

National research e-infrastructure landscape and trends

Ivan Marić, Director
SRCE – University of Zagreb, University Computing Centre

CRIS 2022 Conference „Linking research information across data spaces”
Dubrovnik, May 14th 2022



A new environment for Science and Higher Education

Big data and IoT
in science



Advanced Computing
Models & Services



Stronger application of
e-infrastructure in
Science and Education



Digital skills and
competences



International and
Inter-Institutional
Cooperation



Flexibility in work of
students, teachers
and researchers



Open Science and
Open Education



Digital and Green
Transformation



Research e-Infrastructures

- Research e-Infrastructures are facilities that provide resources and services for the research communities to conduct research and foster innovation in their fields.
- e-Infrastructure encompasses the integration and interconnection of computational hardware and software technology, data resources and services, communications protocols and networks, as well as the human resources and organisational structures required to support modern, internationally leading collaborative research.



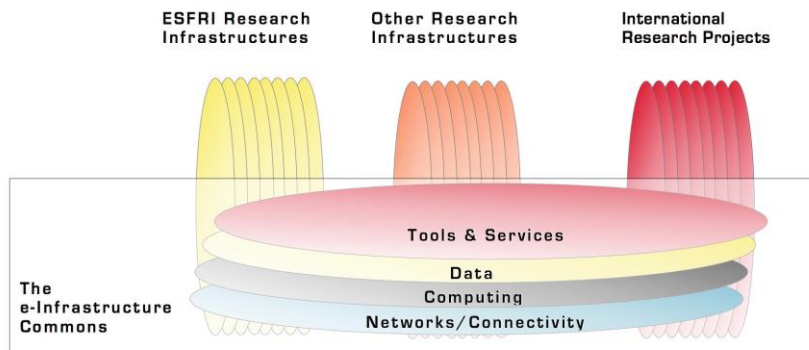
<https://ec.europa.eu>



e-IRG e-Infrastructure Commons

(e-IRG Roadmap 2012 -> e-IRG White Paper 2013 -> e-IRG Roadmap 2016 -> e-IRG White Paper 2021)

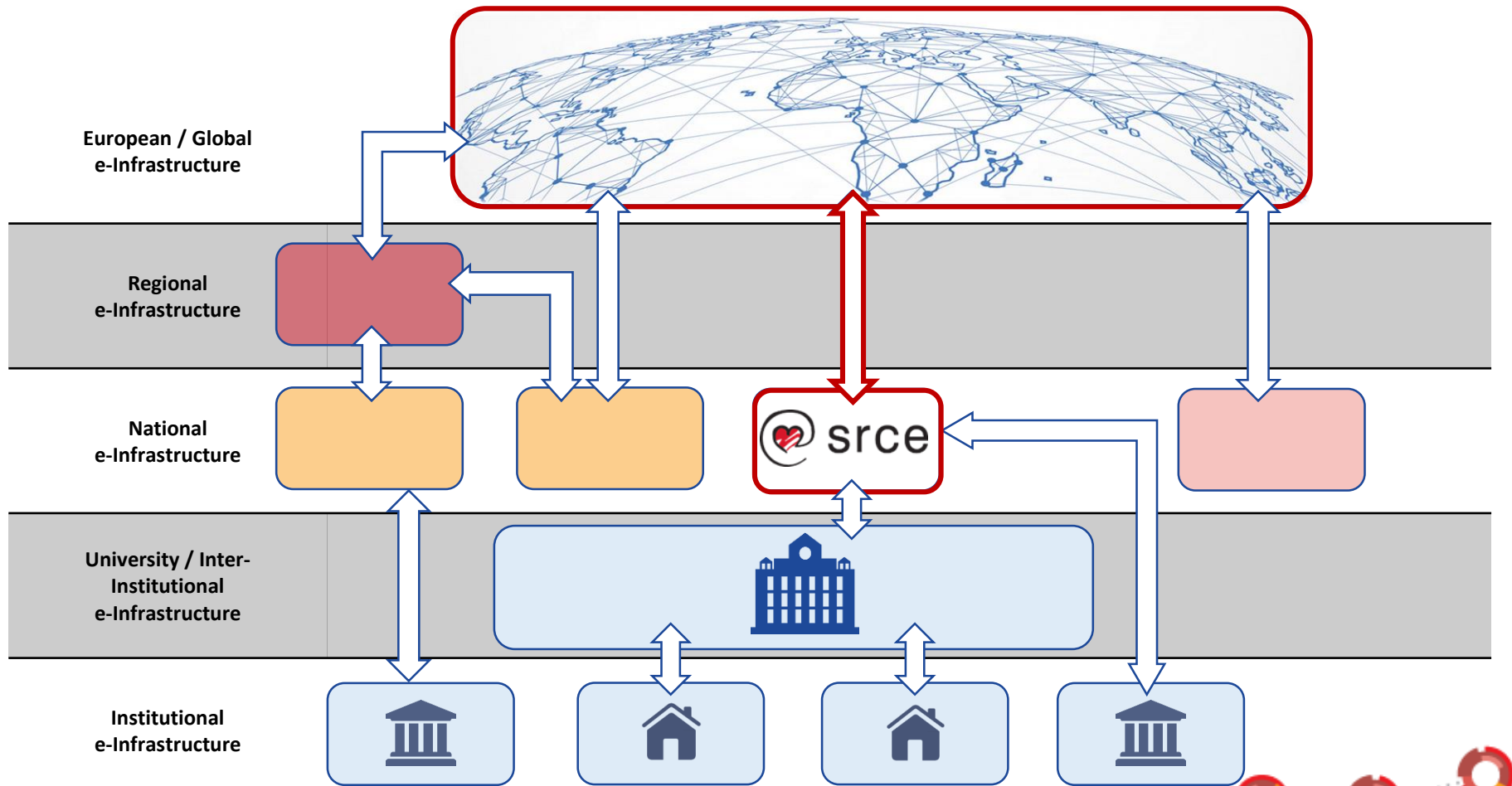
The e-Infrastructure Commons can be defined as the integrated living ecosystem of resources and services (along with its policies and governance) that is open, user friendly and accessible to European researchers and scientists, and continuously adapts to the changing requirements of research and science.



Recommendations:

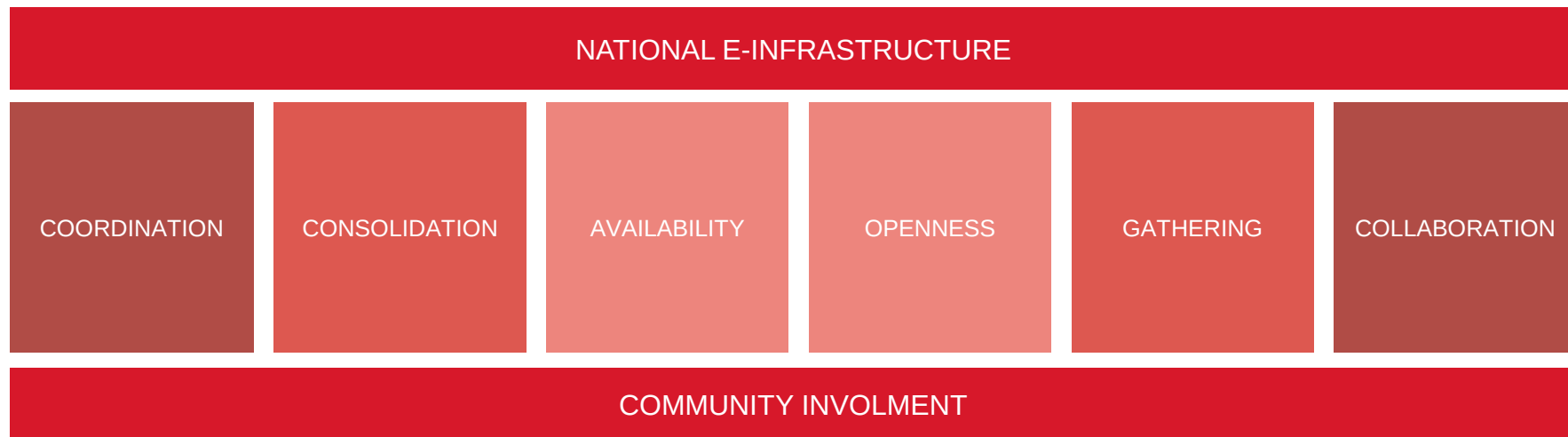
- embrace *e-Infrastructure coordination at the national level* and *build strong national e-Infrastructure building blocks*, enabling coherent and efficient *participation in European efforts*, especially in alignment with the *FAIR principles concerning data and services*
- together *analyze and evaluate their national e-Infrastructure funding and governance mechanisms*, identify best practices, and provide input to the development of the European e-Infrastructure landscape



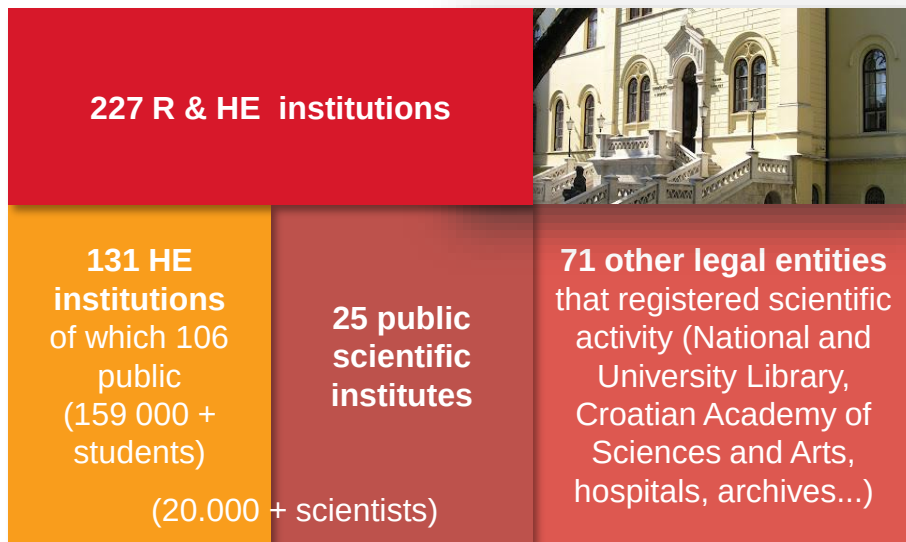
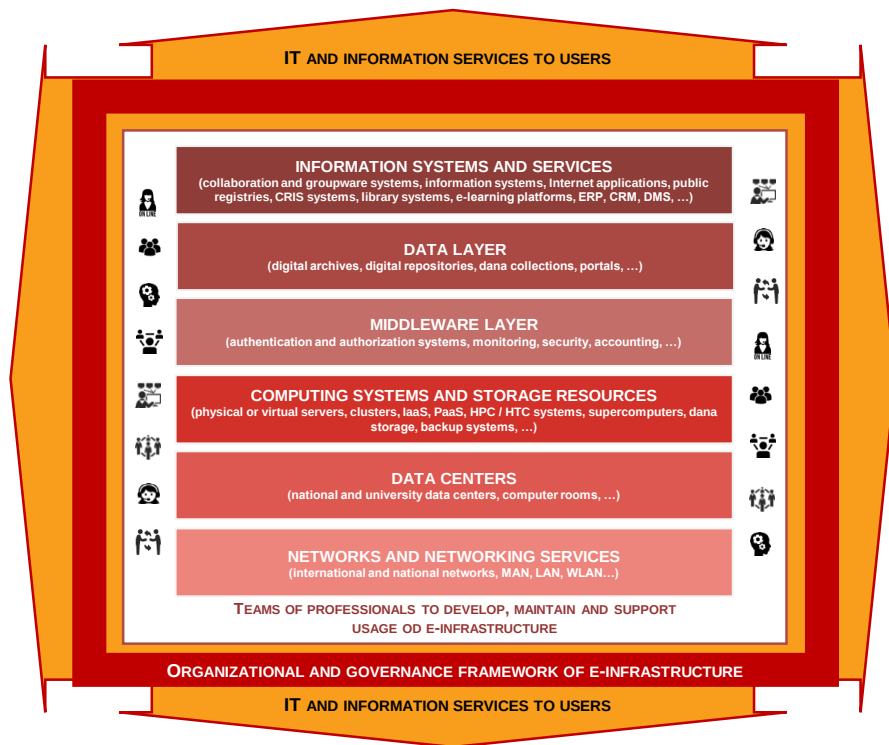


A new landscape of National e-Infrastructure

New environment requires a new principle of action at the national level:



SRCE – TOWARD A VISION OF E-INFRASTRUCTURE



SRCE...

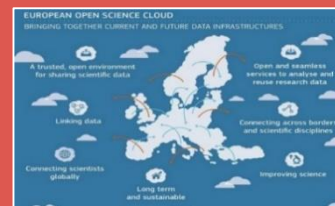
... Builds national **e-infrastructure**, from data centers, through network, computer and storage resources, all the way to information services



... Provides **digital services**, education of users and advanced user support



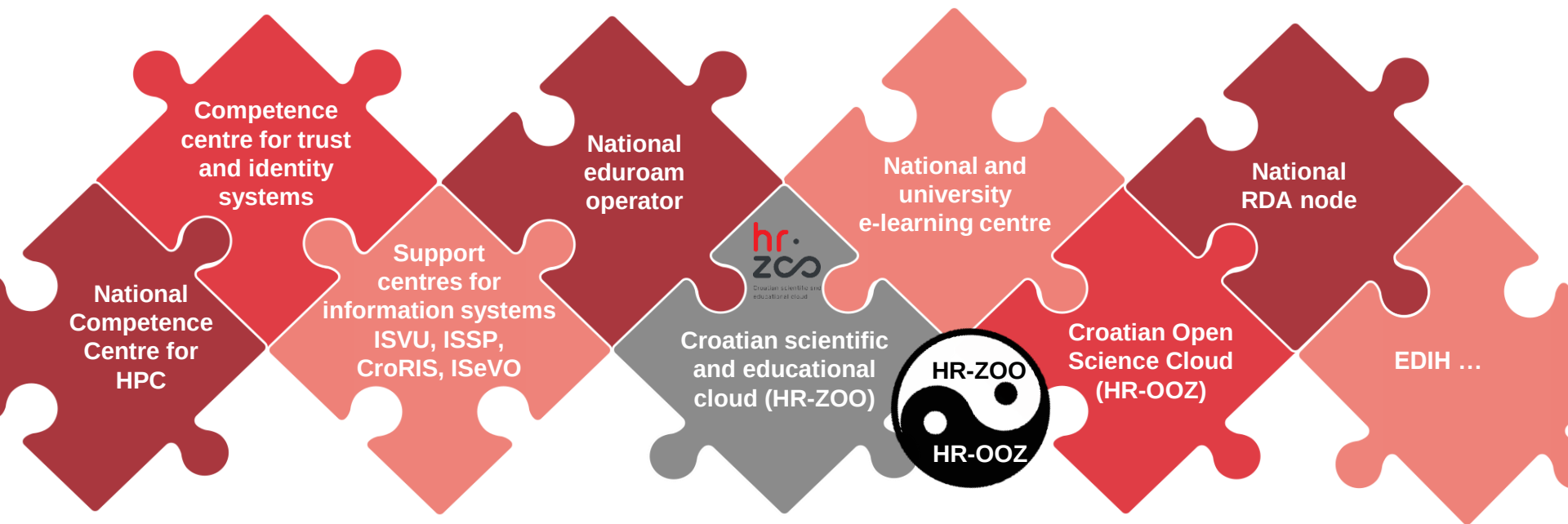
... Builds **bridges** to international infrastructures and initiatives

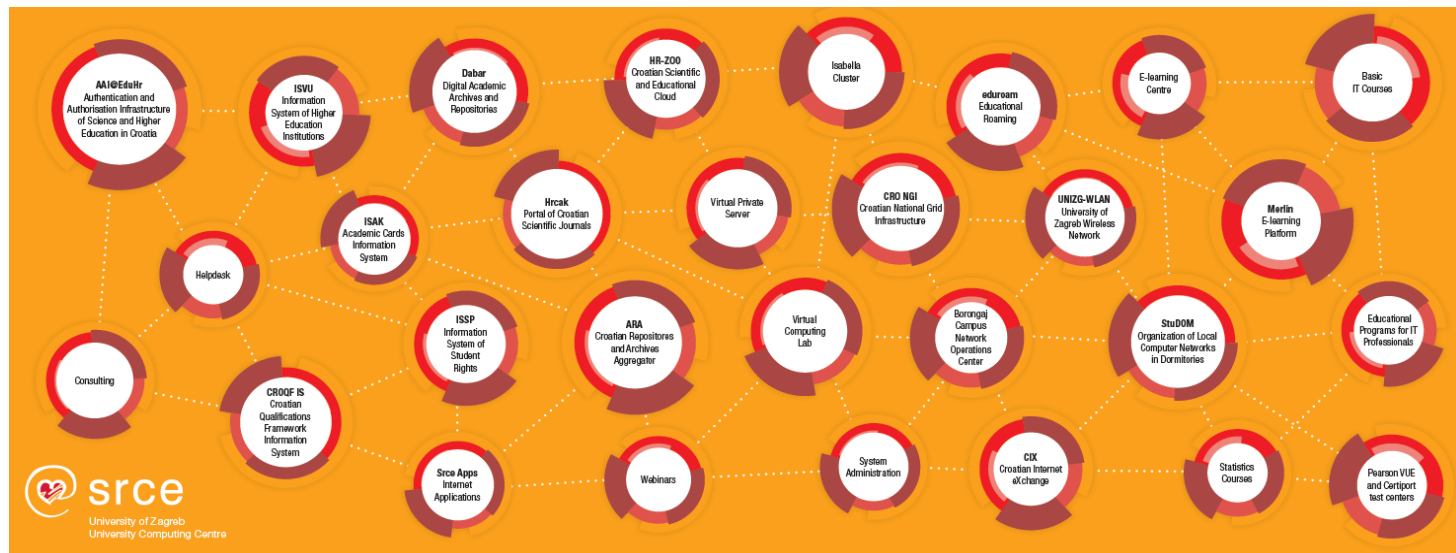


... Is a synonym for a **digital transformation** of science and higher education system



SRCE & National e-Infrastructure





◀ ~ 30 public services
158 employees



Computing & Storage Infrastructure

SRCE Computing & Storage Infrastructure

- ✓ Cloud IaaS VMware
 - ✓ 350 / 750 VMs
- ✓ 1+ PB used storage
 - ✓ 800+ TB backup
- ✓ 1200 TB archives (tapes)



- ✓ HTC Cloud
 - ✓ 600 CPUs
- ✓ 2.400 virtual CPUs
- ✓ 150 TB HDD
 - ✓ 70 users
- ✓ 22 projects



- ✓ HPC
 - ✓ 140 TFLOPs
 - ✓ 3.100 CPUs
 - ✓ 12 GPUs
 - ✓ 350 users
 - ✓ 140 projects
- ✓ 266 scientific works



- ✓ Cloud IaaS
 - ✓ 340 / 400 VPS
 - ✓ 400 VCL

hr·zoo

Croatian scientific and educational cloud

HR-ZOO
**Croatian Scientific
and Educational
Cloud**
(in progress)



Croatian Scientific and Educational Cloud (HR-ZOO)

Strategic project by Ministry of Science and Education of the Republic of Croatia

National e-infrastructure that provides the Croatian scientific and academic community with long-term advanced computing, storage resources and network connectivity, necessary for modern and multidisciplinary science and education.

Coordinator:	SRCE
Reference No:	KK.01.1.1.08.0001
Project value:	196.802.438,11 HRK
EU contribution:	167.282.072,40 HRK
National share:	29.520.365,71 HRK
Implementation:	1.7.2017. - 1.5.2023.

<https://www.srce.hr/hr-zoo/en/>

hr·zoo
Croatian scientific and educational cloud



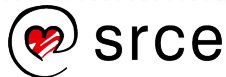
srce CARNET



uniri



Project is co-funded by
European Union from
European Regional
Development Fund



„National research e-infrastructure landscape and trends“, CRIS 2022 conference, Dubrovnik, May 14th 2022

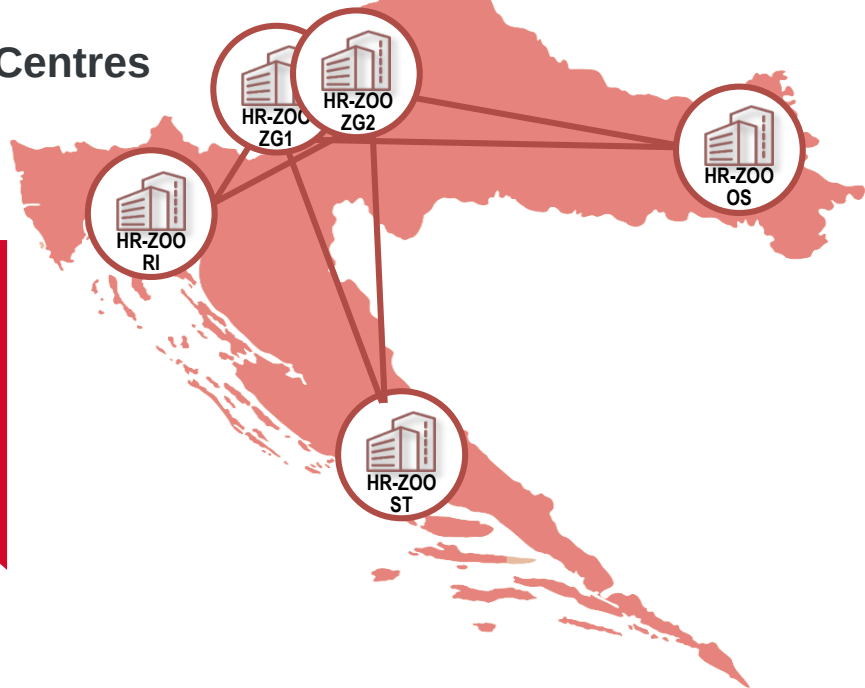


New generation of national e-infrastructure HR-ZOO

HR-ZOO Service Catalogue



5 Data Centres



Croatian Competence Centre for HPC (HR HPC CC)

HR HPC CC established within the project EuroCC as part of a network of national competence centres for HPC in 33 member states of the European High-Performance Computing Joint Undertaking (EuroHPC JU).

ONE-STOP-SHOP FOR HPC

- support users in the use of HPC resources
- development of new competencies in the HPC field
- cooperation between the academic community and industry
- building the European HPC ecosystem

<https://www.hpc-cc.hr/>

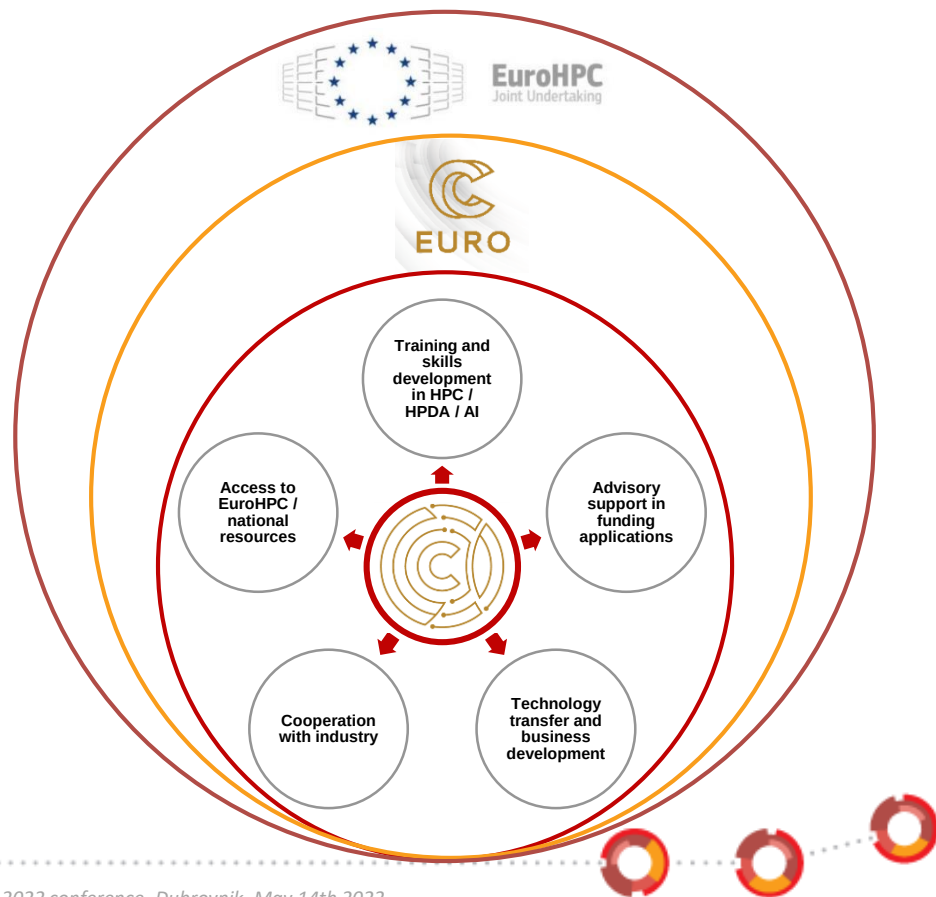


CROATIAN COMPETENCE
CENTRE FOR HPC



Horizon 2020
European Union Funding
for Research & Innovation

Digital Europe Programme



T&I... enabeling mobility



AAI@EduHr

Authentication and Authorisation
Infrastructure of science and higher
education in Croatia

945.786
e-identity
(users)

233
institutions
(identity
providers)

**Security
Trust
Reliability**



eduroam

safe, easy to use and,
for the end user, completely free
Internet access service in Croatia

worldwide
32 000+
locations
106 countries

Croatia
1 149 locations
407 cities /
places



Data Infrastructure and Services



CROATIAN OA JOURNALS

- ✓ Since February 2006
 - ✓ 511 scientific & professional journals (395 active)
- ✓ 246.000 + OA articles
- ✓ 65.000+ visits daily



PRESERVATION & DISEMINATION

- ✓ 16 types of digital objects
 - ✓ 150 digital repositories of research & HE institutions
- ✓ 170.000 digital objects



(TEMPORARY) STORAGE & SHARING SERVICE

- ✓ 430+ researchers & lecturers
 - ✓ 200 GB (default)



Information and collaboration systems

ISVU

Information
System of
Higher
Education
Institutions

110+ HE
institutions,
140.000+ students,
1.700.000+
exams/ac.year



ISSP

Information
System of
Student Rights

115+ HE institutions
159.000+ students

ISAK

Information
System of
Academic
(student) Cards



MOZVAG

Information
System for
Accreditation of
HE institutions
and Study
Programs

110+ HE institutions
1.900+ study
programs



ISRHKO

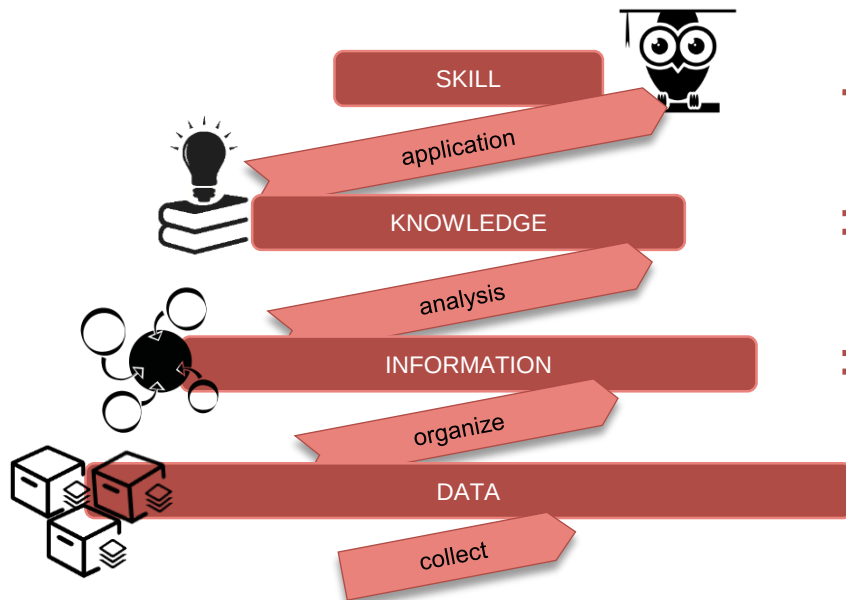
Information
System of
Croatian
Qualifications
Framework

CroRIS

Croatian
Research
Information
System
(in development)



Support in Monitoring and Policy making



Croatian Research Information System – CroRIS

As a part of project Scientific and Technological Forecasting lead by Ministry of Science and Education of the Republic of Croatia



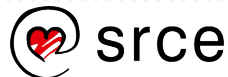
- New national Research Information System of the Republic of Croatia, gradually being put in production
- Information and processes about institutions, researches, projects, publications, equipment, patents, services, events and much more
- Integration with many national systems and international platforms, such as ORCID, OpenAire, WoS, Scopus
- Promote open science
- Provide information reliability
- Ensures openness and interoperability
- Support decision making



Project is co-funded by
European Union from
European Regional
Development Fund



REPUBLIC OF CROATIA
Ministry of Science and
Education

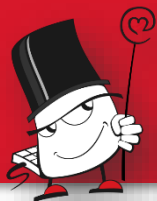


„National research e-infrastructure landscape and trends”, CRIS 2022 conference, Dubrovnik, May 14th 2022



Distance learning system

State-of-the-art e-learning system tailored to user needs



E-portfolio

for personal use, for presentations or as a teaching activity



Webinar system

for online lectures, presentations, seminars, consultations

Adobe ConnectEdumet



e-Course Catalogue

HE institutions
a central place for all e-courses



Open access and open educational materials

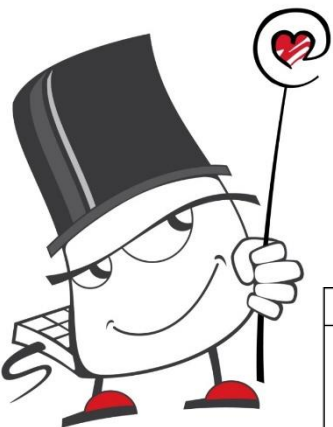
SRCE's educational materials are made in open access and available in the Open Education Portal



Software for Plagiarism Detection

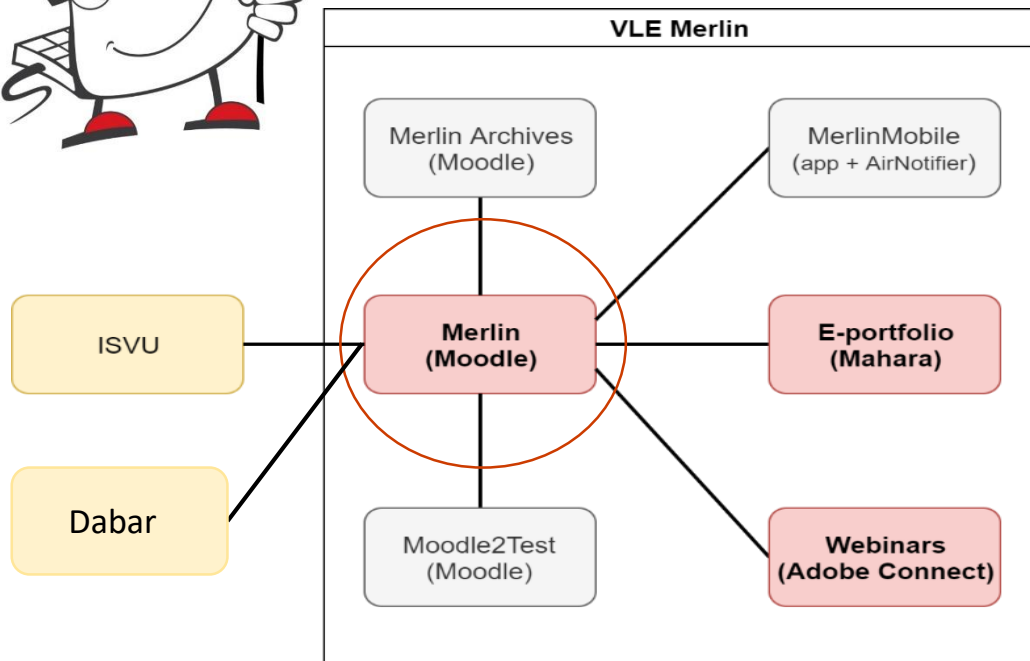
a tool used by teachers, researchers and students for seminars, final and doctoral thesis





Virtual Learning Environment – Merlin

<http://merlin.srce.hr>



1 Moodle installation
94 institutions on Merlin



Support to Researchers

COMPUTING
Advanced
Computing &
Cloud Services



HPC

HTC Cloud

Cloud
services

hr·ZCS

Croatian scientific and educational cloud

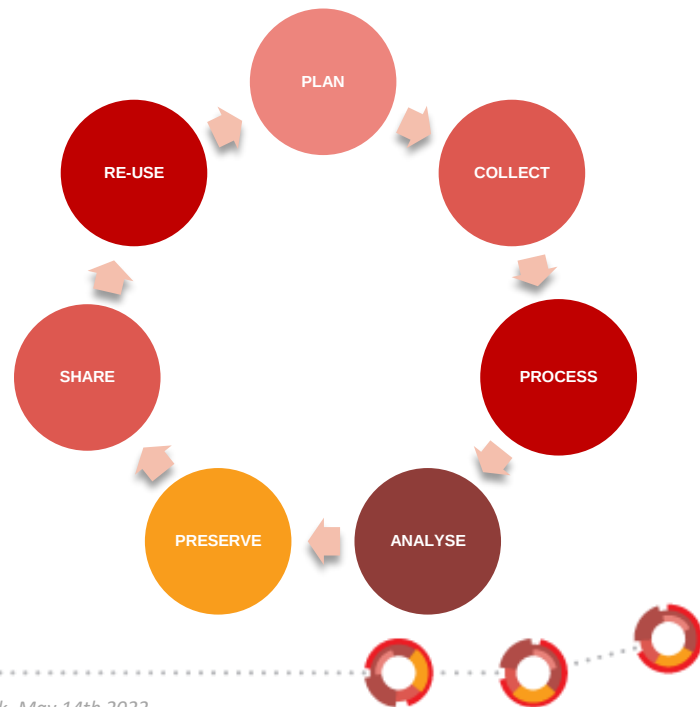
Scientific
papers
publication

Permanent
storage and
research
results
sharing

Data storage
during
research
process



**Research Data Management and
Data Management Plan (DMP)**



Data Services and Open Science

**SRCE services
supporting Open
Science**



**Education and
networking with the
European and
global research
community**



**National Open
Science Cloud**

- Croatian Open Science Cloud (HR-OOZ) Initiative
- National Open Science Plan
- HR-OOZ Catalogue of services, tools and resources



Croatian Open Science Cloud (HR-OOZ) Initiative

GOALS

National Open Science
Cloud (HR-OOZ)

National Open Science Plan



<https://www.srce.unizg.hr/en/hr-ooz>



HR-OOZ as a part of EOSC



“We are creating a European Open Science Cloud now. It is a trusted space for researchers to store their data and to access data from researchers from all other disciplines. We will create a pool of interlinked information, a ‘web of research data’. Every researcher will be able to better use not only their own data, but also those of others”

Ursula von der Leyen, President of the European Commission



CroRIS – as a Service Catalogue of HR-OOZ



Using EU funds in building a National e-Infrastructure

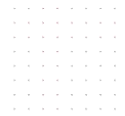


Horizon Europe

THE NEXT EU RESEARCH & INNOVATION
PROGRAMME (2021 – 2027)



EUROPEAN UNION



Digital Europe Programme



- Building research and innovation capacity
- The digital transformation of higher education

National Recovery and
Resilience Plan
2021-2026

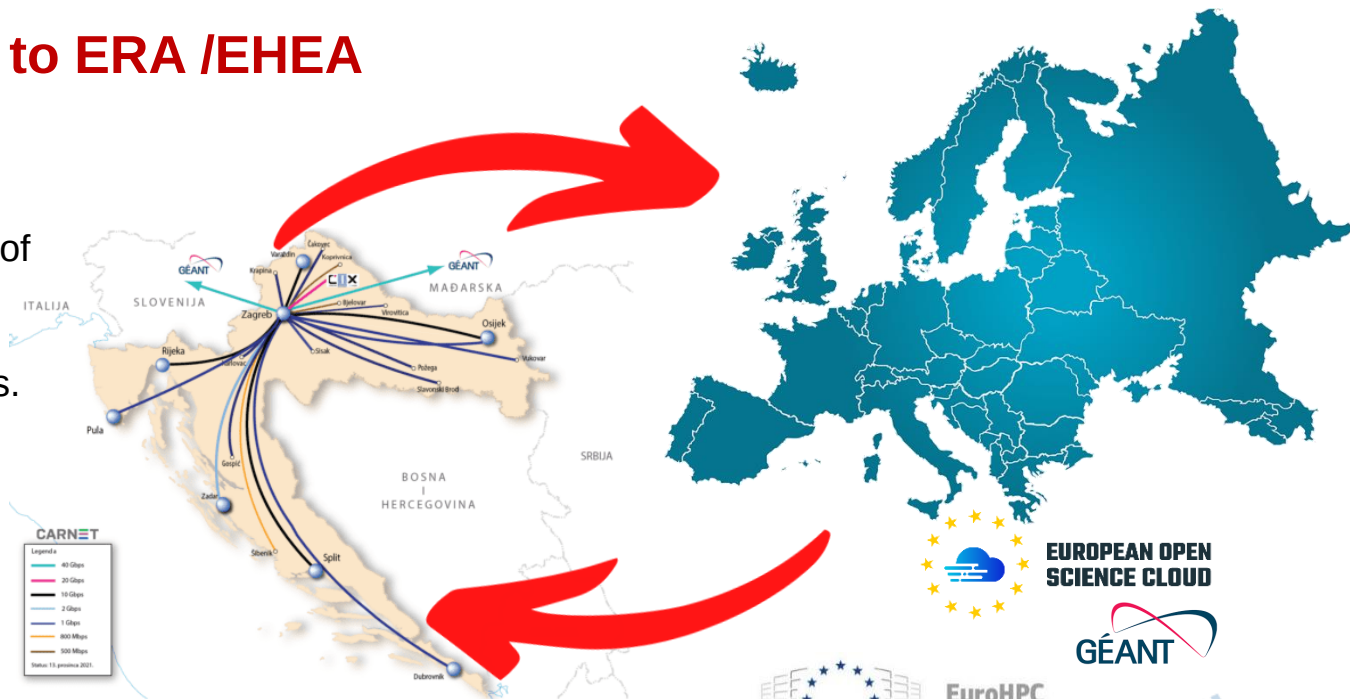


**EUROPEAN STRUCTURAL
AND INVESTMENT FUNDS**



Digital bridges to ERA /EHEA

National components of e-Infrastructure are connected with the similar European ones.



HR-OOZ
CARNET



**CROATIAN COMPETENCE
CENTRE FOR HPC**



hr·zoo

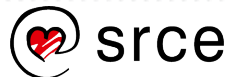
Croatian scientific and educational cloud



EuroHPC
Joint Undertaking



RESEARCH DATA ALLIANCE



„National research e-infrastructure landscape and trends”, CRIS 2022 conference, Dubrovnik, May 14th 2022

The key to Success



TECHNOLOGY
TALENTS
TOLERANCE



srce

University of Zagreb
University Computing Centre





E-INFRASTRUCTURE IS A SOLUTION

IF IT IS STRATEGICALLY WELL
PLANNED!



Thank you!

ivan.maric@srce.hr
<https://www.srce.hr/en>

National research e-infrastructure landscape and trends
CRIS 2022: Linking research information across data spaces, May 14th 2022



This material is available under the Creative Commons License *Attribution-ShareAlike* 4.0 International.

According to the Open Access Policy, Srce ensures that all research data made by Srce is accessible and free to use by the general public, especially educational and professional information and content derived from the actions and work of Srce.

www.srce.unizg.hr/en

creativecommons.org/licenses/by-sa/4.0/deed.en

www.srce.unizg.hr/oa-and-oer

