ENLIGHTEN YOUR RESEARCH @ EAP

EaPConnect
Eastern Partnership Connect

EYR@EaP 2019 Awards

26 September 2019

Agenda

- What is EYR?
  - *EYR for EaPConnect*
- EYR@EaP Programme Results
- 2019 awards

EYR for EaPConnect

- Goal:
  - *Aims to stimulate the use of technology in research and using e-infrastructure resources in Eastern European countries*
- Builds the visibility of the NRENs with their end-users/research communities (with case studies, PR…)
- Provides e-infra resources BY the NREN or THROUGH the NREN to the researchers
  - *Network requests – capacity upgrades*
  - *Supercomputing resources*
  - *Engagement with other European researchers*
  - *Cloud infrastructure resources*
  - *Presentation and attendance at EaPEC*
- Programme offered in 2016, 2017, 2018, 2019

→ EYR helps to build communities, use cases, and advocates around the R&E infrastructure

EYR@EaP 2019 Programme Results

- 14 proposals
- 8 final projects
- Topics
  - *Digitisation of Museums*
  - *Library Digital Infrastructure*
  - *Gas Sensing*
  - *Economics*
  - *Weather Forecasting*
  - *Liver Disease Research*
  - *RINArmenia Public-Private Partnership*
  - *Molecular Dynamics*
- Resources requested
  - *Compute resources in collaboration with PRACE*
  - *Data Storage*
  - *Cloud Resources*
  - *Open Science & Scientific Publication Support*

2019 Awards

DReAM - Digitisation of Regional Armenian Museums

Aram Mirzoyan
ASNET-AM

SHORT DESCRIPTION OF DReAM PROJECT

Regional museums of Armenia are less visible, accessible and presented in the digital environment than the museums of Yerevan. To balance this situation the DReAM project is designed in the frames of which a cloud-based service will be deployed to preserve the digitized cultural heritage of the of the regional museums. The project will begin with the Yeghegnadzor Regional Museum. In future after the lifetime of EYR programme it is planned to include other regional museums from different regions of Armenia. In quantitative terms the planned platform will include:

- more than 300.000 items from various regional museums
- the total amount of digitized materials will be approximately 50 TB

The dream goal of the DReAM project is to be included in Europeana platform.

Contact: aram.mirzoyan@asnet.am

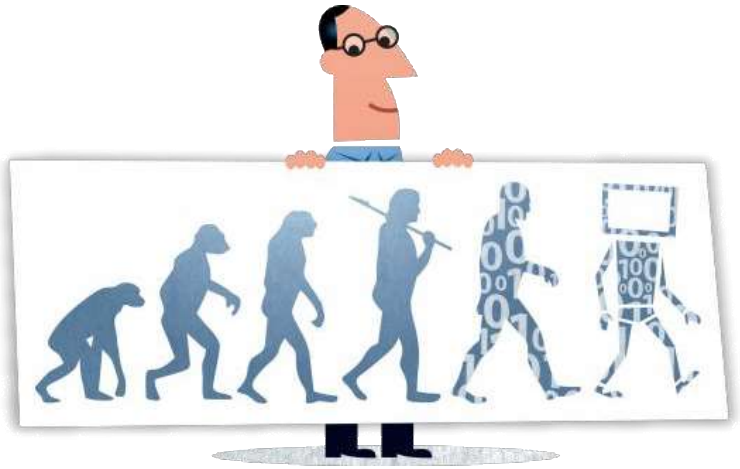
HOW DOES THIS PROJECT HELP TO MOVE FORWARD YOUR RESEARCH FIELD AND / OR BENEFIT WIDER SOCIETY?

1. In future for the deeper processing of the digitized materials we shall need to develop 3D modeling and OCR techniques
2. Digitization of the cultural heritage will help to:
   - improve the level of Armenia's cultural heritage preservation
   - make it more accessible for researchers and all interested people
   - increase its visibility in digital environment
   - involve the new visitors to the regional museums both from Armenia and abroad, which can also be the additional boost for the further development of tourism

IN WHAT WAY IS THE NATIONAL RESEARCH AND EDUCATION NETWORK ORGANIZATION (ASNET-AM) GOING TO SUPPORT THIS PROJECT?

ASNET-AM will provide:

- the cloud storage
- the necessary equipment
- general technical support
- high speed internet connection



DReAM - DIGITIZATION OF REGIONAL ARMENIAN MUSEUMS

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Project benefits

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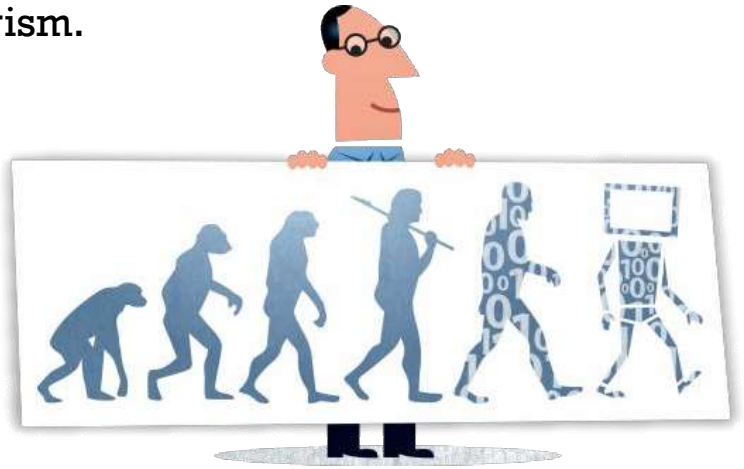


Contact: aram.mirzoyan@asnet.am

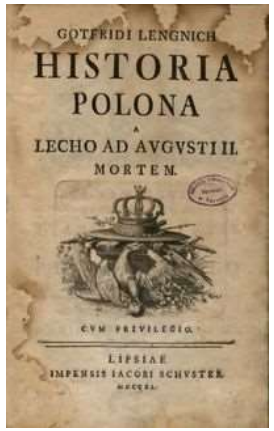
THANK YOU

Expansion of the services of digital infrastructure of the scientific and pedagogical library on the basis of digitalization of funds, improvement of access and expansion of international network interaction.

Nataliia Varaksina Volodymyrivna
V.O. Sukhomlynskyi State Scientific and Pedagogical Library of Ukraine

The V. O. Sukhomlynskyi State Scientific and Pedagogical Library of Ukraine

- **Has about 600,000 documents** kept on traditional and electronic carriers. This collection is a universal one, professional editions constitute 50% of it.
- **A main task is to provide access to the documents** on professional issues which are of great scientific, historical and cultural importance.



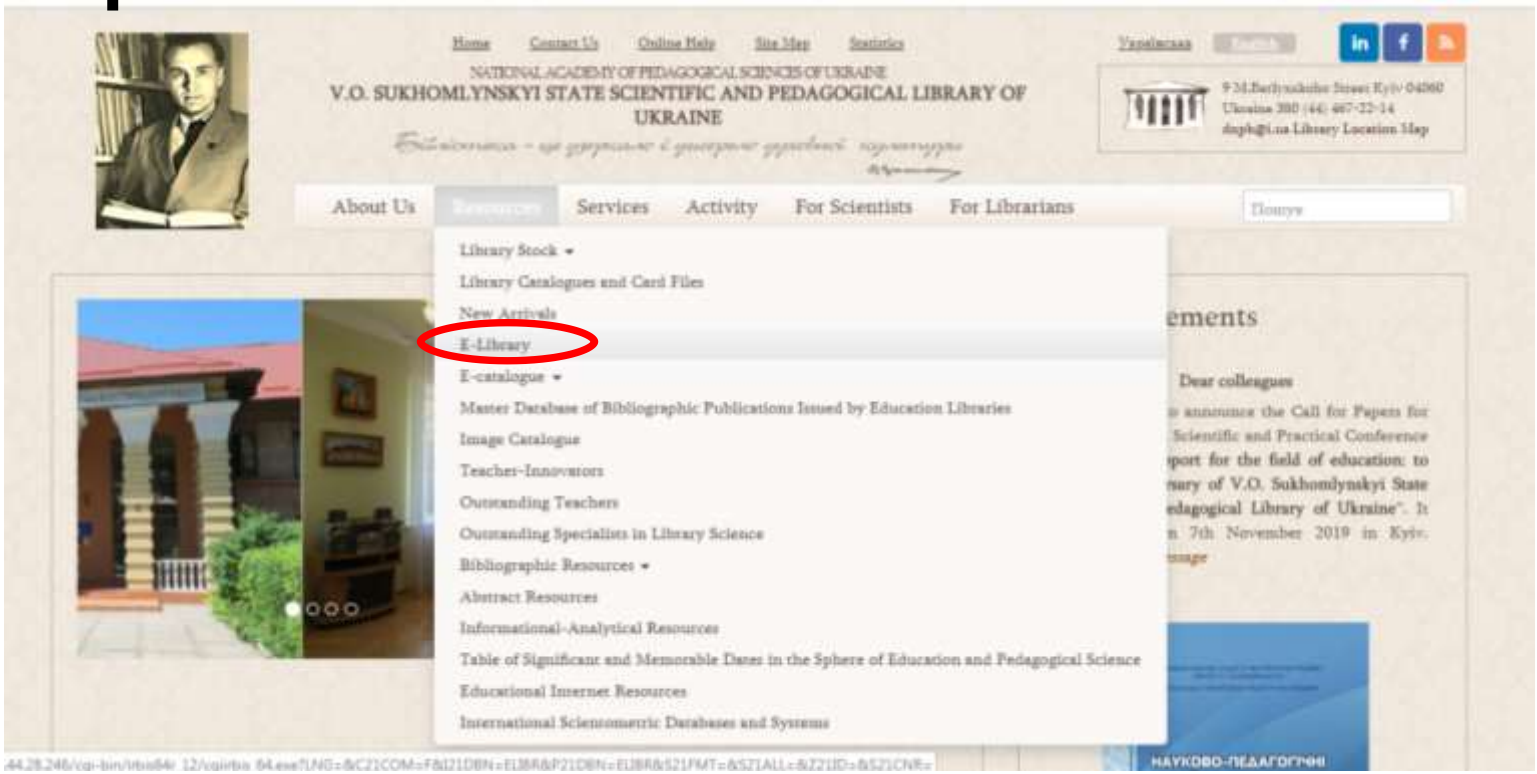
28,081 rare documents:

- pedagogical, psychological, historical and cultural character of the 17th – beginning of 21st centuries.

- National cultural heritage of Ukraine - Decree of the Cabinet of Ministers 2001

Collection presentation

- Web portal



- E-catalogue
- Digital collections management system "Digitized content visualizator”
- Europeana

The Challenge

Large data set requires storage & computing operation capacity

Lack of access to resources to inform the research community that documents are available

PROJECT PROPOSAL

- Improve the e-infrastructure of the library services by being including in the international e-infrastructure
- Provide a number of new e-services, using nios services;
- Improve and develop the library's information resources by digitizating and making new-science oriented interfaces with tools of information enrichment and data visualization.
    - Expand our international partnership

UKRAINIAN SCIENTIFIC AND EDUCATIONAL TELECOMMUNICATIONS NETWORK URAN

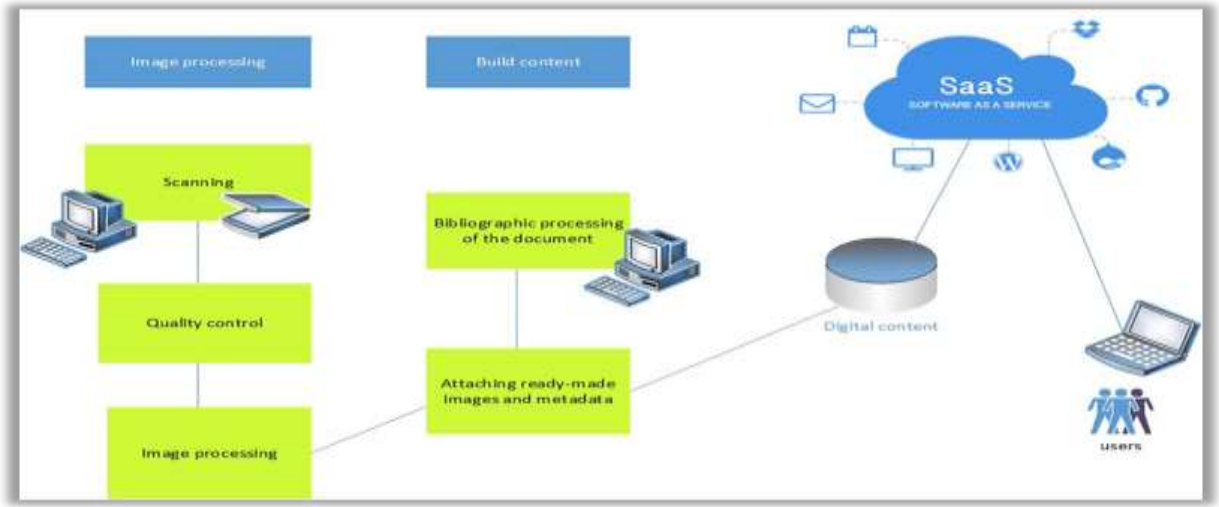
We expect:

Infrastructure-as-a-service

network connectivity

network service tools

Cloud



Thank you for attention!

Nataliia Varaksina
Head of the Department of Scientific and Technical Support
and Computer Technology Applications

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web-portal: ttp://www.dnpb.gov.ua
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Expansion of the services of digital infrastructure of the Scientific and Pedagogical Library on the basis of digitalization of funds, improvement of access and expansion of international network interaction

BACKGROUND

The V. O. Sukhomlynskyi State Scientific and Pedagogical Library of Ukraine has about 600,000 documents
kept on traditional and electronic carriers.

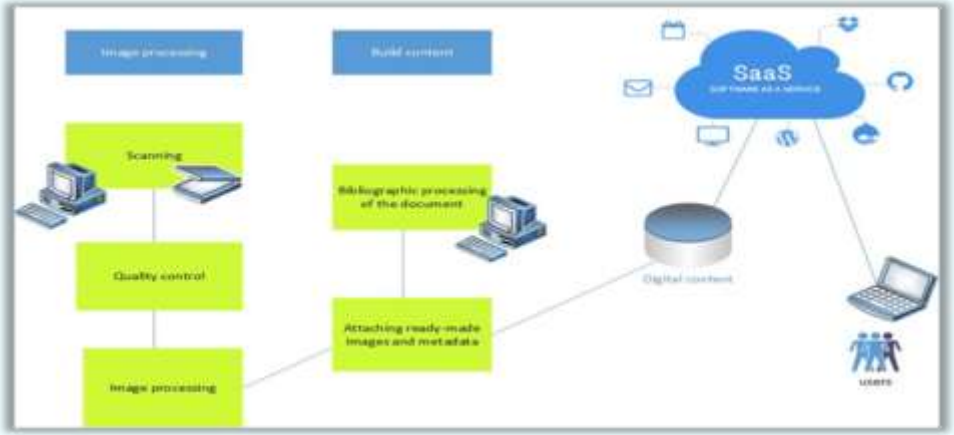
A special part (28,081 documents) is a set of rare publications, documents of pedagogical, psychological, historical and cultural character of the 17th – beginning of 21st centuries are regarded as the national cultural heritage of Ukraine.

CHALLENGE

- Large data set requires storage & computing operation capacity
- Lack of access to resources to inform the research community that documents are available

PROPOSAL

- Improve the e-infrastructure of the libraries' services.
- Develop the user interfaces for access to the information and digitalised collections.
- Collaborate with international partners to improve our digital skills and network service in general.



EYR SUPPORT FROM URAN

- Infrastructure-as-a-service
  - network connectivity
  - network service tools
  - Cloud.

Nataliia Varaksina,
head of department
V. O. Sukhomlynskyi State Scientific and Pedagogical Library of Ukraine
web-portal: ttp://www.dnpb.gov.ua
e-mail: dnpb@i.ua

THANK YOU

Computational material discovery for gas sensing application

Hayk Zakaryan
Yerevan State University, Center of semiconductor devices and nanotechnologies

GAS SENSORS AND NOVEL MATERIALS

Gas sensors are used basically everywhere:

Medicine

Environment monitoring

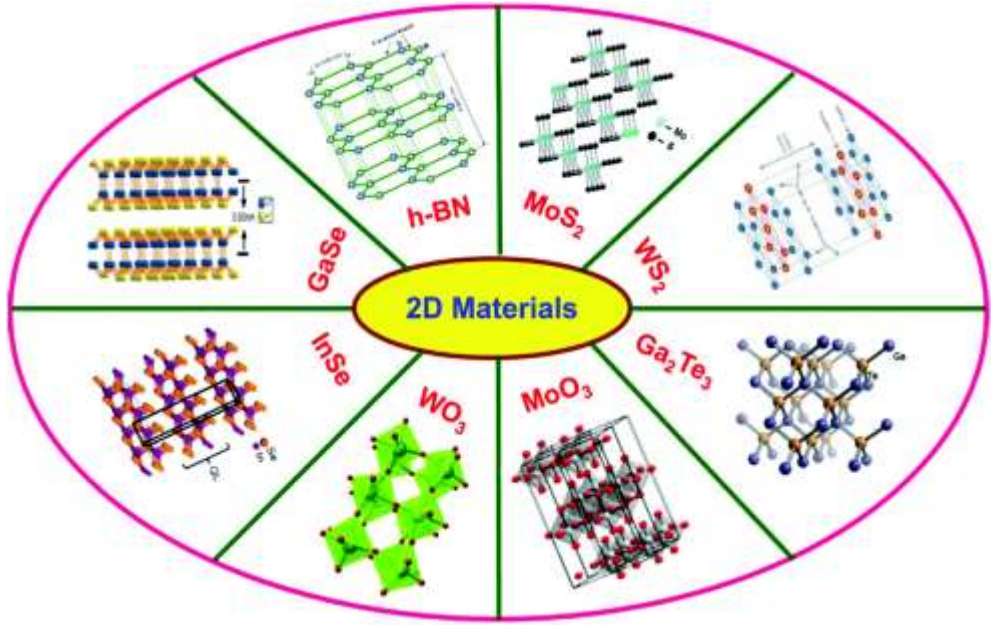
Food control

Information Technology

High technology

Purposes of the research:

- Discover novel 2D materials (transitional metal dichalcogenides).
- Simulate gas adsorption on 2D materials.
- Create new methodology for investigation molecule adsorption on materials in different environment conditions (like temperatures, pressure etc.).



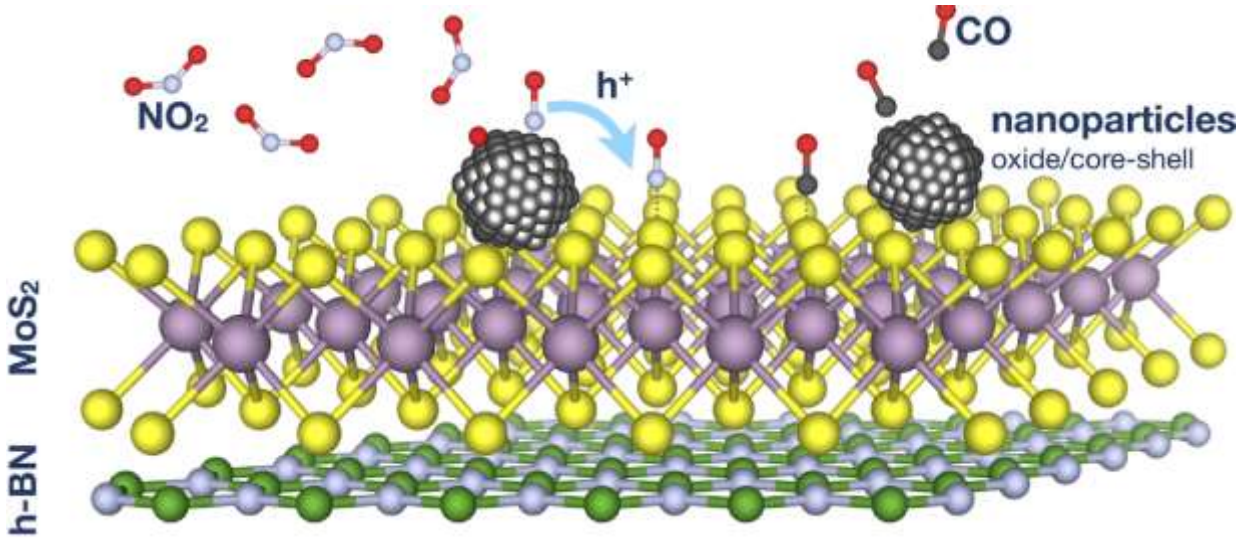
WHAT WILL BE THE BENEFIT?

New methodology for gas adsorption simulation:

- Temperature consideration.
- Other gas influence.
- Defect on the 2D.

New type of sensors:

- Room temperature sensors.
- High sensitivity and selectivity of the sensors.
- Low cost for research.



ENLIGHTENING THE RESEARCH

ASNET-AM (IIAP NAS RA) CONTRIBUTION TO THE PROJECT

HPC services. About 100 cores are already used, but need additional 256 cores.

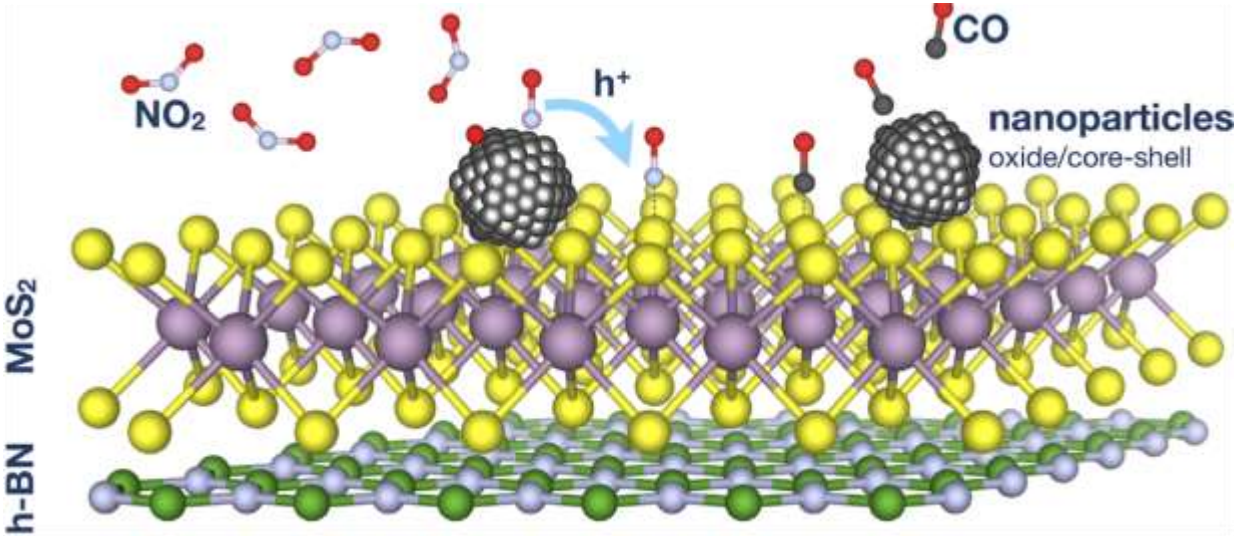
Regional Workshop on Atomistic and Quantum Modelling.

Computational material discovery for gas sensing application

Hayk Zakaryan, Yerevan State University, hayk.zakaryan@ysu.am

Gas sensors applications:

- Medicine
- Food control
- Internet of Things
- Environment monitoring



Purposes and goals:

- Discovery of a new 2D material (transitional metal dichalcogenides).
- Simulate gas adsorption on the new 2D sensing material in room temperature.
- New methodology of investigation gas sensing materials for particular gases.

EYR support from ASNET-AM:

- More than 256 CPUs.
- About 1 TB memory.
- “Regional Workshop on Atomistic and Quantum Modelling”

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THANK YOU

Engagement of Eastern countries and the Republic of Moldova in external fragmentation of production: a cross country comparisons and convergence points

Marica Dumitrasco
Institute of Juridical, Political and Sociological Research, Moldova

Background of research

- In the modern world, most of the trade between countries is carried out within Global Value Chains (GVC), which have become a strong driver of global economic growth. Also, not all countries are sufficiently penetrated into these chains and can benefit from integration in there. Most developing economies and former communist countries lack a strategy framework of including local intermediate products in GVC, as well as didn't develop country's research on this topic.
- Our research will fill in the gap for Eastern Partnership (EaP) countries.

Hypotheses of research

- Do Moldova and other EaP countries have similar or different patterns for participation in GVC?
- To what extent they can be mutually complementary partners in the regional chains?
- Do the goods from Moldova and other EaP countries are sufficiently penetrated in income value chains of the European countries?

IMPACT OF RESEARCH

EaP countries' connection with web-based applications mentioned above will allow:

✓To establish the product specialization of countries in GVC and its predominant market concentration,

✓To elaborate proposals for deepening penetration of countries in the value chains of EaP and European region,

✓To adjust and develop adequate policies in the areas of education, R&D, the labor market and industry, and the service sector by decision makers and the private sector of the EaP countries.

Methodological background of research	Challenges
WEB simulation tools of International institutes that allow estimating the engagement of countries in external fragmentation of production: ➢Trade in Value Added (TiVA) instrument, developed by OECD for the comparative analysis of GVC integration across countries, ➢Market Analysis Tools of International Trade Center of the WTO and the UN.	The analysis of the new global trade landscape is suffering from lack of appropriate models and good initial data: ✓EaP countries are not incorporated in the TiVA database, ✓Azerbaijan, Belarus and Ukraine are not covred by the Market Analysis Tools of International Trade Center of the WTO and the UN.

SUPPORT OF THE PROJECT BY RENAM

EaPConnect project's visibility and support can help us:

✓to influence the international institutes to include corresponding data into their databases (46 principal indicators for 6 EaP countries for the period
2006-2016);

✓to establish collaboration contacts with the researchers interested in
our topic from the other EaP countries;

✓to benefit on guidance on Open Data and Open Science with OpenAIRE.

Engagement of Eastern countries and the Republic of Moldova in external fragmentation of production: a cross country comparisons and convergence points

Marica Dumitrasco, PhD in economics
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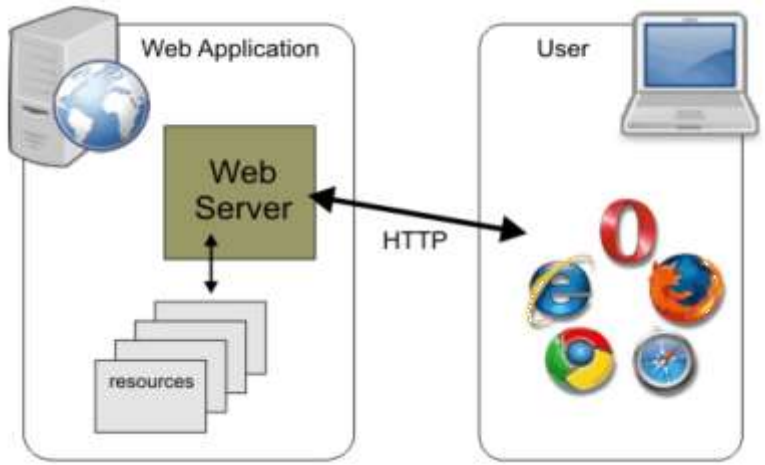
Contact information:

Email: mdumitrasco@gmail.com, telephone: +373 68174141



Graphic 1. *Proposed data pipeline*

Our expectations from support of RENAM

✓We will receive the corresponding data for our research regarding EaP countries, and especially it is required that 46 principal indicators be selected for six EaP countries for the period of time 2006-2016: https://stats.oecd.org/Index.aspx?DataSetCode=TIVA_2018_C1

✓ We will establish collaboration contacts with the researchers interested in our topic from the other EaP countries,

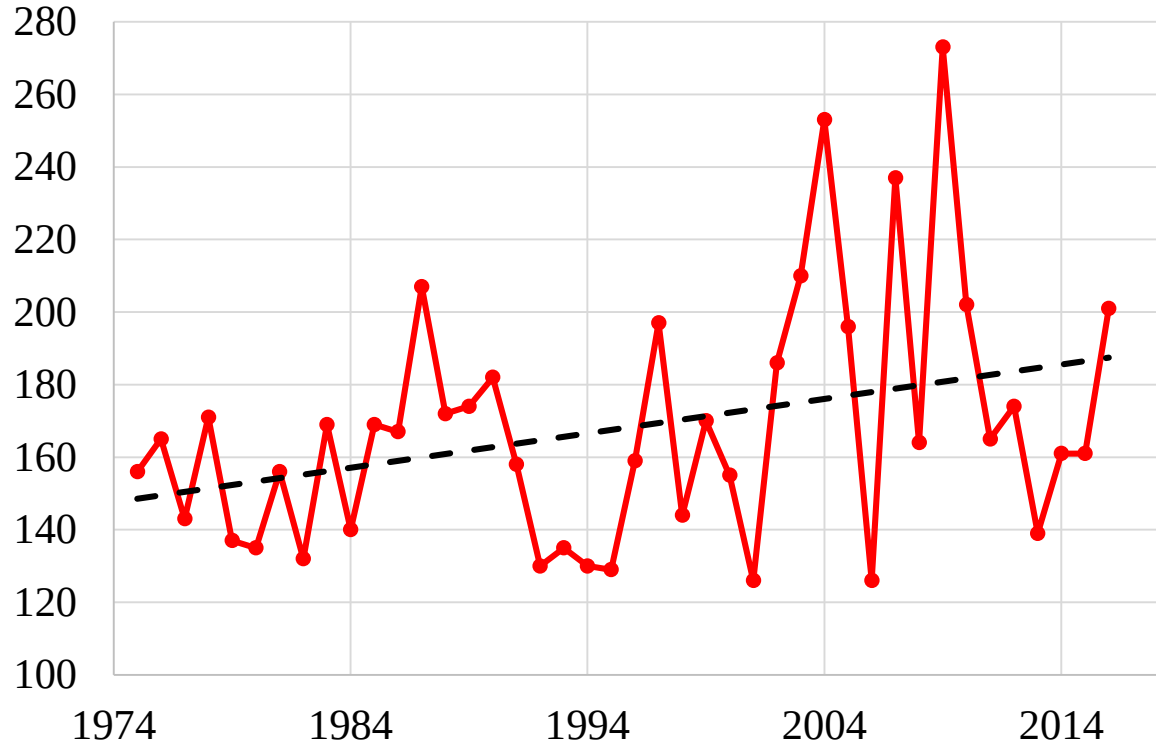
✓We will benefit on guidance on Open Data and Open Science with OpenAIRE

THANK YOU

Forecasting convective high-impact weather events in Armenia using WRF model and WRF Data Assimilation system

Artur Gevorgyan
Service of Hydrometeorology and Active Inuence on Atmospheric Phenomena, Armenia

Number of hazardous weather events are increasing in Armenia in recent decades!



Observed number of severe weather events in Armenia (strong frosts+hailstorms+winds+heavy rains) from 1975 to 2016

PURPOSE OF THE RESEARCH PROJECT

1. The main aim is to perform very high-resolution simulations (500 m – 1 km spatial spacing) over Armenia using the Weather Research and Forecasting model (WRF) which has not been done before due to limitations of computing resources.

2. Perform sensitivity experiments with the WRF model, i.e. testing various physical parametrization of the model, various global forcing datasets, etc.

3. Assimilation of high density local observations (e.g. from local weather stations and radars not included in models) when simulating convective storms. Data assimilation may further improve the modeling and forecasting of location, timing and magnitude of hazardous weather events in Armenia.

The importance of the project for research and applications

The damages caused by extreme weather events in Armenia can reach hundreds of millions dollars (Third National Communication on Climate Change in Armenia, 2015). The damages in agriculture are caused by hailstorms, heavy rainfall events, severe flash floods in mountain river basins of Armenia.

Armenia is still considered as one of the little studied parts of the world. The high resolution modelling research will improve our understanding of physics of initiation of local and mesoscale convective storms, their dynamics and microphysical structures over mountain terrain of Armenia.

The main goal of this study is to improve short-term forecasts of severe weather events in Armenia. The research outcomes can be introduced in the operational practice of Hydromet Service of Armenia to improve the short-term forecasts of dangerous weather events, and thus, developing early warning system.

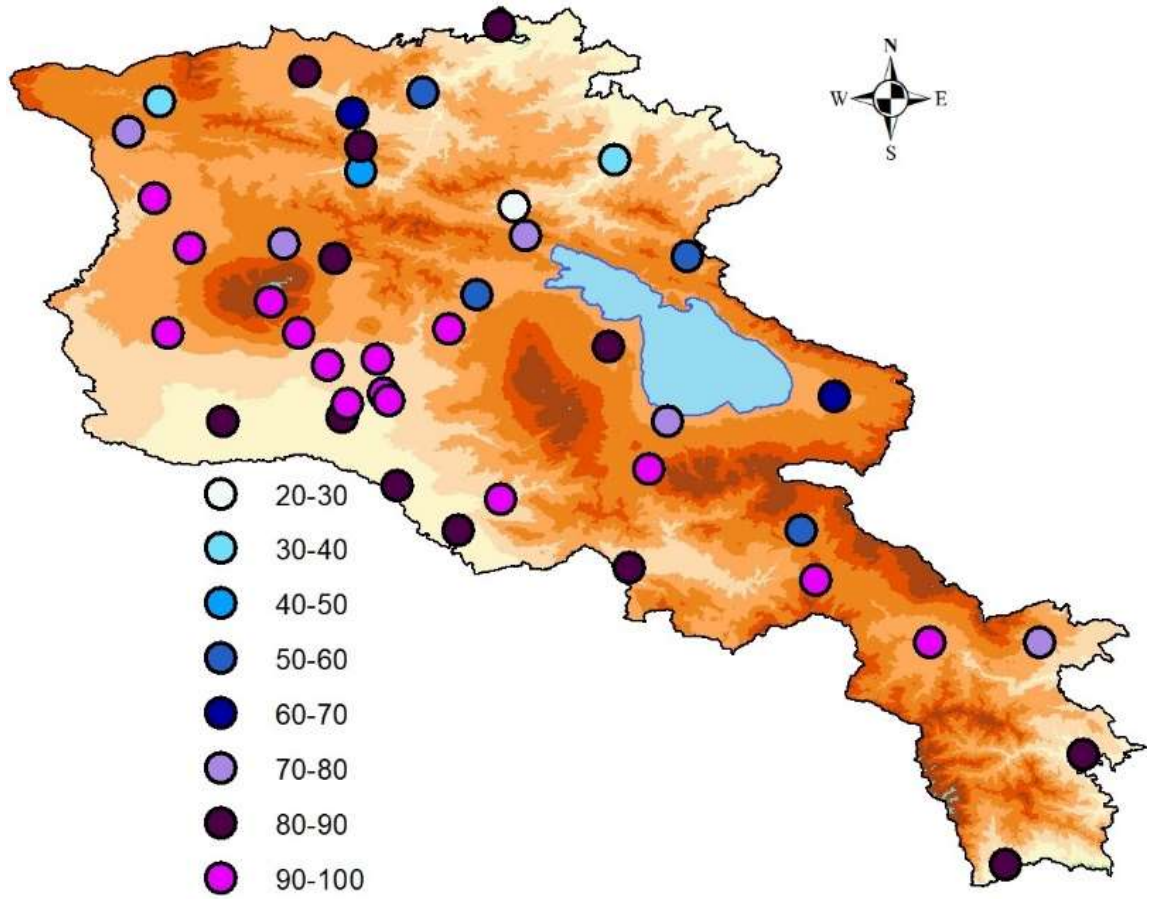
THE EXPECTED SUPPORT FOR THIS PROJECT

Besides the research challenges, implementation of this project requires application of high-performance computing (HPC) resources with using hundreds of CPU cores and work with huge amount of data (up to 3 Terabytes).

The technical support will be needed when working with HPC systems, i.e. technical issues related to properly compiling the WRF model and necessary libraries, etc.

Support for Open Access Publication of the research results in a peer-reviewed journal which is expected to increase the interest of international research community to this unique mountainous country, Armenia.

The verification results (%) of maximum daily temperature forecasts by the WRF model operational runs for June-August, 2019 at 47 meteorological stations of Armenia. The forecasts were classified as successful (100 %), when observed maximum temperatures were between ± 1 ^{0}C range from forecasts, and unsuccessful (0 %), otherwise



Forecasting convective high-impact weather events in Armenia using the WRF model and WRF Data Assimilation system

ENLIGHTEN YOUR RESEARCH @ EAP

EaPConnect

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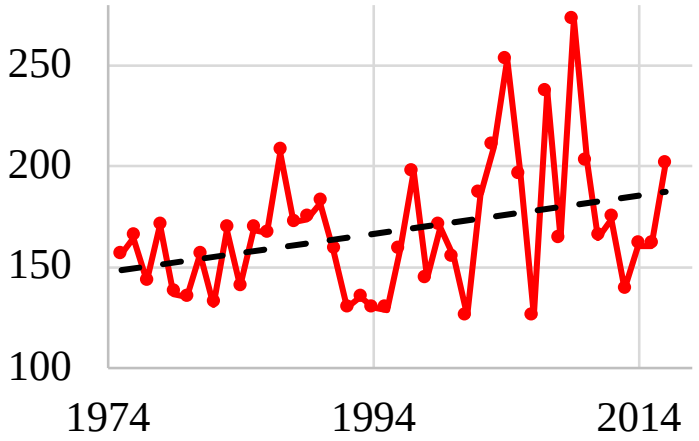

Observed number of severe weather events in Armenia (strong frosts+hailstorms+winds+heavy rains) from 1975 to 2016

Artur Gevorgyan[1,2], Thibaut Dauhut[3], Artashes Mirzoyan[1]

1-Institute for Informatics and Automation Problems of NAS RA, Yerevan, Armenia
2-Service of Hydrometeorology and Active Influence on Atmospheric Phennomena, Yerevan, Armenia

3-Max Planck Institute for Meteorology, Hamburg, Germany

26 September, EaPEC 2019, Yerevan

Purpose of the project

- Very high-resolution simulations (500 m – 1 km spatial spacing) using Weather Research and Forecasting model (WRF), not done before due to limitations of computing resources.
- Perform sensitivity experiments with WRF model, i.e. testing various physical parametrization of the model, various global forcing datasets, etc.
- Assimilation of high density local observations (e.g. from local weather stations and radars not included in models) when simulating convective storms. Data assimilation may further improve the modeling and forecasting of location, timing and magnitude of hazardous weather events in Armenia.

Importance of the project

- Hundreds of millions of dollars of damage from extreme weather in Armenia (3rd National Communication on Climate Change in Armenia, 2015). Agricultural damage caused by hailstorms, heavy rainfall, severe flash floods in mountain river basins.
- Armenia still considered as little-studied. High resolution modelling research will improve our understanding of physics of initiation of local and mesoscale convective storms, their dynamics and microphysical structures over mountain terrain.
- Main goal - research outcomes to be introduced in the operational practice of Hydromet Service of Armenia to improve short-term forecasts of dangerous weather events early warning system.

EYR Support from ASNET-AM

- HPC resources - hundreds of CPU cores and work with huge amount of data (up to 3 Terabytes).
- Technical support – e.g. related to properly compiling the WRF model and necessary libraries, etc.
- Open Access Publication of research results in a peer-reviewed journal

THANK YOU

EaP regional intelligent data warehouse with tools for quantifying and assessing diffuse liver diseases

Iulian Secrieru, Elena Gutuleac
Vladimir Andrunachievici Institute of Mathematics and Computer Science, Moldova

Purpose of the project

- Chronic diffuse liver diseases (DLD) play an important role in morbidity and mortality of the population of many economically developed countries, but also in developing and transition countries, including the EaP region (Armenia, Azerbaijan, Belarus, Georgia, Moldova, Ukraine).
- The aim of the project is to formalize and integrate data and scientific knowledge from the fields of diagnostics and treatment of DLD (which at the moment are unstructured, fragmented and heterogeneous), into a unique informational space. Data and knowledge digital warehouse is used in order to allow the interoperability of the stored data contents and knowledge.

Project ambitions

Being implemented, our project will allow:

- ✓ to aggregate a large number of DLD cases in a standardized manner;
- ✓ to define criteria based on non-invasive measurements and laboratory tests for quantifying and assessing DLD;
- ✓ to establish thresholds and endpoints for onset and all stages of DLD progress;
- ✓ to harmonize efforts of data stakeholders for in-depth DLD phenotyping;
- ✓ to promote clinically impactful new knowledge discovery and its translation into clinical practice.

Potential beneficiaries

- clinicians from imaging and therapy departments, from sections of hepatology and gastroenterology;
- policy makers, in charge of monitoring the general health status of the population, morbidity and mortality related to liver diseases;
- students from the medical universities (Departments of Internal Medicine and Gastroenterology);
- developers of information systems, intelligent systems, knowledge bases and medical databases from EaP region, EU and the rest of the world.

Impact

Relevance of the assumed primary objective is enormous, as we have witnessed the wide spread of DLD in the whole EaP region, which predominantly affect people of working age, having a significant negative impact on social and economic development of the countries.

Correct and early assessment of liver diseases combined with appropriate management of pathologies can certainly increase the patients' quality of life and its duration.

Support from RENAM

- to establish collaboration contacts with the researchers and policy makers interested in our topic from the other EaP countries (Armenia, Azerbaijan, Belarus, Georgia, and Ukraine);
- to share stakeholders' data for research purposes;
- if the volume of data and acquired knowledge exceeds the current storage and processing resources - we will need Cloud resources.
- guidance on open data and open science with OpenAIRE.

EaP regional intelligent data warehouse with tools for quant fying and assessing dif use liver diseases

PROJECT AMBITIONS

Chronic dif use liver diseases (DLD) play an important role in morbidity and mortality of the populat on of many economically developed countries, but also in developing and transit on countries, including the EaP region (Armenia, Azerbaijan, Belarus, Georgia, Moldova, Ukraine).

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morbidity and mortality related to liver diseases;
- students from the medical universit es (Departments of Internal Medicine and Gastroenterology);
- developers of informat on systems, intelligent systems, knowledge bases and medical databases from EaP region, EU and the rest of the world.

All data collected in the project are anonymous and will be used for scient f c research purpose.

Vladimir Andrunachievici Inst tute of Mathemat cs and Computer Science, Republic of Moldova
Iulian Secrieru, iulian.secrieru@math.md

THANK YOU

RINArmenia

Hayk Mnatsakanyan
E-Hayt Research Foundation, Armenia


ENLIGHTEN YOUR RESEARCH
@ EAP
EaPConnect
Eastern Partnership Connect
RINARMENIA
PSOC
pouzin society
open-root
TSD
UFAR
UNIVERSITÉ FRANÇAISE EN ARMÉNIE
IIAP NAS RA
viciniti
MINISTRY OF
HIGH-TECH INDUSTRY
OF THE REPUBLIC OF ARMENIA

RINARMENIA

1st project in the world to attempt a **systemic deployment** of the new network architecture - **RINA** and creation of a global **centre of expertise** in **Armenia**

- Partnerships
- Development of curriculum
- Pilot testing with SMEs

- Demonstration of POC
- Implementation in larger sectors

Scaling

Formation of future experts in RINA

Creation of a national centre of expertise in RINA

RINA

Recursive InterNetwork Architecture

10+ year global scientific and engineering project by early **Internet Founding Fathers**

faster · more powerful · more secure

To support efficiently massive innovations like **5G, AI, IoT**

To solve the problems of the Internet architecture such as **operability, performance, security**

Why RINA ?

RINA replaces the complexity of TCP/IP with a recursive single layer which only features two protocols

Our objective

Demonstrate well-known theoretical benefits of RINA and have a nationwide proof of concept

Impact

- ✓ Better privacy and confidentiality policies
- ✓ Resiliency to data transport attacks
- ✓ Greater robustness
- ✓ More effective respond to change

- Low-latency and solid security measures to implement better real-life applications in **IoT sector**
- Privacy and scalability guarantees for companies using **Blockchain** technologies
- Focused communities with **tightened policies** to be created due to the enhanced security mechanisms

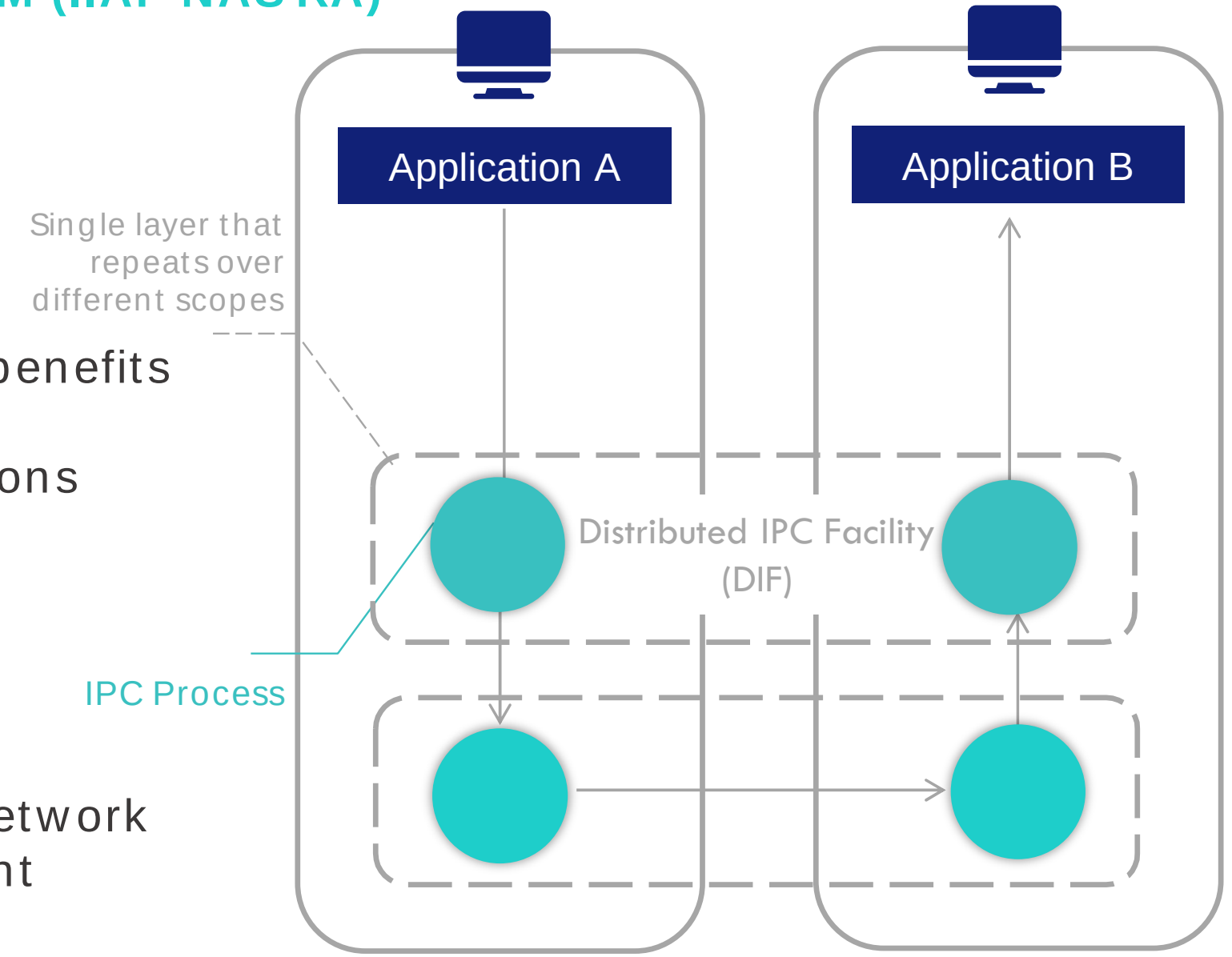
Collaboration with ASNET-AM (IIAP NAS RA)

1. Creating an intranet working with RINA to test and demonstrate it's benefits

2. Optimizing present applications and developing new ones to work with RINA

Current phase

- operational study of the network
- performance enhancement



Support us in making Armenia the first country in the world to adopt the internet of tomorrow

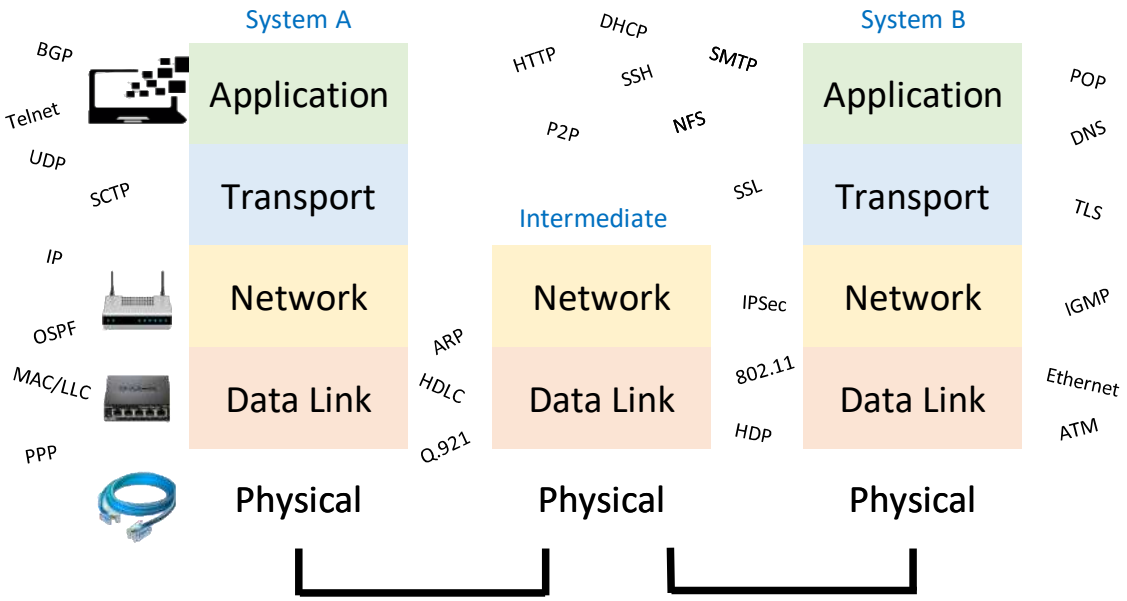
RINA

Contact

contact@rinarmenia.com

rinarmenia.com

Appendix

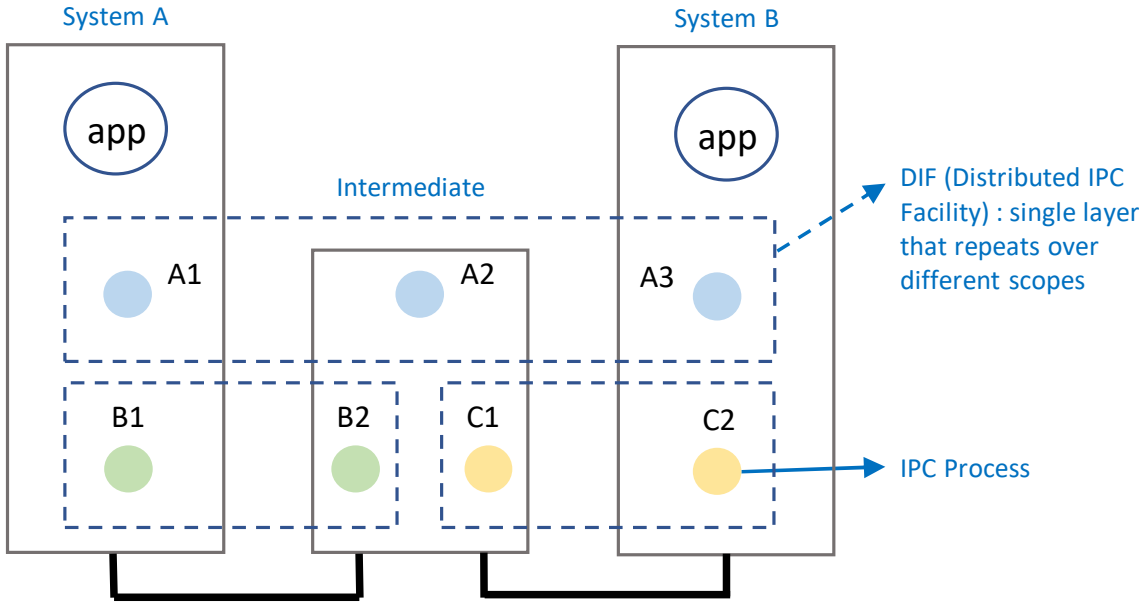


Architecture loosely based on OSI model

Internet

What is **RINA?**

Alternative to TCP/IP model, seen as too obsolete



Computer networking is just Inter-Process Communication (IPC)

RINA

ENLIGHTEN YOUR RESEARCH @ EAP

EaPConnect

RINARMENIA

1st project in the world to attempt a **systemic deployment** and creation of a global **centre of expertise** of the new network architecture **RINA**

RINA

Recursive InterNetwork Architecture

faster · more powerful · more secure

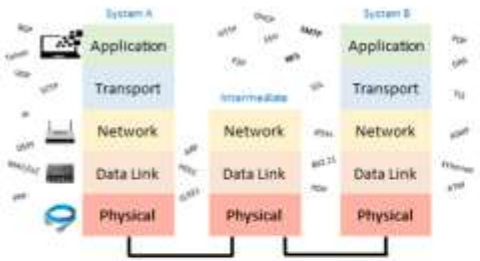
Stage 1
- Local and international partnerships
- Development of curriculum
- Pilot testing with SMEs/startups

Stage 2
- Demonstration of POC
- International exposure
- Implementation in larger sectors: Education, banking, national security, etc.

Stage 3
- Implementation of educational program
- Formation of future experts in RINA

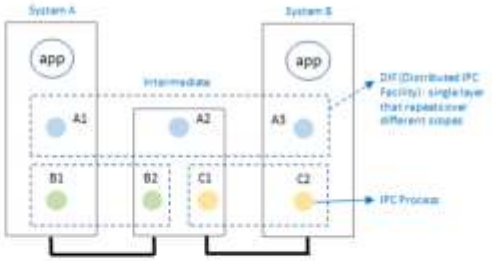
Stage 4
- Scaling benefits of RINA
- Implementation in private and public sectors

Stage 5
Creation of a national centre of expertise in RINA



Architecture loosely based on OSI model

Internet



Computer networking is just Inter-Process Communication (IPC)

RINA

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