

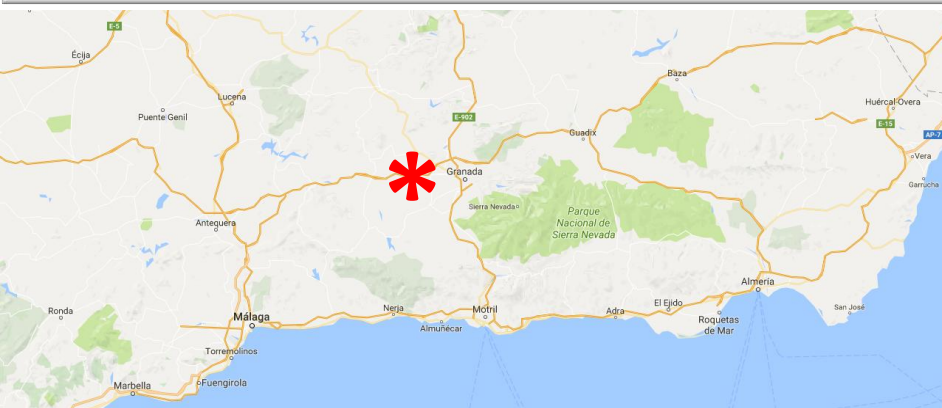
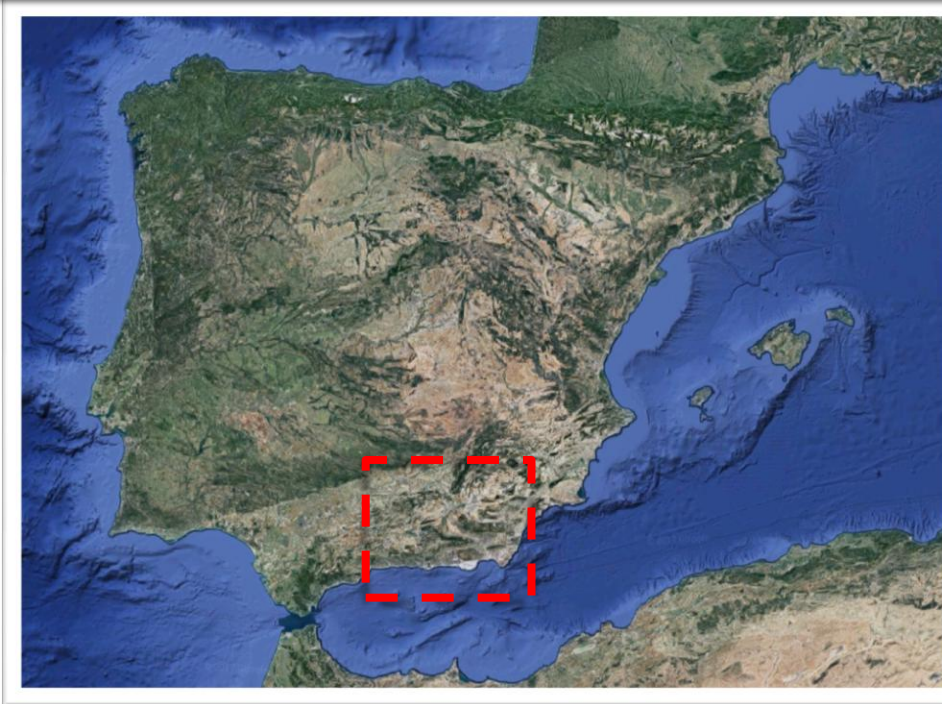
La Realidad del Laboratorio de Anatomía Patológica 100% Digital. Presente y Futuro en Granada

Dr Juan Antonio Retamero – Patólogo
Hospital Parque Tecnológico de la Salud, Granada



Disclaimer

Granada, Spain – Please come and visit!



Meet our team

Granada Campus Hospital

- 21 Pathologists
- 8 Residents
- 26 Technicians
- 2 Porters
- 4 Clerical

Motril Hospital

- 2 Pathologists
- 3 Technicians

Baza Hospital

- 1 Pathologists
- 3 Technicians
- 1 Clerical



**Fully Digital for Biopsy and Autopsy
H&Es
Since July 2016**

A little bit about myself...



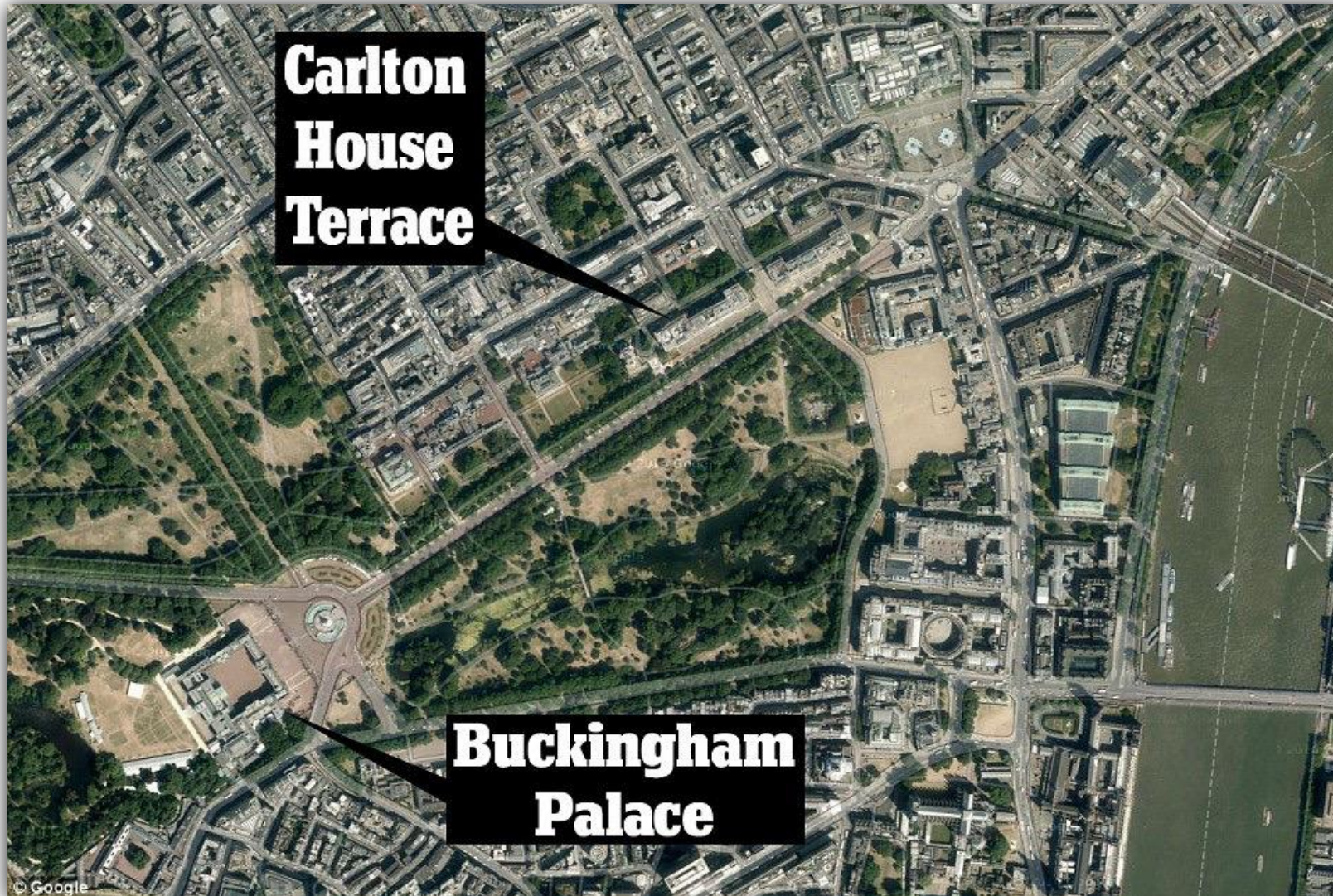
The Royal College of Pathologists
Pathology: the science behind the cure

H
OF
TS



JUNTA DE ANDALUCÍA

A little bit about myself...



A little bit about myself...

MailOnline

Thursday, Apr 14th 2016 5AM 8°C 8AM 7°C 5-Day Forecast

Now that's a fixer-upper! Mansion just a stone's throw from Buckingham Palace goes on sale for £75million... but you'll need ANOTHER £25million to make it habitable

- Carlton Terrace property has housed aristocrats and captains of industry
- King George V was a visitor to the house, which overlooks St James's Park
- Super-rich investors have already shown an interest in the palatial site



Province of Granada Laboratory Fusion (2011 – 2013)

Central Pathology Lab, Granada:

- Biopsy samples: 43202
- Citology samples: 48652
- Autopsies: 101

Granada Campus de la Salud



100km

Baza General 117 beds



- ## Baza General Hospital
- Biopsy samples: 3890
 - Citology samples: 3789
 - Autopsies: Centralized

VNH 944 beds



75km

Motril General 187 beds



- ## Motril General Hospital
- Biopsy samples: 9549
 - Citology samples: 38326
 - Autopsies: Centralized

919,455 inhabitants (2014)
1948 hospital beds

The New Hospital (December 2015)

Granada Campus Hospital

- 700 Rooms
- 26 Operating theatres
- 132 Outpatient consulting rooms

Public Tender awarded to Philips



The Astral Alignment

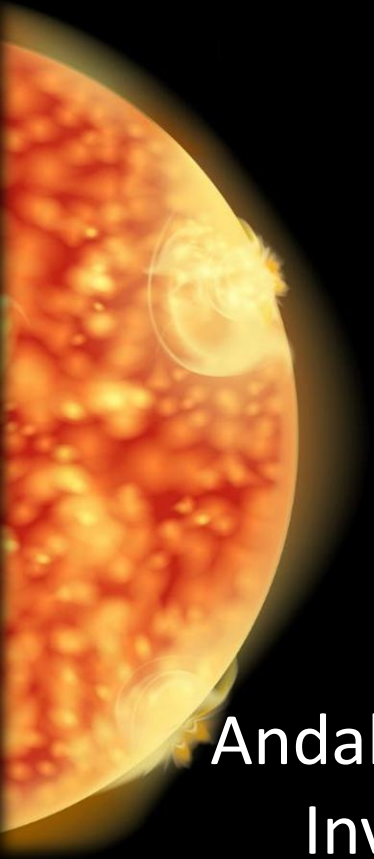
Moon

Department of Pathology



Sun

Andalusian Health Service
Investing Institution



Earth

Public tender awarded
to Philips



Our 100% Digital Lab

- 57,000 biopsies per year in Granada Province
- Approximately 74,000 digitized biopsies so far
- (Almost) complete sample traceability
- Our LIS
 - Vitropath – reporting
 - VTS – lab management
- Integrated with Central Patient Database (DIRAYA)
- Electronic request form
 - Cascade of events



Integration Philips-Vitropath

VitroPath® LIS



Philips IntelliSite Image Management System

INFORMADO
- LECTURA / CONSULTA HISTORIA, MARIA DEL ROSA / B16-23959 12 09

Estudio B16-23959

DATOS DEL ESTUDIO

Reg. P. GARRIDO BELTRAN, J... Cop. 1

Rec. 20/10/2016 09:02 Sal. / / / Administrativo ARCÍA, Mª Carmen Advo. Macro ARCÍA, Mª Carmen

Pet. 18/10/2016 09:01 F.Val. / / / Patólogo Aneiros Fernandez, Jose

Inf. / / / Pl. / / / Res. / Cit. LOPEZ LOPEZ, NICOLAS Asoc. C15-59059

Centro Destino GRANADA - COMPLEJO HOSPITALARIO G Consultores 0 Enviar a GRANADA - COMPLEJO HOSPITALARIO G

Servicio Destino ONCOLOGIA MEDICA Diag. Clínico carcinomatosis peritoneal con AP de adenocarcinoma.

MUESTRA A

Muestra*	Tipo de Estudio	Órgano	Material remitido
A	CASO DE CONSULTA	Peritoneo - T-D4400	
B	BIOPSIA ESCISIONAL		

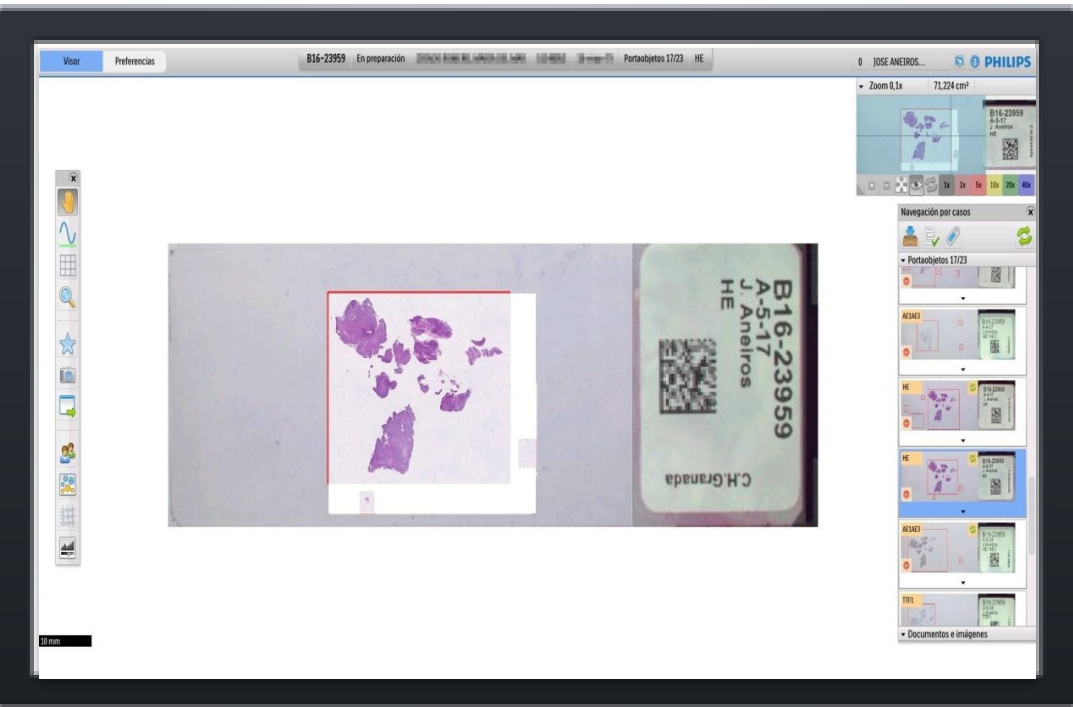
1 registros

Valoración Caso consulta 35 Foto ☐ Interesante ☐ Conservar ☐ Congelar ☐ Mic.Elec. ☐ R.T. ☐ B.B. ☐

F.Verificación / / /

Resp. / / / F.Registro / / / F.C.parcial / / / F.Sal. / / / F.Val. / / /

1.Macro 2.Micro 3.Diag. Preliminar 4.Diagnóstico 5.Notas 6.Codificaciones 7.Formularios



Integration of patient & biopsy data

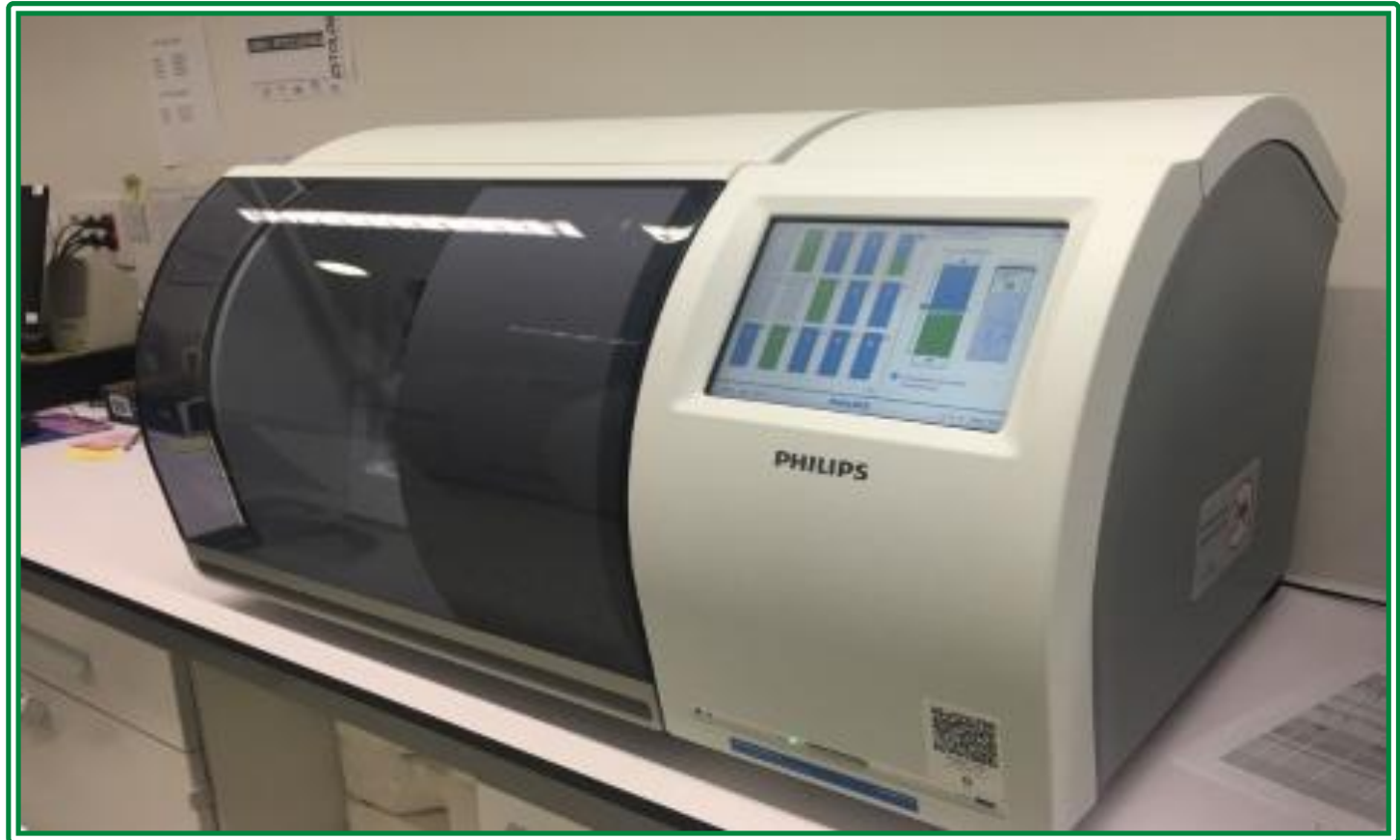
Hardware Setup

**Granada Central Hospital
2x Philips UFS**

**Granada Central Hospital
1x Sysmex Dark Field Scanner**

**Baza Hospital
1x Philips UFS**

**Motril Hospital
1x Philips UFS**



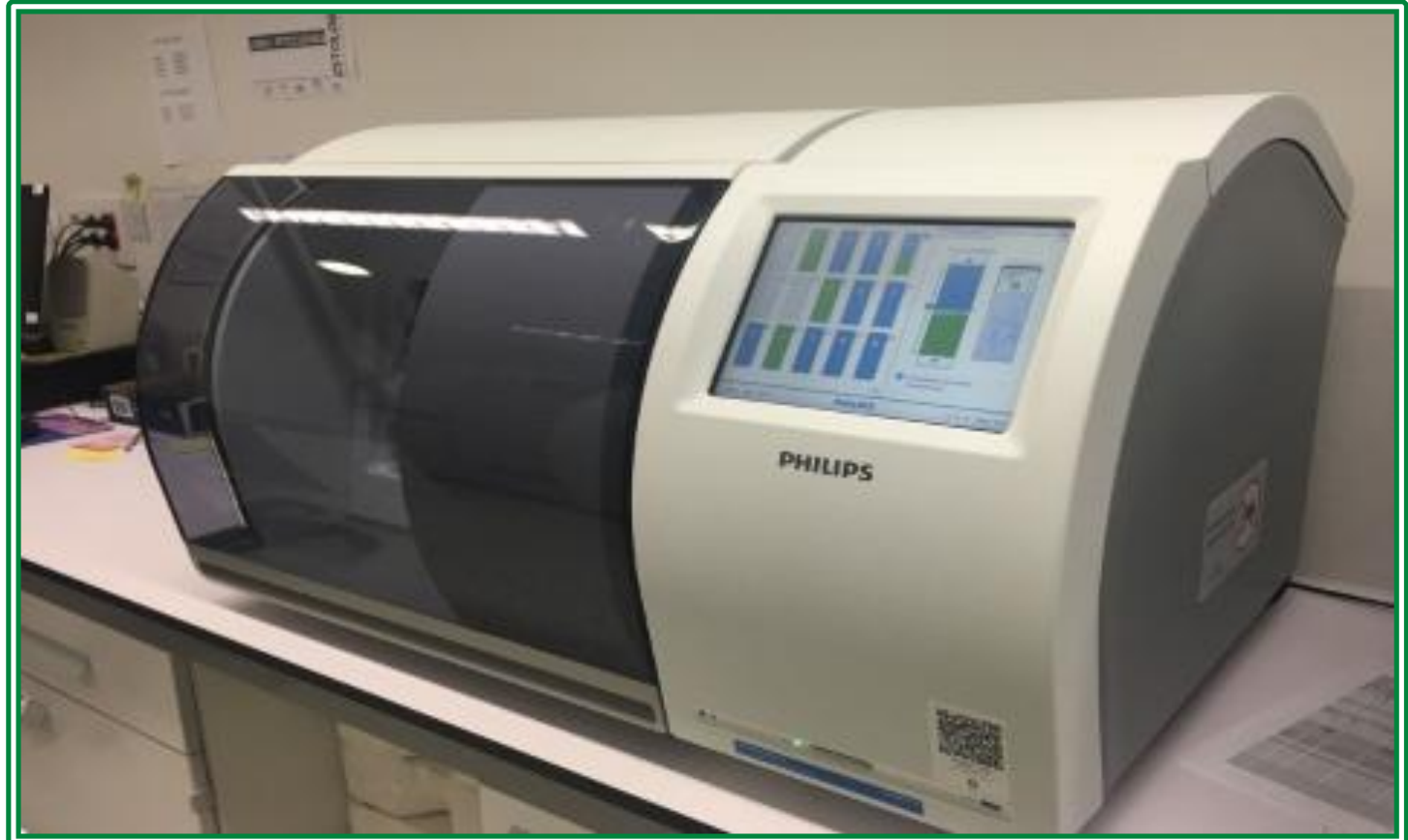
Hardware Setup

**Immediate Access Storage
350 TB**

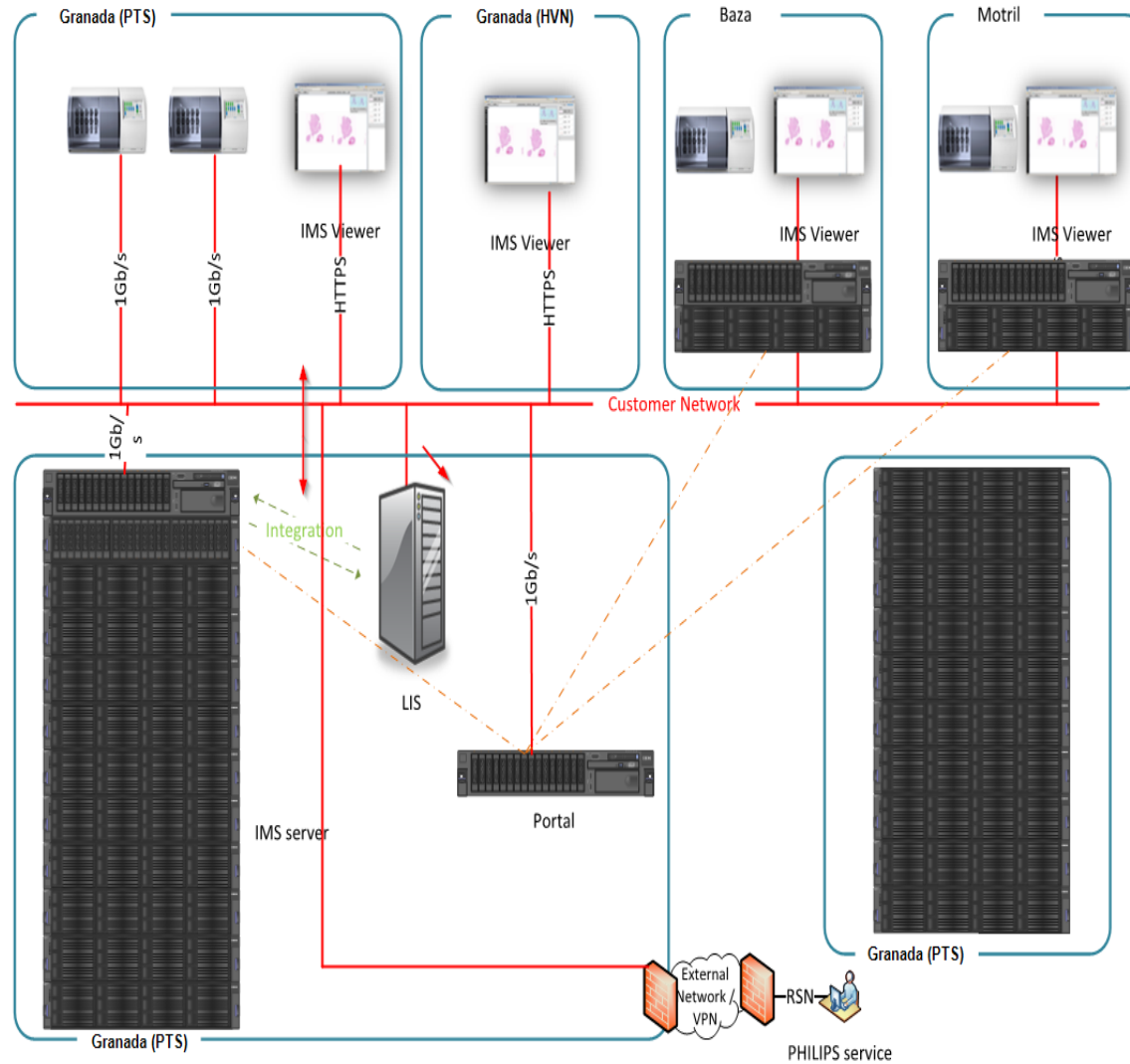
**Long Term Storage
1PB**

57,000 Cases per year

6GB per Case



Solution Design Architecture



What does 100% digital mean to Granada and our patients?

Baza Hospital slides are processed peripherally but assessed centrally by specialist team

Motril Hospital pathologists have instant expert opinion, because their cases are immediately available at Granada

Our pathologists have access to their biopsies when on call, at home...

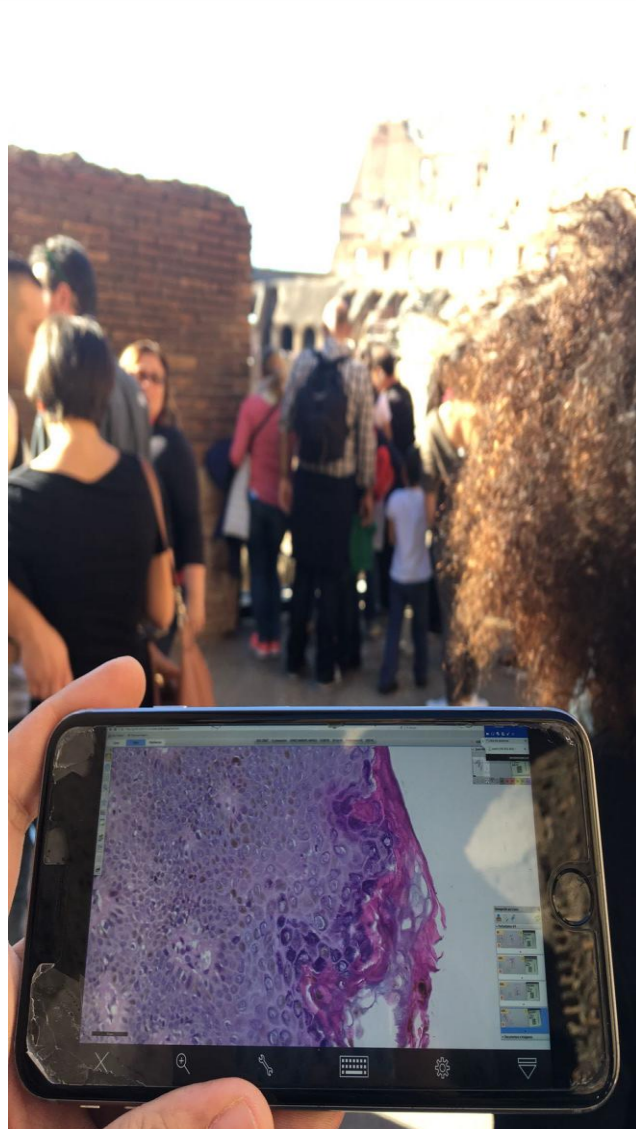
What does 100% digital mean to Granada and our patients?

(Subjective) Improvement in Workflow
Use of digital tools

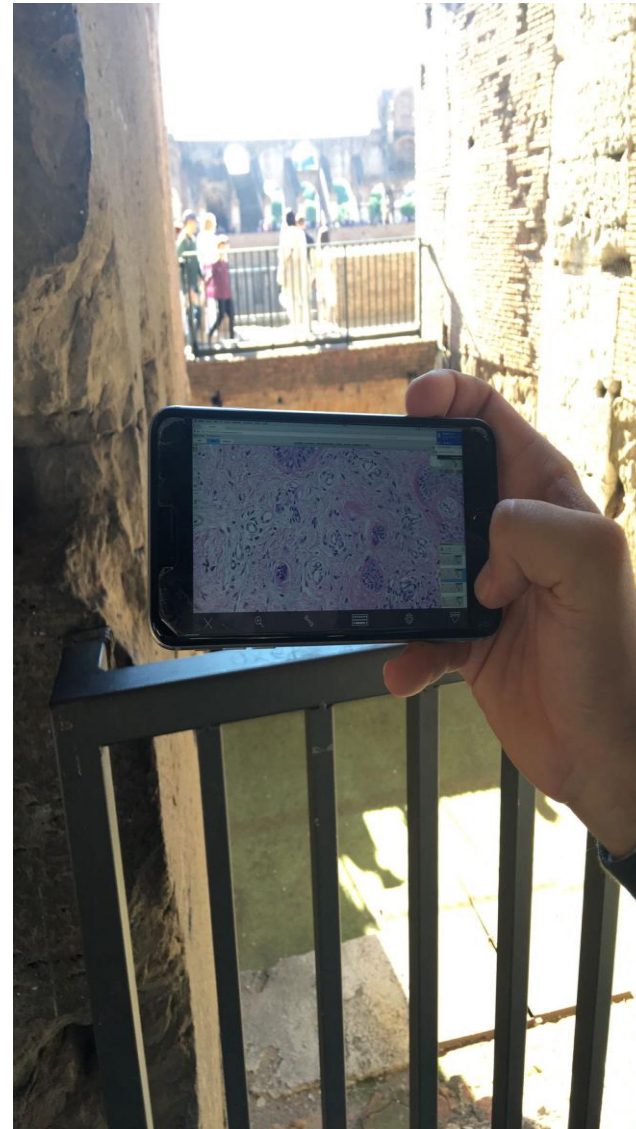
**100% Digital means some workflows are
redundant and not repeated**

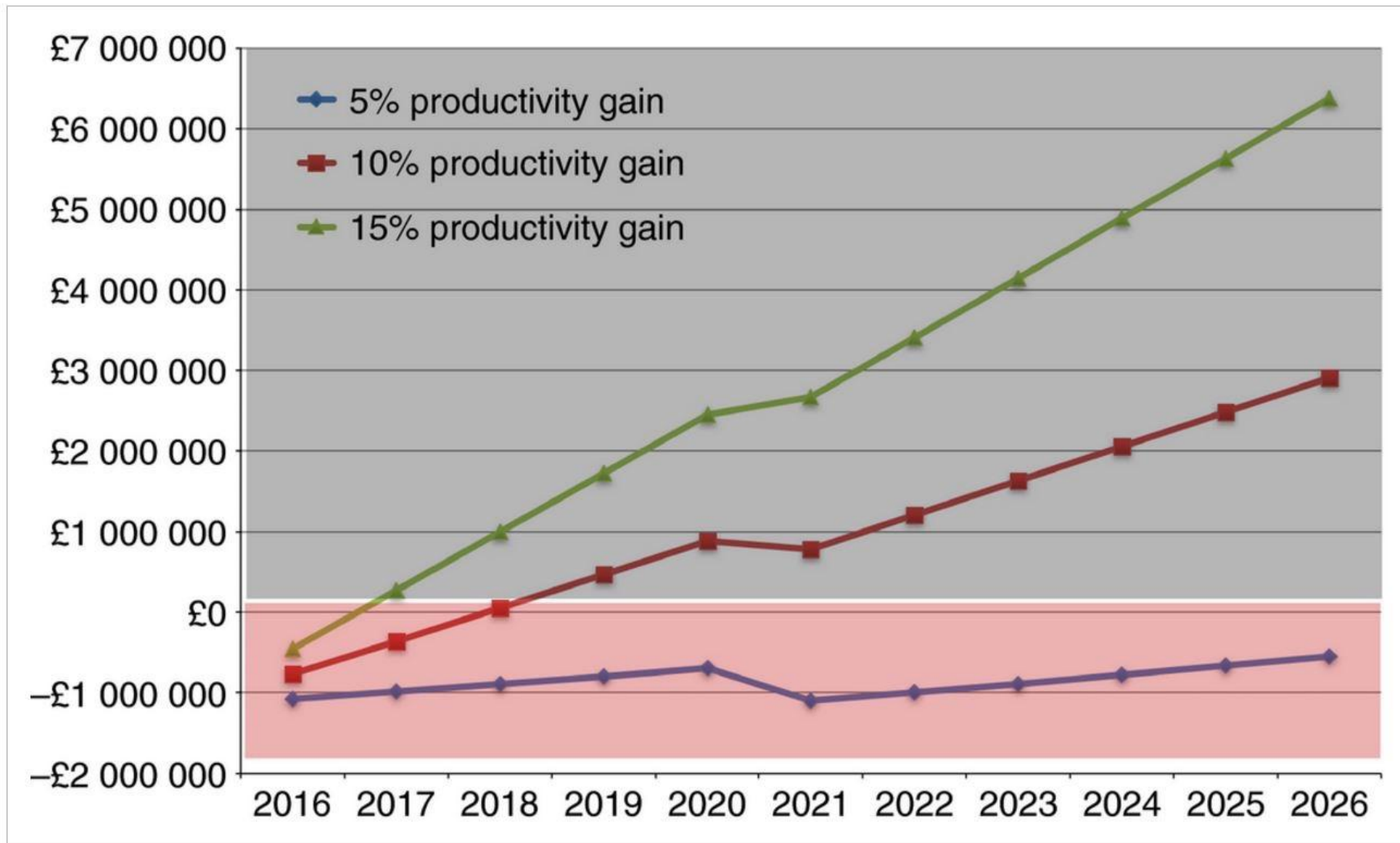
**Possibility to conduct consultations
outside our hospital network
(Philips Consultation Suite)**

What does 100% digital mean to Granada and our patients?



Images for illustrative purposes only, not for IVD





Griffin J, Treanor D. Digital pathology in clinical use: where are we now and what is holding us back? *Histopathology*. 2017 Jan;70(1):134-145

Barriers to implementation

Acceptance by Pathologists

Validation Studies

Change in Habits



A Digital Pathology Concerto

Central Patient History Database

**Laboratory Information System
(LIS)**

Image Viewer (Philips IMS)

**Intelligent Dispatching Algorithm
(Under development, Philips Research)**

**Open & Recognizable to each other
(HL7 messaging)**

A Digital Pathology Concerto



Open & Recognizable to each other
(HL7 messaging)

A Digital Pathology Concerto



A Digital Pathology Concerto



100% Biopsies & Autopsies...

*... but full digitization is only
the beginning*

On the road to Computational Pathology



On the road to Computational Pathology



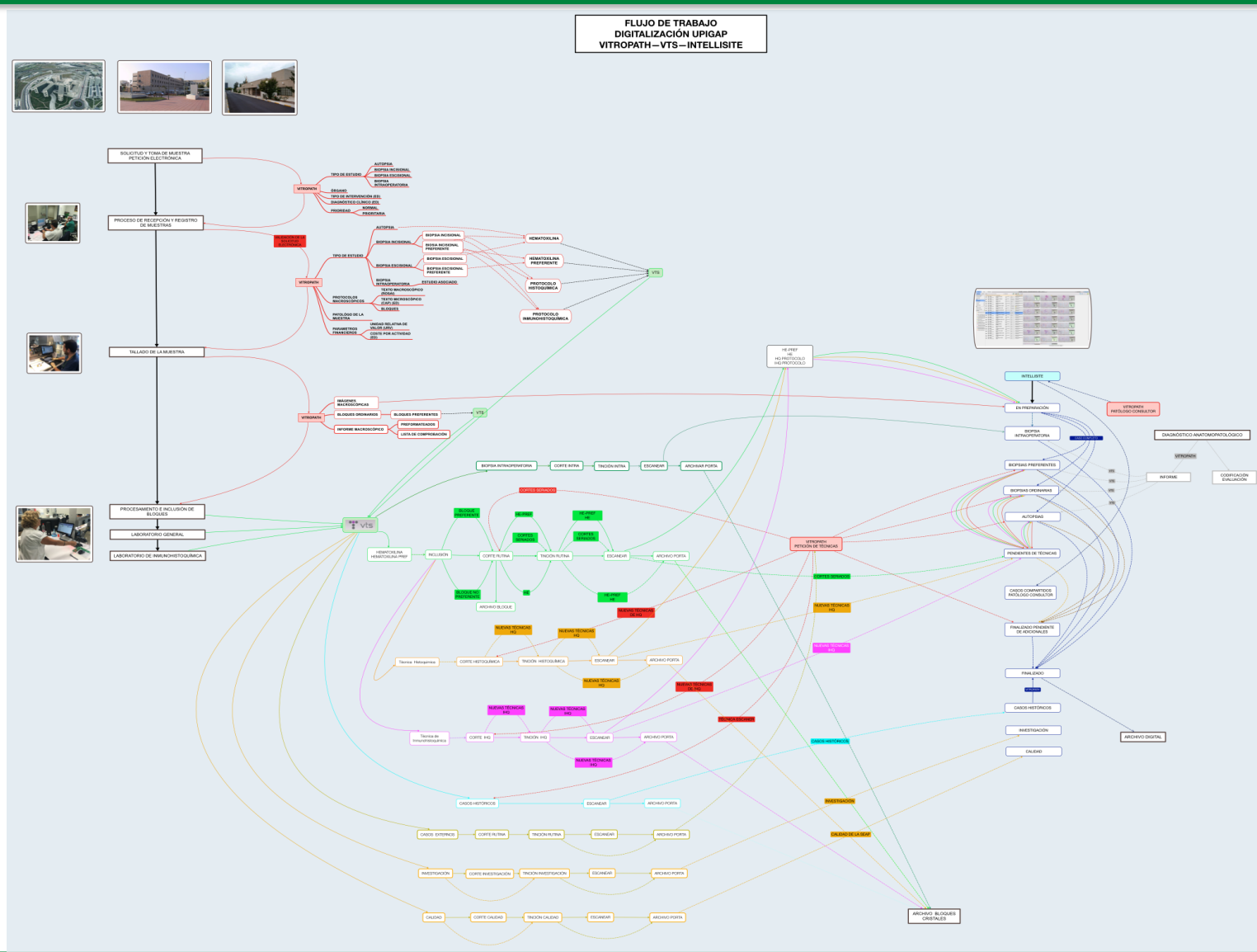
Computational Pathology

Digital Pathology

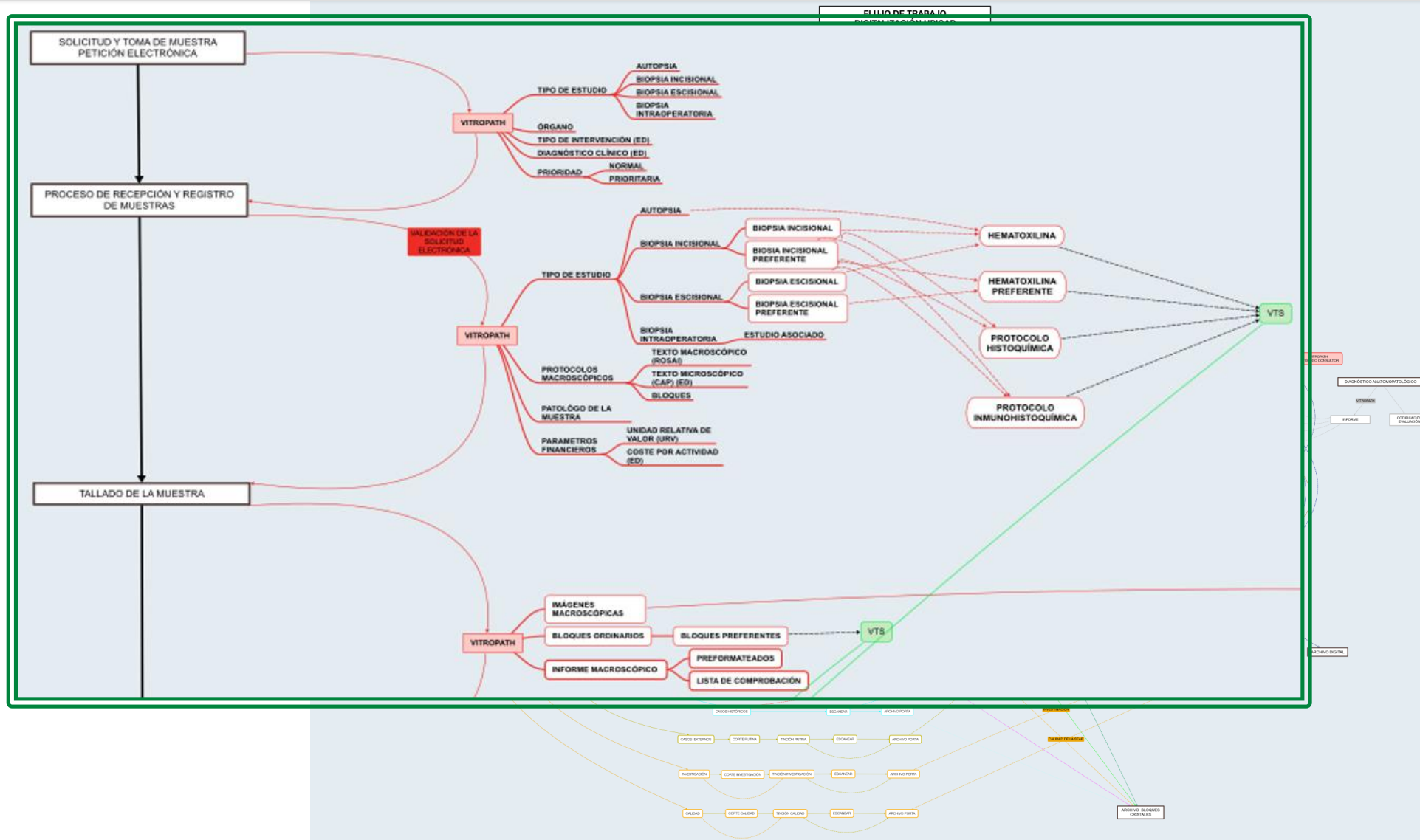
Sample Traceability

- Workflow optimization
- Use of diagnostic algorithms
- Image analysis
- Platform results
 - Genomic
 - Proteomic
 - Metabolomic
- Integration of Patient Info
- BIG DATA

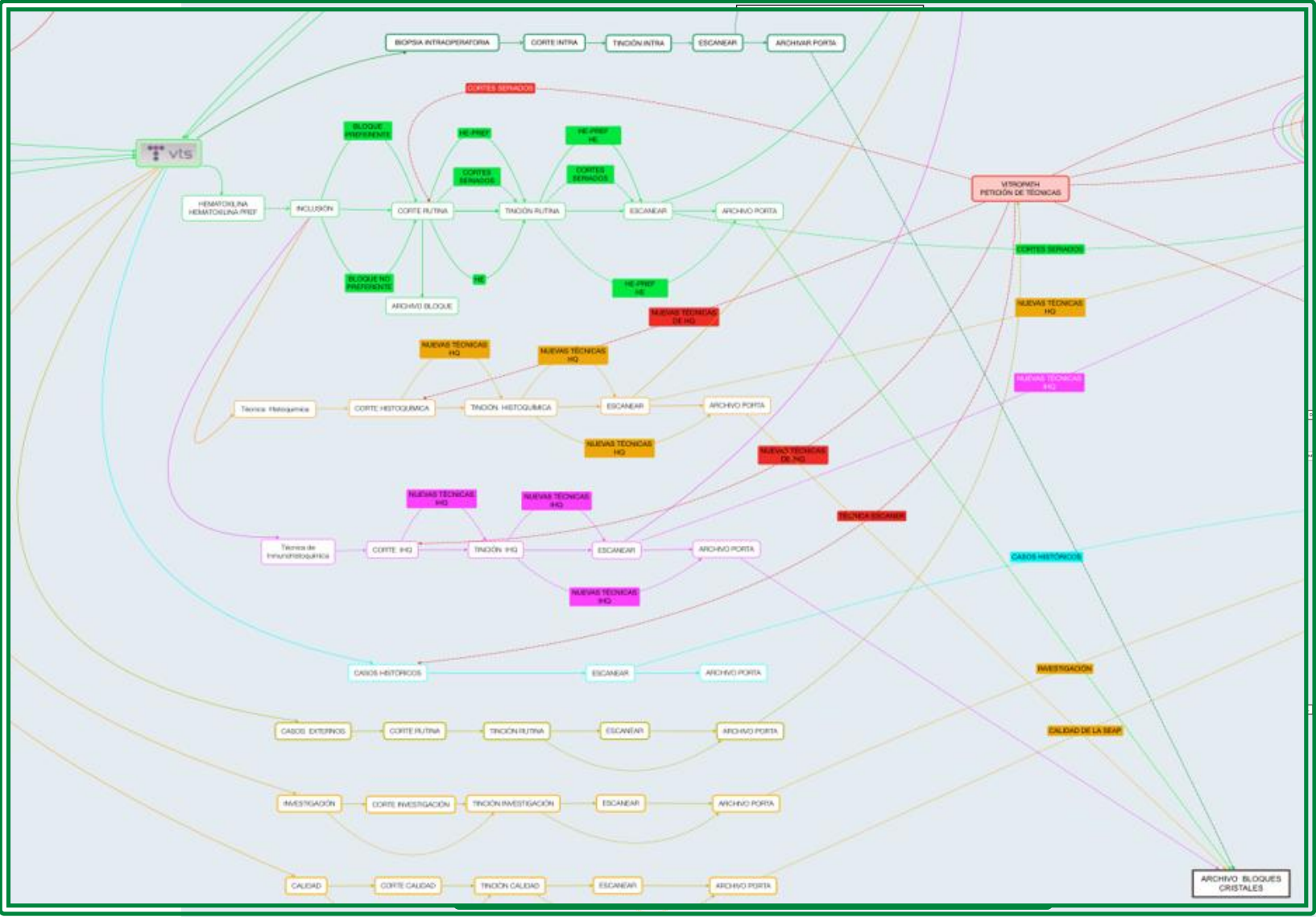
Workflow representation at Granada



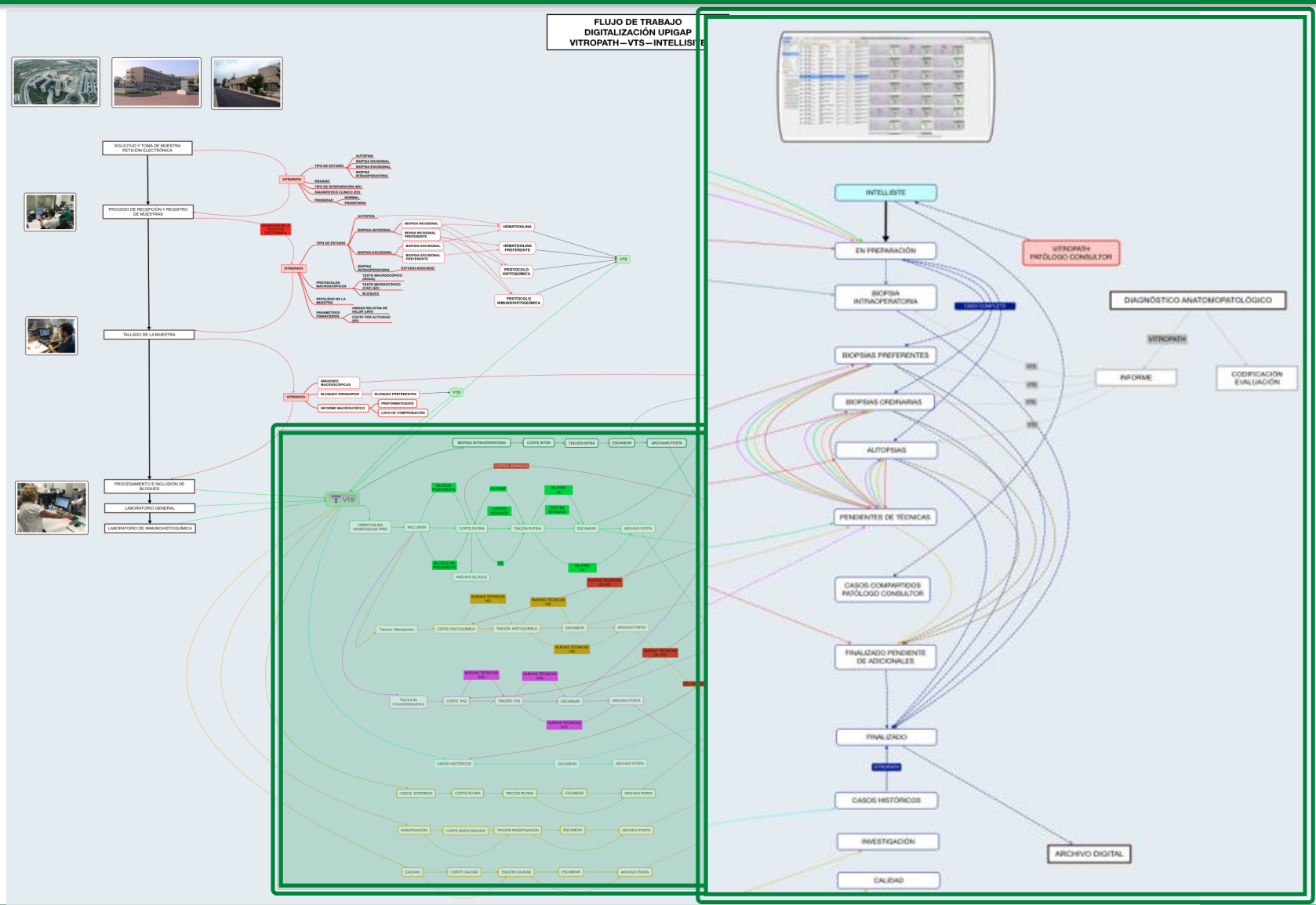
Workflow representation – VitroPath® LIS



Workflow representation – VTS LIS



Workflow representation – Philips IntelliSite



Intracentre flow and virtual slide trays

Casos

Visor

Preferencias

Mis casos

Laboratorio

Buscar...

ID del caso

1 caso(s) seleccionado(s)

Mostrando el caso 1-19 de 19 casos en "En preparación"

Categoría	ID	Código	Fecha	Edad	Sexo	Organismo	Estado	Acción
Activar prioridad								
Alta prioridad	0							
Casos	BAZ	B16-72310	13-oct-64 (52)	Fem.	1 Cérvix	ANEIROS FERNANDEZ, JOSE	En preparación	
En preparación	0	BAZ	12-jul-35 (81)	Masc.	1 Piel del rostro	ANEIROS FERNANDEZ, JOSE	En preparación	
Para revisión	0	BAZ	25-ene-65 (51)	Fem.	1 Mama	ANEIROS FERNANDEZ, JOSE	En preparación	
Biopsias Intraoperatorias	0	BAZ	18-may-47 (59)	Fem.	1 Piel	ANEIROS FERNANDEZ, JOSE	En preparación	
Biopsias Preferentes	0	BAZ	12-jun-54 (62)	Fem.	1 Piel del rostro	ANEIROS FERNANDEZ, JOSE	En preparación	
Biopsias Ordinarias	0	BAZ	12-ago-15 (1)	Masc.	2 Piel del tórax	ANEIROS FERNANDEZ, JOSE	En preparación	
Autopsias	0	BAZ	04-sep-77 (39)	Fem.	1 Piel	ANEIROS FERNANDEZ, JOSE	En preparación	
Citologías	0	GRA	15-may-79 (37)	Fem.	15 Peritoneo	ANEIROS FERNANDEZ, JOSE	En preparación	
Pendientes de TécnicaS	0	GRA	18-mar-47 (59)	Masc.	5 Uretra	ANEIROS FERNANDEZ, JOSE	En preparación	
Casos Compartidos	0	GRA	31-jul-47 (59)	Masc.	1 Piel	ANEIROS FERNANDEZ, JOSE	En preparación	
Finalizados Ptes de Adicionales	0	GRA	22-may-61 (55)	Masc.	1 Piel	ANEIROS FERNANDEZ, JOSE	En preparación	
Finalizado	0	GRA	05-sep-80 (16)	Masc.	5 Piel	ANEIROS FERNANDEZ, JOSE	En preparación	
Casos Históricos	0	GRA	18-dic-48 (67)	Masc.	1 Piel	ANEIROS FERNANDEZ, JOSE	En preparación	
Research	0	GRA	02-mar-64 (52)	Fem.	1 Piel	ANEIROS FERNANDEZ, JOSE	En preparación	
Calidad	0	GRA	18-ago-78 (38)	Masc.	1 Piel	ANEIROS FERNANDEZ, JOSE	En preparación	
Todo lo anterior	5	GRA	29-jun-44 (72)	Fem.	1 Piel	ANEIROS FERNANDEZ, JOSE	En preparación	
Otro	0	GRA	25-ene-89 (27)	Fem.	1 Piel	ANEIROS FERNANDEZ, JOSE	En preparación	
Acción requerida	16	GRA	12-jun-01 (15)	Fem.	1 Piel	ANEIROS FERNANDEZ, JOSE	En preparación	
Elementos eliminados	0	GRA	26-may-21 (85)	Fem.	1 Piel	ANEIROS FERNANDEZ, JOSE	En preparación	

Archivar

Etiquetas

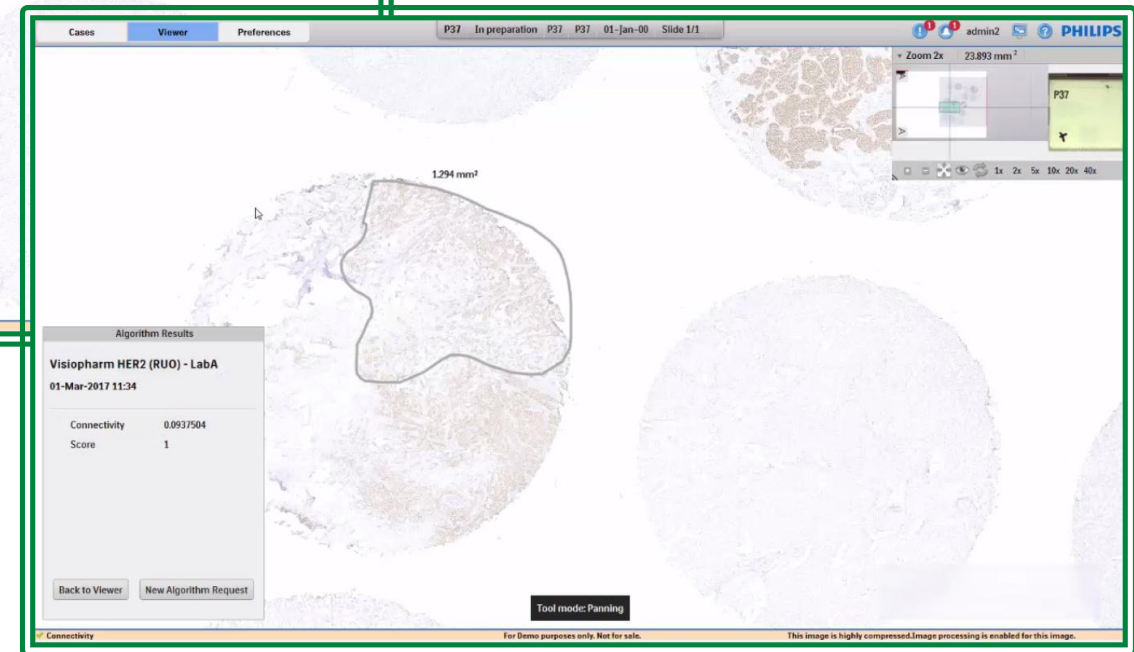
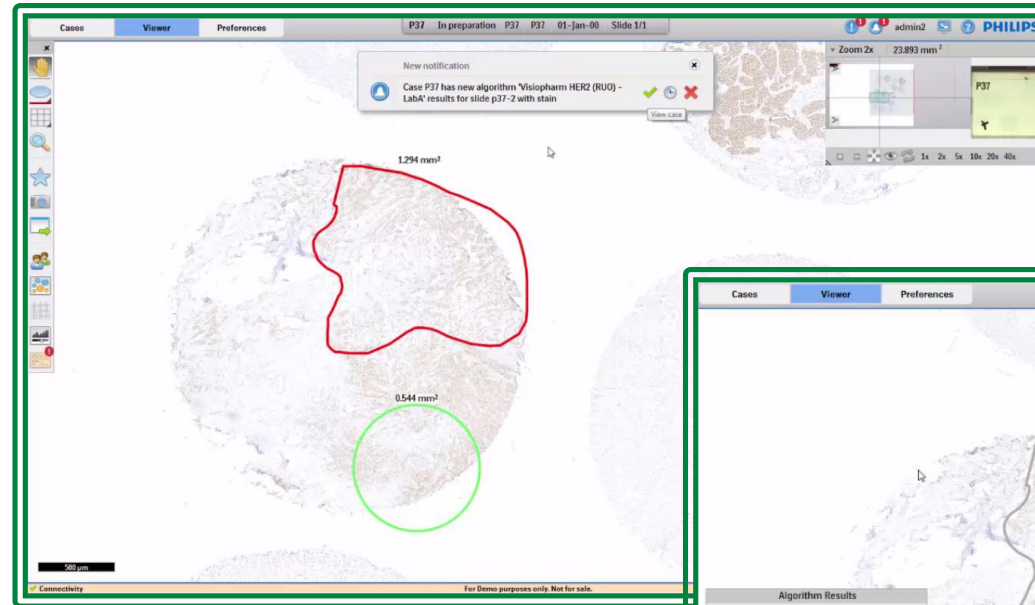
1 caso(s) seleccionado(s)

Mostrando el caso 1-19 de 19 casos en "En preparación"

1 caso(s) seleccionado(s)

Mostrando el caso 1-19 de 19 casos en "En preparación"

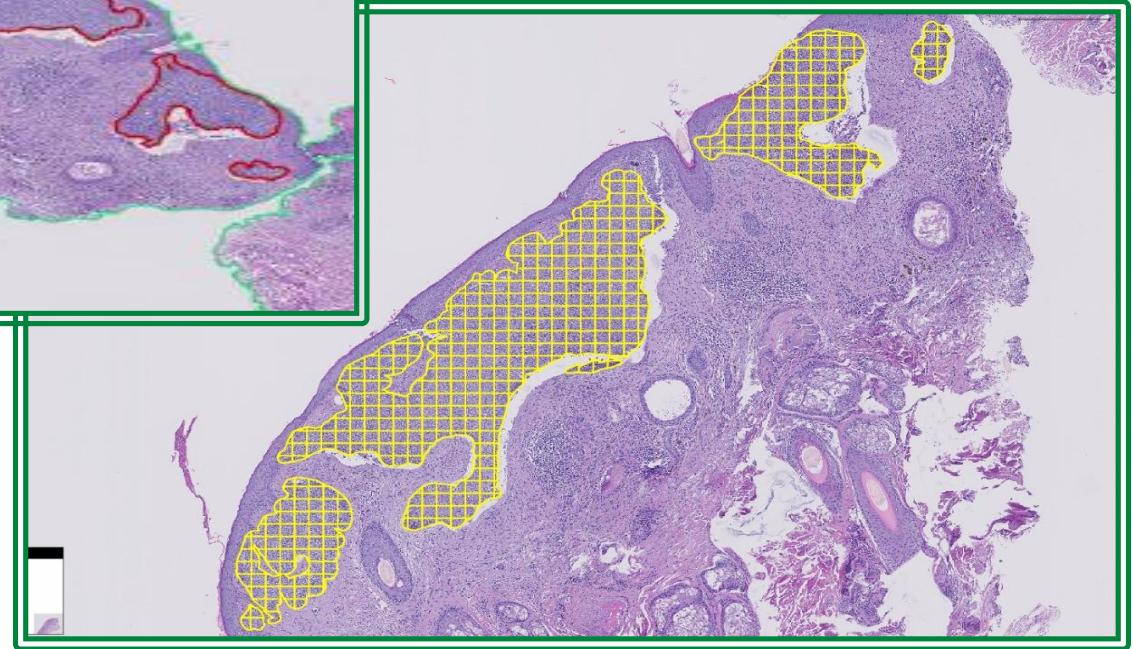
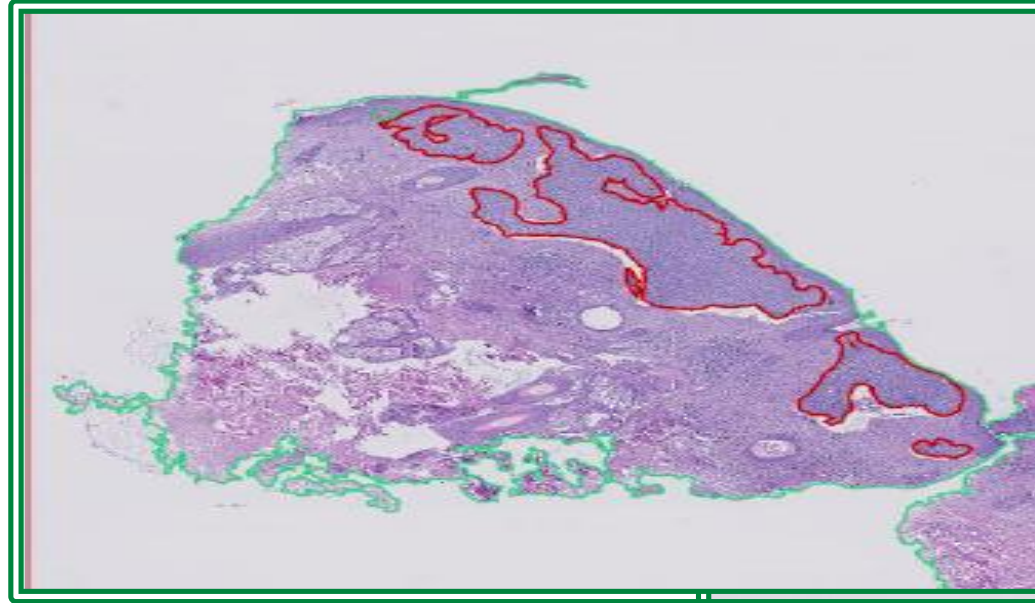
Next steps: Integration of CE-IVD algorithms



Algorithms for Breast IHC panel

- HER2
- ER
- PR
- Ki-67

Next Steps: Automatic Quantification of Skin Basal Cell Carcinoma



*Granada's own internal
development and progress in
Computational Pathology*

Next Steps: Automatic Quantification of Skin Basal Cell Carcinoma



43^a Reunión del Grupo Español de Dermatopatología

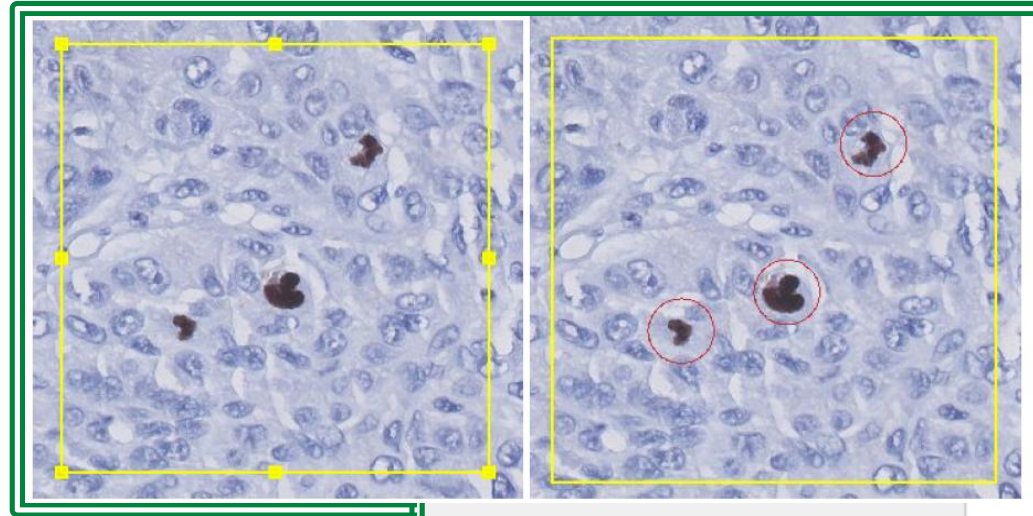
Barcelona, 10 y 11 de noviembre de 2017

Computational Pathology

Next steps: Automatic Mitotic Counting with Phospho-histone H3 in Melanoma



*Granada's own internal
development and progress in
Computational Pathology*



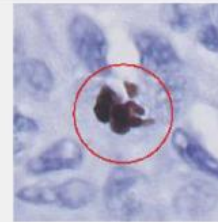
VALIDATION

Image:
B16-21375-A-2-5_PHH3_20160928_2030
26_18
Annotation: 18



Positive Negative

Image:
B16-21375-A-2-5_PHH3_20160928_2030
26_21
Annotation: 21



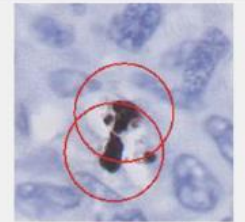
Positive Negative

Image:
B16-21375-A-2-5_PHH3_20160928_2030
26_22
Annotation: 22



Positive Negative

Image:
B16-21375-A-2-5_PHH3_20160928_2030
26_24
Annotation: 24



Positive Negative

Conclusion

Digital pathology is not an end in itself, but rather the beginning of computational pathology, that will produce Big Data for each tumour, for each patient, for each organization for both personal and collective use (personalized medicine, clinical trials, epidemiology and cancer genetics, etc.)

Take home messages

Think computational pathology!

Get the right tools for the job

Get the right partner

Thank you

