modulight

Design, experiences and opportunities of cloud based medical devices enabling improvement of treatment efficacy by analytics

Petteri Uusimaa, CTO
Jan 24th 2022

Lasers and optics for personalized medicine and better life.

PERSONALIZED MEDICINE AND BETTER LIFE

- ❑ Exclusive supplier to 10+ pharmas, other Fortune 500 companies & well-known cancer centers
- ❑ 20+ years track record of semiconductor lasers & optics (400–2000 nm) for medical and high value-add applications
- ❑ Listed in NASDAQ First North

Life sciences

・ Oncology ・
・ Ophthalmology ・
・ Genetics & diagnostics ・

Other high value-add applications

・ Quantum computing ・
・ Communications ・ Digital press ・
・ Weather monitoring ・ AR/VR ・
・ Environment & sensing ・

Services

・ Data analytics & Cloud for improving treatment efficacy ・
・ Pay-per-use (new indications) ・
・ On-site/online training and annual calibration ・
・ Lifecycle support with recurring service plans ・
・ Regulatory design & approvals ・
・ Regulatory and feature software updates ・

Motivation & market drivers

modulight

1. Various treatment modalities call for different laser systems and light delivery technologies
2. Growing number of imaging dyes call for wide range of wavelength options and optical power → need for flexible configurable platforms
3. Desire to combine diagnostic and therapeutic processes into one theranostic treatment flow
4. Real-time treatment monitoring and analytics guide the treatment towards better outcome
5. Standard protocols & interfaces to enable fluent interplay with hospital environment and cloud-based analytics

Large underlying market opportunity

modulight

Aging population fueling the need for better and complementary therapies

- **120% growth in the number of persons aged over 65 years old by 2050**[1)]
- **~EUR 150bn global oncology market estimated to grow at a CAGR of 11%**[2)]

Combination therapies and personalized medicine becoming more standard care in oncology

- **Cancer drugs ineffective for 75% of patients**[3)]
- **Personalized medicine accounts for more than a third of new FDA drug approvals**[4)]

Drive for scalable cloud-connected treatment solutions

- **~EUR 100bn global digital health R&D market estimated to grow at a CAGR of 8%**[5)]
- **~EUR 46bn global mobile health market estimated to grow at CAGR of >30%**[6)]

1) Forecasted change globally between 2019 and 2050, source: UN, World Population Ageing 2019; 2) Forecasted global oncology market growth between 2015 and 2030, source: Frost & Sullivan: Global Oncology Market Breakdown; 3) Source: Clinical Trends in Molecular Medicine Volume 7, Issue 5; 4) In three of last four years, source: Personalized Medicine at FDA: The Scope & Significance of Progress in 2020; 5) Forecasted global digital health R&D market growth between 2019-2024, source: McKinsey & Company: Healthtech in the fast lane: What is fueling investor excitement?; 6) Between 2021-2030, source: Global Market Insights: mHealth market size by platform

Average survival of glioblastoma patients is 12-15 months with the current standard of care (SOC)

- ❑ SOC increases the mean survival only by a few months and doesn't bring curative solutions
- ❑ Is limited by systemic toxicity and damage to normal brain
- ❑ Complete resection is rarely feasible because of the safety margin

High recurrence of GBM despite treatment

- ❑ Recurrence nearly universal within 2 years of diagnosis, average time to recurrence only 6-7 months

Tumor resistance (inherent or acquired) to therapy

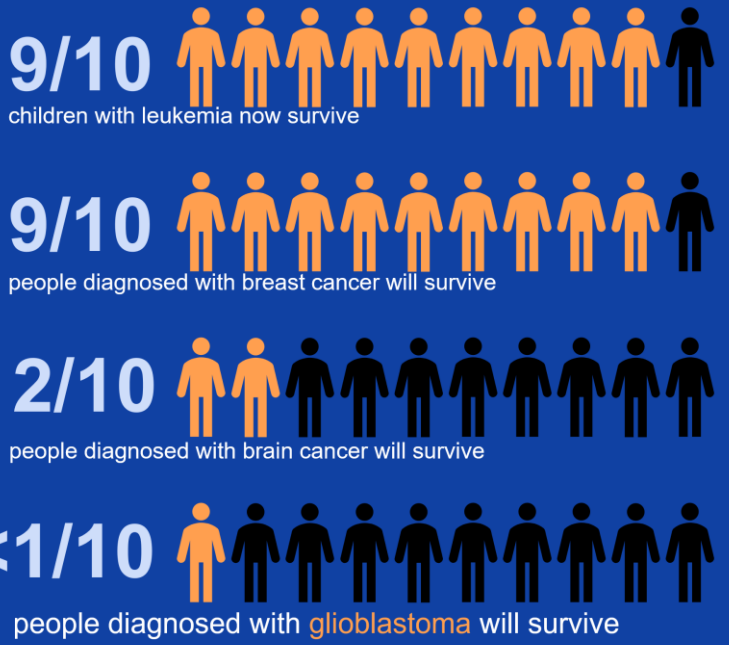
- ❑ Blood-brain and blood-tumor barriers restrict the effective transport of most drugs to the tumor
- ❑ Mutations in drug resistance pathways, resistant glioma stem cells, expression of MGMT etc.

→ New treatment options needed

modulight

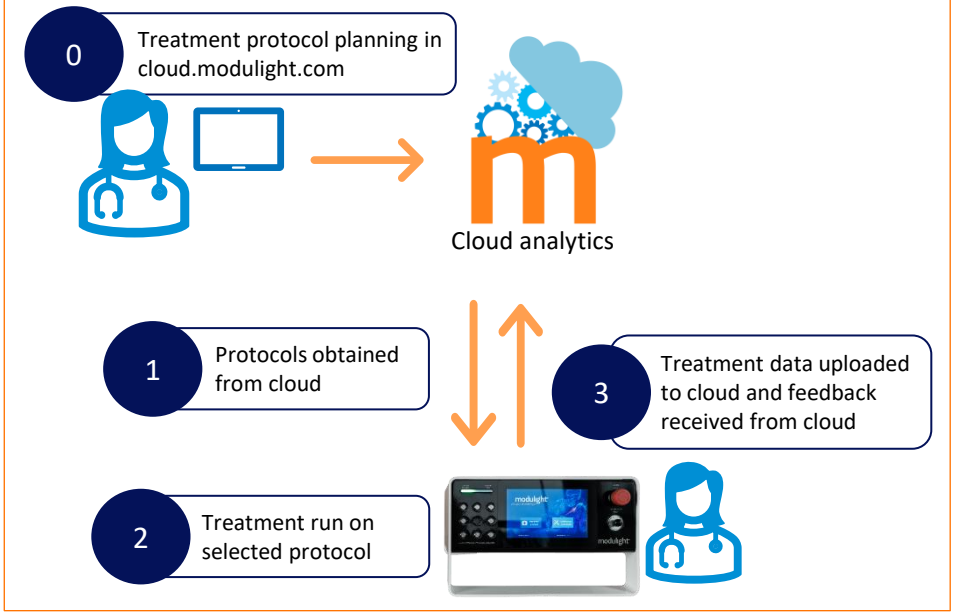
"Glioblastoma diagnosis is still practically a death sentence in 2022"

Five-year survival rates…



Modulight solution example for glioblastoma

REAL-TIME TREATMENT MONITORING & CLOUD ANALYTICS



CONFIGURABLE MEDICAL LASER PLATFORM

- ❑ Proven & certified ML7710 design
- ❑ Scalable and configurable optical delivery and monitoring channels
- ❑ Configurable wavelength 400–2000 nm
- ❑ Support for all major photosensitizers and dyes
- ❑ Configurable to different modalities, treatment, imaging, diagnostics etc.

TREATMENT MONITORING AND CLOUD BASED ANALYTICS

- ❑ Minimally invasive combined illumination and measurement probes
- ❑ Simultaneous illumination and multi-channel measurement
- ❑ Automated real-time monitoring and data-collection
- ❑ Centralized data analytics for real-time feedback and post Tx efficacy improvement

Example treatment flow-GBM

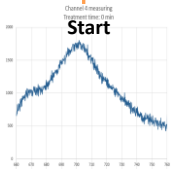
modulight

modulight
MRI and other pre-op data used for Cloud based Tx planning in Modulight Cloud

Patient is given theranostic drug before operation

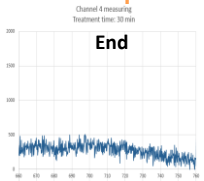
Bulk tumor removal (optional)

modulight
Drug distribution monitoring & baseline monitoring data



modulight
Drug activation and Tx progress monitoring

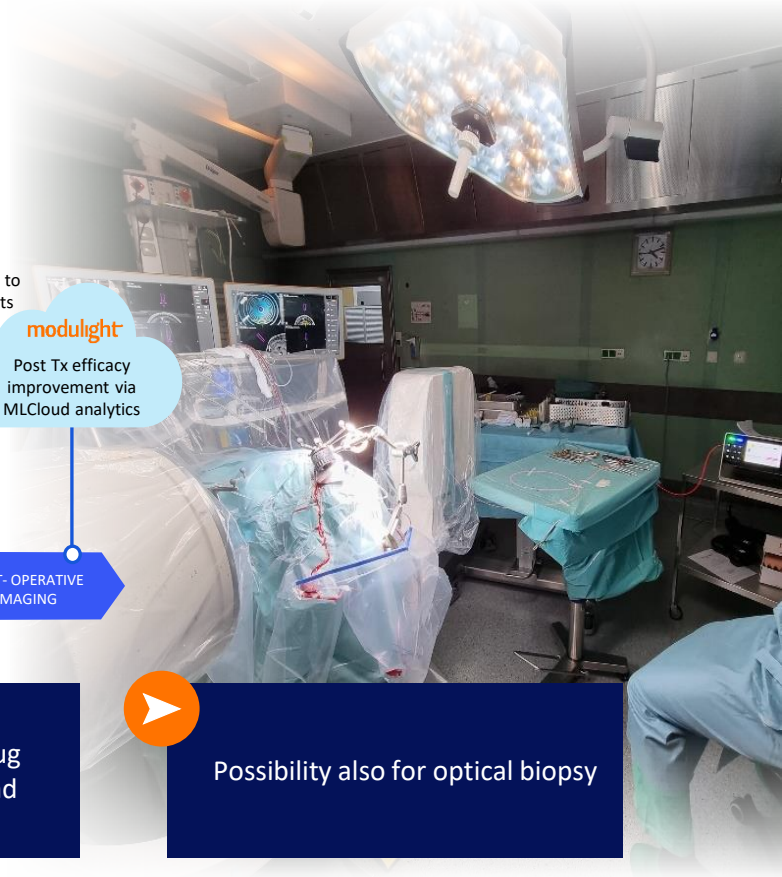
modulight
Post TX monitoring data



MRI/CT imaging to check the results

modulight
Post Tx efficacy improvement via MLCloud analytics

PRE-OPERATIVE IMAGING | DRUG ADMINIS-TRATION | SURGERY | INTRAOPERATIVE PIT | POST- OPERATIVE IMAGING

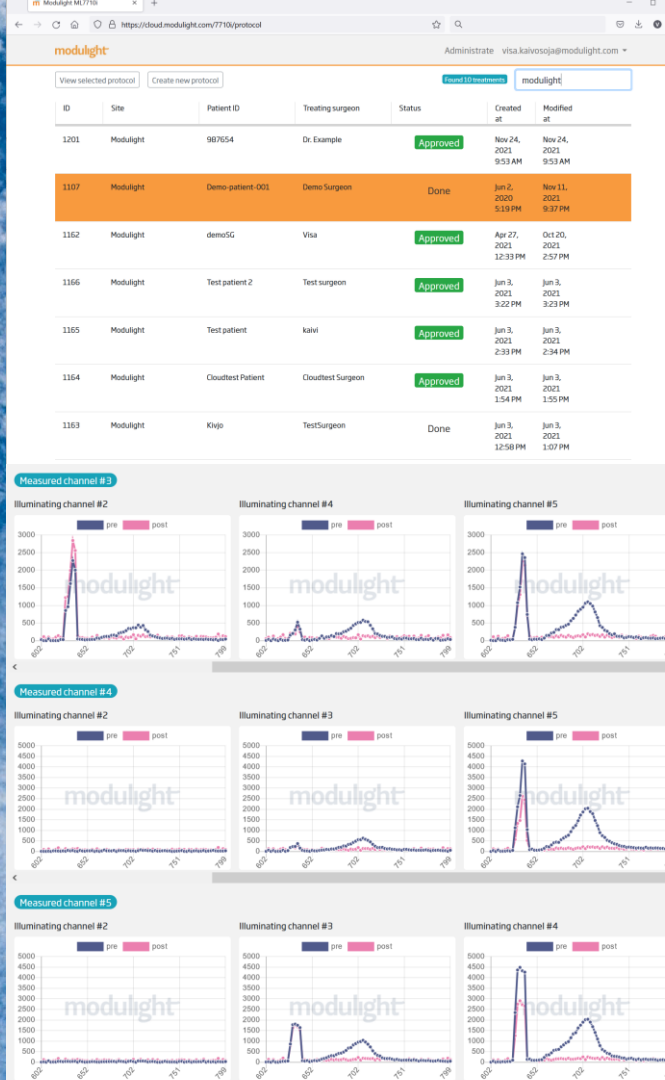


- Theranostic treatment and monitoring process can be integrated into the existing clinical workflows
- Seamless integration of photoimmunotherapy & drug delivery with the surgery and pre/post-operative imaging
- Possibility also for optical biopsy


0h 34 min 58 s
modulight

Modulight Cloud and analytics

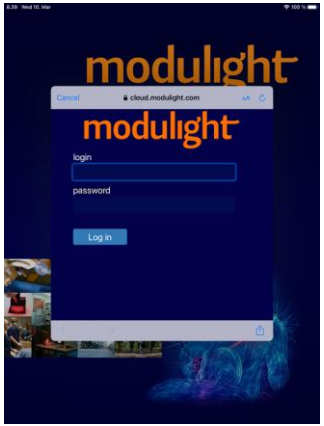
- All Modulight medical devices are cloud-connected
- Goal to improve treatment efficacy
- Automatic data upload for real-time monitoring and analysis
- Modulight cloud enables storage, management, analysis and downloading monitoring data that is collected during treatments
- All data is linked to the particular treatment which allows for combining to other clinical data for complex analysis
- Connectivity enables remote support and technical diagnostics for improved usability and user experience

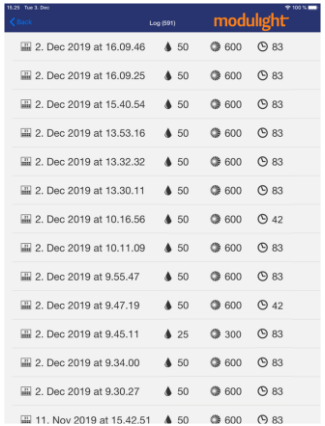


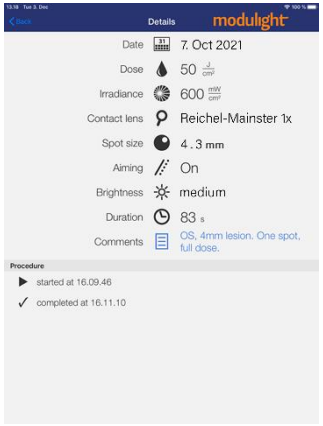
Modulight's cloud-connected ophthalmic laser platform

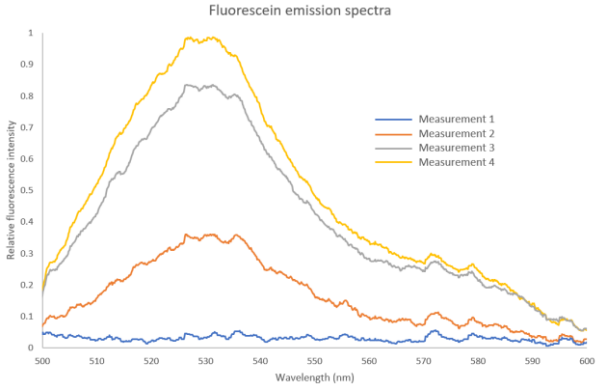
- Major ophthalmic diseases affecting the eye posterior (AMD, DME, glaucoma) are becoming more prevalent with aging population
- There is a need for novel ophthalmic laser technology that offers versatile and up-to-date treatment control and monitoring possibilities for above diseases
- Modulight cloud-connected ophthalmic laser platform consists of laser system controlled with an iOS app and optical beam shaping unit
- Cloud and iOS based platform offer unique service offering and user experience

Modulight Cloud features

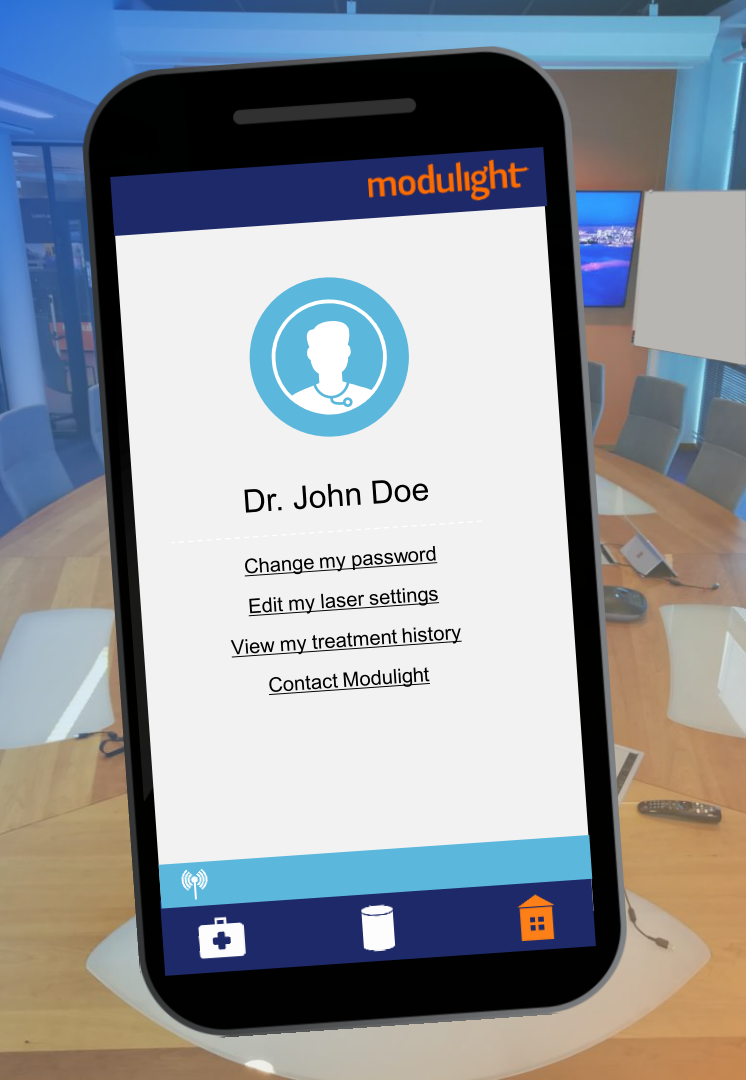








- Anonymous storage of all planned and realized treatment parameters
- Machine learning (ML) and artificial intelligence (AI) based treatment planning from previously uploaded data
- Analysis of intraoperative monitoring and diagnostic data, such as ocular image and fluorescence data
- Additional features enabled by cloud and internet connectivity include
  - Easy switch of UI/treatment protocol per indication
  - User authentication, real-time support chat, personal settings, treatment history, automatic software updates, user training videos



modulight

PERSONALIZED EXPERIENCE

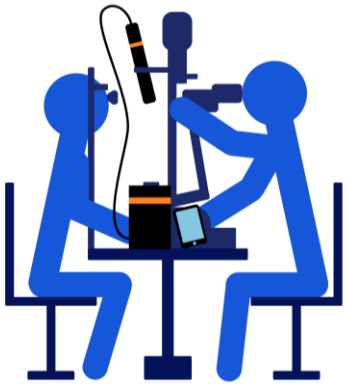
Medical devices can be daily tools for healthcare professionals. Two things matter the most:

Safety

- ❑ User authentication
- ❑ Real-time personal contact channel directly to Modulight support
- ❑ Automatic SW updates

Efficiency

- ❑ Adapt the device to your needs
- ❑ Intuitive and mobile user interface
- ❑ Treatment history view



Modulight ML6710i Laser has received praising usability feedback from ophthalmologists. Especially the iPad user interface is seen very intuitive and fluent to use. Not to mention “high style points” of the design.

Key aspects for future medical lasers

modulight

1. Multi-indication platforms to support upcoming drugs/dyes
2. Cloud connectivity for treatment planning, monitoring and analytics
3. Real-time optical treatment monitoring and dosimetry
4. Solutions to support entire treatment development process from discovery to clinical phase
5. Future combination of treatment, imaging and diagnosis of photoactivated drug delivery process

Thank you!

modulight

MORE GREAT STORIES BY FOLLOWING US
IN TWITTER, FACEBOOK & YOUTUBE: