

Artificial Intelligence in Medicine



INFN - CSN5 proposal
2019-2021

RL - Ba: S. Tangaro(INFN-BA)

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D. Diacono		0.2
A. Monaco		0.2
E. Lella		1.0
T. Maggipinto		0.4
TOTALE INFN-rendicontati: 3.7 FTE		

richieste ai servizi : Servizio Calcolo: 2 m.u.

AIMs



AIM+: Networking and Continuous Training

AIM+.T1 - Annual workshop on Methods, Algorithms and Computing Resource Operability, including training for new members (MACRO workshop). [Task expected duration: 3 years; starting month: 1]

AIM+.T2 - Annual workshop on applications (APP workshop). [Task expected duration: 2.5 years; starting month: 7]

AIM 1: Data harmonization

AIM1.T1 - Multi-site data harmonization in MRI (PI, BA) [Task expected duration: 3 years, starting month: 1]

AIM1.T2 - Multi-site data harmonization in mammography (PI, CA) [Task expected duration: 2 years; starting month: 1]

... AIM1.Tn - future tasks to be added during the project.

AIM 2: Quantification

AIM2.T1 - Quantification models in PET (GE) [Task expected duration: 2 years; starting month: 1]

AIM2.T2 - Integrated quantification of PET and omics data (BO) [Task expected duration: 2 years; starting month: 6]

... AIM2.Tn - future tasks to be added during the project.

AIM 3: Predictive models

AIM3.T1 - Predictive models for Radiation Therapy treatments (FI, GE) [Task expected duration: 3 years; starting month: 1]

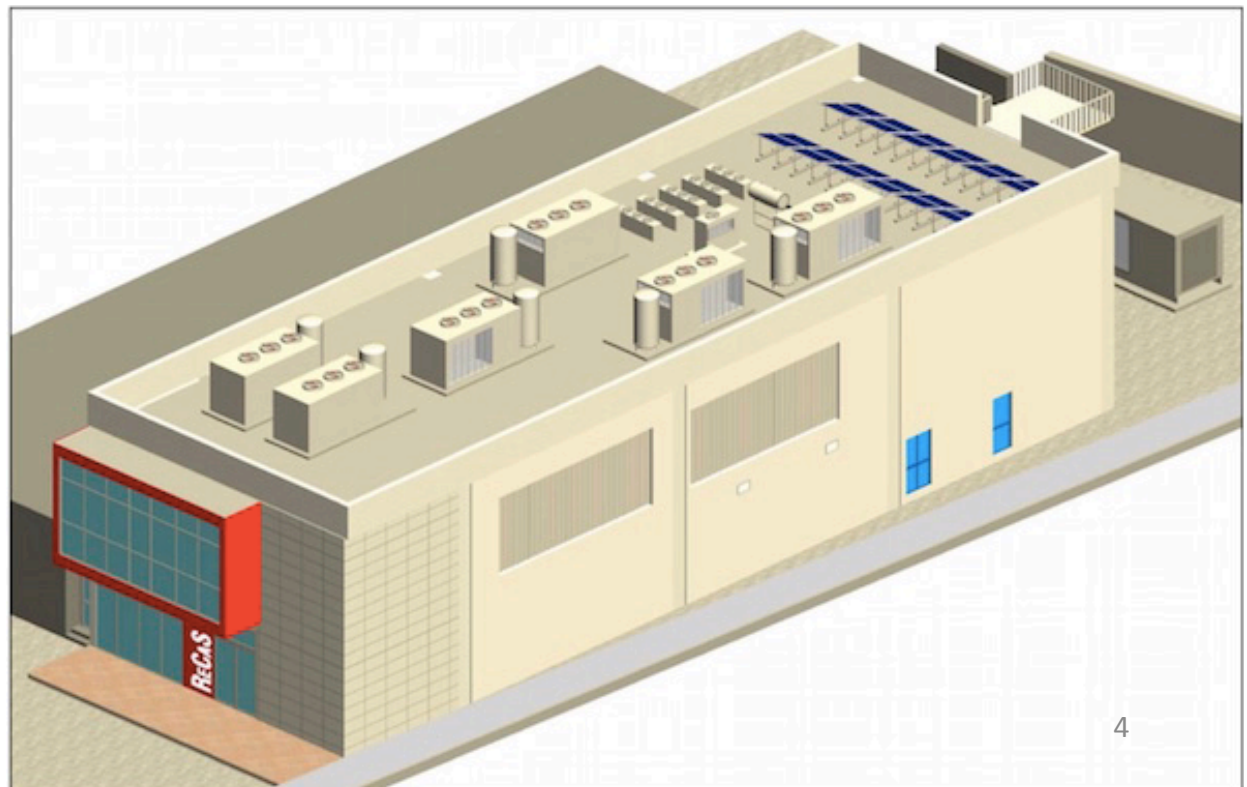
AIM3.T2 - Predictive models for mammography and CESM (PI, CA, BA) [Task expected duration: 3 years; starting month: 1]

AIM3.T3 - Predictive models for transcranial-MR-guided Focused Ultrasound Surgery (tcMRgFUS) (CT) [Task expected duration: 3 years; starting month: 1]

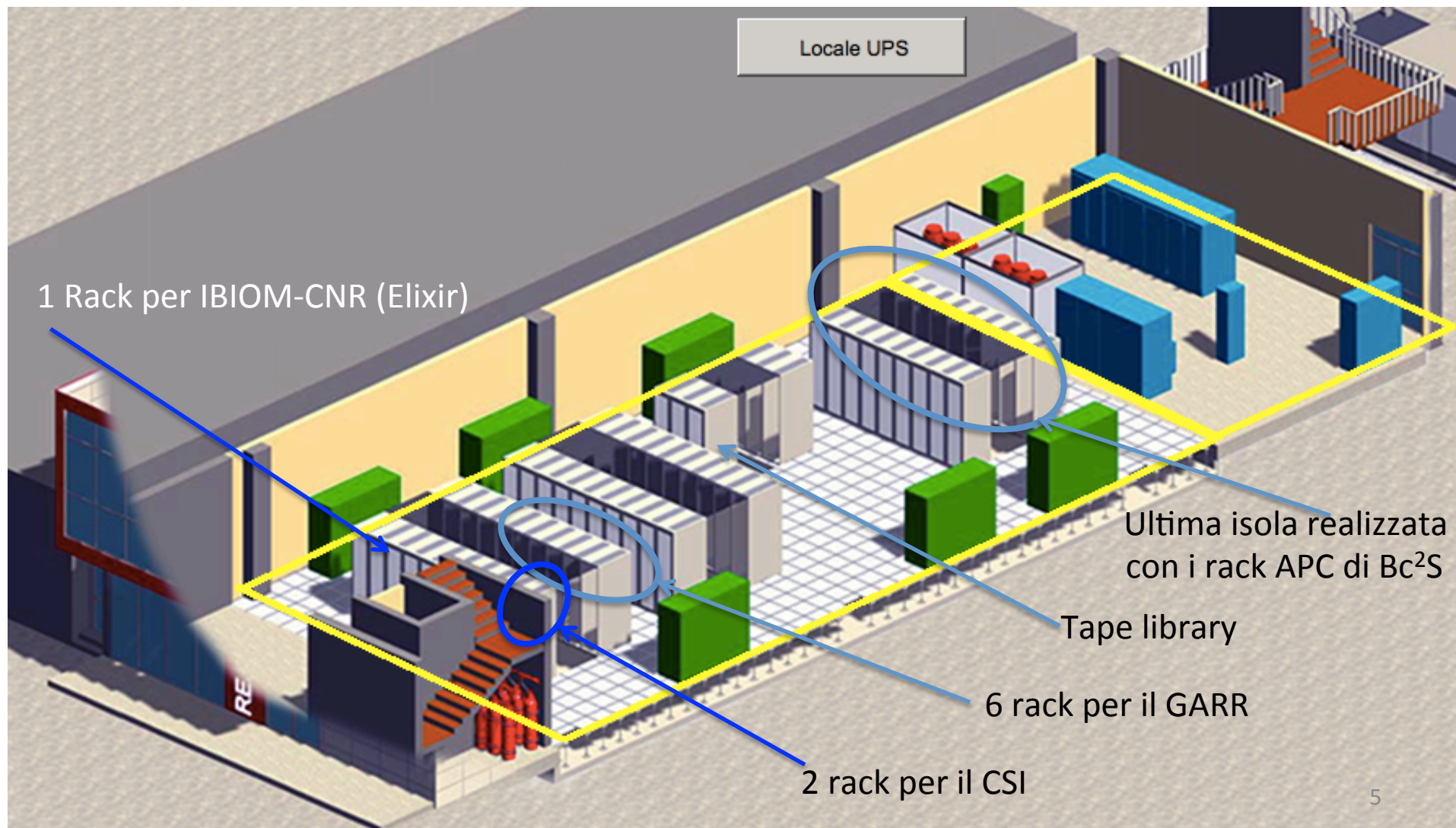
AIM3.T4 - Predictive models for Systems Medicine (BO) [Task expected duration: 2 years; starting month: 1]

... AIM3.Tn - future tasks to be added during the project.

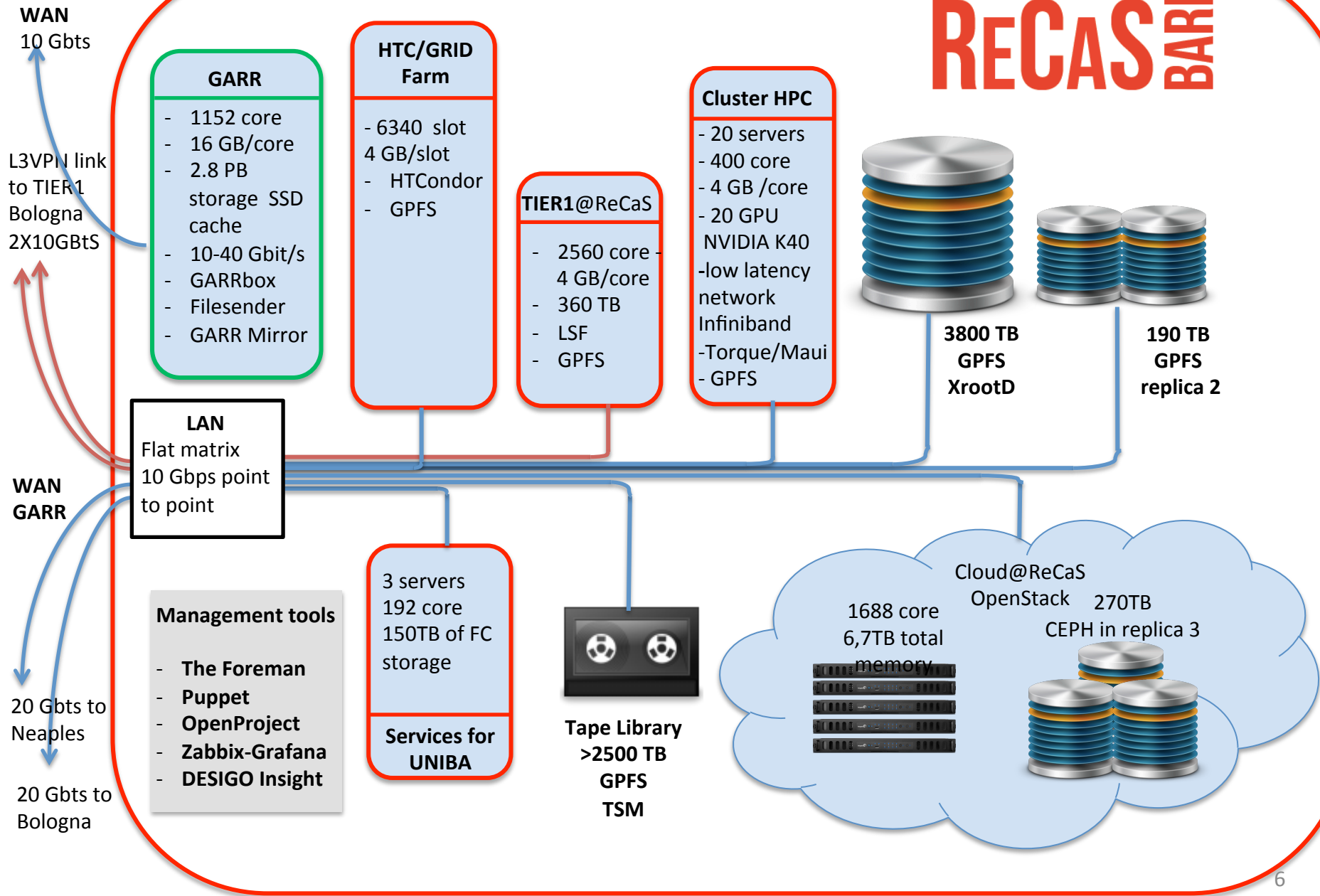
Il DataCenter ReCaS, realizzato in collaborazione con l'Università degli Studi di Bari è ospitato in un edificio di due piani, appositamente realizzato, con una superficie di 430 metri quadri per piano.



Le risorse computazionali sono alloggiate al piano terra in una sala di 270 mq.
A regime ci saranno 4 isole di 20 rack (due file contrapposte di 10 rack ciascuna)
per un totale di 80 rack complessivi.



RECaS BARI



Scuole

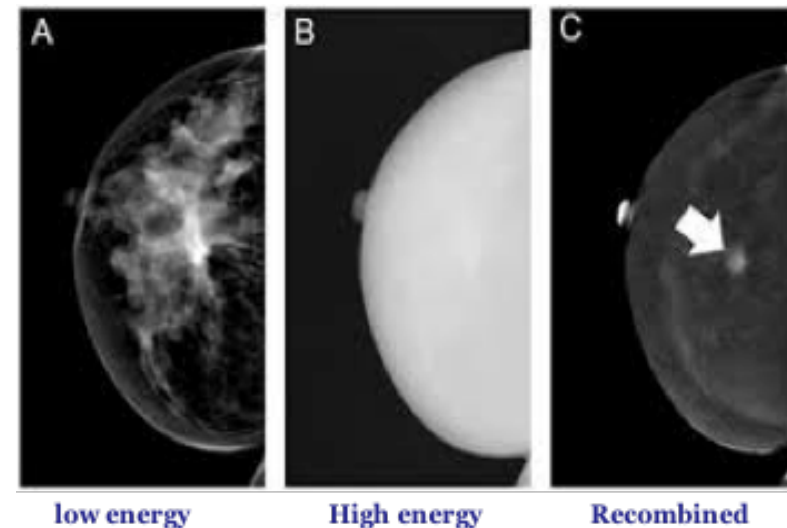
- corso '**Data Science: methods, tools and applications**' - approvato dalla commissione formazione.
- Il corso verrà erogato 'in serie' al corso di '**machine learning**' – approvato dalla CCR a maggio 2019

- a) Predictive models on standard mammograms (PI, CA)
- b) Predictive models on Contrast Enhanced Spectral Mammography (CESM) (BA)

CESM: Imaging technique to study the breast by acquisition of digital mammograms in Dual-Energy with low (LE) and high (HE) energy with contrast medium (MdC) and subsequent spectral subtraction.

It visually provides information similar to that provided by breast MRI (however it does not allow evaluation of contrast kinetics in areas of interest (ROI))

Visualization of a 2D CESM image (LE and HE) and one recombined with MdC



Predictive model

Parenchymal/malignant and benignant ROI discrimination:

- Feature extraction and feature selection
- Detection and discrimination based on machine learning method

Convenzione Quadro

- Accordo Quadro IRCCS 'Giovanni Paolo II' di Bari – INFN – Dipartimento di Fisica UniBa (in fase di finalizzazione)
- Accordo attuativo su CESM

TT / Progetti finanziati da Enti esterni

- CNTT
- Progetto di ricerca "SINACH" - Sistemi Integrati di Navigazione per Chirurgia Mini Invasiva - Avviso pubblico "InnoNetwork" approvato con A.D. n. 498 del 19/12/2016 e A.D. n. 16 del 23/02/2017. POR Puglia FESR - FSE 2014-2020. Fondo Europeo Sviluppo Regionale
- 2018-2021 Progetto ERHA (Enhanced Radiotherapy with Hadrons) ammesso a finanziamento dal Ministero per lo Sviluppo Economico MISE sul bando Horizon PON-MISE (HORIZON 2020) 2016-2020, Budget della Unità INFN: circa 640.000 euro (incluso cofinanziamento). Partner: ITEL (capofila) - INFN – PoliBa
- 2018- 2019 - 'Data-drivEn Customer Service InnovatiON (DECiSION)' finanziato dalla Regione Puglia sul bando 'INNONETWORK', Budget dell'Unità INFN: circa 68.000 euro (incluso cofinanziamento). Partner: Sud Sistemi (capofila) - INFN – UniBa - Planetek