

Data Science and Engineering in the Real World

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Data Engineer | Data & Analytics, Wellington-Dufferin-Guelph Public Health, Ontario, Canada

University of Guelph | Global Burden of Animal Diseases (GBADs)



Agenda

- **Path from research to data engineering**
 - **Real-world projects in One Health**
 - **Lessons on collaboration**
-

Academic Path

BSc: Biological Sciences

University of Guelph, ON, Canada
2014-2019

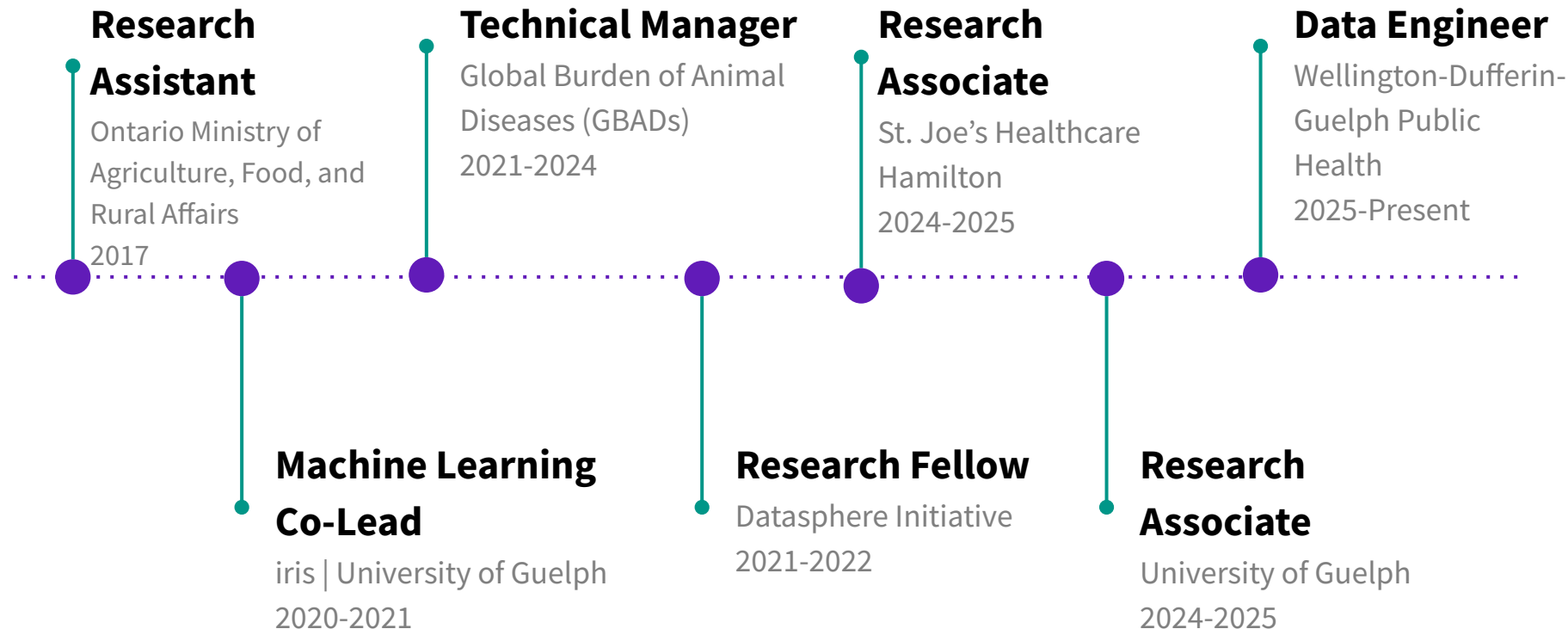
PhD: Computational Sciences

School of Computer Science,
University of Guelph
2021-present

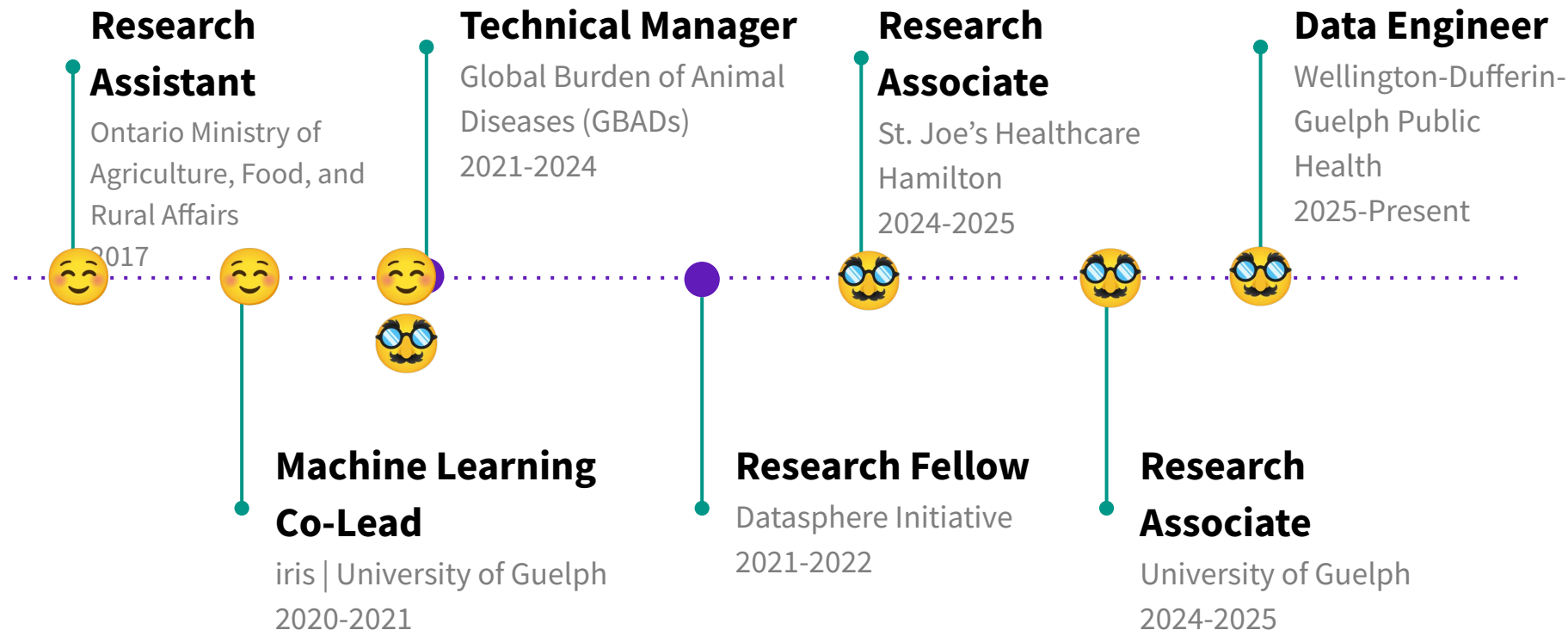
MSc: Bioinformatics

School of Computer Science,
University of Guelph
2019-2021

Career Path



Career Path



Data Science vs Data Engineering

Data Science

Analyzes and interprets data to extract insights and build predictive models

Works with **statistics, machine learning, and visualization** tools

Answers ***“What does this data tell us?”***

Delivers insights, reports, and models.

Data Engineering

Data Science vs Data Engineering

Data Science

Analyzes and interprets data to extract insights and build predictive models

Works with **statistics, machine learning, and visualization** tools

Answers ***“What does this data tell us?”***

Delivers insights, reports, and models.

Data Engineering

Builds **and maintains systems** that make data accessible, clean, and reliable.

Works with **data pipelines, databases, and cloud infrastructure**

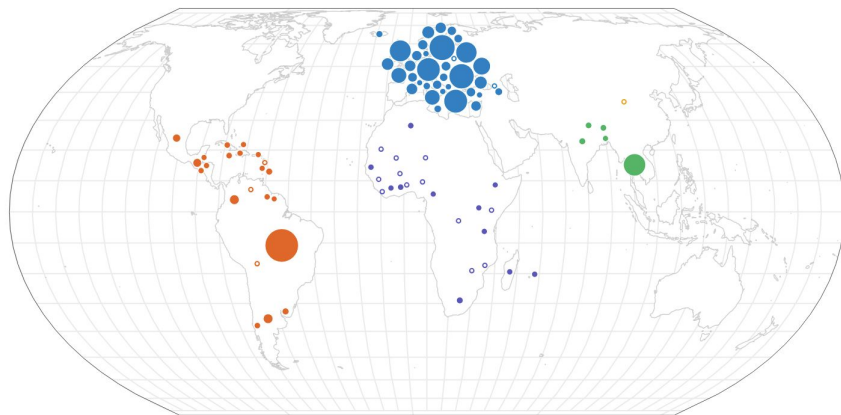
Answers ***“How do we get this data where it needs to go?”***

Delivers data architecture and pipelines.

COVID-19 Dashboards

Number of COVID-19 cases reported to WHO

World, 28 days to 28 September 2025



WHO Regions

■ Africa ■ Americas ■ Eastern Mediterranean ■ Europe ■ South-East Asia
■ Western Pacific

Data Engineering:

- Create data pipelines to pull case counts from hospitals or labs
- Cleaned data
- Data storage in databases

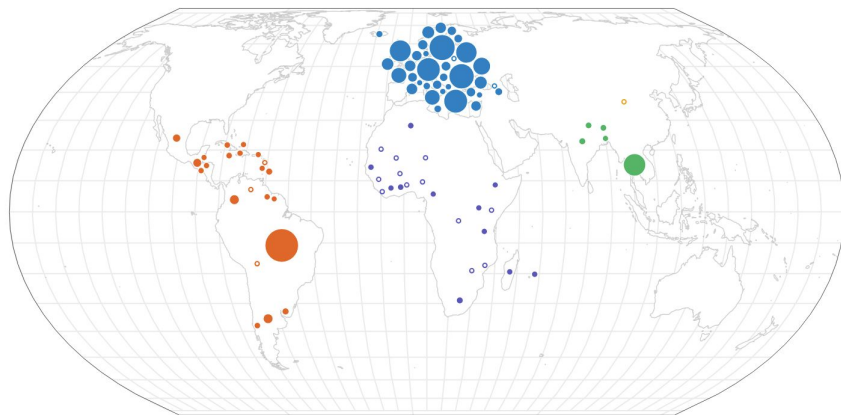
Prevent garbage in - garbage out!

<https://data.who.int/dashboards/covid19/cases>

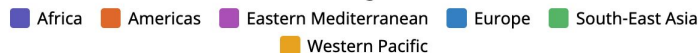
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Data Engineering:

- Create data pipelines to pull case counts from hospitals or labs
- Cleaned data
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Data Science:

- Forecast models
- Dashboards
- Data visualization

<https://data.who.int/dashboards/covid19/cases>

What is a Data Engineer?

Responsibility	What it means	Example
Collecting data	Bringing information together from many sources	Combining files from hospitals, schools, or surveys
Cleaning and organizing	Making sure data is accurate, consistent, and follows the same rules	Fixing typos, standardizing dates, removing duplicates
Building pipelines	Automating how data moves from place to place	Developing code and scripts that fetch, clean, and store data
Storing data	Choosing the best way to save data for easy and secure access	Designing cloud storage solutions and databases
Monitoring data quality	Checking for missing or unusual values	Logging errors and alerting when things go wrong
Collaboration	Working with analysts, epidemiologists, and IT staff	Helping them access clean, trustworthy data

Agenda

- **Path from research to data engineering**
 - **Real-world projects in One Health**
 - **Lessons on collaboration**
-

Agenda

Real-world projects in One Health

1. Active Surveillance and Immunization Notice Automation at WDGPH
 2. FAIR Data for the Global Burden of Animal Diseases (GBADs)
 3. Thermal Imaging for Metabolic Signal Re-creation
-

Vaccine Mandates: Brief History of Policy

Vaccine mandates have been part of public health for **over two centuries**

- Smallpox
 - 1777 - US Continental Army troops,
 - 1853 - England Vaccination Act - smallpox vaccine mandatory for infants and penalties for non-compliance,
 - 1855 - Schoolchildren in Boston
 - 1922 - US Supreme Court - schools may exclude unvaxed children, even outside of outbreaks

Which countries have mandatory childhood vaccination policies?

Our World
in Data

Countries are mapped based on having requirements or recommendations for at least one vaccine in 2019.

Table

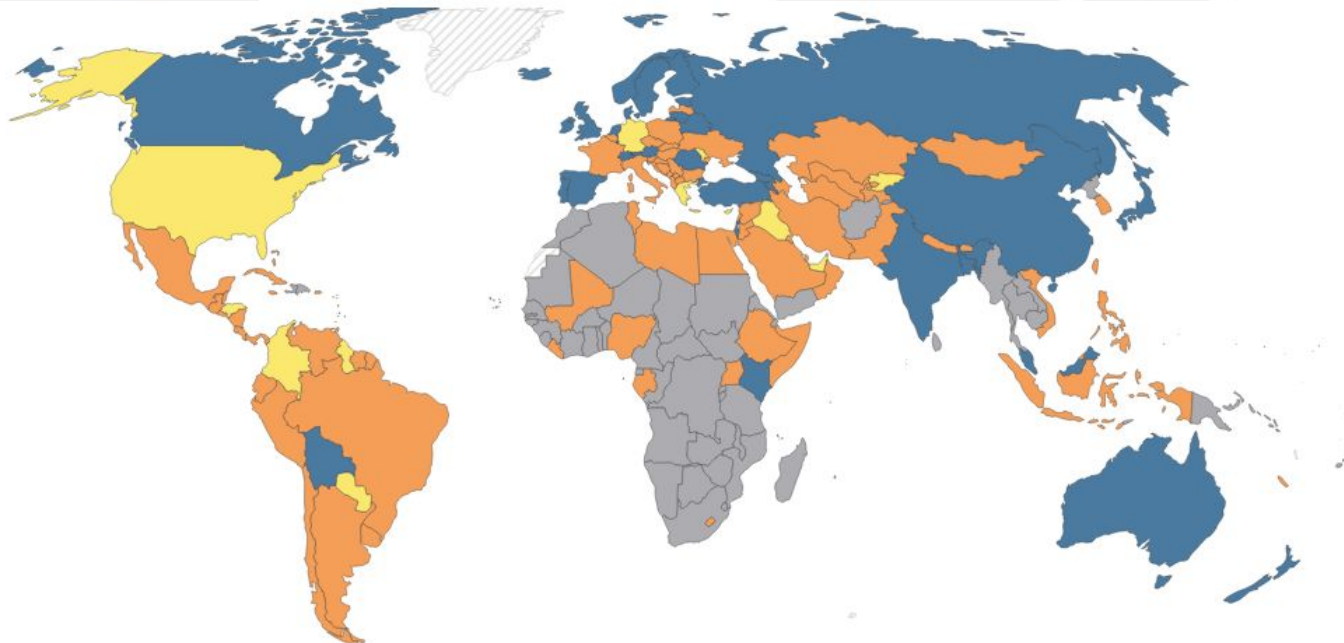
Map

Zoom to...

2D

3D

Select countries



Orange Mandatory Yellow Mandatory for school entry Grey No source found Dark blue Recommended

Data source: Vanderslott & Marks (2021). Charting mandatory childhood vaccination policies worldwide. Vaccine. – [Learn more about this data](#)

Note: Policies can vary at the state level in some countries.

OurWorldinData.org/vaccination | CC BY



Vaccination Enforcement in Ontario

Report immunizations to your local public health unit

Under the [Immunization of School Pupils Act \(ISPA\)](#), you are responsible for reporting your children's vaccinations to your local public health unit so your child can attend school in Ontario. Report all immunizations as soon as you can to avoid possible disruptions to your child's school attendance.

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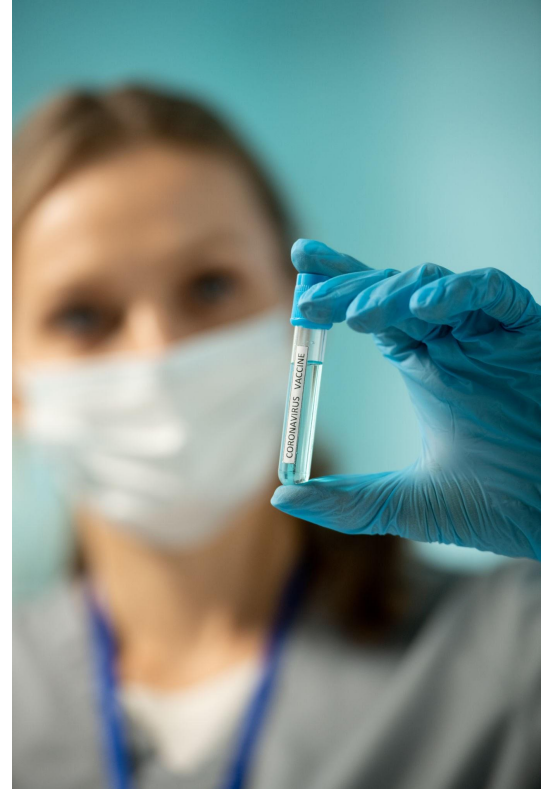
ISPA diseases include:

diphtheria, measles, mumps, poliomyelitis, rubella, tetanus, and any other diseases prescribed by the Minister of Health and Long-Term Care

Managing Immunization Data

- Public Health Units **manage student vaccination data**
- Children who **do not have a complete immunization record** may be **suspended** from school until they provide **proof of vaccination** or **an exemption**

Children overdue for diseases are sent letters;
parents mandated to submit proof of vaccination.

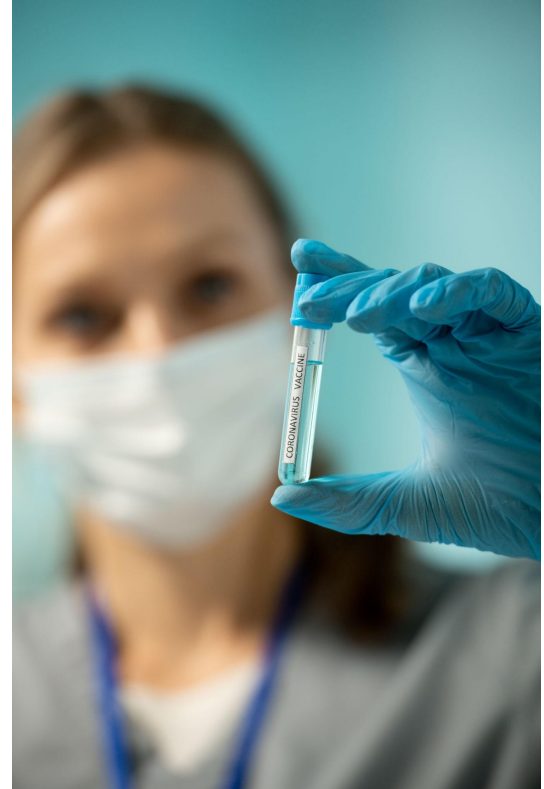


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Active Surveillance: actively reviewing, collecting, and updating records for every student enrolled in our jurisdiction



Vaccine Notice Automation at WDGPH

Workflow Challenge:

- Notice generation is time consuming and tedious
- Legacy tools do not support customization of letter format

Our Solution

- Automated pipeline for generation of ISPA and measles notices
- Open-Source
- Ability to generate ~50,000 notices/hr

PublicHealth
WELLINGTON-DUFFERIN-GUELPH
Stay Well.

Request for immunization record

To Parent/Guardian of:
Denise Lamb

Client ID: **1110246921**

Address:
**8459 Angelica Fork Suite 217
Guelph**

Date of Birth: **Sep 08, 2009**

Childcare Centre: **DOUBLE DOUBLE HIGH SCHOOL**

Wellington-Dufferin-Guelph (WDG) Public Health does not have up-to-date vaccination records for all children. Please review the immunization record on page 2 and update your child's record using the following options:

1. By visiting www.immunization.ca
2. By emailing vaccine.records@wdgpublichealth.ca
3. By mailing a photocopy of your child's immunization record to Vaccine Records, Wellington-Dufferin-Guelph Public Health, 1000 Wellington Street West, Guelph, Ontario N1G 0E1
4. By Phone: 1-800-265-7293 ext. 7006

Please update Public Health and your childcare centre every time you receive a vaccine for your child, keeping your child's vaccinations up to date, you are not only protecting your child but also other children and staff at the childcare centre.

If you are choosing not to immunize your child, a valid medical exemption or religious belief must be completed and submitted to Public Health. For more information, please visit <https://wdgpublichealth.ca/your-kids/vaccination>. Please note this exemption will be required upon enrollment in elementary school.

If there is an outbreak of a vaccine-preventable disease, Public Health may require that children not adequately immunized (including those with exemptions) be vaccinated. If the outbreak is over, exemptions will be removed.

If you have any questions about your child's vaccines, please contact your Public Health Nurse.

Sincerely,

PublicHealth
WELLINGTON-DUFFERIN-GUELPH
Stay Well.

Matthew Tenenbaum, MD, CCFP, MPh, FRCPC
Associate Medical Officer of Health

Every time your child gets a vaccine, please let us know. For more information, visit www.immunization.ca

Immunization Record

Below is a record of all immunizations received by the student on file with Public Health, excluding seasonal vaccinations against influenza and COVID-19. We appreciate your cooperation in ensuring this student immunization record is complete and accurate.

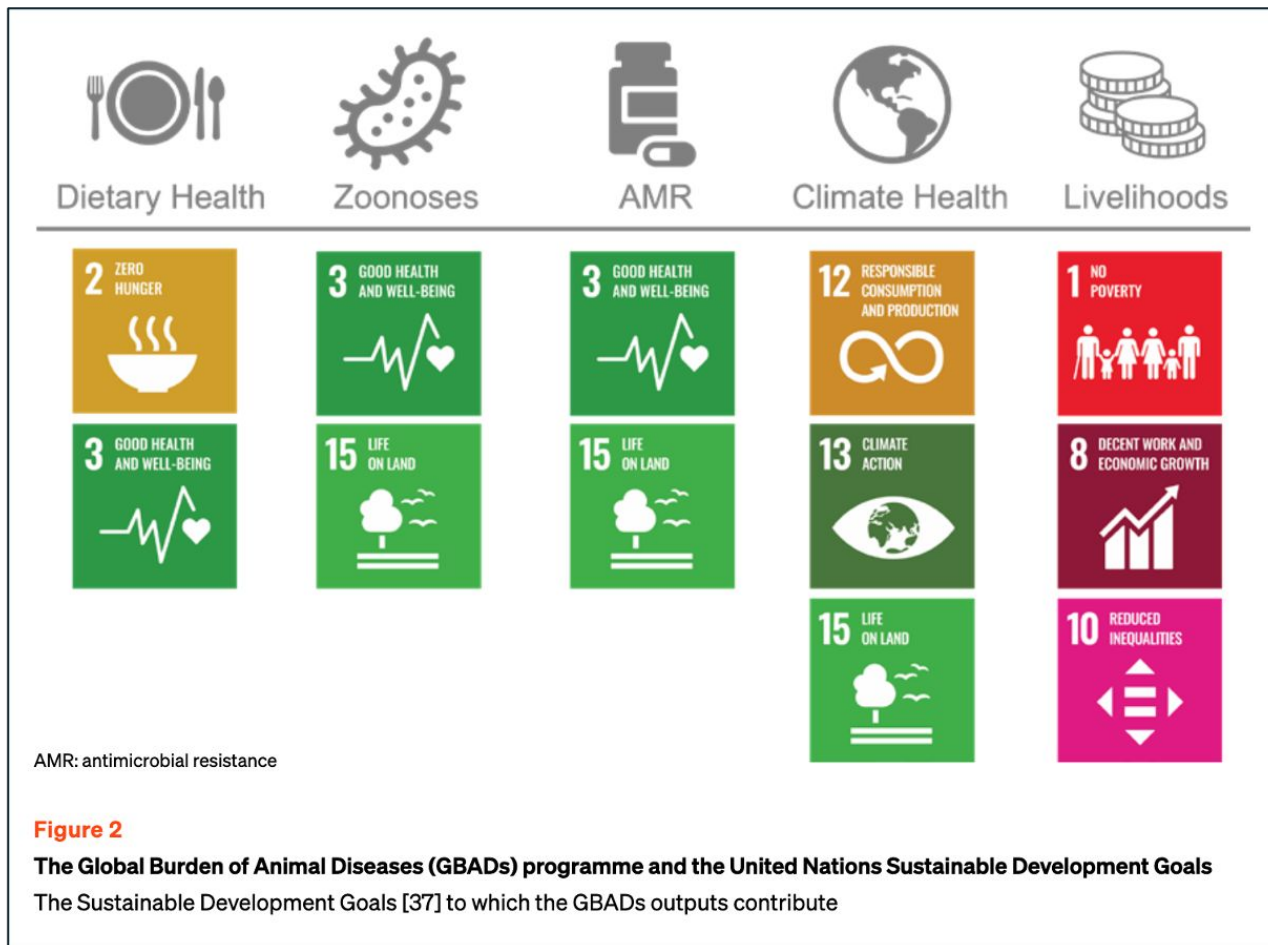
Date Given	At Age	Diphtheria	Tetanus	Polio	MM	MMV	MMV2	MMV3	MMV4	MMV5	MMV6	MMV7	MMV8	MMV9	MMV10	MMV11	MMV12	MMV13	MMV14	MMV15	MMV16	MMV17	MMV18	MMV19	MMV20	MMV21	MMV22	MMV23	MMV24	MMV25	MMV26	MMV27	MMV28	MMV29	MMV30	MMV31	MMV32	MMV33	MMV34	MMV35	MMV36	MMV37	MMV38	MMV39	MMV40	MMV41	MMV42	MMV43	MMV44	MMV45	MMV46	MMV47	MMV48	MMV49	MMV50	MMV51	MMV52	MMV53	MMV54	MMV55	MMV56	MMV57	MMV58	MMV59	MMV60	MMV61	MMV62	MMV63	MMV64	MMV65	MMV66	MMV67	MMV68	MMV69	MMV70	MMV71	MMV72	MMV73	MMV74	MMV75	MMV76	MMV77	MMV78	MMV79	MMV80	MMV81	MMV82	MMV83	MMV84	MMV85	MMV86	MMV87	MMV88	MMV89	MMV90	MMV91	MMV92	MMV93	MMV94	MMV95	MMV96	MMV97	MMV98	MMV99	MMV100	MMV101	MMV102	MMV103	MMV104	MMV105	MMV106	MMV107	MMV108	MMV109	MMV110	MMV111	MMV112	MMV113	MMV114	MMV115	MMV116	MMV117	MMV118	MMV119	MMV120	MMV121	MMV122	MMV123	MMV124	MMV125	MMV126	MMV127	MMV128	MMV129	MMV130	MMV131	MMV132	MMV133	MMV134	MMV135	MMV136	MMV137	MMV138	MMV139	MMV140	MMV141	MMV142	MMV143	MMV144	MMV145	MMV146	MMV147	MMV148	MMV149	MMV150	MMV151	MMV152	MMV153	MMV154	MMV155	MMV156	MMV157	MMV158	MMV159	MMV160	MMV161	MMV162	MMV163	MMV164	MMV165	MMV166	MMV167	MMV168	MMV169	MMV170	MMV171	MMV172	MMV173	MMV174	MMV175	MMV176	MMV177	MMV178	MMV179	MMV180	MMV181	MMV182	MMV183	MMV184	MMV185	MMV186	MMV187	MMV188	MMV189	MMV190	MMV191	MMV192	MMV193	MMV194	MMV195	MMV196	MMV197	MMV198	MMV199	MMV200	MMV201	MMV202	MMV203	MMV204	MMV205	MMV206	MMV207	MMV208	MMV209	MMV210	MMV211	MMV212	MMV213	MMV214	MMV215	MMV216	MMV217	MMV218	MMV219	MMV220	MMV221	MMV222	MMV223	MMV224	MMV225	MMV226	MMV227	MMV228	MMV229	MMV230	MMV231	MMV232	MMV233	MMV234	MMV235	MMV236	MMV237	MMV238	MMV239	MMV240	MMV241	MMV242	MMV243	MMV244	MMV245	MMV246	MMV247	MMV248	MMV249	MMV250	MMV251	MMV252	MMV253	MMV254	MMV255	MMV256	MMV257	MMV258	MMV259	MMV260	MMV261	MMV262	MMV263	MMV264	MMV265	MMV266	MMV267	MMV268	MMV269	MMV270	MMV271	MMV272	MMV273	MMV274	MMV275	MMV276	MMV277	MMV278	MMV279	MMV280	MMV281	MMV282	MMV283	MMV284	MMV285	MMV286	MMV287	MMV288	MMV289	MMV290	MMV291	MMV292	MMV293	MMV294	MMV295	MMV296	MMV297	MMV298	MMV299	MMV300	MMV301	MMV302	MMV303	MMV304	MMV305	MMV306	MMV307	MMV308	MMV309	MMV310	MMV311	MMV312	MMV313	MMV314	MMV315	MMV316	MMV317	MMV318	MMV319	MMV320	MMV321	MMV322	MMV323	MMV324	MMV325	MMV326	MMV327	MMV328	MMV329	MMV330	MMV331	MMV332	MMV333	MMV334	MMV335	MMV336	MMV337	MMV338	MMV339	MMV340	MMV341	MMV342	MMV343	MMV344	MMV345	MMV346	MMV347	MMV348	MMV349	MMV350	MMV351	MMV352	MMV353	MMV354	MMV355	MMV356	MMV357	MMV358	MMV359	MMV360	MMV361	MMV362	MMV363	MMV364	MMV365	MMV366	MMV367	MMV368	MMV369	MMV370	MMV371	MMV372	MMV373	MMV374	MMV375	MMV376	MMV377	MMV378	MMV379	MMV380	MMV381	MMV382	MMV383	MMV384	MMV385	MMV386	MMV387	MMV388	MMV389	MMV390	MMV391	MMV392	MMV393	MMV394	MMV395	MMV396	MMV397	MMV398	MMV399	MMV400	MMV401	MMV402	MMV403	MMV404	MMV405	MMV406	MMV407	MMV408	MMV409	MMV410	MMV411	MMV412	MMV413	MMV414	MMV415	MMV416	MMV417	MMV418	MMV419	MMV420	MMV421	MMV422	MMV423	MMV424	MMV425	MMV426	MMV427	MMV428	MMV429	MMV430	MMV431	MMV432	MMV433	MMV434	MMV435	MMV436	MMV437	MMV438	MMV439	MMV440	MMV441	MMV442	MMV443	MMV444	MMV445	MMV446	MMV447	MMV448	MMV449	MMV450	MMV451	MMV452	MMV453	MMV454	MMV455	MMV456	MMV457	MMV458	MMV459	MMV460	MMV461	MMV462	MMV463	MMV464	MMV465	MMV466	MMV467	MMV468	MMV469	MMV470	MMV471	MMV472	MMV473	MMV474	MMV475	MMV476	MMV477	MMV478	MMV479	MMV480	MMV481	MMV482	MMV483	MMV484	MMV485	MMV486	MMV487	MMV488	MMV489	MMV490	MMV491	MMV492	MMV493	MMV494	MMV495	MMV496	MMV497	MMV498	MMV499	MMV500	MMV501	MMV502	MMV503	MMV504	MMV505	MMV506	MMV507	MMV508	MMV509	MMV510	MMV511	MMV512	MMV513	MMV514	MMV515	MMV516	MMV517	MMV518	MMV519	MMV520	MMV521	MMV522	MMV523	MMV524	MMV525	MMV526	MMV527	MMV528	MMV529	MMV530	MMV531	MMV532	MMV533	MMV534	MMV535	MMV536	MMV537	MMV538	MMV539	MMV540	MMV541	MMV542	MMV543	MMV544	MMV545	MMV546	MMV547	MMV548	MMV549	MMV550	MMV551	MMV552	MMV553	MMV554	MMV555	MMV556	MMV557	MMV558	MMV559	MMV560	MMV561	MMV562	MMV563	MMV564	MMV565	MMV566	MMV567	MMV568	MMV569	MMV570	MMV571	MMV572	MMV573	MMV574	MMV575	MMV576	MMV577	MMV578	MMV579	MMV580	MMV581	MMV582	MMV583	MMV584	MMV585	MMV586	MMV587	MMV588	MMV589	MMV590	MMV591	MMV592	MMV593	MMV594	MMV595	MMV596	MMV597	MMV598	MMV599	MMV600	MMV601	MMV602	MMV603	MMV604	MMV605	MMV606	MMV607	MMV608	MMV609	MMV610	MMV611	MMV612	MMV613	MMV614	MMV615	MMV616	MMV617	MMV618	MMV619	MMV620	MMV621	MMV622	MMV623	MMV624	MMV625	MMV626	MMV627	MMV628	MMV629	MMV630	MMV631	MMV632	MMV633	MMV634	MMV635	MMV636	MMV637	MMV638	MMV639	MMV640	MMV641	MMV642	MMV643	MMV644	MMV645	MMV646	MMV647	MMV648	MMV649	MMV650	MMV651	MMV652	MMV653	MMV654	MMV655	MMV656	MMV657	MMV658	MMV659	MMV660	MMV661	MMV662	MMV663	MMV664	MMV665	MMV666	MMV667	MMV668	MMV669	MMV670	MMV671	MMV672	MMV673	MMV674	MMV675	MMV676	MMV677	MMV678	MMV679	MMV680	MMV681	MMV682	MMV683	MMV684	MMV685	MMV686	MMV687	MMV688	MMV689	MMV690	MMV691	MMV692	MMV693	MMV694	MMV695	MMV696	MMV697	MMV698	MMV699	MMV700	MMV701	MMV702	MMV703	MMV704	MMV705	MMV706	MMV707	MMV708	MMV709	MMV710	MMV711	MMV712	MMV713	MMV714	MMV715	MMV716	MMV717	MMV718	MMV719	MMV720	MMV721	MMV722	MMV723	MMV724	MMV725	MMV726	MMV727	MMV728	MMV729	MMV730	MMV731	MMV732	MMV733	MMV734	MMV735	MMV736	MMV737	MMV738	MMV739	MMV740	MMV741	MMV742	MMV743	MMV744	MMV745	MMV746	MMV747	MMV748	MMV749	MMV750	MMV751	MMV752	MMV753	MMV754	MMV755	MMV756	MMV757	MMV758	MMV759	MMV760	MMV761	MMV762	MMV763	MMV764	MMV765	MMV766	MMV767	MMV768	MMV769	MMV770	MMV771	MMV772	MMV773	MMV774	MMV775	MMV776	MMV777	MMV778	MMV779	MMV780	MMV781	MMV782	MMV783	MMV784	MMV785	MMV786	MMV787	MMV788	MMV789	MMV790	MMV791	MMV792	MMV793	MMV794	MMV795	MMV796	MMV797	MMV798	MMV799	MMV800	MMV801	MMV802	MMV803	MMV804	MMV805	MMV806	MMV807	MMV808	MMV809	MMV810	MMV811	MMV812	MMV813	MMV814	MMV815	MMV816	MMV817	MMV818	MMV819	MMV820	MMV821	MMV822	MMV823	MMV824	MMV825	MMV826	MMV827	MMV828	MMV829	MMV830	MMV831	MMV832	MMV833	MMV834	MMV835	MMV836	MMV837	MMV838	MMV839	MMV840	MMV841	MMV842	MMV843	MMV844	MMV845	MMV846	MMV847	MMV848	MMV849	MMV850	MMV851	MMV852	MMV853	MMV854	MMV855	MMV856	MMV857	MMV858	MMV859	MMV860	MMV861	MMV862	MMV863	MMV864	MMV865	MMV866	MMV867	MMV868	MMV869	MMV870	MMV871	MMV872	MMV873	MMV874	MMV875	MMV876	MMV877	MMV878	MMV879	MMV880	MMV881	MMV882	MMV883	MMV884	MMV885	MMV886	MMV887	MMV888	MMV889	MMV890	MMV891	MMV892	MMV893	MMV894	MMV895	MMV896	MMV897	MMV898	MMV899	MMV900	MMV901	MMV902	MMV903	MMV904	MMV905	MMV906	MMV907	MMV908	MMV909	MMV910	MMV911	MMV912	MMV913	MMV914	MMV915	MMV916	MMV917	MMV918	MMV919	MMV920	MMV921	MMV922	MMV923	MMV924	MMV925	MMV926	MMV927	MMV928	MMV929	MMV930	MMV931	MMV932	MMV933	MMV934	MMV935	MMV936	MMV937	MMV938	MMV939	MMV940	MMV941	MMV942	MMV943	MMV944	MMV945	MMV946	MMV947	MMV948	MMV949	MMV950	MMV951	MMV952	MMV953	MMV954	MMV955	MMV956	MMV957	MMV958	MMV959	MMV960	MMV961	MMV962	MMV963	MMV964	MMV965	MMV966	MMV967	MMV968	MMV969	MMV970	MMV971	MMV972	MMV973	MMV974	MMV975	MMV976	MMV977	MMV978	MMV979	MMV980	MMV981	MMV982	MMV983	MMV984	MMV985	MMV986	MMV987	MMV988	MMV989	MMV990	MMV991	MMV992	MMV993	MMV994	MMV995	MMV996	MMV997	MMV998	MMV999	MMV1000	MMV1001	MMV1002	MMV1003	MMV1004	MMV1005	MMV1006	MMV1007	MMV1008	MMV1009	MMV1010	MMV1011	MMV1012	MMV1013	MMV1014	MMV1015	MMV1016	MMV1017	MMV1018	MMV1019	MMV1020	MMV1021	MMV1022	MMV1023	MMV1024	MMV1025	MMV1026	MMV1027	MMV1028	MMV1029	MMV1030	MMV1031	MMV1032	MMV1033	MMV1034	MMV1035	MMV1036	MMV1037	MMV1038	MMV1039	MMV1040	MMV1041	MMV1042	MMV1043	MMV1044	MMV1045	MMV1046	MMV1047	MMV1048	MMV1049	MMV1050	MMV1051	MMV1052	MMV1053	MMV1054	MMV1055	MMV1056	MMV1057	MMV1058	MMV1059	MMV1060	MMV1061	MMV1062	MMV1063	MMV1064	MMV1065	MMV1066	MMV1067	MMV1068	MMV1069	MMV1070	MMV1071	MMV1072	MMV1073	MMV1074	MMV1075	MMV1076	MMV1077	MMV1078	MMV1079	MMV1080	MMV1081	MMV1082	MMV1083	MMV1084	MMV1085	MMV1086	MMV1087	MMV1088	MMV1089	MMV1090	MMV1091	MMV1092	MMV1093	MMV1094	MMV1095	MMV1096	MMV1097	MMV1098	MMV1099	MMV1100	MMV1101	MMV1102	MMV1103	MMV1104	MMV1105	MMV1106	MMV1107	MMV1108	MMV1109	MMV1110	MMV1111	MMV1112	MMV1113	MMV1114	MMV1115	MMV1116	MMV1117	MMV1118	MMV1119	MMV1120	MMV1121	MMV1122
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Agenda

Real-world projects in One Health

1. Active Surveillance and Immunization Notice Automation at WDGPH
 2. **FAIR Data for the Global Burden of Animal Diseases (GBADs)**
 3. Thermal Imaging for Metabolic Signal Re-creation
-

GBADs generates estimates of the social and economic burden of animal diseases



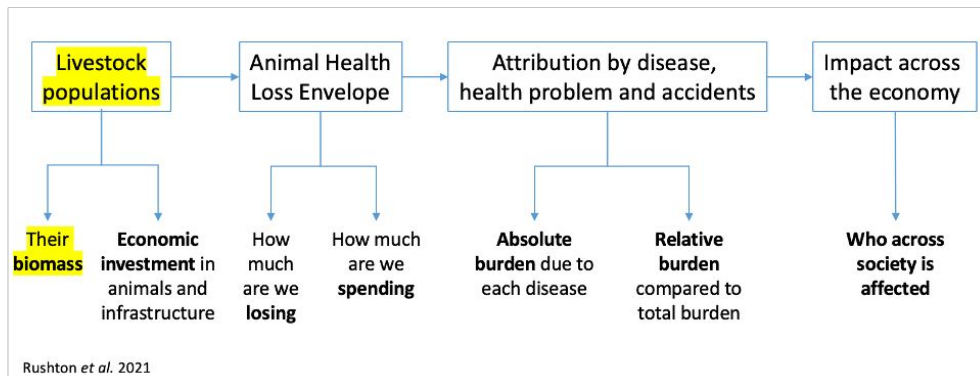
Raymond K, BenSassi N, Patterson GT, et al. Informatics progress of the Global Burden of Animal Diseases programme towards data for One Health. *Revue Scientifique et Technique* (International Office of Epizootics). 2023 May;42:218-229. DOI: 10.20506/rst.42.3365. PMID: 37232302.

Importance of Livestock Population Data

Intergovernmental Organizations



National Statistics Organizations



Challenges with Livestock Population Data

- No central access point for data
- Lost time spent looking for data
- Metadata not provided or without level of detail needed
 - Species
 - Age/sex/production system



Objectives

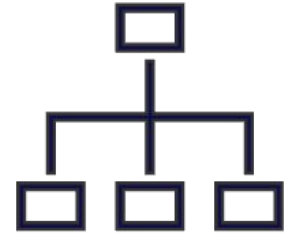
1. Requirements for interoperability



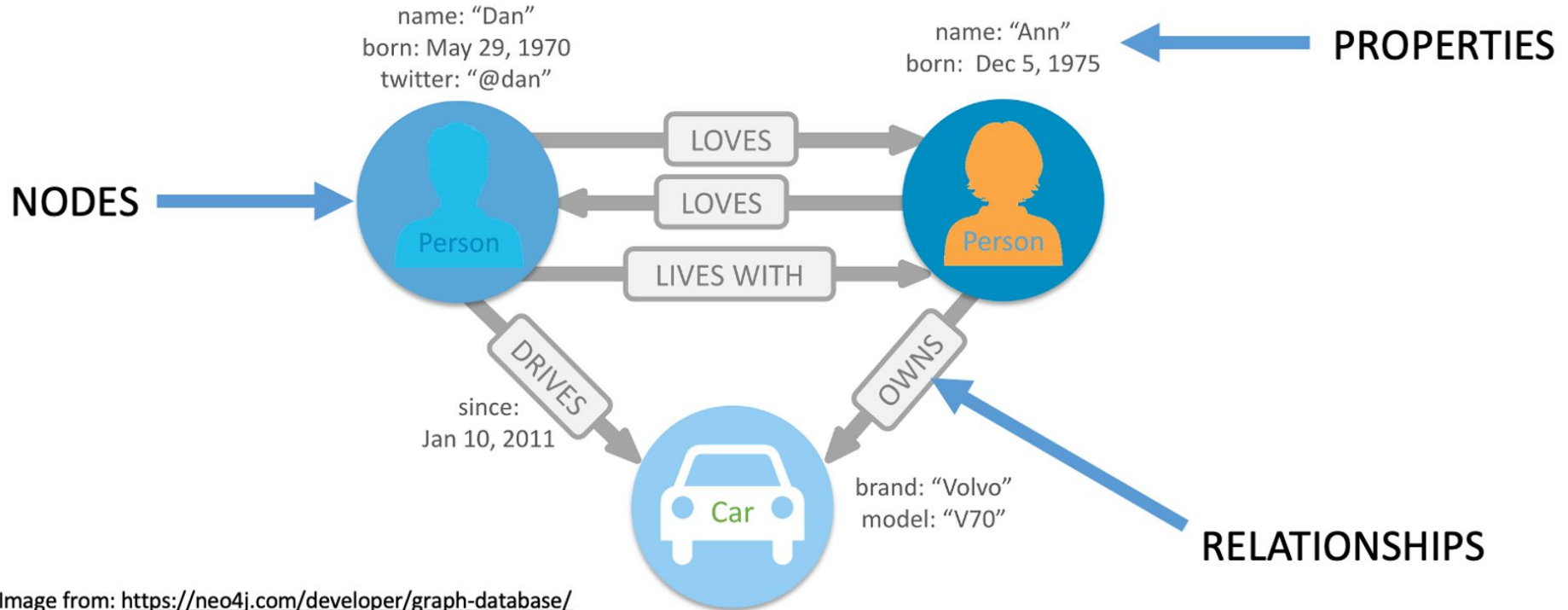
2. Improve access and discovery of livestock data



3. Develop a library of livestock classifications



Graph Databases



Data Engineering Solution

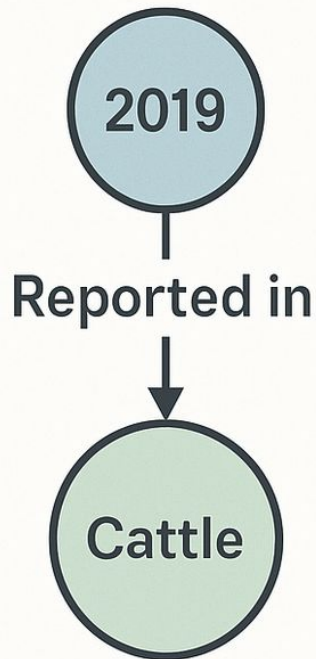
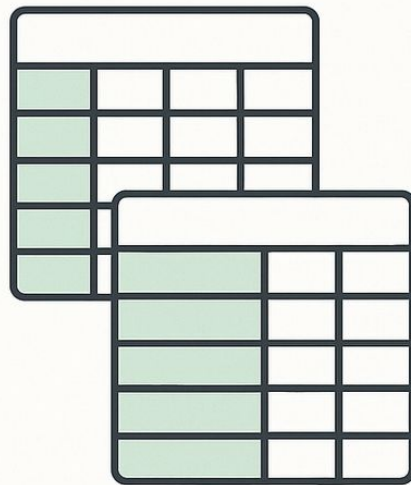
Collect: Livestock data gathered from multiple countries and agencies (e.g., FAO, national surveys).

Clean and Standardize: Python scripts extract metadata, fix inconsistencies, and align fields like *species*, *year*, and *country*.

Connect & Query: Data loaded into a Neo4j graph, showing relationships like:

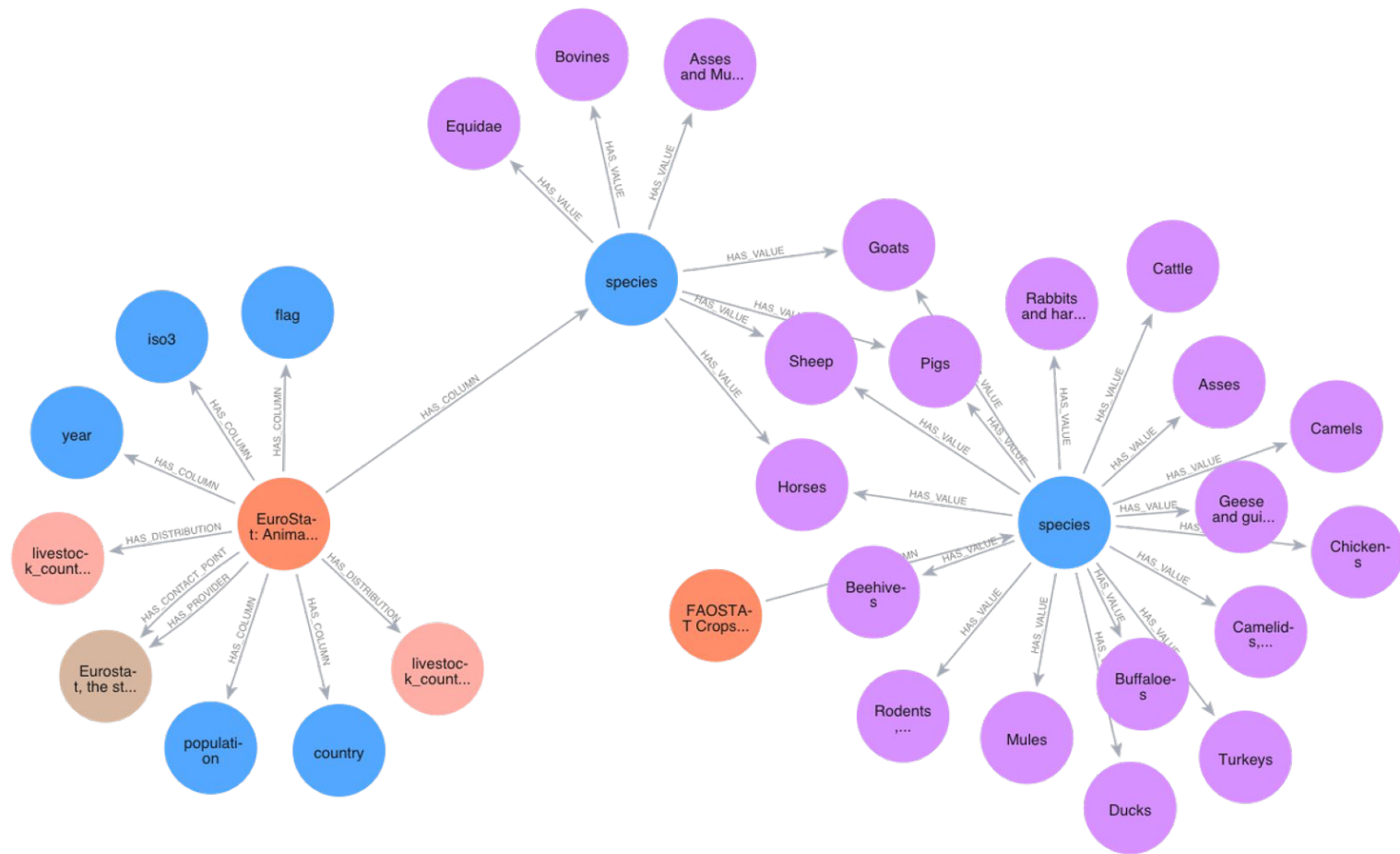
Cattle → Reported in → Ethiopia → 2019.

FROM SPREADSHEETS → TO GRAPH



Supported Queries

1. Get a list of all species and species categories used for reporting data
2. Get a list of all countries reporting data
3. Return datasets that report a given a specie(s), countrie(s)

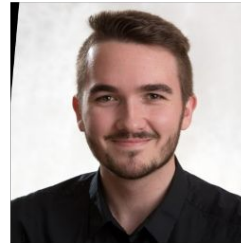
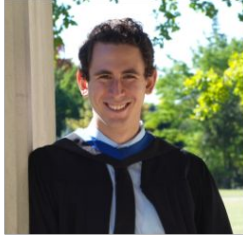


Summary

Researchers and policymakers couldn't easily find or compare datasets, even when they described the same animals or countries.

- Users can **discover datasets faster**, even across institutions.
- The system reveals **relationships and gaps** in global livestock reporting.
- Enables **FAIR data principles**: Findable, Accessible, Interoperable, and Reusable.

GBADs Informatics Team



Agenda

Real-world projects in One Health

1. Active Surveillance and Immunization Notice Automation at WDGPH
 2. FAIR Data for the Global Burden of Animal Diseases (GBADs)
 3. **Thermal Imaging for Metabolic Signal Re-creation**
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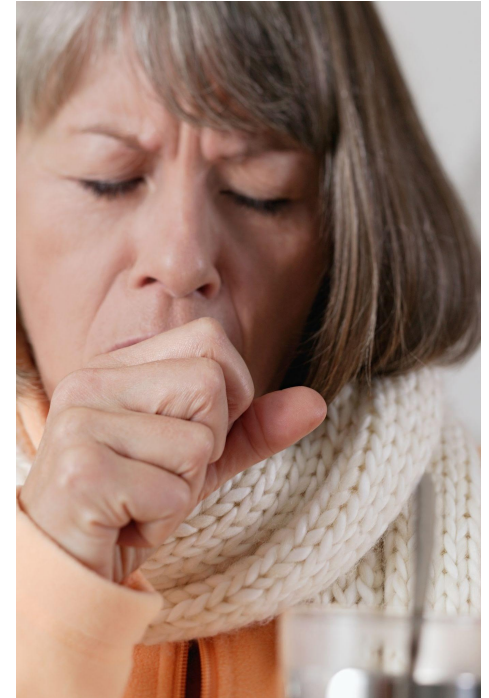
Respiratory Infections in Long-Term Care Homes

- Older adults in long-term care homes (nursing homes) vulnerable to **Respiratory Syncytial Virus (RSV)** and **COVID-19**



Respiratory Infections in Long-Term Care Homes

- Older adults in long-term care homes (nursing homes) vulnerable to **Respiratory Syncytial Virus (RSV)** and **COVID-19**
- **Symptoms of RSV:** Runny nose, fever, cough, short periods without breathing (apnea), wheezing, breathing faster than normal, trouble breathing



Respiratory Infections in Long-Term Care Homes

- Older adults in long-term care homes (nursing homes) vulnerable to **Respiratory Syncytial Virus (RSV)** and **COVID-19**

Table 2a: Confirmed outbreaks in LTCHs among residents, by pathogen, Ontario:
August 27, 2023 – March 2, 2024

Measure	COVID-19	Influenza	RSV
Total number of cases among residents	17,747	1,885	697
Median outbreak attack rate (IQR)	25.0% (12.5-41.6%)	14.7% (9.0-22.6%)	15.4% (9.5-24.0%)
Total number of cases hospitalized	558	156	30
Median hospitalization rate (IQR)	4.0% (0.0-11.1%)	0.0% (0.0-11.3%)	0.0% (0.0-0.0%)
Total number of deaths	396	58	13
Median case fatality rate (IQR)	2.5% (0.0-6.7%)	0.0% (0.0-0.0%)	0.0% (0.0-0.0%)

IQR: Interquartile Range; --: Refers to where data are not reported or are not presented due to low counts.



Infection Prevention and Control of RSV

Infection Prevention and Control (IPAC) refers to the set of **practices**, **policies**, and **systems** designed to prevent the spread of infections among residents, staff, and visitors

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Goals:

- 1. Prevent infections before they occur**
 - Vaccines, hand washing, environmental cleaning, and **surveillance**
- 2. Identify and control outbreaks quickly**
 - Detect unusual illness patterns early to reduce spread
- 3. Protect high-risk populations**
 - Minimize exposure for residents with weaker immune systems or particular care needs
- 4. Ensure compliance with provincial and federal public-health standards**

Surveillance in Long-Term Care Homes



Surveillance → watching for infections before they are spread

Traditional Methods - Staff Monitoring for RSV symptoms:

- Fever, cough, shortness of breath
- Changes in appetite, or alertness
- Gastrointestinal illness
- Skin changes

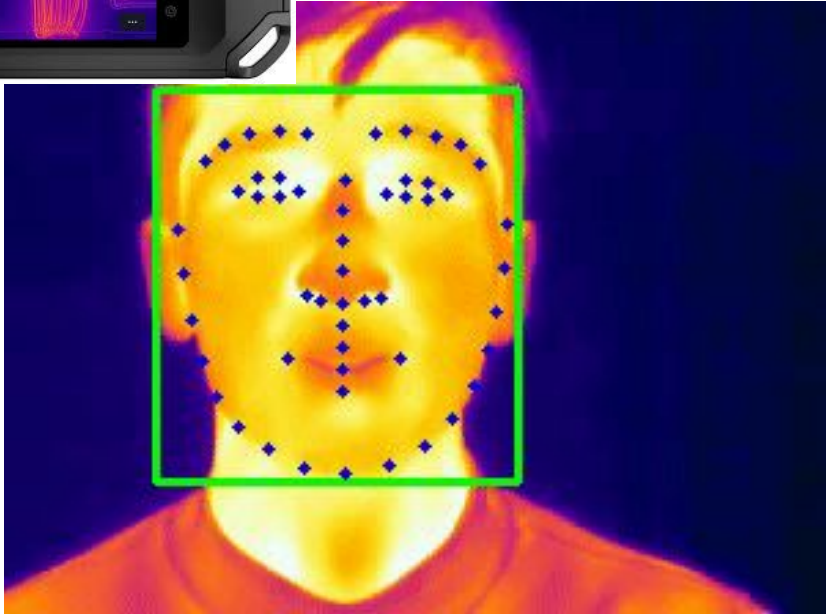
Surveillance in Long-Term Care Homes



Traditional Methods - Staff Monitoring for RSV symptoms limitations:

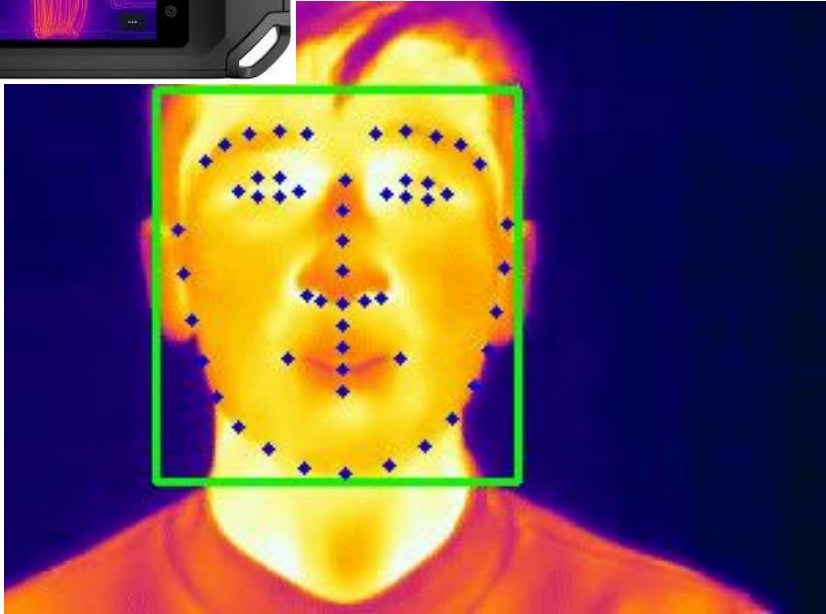
- Reliance on visible symptoms
- Infrequent checks
- Resource intensive
- Limited data and documentation

Thermal Imaging for Long-Term Care Homes



Thermal imaging is a non-contact technology that detects and visualizes temperature changes on objects and people

Thermal Imaging for Long-Term Care Homes

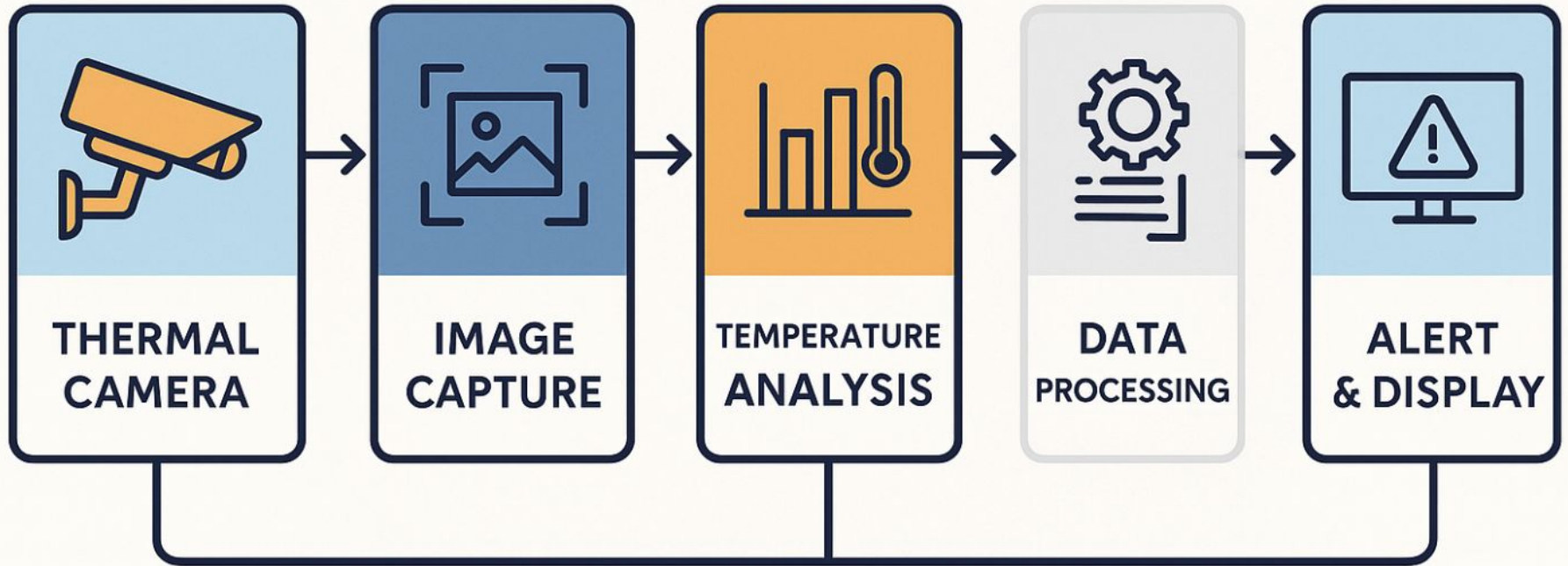


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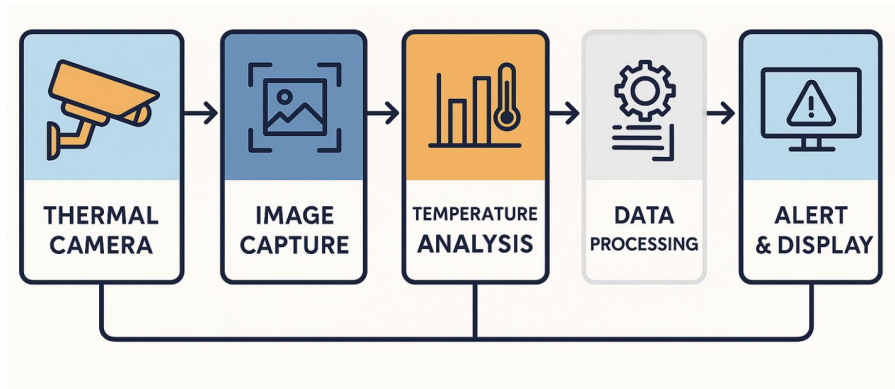
Benefits:

- Early detection of illness
- Continuous non-invasive monitoring
- Detect infectious individuals early

Thermal Imaging for Surveillance



Data Engineering and Data Science



Data Engineering:

- Capture and store data
- Clean and organize
- Deliver data to modelling tools

Data Science:

- Algorithms detecting breath, temperature, heart rate
- System flags anomalies (elevated temp or resp. rate)

AIR-ALERT Team

- **Dr. Andrew Hamilton-Wright** (University of Guelph, School of Computer Science, Canada)
- **Dr. Dan Perri** (St. Joseph's Hospital, Hamilton, Canada)
- **Sarah Culgin** (Project Manager; St. Joseph's Hospital, Hamilton, Canada)
- **Kelly Waters** (St. Joseph's Hospital, Hamilton, Canada)
- **Kassy Raymond** (University of Guelph, School of Computer Science, Canada)
- **Sayana Varughese** (University of Guelph, School of Computer Science, Canada)
- **Cathrine Nayrouz** (University of Guelph, School of Computer Science, Canada)



Agenda

- **Path from research to data engineering**
 - **Real-world projects in One Health**
 - **Lessons on collaboration**
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Lessons on Collaboration

1. Understanding different perspectives
 - Understand data workflows and work with domain-experts
2. Speak different languages
3. Respecting expertise



Lessons on Collaboration

1. Understanding different perspectives
2. Speak different languages
 - Understanding different terms across disciplines (e.g. spreadsheet vs. database)
3. Respecting expertise



Lessons on Collaboration

1. Understanding different perspectives
2. Speak different languages
3. Respecting expertise
 - Everyone brings important expertise when it comes to data!
 - Listen and ask questions



Contact

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