Call for the Training Plan in Artificial Intelligence and Big Data for Cardiovascular health: CardiotrAIning
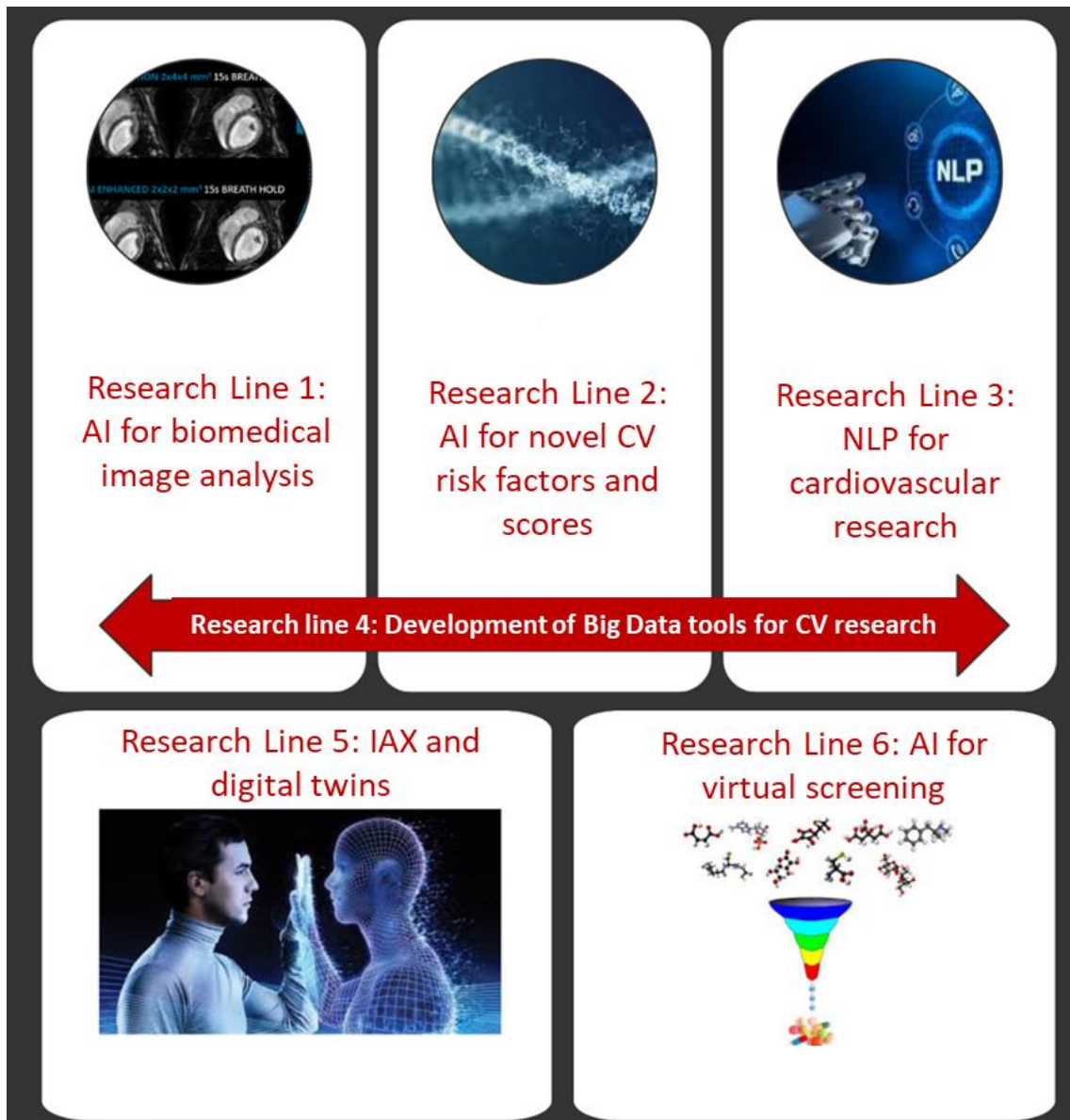
Annex II: Research Lines

This call is included in the framework of the TALENT ATTRACTION AND RETENTION PROGRAMS. Talent attraction and retention programs are one of the actions at the investment area 4, Digital Professionals, which is within component 19 of the National Digital Capabilities Plan, encompassed within Generation D, and framed within the Recovery, Transformation and Resilience Plan. The project is part of the Artificial Intelligence Strategy approved on May 14, 2024 by the Council of Ministers, in which one of the fundamental axes is training in Artificial Intelligence. Red.es, an entity attached to the Ministry for Digital Transformation and Public Function through the Secretary of State and Artificial Intelligence has allocated 120 million euros for scholarships and training contracts in Artificial Intelligence that aim to ensure the training and digital inclusion of citizens and workers.

Cardiovascular diseases are not only the leading cause of death in the world, but also the main reason for global health care expenditure. Atherosclerosis, which is the progressive accumulation of cholesterol and inflammatory material in the arteries, is the process underlying most cardiovascular diseases. Although it has been known for years, current prevention strategies are unable to reduce the burden of cardiovascular diseases associated with atherosclerosis. For this reason, at the CNIC we have been investigating the transition from health to cardiovascular disease for years by means of cohort studies in which thousands of healthy people of different ages are followed over time. These studies (PESA CNIC-Santander and REACT) generate a large amount of data from different modalities (image, clinical data and omics) that can only be fully exploited through the use of Big Data and Artificial Intelligence techniques.

CardiotrAIning participants will conduct research projects aimed at the integrative analysis of Biomedical Big Data in order to improve the diagnosis, treatment and prevention of cardiovascular disease using AI and Big Data analytics techniques in the following research areas:

- **Line 1: AI for biomedical image analysis** (3 predoctoral researchers, 1 postdoctoral researcher, 1 technician)
- **Line 2: AI for the development of new cardiovascular risk scores** (1 predoctoral researcher, 1 senior technician)
- **Line 3: AI for natural language processing in biomedical research** (2 predoctoral researchers)
- **Line 4: Big Data tools in cardiovascular research** (1 predoctoral researcher, 1 technician)
- **Line 5: Explainable AI and digital twins** (1 predoctoral researcher, 1 postdoctoral researcher)
- **Line 6: AI for the design of new drugs by virtual screening** (1 predoctoral researcher, 1 postdoctoral researcher)

Predoctoral researchers participating in **cardiotrAIning** will have the opportunity to choose their research line after an initial training period that includes theoretical classes in AI and Big Data analytics and placements in the CNIC laboratories leading the projects and in national and international collaborating entities. Postdoctoral researchers and technicians will also have access to the theoretical training plan and will carry out internships, but will be assigned to a specific research project from the beginning of **cardiotrAIning**.

Research Line 1: AI for biomedical image analysis

Research Line 2: AI for novel CV risk factors and scores

Research Line 3: NLP for cardiovascular research

Research line 4: Development of Big Data tools for CV research

Research Line 5: IAX and digital twins

Research Line 6: AI for virtual screening