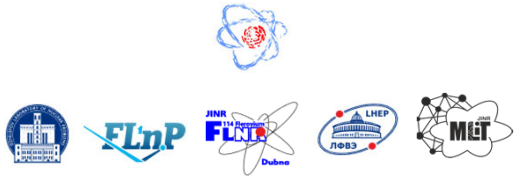

Digital technology map: detectors, accelerators, competencies

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June 19, 2025

Motivation

The JINR has significant experience in:

- The development and application of **detector and accelerator systems**, **data handling and processing**,
- Co-operation with **manufacturers** of components, materials and non-standard equipment,
- Co-operation with scientific and technological **partners**.

Sharing this knowledge, especially on equipment for detector and accelerator R&D, is crucial.

The eight-layer module of the TRT ATLAS transient radiation detector is being tested before being sent to CERN (photo.jinr.ru)

During the installation of the DC-60 cyclotron, developed for the Republic of Kazakhstan (2006) (photo.jinr.ru)

The picture shows the calibration of charged particle telescopes at the ACCULINNA-2 facility. In the photo A.A.Bezbakh (photo.jinr.ru)

Motivation

AYSS JINR

The need for a shared knowledge base has been raised repeatedly.

With the sharing of such information, it seems possible to get quick answers to questions such as:

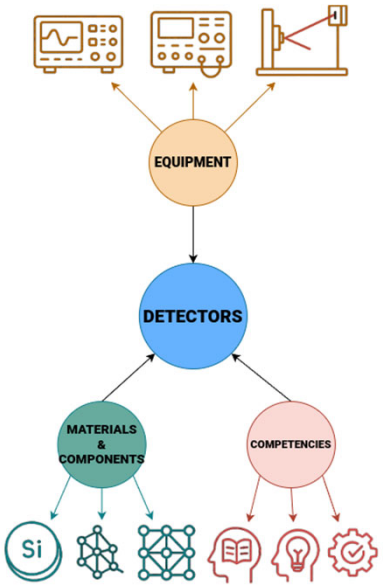
- Where to find the **necessary equipment**?
- Who has the **necessary competence**
  or
  Where to get the **necessary people**?
- And what has already been **done in detector and accelerator technology directions in the JINR**?

First step: a map of detectors technologies

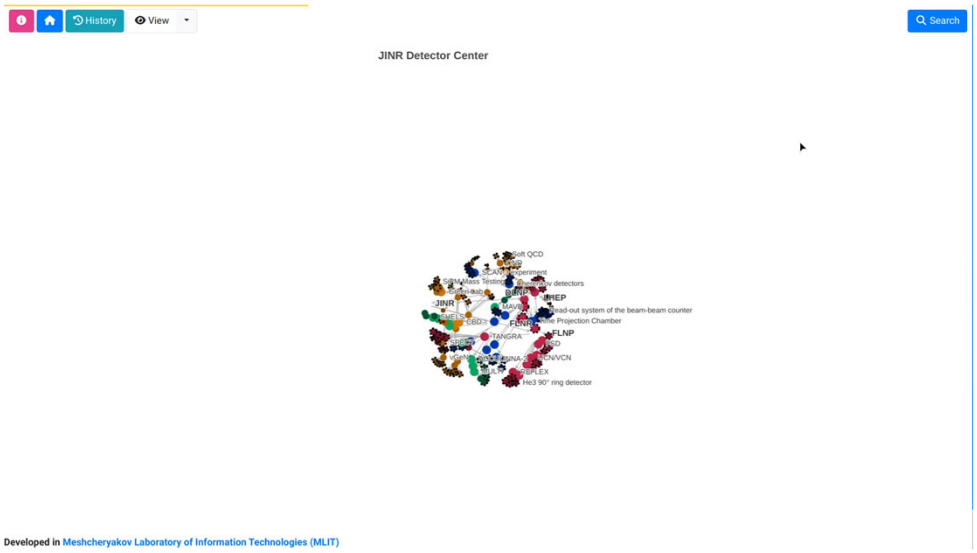
AYSS JINR

The first step of the project was to collect and organize information about detector technologies.

Work on the app started over 2 years ago.

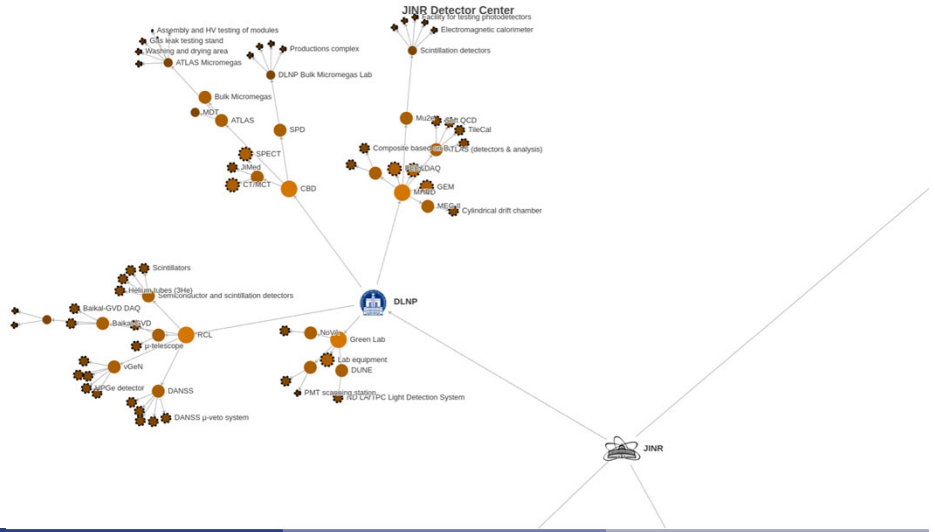


Storing the data as a graph

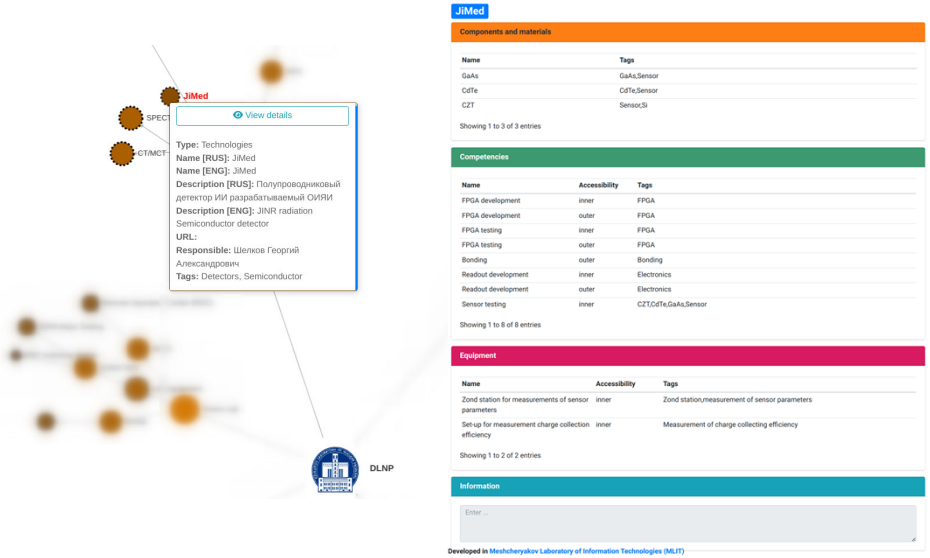


Nodes and edges

The nodes are connected by edges showing "parent-child" relationships, forming a heirarchy

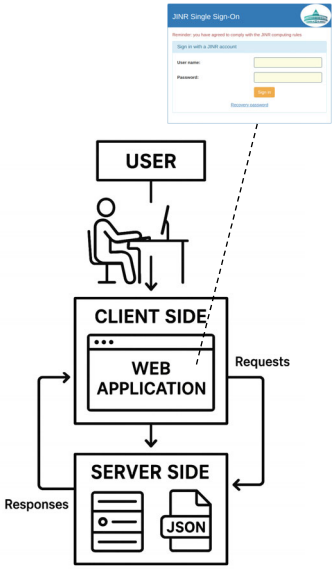


Nodes with «Technologies» type



Tags are the key part of the keyword-based search

Web application workflow & Data storage

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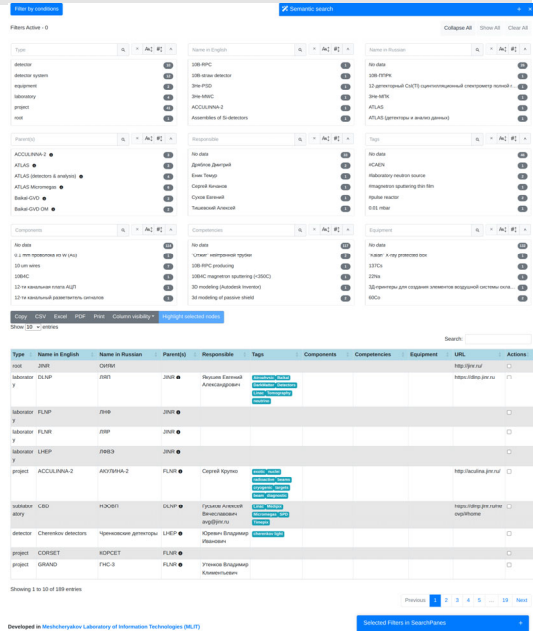
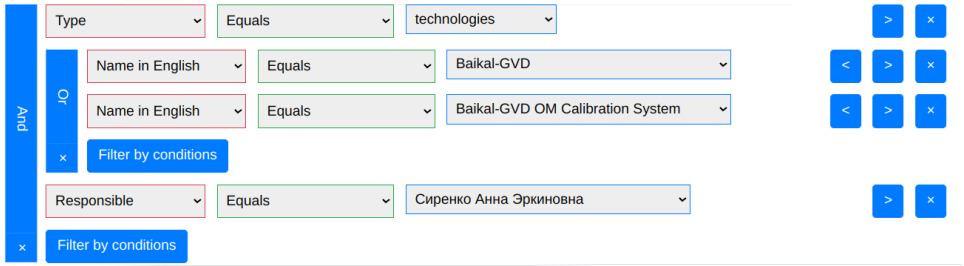
Search system: the key feature

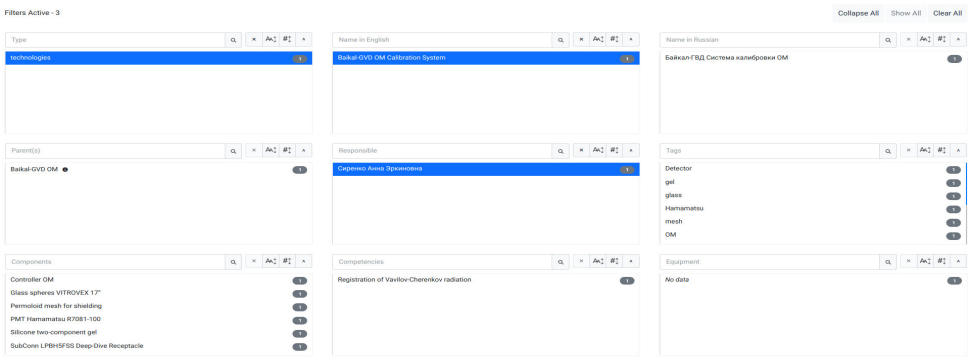
The interface allows user to apply multiple filters, use semantic search and export results.

- All accumulated data is shown in the main data table on a special search page
- The search is performed on the main data table
- The search results are also displayed in the main data table

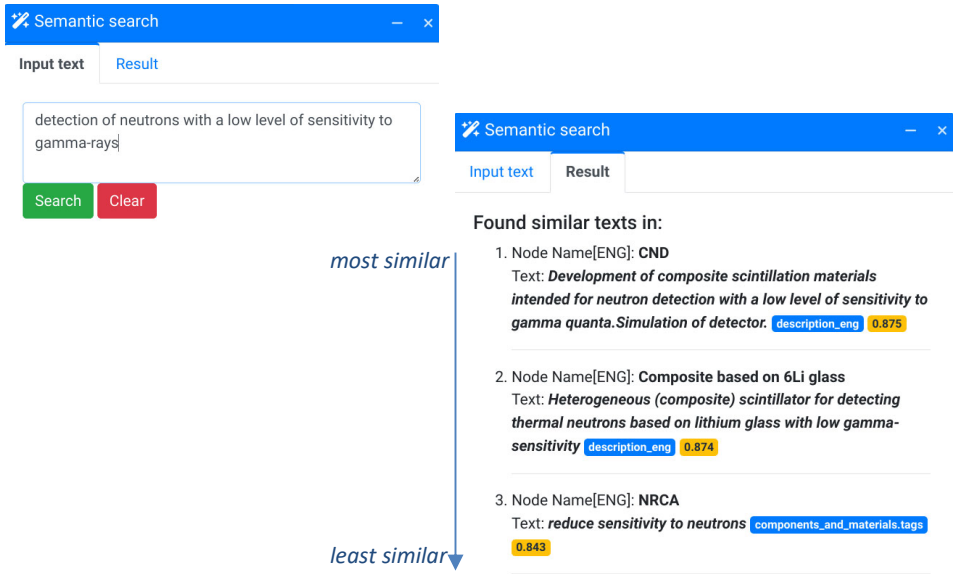


Conditions & Quick filters





Semantic search (basic version)



Conclusion

The service allows to store and **search data by categories and key parameters**:

- Filter equipment by type (e.g. detectors, detector systems, technologies etc.).
- Specify technical specifications (beam energy, resolution, sensitivity, application area etc.).
- Identify which laboratories or departments have the required equipment/competencies.

For nodes may be specified:

- Responsible staff (to find their contacts in PIN),
- History of use (examples of experiments, publications),
- Conditions of access (internal/external).

In 2025 the service became part of the JINR Digital EcoSystem services (*Science → Technologies and Expertise → Map of detector technologies*).

✓ ***For researchers***: to quickly find an available component or people with the right competences for a new experiment

✓ **To find industrial partners**: to clarify which technologies can be used in a joint project

✓ ***For administration***: to analyse equipment utilisation and plan infrastructure development

Links

https://detectors.jinr.ru/
(access via JINR SSO)

https://digital.jinr.ru/e?sid=178
(access via JINR SSO)

A certificate of state registration of a computer program

In 2024 a certificate of state registration of a computer program was received.

РОССИЙСКАЯ ФЕДЕРАЦИЯ

RU2024690973

ФЕДЕРАЛЬНАЯ СЛУЖБА
ПО ИНТЕЛЛЕКТУАЛЬНОЙ СОБСТВЕННОСТИ

ГОСУДАРСТВЕННАЯ РЕГИСТРАЦИЯ ПРОГРАММЫ ДЛЯ ЭВМ

Номер регистрации (свидетельства):
2024690973
Дата регистрации: **18.12.2024**
Номер и дата поступления заявки:
2024687896 18.11.2024
Дата публикации и номер бюллетеня:
18.12.2024 Бюл. № 12

Автор(ы):
Ильина Анна Владимировна (RU),
Пелеванюк Игорь Станиславович (RU)
Правообладатель(и):
Объединенный Институт Ядерных Исследований (RU)

Название программы для ЭВМ:
Программа визуализации и учёта технологий и компетенций организации

Реферат:
Программа позволяет вносить информацию о направлениях деятельности, проектах и конкретных установках с учётом их связей друг с другом. Программа строит граф связей от организации к конкретной технологии. Визуализированный граф позволяет увидеть общую картину технологий, которыми владеет организация. Каждая технология имеет отдельное окно визуализации связанных с ней материатов, компонентов, компетенций и оборудования. Каждый узел или технология имеют связанные с ними ключевые слова. Программа позволяет осу ществлять поиск, по ключевым словам, названию узлов или технологий, а также по словам в описании. Тип ЭВМ: ПК на базе процессора Intel, AMD, x32, x64, ARM. ОС: Windows 7 и более новые версии Windows. Ubuntu 20.04 и более новые версии. MacOS 10.15 Catalina.

Язык программирования: Python 3.10 с использованием библиотеки Django

Объем программы для ЭВМ: 18 МБ

Future plans

1. Collect users feedback.
2. Update the service design and functions to meet users needs.
3. Improve the semantic search algorithms.
4. Continue to develop a similar base for the accelerator technology area.

Acknowledgements

We warmly thank all colleagues who take an active part in the development of the service and filling the databases and look forward to further co-operation:

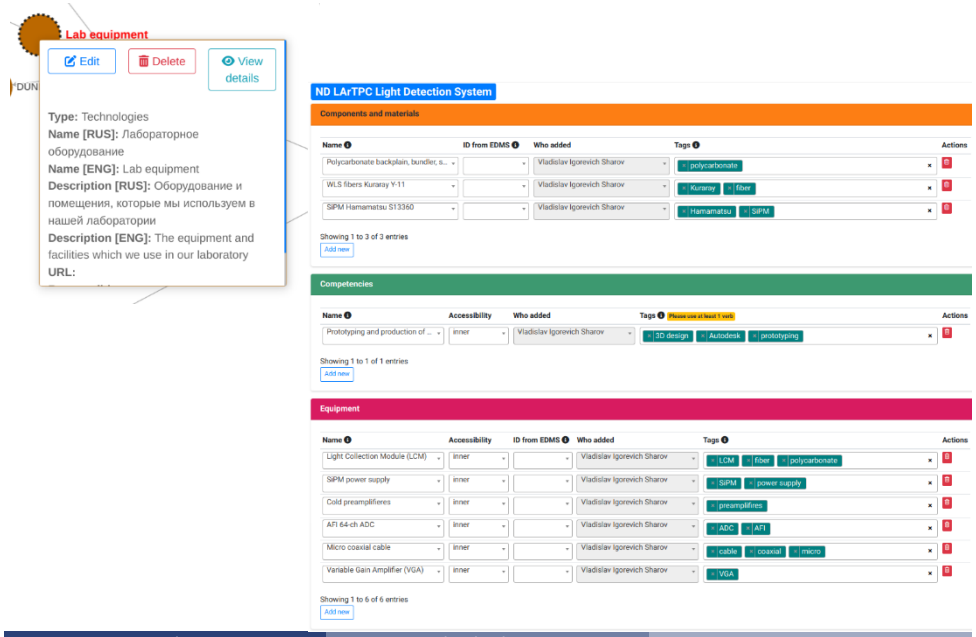
Alexey Aparin (LHEP)
Andrey Bezbakh (FLNR)
Karen Bunyatov (DLNP)
Artem Bystryakov (DLNP)
Sergei Fateev (DLNP)
Nikita Fedorov (FLNP)
Polina Filonchik (FLNP)
Kirill Gikal (FLNR)
Semen Gursky (DLNP)
Alexey Kuznecov (DLNP)
Igor Lensky (Department of Innovation And Intellectual Property)
Alexandr Nezvanov (FLNP)
Maria Patsyuk (LHEP)
Igor Pelevanyuk (MLIT)
Maria Petrova (FLNP)
Vladislav Rozhkov (DLNP)
Rostislav Sotenskii (DLNP)
Sergei Stukalov(FLNR)
Vladislav Sharov(DLNP)
Ilia Zimin (DLNP)

Special thanks go to those who first highlighted the need for a technological map and helped design its structure and features.

Thank you for your attention!

Slides reserve

Editor’s functional



Find by text

Copy CSV Excel PDF Print Column visibility Highlight selected nodes

Show 10 entries

Search: 3d

Type	Name in English	Name in Russian	Parent(s)	Responsible	Tags	Components	Competencies	Equipment	URL	Actions
technologies	CT/MCT	КТ/ЭКТ	New semiconductor detectors	Шелков Георгий Александрович chelkov@jinr.ru	Medipix, PixelDetectors, Timepix, Tomography, Detector, Semiconductor, Prodis, scintillator, Mechanics, Standa, Hamamatsu, Source Ray, ЭлтехМед, ELtechMed, Cooling system, Geant4, c++, python, ImageJ, ASTRA Toolbox, Tiger, 3dSlicer, X-Ray	Timepix, Widepix, Prodis MARK, Galapad, Steper motors, Motor controllers, X-ray source, Cooling system, JiMed	Pixel detector simulation, Processing and analysis of data received from the detector, Tomographic reconstruction, 3d visualisation of gamma sources and radiopharmacy	"Kalan" X-ray protected box	https://dlnp.jinr.ru/neovp/	☐
technologies	Lab equipment	Лабораторное оборудование	Green Lab		design, protomat, climate chamber, Earth's magnetic field compensation, Faraday cage, Light-proof room, clean room, dark, 3D, printer, CNC, Milling, scaning			LPKF ProtoMat S103, Climate chamber, Dark room, Photopolymer 3D printer Formlabs Form 2, CNC machine, 3D axis table		☐
technologies	MWPC	Многопроволочные пропорциональные камеры	ACCULINNA-2	Безбах Андрей	chambers, proportional, tracking, Positronic, xavac, 3D design, soldering	Разъем вакуумны многоштырьковый	Разработка и изготовление корпуса, Разработка и изготовление сеток и катодов детектора		http://aculina.jinr.ru/a-2.html	☐

Nodes highlighting