NATIONAL RESEARCH E-INFRASTRUCTURES IN ARMENIA

Hrachya Astsatryan

National Capacity Building NI4OS Training

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OVERVIEW

Network, Data, Computing

HISTORY OF A HYBRID RESEARCH COMPUTING PLATFORM

DISTRIBUTED SYSTEM
Network-based concurrent computing environment

GRID INFRASTRUCTURE
Nation-wide Grid infrastructure.

2001

2004

2007

2014

ARMCLUSTER HPC
A centralized HPC system

CLOUD
IaaS Cloud infrastructure

NETWORKING INFRASTRUCTURE

Direct Con. 1Gb/s	**2015**	EaPConnect Project
Optical network to Geant	**2008**	Black Sea Interconnection
Satellite conn. to Geant	**2002**	Nato Virtual Silk Project
Operator	**1998**	Connectivity to the universities
1ˢᵗ international link –DESY (Germany)	**1994**	Founded
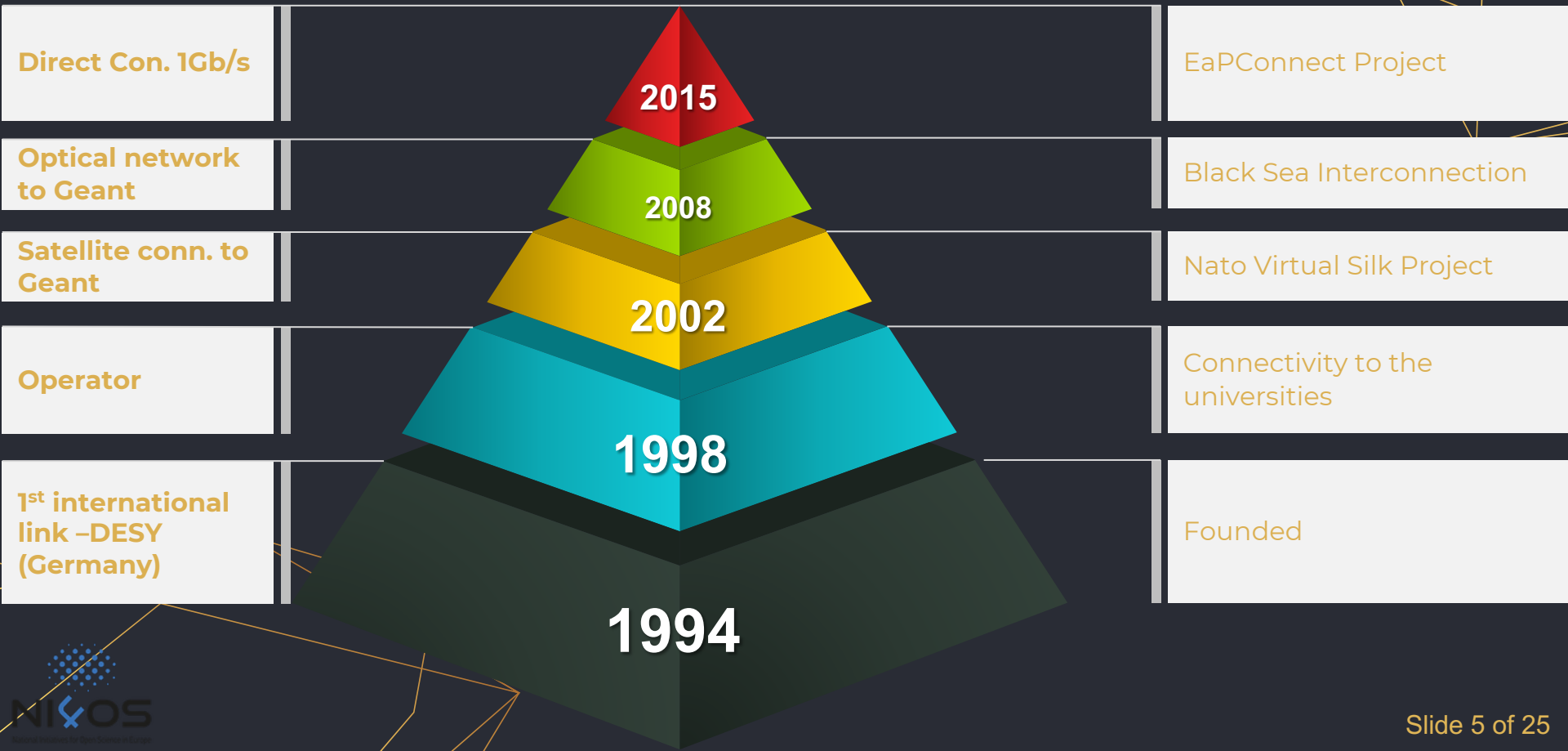
COMPUTNG INFRASTRUCTURE

Collaboration **Funding**

Supercomputing	EUROPEAN OPEN SCIENCE CLOUD / NI4OS	IRIT	French Supercomputer
Cloud	GÉANT Networks · Services · People	EaPConnect Eastern Partnership Connect	Openstack – 620vCPUs and GPUs
Grid	EGI	ISTC МНТЦ	ArmGrid – 512CPUs
Cluster		ISTC МНТЦ	Armcluster – 128 CPUs
Distributed Systems		Asnet AM	Networking servers - 10

2019

2016

2007

2004

1998
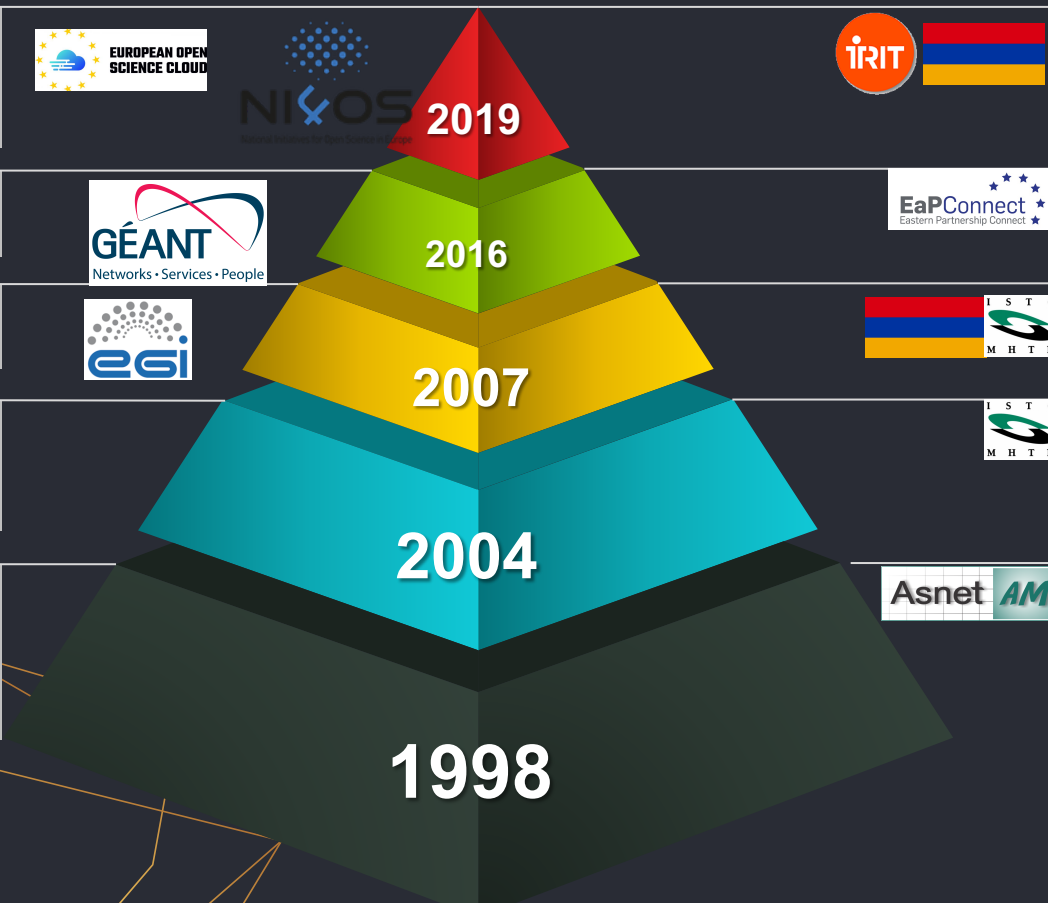
2

ROADMAP

Mission, Vision

MISSION

Mission

Digital economy

- R&D focused on ICT and their application
- Creating an ecosystem for inspired innovations

Digital science

- An advanced eInfrastructures to academia
- R&D Environments

VISION

01
E-infrastructures

- HPC, networking & data facilities

Connecting Armenia

02
Applications

- Scientific challenges
- Societal challenges
- Industry

Fostering communities

03
Technologies

- HPC and cloud
- Data
- Networking

Advancing technologies

04
Education

- AI/ML
- Data science
- Scientific computing and computational science

Empowering knowledge
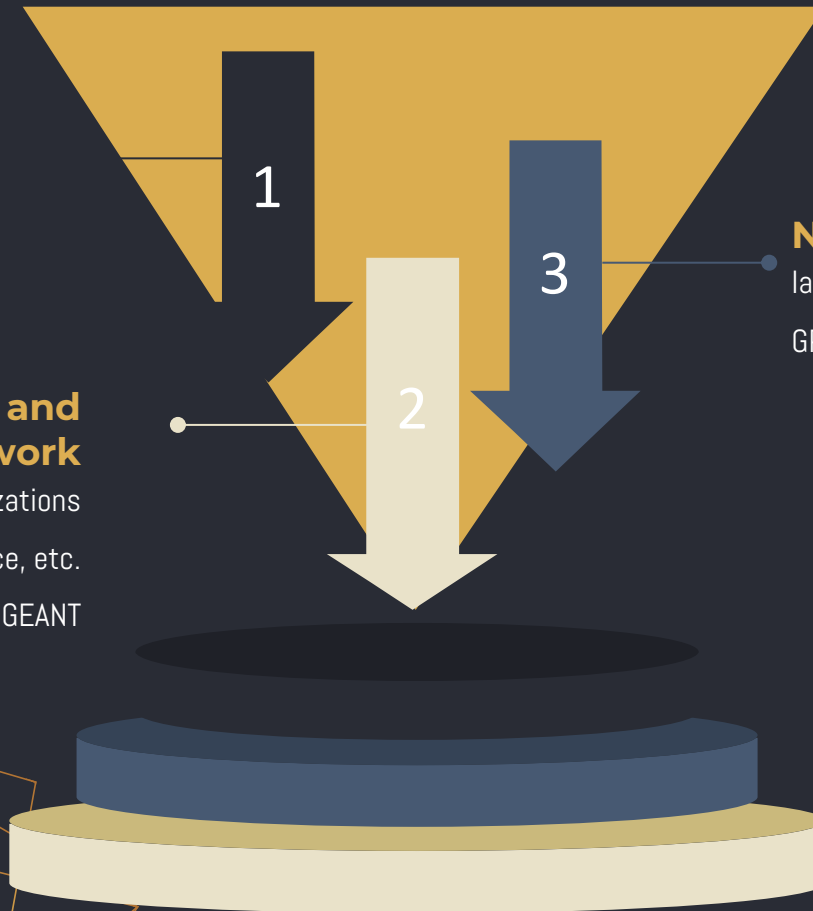
E-INFRASTRUCTURE – AT A GLANCE

National Data Center

Digital libraries
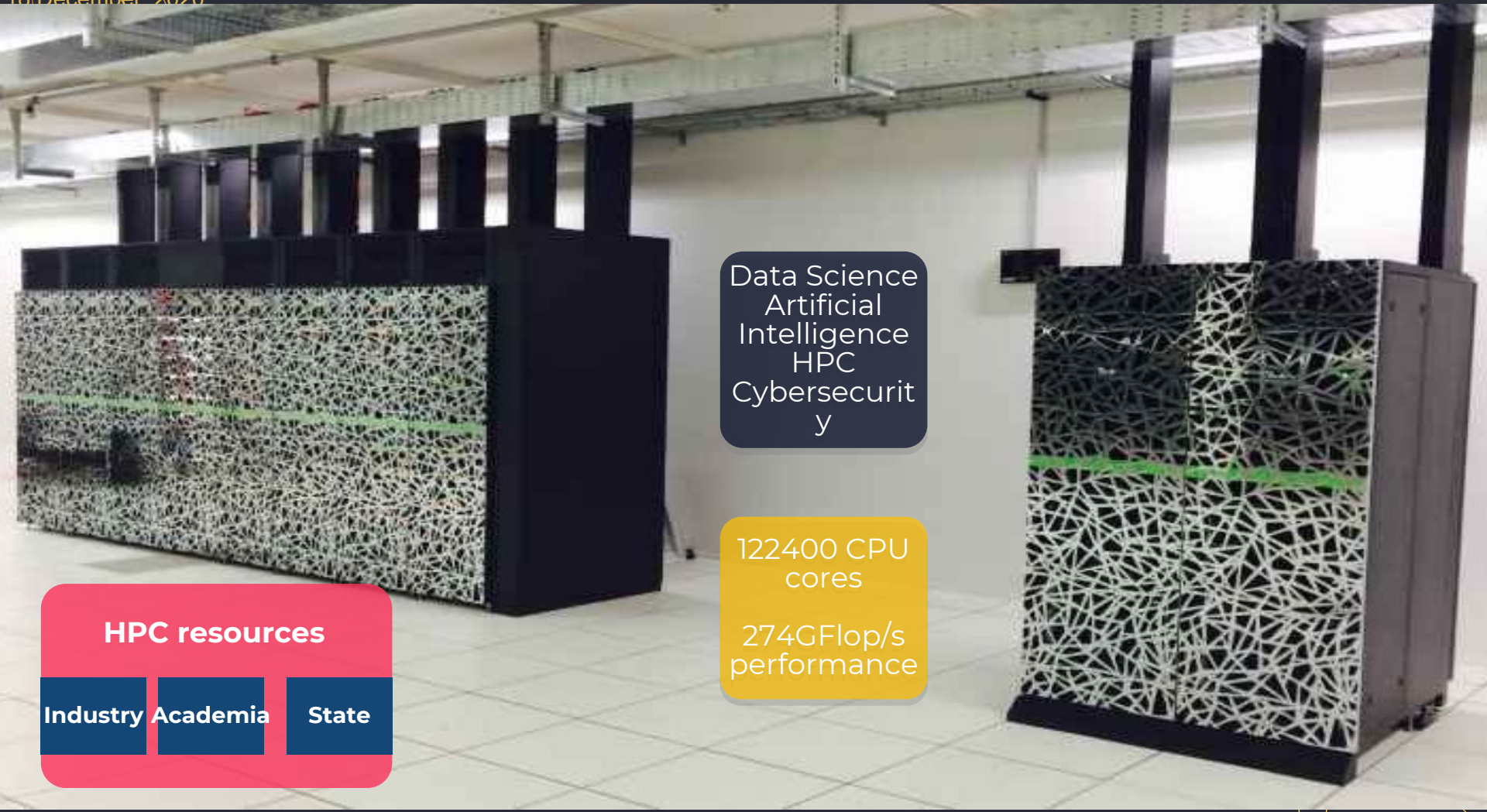
Digital museum

Astrophysics

Meteorology

1

3

National HPC Center

Iass Cloud providing CPU cores,

GPU cloud (ongoing): Tesla V100 devices

National Research and Educational Network

ASNET-AM: >65 organizations

Eduroam, videoconference, etc.

Direct connectivity with GEANT

2

Data Science
Artificial
Intelligence
HPC
Cybersecurity

122400 CPU cores

274GFlop/s performance

HPC resources

Industry | Academia | State

3

DIGITAL SERVICES

DIGITAL SERVICES

Big data
Metadata management
Repositories
Digitization

DATA

COMPUTING

**High-Performance Computing
Cloud Computing**

**Connectivity & network management
Trust, identity & security
Real time communication & learning**
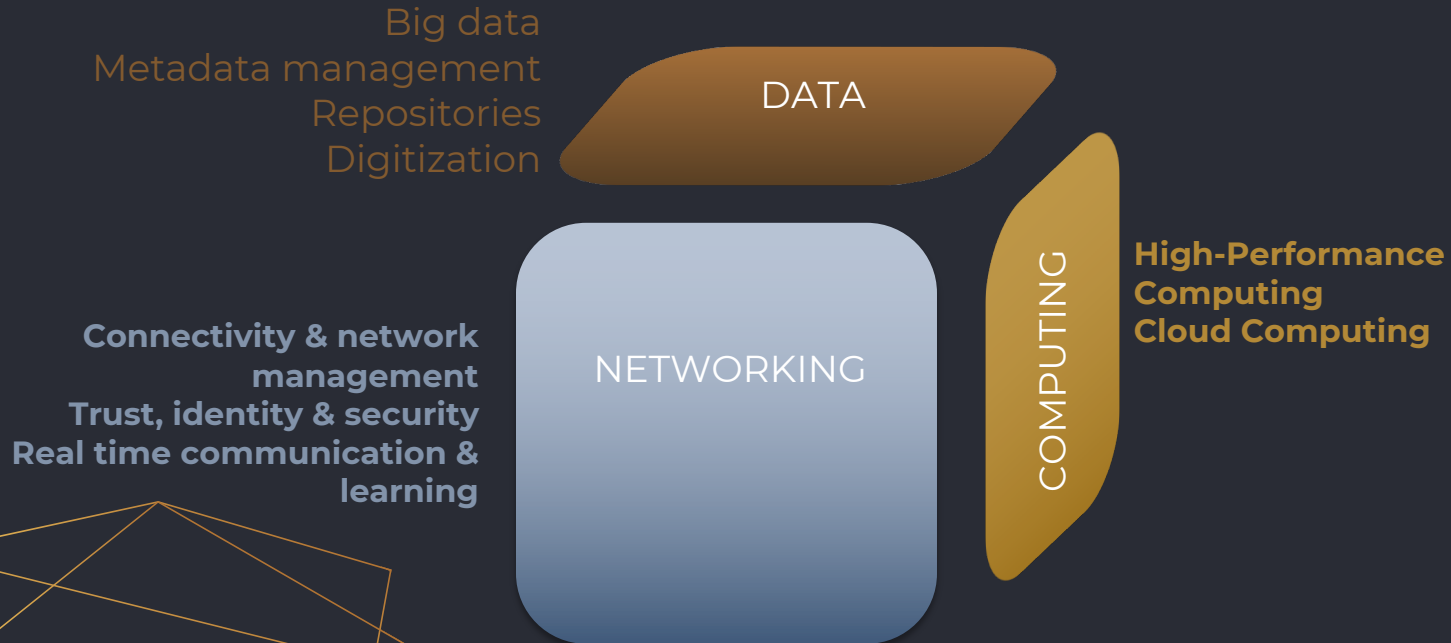
NETWORKING

4

NETWORKING SERVICES

EDUROAM

Time interval 2020-01-01 00:00:00 - 2020-12-31 23:59:59

🕐 Select different time interval

Country	Diff. realms	OK	FAIL	Total
Armenia (am) ASNET-AM	15	27647	21149	48796
United Kingdom (uk) JANET	10	277	287	564
Sweden (se) SUNET	4	145	269	414
Portugal (pt) FCCN	2	58	173	231
Czech Republic (cz) CESNET	4	120	108	228
France (fr) RENATER	2	108	99	207
Germany (de) DFN	11	93	112	205
Poland (pl) PIONIER/U.Tourn	2	70	15	85
Spain (es) RedIRIS	4	39	36	75
China, Mainland (cn) CSTNET	1	18	24	42
Belgium (be) BELNET	1	16	25	41
The Netherlands (nl) SURFnet	2	8	16	24
Lithuania (lt) LITNET/KTU	1	14	2	16
Austria (at) ACOnet	1	12	4	16
Italy (it) GARR	1	6	9	15
Switzerland (ch) SWITCH	1	5	5	10
Norway (no) UNINETT	1	4	4	8

eduroam (education roaming) is the secure, world-wide roaming access service developed for the international research and education community.

eduroam allows students, researchers and staff from participating institutions to obtain Internet connectivity across campus and when visiting other participating institutions by simply opening their laptop.
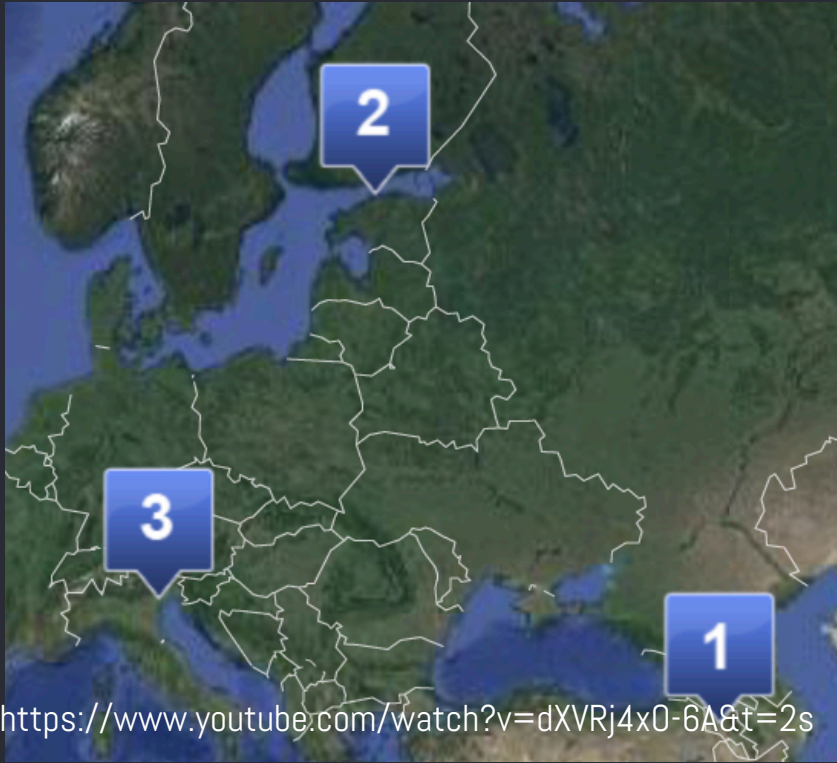
A LOW LATENCY, HIGH QUALITY AUDIO/VIDEO TRANSMISSION SYSTEM (LOLA) FOR NETWORK MUSICAL PERFORMANCES AND INTERACTION

Estonian Academy of Music and Theatre

CAPPELLA MARCIANA - VENICE

Fondazione Università Ca' Foscari. Cà Dolfin

HOVER STATE CHAMBER CHOIR - YEREVAN

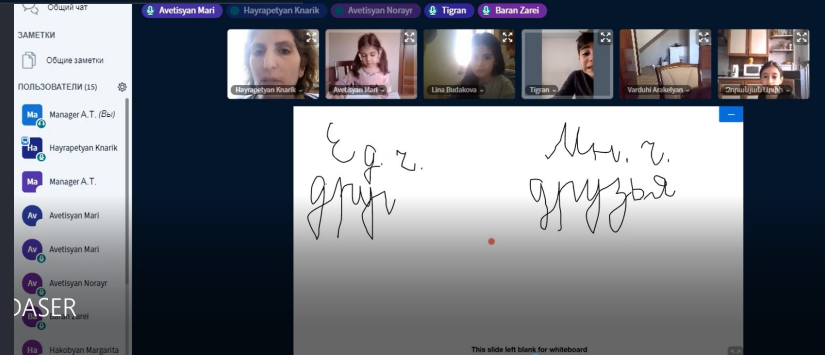National Academy of Sciences of Armenia

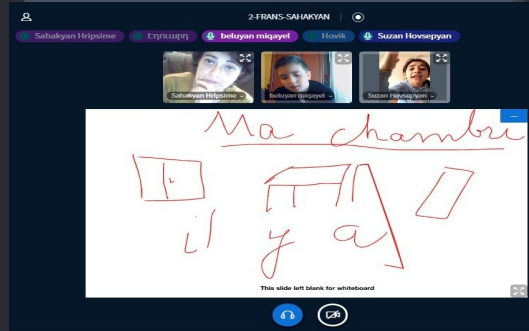https://www.youtube.com/watch?v=dXVRj4x0-6A&t=2s

DISTANCE LEARNING

ASNET-AM provides open source web conferencing and distance learning platforms for science and education organizations to assist in organizing the online work and educational process.

The platform's capacity has increased several times during the past weeks to provide a secure connection of good quality.

MEET.ASNET.AM
BAREV.ASNET.AM
EDU.ASNET.AM

- **More than 1000**
- **Teachers**
- **Pupils**
- **Lectors**
- **Students**

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COMPUTING

HPC, CLoud

Use cases - societal challenges

Off site monitoring

Atmospheric modeling

Hydrological modelling

Water resources management

Air pollution

Env. protection

Societal challenges

Weather prediction

Severe weather

Drought, desertification

Climate modelling

Seismology and geology

hazardous geological and seismological phenomena

Use cases - societal challenges

Supporting weather 'nowcasting' to prevent damage in Armenia

Armenian State Hydrometeorological and Monitoring Service
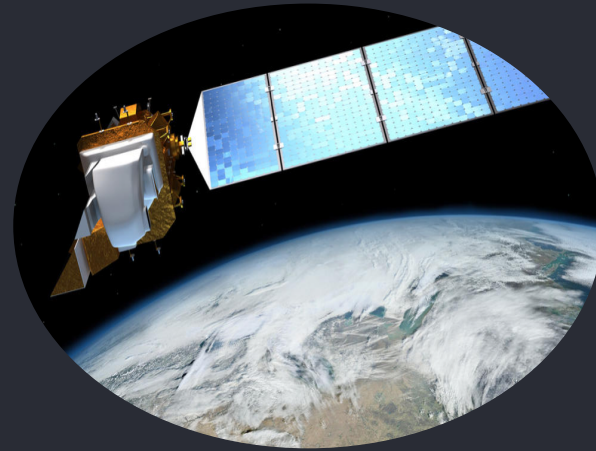
Monitoring the environment with Earth observation in Armenia

http://datacube.sci.am

Use cases - scientific challenges

Genomics, molecular dynamics

Life science & medicine

Materials, chemistry

Quantum chemical simulations

LHC CERN, IVOA

Astrophysics and high energy physics

Scientific challenges

Engineering

Scientific computing & modelling

GIS, GPS

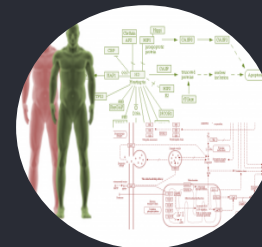Earth science

Archeology and social sciences

3D modelling
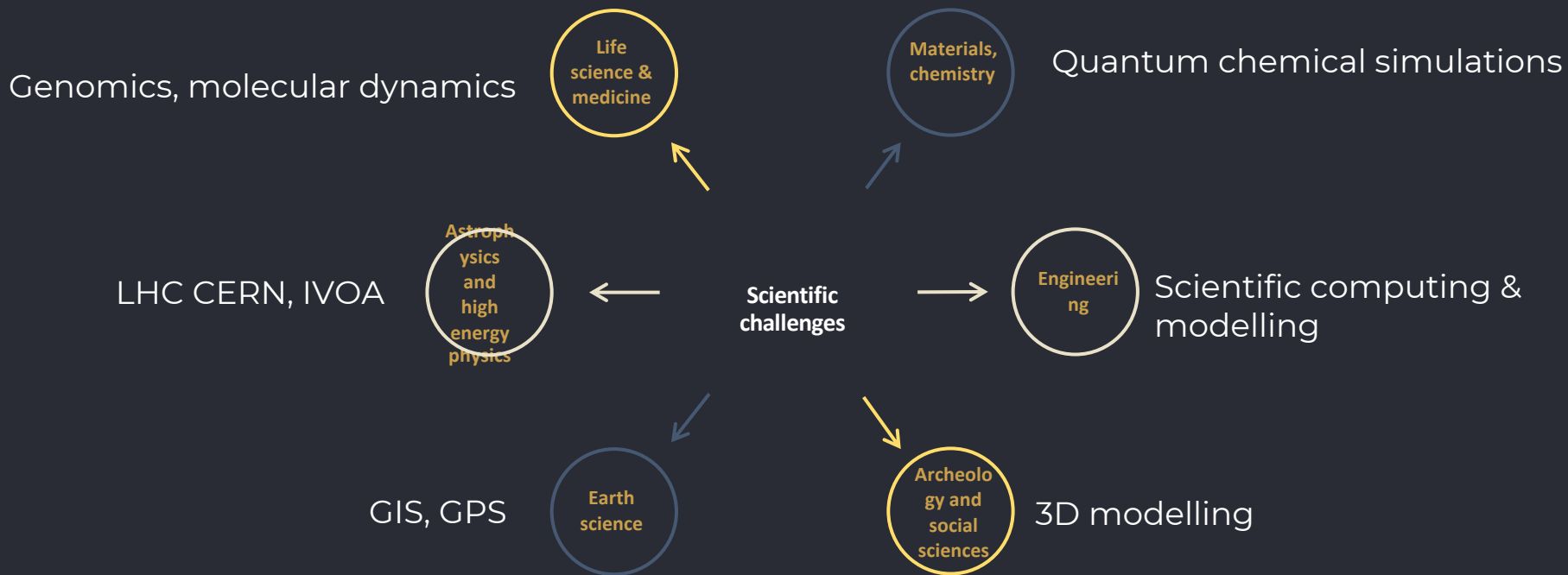
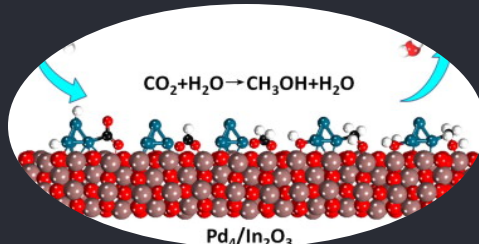# Use cases - scientific challenges
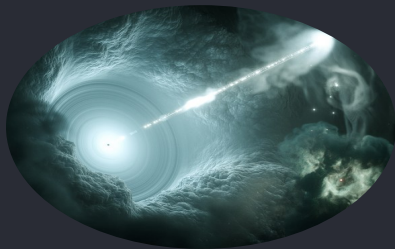
Supporting the multiwavelength monitoring of the bright Blazars
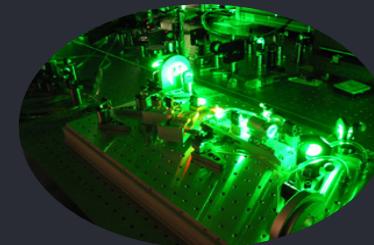
International Centre for Relativistic Astrophysics

Empowering the Armenian Genome Project with HPC

http://armeniangenome.am

Enabling computational materials discovery and atomic scale

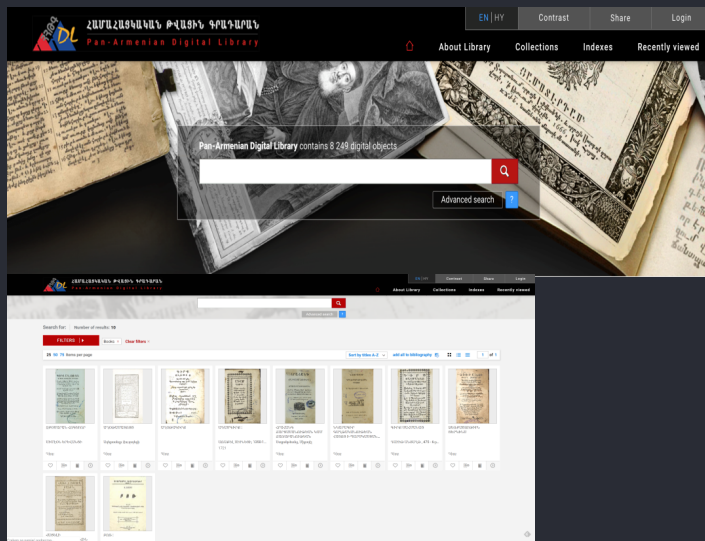**Faculty of Radiophysics, Yerevan State University**

Enabling laser physics and quantum computing simulations

Institute for Physical Research of NAS RA

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DATA

Digital services – digital libraries online

We are moving to the new platform based on dLibra system.

The new portal offers the users many powerful possibilities such as **searching the content** of the collected resources, searching bibliographic descriptions using **synonyms** dictionary, **grouping** digital publications and navigating their **structure**.

dLibra enables creating professional repositories of digital documents and sharing them with other people and systems on the Internet.

Digital services – data repository

Primary country mirror - mirrors.asnet.am

o **Faster downloads for users**

o **Saving bandwidth**

o **Reproducible package installation**

Additional packages:
o **Turnkeylinux**
o **Raspbian**
o **Dotdeb**
o **...**

MIRꓤORS

Asnet AM

4+TB
**Software
Packages &
Repositories**

Archive Mirror at the Academic Scientific Research Computer Network of Armenia (ASNET-AM)