Software Upgrades of Beam and Irradiation Test Infrastructures in AIDA-2020

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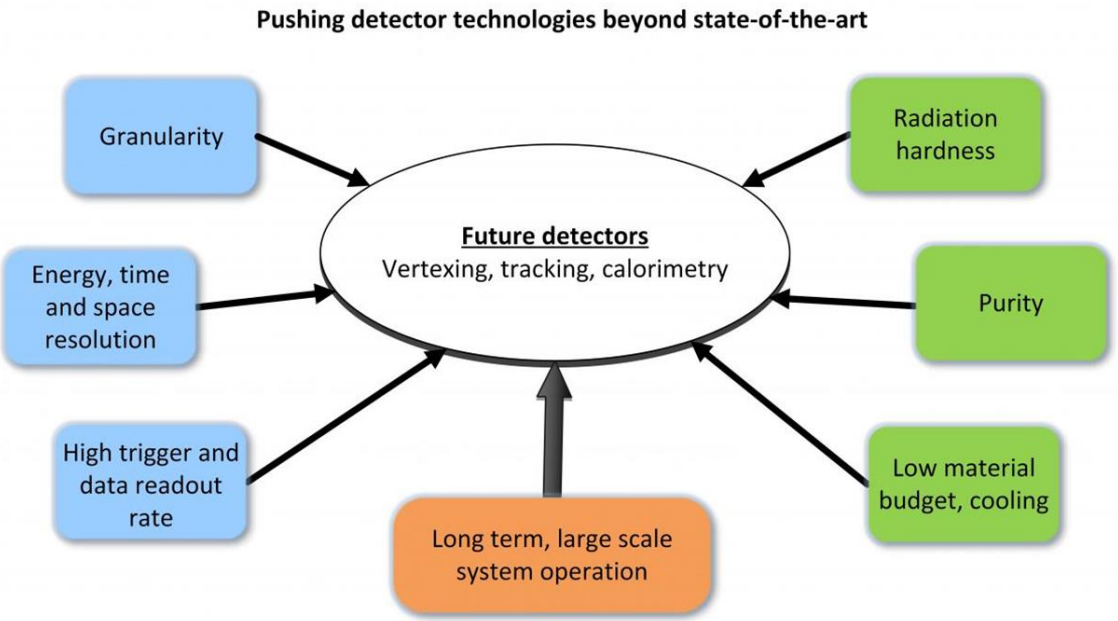
This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement no. 654168.

What is AIDA-2020?

Advanced European Infrastructures for Detectors at Accelerators (AIDA-2020) is an EU-funded project that unites important European research infrastructures in the field of detector development and testing.

CMS Pixel Detector

View of the ATLAS calorimeters from below

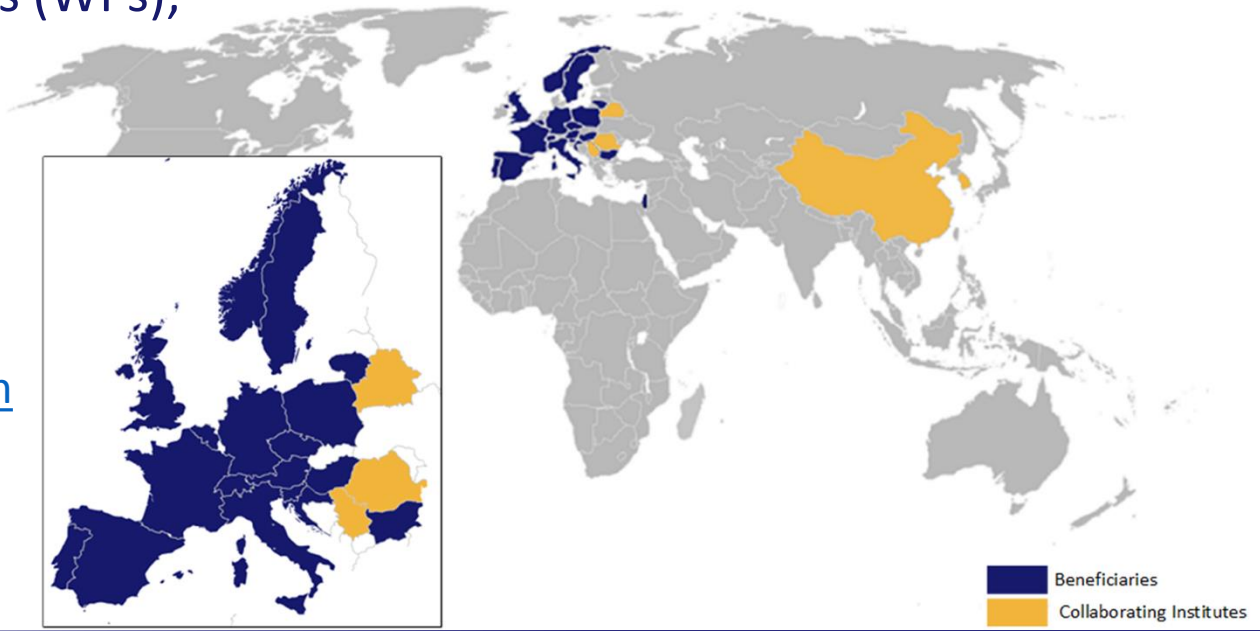


What is AIDA-2020?

- 24 countries and CERN (the European Organization for Particle Physics);
- Coordinated program, in line with the priorities of the European Strategy for Particle Physics (URL: https://europeanstrategy.cern/european-strategy-for-particle-physics):
  - Networking Activities (NAs);
  - Transnational Access (TAs);
  - Joint Research Activities (JRAs).
- 15 different Work Packages (WPs);
- On track newsletter:

n track
News for the Detector Community

URL:
http://aida2020.web.cern.ch/content/newsletter



AIDA-2020 Activities

AIDA-2020 is divided into 15 Work Packages. A Work Package (WP) is a unit of work within the project. The WPs are theoretically independent, but they were defined in order to foster synergies in AIDA-2020:

- Management and Coordination
  - **WP1 (MGT)**: Project management and coordination
- Networking Activities:
  - **WP2 (NA1)**: Innovation and Outreach
  - **WP3 (NA2)**: **Advanced Software**
  - **WP4 (NA3)**: **Micro-electronics** and **interconnections**
  - **WP5 (NA4)**: **Data acquisition** system for beam tests
  - **WP6 (NA5)**: Novel high voltage and resistive **CMOS sensors**
  - **WP7 (NA6)**: Advanced **hybrid pixel detectors**
  - **WP8 (NA7)**: Large scale **cryogenic liquid detectors**
  - **WP9 (NA8)**: New support structures and **micro-channel cooling**
- Transnational Access
  - **WP10 (TA1)**: Beam test facilities
  - **WP11 (TA2)**: Irradiation test facilities
  - **WP12 (TA3)**: Detector characterisation facilities
- Joint Research Activities
  - **WP13 (JRA1)**: Innovative gas detectors
  - **WP14 (JRA2)**: Infrastructure for advanced calorimeters
  - **WP15 (JRA3)**: Upgrade of beam and irradiation test infrastructure

WP15 Activities

- **Beam and irradiation test facilities**: Infrastructures for the qualification of particle detectors, material, and components prior to their installation in High-Energy Physics (HEP) experiments such as those performed at CERN.
- WP15 is involved in the improvement of the beam and irradiation test facilities infrastructures.

CERN Proton Irradiation Facility

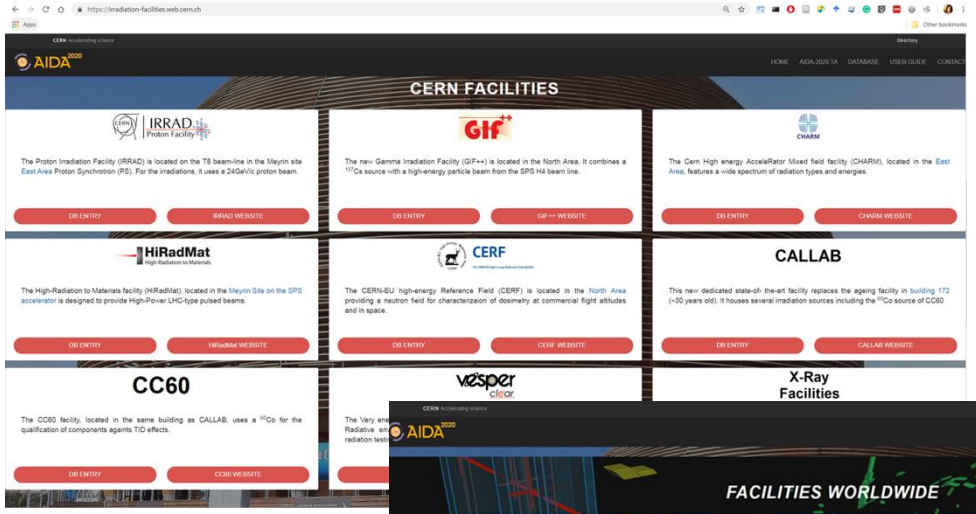
CERN Gamma Irradiation Facility

JSI neutron irradiation facility
(Image: Branko Čeak, National Geographic, Slovenia)

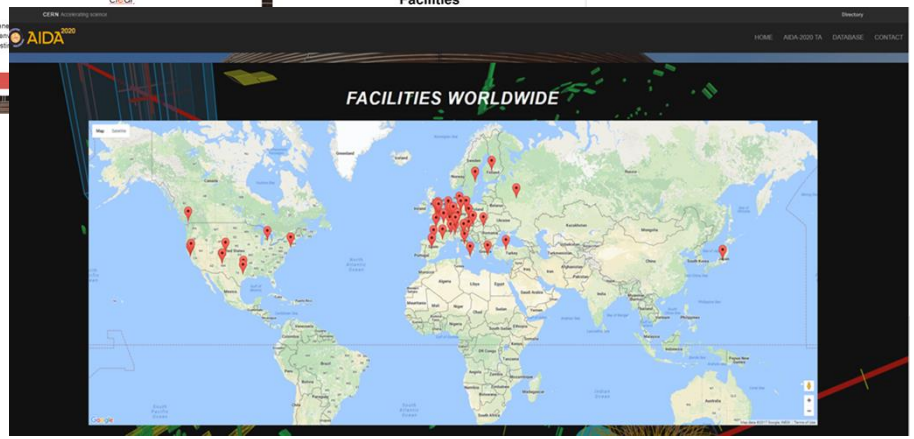
Birmingham Proton Irradiation Facility

Software Development Activities in WP15

- **Database of irradiation and test beam facilities**: Online web application containing information about irradiation and test beam facilities;
- URL: http://cern.ch/irradiation-facilities ;
- 211 entries;
- Data:
  - Facility coordinator
  - Institute
  - Facility information
  - Safety
  - Accessibility
  - Additional comments
- Test beam facilities database under development



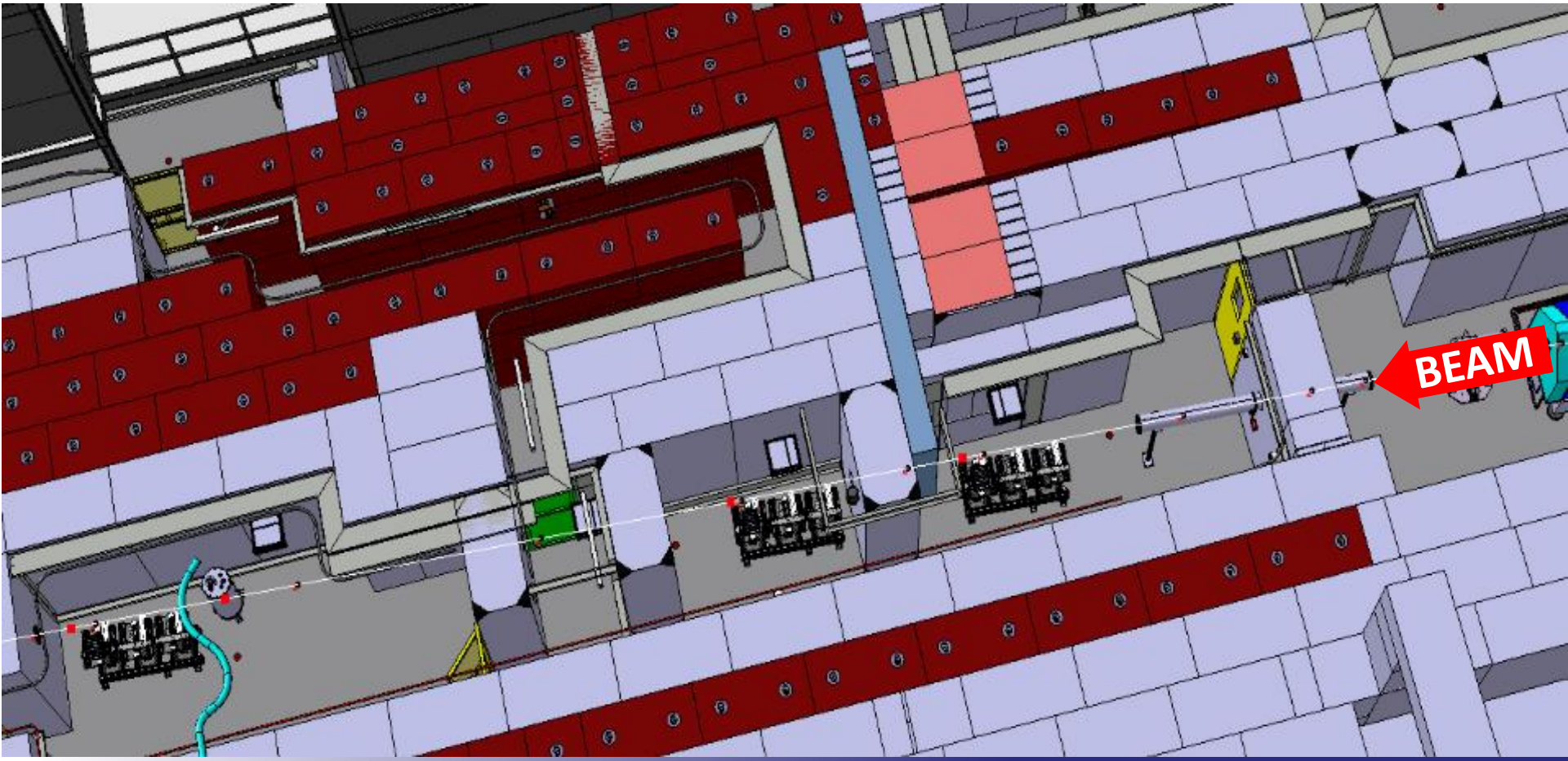
CERN Irradiation Facilities



Worldwide Irradiation Facilities

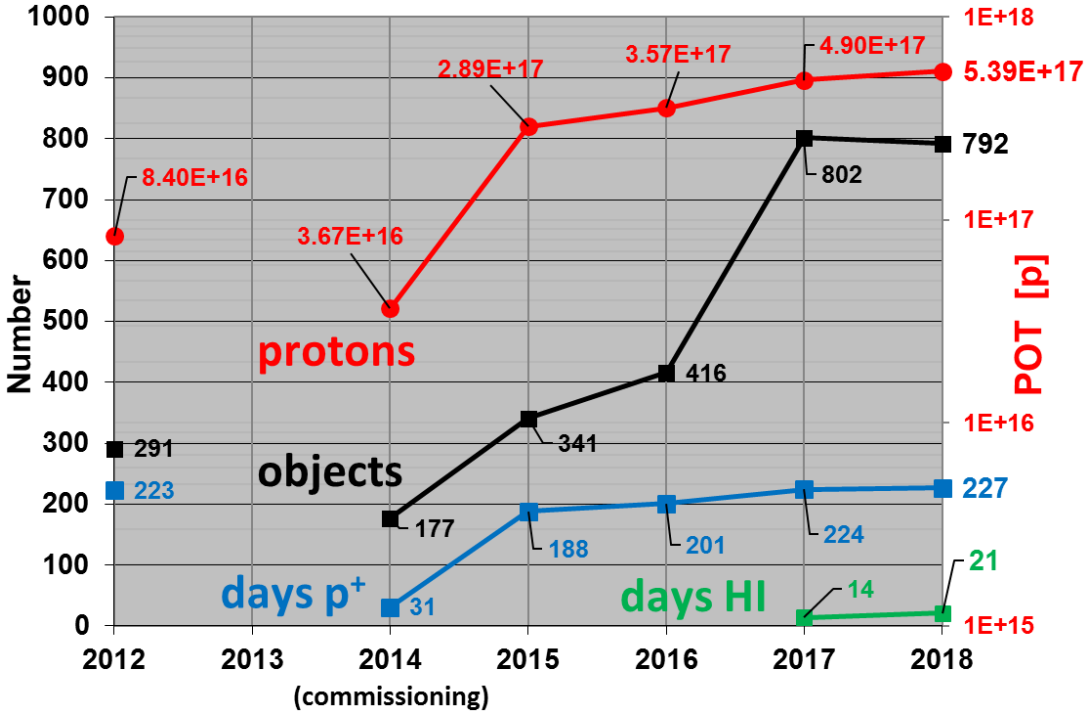
Software Development Activities in WP15

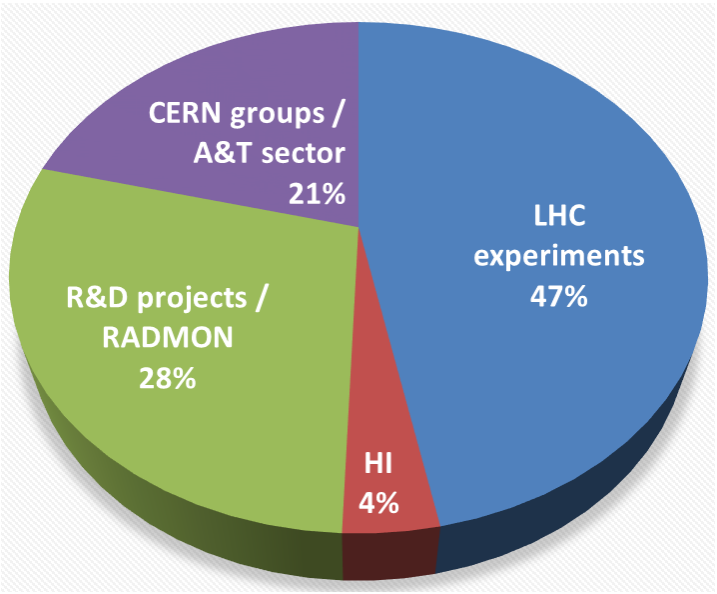
- Proton beam of **24 GeV/c**
- Testing inner detector components of the HEP experiments



Statistics

- **81 experiments completed in 2018:**
  - **92 users**
  - **792 objects** tested in 2018



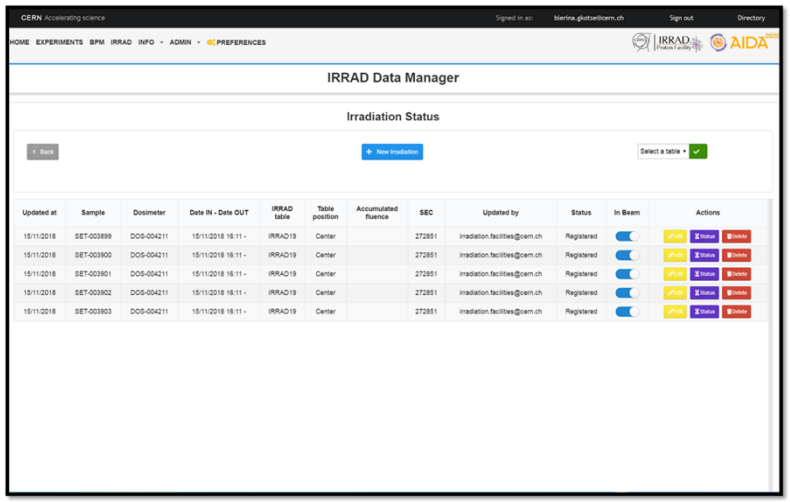


Experiments distribution

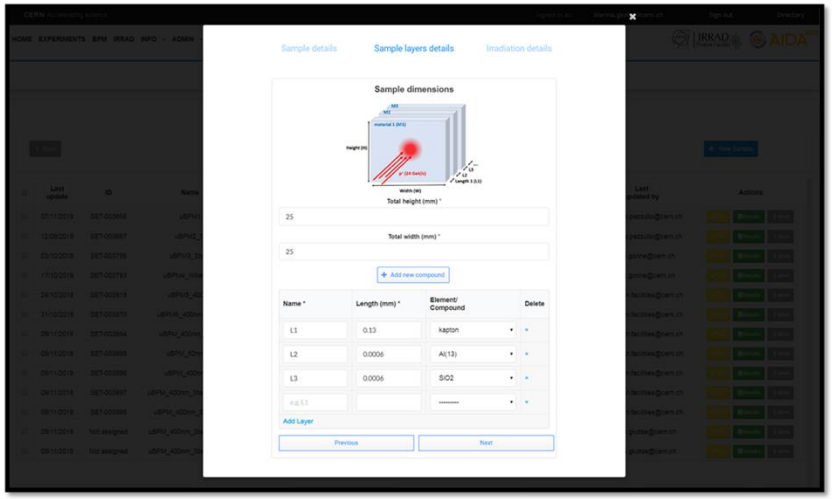
Software Development Activities in WP15

- **IRRAD Data Manager (IDM):** A data management web application used in the Proton Irradiation Facility at CERN (IRRAD):
  - Experiments, samples, users and dosimeters registration
  - Real-time follow-up of irradiation experiments
  - Computation of proton interaction parameters
  - Display and archive of dosimetry result
  - User Interface preferences customization
  - History and details of past experiments (with user permission)

URL: https://cern.ch/irrad-data-manager



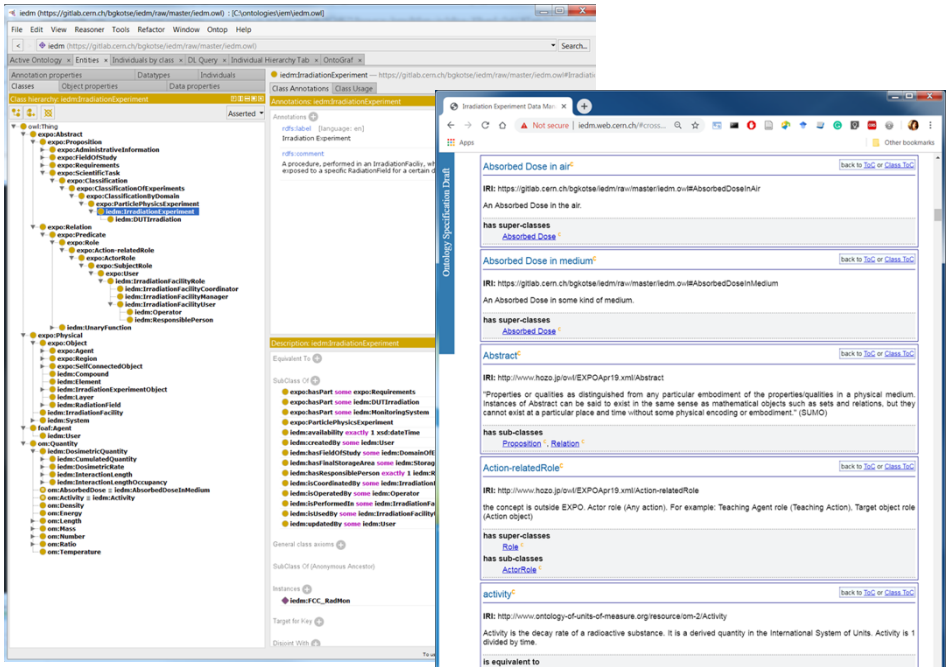
Status of irradiation experiments



Inserting information for the material composition of items to be irradiated

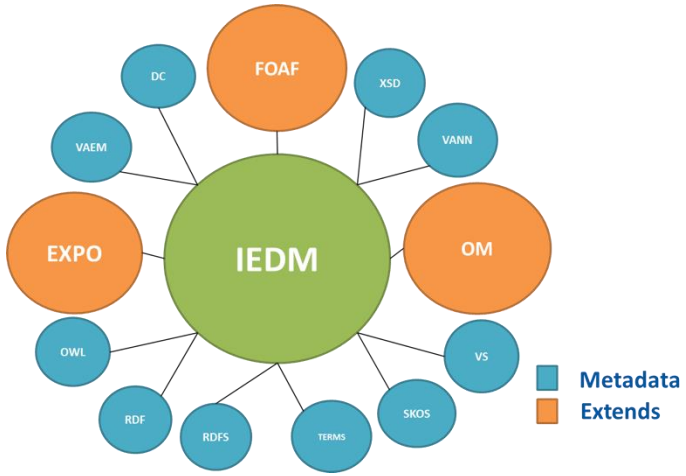
Software Development Activities in WP15

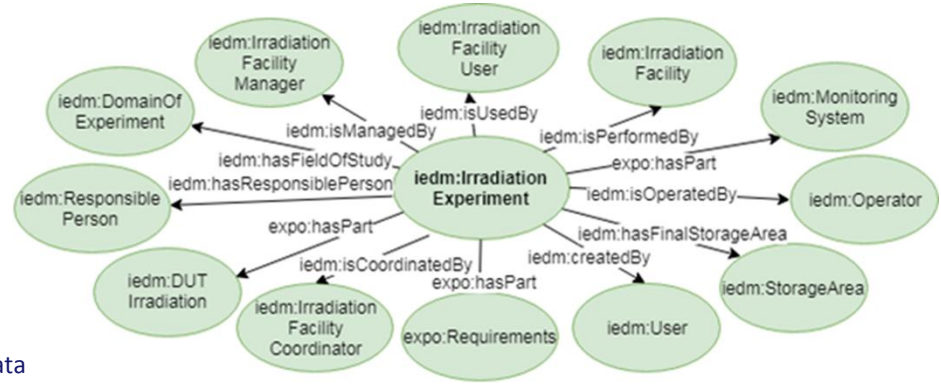
Irradiation Experiments Data Management ontology (IEDM)*: IEDM includes concepts of data management of irradiation experiments extending classes from the **Ontology of Scientific Experiments (EXPO)**, the **Units of Measure ontology (OM)** and the **Friend-of-a-Friend ontology (FOAF)**.



Ontology representation with Protégé
https://gitlab.cern.ch/bgkotse/iedm

Online documentation with Widoco
http://cern.ch/iedm





*B. Gkotse, P. Jouvelot and F Ravotti, "IEDM: An Ontology for Irradiation Experiments Data Management". Accepted at the ESWC2019 Posters and Demos session

Contact

AIDA-2020 3rd Annual Meeting, April 2018, Bologna

AIDA-2020 URL: http://cern.ch/aida2020

AIDA-2020 contact form: http://aida2020.web.cern.ch/contact

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