Connecting the life sciences

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... helps researchers, teachers and students work together using ICT

- Network infrastructure
- Collaboration infrastructure
SURFNET’s network

National Research and Education Network of The Netherlands

11,000+ km dark fiber, into connected institutions

1 to 100Gbit/s services available for each connected institution

Multiple services over one port with guaranteed bandwidth

NetherLight for international connections and service provider connections
Lightpath

- Dedicated point-to-point connection
- Known geographic routes
- High and guaranteed bandwidth directly into campus
- Low and fixed latency
- Extend the campus
- Fixed vs OnDemand
NetherLight - connectivity
Two life science projects

Infrastructure for Biomedical Population Studies
- Facilitating data transfer, analysis and visualisation for population imaging
- Involvement: Four Dutch research institutes

Next Generation Networking for Next Generation Sequencing
- Facilitating data transfers in genomics
- Involvement: Ten Dutch research institutes, Two international parties
Lightpaths for population imaging
The challenges

The scientific challenge
- Early and more accurate diagnosis

The data challenge
- Big Data
- Secure data transfer and storage
- Combining and sharing data

The network challenge
- Two sites that want to offload their generated data to a private cloud
- A third location that needs onDemand access to this cloud for visualisation
The network challenge
The realized solution
Lightpaths for Genome research
The challenges

The scientific challenge
- Sharing data
- Sharing resources
- Collaboration
- Sequencing

The data challenge
- Data explosion
- Secure data transfer and storage
- OnDemand access to sequenced data

The network challenge
- Connecting Life Science Grid clusters located at ten different locations
- Connecting large NGS facilities
Harddisks

- Inefficient
- Risk of losing data
- Not very green
The network challenge
The realized solution
Last mile issues…

- **Multi-domain**
  - Campus network managers of the different institutions need to agree on setup

- **Obsolete hardware**
  - New hardware required
    - Licenses not available
    - Protocols not supported
  - Think “out of the box”…

- **Firewall**
  - Bandwidth limitation (obsolete hardware)
  - All traffic must be inspected
  - Security officer does not allow bypassing the firewall
Lessons Learned

- **Organisation**
  - Involve and update ICT staff from the beginning
  - Have both researchers and ICT staff around the table
  - Roll-out of infrastructure requires proper supervision and takes quite some time

- **Infrastructure**
  - More heterogeneous than you expect
  - Design together
  - The details matter (know them early on)
Future

- Technical evaluation resulting in a cook-book
- Apply knowledge gained when connecting new lightpaths for science
- Truly end-to-end
  - More flexibility using e.g. Virtual Networking
  - Traffic Engineering in multiple domains