



Challenges in the development of the EU Health Data Space through the lens of COVID-19 experiences

Cezary Mazurek, Natalia Koralewska

Institute of Bioorganic Chemistry, Polish Academy of Sciences
Poznan Supercomputing and Networking Center

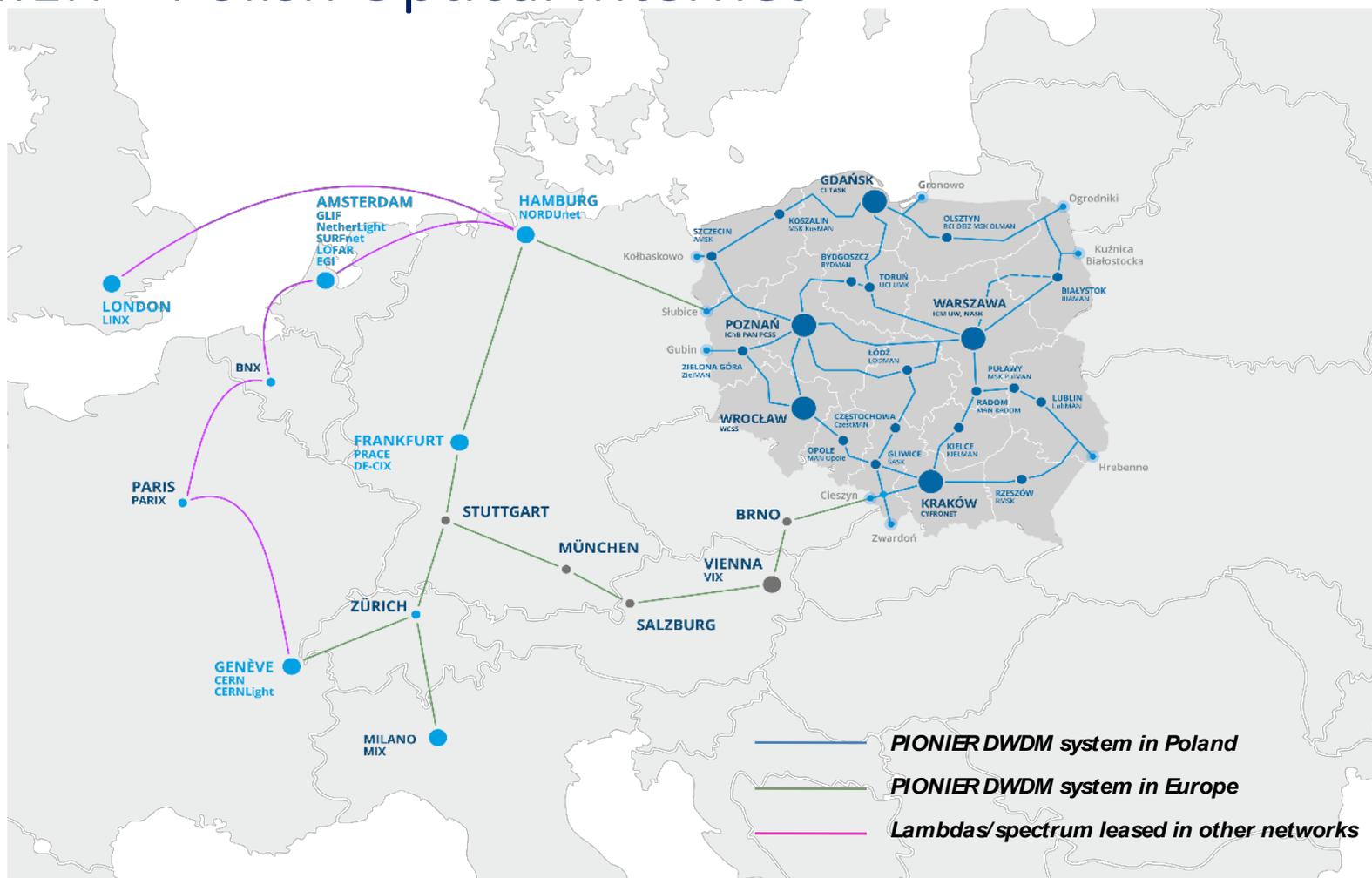
V4 seminar on
European Health Data Space
Brussels, 23rd November 2021

Institute of Bioorganic Chemistry PAS

- The Institute of Bioorganic Chemistry of the Polish Academy of Sciences (IBCh PAS) is a unique research unit in Europe, which carries out interdisciplinary research in chemistry, biology, bioinformatics and computer science
- Together with its affiliated Poznań Supercomputing and Networking Center (PSNC) it is one of the largest institutes of Polish Academy of Sciences, employing in total **over 750 people**
- The core mission of PSNC is **to foster scientific excellence** by providing reliable and cutting-edge e-Infrastructure such as communication networks, data and supercomputing systems, as well as highly-specialized laboratories

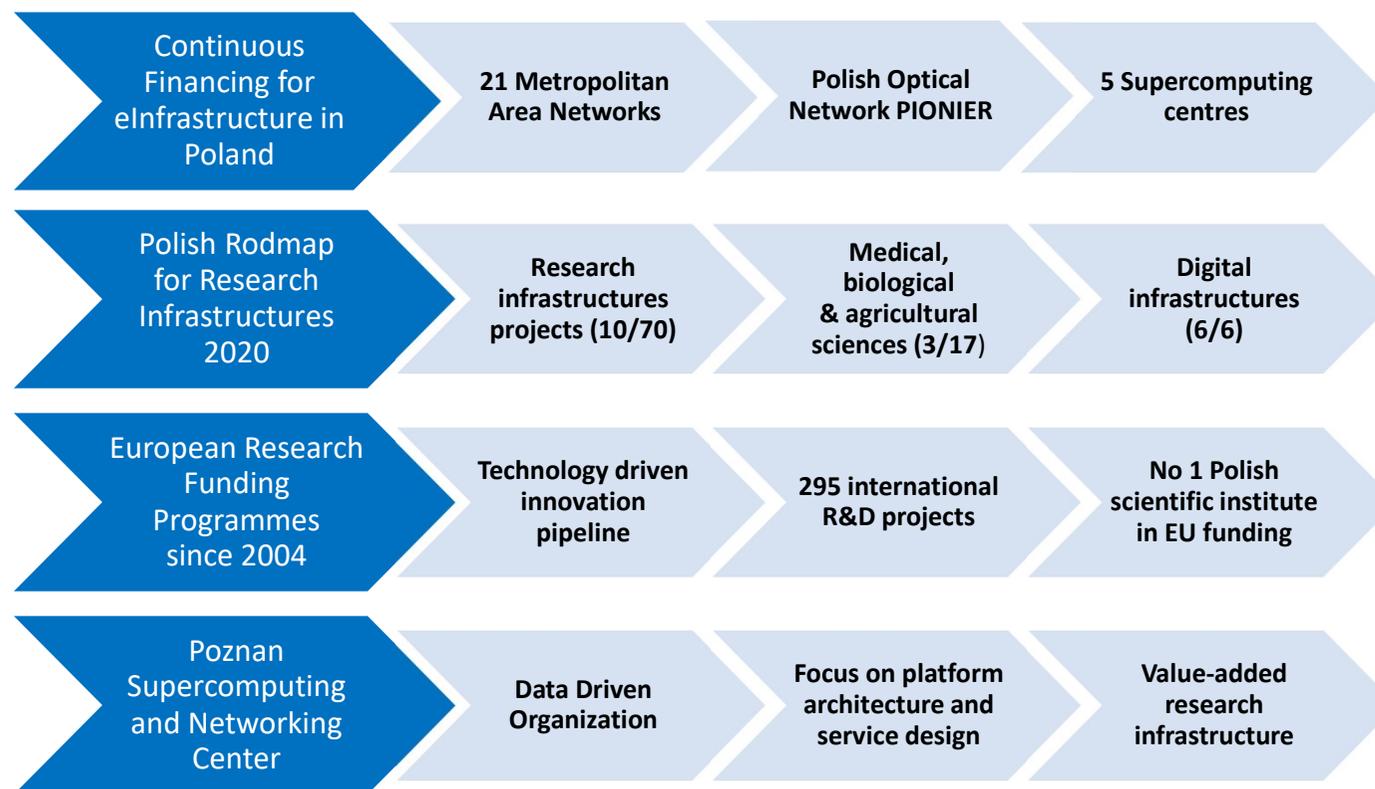


PIONIER – Polish Optical Internet



Focus on Digital Transformation based on advanced einfrastrucutre

- Continuous R&D activities related to information and communication technologies and their innovative applications



28
years of activity

1.34M*
scientific users
* all users served for 21 MANs

1680*
customers
* since 2016

432
employees

301
projects



Digital Transformation: Shaping the future of European healthcare – Deloitte report (2020)

Top challenges facing HC organizations in implementing digital technologies

Europe

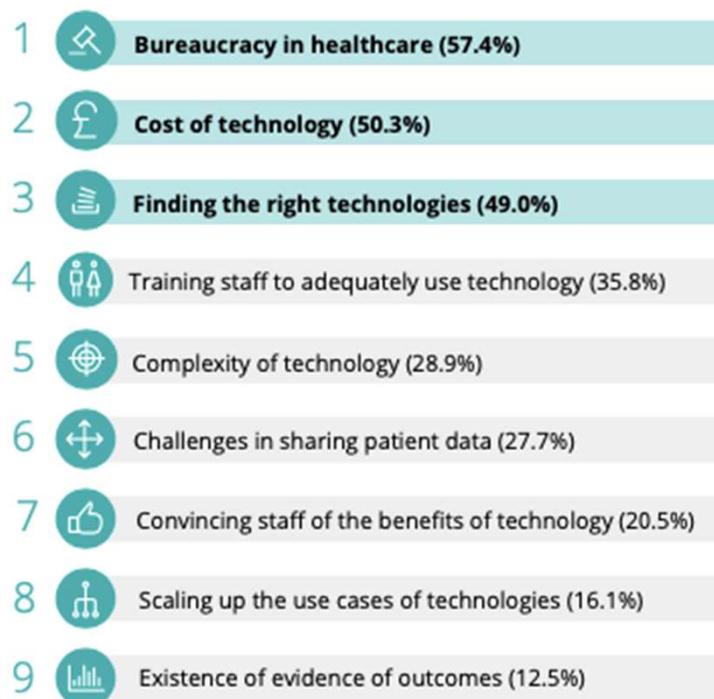
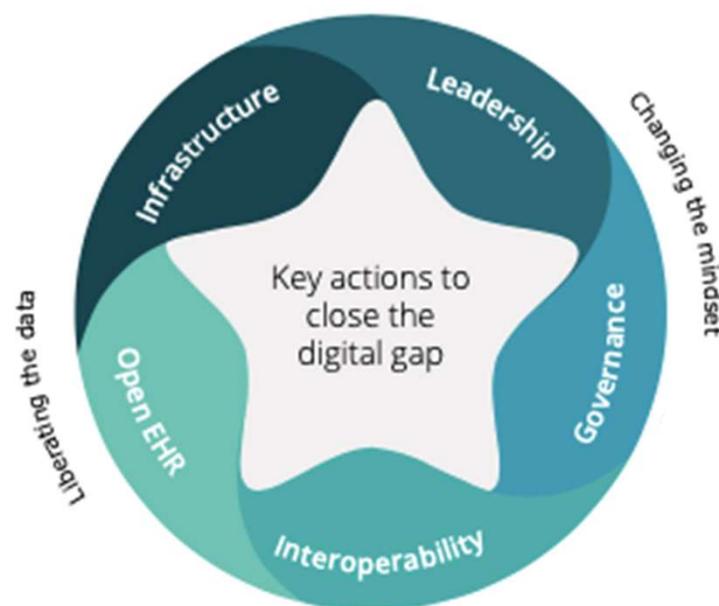


Figure 12. Key actions to close the digital gap

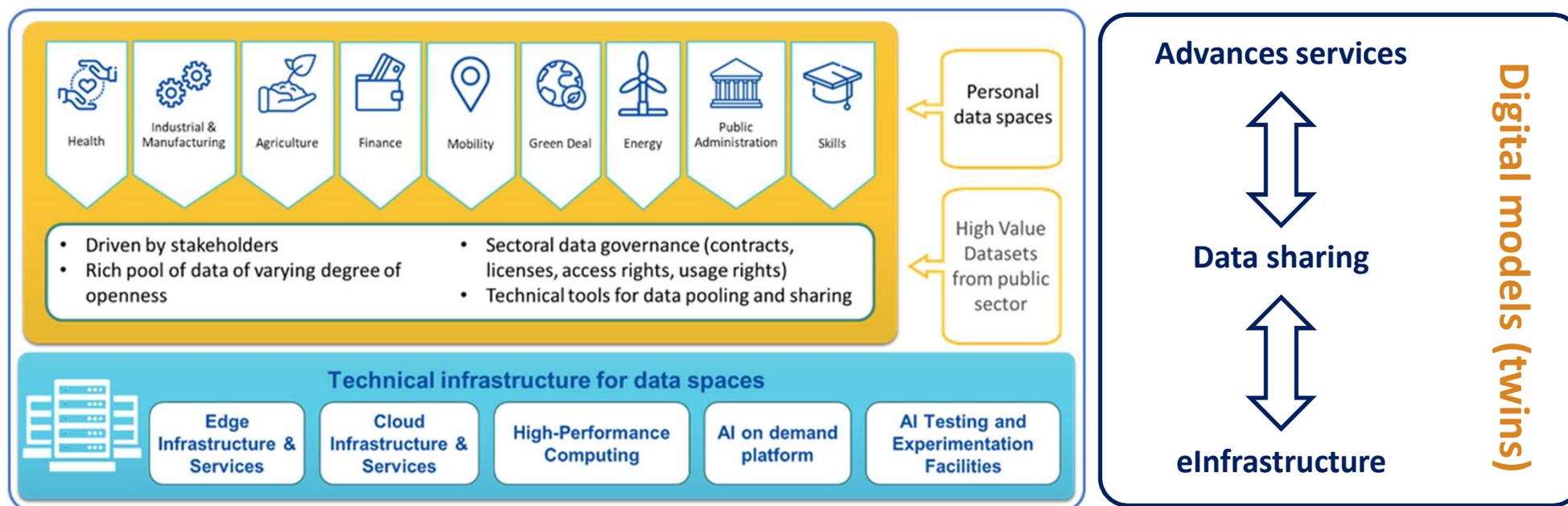


Source: Deloitte research and analysis, 2020

© Institute of Bioorganic Chemistry of the Polish Academy of Sciences / Poznan Supercomputing and Networking Center

Common European data spaces

- The medicine of today is increasingly employing IT technologies to better understand the observed processes and support diagnostic and individual therapeutic procedures based on digital models



<https://digital-strategy.ec.europa.eu/en/library/building-data-economy-brochure>

Healthcare – our emphasis on data management and integration towards better diagnosis and treatment

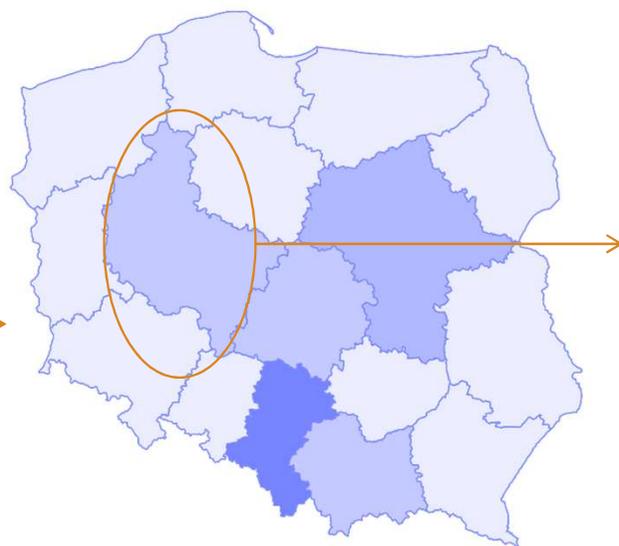
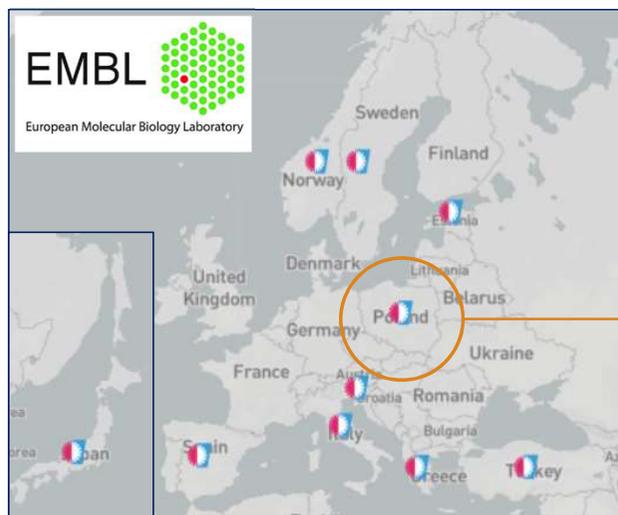
- **ICT**
 - ADMIRE - Adaptive multi-tier intelligent data manager for Exascale (Brain Super-resolution imaging)
 - INSESION - Personalized intelligent platform enabling interaction with digital services to individual with PMLD (Profound and multiple learning disabilities)
 - GlaucomAI - Multimodal Advanced Glaucoma Diagnosis Model
 - medVC - Real-time audio-video collaboration for doctors
- **AAL**
 - PELOSHA: Personalizable services for supporting healthy ageing
 - Fit4Work: Self-management of physical and mental fitness of older workers
- **eInfrastrucutre**
 - NEBI – National Imaging Centre for biological and biomedical sciences
 - MOSAIC – AI Platform to integrate and analyze multiomics and clinical data for new insights and tools for broadly accessible, personalized prevention, diagnosis and medical therapy



Data sharing at the times of pandemic National SARS-CoV-2 Data Hub and Research Platform in Poland



National SARS-CoV-2 Data Hub and Research Platform in Poland



Co-funded by the Horizon 2020 programme of the European Union



Ministry of Science and Higher Education
Republic of Poland



WIELKOPOLSKA
REGION



European COVID-19 Data Platform

https://audiovisual.ec.europa.eu/en/video/I-189639

European Commission English Search

European Commission > News > Audiovisual Service > Video > Video details

Audiovisual Service

Home Headline News Europe by Satellite Video Photo EU History Copyright

HIGHLIGHTS #SafeVaccines Recovery plan for Europe College Press Conferences Midday Briefings Press corner

Statement by Ursula von der Leyen, President of the European Commission, on the launch of the EU COVID19 Data Platform (international sign language version)



20/04/2020

ID: I-189639

Type : Complete speech

Date: 20/04/2020

Location: Brussels - EC/Berlaymont

Tag: [Research and development](#), [Medical treatment](#), [Public health](#), [Data Protection](#), [Epidemic](#), [Crisis Management](#), [An economy that works for people](#), [Political priority VDL](#), [Coronavirus](#), [COVID-19](#)

Personalities: [Ursula von der Leyen](#)

Language: [International Sign](#)

Co-operators: Director: Stefaan Fortemps

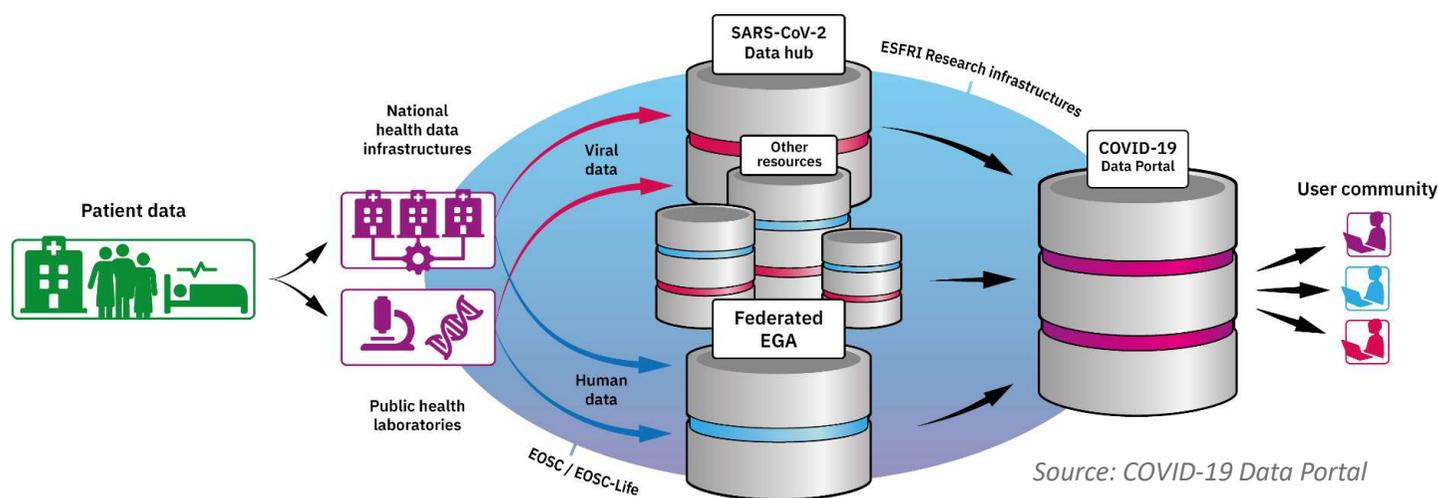
On 20 April 2020, Ursula von der Leyen, President of the European Commission, recorded a video message at the European Commission in Brussels, Belgium, on the launch of the EU COVID19 Data Platform.

- Open and rapid access to data, tools and workflows for the European COVID-19 response and research
- FAIR data for the global research communities
- Long-term sustainable solutions, build on open standards and aligned with the European Open Science Cloud (EOSC)



European COVID-19 Data Platform components

- **SARS-CoV-2 Data Hubs** – organize the flow of SARS-CoV-2 genomic data, offer deep user support
- **Federated European Genome-phenome Archive** – provides secure, controlled access sharing of sensitive patient and COVID-19 research data
- **COVID-19 Data Portal** – brings together relevant COVID-19 datasets and tools, hosts sequence data sharing and facilitates access to other SARS-CoV-2 resources



COVID-19 Data Portal

- Over **5M records** across molecular platforms and literature
- Nucleotide and amino-acid sequences, protein structures, expression data, compound screens, bioimaging data and scientific publications
- Includes a federation of **8 national data portals** (Italy, Japan, Norway, Poland, Slovenia, Spain, Sweden, Turkey)

The screenshot shows the COVID-19 Data Portal website. At the top, the URL is <https://www.covid19dataportal.org>. The main navigation bar includes: About, News, Partners, Related resources, FAQ, Bulk downloads, and Submit data. A secondary navigation bar lists: Viral Sequences, Host Sequences, Expression, Proteins, Networks, Samples, Imaging, and Literature. The hero banner features the text "Accelerating research through data sharing" and a link to "Read and sign our letter in support of open COVID-19 data". Below the banner is a grid of featured content:

- Viral sequences** (5,204,514 records): Raw and assembled sequence and analysis of SARS-CoV-2 and other coronaviruses.
- Host sequences** (18,518 records): Raw and assembled sequence and analysis of human and other hosts.
- Expression** (117 records): Gene and protein expression data of human genes implicated in the virus infection of the host cells.
- Proteins** (2,767 records): Curated functional and classification data on the SARS-CoV-2 protein entries and associated protein receptors.
- Networks**: COVID-19 pathways, interactions, complexes, targets and compounds.
- Imaging** (26 records): Biological images from microscopy and other platforms.
- Literature** (546,516 publications): Search for the latest literature about SARS-CoV-2.
- Related resources**: A range of related resources for studying the SARS-CoV-2 coronavirus and the COVID-19 disease.

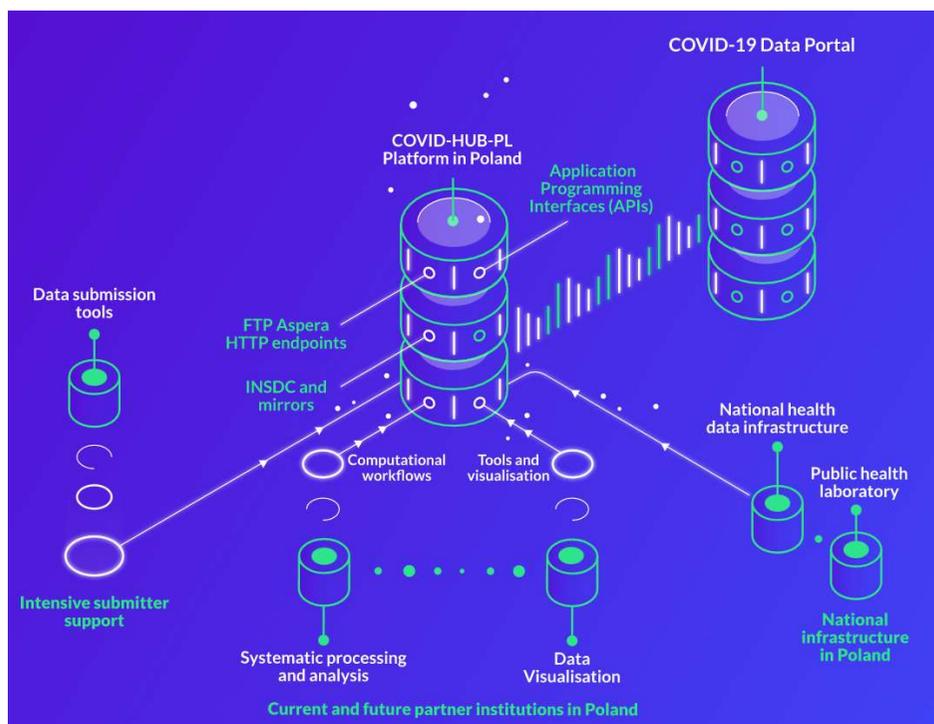
On the right side, there is a "Latest news" section with a "Read all Portal news" button. The news items include:

- 15 Nov 2021: **9th VEO report on SARS-CoV-2 mutations and variations now published**
- 15 Nov 2021: **COVID-19 Data Portal surpasses 2 million each for raw reads and sequences**
- 8 Oct 2021: **VEO 8th report on SARS-CoV-2 published**
- 1 Oct 2021: **COVID-19 Data Portal surpasses 1.5 million each for raw reads and sequences**

<https://www.covid19dataportal.org/>



National COVID-19 data hub and research platform COVID-HUB-PL



<https://covidhub.psnc.pl/eng/>

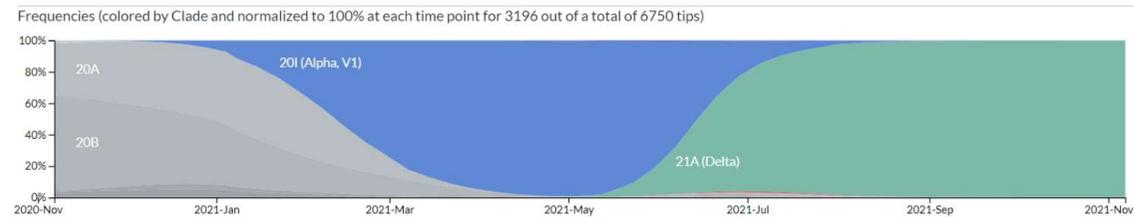
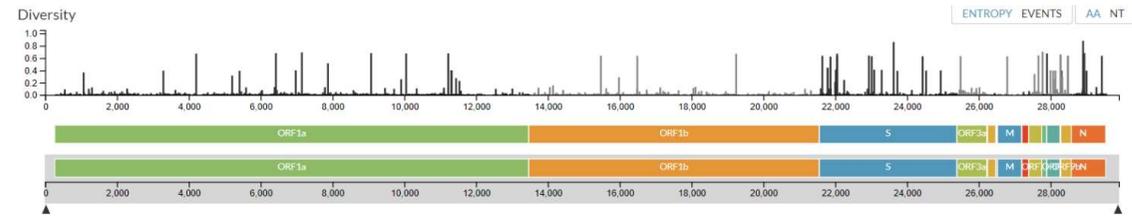
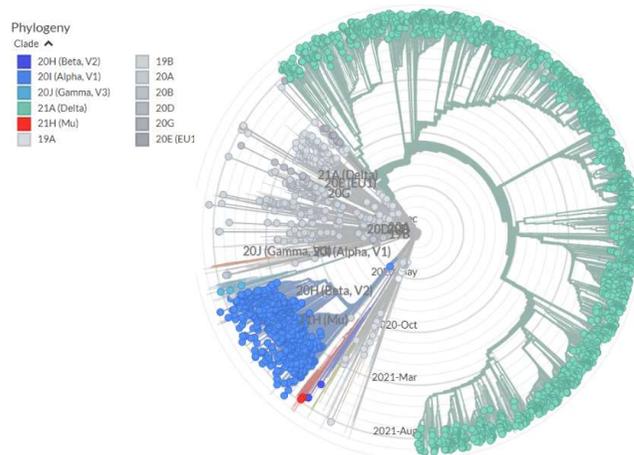
- Provides information, guidelines, tools and services to support researchers in creating and sharing research data on COVID-19,
- Large **data repository** and dedicated **storage space** at PSNC created to collect and share:
 - Genomic data
 - Clinical data
- Higher priorities established for **accessing HPC resources** by computational tasks related to COVID-19
- **IaaS/PaaS** environments available at PSNC for data and service providers
- Utilizes EOSC ecosystem in Poland (PIONIER NREN)



COVID-HUB-PL Tools & Services



- Genomic data analysis
- Genome visualization based on a dedicated Nextstrain instance
<https://nextstrain.covidhub.psnk.pl/ncov/poland>
- Other tools, e.g.: automatic analysis of medical imaging data using AI/MLs, support tools for remote access to SARS-CoV-2 reference databases in Poland, Europe and worldwide



COVID-HUB-PL for the general public



- Aggregated and relevant news regarding COVID-19 and R&D activities in Poland
- Raising public awareness of science and disseminating knowledge
- COVID-19 dashboard

BNT162b2 BioNTech/Pfizer

Szczepionka: Białko S, Odg. Immu. Kam. prod. białek

Komórka ludzka mRNA

Szczepionka mRNA

mRNA, z którego powstaje białko S jest zamił nanocząsteczkę lipidowej (kapsułce). Nanocząstki (funkcję nośnika. Po wnikięciu nanocząstki do rozpoczynają się produkcja białka S, a następną odpowiedzi immunologicznej przeciwko SAR

Skuteczność: 95% (wariant IB.1351 w --%)

Dawka: 0,3mL - 2 dawki - w odstępie

Przechowywanie: -70°C - 6 miesięcy +2-8°C - 5 dni

© LaPijette.labs
Ostatnia aktualizacja 01/03/21
Zweryfikowane przez ICHB PAN / PCS w ramach REGIONAL COVID-HUB

ChAdOx1 / AZD1222 (Covishield) Oxford/AstraZeneca

Szczepionka (Adenowirus jako nośnik) Białko S

Komórka ludzka DNA

Szczepionka wekto

DNA stanowiący matrycę do produkcji zamknięty w bezpiecznym wirusie (zm Adenowirus). Wirus pełni funkcję nośnik komórce rozpoczynają się produkcja białka S, a następną odpowiedzi immunologicznej przeciwko SARS-CoV-2.

Skuteczność: 82% (wariant IB.1351 w 10%)

Dawka: 2 dawki - *w odstępie

Przechowywanie: +2-8°C - 2 lata

© LaPijette.labs
Ostatnia aktualizacja 01/03/21
Zweryfikowane przez ICHB PAN / PCS w ramach REGIONAL COVID-HUB

NVX-CoV2373 Novavax

Szczepionka Odpowiedź immunologiczna

Nanocząstki opłaszczone białkiem S

Szczepionka podjednostkowa

Nanocząstki są opłaszczone rekombinowanym białkiem S. Dodatkowo, szczepionka zawiera adiuwant. Adiuwant to substancja wzmacniająca odpowiedź immunologiczną.

Skuteczność: 96% (wariant klasyczny) 86% (wariant IB.117 brytyjski) 55% (wariant afrykański)

Dawka: 2 dawki - w odstępie 21 dni

Przechowywanie: +2-8°C - 6 miesięcy -20°C - 2 lata

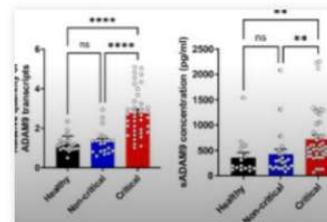
© LaPijette.labs
Ostatnia aktualizacja 14/03/21
Zweryfikowane przez ICHB PAN / PCS w ramach REGIONAL COVID-HUB



New drugs to treat COVID-19 approved by EMA

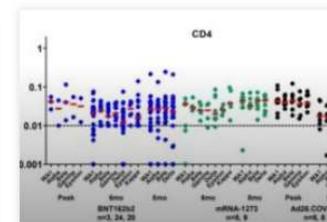
The European Medicines Agency (EMA) has approved two monoclonal antibodies, Regkirona (regdanvimab) and Ronapevri (casirivimab / imdevimab), as biological drugs in the fight against COVID-19.

[READ MORE](#)



Identification of driver genes for critical forms of COVID-19 in a deeply phenotyped young patient cohort

Research using multi-omics analysis (whole genome sequencing, RNA sequencing, proteomics, cytokine profiling and high-throughput immunophenotyping) combined with artificial intelligence has shown that



Differential Kinetics of Immune Responses Elicited by Covid-19 Vaccines

A study published in NEJM shows how the cellular and humoral response changes within 8 months of receiving either the two-dose BNT162b2 or mRNA-1273 vaccine or the single dose Ad26.COV2.S vaccine

18 November

<p>Cases</p> <p>+23 242 ↓</p> <p>/ 3 302 041</p>	<p>Active cases</p> <p>+4539 ↑</p> <p>1,25% of patients</p>	<p>Recoveries</p> <p>+18 300 ↑</p> <p>5,05% of patients</p>	<p>Deaths</p> <p>+403 ↑</p> <p>/ 80 379</p>
<p>Percent of vaccinated</p> <p>53,43%</p> <p>20 561 348</p>	<p>Percent of fully vaccinated</p> <p>51,75%</p>	<p>All tests</p> <p>+91 296 ↓</p> <p>26,99% pozytywnych</p>	<p>Quarantine</p> <p>+58 651 ↑</p> <p>/ 561 958</p>

47

The incidence rate
Average 7 days/per 100,000 population

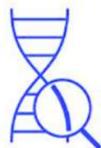


REGIONAL SARS-CoV-2 DATA & e-SERVICES PORTAL



The aim of the REGIONAL COVID-HUB project is to provide **e-services** to help research and public institutions (Sanitary-Epidemiological Stations, hospitals, Marshal of the Wielkopolska Region), as well as general public to counteract COVID-19 pandemic in Wielkopolska region.

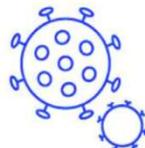
Research institutions



Hospitals



Sanitary-epidemiological Stations



Society



Local authorities



Project duration: 2020.07.01 – 2022.06.30



Republic of Poland



EUROPEAN UNION
European Regional Development Fund

REGIONAL SARS-CoV-2 DATA & e-SERVICES PORTAL

- **COVID-19 dashboard**,
- **Knowledge base** (FAQ, expert-verified information on SARS-CoV-2, useful links),
- **Lesson plans and educational materials** (immunology, virology, genomics)
- **Interactive COVID-19 map** (Nextstrain),
- Dedicated **storage space** for collecting and sharing COVID-19 biomedical and epidemiological data (according to FAIR principles) together with open/public documents for institutions and citizens in Wielkopolska region,
- e-service for **remote communication and tele-consultation**.



REGIONAL COVID-HUB | WIELKOPOLSKA O PROJEKCIE E-USŁUGI EDUKACJA BAZA WIEDZY

**WIELKOPOLSKI PORTAL I E-USŁUGI
POŚWIĘCONE INFORMACJOM,
BADANIOM I WSPÓŁPRACY
DOTYCZĄCYM COVID-19 I SARS-
COV-2**

Baza wiedzy

Wizualizacja stanu i dynamiki pandemii	Interaktywna mapa rozwoju COVID-19	Komunikacja multimedialna	Dane biomedyczne i epidemiologiczne	Wsparcie diagnostyki COVID-19	Interaktywne przetwarzanie danych
--	------------------------------------	---------------------------	-------------------------------------	-------------------------------	-----------------------------------

Conclusions – Challenges for Personal Medicine solutions

- An **interdisciplinary approach** in medicine no longer means only medical teams working together
- For data-driven solutions, it is crucial to have access to **sufficient number of records** to avoid imbalances between number of parameters and the size of the set to analyze
- Data mining leading to determination of the crucial parameters which characterize the case and disease should be **strictly supervised by the physician's expertise**
- Feedback loop for improved understanding – modeling based on medical knowledge and **physiology cross-referencing** while working with data and model
- Advancing beyond diagnosis support towards **specific therapeutic interventions** suggested for physicians
- Sustainable and transparent **science communication** and **citizen empowerment** strategies contributing to openness and trust are fundamental for the public dialogue about the research use of healthcare data and implementation of new technologies in medicine

6th European Laryngological Live Surgery Broadcast
24th November 2021 | 9.00 16.00 (GMT+1)

Save the date

els.livesurgery.net





Contact

Cezary Mazurek
mazurek@man.poznan.pl

Natalia Koralewska
nataliak@ibch.poznan.pl

V4 seminar on
European Health Data Space
Brussels, 23rd November 2021