
Digital technology and advanced analytics in Roche

Investor Relations Event May 2020



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- 1 pricing and product initiatives of competitors;
- 2 legislative and regulatory developments and economic conditions;
- 3 delay or inability in obtaining regulatory approvals or bringing products to market;
- 4 fluctuations in currency exchange rates and general financial market conditions;
- 5 uncertainties in the discovery, development or marketing of new products or new uses of existing products, including without limitation negative results of clinical trials or research projects, unexpected side-effects of pipeline or marketed products;
- 6 increased government pricing pressures;
- 7 interruptions in production;
- 8 loss of or inability to obtain adequate protection for intellectual property rights;
- 9 litigation;
- 10 loss of key executives or other employees; and
- 11 adverse publicity and news coverage.

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Agenda

Welcome

- Karl Mahler, Head of Investor Relations

Digital technology and advanced analytics

- Alan Hippe; Chief Financial and IT Officer Roche

Digital endpoints and technology changing drug development

- Bryn Roberts; Global Head of Operations and Informatics, pRED

Healthcare data generating meaningful clinical insights in 2020 and beyond

- Mark Lee; Global Head for Personalized Healthcare, Product Development

Digital pathology and clinical decision support - tools to transform healthcare systems

- Mike Rivers; Lifecycle Leader, Digital Pathology, Roche Tissue Diagnostics

Information technology at Roche - underpinning our digital ambition

- Steve Guise; Global Head, Pharma Informatics

Q&A

Digital technology and advanced analytics

Alan Hippe / *Chief Financial and IT Officer Roche*

Roche COVID-19 Response

FDA approved Elecsys Anti-SARS-CoV-2 serology test (3 May, 2020)

cobas SARS-CoV-2 molecular test



cobas 6800

cobas 8800

1,440 results in 24h

4,128 results in 24h

- FDA issued EUA for the cobas SARS-CoV-2 PCR test; test also available in markets accepting the CE mark

Key initiatives:

- Continuously increasing production capacity

Elecsys® Anti-SARS-CoV-2 assay



e 411

e 601/602

e 801

- FDA issued EUA for the serology test for detection of antibodies against SARS-CoV-2 (3 May, 2020)

Key initiatives:

- Ramp up to high double digit million tests per month by June

Actemra in severe COVID-19 pneumonia (in collaboration with BARDA)



- First-in-class interleukin-6 receptor antagonist
- Approved in >110 countries worldwide for rheumatoid arthritis

- Actemra (tocilizumab) targeted to reduce ICU admissions and/or improve ICU outcomes

Key initiatives:

- Randomized phase III (COVACTA) to show improved survival and outcome in severe COVID-19 pneumonia
- Increasing production capacity

Industry trends

Roche in Digital

Outlook: Building a digital culture across the organisation

Industry trends in Digital

Increasingly impacting our core businesses

Product & Stakeholder Experience

Internal Value Chain

Increasingly consumerised healthcare

- Healthcare delivery complemented by digital solutions
- Stakeholders engaging through digital channels



Patient outcomes easier to measure & manage

- Healthcare delivery integrated across stakeholders
- Patient data collected & acted upon in real time



Patients / citizens managing own health

- Patients can access and control their health data
- Personalised digital services empowered to take health decisions



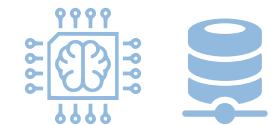
Non-traditional players moving into healthcare

- New players collect data, build platforms, provide digital services
- This reduces inefficiencies in healthcare system



Next level of process optimisation

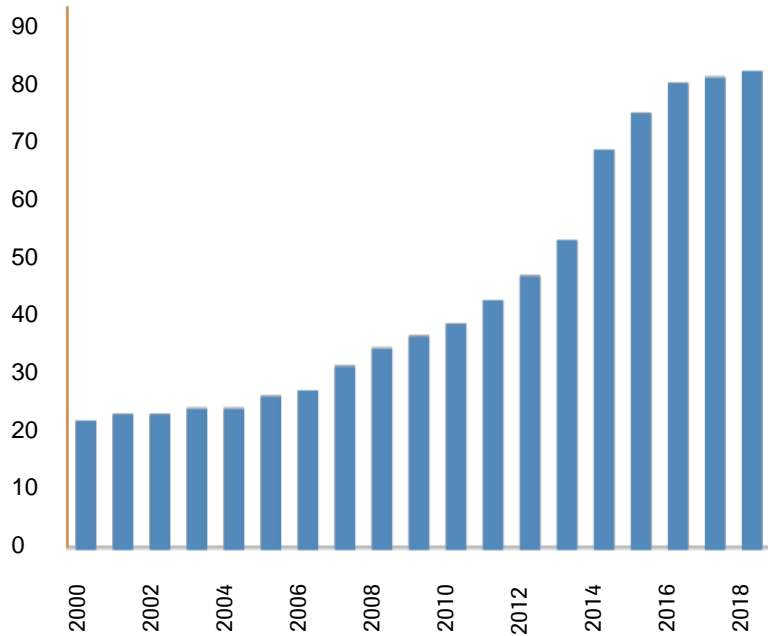
- Artificial intelligence and robotics improve internal processes
- Result: higher quality, lower costs and faster speed to market



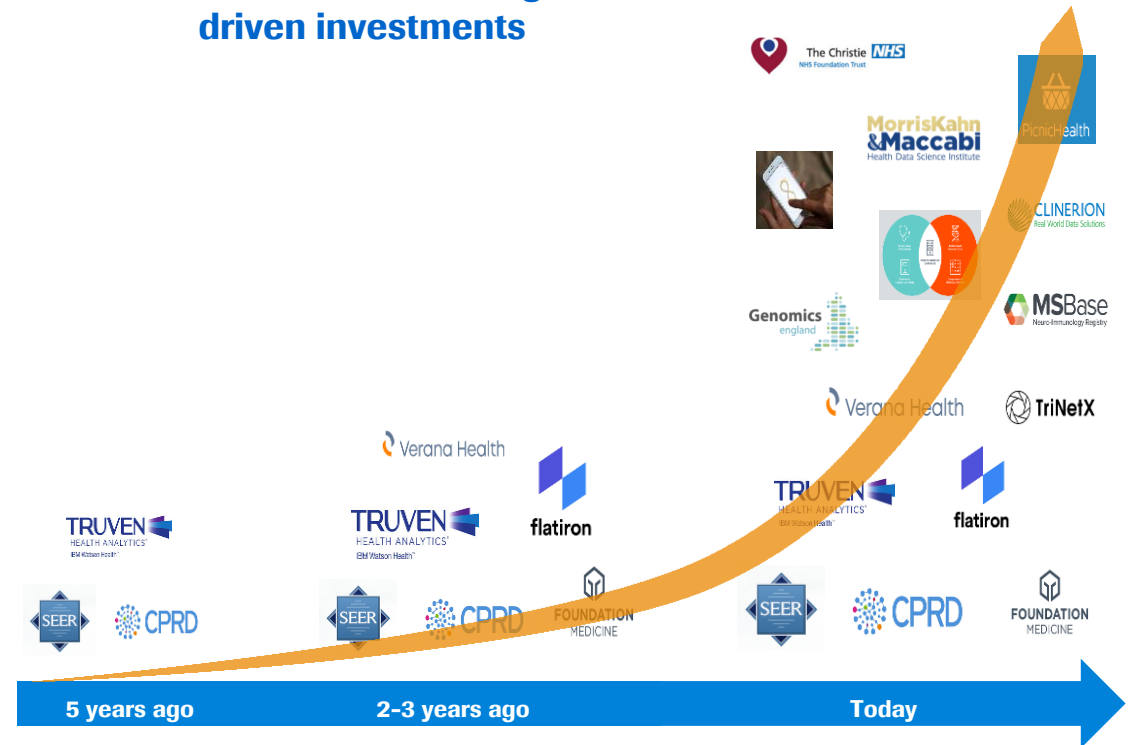
Increased investment in data

Emerging value of large scale healthcare data

Cumulative number of clinical decision support (CDS) companies¹



Substantial increase in big data driven investments



¹ Based on the subset of companies screened and publicly available information; only includes companies still operating at time of screen

Industry trends

Roche in Digital

Outlook: Building a digital culture across the organisation

Today's magnitude of Digital across Roche

More than CHF 3bn annual spend in digital across the company

Significant M&A investment



- World leading molecular insights business
- Fully acquired in 2015



- Healthcare technology and services company focused on accelerating cancer research and improving patient care
- Fully acquired in 2018

Ongoing activities



300+

key initiatives ongoing



3bn+

digital spend



30+

solutions on market

> 50 partnerships across data, analytics and digital supporting our continued focus on PHC over the last 3 years



INSIGHT

illumina®



Clover
Therapeutics

HDRUK
Health Data Research UK

HARMAN
A SAMSUNG COMPANY

Roche IT infrastructure and capabilities

IT Performance (not only) in response to COVID-19

Connectivity	Working from Home (WfH)	New Employees	External Partners	Contact Center	Sourcing Balance	Manufacturing Blueprint
Strategic investments in Roche's connectivity	Strategic investment in Roche's WfH	Different technologies to provide access to the Roche Core Network		Optimised and harmonized Contact Center Infrastructure	Investment into a balanced portfolio of internal and external resources, skills and services	Standard Manufacturing Blueprint, available for Pharma & Diagnostics
1:1 to N:10000's format meetings	All employees are able to connect from home	Effective on-boarding of new employees even w/o company device	Enabled external business partners to work from home	Agents to work from home, immediately, productively and securely	Provided flexibility and mitigation for vendor dependencies	Maintained high reliability and resiliency of our business critical services

Increased Working from Home from 38K to 108K users

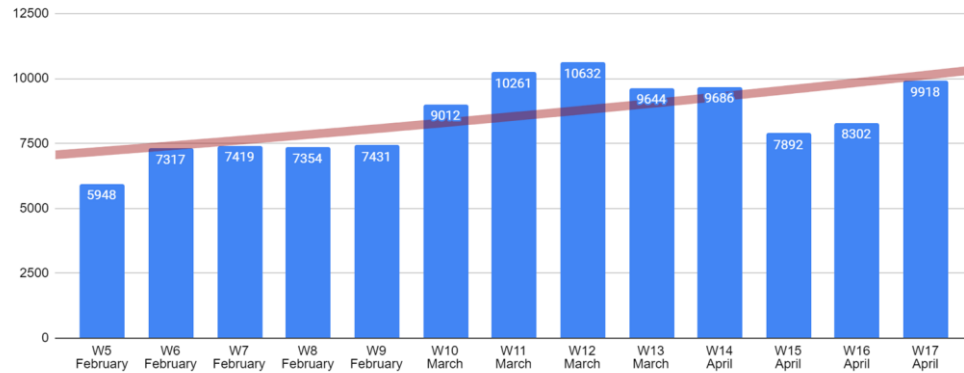
Increased remote collaboration by 375%

Maintained high reliability and resilience

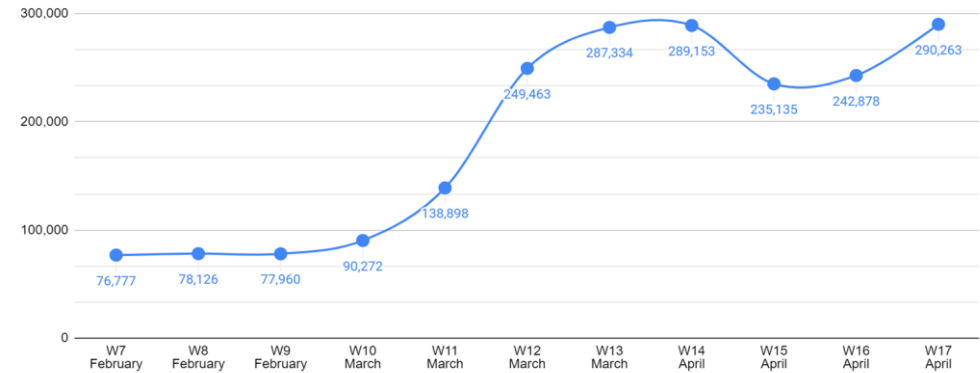
Roche IT infrastructure and capabilities

IT successfully passed stress test

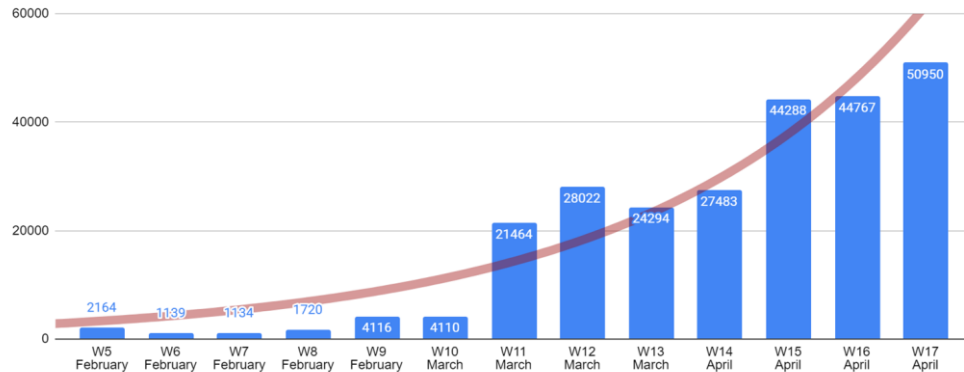
Service Desk Incidents Created



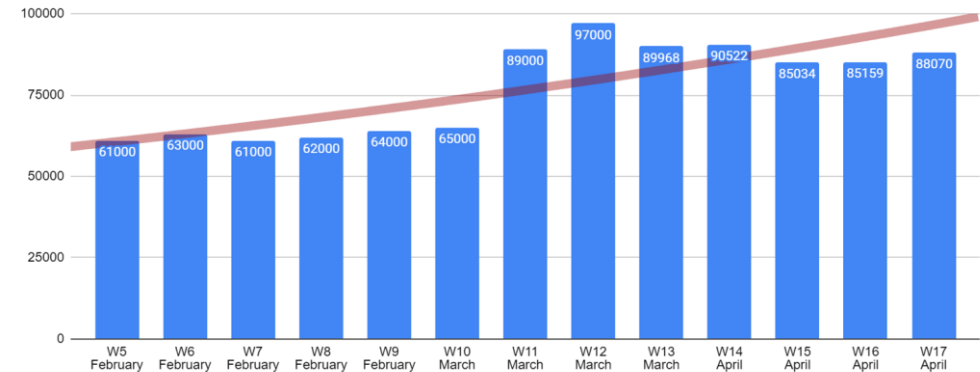
Remote Collaboration Meet Participants



Non-VPN Apps Cloudflare / WAF Connections



VPN Connectivity Users



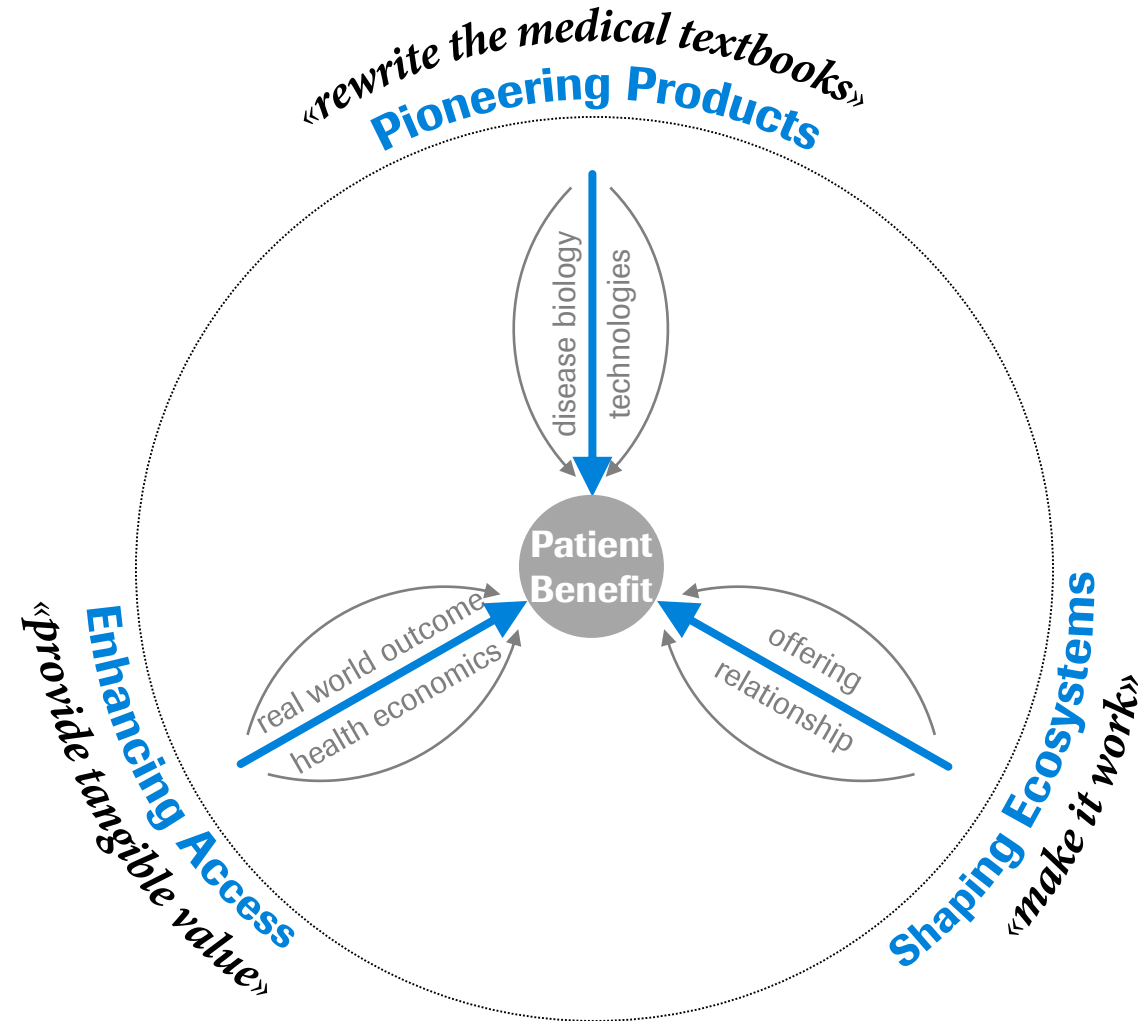
Industry trends

Roche in Digital

Outlook: Building a digital culture across the organisation

Outlook on Roche's integrated strategy

Fitting treatments to patients



What Digitalisation means for Roche

Prerequisite to maintain and grow our core business

Leverage digital to enhance stakeholder experience

Differentiate core products with digital solutions



Optimise the internal value chain through digital

Current Digital highlights

Three examples



Augmented Products

Software as a medical device
and digital biomarkers
MS, ASD, HD, Parkinsons



- **Continuous** and **longitudinal** measurement

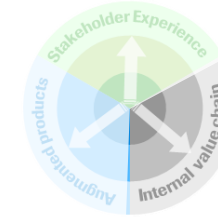


Stakeholder Experience

Digital go-to-market Model

EpiCX

- **360° customer view** by assembling all customer interactions, content and data in a common platform



Internal Value Chain

Blood and Gas electrolyte sensors



- Program to replace manual **sensor checks** with a digital solution
- **Image extraction** and **deep learning algorithm** for quality control of sensors
- Improved monitoring results in **higher yield** and **reduced manufacturing costs**

Finance: Shifting focus from data reporting to generating actionable insights

End-to-end processes

Smart Analytics & Insights

Cognitive automation/ Digital Board Room

Implementing single data source & process automation

- Implemented Shared Service Centers in Budapest, Sao Paulo, Kuala Lumpur, Puerto Rico
- Centralized Procurement

Implementing smart analytics for improved resource planning, simulations, & forecasting

- Finance as active business partner to business

Implementing AI tools for automatic processes and systems

- Finance as integrated partner in all business processes

Today

Future

Digital: Impacting our entire value chain



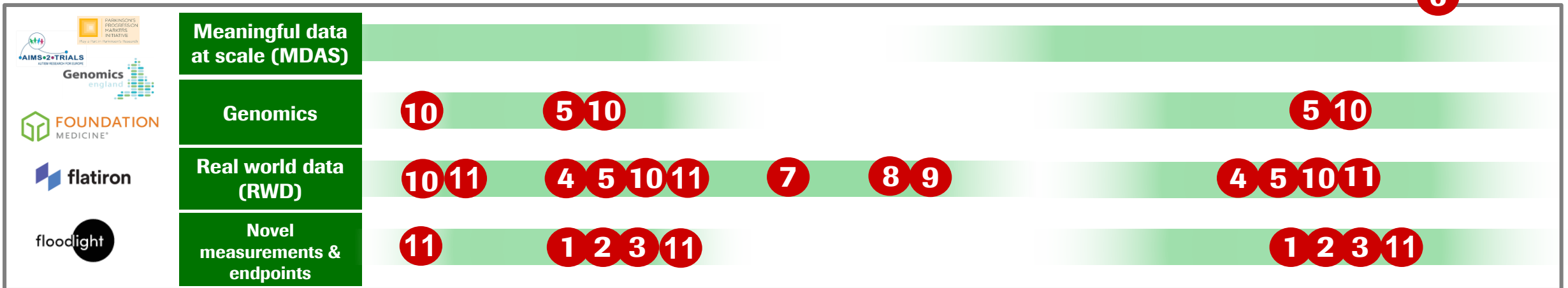
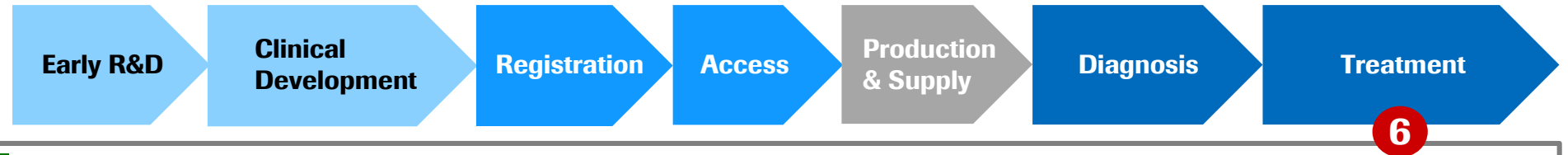
	Meaningful data at scale (MDAS)	[Green bar]				
	Genomics	[Green bar]				
	Real world data (RWD)	[Green bar]				
	Novel measurements & endpoints	[Green bar]				

	Digital pathology	[Green bar]				
	Decision support	[Green bar]				
	Consumer ecosystems	[Green bar]				

Positive business impact by digital technology and advanced analytics established

Digital: Impacting our entire value chain

17 use cases highlighting the depth & breath of digitalisation

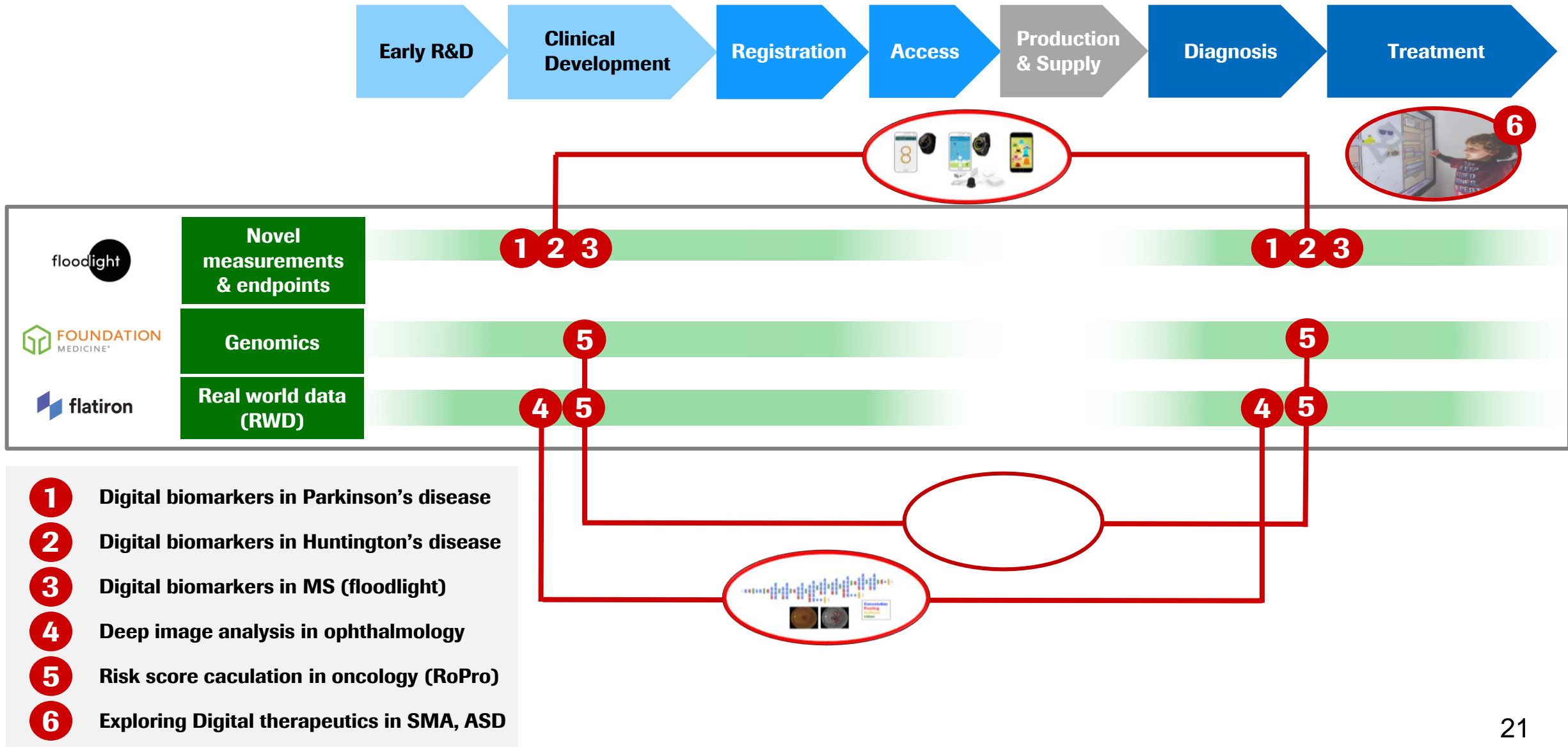


Positive business impact by digital technology and advanced analytics established

Digital endpoints and technology changing drug development

Bryn Roberts / *Global Head of Operations and Informatics, pRED*

Pharma use cases 1-6



Enabling drug development with a suit of digital tools

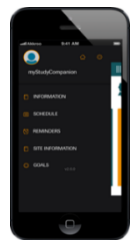
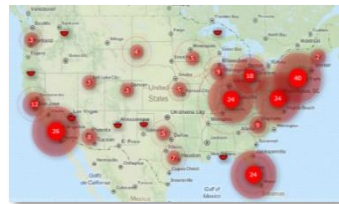
Efficiency, effectiveness and enhanced patient and investigator experience

Patient-focused: engagement, recruitment, trial experience



ForPatients portal

Data Driven Recruitment



Patient Engagement App

eConsent



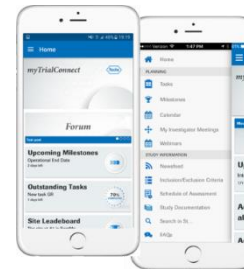
AiCure medication compliance

Investigator-focused: engagement, efficiency, effectiveness



Study & Investigator Portals

Investigator Engagement Platform



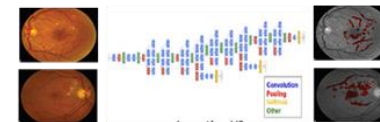
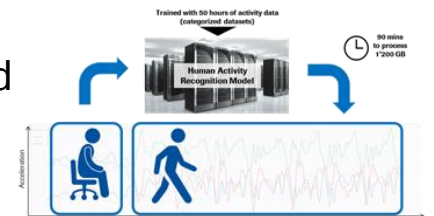
Investigator Meeting App

Novel measurement & endpoints



Digital biomarkers using sensors, wearables, mobile

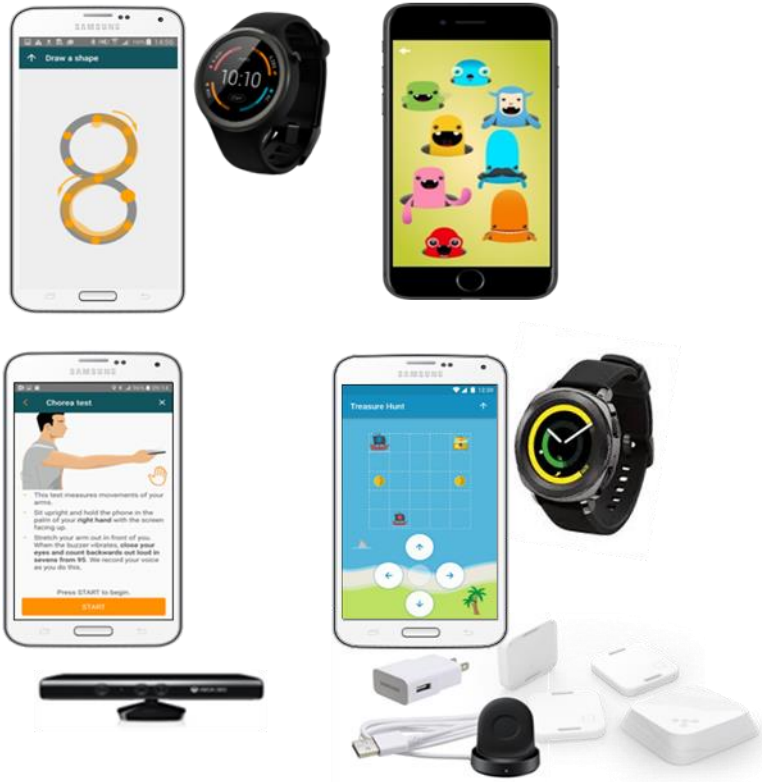
AI – machine and deep learning models



Algorithms for endpoint measurement and prediction

Measurement & endpoints

Digital biomarkers - providing enhanced patient insights and novel endpoints



- Clinical trials utilizing **mobiles**, **wearables** and **gaming** devices
- More **sensitive**, **precise** and **objective**
- **Continuous** and **longitudinal** measurement captures episodic and rare events
- Reduced **assessment burden** and greater **real-world relevance**

Multiple Sclerosis

Parkinson's Disease

Huntington's Disease

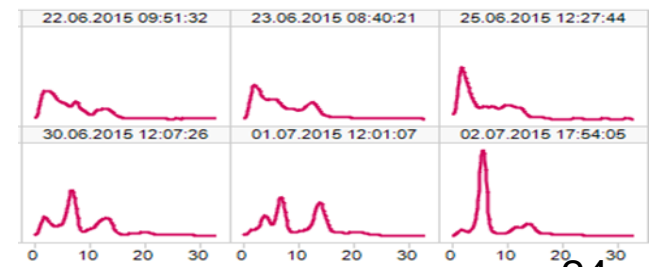
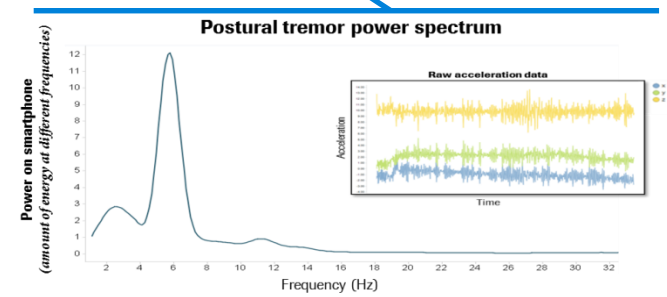
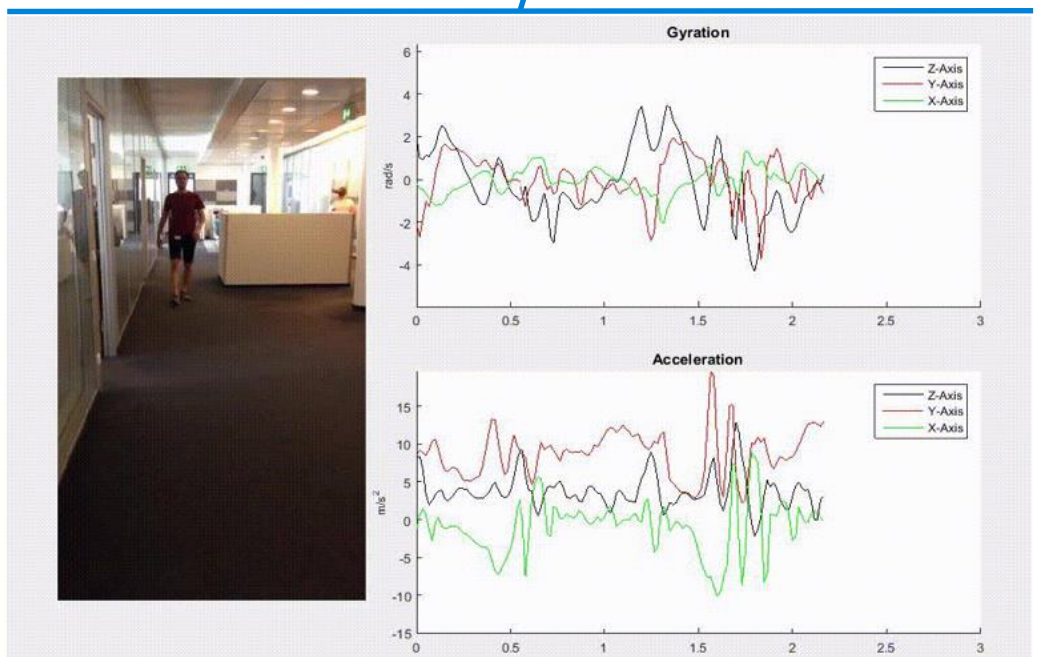
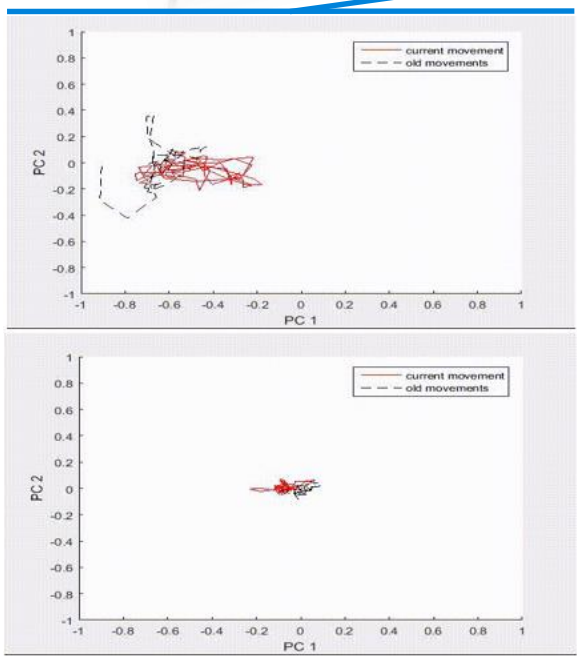
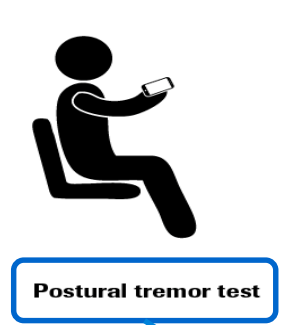
Spinal Muscular Atrophy

Autistic Spectrum Disorders

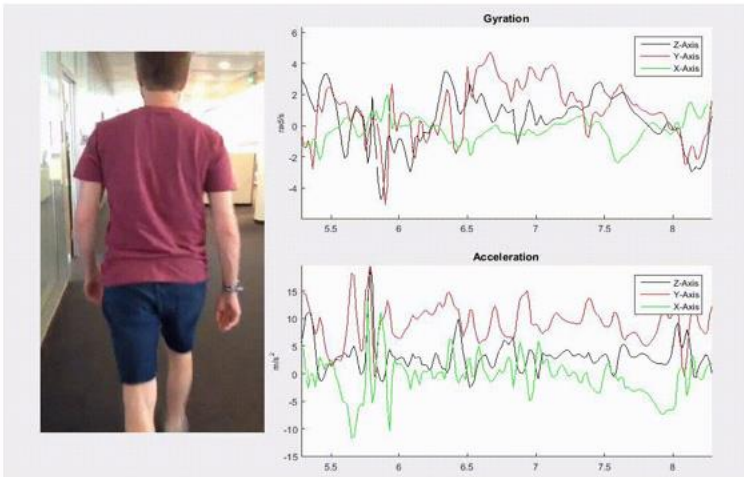
Angelman's Syndrome...

Digital biomarker active tests

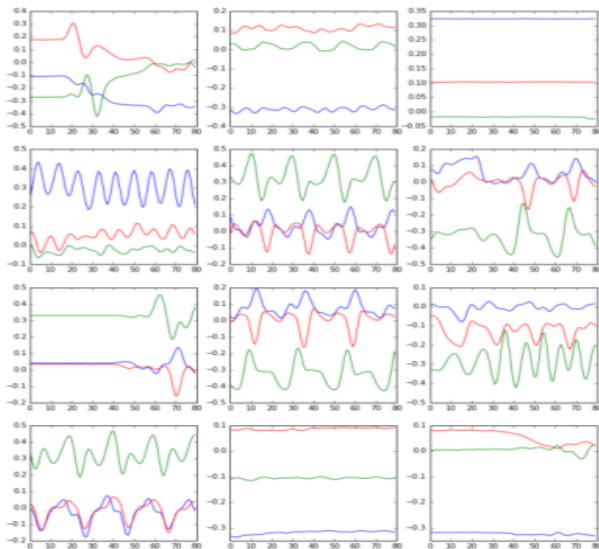
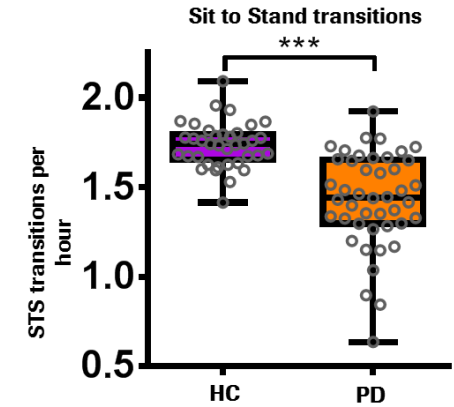
Supporting clinical development programmes – e.g. Parkinson’s Disease



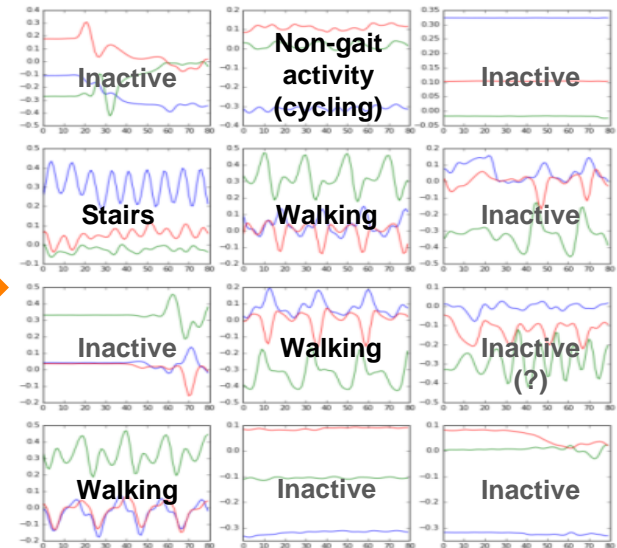
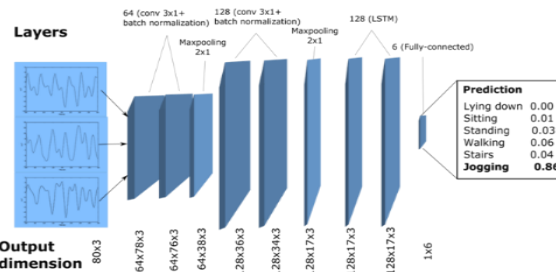
Digital biomarker continuous passive monitoring *AI (deep learning) classification of activity & performance in daily tasks*



Parkinson's disease



Human Activity Recognition (HAR)



Roche HD digital monitoring platform has been developed to assess disease progression in clinical trials

Patients with HD in the RG6042 global development programme receive a smartphone and smartwatch

ACTIVE TESTS									
Patient-reported outcomes		Cognitive tests		Upper body motor tests			Stability and gait		
Daily Qs	EQ-5D-5L	SDMT	Word reading	Speeded tapping	Draw a shape	Chorea	Balance	U-turn	2-minute walk
Daily	Weekly	Weekly	Weekly	Daily	Daily	Daily	Daily	Daily	Daily
Behavioural assessment	Behavioural assessment	SDMT	Stroop Interference Test	Finger taps	Finger taps Pronate/supinate-hands	Maximal chorea	Maximal chorea and Pull Test	Bradykinesia-body and Gait	Bradykinesia-body, Gait and Tandem walking

PASSIVE MONITORING		
Activities of daily living		
Gait	Chorea	Activity levels
Bradykinesia-body and Gait	Maximal chorea	Bradykinesia-body and Gait

With smartphone and smartwatch

Anchored to clinical assessments

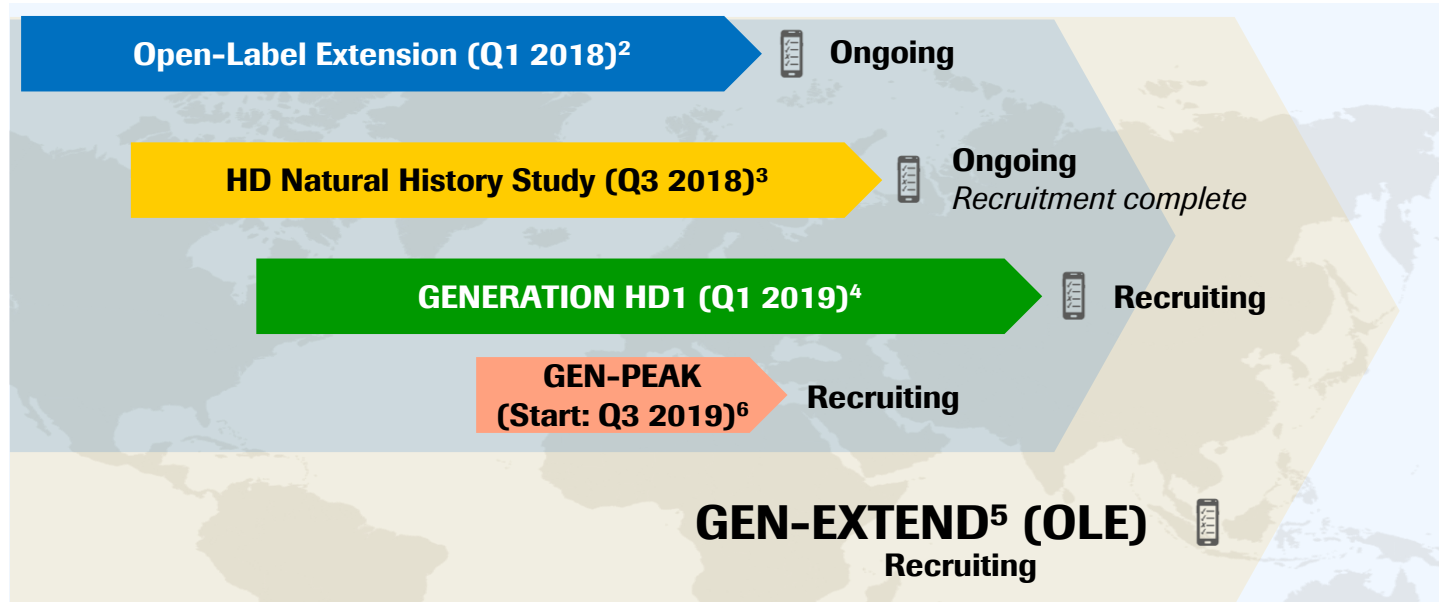
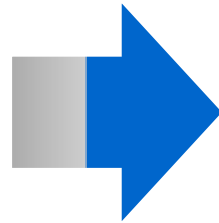


- Patients first complete active tests using these tools in a teaching session in the clinic. The active tests are then done remotely at home and at follow-up clinical visits
- For passive monitoring, patients are asked to carry the devices with them as they go about their daily activities
- The sensor data are securely transferred via WiFi to Roche, where they are processed and analysed

The digital monitoring platform is being assessed in the RG6042 clinical development programme and external studies

Phase I/IIa¹
(Completed: End 2017)

- First-in-human study
- Safety, tolerability, PK/PD
- Early manifest HD patients
- N=46



Investigator-initiated study:

Digital-HD

- Prospective, observational study
- Manifest and premanifest HD patients, and healthy controls
- N=80

includes digital monitoring platform

The use of the remote digital monitoring platform has the potential to provide new insights into HD progression outside the traditional clinical trial setting

HD=Huntington's disease, OLE=open-label extension; PD=pharmacodynamics; PK=pharmacokinetics

1 Tabrizi SJ, et al. N Engl J Med. 2019; 380:2307–2316; 2 NCT03342053 (Mar 19); 3 NCT03664804 (Mar 19); 4 NCT03761849 (Mar 19); 5 NCT03842969 (Mar 19); 6 NCT04000594 (Jun 19); NP/PIPE/1908/0010

Digital healthcare solutions

Digital solutions offer us the opportunity to develop integrated personalised healthcare solutions around and beyond the medicine

Around



Optimising the Medicine

Treatment selection and management, e.g. earlier access, dose optimization
Automation of delivery
Patient empowerment, e.g. monitoring & reporting

Beyond

Augmenting the Medicine

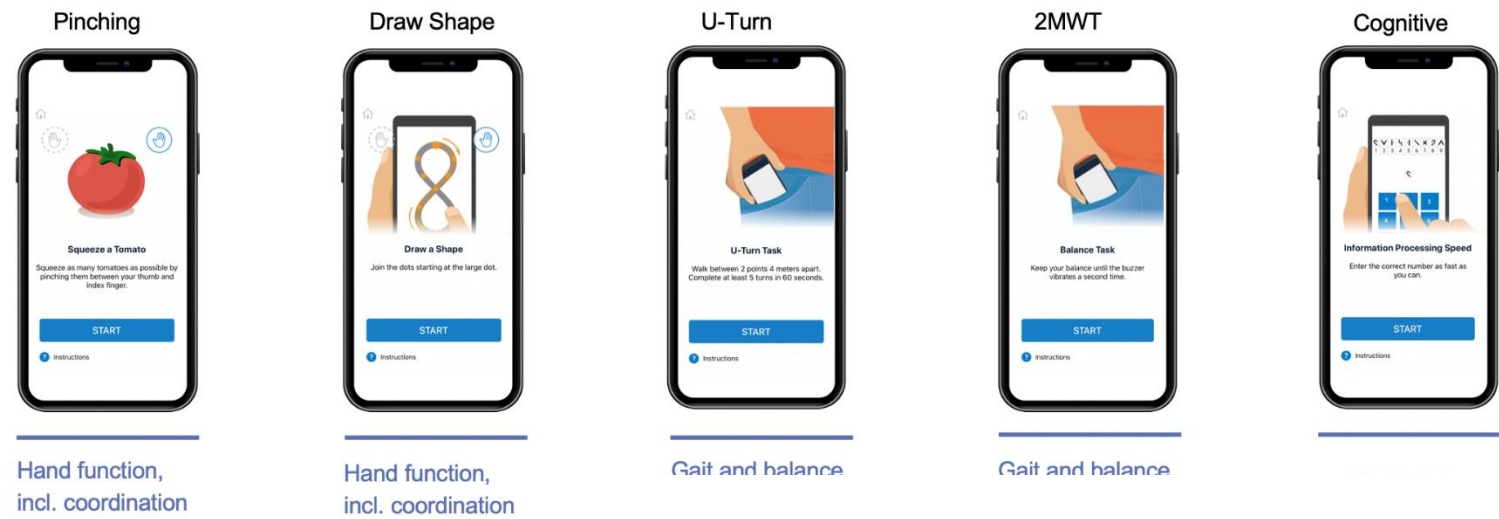
Skills development
Cognitive behavioral therapy
Disease management services
Prognostics & prevention
Human augmentation, e.g. implants, human-computer interfaces (AR, VR), robotic augmentation

Driven by evidence-based, differentiated medical value

Floodlight MS

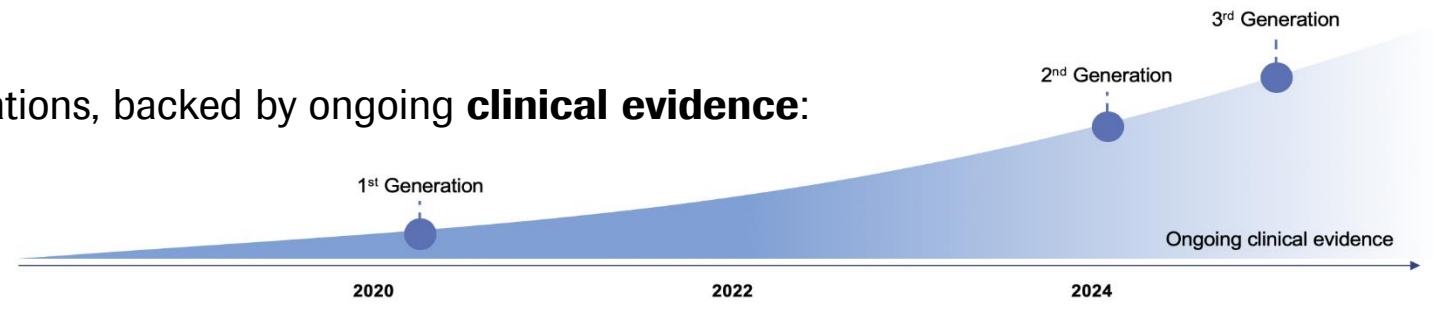
Shifting clinical practice towards objective and frequent measurements of multiple sclerosis in-between clinic visits

The first generation of Floodlight MS consists of five tests intended to measure motor and cognitive function¹



Floodlight MS will evolve in three generations, backed by ongoing **clinical evidence**:

1. Measure function
2. Measure disease progression
3. Predict disease progression



¹ Intended for patients 18 years of age and older with neurological disease, such as multiple sclerosis. The patient is not intended to take action on the device output without consultation of a qualified healthcare professional. The HCP is solely responsible for interpreting the results; 2MWT=2 minute walk test

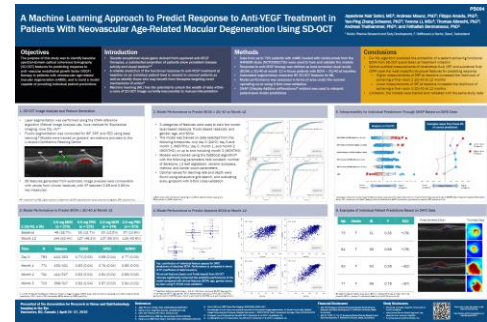
Predictive algorithms

Applying machine and deep learning (AI) in multiple disease areas

Retinal Disease

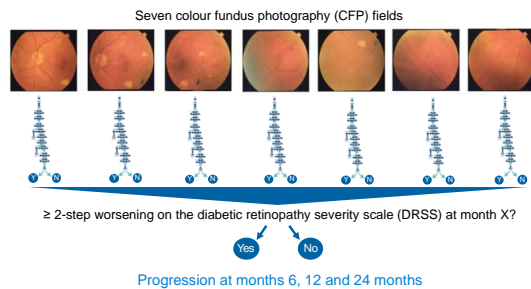
Response to anti-VEGF treatment in patients with nAMD

nAMD=neovascular age-related macular degeneration; SD-OCT=spectral-domain optical coherence tomography; ARVO, April 2019



Progression of diabetic retinopathy

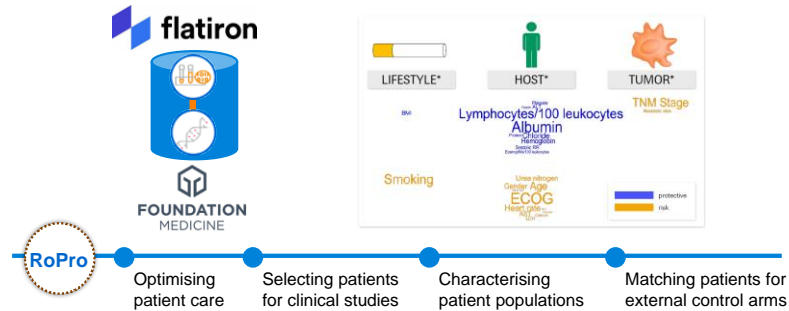
Arcadu F et al. NPJ Digit Med 2019;2:92



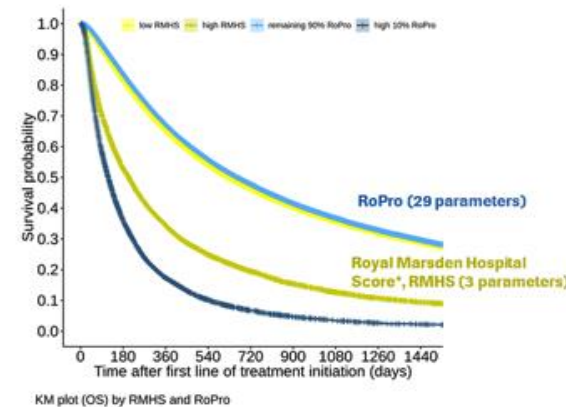
AI=artificial intelligence

Oncology

RoPro was generated by applying machine learning to data from 110 000 patients across 15 cancer indications



RoPro calculates a risk score¹ that has a number of potential applications in drug development and clinical practice



RoPro shows better separation of survival curves compared to RMHS HR 4.66 (95% CI 4.56-4.77 vs HR 2.22 (2.15-2.28))

RoPro = Roche Prognostic Score; RMHS = Royal Marsden Hospital Score; ¹Rüttinger D Presentation at AACR, Atlanta, April 1, 2019. [patent application pending]

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Human augmentation, e.g. implants, human-computer interfaces (AR, VR), robotic augmentation

Driven by evidence-based, differentiated medical value

Digital therapeutics

Exploring exergaming as a potential therapeutic adjunct in diseases such as SMA or ASD

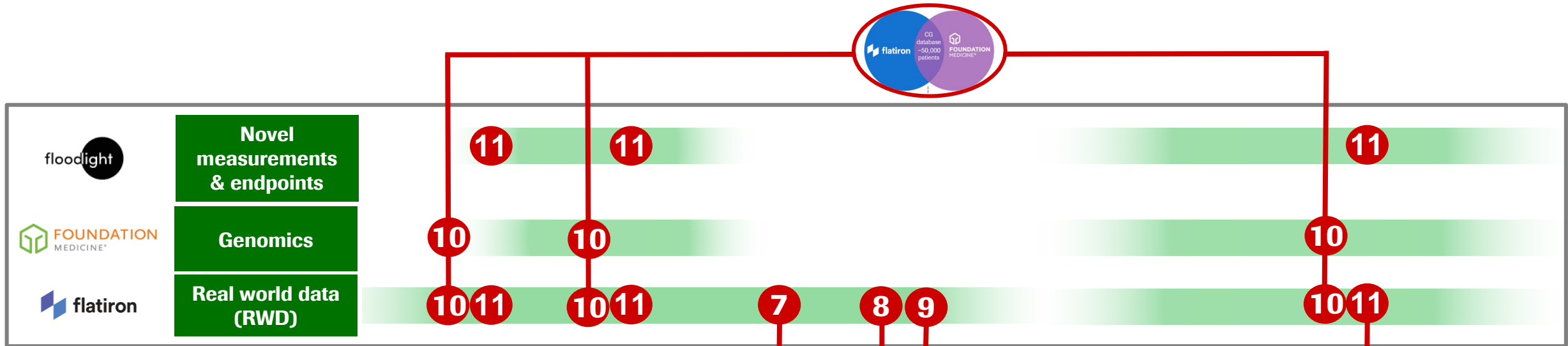
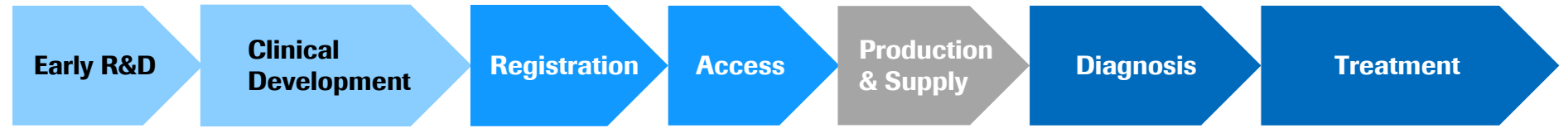


- Appropriately designed 'games' have the potential to develop physical and cognitive skills, enable physical therapy at home, etc.
- Roche is exploring solutions with the potential to offer meaningful benefit, demonstrated through robust clinical evidence
- Signed development and commercialization agreement to create a digital therapeutics (DTx) platform for autism and other digital health products with HARMAN

Healthcare data generating meaningful clinical insights in 2020 and beyond

Mark Lee / *SVP and Head of Personalised Healthcare, Product Development*

Pharma use cases 7-11



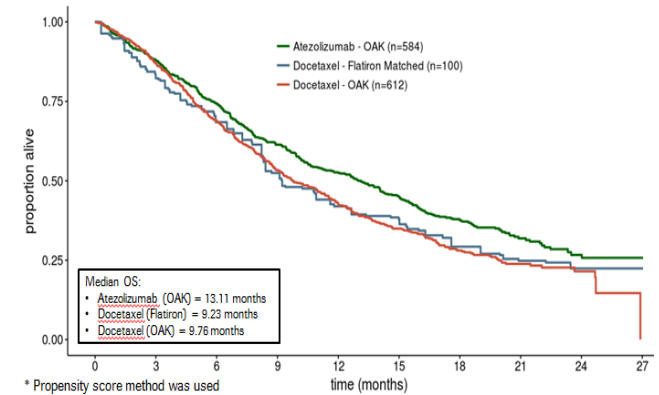
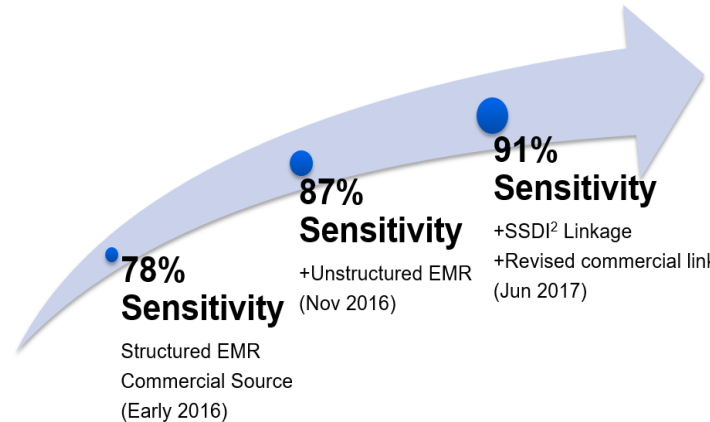
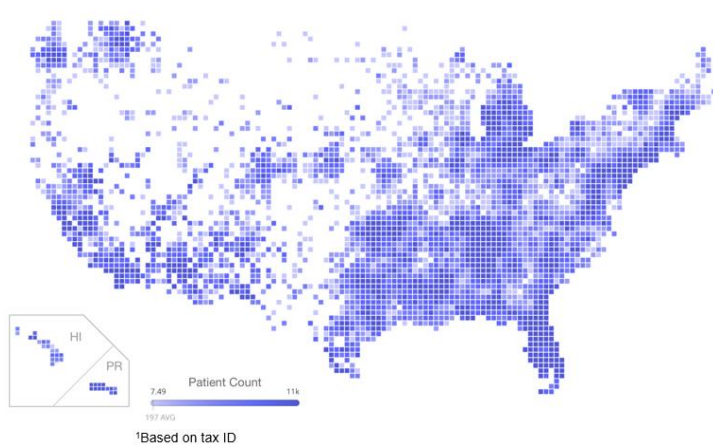
- 7** RWD for regulatory interactions: Rozlytrek in ROS1+ NSCLC
- 8** RWD for access: Perjeta in early-stage BC
- 9** RWD for post-marketing safety: Kadcyla in mBC
- 10** Clinico-Genomic data (Flatiron/FMI)
- 11** Automated analysis of medical imaging data to enhance RWD

Utility of RWD: Data scale, depth, and quality are critical

Flatiron Health electronic health record (HER)-derived de-identified database

Rigorously curated, integrated, structured and unstructured data ¹

Propensity-score modeling replicates control arms from randomized clinical trials



- 2.15m active patients
- 2500 clinicians
- 280 cancer clinics
- 800 sites of care

- Validated for high sensitivity to mortality clinical endpoint

- Example: Tecentriq in NSCLC (OAK)
- 8 other NSCLC randomized clinical trials modelled ³

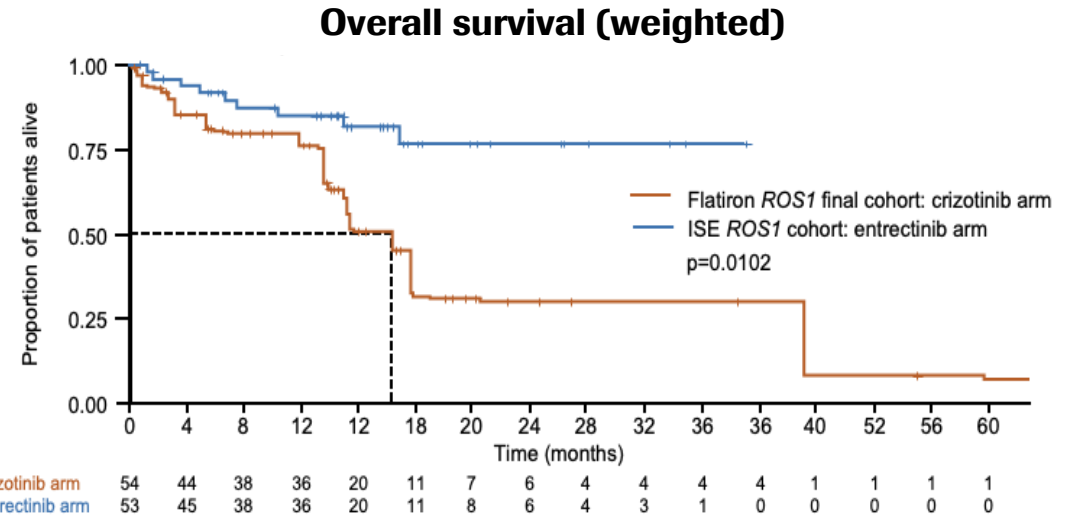
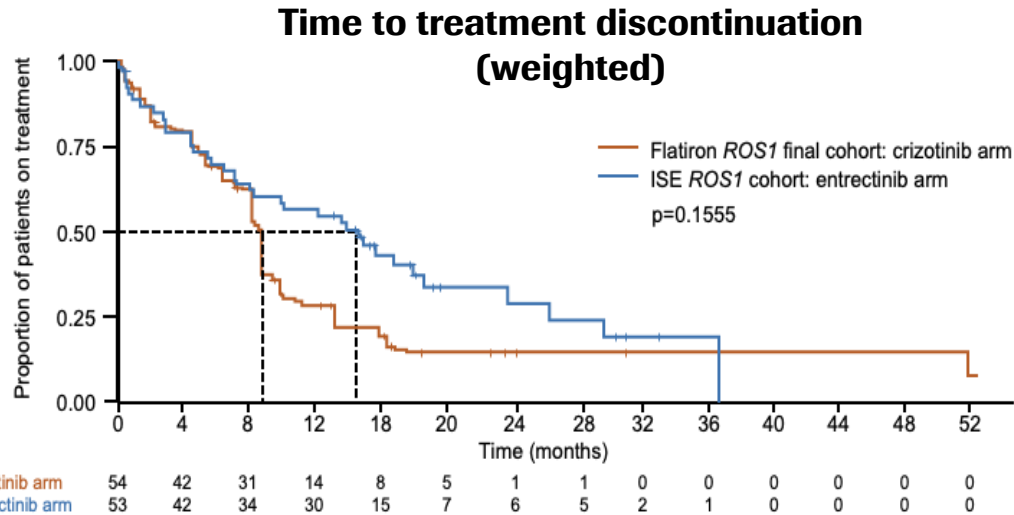
100+ applications active across R&D, access, and regulatory with RWD from Flatiron and other sources

1. Melissa D. Curtis, et al. Development and Validation of a High-Quality Composite Real-World Mortality Endpoint, 2018; 2. Social Security Death Index; 3. Gillis Carrigan, et al. Using Electronic Health Records to Derive Control Arms for Early Phase Single-Arm Lung Cancer Trials: Proof-of-Concept in Randomized Controlled Trials, 2019; RWD=real world data; NSCL=non-small cell lung cancer

Rozlytrek in ROS1+ NSCLC

Accelerated filing and launch based on RWD

External control based on Flatiron RWD

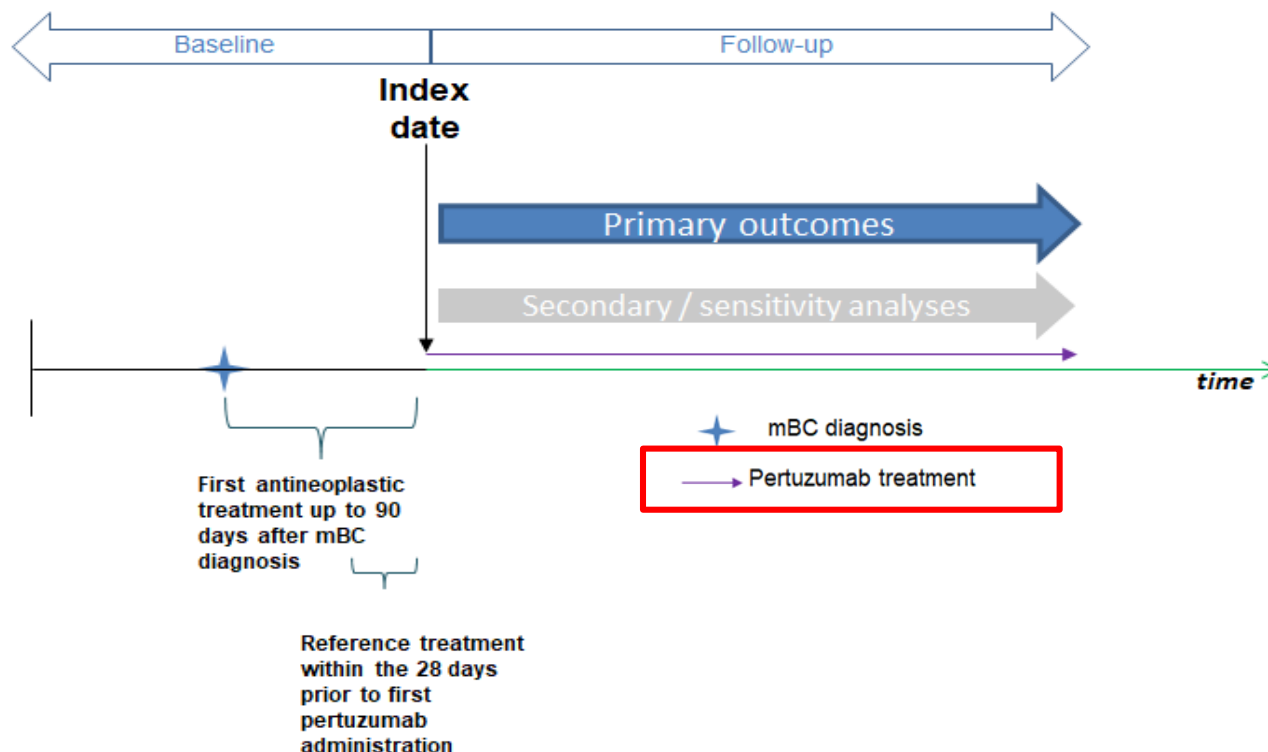


- Due to rarity of ROS1+ NSCLC, a placebo controlled trial of Rozlytrek (entrectinib) versus crizotinib was not feasible
- Comparative RWD enabled early submissions to EMA and the Japanese Health Authority; included in US dossier
- Enabled approval in Japan (1st in world for Rozlytrek)

Perjeta in early-stage BC

Supporting reimbursement decision based on RWD

Treatment schemes in 1L mBC

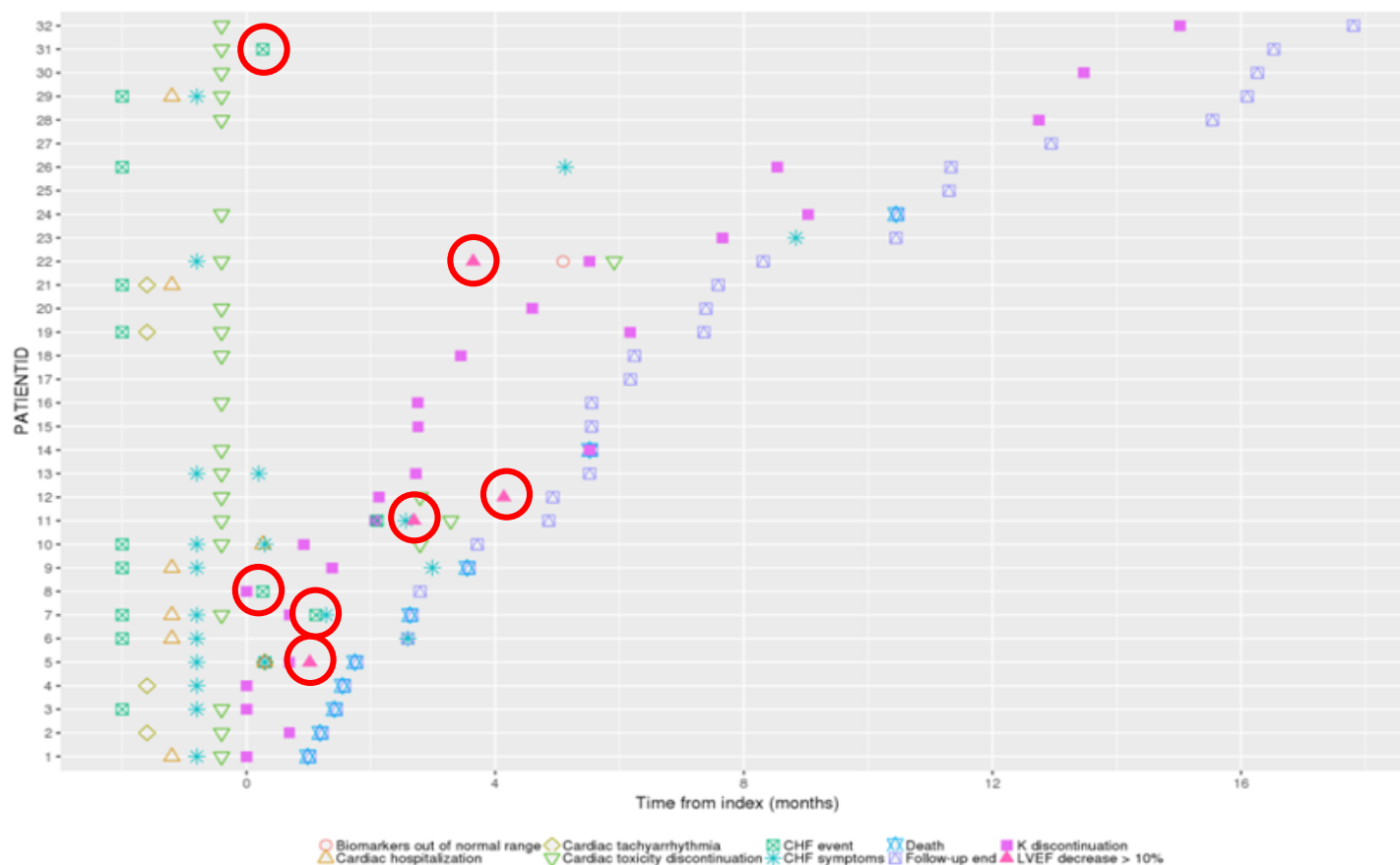


- Understanding of real-world Perjeta treatment duration and cost in 1L mBC was used to contextualize value of Perjeta treatment benefit in early-stage BC
- Datasets derived from Flatiron enabled largest-ever RWD study of Perjeta use, demonstrating extended duration of treatment in 1L mBC in standard of care
- **Helped address questions from German HTA, resulting in support for reimbursement for Perjeta in early-stage BC in April 2019**

Benefit: Additional NPV of CHF 25mn for Germany

Kadcyla in mBC

RWD study of cardiac events to fulfill post-marketing commitment

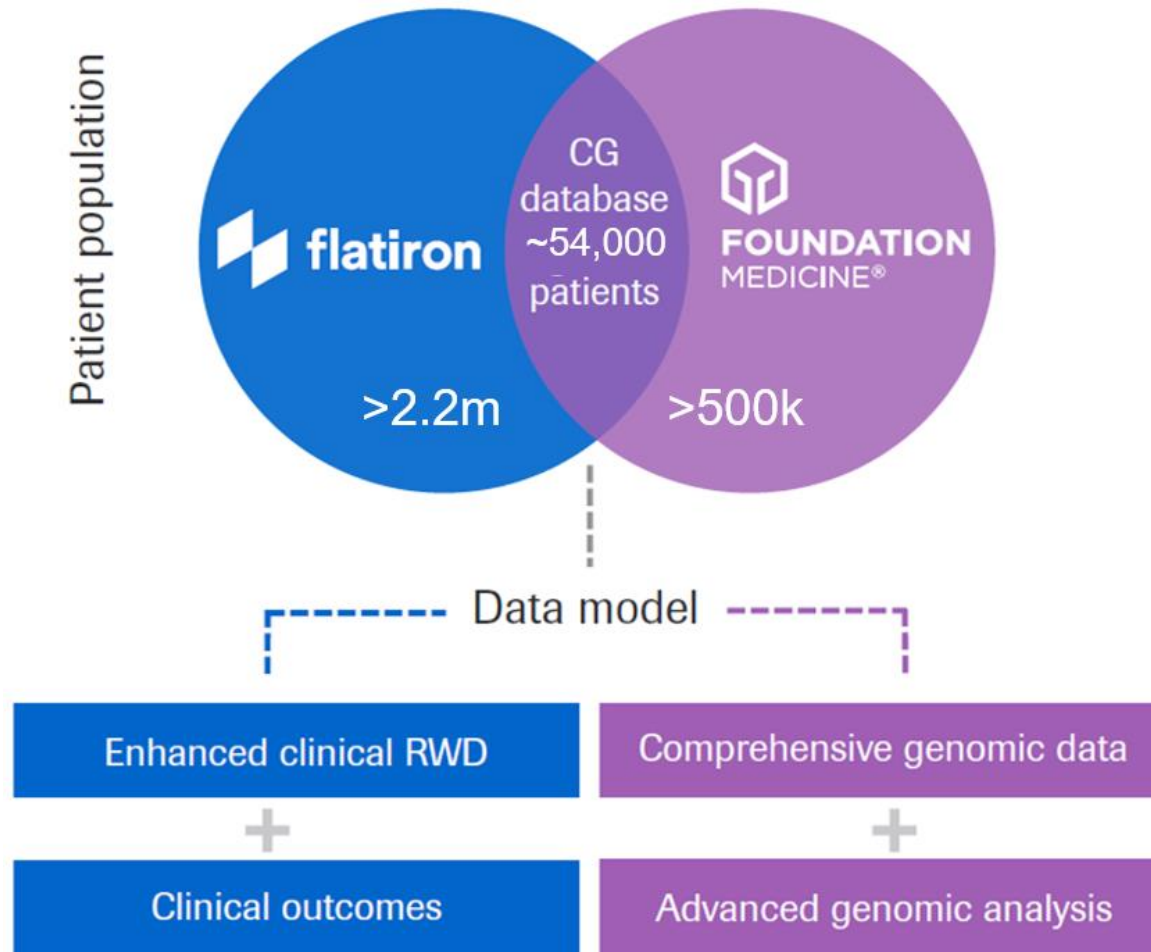


Note: The events identified prior to index date are not to time scale. If a patient died within the 84 days following last administration the treatment was considered discontinued. Patients are sorted by duration of follow-up.

- Post-marketing commitment to evaluate Kadcyla cardiac risk in HER2+ mBC patients with low LVEF (40-49%)
- **Flatiron RWD enabled analysis of largest cohort of Kadcyla-treated patients with low LVEF**
- With only a small number of patients experiencing an LVEF drop of >10% and/or CHF; deemed not an unacceptable cardiac risk for patients with low LVEF
- **CHMP supported label update based on this RWD study**

Clinico-Genomic Database

Addition of genomics increases depth and impact of RWD



Flatiron-FMI Clinico-Genomic (CG) Database enabling multiple applications, including:

- Understanding the genomics of rapidly progressive disease
- Natural history cohorts for molecularly defined populations (ALK, NTRK, EGFR, ROS-1, RET, KRAS, etc.), including patterns of metastatic spread
- Mechanisms of resistance
- Improved prognostic classifiers
- Higher resolution representation of patients for downstream analysis, including external controls

Clinico-Genomic Database

Scientific hypothesis generation feeds back into early R&D



Recent use cases gRED



- Analysis of the clinico-genomic data base (CGDB) provided insight and further evidence for team to take a **pan tumor approach**
- Analysis of CGDB found cumulative **incidence of brain metastases in patients with a certain mutation** is significantly higher than patients with the wild-type allele or other mutations; Partly based on CGDB results the decision was taken to develop a brain-penetrant molecule as part of the broader development strategy

Recent use cases pRED



- Analysis of CGDB contributed to a decision to bring a target into the portfolio based on **increased understanding of current treatment outcomes of mutated vs non-mutated** patient populations
- Analysis of CGDB used to decipher a **molecular mechanism for checkpoint inhibitor resistance** and ultimately helped address a fundamental question that can potentially benefit many cancer immunotherapy projects

Linking advanced tumor genetics with clinical outcomes drives scientific hypothesis generation

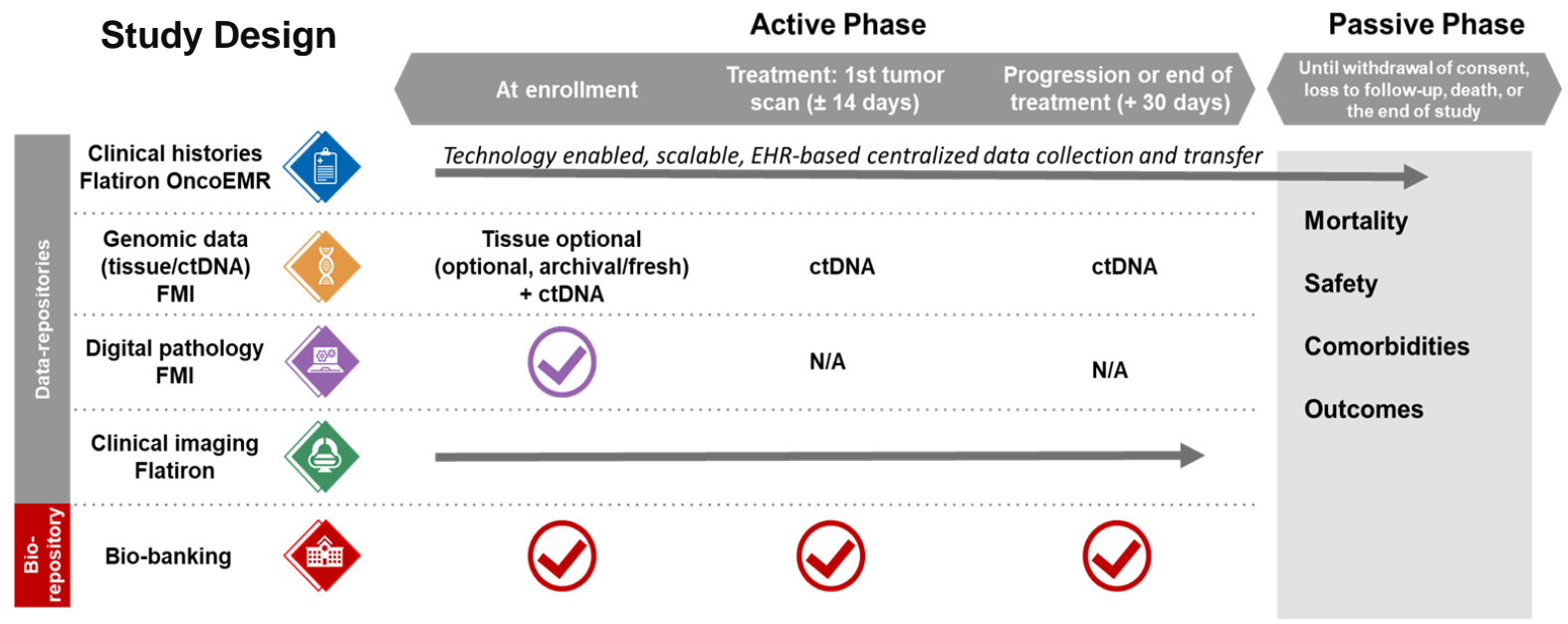
Prospective Clinico-Genomic Platform

Novel EHR-enabled, scalable, prospective, longitudinal, multi-modal data- and bio-repository



PCG Platform

- Leverages FMI tissue and liquid genomics capability + Flatiron RWD platform
- By eliminating case report forms, expands clinical research access to more patients and investigators
- Program launched in December 2019, target enrollment 1000 metastatic lung cancer patients
- Understanding the genomics of rapidly progressive disease

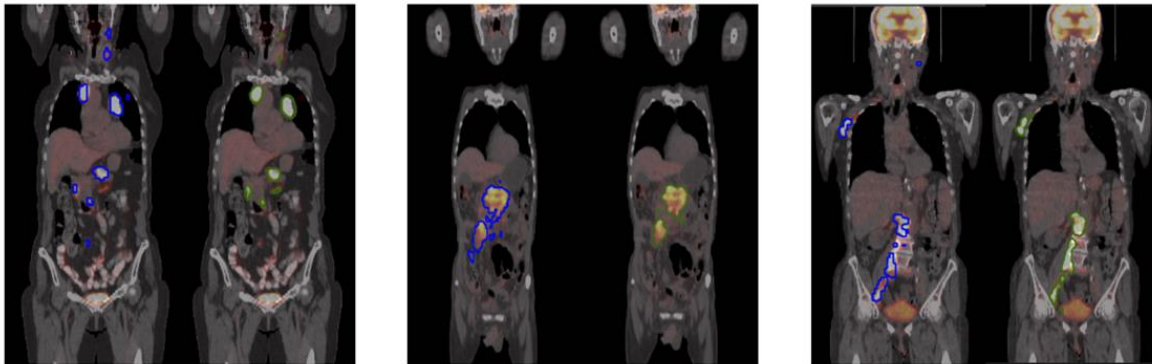


EHR=electronic health record; FMI=Foundation Medicine; RWD=real world data; ctDNA=circulating tumor DNA

Next-generation RWD

Automated analysis of medical imaging data to enhance RWD

Whole-body FDG-PET/CT fused coronal images from three different patient scans



Summary of whole body results

Clinical trial data	Scans (n)	Dice score	Sensitivity (%)
DLBCL (training)	2266	0.895	93.2
Follicular lymphoma (test)	1124	0.886	92.6
NSCLC (test) ^a	274	–	93.0

The approach

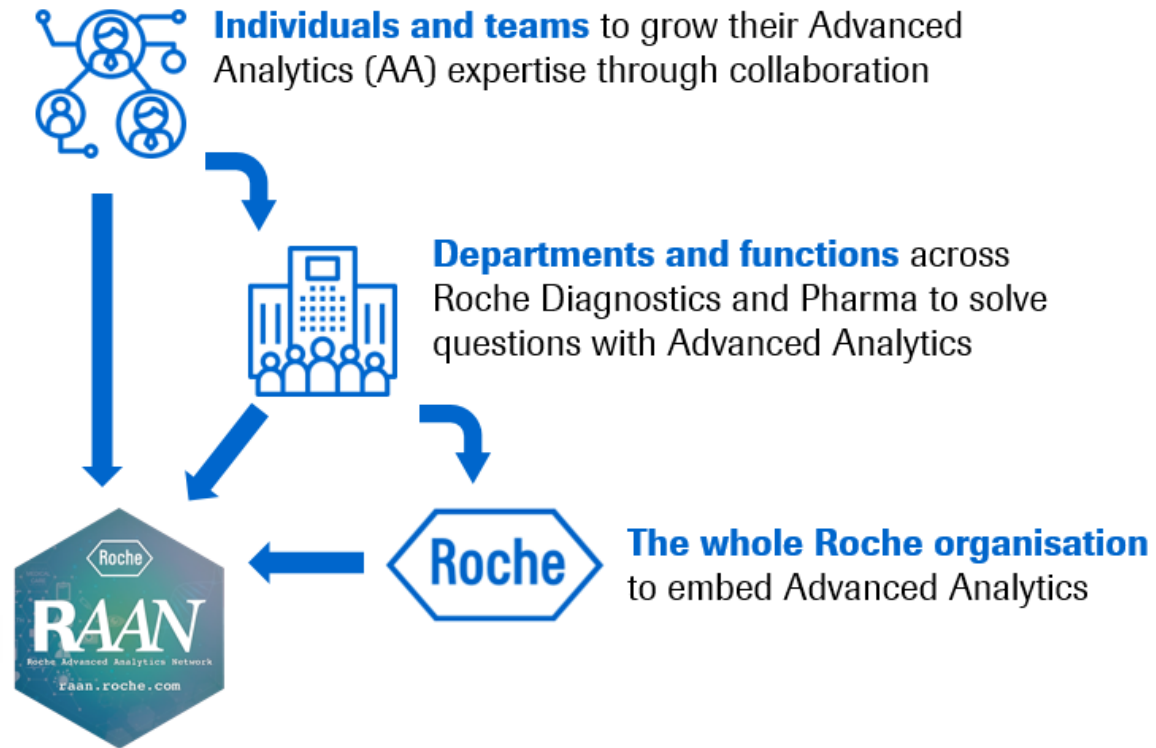
- An automated FDG-PET segmentation method was devised using a deep learning model
- Model trained on radiology reads that served as 'ground truth'

The promise

- Automated analysis appears to outperform radiologist-to-radiologist agreement (~80%) for tumor volume
- Potentially more reproducible, quantitative assessment of response and progression
- Application to real-world imaging data would enhance reliability of real-world clinical endpoints

The Roche Advanced Analytics Network (RAAN)

Leveraging the scale and diversity of our scientific community



- **Events and trainings**
RAAN conferences, AA trainings, self-study groups, academic seminars
- **Data challenges**
Annual Roche-wide challenge plus regular masters & community challenges
- **Advisory group**
Team of more than 35 experts providing expert consultation & white papers
- **Academic collaborations & interns**
Executing 5 RAAN capstones and ~30 AA internships throughout the organisation
- **Technology**
Sharing infrastructure and tools for advanced analytics

RAAN has now > 1300 members at 40 Roche sites

RAAN Data Challenges

“Crowdsourcing” science for insights from Roche data assets



Challenge

Use Advanced Analytics to develop a prediction model to identify 1L NSCLC patients who are most likely to respond to Tecentriq treatment versus standard of care



The data

The training data set

- 10 curated clinical trials
- ~5000 patients

Test data set

- 1 clinical trial
- ~1000 patients



517
participants



141
teams



38
Roche sites

Digital pathology and clinical decision support - tools to transform healthcare systems

Mike Rivers / *Lifecycle Leader, Digital Pathology, Roche Tissue Diagnostics*

Dia use cases* 12-17



12 13

14 15 16 17



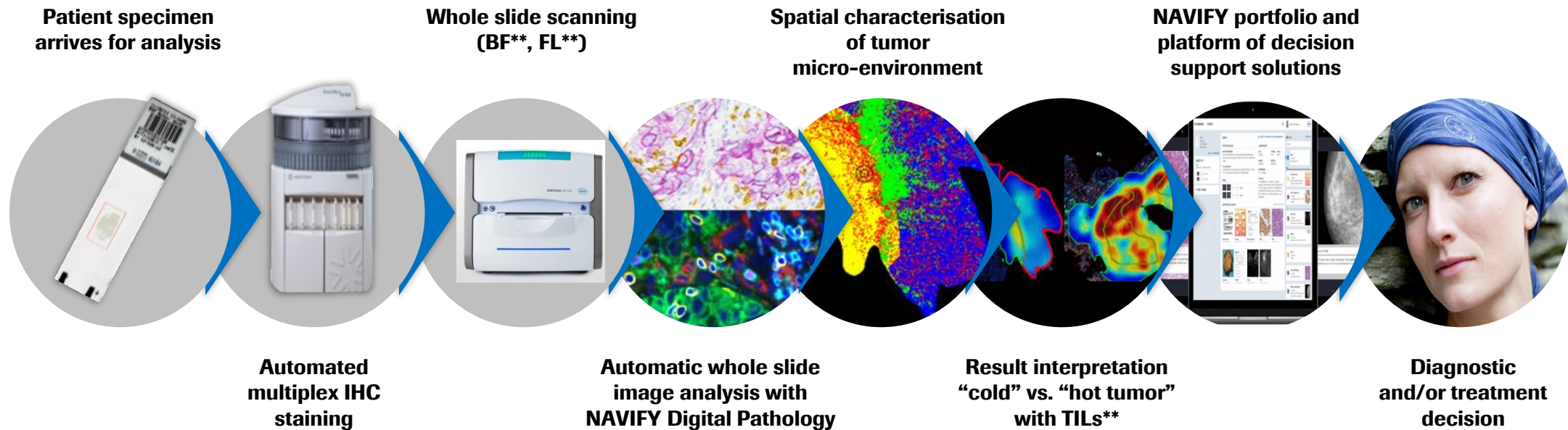
	Digital pathology
NAVIFY®	Decision support
	Consumer ecosystems

- 12** DP200/600 slide scanners
- 13** NAVIFY Digital Pathology
- 14** Roche image analysis App PD-L1 (SP263) lung
- 15** Roche image analysis App Her2 Dual ISH, breast
- 16** NAVIFY Mutation Profiler
- 17** NAVIFY Tumor Board

* Non-exhaustive

Workflow of Future Pathology Lab

Superior clinical lab workflow enhanced by multiplex IHC with NAVIFY Digital Pathology and Tumor Board solution*



* IHC = Immunohistochemistry

** BF = brightfield; FL = fluorescent; TILs = tumor-infiltrating lymphocytes

Roche Digital Pathology Portfolio

Establishing a platform ecosystem and controlling the pathologist interface is key to our long-term success

Scanning

12

Roche DP 200 and DP 600* Slide Scanners



Interoperable with DICOM images and other open formats from third party scanners



Pathologist Interface

13

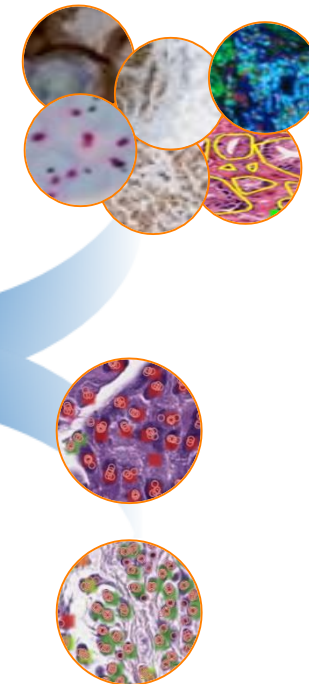


NAVIFY Digital Pathology platform manages the full pathologist workflow

Image Analysis

14 15

Roche Image Analysis Apps
PD-L1 (SP263) lung, Her2 Dual ISH, Her2, Ki-67, ER*, PR**



Open API to support third party image analysis algorithms

For the **NAVIFY® Digital Pathology** demonstration please
click on the link below

[https://www.roche.com/dam/jcr:28f7fe67-3ed6-4d70-
b7c0-78ac86511d50/combined-video.mp4](https://www.roche.com/dam/jcr:28f7fe67-3ed6-4d70-b7c0-78ac86511d50/combined-video.mp4)

Personalized Oncology

Bridging precision diagnostics, and personalized patient management



Precision clinical diagnostics



Personalized clinical management

An ecosystem of digital value
CDS¹ Apps

16



NAVIFY[®]
Digital Pathology



NAVIFY[®]
Mutation Profiler

17



NAVIFY[®] Tumor Board

Image analysis
(PD-L1, Breast Panel*,
HER2 DISH, MPx²)

Therapy matching

Clinical trial
matching

Clinical guidelines*

Patient pooling*

Continuous learning as systems become more integrated

¹ CDS – Clinical Decision Support ² MPx – Multiplex * In Development
NAVIFY is a trademark of Roche; DISH=dual in situ hybridization

Information technology at Roche - underpinning our digital ambition

Steve Guise / *Global Head, Pharma Informatics*

Go-to-market Model

Roche Capabilities

Roche Response to COVID-19

Digital Strategic Priorities 2030

Pharma: Differentiating innovative medicines

Differentiation options in Pharma industry

Faster and more successful drug discovery and development

Better treatment effectiveness

Addressing ever smaller patient populations

Addressing evolving customer and patient expectations


Digital Strategic Priorities 2030

- 1 Industry-leading R&D effectiveness
- 2 Medicine augmentation
- 3 Mass-customised manufacturing & supply chain
- 4 Go-to-market model

Digital Strategic Priorities have been identified on top of Digitalisation initiatives across all areas of business

Go-to-market Model

Shift in the market

	From		To
Engagement	"Mass field" largely in-person		More targeted and often virtual
Content	Static information		Personalised, digital content and services
Content release	Synchronised with field force cycles		Continuous and real-time
Customer targeting	Decided by sales representatives		Supported by advanced analytics
Conference	Physical attendance		Virtual and real-time exchange

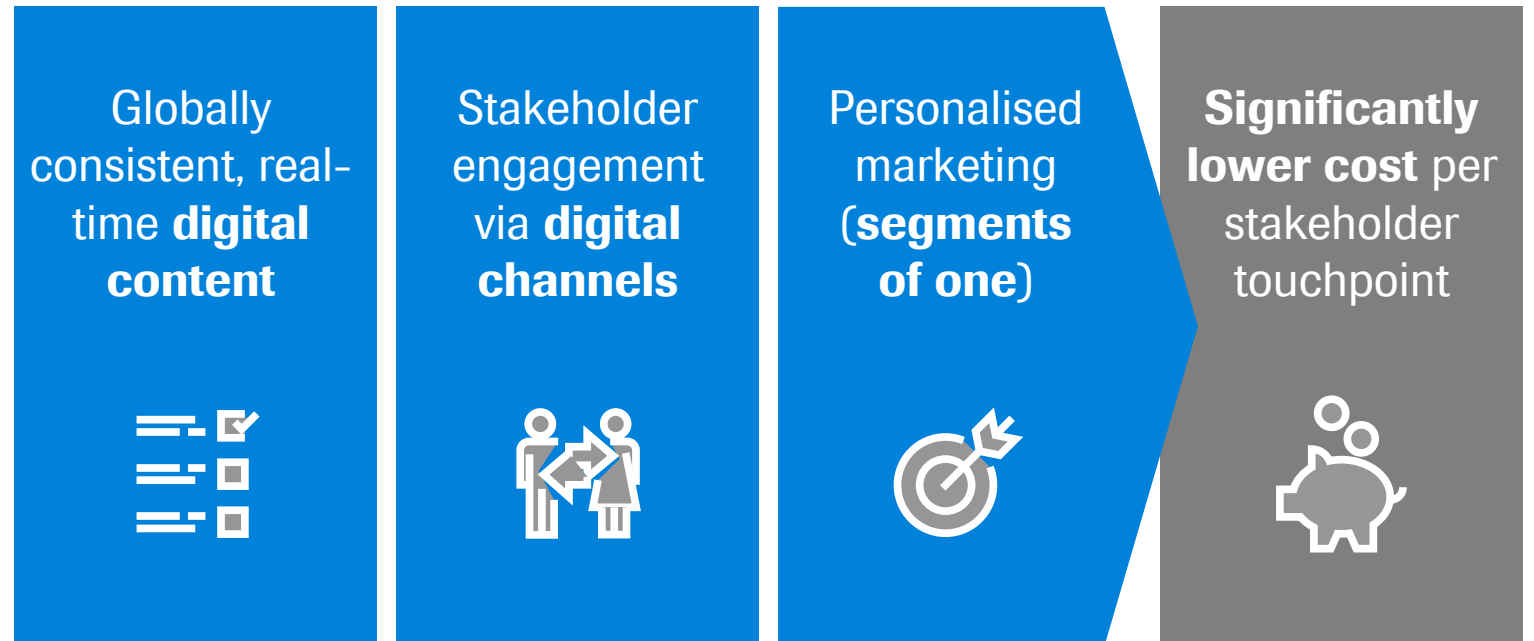
Go-to-market Model

Personalise stakeholder interactions

Needs

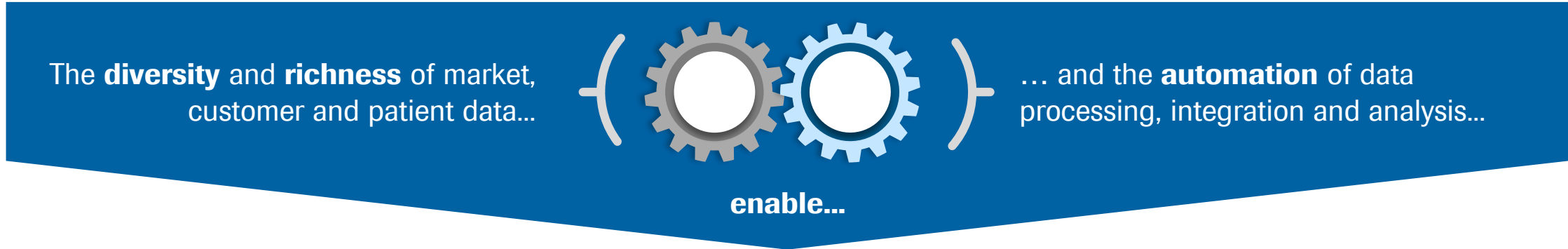
- Digital, personalised and real-time interactions and information expected
- Patient populations smaller and globally connected, e.g., communities for rare diseases
- Further stakeholders besides clinicians involved in decision making, e.g., patients, payers

Elements of personalised go-to-market model

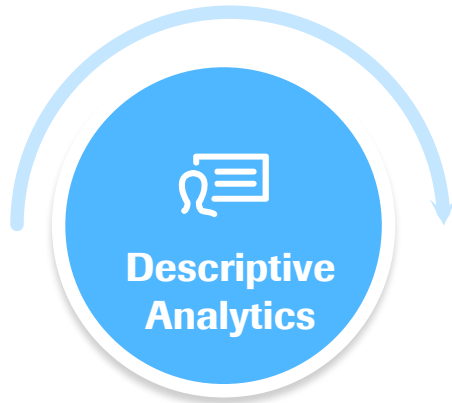


Go-to-market Model

Data driven approach



1 Increasingly **automated**, **enriched** and **objective**...



What happened and why?
Explaining the past

2 Increased use of **advanced analytics** that deliver **actionable insights**, namely...



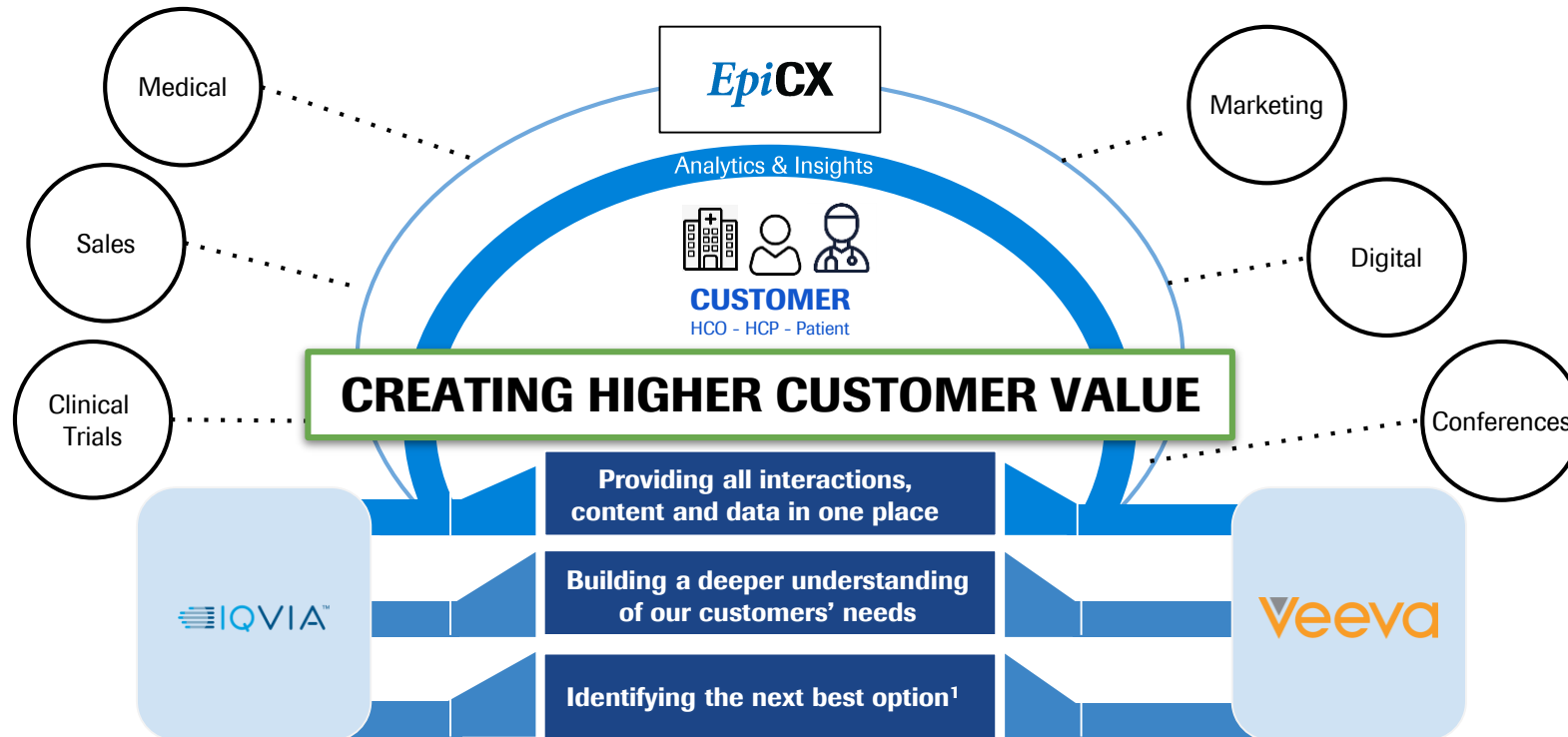
What might happen?
Predicting the future



What should we do?
Delivering intelligent recommendations

Go-to-market Model

Technology and infrastructure investments



Benefits

- Make our customer interactions as meaningful as our science
- Deliver efficiency gains and enable a cost effective go-to-market approach for rare diseases and small products
- Bring globally consistent content and messaging to our stakeholders

Go-to-market Model

Roche Capabilities

Roche Response to COVID-19

Roche Capabilities

People, technology and information



“ Few people straight out of undergrad have the opportunity to dive head first into machine learning. Our work is the cutting edge in computer science and biotechnology. I love knowing that I am making a positive impact in the company and also in the people we help with our technology.

Jordan L. Henck
Software Engineer



“ We have a Mission and we live it by using technology to help people. PHC is real and happening right here. We are using cutting edge technologies to solve problems that impact patients lives - we choose the tech stack that we need now which makes us just as fast as a startup

Mateusz Szewczyk
Principal Software Engineer
Belmont, USA



“ Pharma is the next big data driver - we produce more data in a day than Facebook.

Janos Ebohasi
Principal Software Engineer
Santa Clara, USA

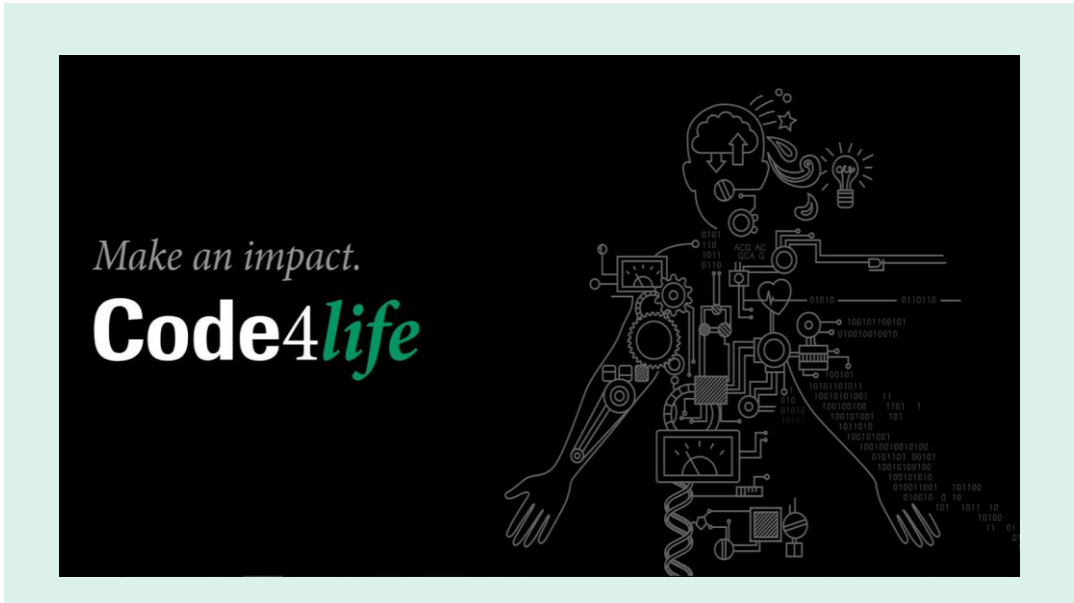


Roche Capabilities

Digital investment ensures we are attractive for the next generation of tech and data science talents

Dedicated site for data science and IT recruitment

State of the Art events engaging with digital healthcare community



- Enable Roche to attract, recruit & retain tech talent by leveraging digital solutions to convey targeted messages and visuals, which differentiate Roche as the employer of choice and ultimately convert the right tech people into candidates and employees at Roche.

- Connect key innovation drivers in healthcare for an open and inspiring exchange of ideas, insights and solutions – including science, industry, VCs, start-ups, payers and policy makers.

Roche Capabilities — Roche Science Infrastructure (RSI)

Modernising scientific data and compute capabilities

Roche Science Infrastructure is a dedicated science IT infrastructure and services to enhance the company's scientific capabilities and enable Personalized Healthcare (PHC)



RSI Program

Roche Science Network II

Identity & Access Management for Science

Roche Science Data Lifecycle Management

RSI Elastic Compute

RSI Partner Integration

Go-to-market Model

Roche Capabilities

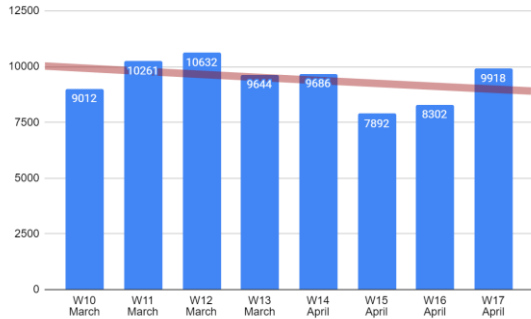
Roche Response to COVID-19

Roche IT Infrastructure and Capabilities

IT Performance in response to COVID-19

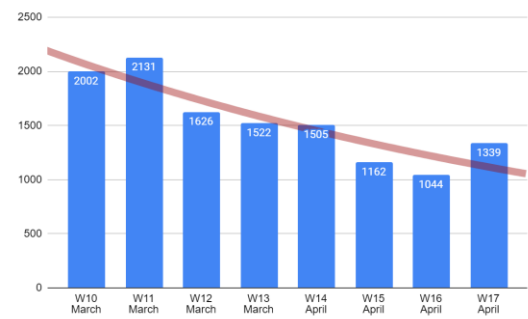


Service Desk Incidents Created



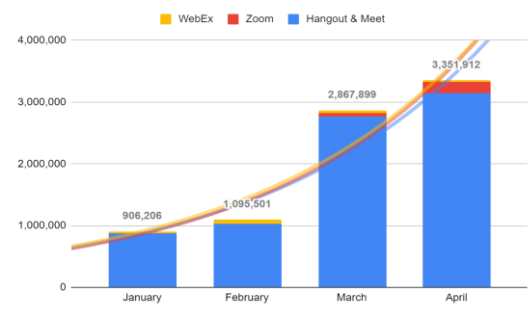
Increase by 79% of incidents created for 1st line of support. Slight increase this week

Onsite Requests Tasks Created



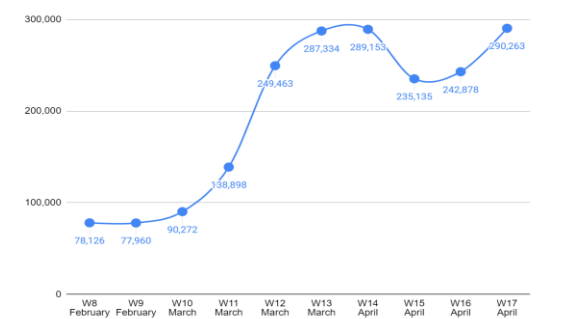
Increase by 28% of request tasks handled by onsite teams. Slight increase this week

Remote Collaboration Meeting Duration (Hours)



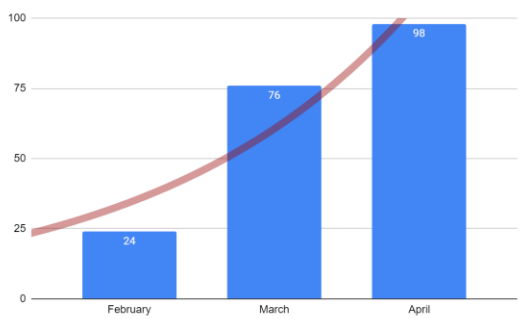
Increase by 200% of virtual meetings, strong Zoom increase.

Remote Collaboration Meet Participants



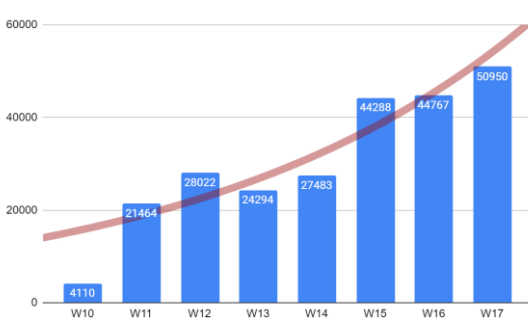
Increase by 375% of Meet Participants, strong increase this week

Non-VPN Apps Cloudflare / WAF enabled Apps



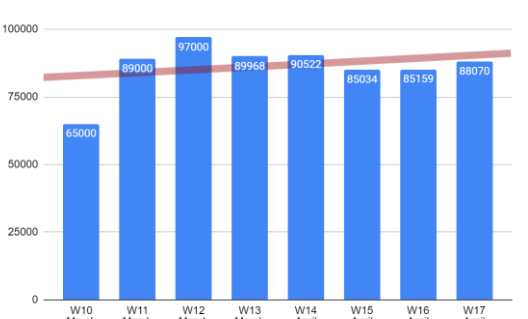
Enabled 72 additional enterprise systems to be available outside Roche network

Non-VPN Apps Cloudflare / WAF Connections



Increase to 1300% of users accessing Roche systems via Cloudflare. Strong increase this week.

VPN Connectivity Users



Increase by 59% of users accessing Roche systems via Pulse Secure. Slight increase this week

Training & IT Recommendations

- 22400** Page hits on IT-Recommendations since Feb 16
- 81** Virtual COVID-19 related Trainings since March 16
- 5165** Users attended the Trainings

Roche Response to COVID-19

Roche Italy social responsibility story



Problem



Analysis



Solution identification



Launch



Maintenance



Ministero della Salute

- Reached the peak of 25'000 - 35'000 calls per day
- Call Center of 1st Level - 120 agents
- 50% of calls were lost
- Call Center of 2nd Level - 80 doctors

- **Call** with Ministry of Health about COVID Emergency Call Centre
- **Call** with an internal Infrastructure Team

- Servers, platform, software licences delivered in **1 weekend**
- CPUs and memory doubled in the virtual environment

- 250 volunteers from Pharma (mainly), Diagnostics and Diabetes
- Complete readiness of the infrastructure and volunteers **in 2 weeks**

- Volunteers serve 2 shifts (9:00-13:00, 13:00-17:00), 5 days per week
- Cover 30% of all national 1st level calls
- Give daily updates to the Ministry of Health

Digitalisation for Roche

Prerequisite to maintain and grow our core business

Leverage digital to enhance stakeholder experience

Differentiate core products with digital solutions



Optimise the internal value chain through digital

Q&A

Doing now what patients need next