Industrial Challenges of CoEs in Medical/Bio/Pharma sectors

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Healthcare Overview

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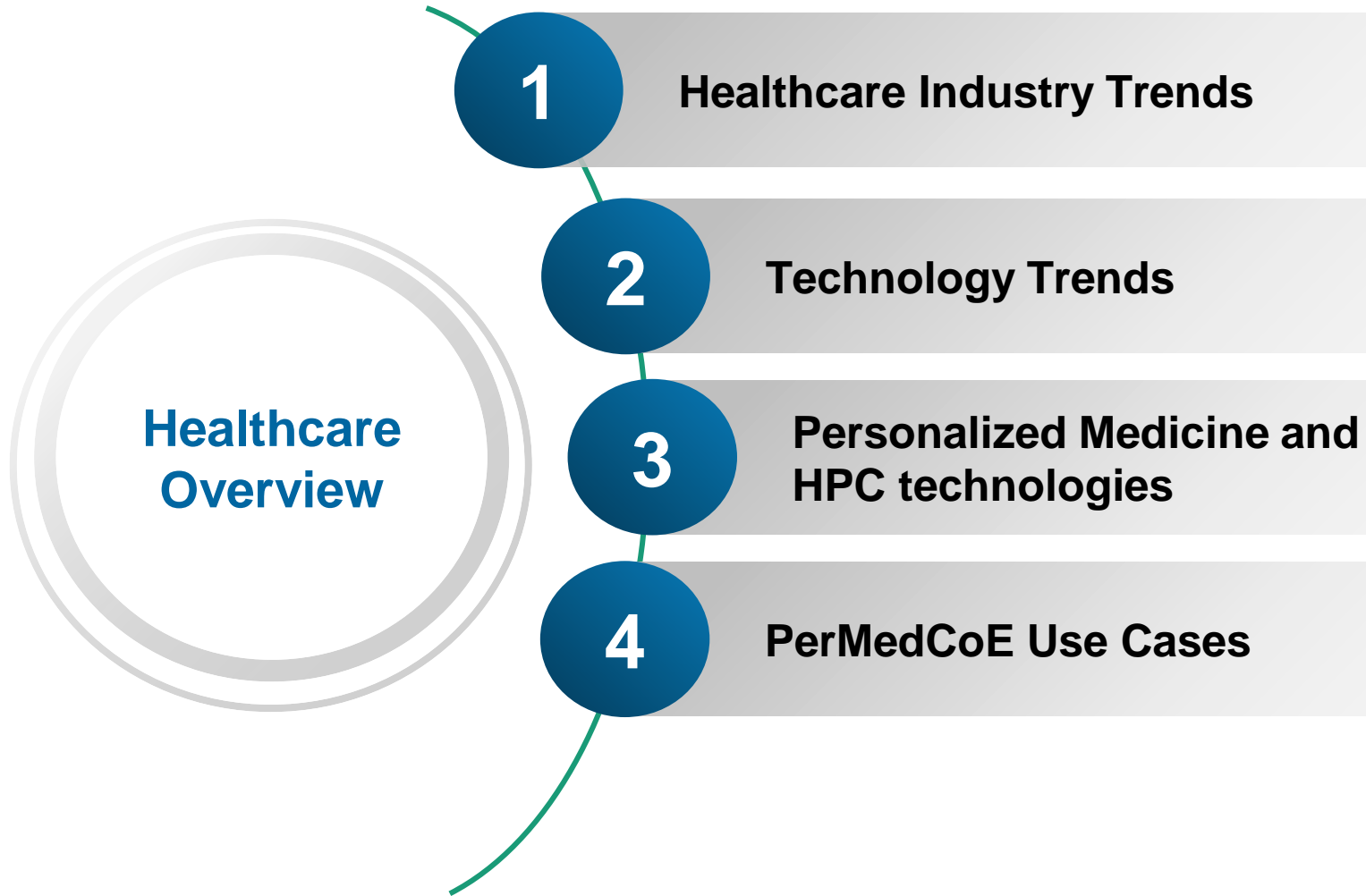
Healthcare Industry
Trend #1: COVID-19 Impact

COVID-19's Impact on Healthcare Stakeholders Varies Widely

Impact of COVID-19 on Healthcare Stakeholders

The impact of COVID-19 varies significantly among healthcare stakeholders due to differences in their exposure to COVID-19 patients, the relevance of their product portfolio for the disease, and their level of preparedness for a pandemic.

SERVICE PROVIDERS
Healthcare settings and healthcare professionals (HCPs). **Acute versus non-acute** facilities face different concerns

PRODUCT AND SERVICE SUPPLIERS
Biopharmaceutical, medical technology, and service providers. The type and level of impact to each is **contingent on their portfolio's relevance to COVID-19** prevention, diagnosis, and treatment, as well as its **stage of maturity**

MEDICAL AUTHORITIES AND REGULATORS
Healthcare regulators (such as the **FDA[1] in the US** and the **EMA[2] in Europe**), **public health institutes** responsible for publishing guidelines (e.g. CDC[3]), policy makers, and others

Healthcare Stakeholders Segmentation

PAYERS
Public and private payers responsible for covering **medical expenses**, including diagnostics, drugs, medical devices, and procedures

PATIENTS
People currently receiving or registered to receive medical treatments **prior to or during the pandemic, whether related or not to COVID-19.** The collateral impact to a patient varies greatly by their condition
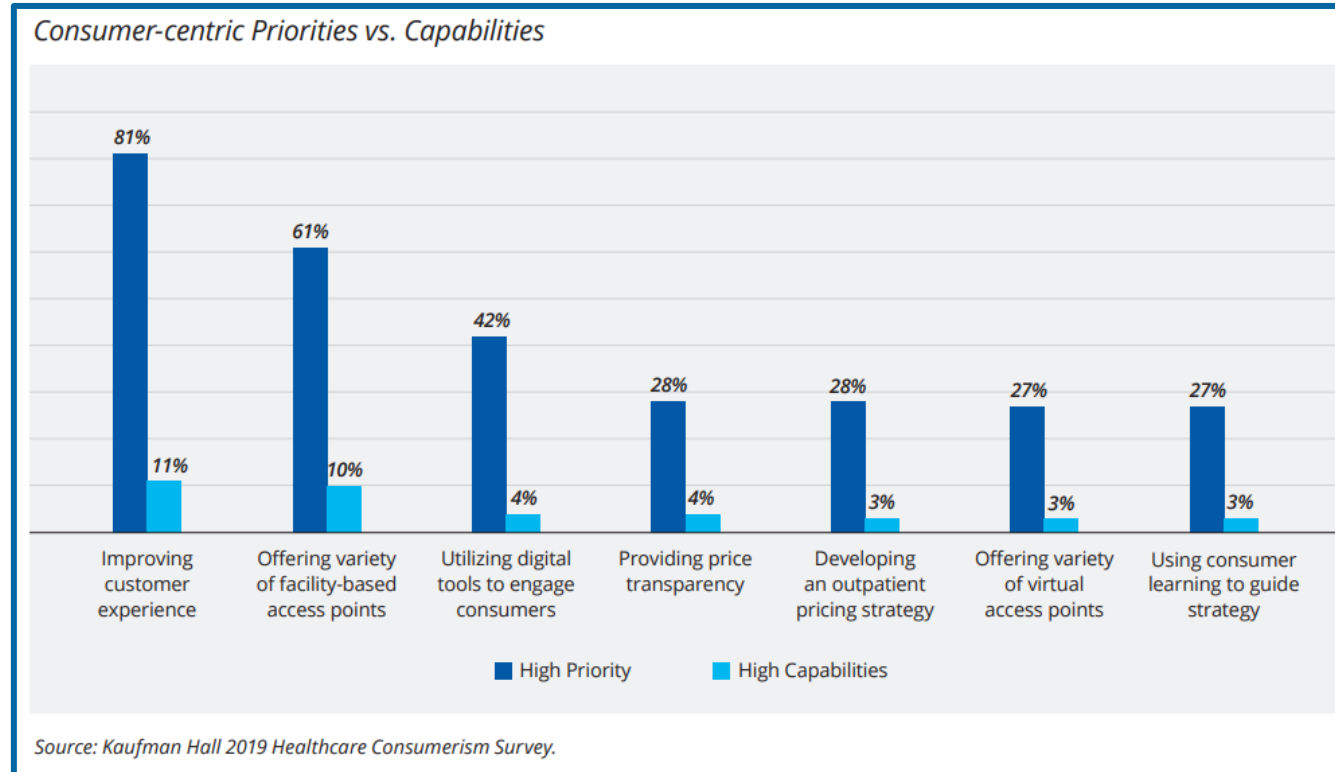
Note: [1]Food and drug administration; [2]European medicines agency; [3]Centers for disease control and prevention.

Source: Alira Health analysis.

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Trend #2: Consumerism

Consumerism—One of The Biggest Disruptors in Healthcare

Consumer-centric Priorities vs. Capabilities

	High Priority	High Capabilities
Improving customer experience	81%	11%
Offering variety of facility-based access points	61%	10%
Utilizing digital tools to engage consumers	42%	4%
Providing price transparency	28%	4%
Developing an outpatient pricing strategy	28%	3%
Offering variety of virtual access points	27%	3%
Using consumer learning to guide strategy	27%	3%

Source: Kaufman Hall 2019 Healthcare Consumerism Survey.

— Health systems should ask themselves if they are ready to compete in this new landscape.

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Trend #3 – Social Issues

- **<u>Socioeconomic information as part of the care process</u>**. Where a patient resides, employment, family situation, etc.

- **<u>Social determinants of health (SDoH) impact mortality, morbidity, life expectancy, healthcare expenditures, and health status and functional wellbeing, to name a few. They also cause major disparities in health and healthcare.</u>**

- **Health systems have the insight** to improve care across underserved categories.

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Trend #1 – Telemedicine

- Easy accessibility and the availability of electronic records has contributed to improved communication between the patients and the doctors.

- **Real-time monitoring is one of the major achievements of telemedicine.**

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Trend #2 – The Internet of Medical Things (IoMT)

Combining IOMT with telemedicine has led to a massive change in the way that healthcare organizations work.

It can help with additional data collection but also with the process, giving extra care to the análisis of symptoms.

Between **20 and 30 billion IoMT devices** are expected to be deployed by 2021.
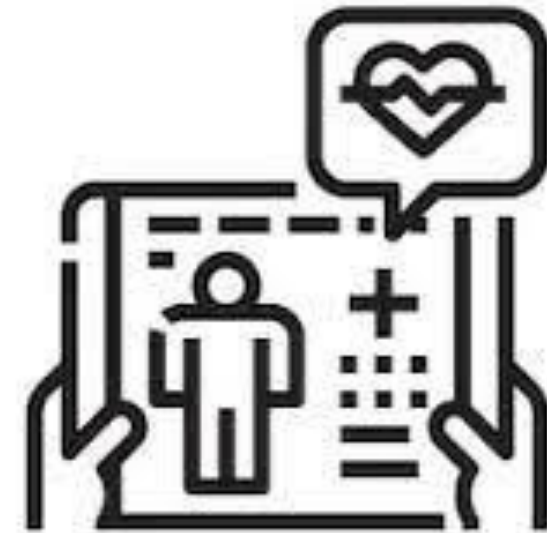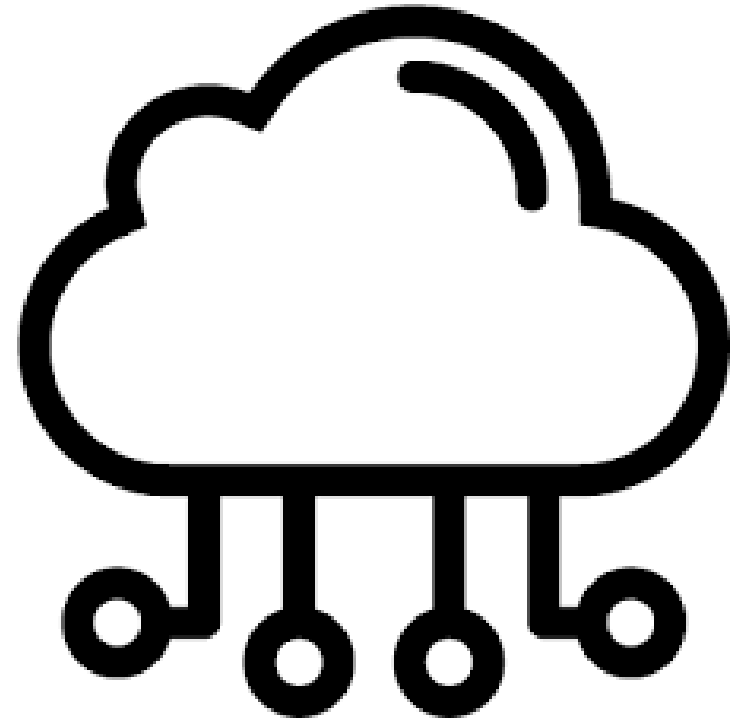

INTERNET OF MEDICAL THINGS

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Trend #3 – Cloud Computing

> ► **<u>Cloud computing</u>** has actually helped in the administrative tasks and maintenance of the infrastructure of many healthcare organizations.
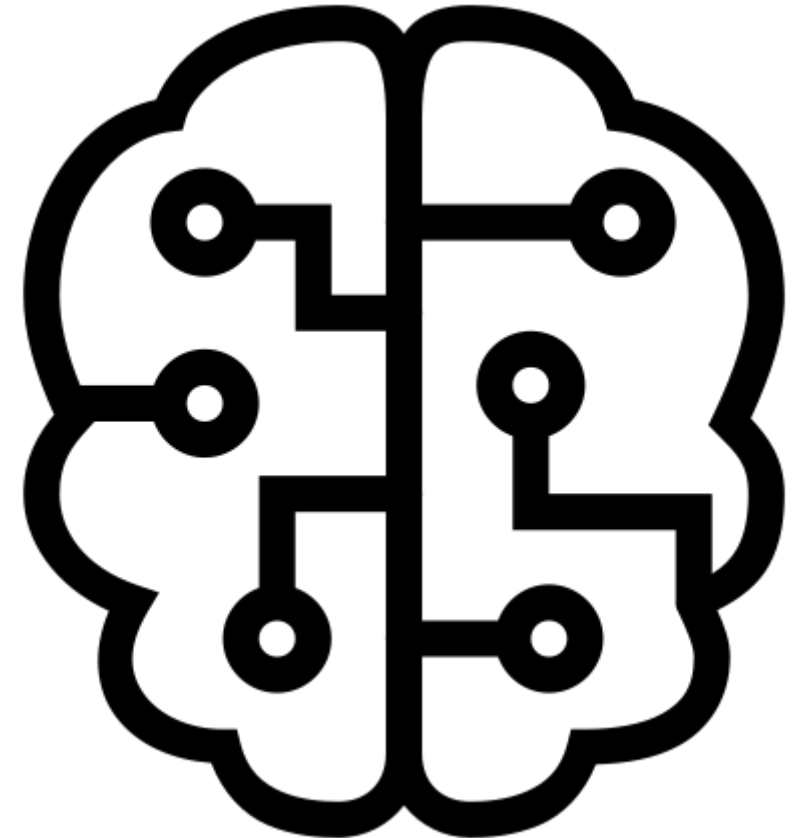
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➤ Introduction of **Augmented Reality and Virtual Reality** has led to the improvement of the patient experience.

➤ Doctors can get their diagnosis done with much precision by being able to check each and every detail of different body parts.

➤ It has also proven to be useful in terms of **teaching**.

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Trend #5 – Artificial Intelligence (AI)

- ► It has helped with **medical research**.
- ► It has improved the **process of testing new drugs** for their efficiency and usage.
- ► It has also improved the **process of diagnosis.**
- ► The data collected can be analyzed with the help of AI to offer **actionable insights**.

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➤ With the help of **Automated Chabot's and voice messages**, powered by AI, a particular institution can reduce costs and increase efficiency at the same time.

➤ They can be **used as friendly reminders**, especially for older patients or patients suffering from Alzheimer's. **It will also provide 24×7 accessibility** to patients in case of any emergency,
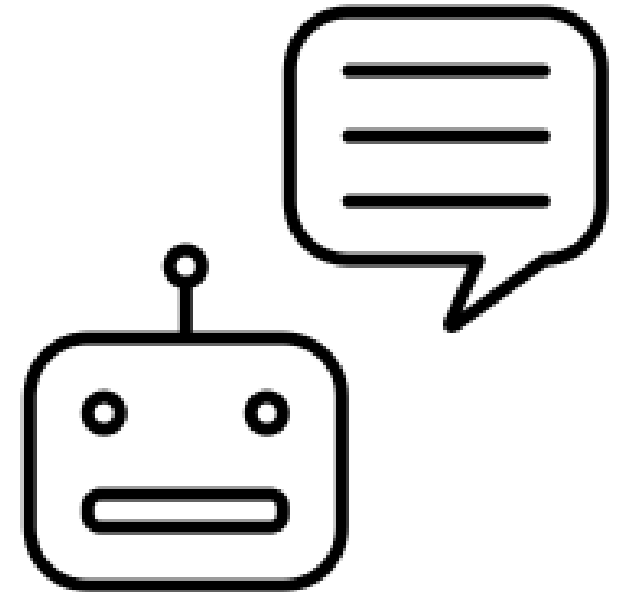
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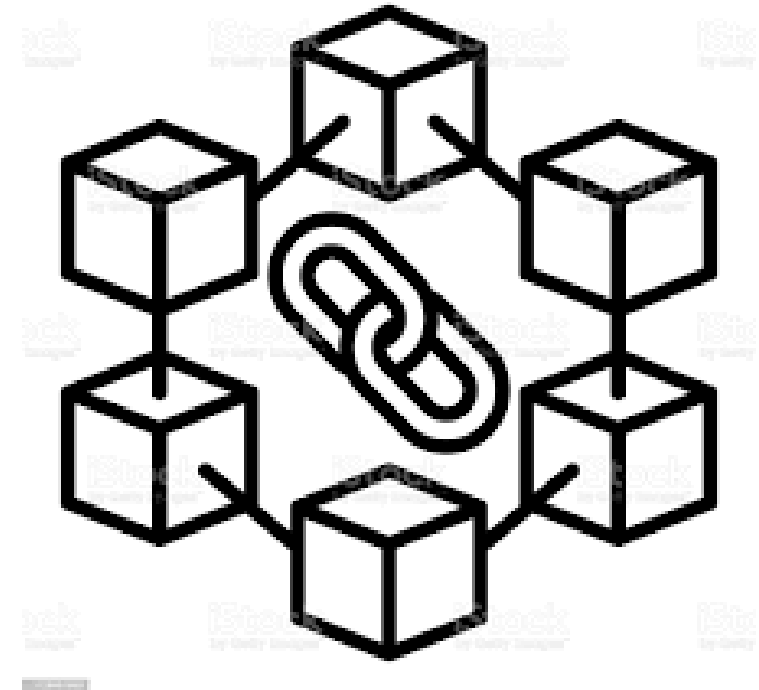
Trend #7 – Data Science and predictive analytics

> ▶ It has become **easier and convenient to analyze information** that can save the lives of thousands of people.

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- Blockchain is one of the **biggest technological innovations of the last decade.**

- It is a secured platform that has enabled transactions and information to be shared between various stakeholders without any third party being involved.

- Blockchain also ensures the anonymity of the users while ensuring cost-effectiveness and improved accessibility.

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Personalized medicine integrates information from multiple sources to make Healthcare smarter, better and more cost-efficient.

It offers **tailor-made prevention, diagnosis and treatment** for individuals or groups of individuals enabling healthier, more productive lives:

- **Treat patients** with the therapies that work best for them.

- **Drive healthcare innovation**: establish Europe as a global leader in healthcare industry.

- **Avoid adverse reactions** to medicines: 6% of acute hospital admissions are due to serious adverse reactions to medicines.
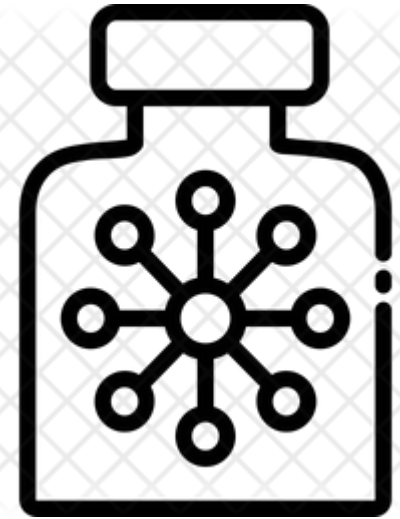
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Trend #8 – Personalized medicine

Significant EU investments in research on personalised medicine to

7th Framework Programme 2007-2013

Horizon 2020
First 3 years 2014-2017

209 projects on personalized medicine

€1.334 million in EU funding

167 projects on personalized medicine

€872 million in EU funding

Healthcare Industry
Trend #8 – Personalized medicine

Personalized Medicine in the news

US Biotech Unicorn Steps up Competition for BioNTech's mRNA Personalized Cancer Vaccine

BY CLARA RODRÍGUEZ FERNÁNDEZ
15/11/2017 - 2 MINUTES

Moderna Therapeutics has started dosing patients with an mRNA-based personalized cancer vaccine that resembles another one being developed by BioNTech.

Link between Personalized Medicine and HPC Technologies

- PerMed promises a breakthrough in **our ability to fight illness at the individual level.**

- We need to **improve our capacity** to predict the course of diseases at their possible treatments.

- To deal with the challenges of developing **accurate models** based on vast amounts of personal medical data, we need to adapt the current modelling tools to the new **pre-exascale environments**.

- HPC Community has provided software for:

  - Organ-level simulations **(CompBioMed CoE)**

  - Molecular simulations **(BioExcel CoE)**

CELL-LEVEL SIMULATIONS WERE STILL MISSING

PerMedCoE

PerMedCoE: link between Personalized Medicine and HPC Technologies

The HPC/ Exascale Centre of Excellence in PerMed (PerMedCoE) will:

❏ Provide **cell-level simulations** codes adapted and optimised to work in the new generation of pre-exascale systems;

❏ Build the infrastructures to bridge the current gap between genomics/ omics data, cellular models, and medical interpretation;

❏ Enpower the PerMed community with sustainable systems easily accessible to the end-users.

PerMedCoE Use Cases

PerMedCoE technologies will be validated through 4 different Use Cases:

- ❑ Use Case 1 Cancer Diagnosis based on omics Information

- ❑ Use Case 2 Drug Sinergies for cancer treatment

- ❑ Use Case 3 Personalised Modelling of rare-disease related patients

- ❑ Use Case 4 Tumour evolution based on the single-cell omics and imaging