



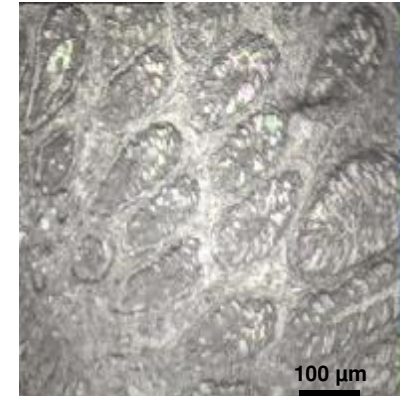
MId- to NEaR infrared spectroscopy
for improVed medical diAgnostics

MINERVA

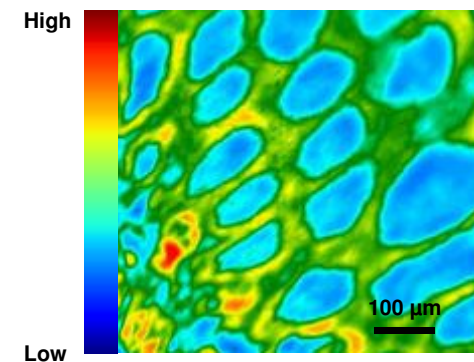
Project introduction

MINERVA motivation: improve early cancer diagnosis

- **Early cancer diagnosis reduces mortality**
 - Single most important factor
 - Identification whilst cancer is surgically curative
- **Early identification is very difficult**
 - Cancerous cells are very similar to healthy cells
 - Diagnosis becomes easier as the cancer develops
- **Mid-IR spectroscopy offers new tool**
 - MINERVA considers wavelengths $\sim 1.5\text{-}12\ \mu\text{m}$.
 - Broadband supercontinuum (SC) sources
 - Many organic molecule absorption peaks
 - Could offer clinicians additional information
 - Skin cancer detection (rigid skin probe)
 - High throughput microscope-based pathology screening.



Unstained normal colonic mucosa tissue section (7 μm thick) on calcium fluoride substrates



IR spectral image (Amide I peak)

Images courtesy of University of Exeter

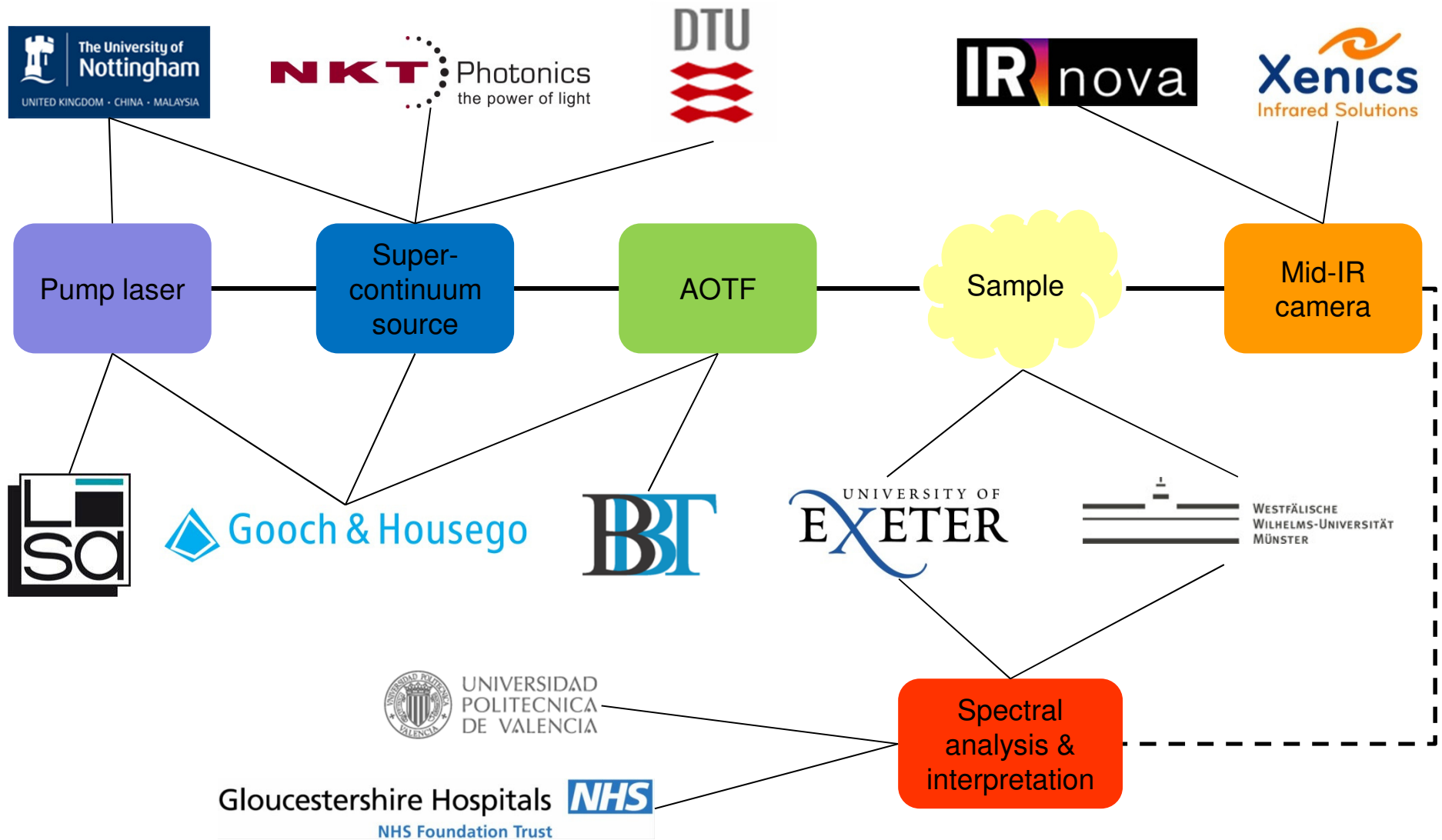
Project information

- **MINERVA is funded under the European Commission's Seventh Framework Programme**
 - Programme acronym FP7-ICT
 - http://cordis.europa.eu/fp7/ict/home_en.html
- Funding scheme : Large-scale integrating project - CP-IP
- Activity : ICT-8-3.5 - Core and disruptive photonic technologies
 - Project Reference 317803
- Project cost 10.6 M€
- Project funding 7.3 M€
- Start date 01-Nov-2012
- End date 31-Oct-2016
- Duration 48 months.

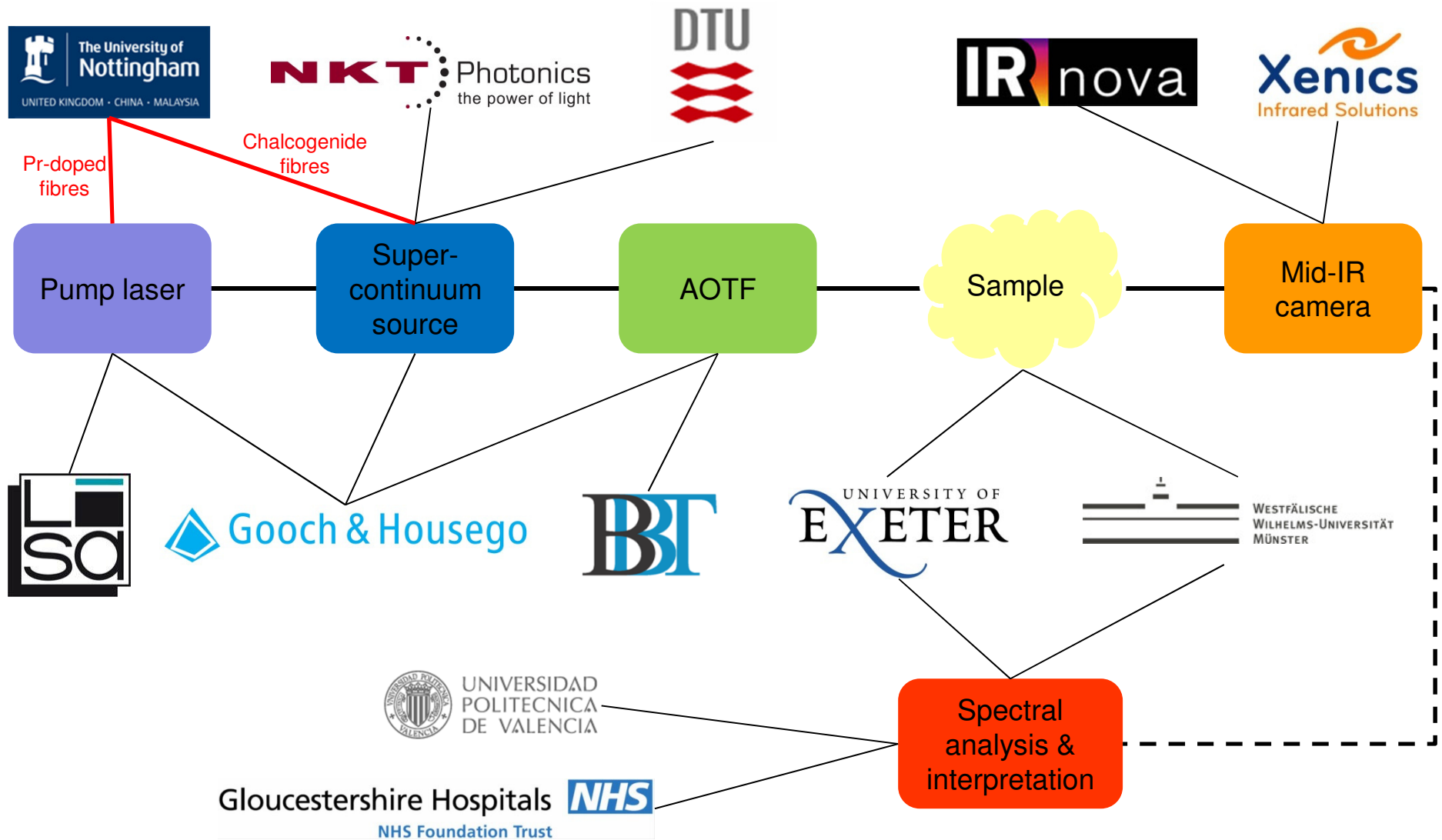
Consortium

1	Gooch & Housego (UK) Ltd. <i>Gooch & Housego (Torquay) Ltd.</i>	UK (Coordinator) <i>UK (Third party)</i>
2	NKT Photonics A/S	DK
3	LISA Laser Products OHG	D
4	BBT-Materials Processing SRO	CZ
5	Xenics NV	B
6	IR Nova AB	S
7	University of Nottingham	UK
8	Technical University of Denmark	DK
9	Vivid Components Ltd.	D
10	Westfaelische Wilhelms-Universitaet Muenster	D
11	The University of Exeter	UK
12	Gloucestershire Hospitals NHS Foundation Trust	UK
13	Universidad Politecnica de Valencia	E

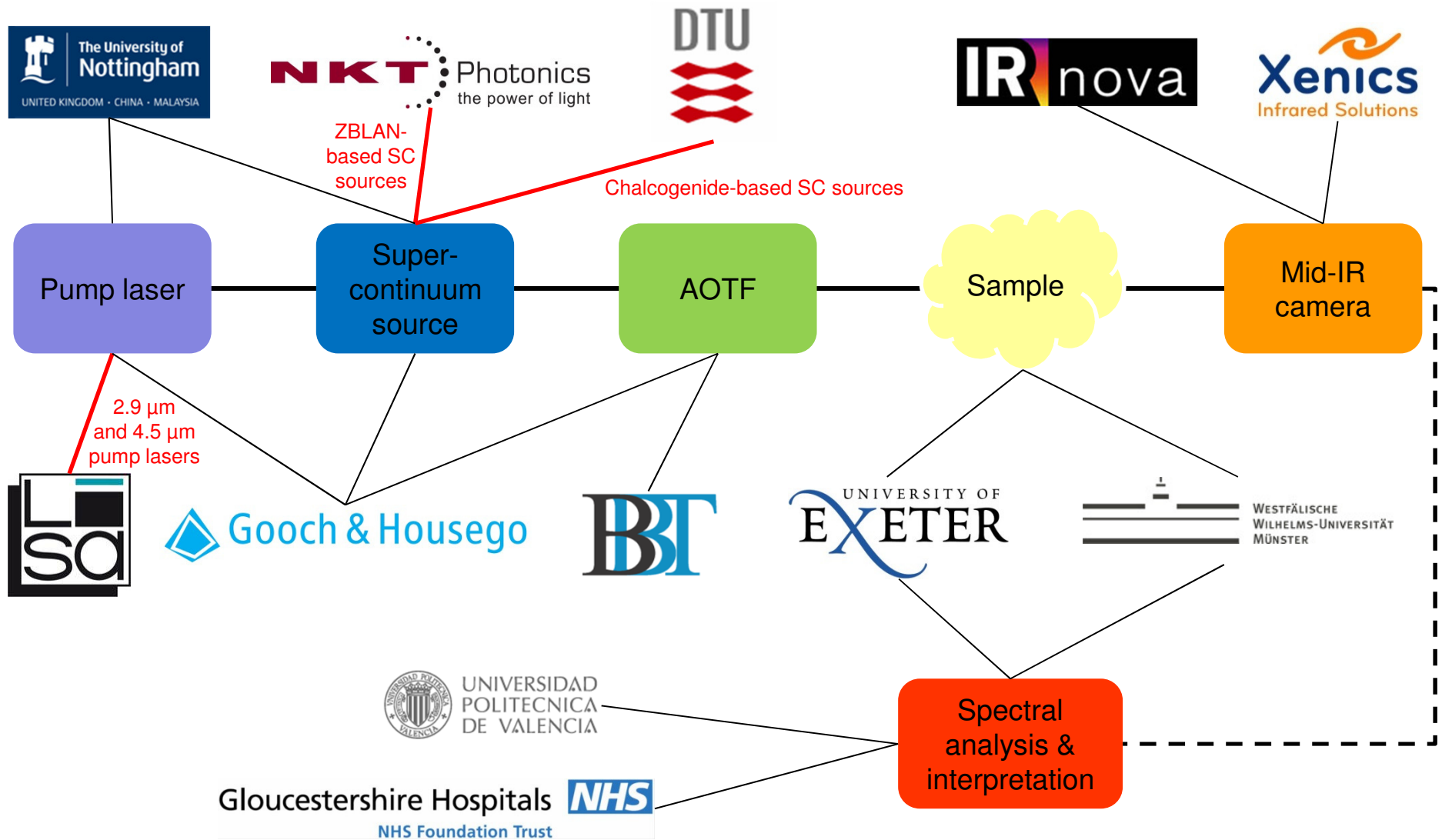
System overview



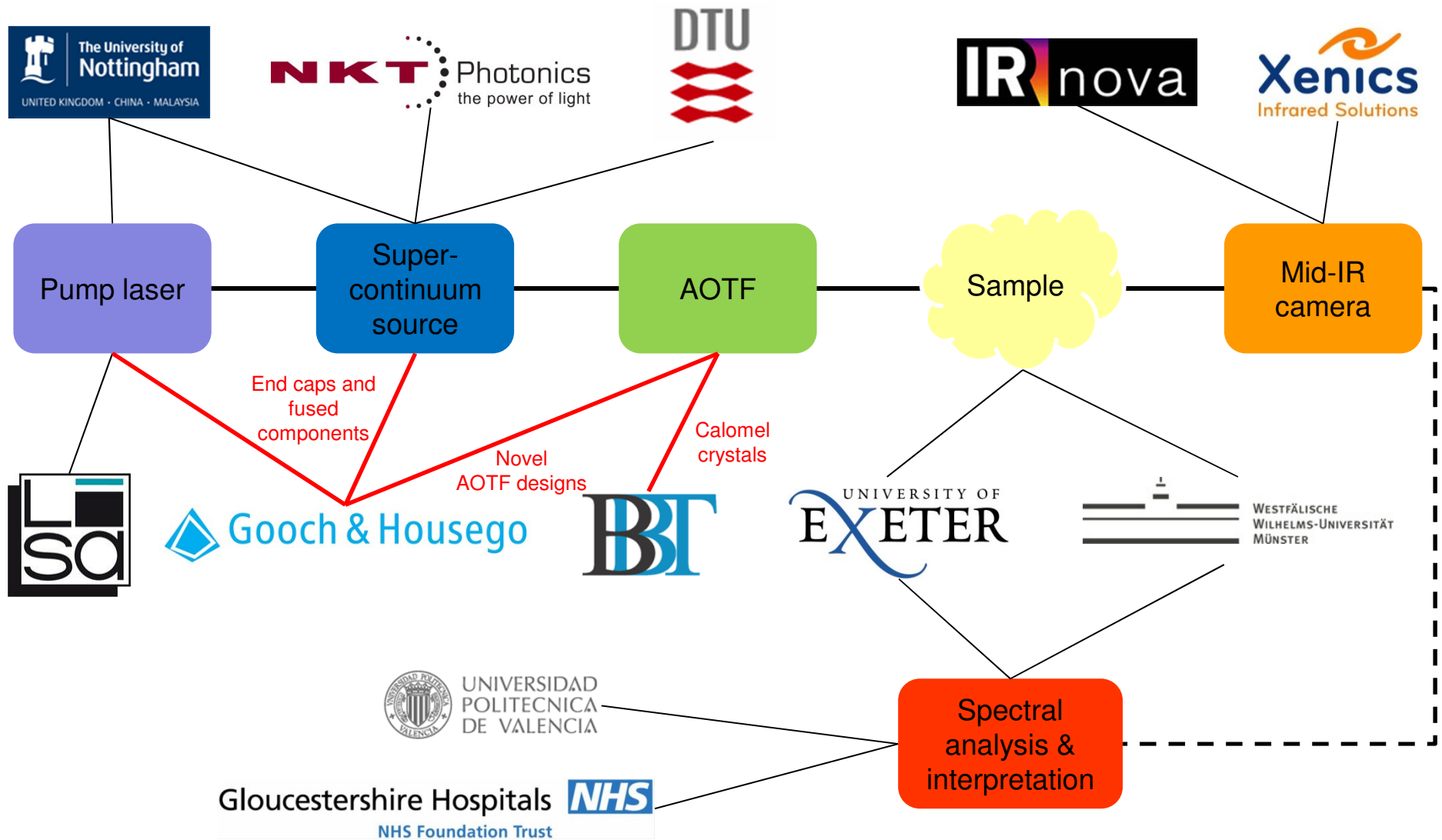
System overview



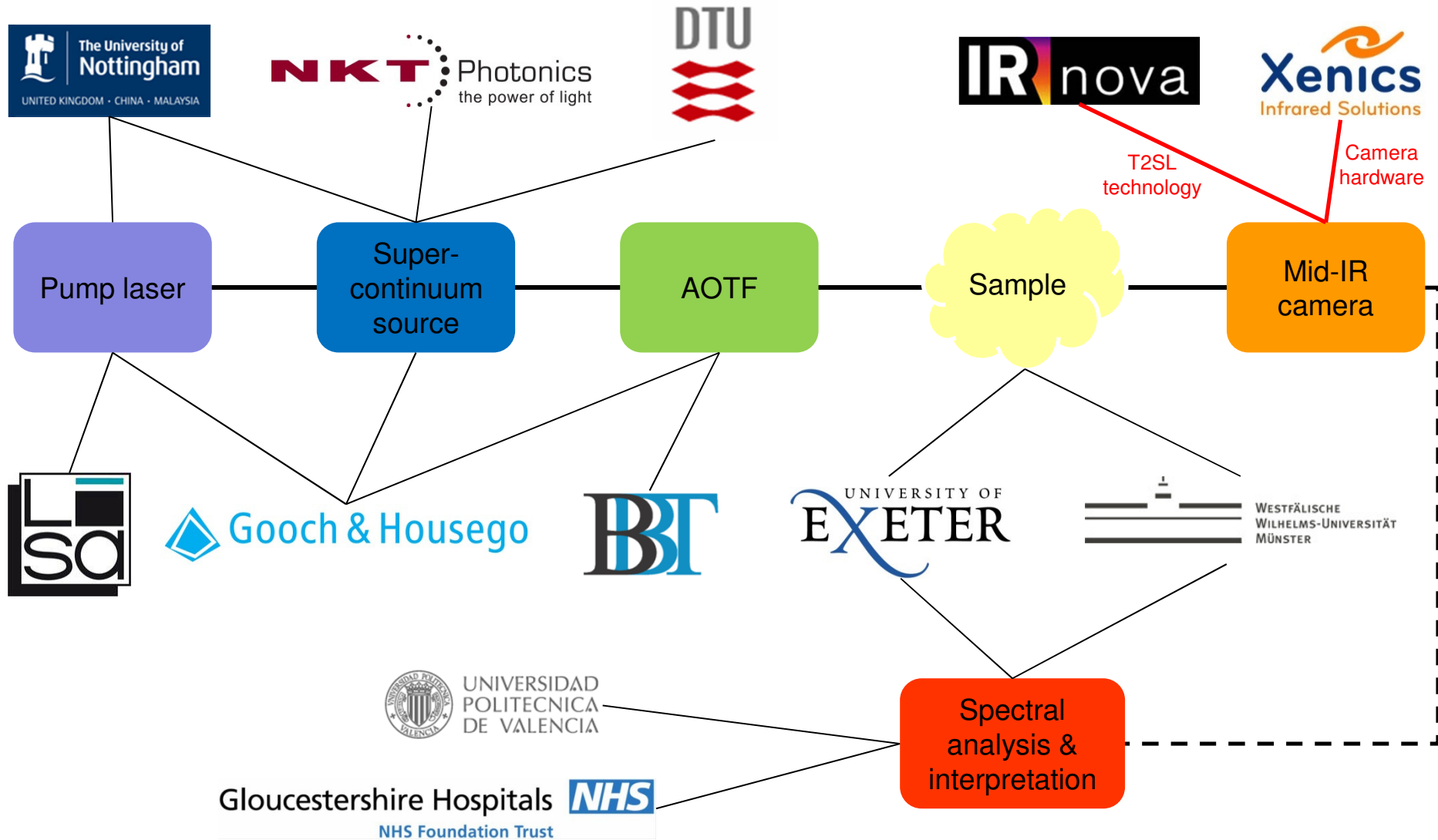
System overview



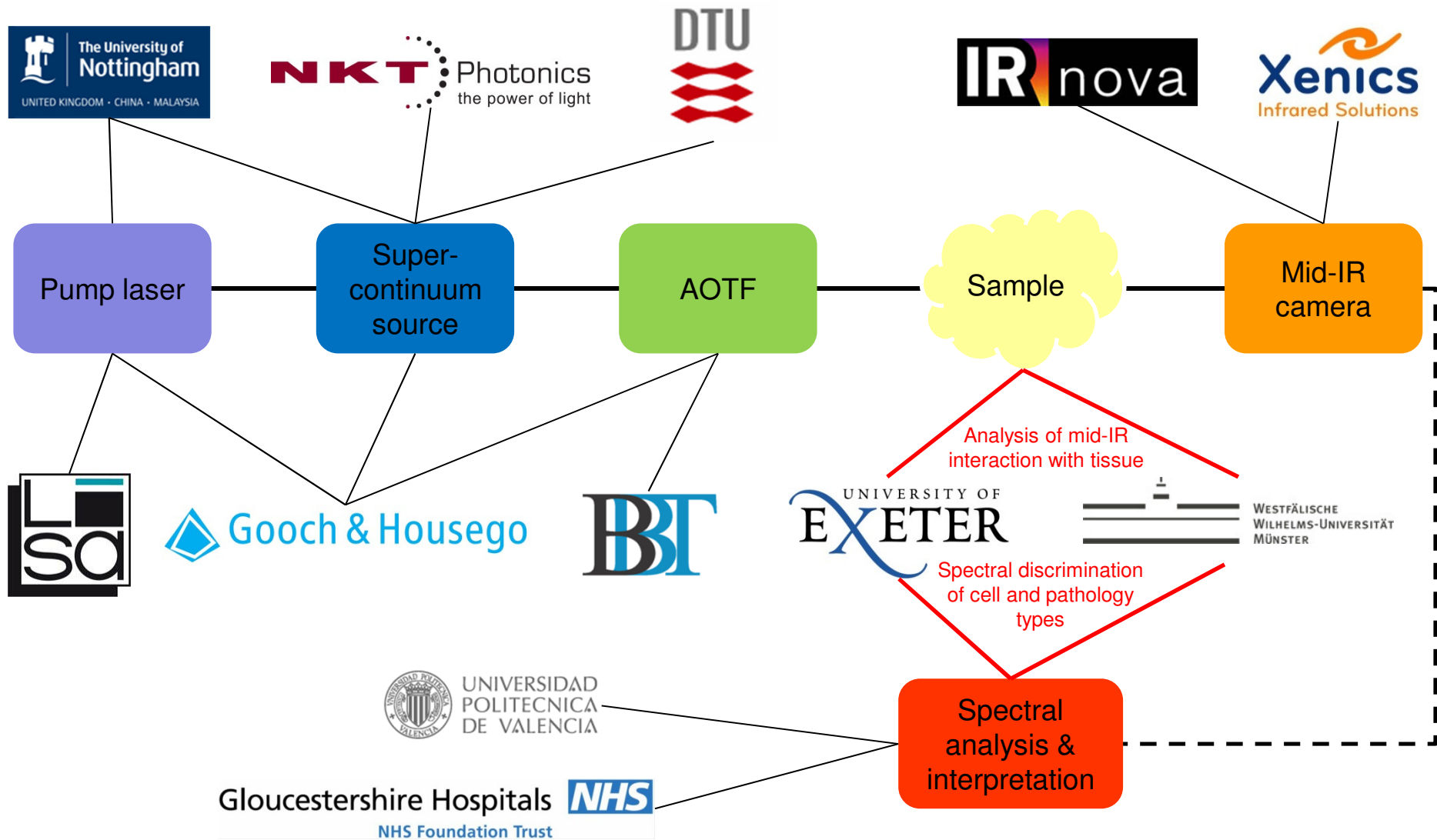
System overview



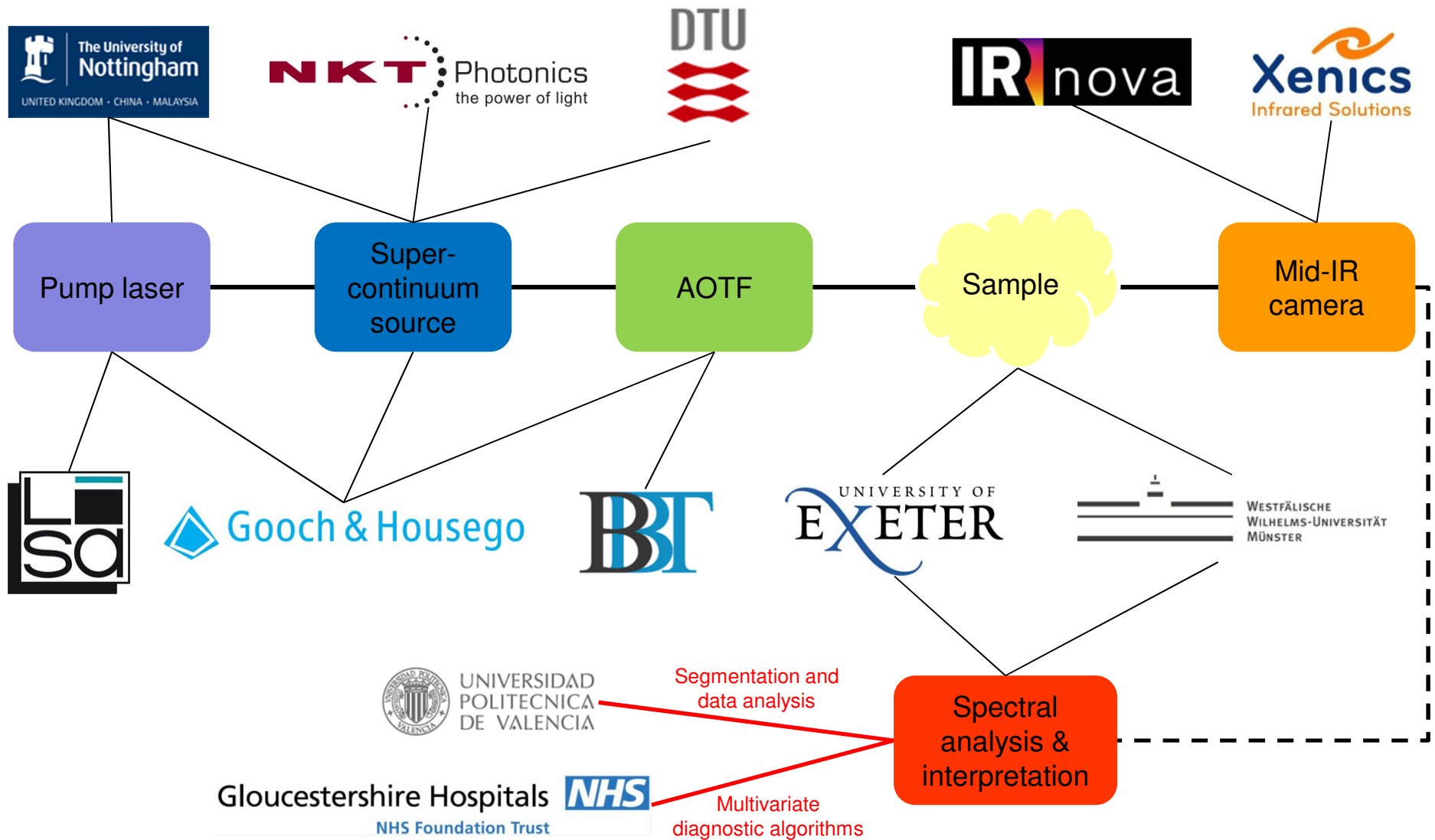
System overview



System overview



System overview



Selected MINERVA technical highlights

- Record long wavelength SC generation (1.4-13.3 μm) Nature Phot. **8**, p. 830 (2014)
- Longest wavelength ZBLAN SC source (1.2 W; 4.75 μm) Conf. Adv. Solid State Lasers
JTh5A (2013)
- Highest peak power 2.9 μm laser (10.6 kW) CLEO Europe paper CJ-7.2 (2015)
- Highest NA in a mid-IR optical fibre Opt. Mat. Exp. **4**, p. 1444 (2014)
- Lowest loss and longest transmission in Ge-As-Se fibre (52 m) Opt. Mat. Exp. **5**, p. 1722 (2015)
- Record Pr mid-IR luminescence and lifetime in small-core optical fibre Opt. Exp. **22**, p. 21236 (2014)
Opt. Mat. Exp. **5**, p. 870 (2015)
- First ever SM ZBLAN fused fibre coupler PW16. Tomorrow! Paper 9730-7
- Largest calomel crystals produced (35 mm diameter) PW16. Today! Paper 9703-3

MINERVA Advisory Group

- MINERVA welcomes contact from interested parties to:
 - Guide MINERVA research
 - Develop new exploitation routes for mid-IR technology
 - Identify novel applications
- Target organisations:
 - End users (hospitals, medical practitioners)
 - Research organisations (bio-medical and photonic)
 - Universities
 - Industrial companies.

Contact

Thanks for your attention!

www.minerva-project.eu

Project website

For further information please contact:

jward@goochandhousego.com

Technical

bruce@vividcomponents.co.uk

Admin & Advisory Group