

Shared Research Program

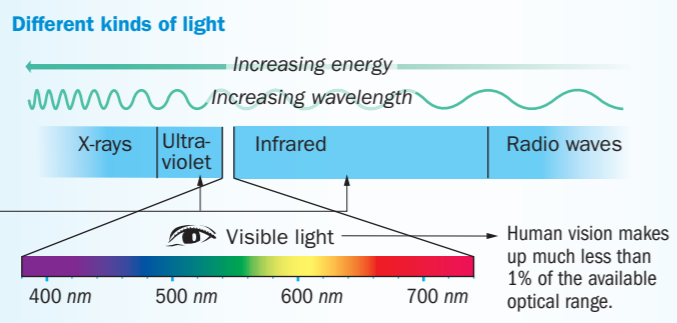
Enhancing medical diagnosis and therapy by applying multi- and hyper-spectral technologies

1 What are multi and hyper spectral technologies?

Different colours in the range of visible light correspond to different wavelengths. Light beyond the visible spectrum may also be used to gain more information from a wider range of wavelengths.

Devices utilising multiple wavelengths across a wide-spectrum are referred to as multi- and hyper-spectral technologies.

Multi- and hyper-spectral technologies utilise a much wider spectrum than that visible to the human eye.



Multi- and hyper-spectral techniques for medical applications

- Multispectral image enhancement**
 - Contrast enhancement using multiple wavelength information
 - Hidden or "invisible" tissue structures become visible
- Hyper-spectral image enhancement**
 - Every pixel is a spectrometer
 - Making a huge amount of information available throughout the image
- Image enhancement with tissue recognition added**
- Tissue recognition**
 - Single point measurement
 - Imaging with spatial resolution

Goal

Enhancing medical diagnosis and therapy.

2 Techniques

Image enhancement
Hidden or "invisible" tissue structures become visible

Visible image | Infrared enhanced image

Vessels

Hyper-spectral tissue imaging
Every pixel is a spectrometer making a huge amount of information available in one image.

Tissue | Hyper-spectral information

Infrared layers | Visible layers | UV layers

Hyper-spectral image containing hyper-spectral information

Image enhancement with tissue recognition added
Based on real-time spectral measurements, trained algorithms and models, tissue recognition can be performed and augmented back into the image.

Visible image | Hyper-spectral information | Tissue recognition | Hyper-spectral enhanced image

Infrared layers | Visible layers | UV layers

Tissue X | Vein | Artery | Nerve

Tissue recognition
Algorithms have been developed and implemented to categorise and recognise tissue.

Single point measurement | Tissue recognition

Measurement instrument | Skin Fat | Tissue X

Spectrometry for non-invasive blood component measurement
With selected light sources and sensors a wide range of measurements can be performed.

Absorption spectrometry measurement

Sensor | Vessels | LED light | Fingertip

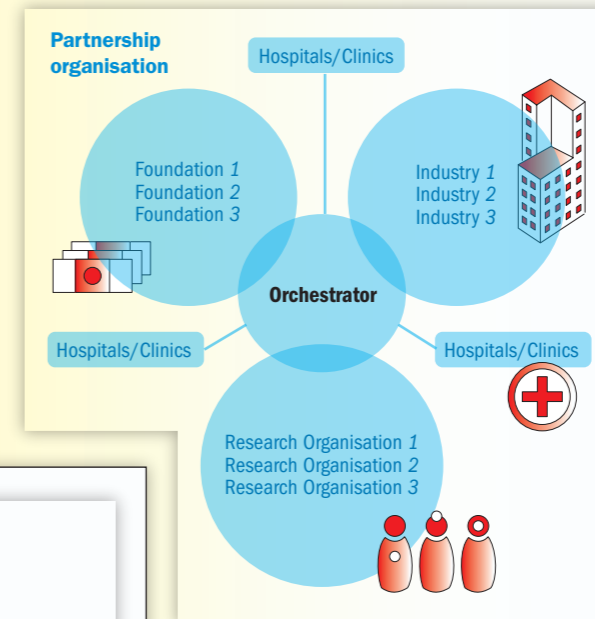
Algorithms help estimate the concentrations of components in mixtures. In this example the light measures concentrations in the blood, and will also provide information about heart rate and respiration.

3 Shared Research Program

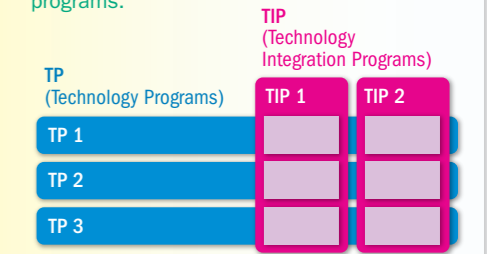
Why teaming up?

- The benefits of parties in the program are:
- Share risks
 - Share facilities
 - Share knowledge
 - Increase know how on: Pathology, Clinical treatments and procedures, Tissue behaviour and modelling, Surgical devices, Imaging hardware, Illumination technologies, Image processing software, Data management and transfer, System integration, etc.

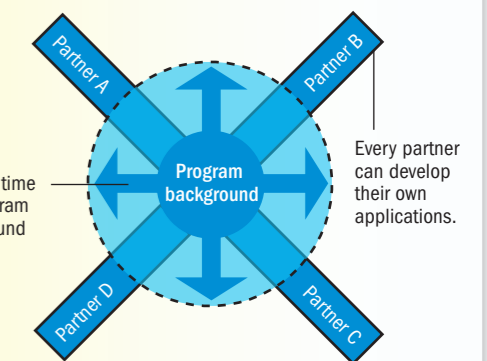
What does a Shared Research Program look like?



Specific technology
A partner can choose specific technology programs and/or broader Technical integration programs.



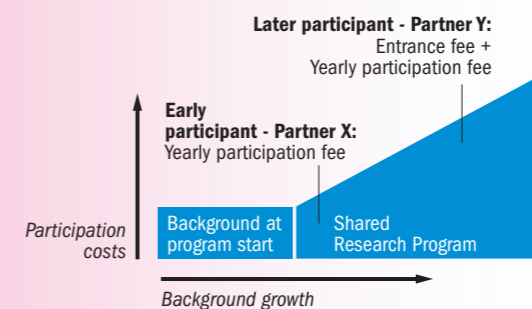
Program knowledge foundation grows and partners develop unique applications



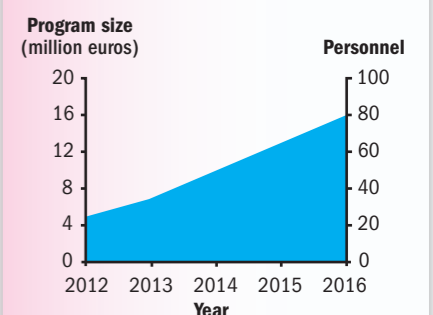
4 The future of the shared research program

The program intends to accelerate innovation and development of spectral technologies. In time the program should expand to include more partners, more resources and offer even more results.

It is beneficial to participate early
In the interest of fairness to all partners, after the program starts participants have to pay an additional entrance fee that increases with the size of the program.



Shared research has high expectations
Program growth



Shared Research Program

Enhancing medical diagnosis
and therapy by applying multi-
and hyper-spectral technologies

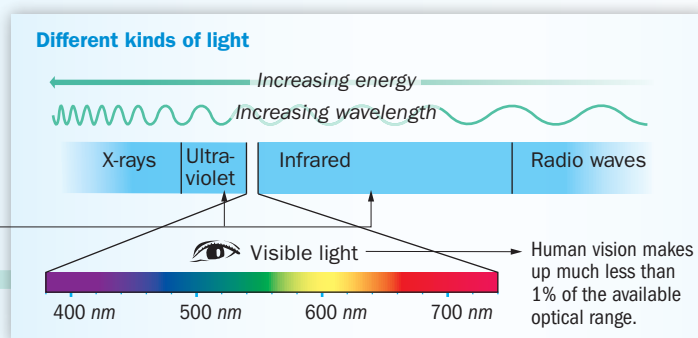
1

What are multi and hyper spectral technologies?

Different colours in the range of visible light correspond to different wavelengths. Light beyond the visible spectrum may also be used to gain more information from a wider range of wavelengths.

Devices utilising multiple wavelengths across a wide spectrum are referred to as multi- and hyper-spectral technologies.

Multi- and hyper-spectral technologies utilise a much wider spectrum than that visible to the human eye.



Goal

Enhancing
medical
diagnosis
and therapy.

Multi- and hyper-spectral techniques for medical applications

Multispectral image enhancement

- Contrast enhancement using multiple wavelength information
- Hidden or "invisible" tissue structures become visible

Hyper-spectral image enhancement

- Every pixel is a spectrometer
- Making a huge amount of information available throughout the image

Image enhancement with tissue recognition added

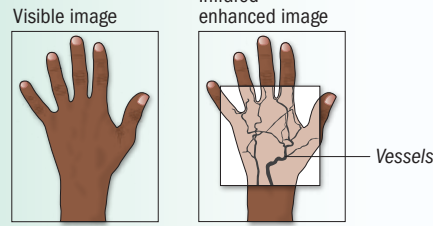
Tissue recognition

- Single point measurement
- Imaging with spatial resolution

2 Techniques

Image enhancement

Hidden or "invisible" tissue structures become visible



Hyper-spectral tissue imaging

Every pixel is a spectrometer making a huge amount of information available in one image.

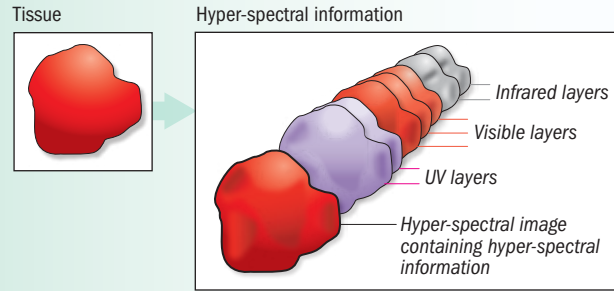
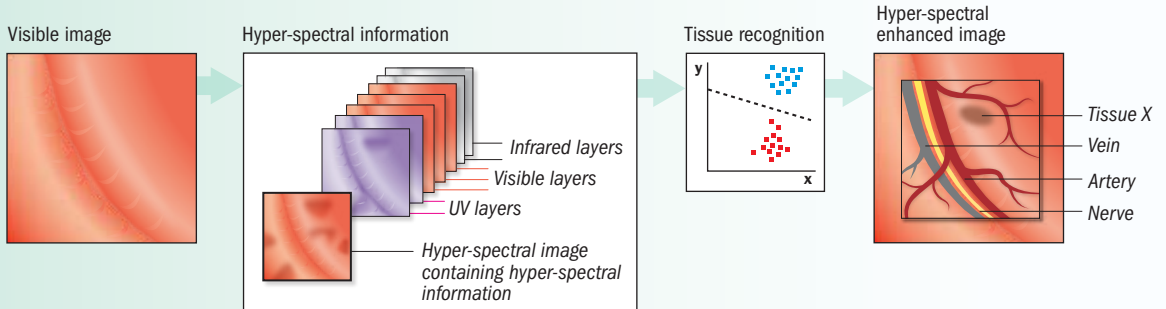


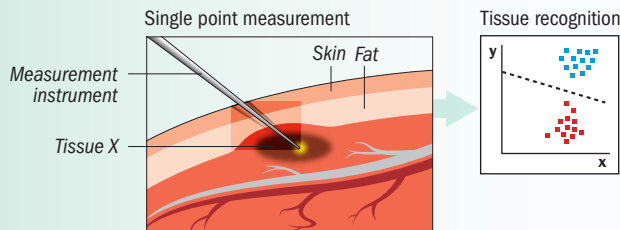
Image enhancement with tissue recognition added

Based on real-time spectral measurements, trained algorithms and models, tissue recognition can be performed and augmented back into the image.



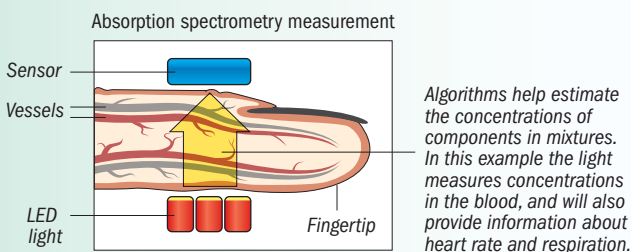
Tissue recognition

Algorithms have been developed and implemented to categorise and recognise tissue.



Spectrometry for non-invasive blood component measurement

With selected light sources and sensors a wide range of measurements can be performed.



3 Shared Research Program

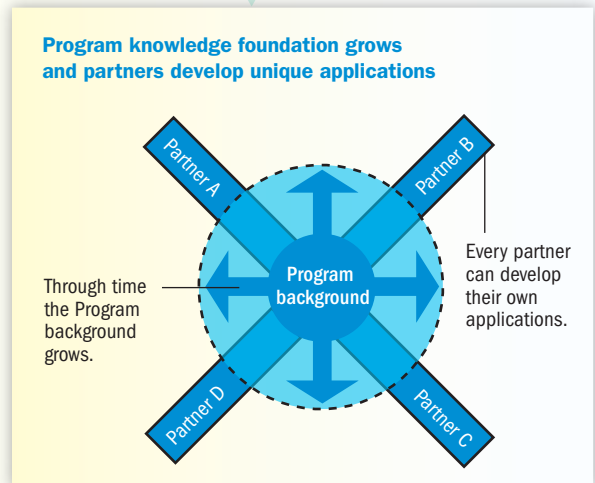
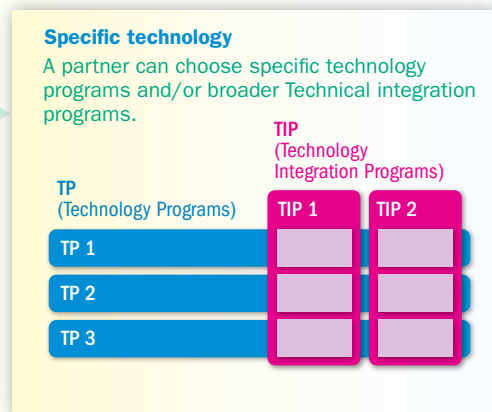
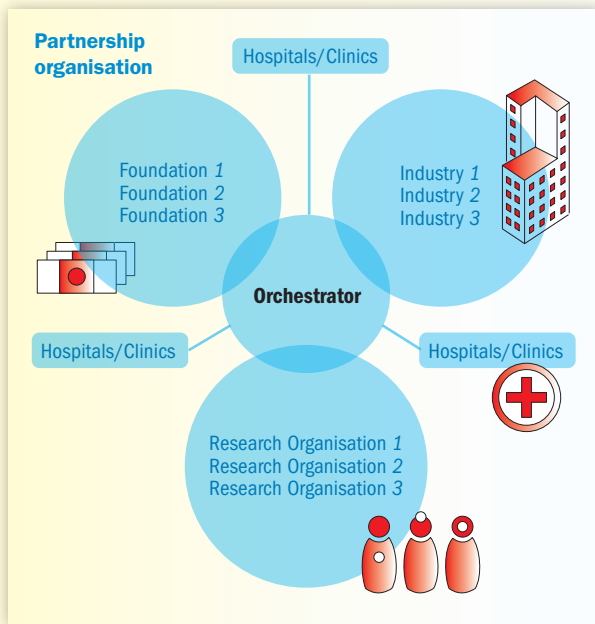
Why teaming up?

The benefits of parties in the program are:

- Share risks
- Share facilities
- Share knowledge

- increase know how on: Pathology, Clinical treatments and procedures, Tissue behaviour and modelling, Surgical devices, Imaging hardware, Illumination technologies, Image processing software, Data management and transfer, System integration, etc.

What does a Shared Research Program look like?



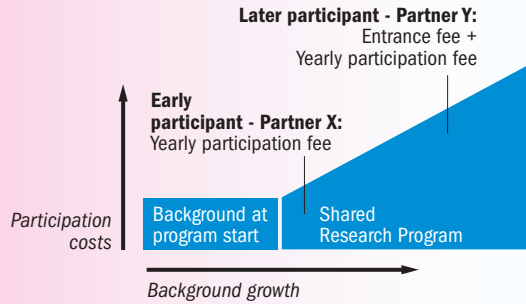
4

The future of the shared research program

The program intends to accelerate innovation and development of spectral technologies. In time the program should expand to include more partners, more resources and offer even more results.

It is beneficial to participate early

In the interest of fairness to all partners, after the program starts participants have to pay an additional entrance fee that increases with the size of the program.



Shared research has high expectations

Program growth

