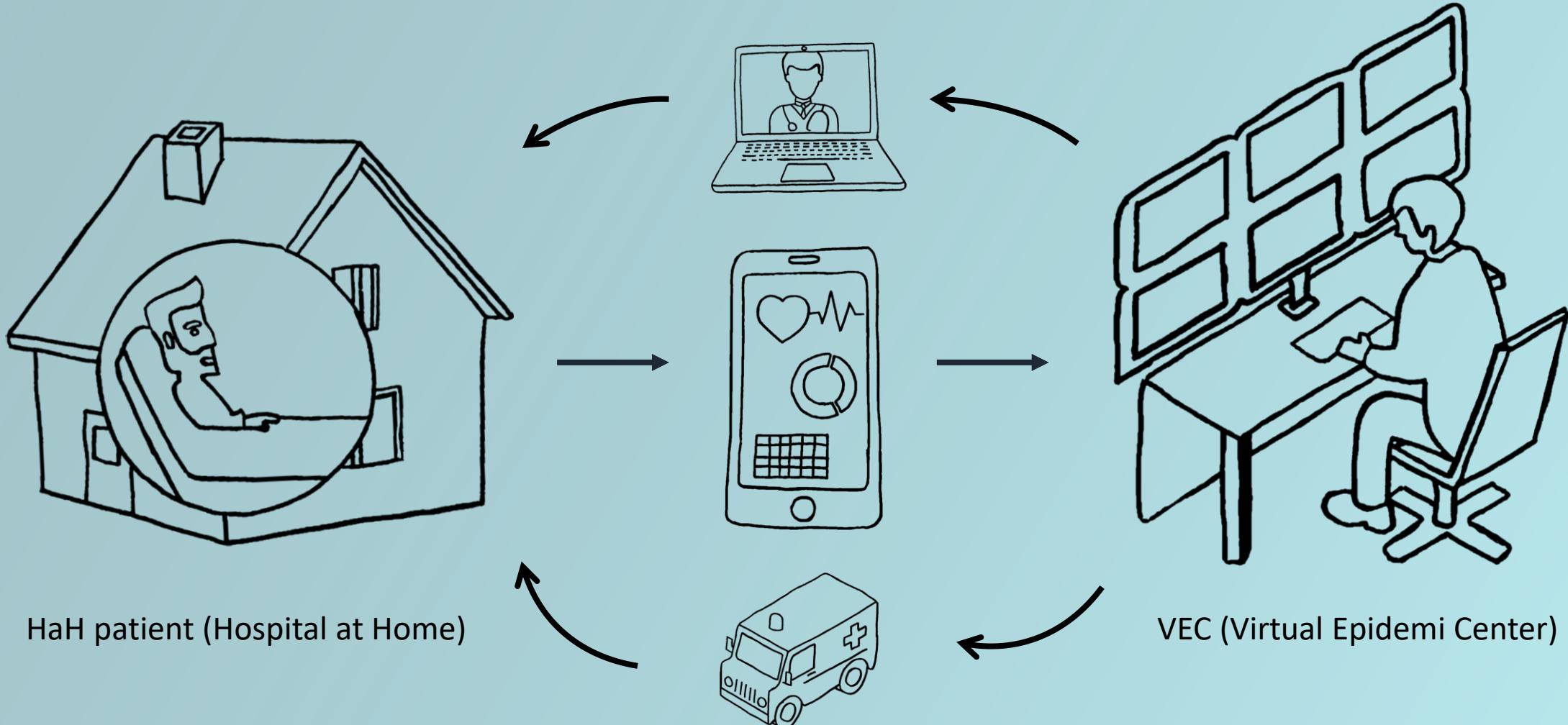
Influenz-er
Hospital-at-home

Paradigm Shift



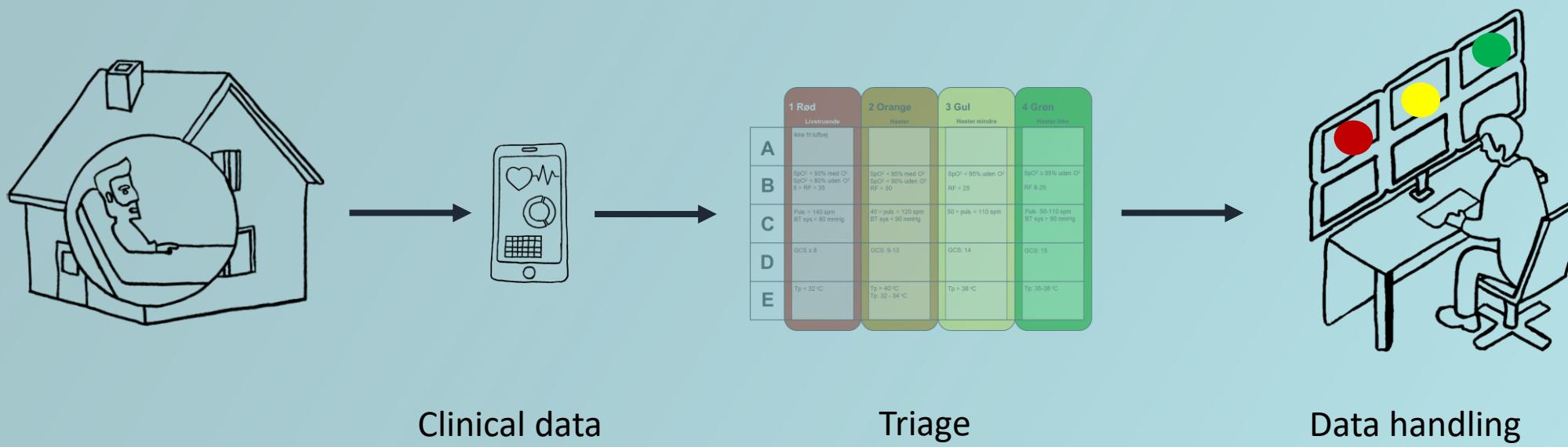
Influenz-er
Hospital-at-home

Influenz-er Model



Influenz-er
Hospital-at-home

Patient safety



Development & Testing

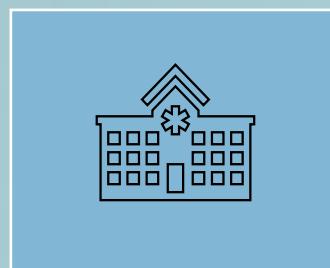


Development

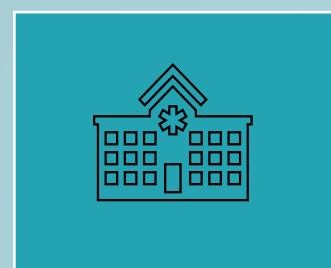
**Technology +
SOP design**



**In-hospital
Pilot test**



**Training of
staff**



**Feasibility
Proof of concept**



N = 13

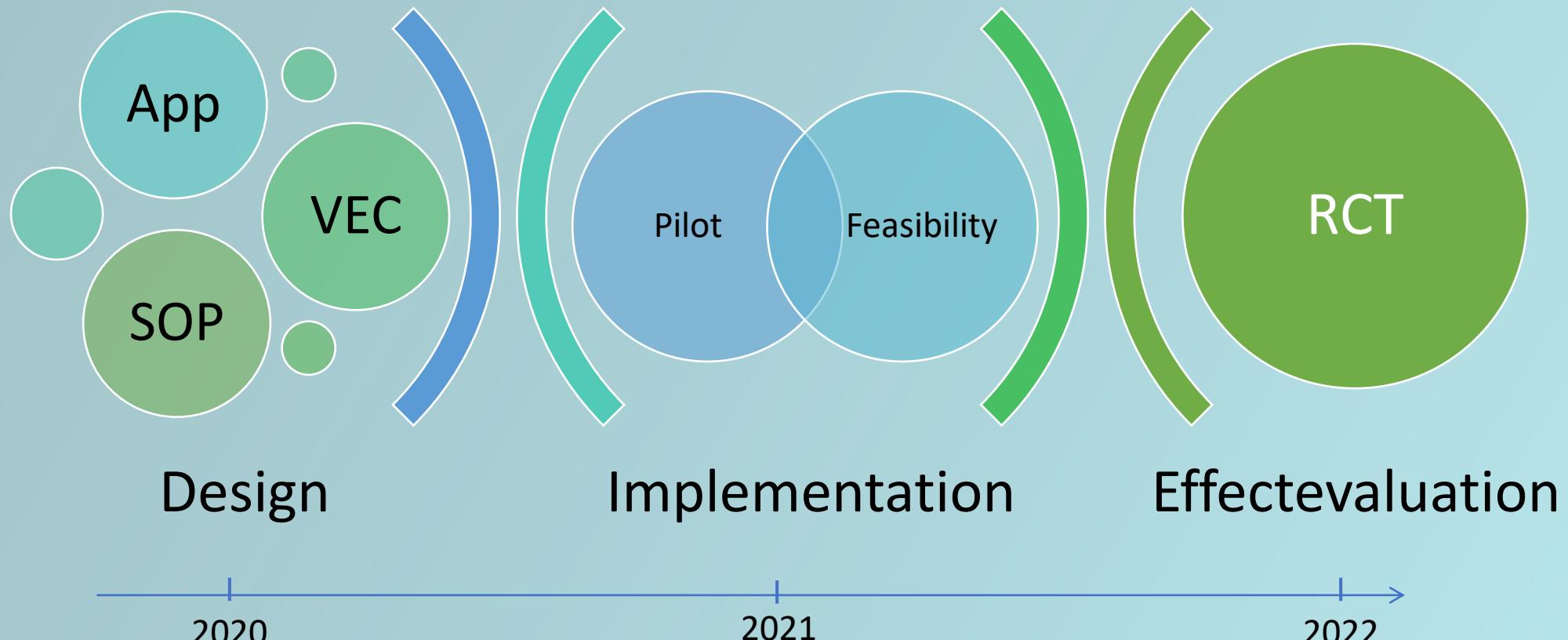
N = 7

25/5 2021 – 27/1 2022

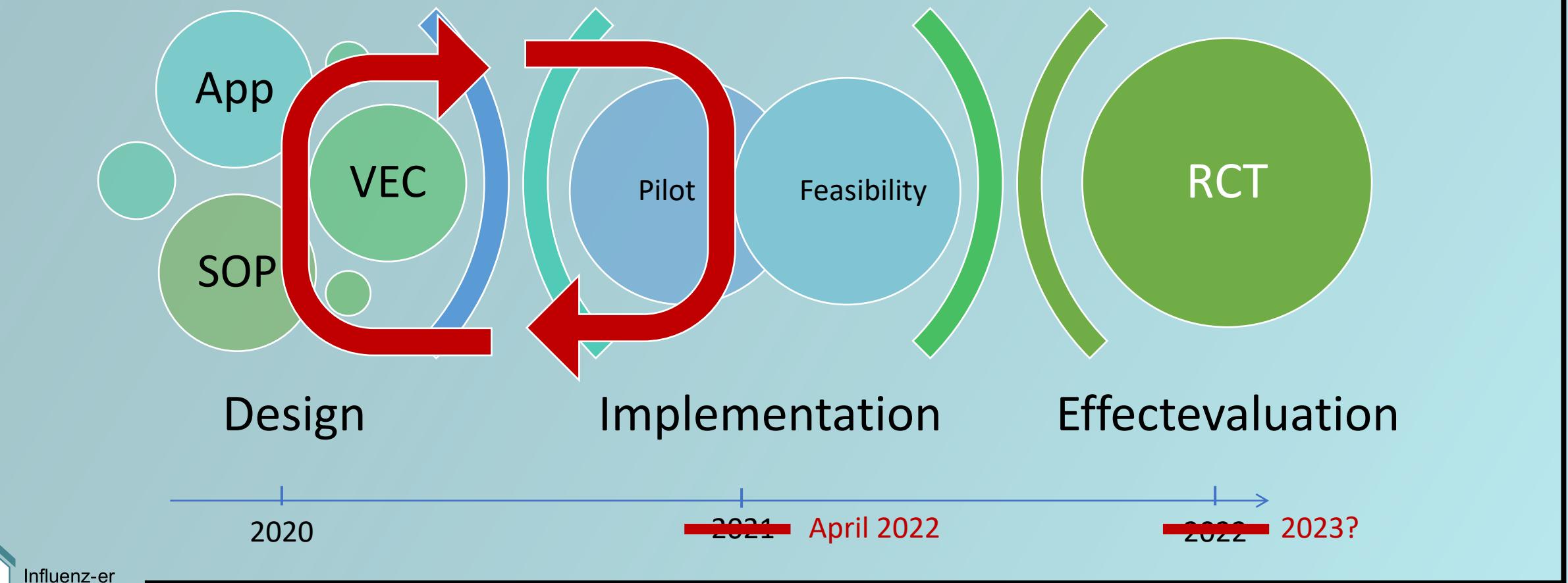
28/2 – 06/4 2022

25/10 2022 -

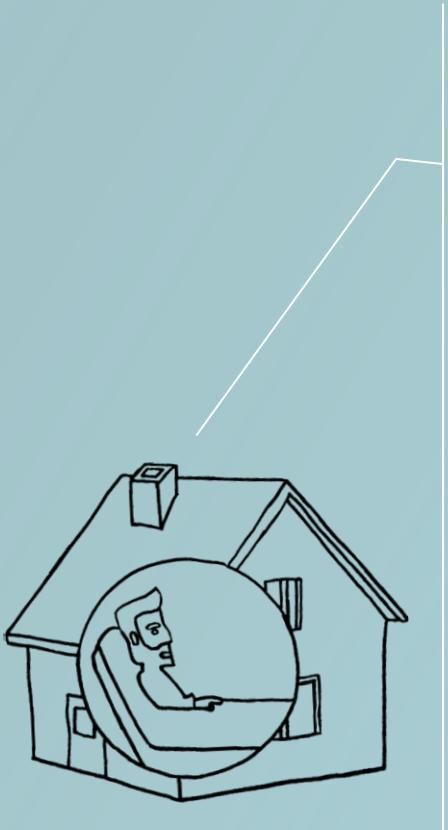
The process (as imagined)



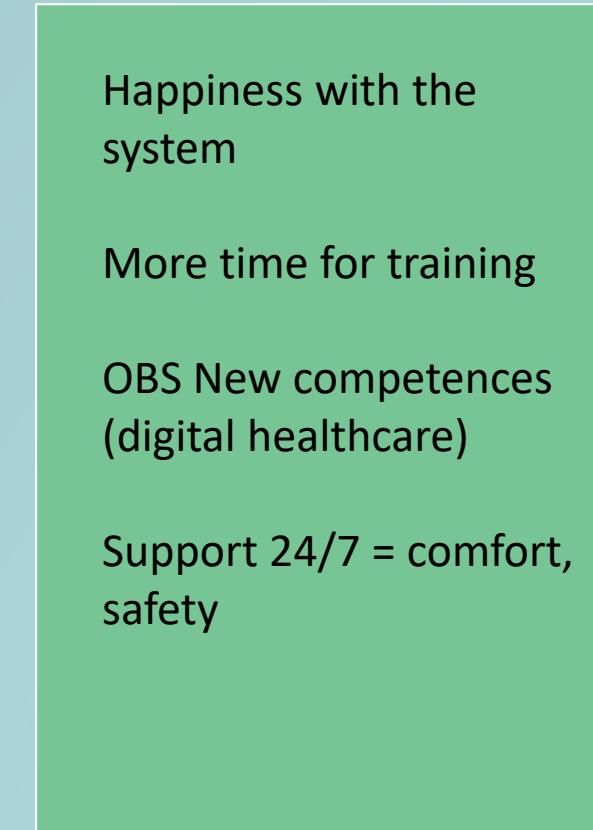
The process (as ~~imagined~~)



Results: Pilot og Feasibility



Userfriendly technology
Highly flexible
Patient empowerment
"Great out, much better home"



Happiness with the system
More time for training
OBS New competences (digital healthcare)
Support 24/7 = comfort, safety



Perspectives:

- < 2-4 months: a new, well-documented, safe and effective home-hospital model and offer to moderately ill epidemic Danish patients
- <6 months: model role-out internationally
- <2 years: well-documented, safe home-hospitalization offer to patient with other diseases

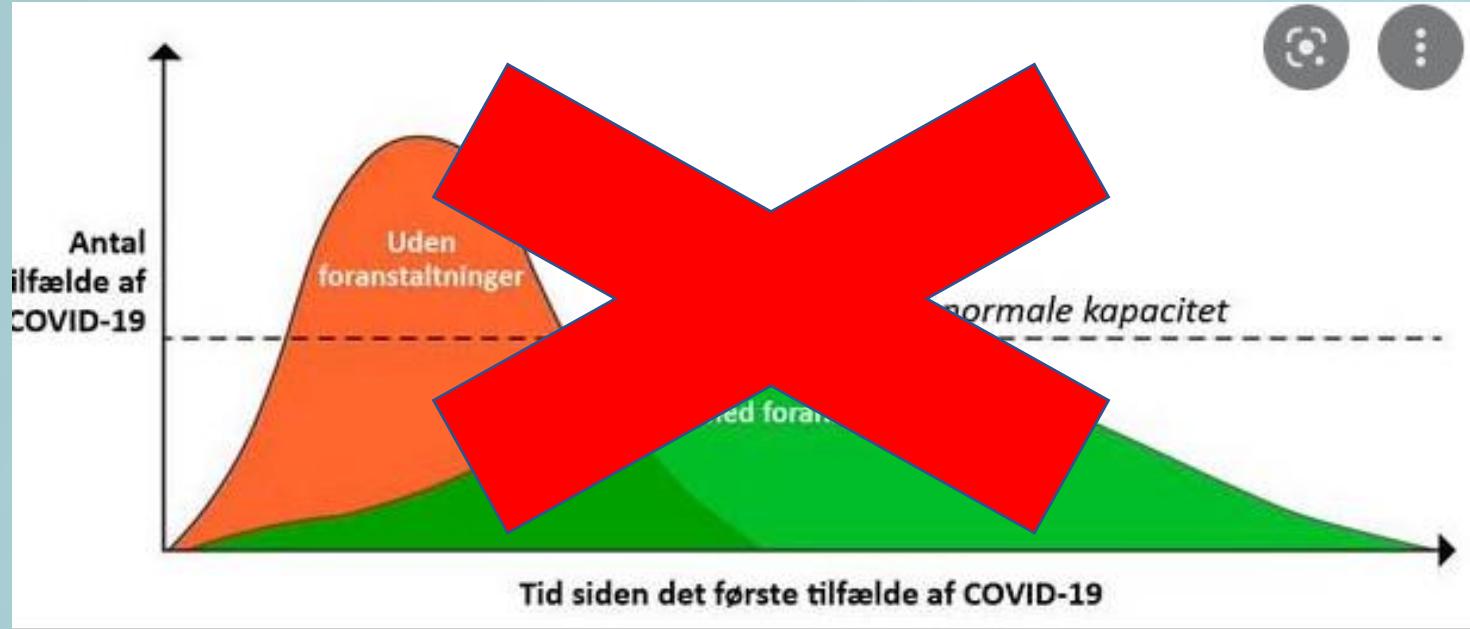


Perspectives



1.1. 2023

Safe, effective
H@H model for
epidemic patients



international
roll-out



Influenz-er
Hospital-at-home



Thanks for
your
attention



Understanding health data
Perspectives from epidemiology research



Debate

*Preparing for future pandemics:
What did we learn from Covid-19
and what lies ahead?*

Digital Tech Summit 2022

