

CONNECT-TO-WIN

*End-to-end solutions for mobilizing routine
CGP test data for research*

Illumina

Volker Liebenberg, Head of Medical Affairs EMEA

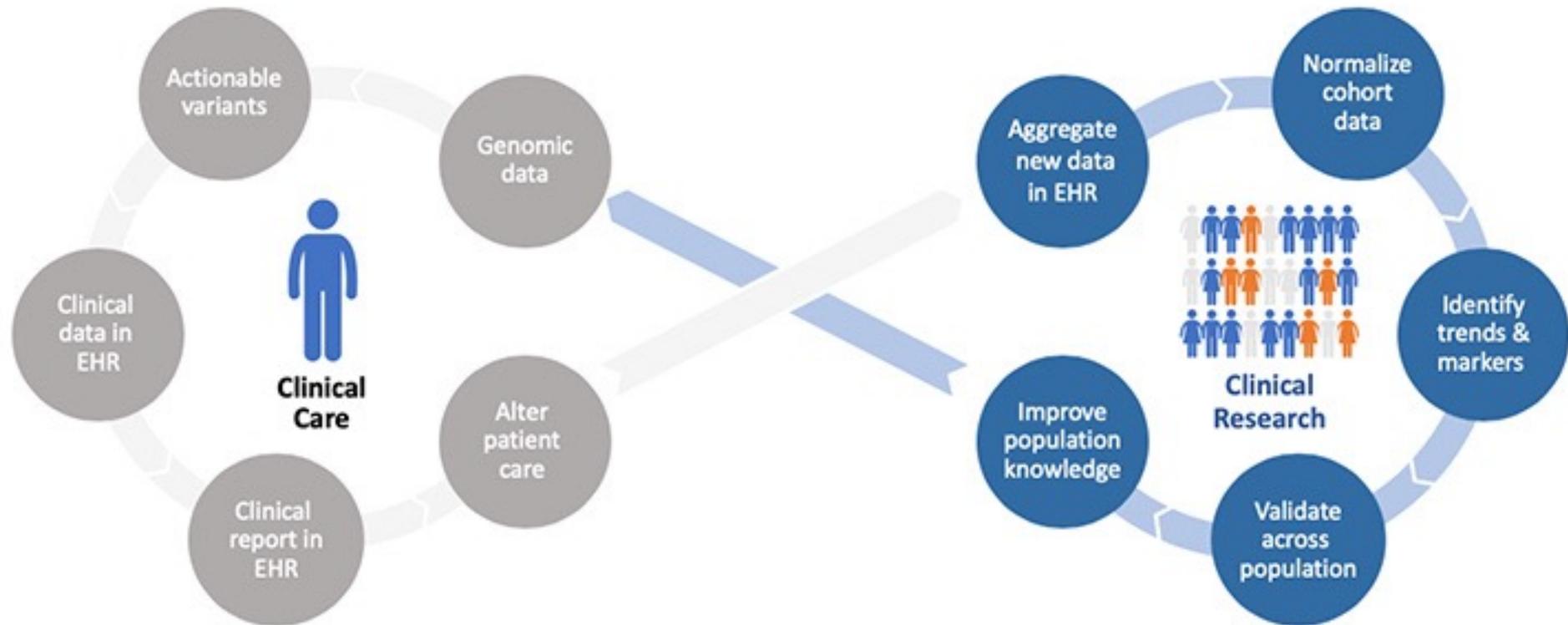


Curing Cancer is a Complex Challenge

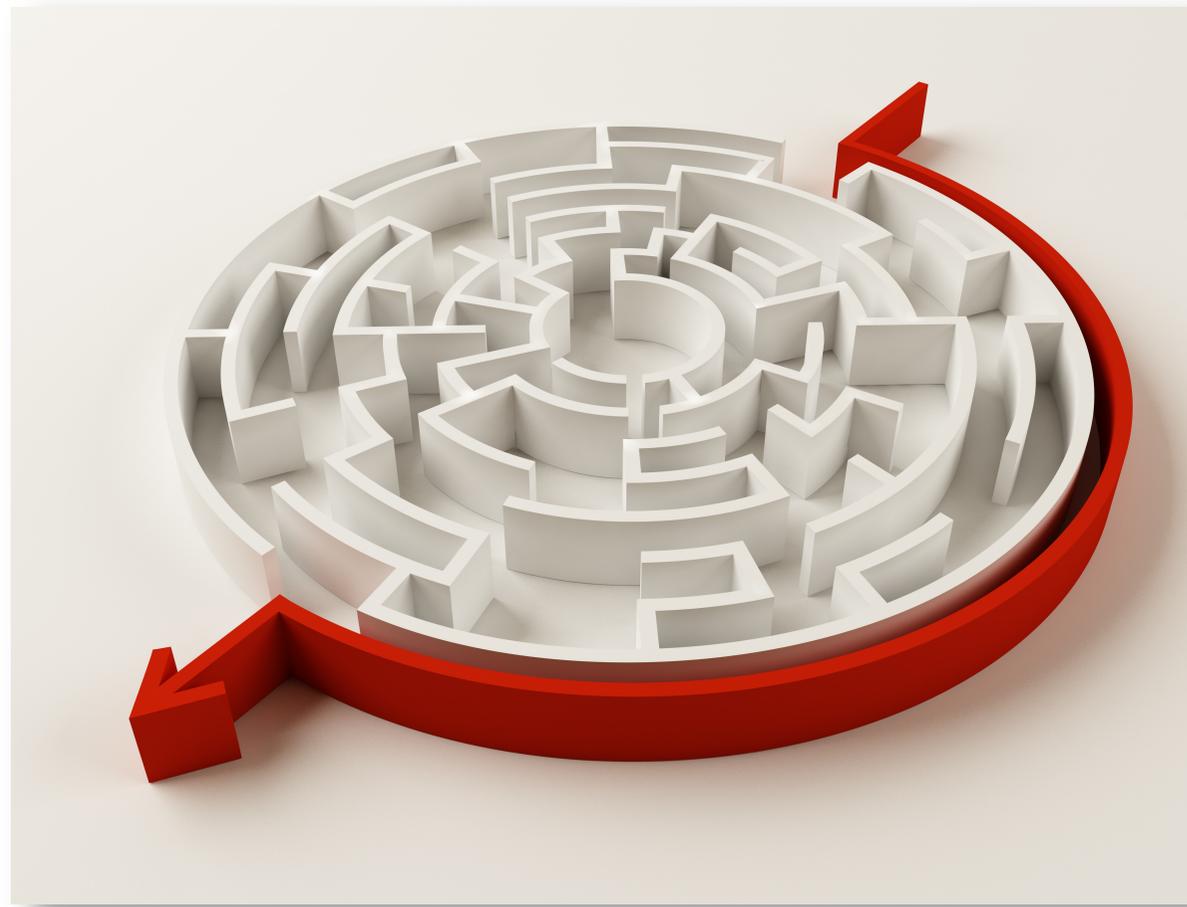


There is no silver bullet

A Learning Health System



Making Diagnostics Simple Is Key To Beat Cancer



Our Mission

Unlocking the Power of the Genome
to Improve Human Health

End-to-End Solutions

DigiCore



Make **Precision Medicine in Oncology** a reality by combining **groundbreaking science and technology** with a **world-leading network of strategic partners**



A Menu of Solutions, From Early Surveillance to Monitoring

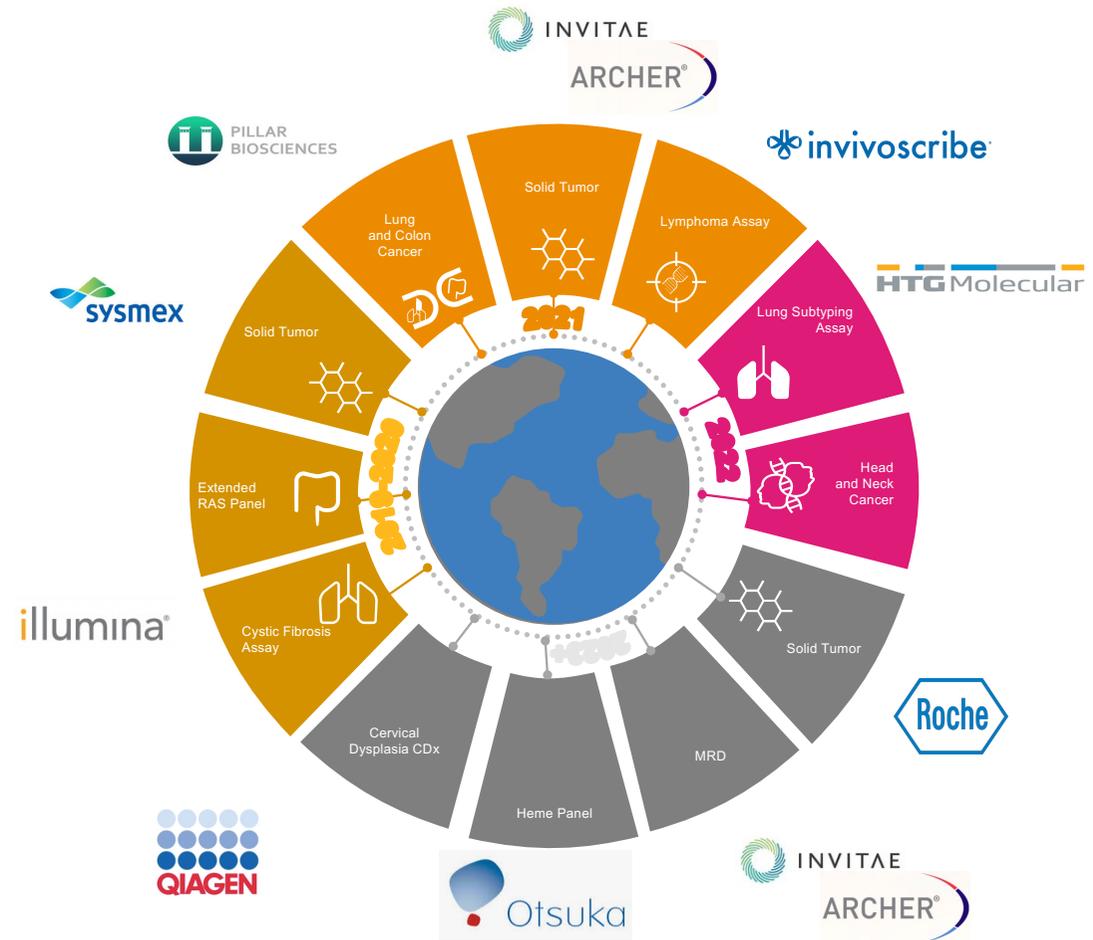
Robust and flexible development of IVD tests*
from early surveillance to monitoring

Partners

- ArcherDx – Stratifide Solid Tumor Panel
- ArcherDx - MRD
- HTG Molecular – Lung Subtyping
- HTG Molecular - Head and Neck Cancer
- Invivoscribe – LymphoTrack
- Otsuka – Heme Panel
- Pillar Biosciences – Lung and Colon Cancer
- Qiagen – Cervical Dysplasia CDx
- Roche – FM1 Solid Tumor Panel
- Sysmex – Solid Tumor Panel

*Under development

- <https://www.illumina.com/company/news-center/press-releases/2020/82bcf08b-d262-4ef8-a483-341716566fe6.html?langsel=us/>
- <https://investors.adaptivebiotech.com/news-releases/news-release-details/adaptive-biotechnologies-enters-partnership-illumina-develop>
- https://corporate.qiagen.com/newsroom/press-releases/2019/20191007_qiagen_illumina_ngs_collaboration?sc_lang=en
- <https://www.genomeweb.com/business-news/archerdx-illumina-agree-comarket-future-ivds#.X4COJ2hKg2w>
- <https://www.illumina.com/company/news-center/press-releases/2018/2341745.html>
- <https://www.businesswire.com/news/home/20210223006239/en/QIAGEN-and-INOVIIO-Expand-Collaboration-to-Develop-Next-Generation-Sequencing-NGS-Companion-Diagnostic-for-INOVIIO%E2%80%99s-VGX-3100-for-Advanced-Cervical-Dysplasia>



Comprehensive Genomic Profiling

Provides more comprehensive gene coverage than hot spot panels

The diagram illustrates three methods for identifying relevant biomarkers, represented by DNA double helix icons. In the 'Single gene assays' method, only one specific biomarker is highlighted with a yellow background. In the 'Hotspot panels' method, several common biomarkers are highlighted with yellow backgrounds. In the 'Comprehensive Genomic Profiling' method, all biomarkers are highlighted with a yellow background, indicating full coverage.

- **Single gene assays:**
 - Biomarker panels require multiple workflows
 - Reflex algorithms extend TAT
 - Can miss important alterations^{1,2,3}
- **Hotspot panels:**
 - Focus on more prevalent alterations only
 - Potentially misses important biomarkers^{3,4}
- **Comprehensive Genomic Profiling:**
 - Provides full coverage of coding sequences
 - Identify most relevant alterations

1. Drlon A, Wang L, Arcila ME, et al. Broad, hybrid capture-based next-generation sequencing identifies actionable genomic alterations in “driver-negative” lung adenocarcinomas. *Clin Cancer Res.* 2015 Aug 15; 21(16): 3631–3639. | 2. Ali SM, Hensing T, Schrock AB, et al. Comprehensive Genomic Profiling Identifies a Subset of Crizotinib-Responsive ALK-Rearranged Non-Small Cell Lung Cancer Not Detected by Fluorescence In Situ Hybridization. *Oncologist.* 2016 Jun; 21(6): 762-70. | 3. Suh JH, Schrock AB, Johnson A, et al. Hybrid Capture-Based Comprehensive Genomic Profiling Identifies Lung Cancer Patients with Well-Characterized Sensitizing Epidermal Growth Factor Receptor Point Mutations That Were Not Detected by Standard of Care Testing. *Oncologist.* 2018 Jul; 23(7): 776–781. | 4. Schrock AB, Frampton GM, Herndon D, et al. Comprehensive Genomic Profiling Identifies Frequent Drug-Sensitive EGFR Exon 19 Deletions in NSCLC not Identified by Prior Molecular Testing. *Clin Cancer Res.* 2016;22(13): 3281-5.

Comprehensive Genomic Profiling

Enabling in-house comprehensive genomic profiling from tissue and liquid biopsy samples



CGP Testing

Biomarker covered:

- Key Guidelines
- Clinical trials
- All relevant biomarkers
- Immuno-oncology (IO) biomarkers: TMB and MSI

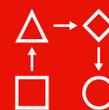
Consolidate all biomarker assays into a single NGS panel, saving sample, time and costs.



Implement Assay In-House

Offer Precision Oncology in your institution, keep the data in-house and avoid losing samples to send-out services.

Keep the assay in the long run with a portfolio of assays that includes emerging biomarkers and has an IVD roadmap



Integrated Workflow

Integrated workflow from sample to report.

CGP from solid or liquid biopsy samples with similar workflows for test labs.



Reliable Results

Harmonized processes allow to generate high-quality genomic data and enable its aggregation for research use.

Generating Insights from Data is Challenging



Scaling Up Infrastructure

to address petabyte-scale datasets is costly and resource intensive



Data Silos

hinder collaboration and stifle the pace of innovation



Maintaining Security, Privacy, and Compliance

is non-trivial and requires substantial investment and regular audit checks



Building and Deploying New Workflows

involves navigating many systems, technologies, and leads to inefficiencies



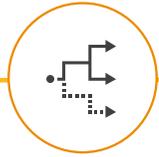
Limited Informatics Resources

are shared across groups, distracting from scientific focus and driving novel insights

ICA Provides Flexible, Interoperable Components to Power Data Insights



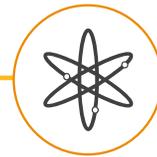
Sequence



Analyze



Aggregate



Explore



Collaborate

Out-of-the-box integration with Illumina sequencing systems

Process data with pre-packaged DRAGEN™ pipelines or build custom tools and workflows

Combine and query – omics data and real-world evidence to extract knowledge from cohorts

Data science workbench to derive new data insights

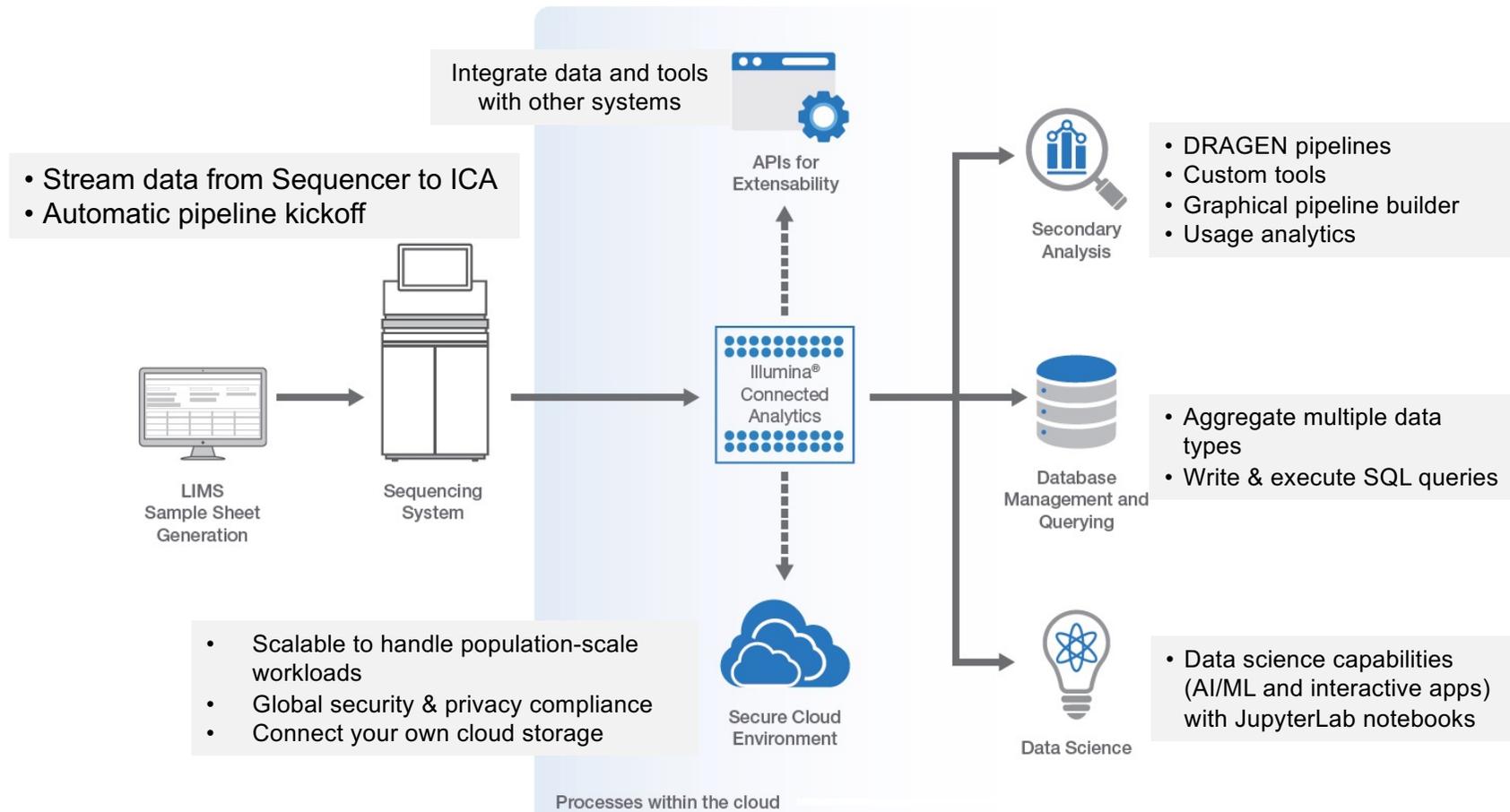
Accelerate discoveries on a global scale

SCALE

SECURITY

INSIGHTS

ICA: A Cloud Platform for Advanced Genomic Data Analysis





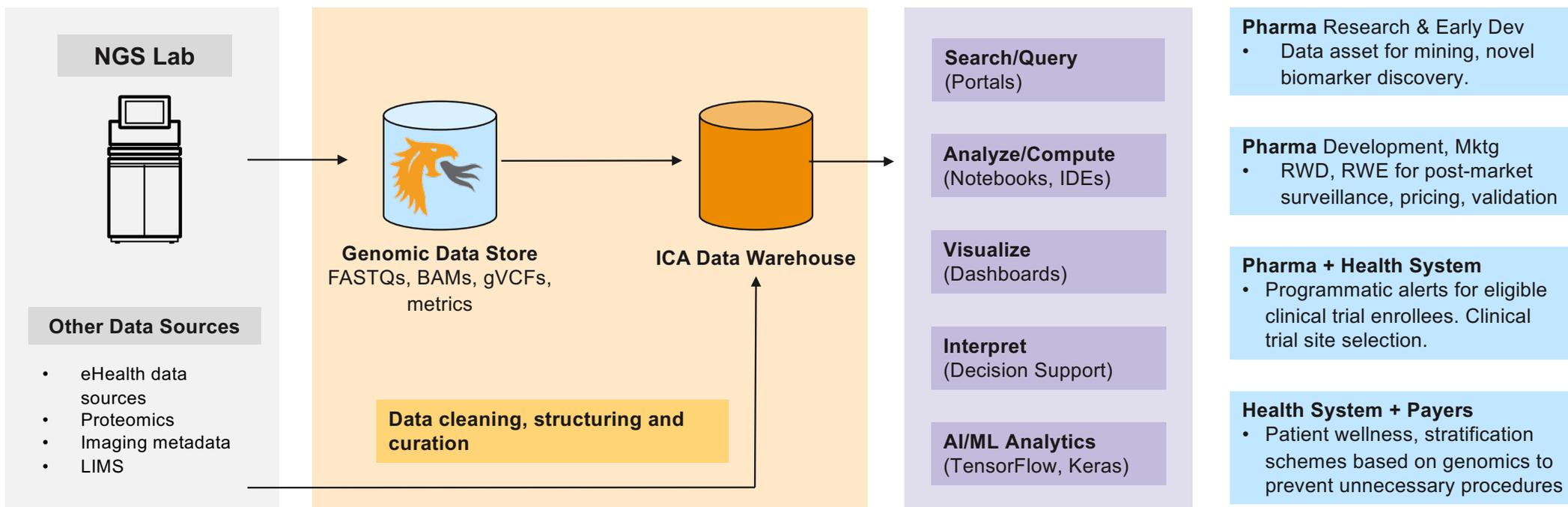
Data can be Presented in Many Ways to Power Different Use Cases

Data Generation

Illumina Connected Analytics

Data Presentation

Stakeholders / Use Cases



Early Access Story | University of Melbourne Center for Cancer Research

ICA + DRAGEN reduces time to result and improves workflow reliability



Cloud-based bioinformatics platform fast-tracking genomic analysis

Researchers at the University of Melbourne Centre for Cancer Research (UMCCR) have established a reliable, scalable and fast bioinformatics platform to analyse the genomic data of hundreds of cancer patients.



Picture: Associate Professor Oliver Hofmann's (front, second from right) Genomics Platform Group, based at the University of Melbourne Centre for Cancer Research

Challenge

- >24h post-sequencing to achieve analysis result
- Manual data transfer, analysis, QC

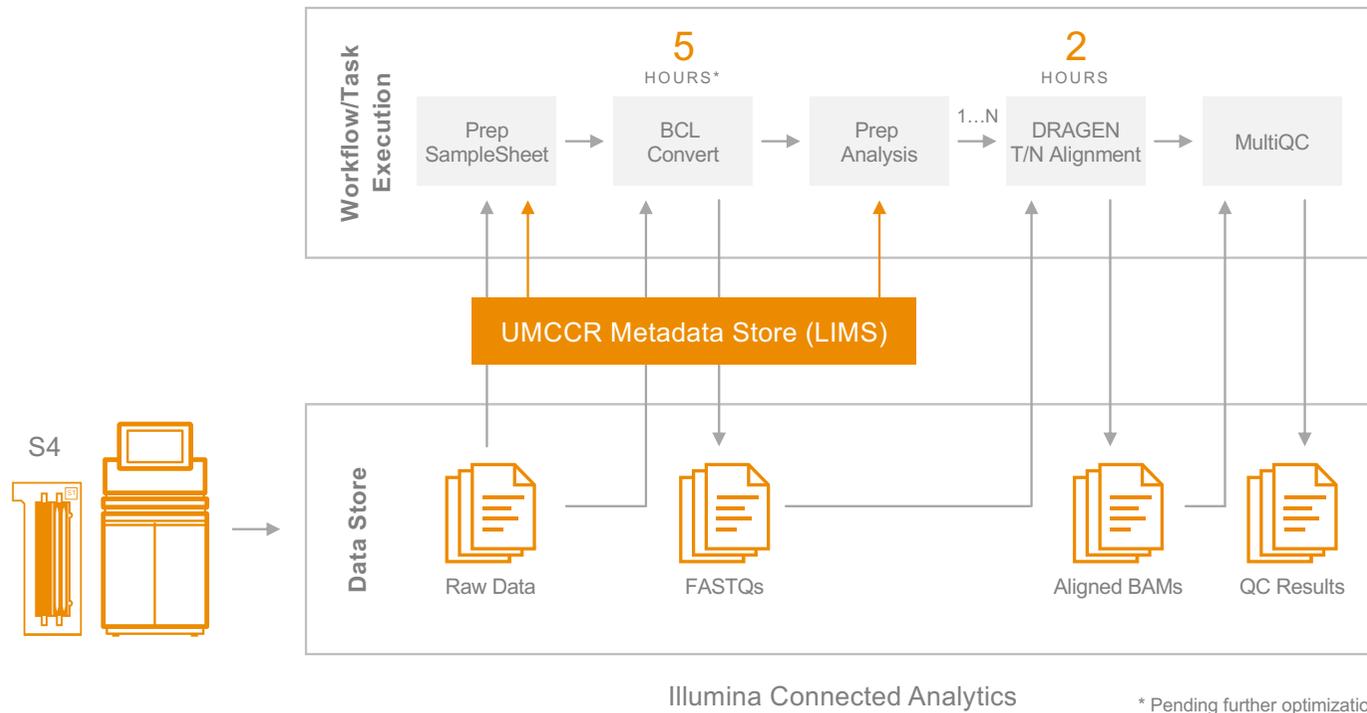
Solution

- Automated analysis & report delivery through ICA
- DRAGEN on ICA → **3X reduction in time to QC report**

<https://mdhs.unimelb.edu.au/centre-for-cancer-research/news-and-events/cloud-based-bioinformatics-platform-fast-tracking-genomic-analysis>

Early Access Story | University of Melbourne Center for Cancer Research

Rapid WGS Alignment & QC using IAP & DRAGEN™



"With Illumina Connected Analytics, we can easily contribute our own analysis and get it up and running with a few lines of code, leveraging the speed and quality of Illumina's existing DRAGEN technology without having to host and maintain our own computational infrastructure."

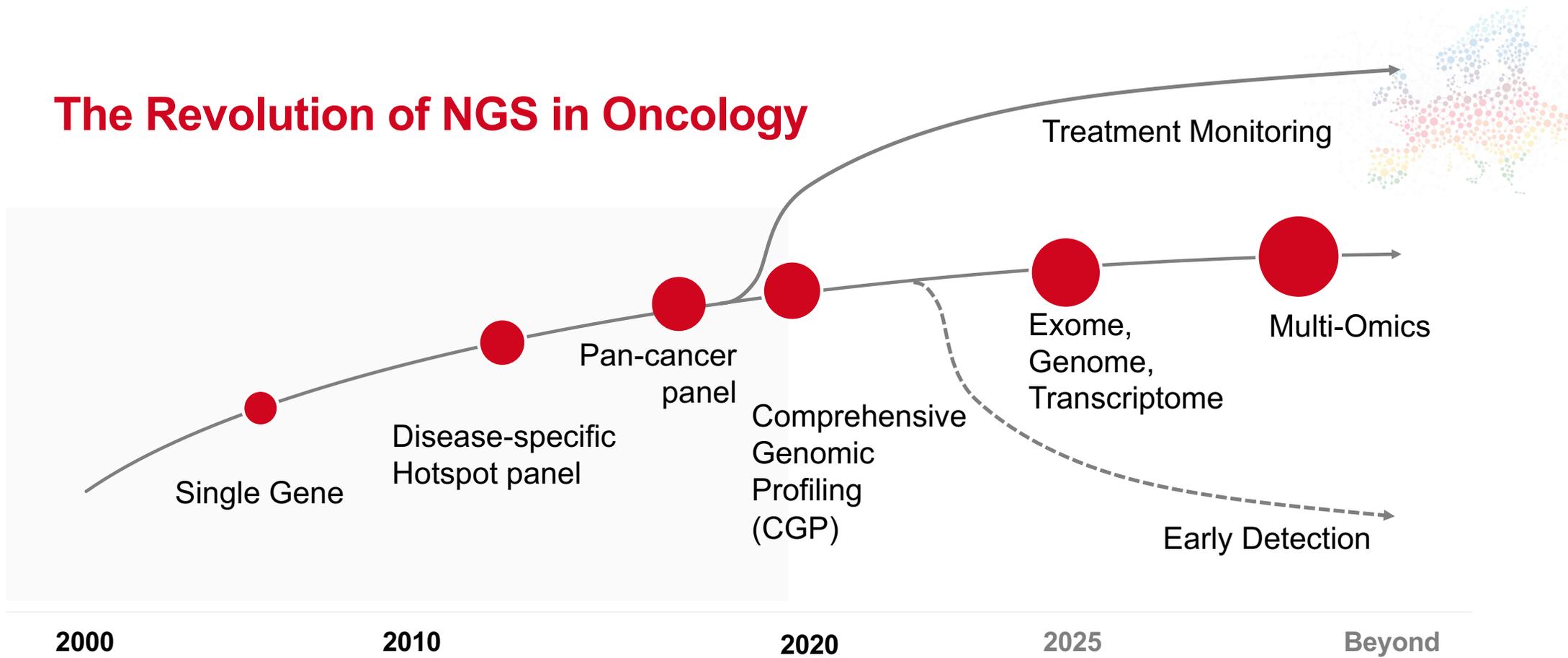
- Assoc. Prof Oliver Hofman

Conclusion – Critical Enablers to Success

Making Personalized Medicine in oncology a reality together

- Combine **groundbreaking science** and technology with a world-leading **network of partners**
- Establish **local end-to-end CGP solutions** covering **all relevant biomarkers**
- **Integrate** high-quality clinical and genomics data **in a secure analytical infrastructure**
- **EU-wide governance framework** to manage access and use of data for research and routine
- **Cooperation and funding** to implement and drive change

The Revolution of NGS in Oncology



The adoption of technology will accelerate with sequencing becoming more affordable

DigiCore

Let's **CONNECT-TO-WIN**



Our Data Privacy and Security Safeguards Adhere to ISO Standards

Our Position on Data Privacy

We create and develop advances in technology to improve human health by unlocking the power of the genome. To support this mission, Illumina collects and processes personal data in a variety of manners. We believe that responsible data stewardship, built on a foundation of strong privacy and data security protections, is essential to promote trust and support innovation.

Illumina is committed to handling personal data according to applicable laws and the following guiding principles:

1. **Transparency:** We clearly communicate our privacy practices and how we use personal data.
2. **Responsible Stewardship:** We protect personal data to keep it confidential and secure.
3. **Ethical Use:** We only collect and use personal data in a lawful and transparent manner for purposes that further our mission to improve human health by unlocking the power of the genome.
4. **Accountability:** We are committed to compliance with all legal requirements and promoting internal practices to achieve the highest standards for personal data privacy