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A perspective on AI from Philips
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innovation you

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# The global healthcare challenge

**1 out of 3 people**

will be diagnosed with cancer in their lifetime

**400 million people**

worldwide have diabetes

**500+ million people**

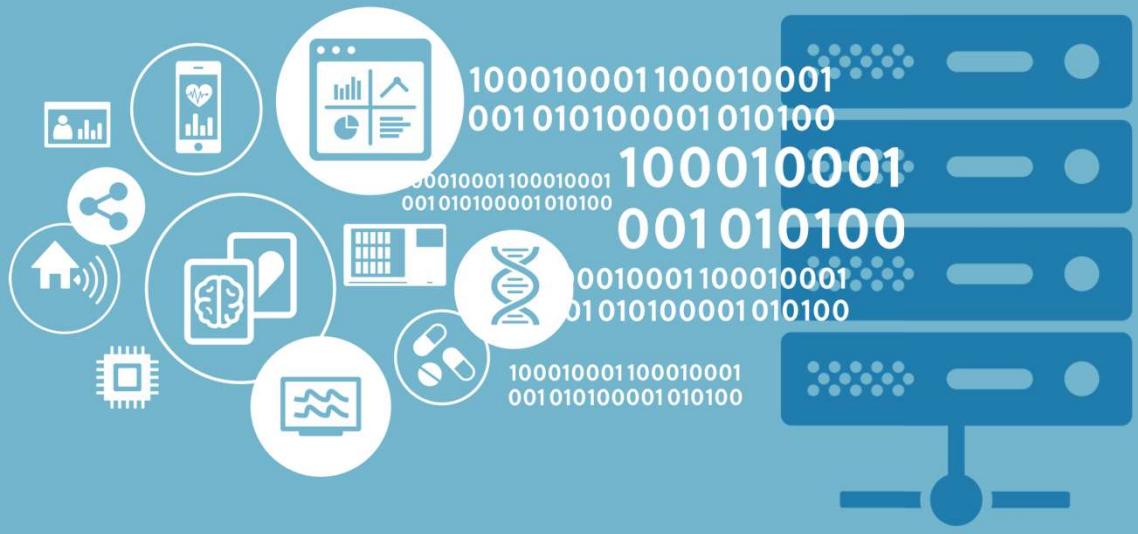
suffer from respiratory diseases

An estimated **1 billion adults** have hypertention

Source: *Future Health Index*

# Digital is driving exponential growth of health data

- **Personal health tracking**
- **Medical imaging**
- **Patient monitoring**
- **Home monitoring**
- **Medication adherence**
- **Pathology**
- **Quantification**
- **Genomics**
- **Analytics**



# The north star for AI in radiology is the enablement of precision medicine

- Integration of vast amounts of diagnostic data for earlier and more definitive diagnosis
- Right study, at the right time, leading to the right therapeutic interventions
- Precise therapies guided by imaging
- Optimal operational performance to ensure equal quality of care across all healthcare providers
- Simplified and automated workflow to reduce staff workload and variability

Using AI to **augment** healthcare providers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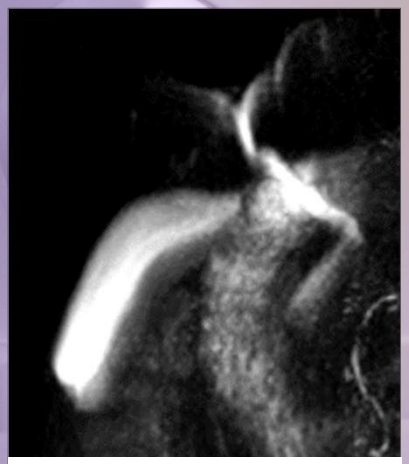
Adaptive intelligence
combines the power of AI and other technologies with clinical and operational domain knowledge

# VitalEye



MRCP with respiratory belt

MRCP with VitalEye

## Always keeping a caring eye on the patient

- Interaction free
- No operator or patient handling
- Respiratory triggering and breath hold monitoring

# Compressed SENSE for MR-RT

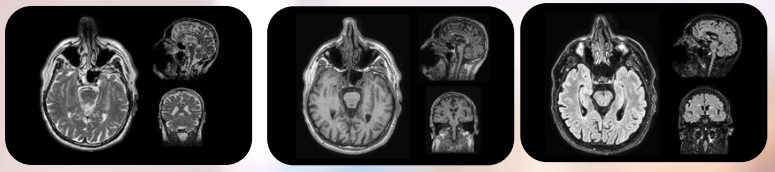
**Up to 50% exam acceleration with Compressed SENSE[1]**

Enables 2D and 3D scans to be up to 50% faster with virtually equal image quality[1]

Reduce the time the patient is in the MR scanner and manage intra-scan motion

RT ExamCards to accelerate MR simulation scans

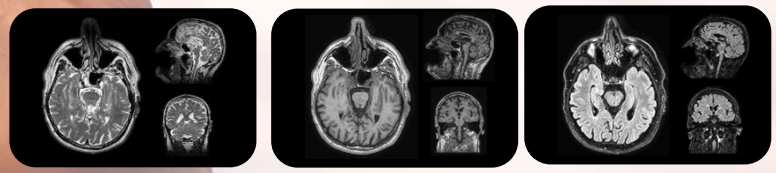
## Compressed SENSE



T2W 3D TFE | T2W 3D TFE | FLAIR 3DView

10:06

## Without compressed SENSE



T2W 3D TFE | T2W 3D TFE | FLAIR 3DView

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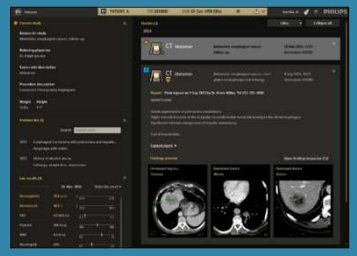
1 Compared to Philips scans without Compressed SENSE

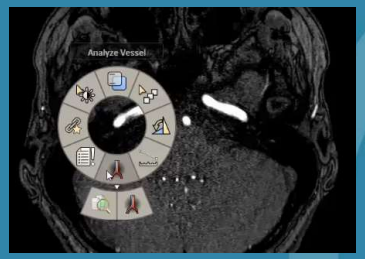
# **Illumeo**[1] with adaptive intelligence

### Patient Briefing

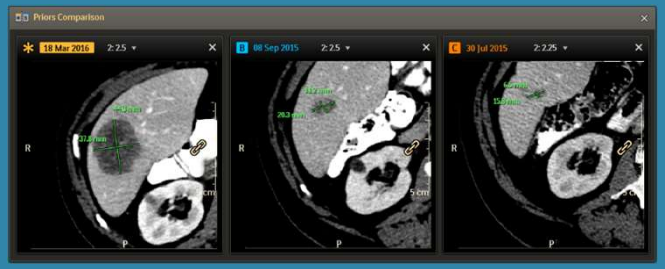


### Semantic Labeling

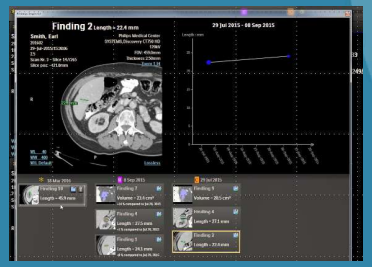

### Inspection Reticle




### Comparison Inspector




### Findings Inspector




[1] Illumeo is available for sale in USA, Canada, Australia and New Zealand.

# Advanced image analysis

## IntelliSpace Portal

**From detection and diagnosis to therapy planning and follow-up, the IntelliSpace Portal supports the clinical workflow along the care continuum.**

**Clinical benefits**
IntelliSpace Portal provides tools to assist in diagnosis of multiple clinical questions based on multi-modality imaging with capabilities designed for results sharing between the imager and the treating physician.

**Operational benefits**
With the enterprise scalability, access IntelliSpace Portal anywhere within the organization while maintaining consistent applications and user preferences.

**Financial benefit**
Help maximize resources to support productivity through performance, efficient workflows and machine learning.

**Track subtle differences in the brain**

With MR Longitudinal Brain Imaging (MR LoBI)

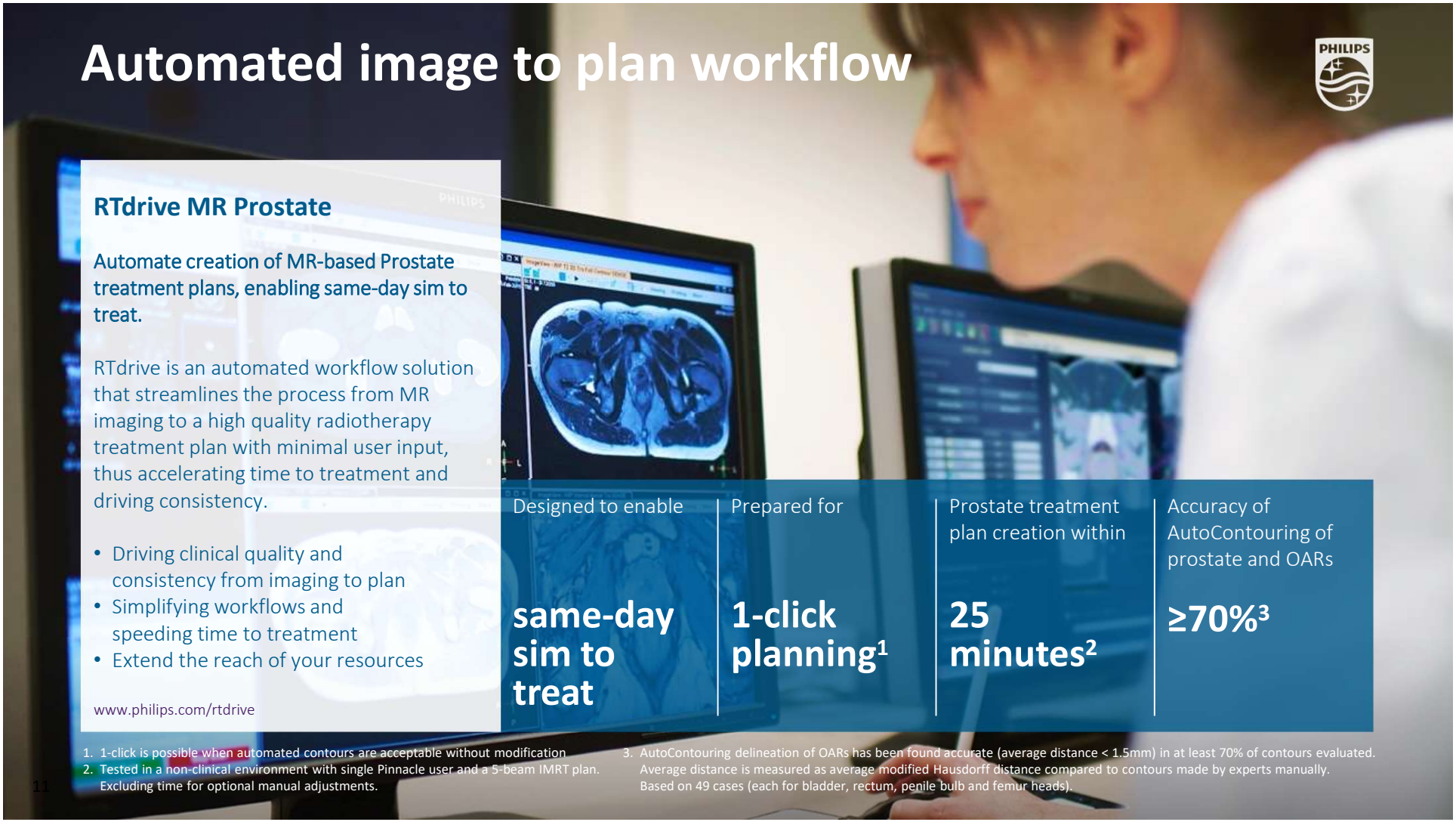
**Monitor tumor progression and treatment response**

With Multimodality Tumor Tracking (MMTT)

**Patient education and procedure preparation**

With 3D Modeling

# Automated image to plan workflow



## RTdrive MR Prostate

**Automate creation of MR-based Prostate treatment plans, enabling same-day sim to treat.**

RTdrive is an automated workflow solution that streamlines the process from MR imaging to a high quality radiotherapy treatment plan with minimal user input, thus accelerating time to treatment and driving consistency.

- Driving clinical quality and consistency from imaging to plan
- Simplifying workflows and speeding time to treatment
- Extend the reach of your resources

www.philips.com/rtdrive

| Designed to enable | Prepared for | Prostate treatment plan creation within | Accuracy of AutoContouring of prostate and OARs |
|---|---|---|---|
| **same-day sim to treat** | **1-click planning[1]** | **25 minutes[2]** | **≥70%[3]** |

1. 1-click is possible when automated contours are acceptable without modification
2. Tested in a non-clinical environment with single Pinnacle user and a 5-beam IMRT plan. Excluding time for optional manual adjustments.
3. AutoContouring delineation of OARs has been found accurate (average distance < 1.5mm) in at least 70% of contours evaluated. Average distance is measured as average modified Hausdorff distance compared to contours made by experts manually. Based on 49 cases (each for bladder, rectum, penile bulb and femur heads).

# Simplifying data and insight gathering through PerformanceBridge Utilisation

Phoenix Children's Hospital, USA

*Philips helped us reduce the number of protocols, saving technologists time when searching for a protocol, reducing the risk of selecting a wrong protocol, standardizing the department.*

**Matt Eslinger**
**Lead MRI Technologist at Phoenix Children's Hospital**

**PerformanceBridge Utilization pilot:**

- Analyzed imaging protocols; identified redundancies, inconsistencies in exam cards
- Simplified and standardized worklist, removing unused or redundant cards
- Introduced a process to ensure consistent exam card use by all operators

**Reduced waste**
**60** Unnecessary exam cards eliminated
**7%** Repeat scans reduction

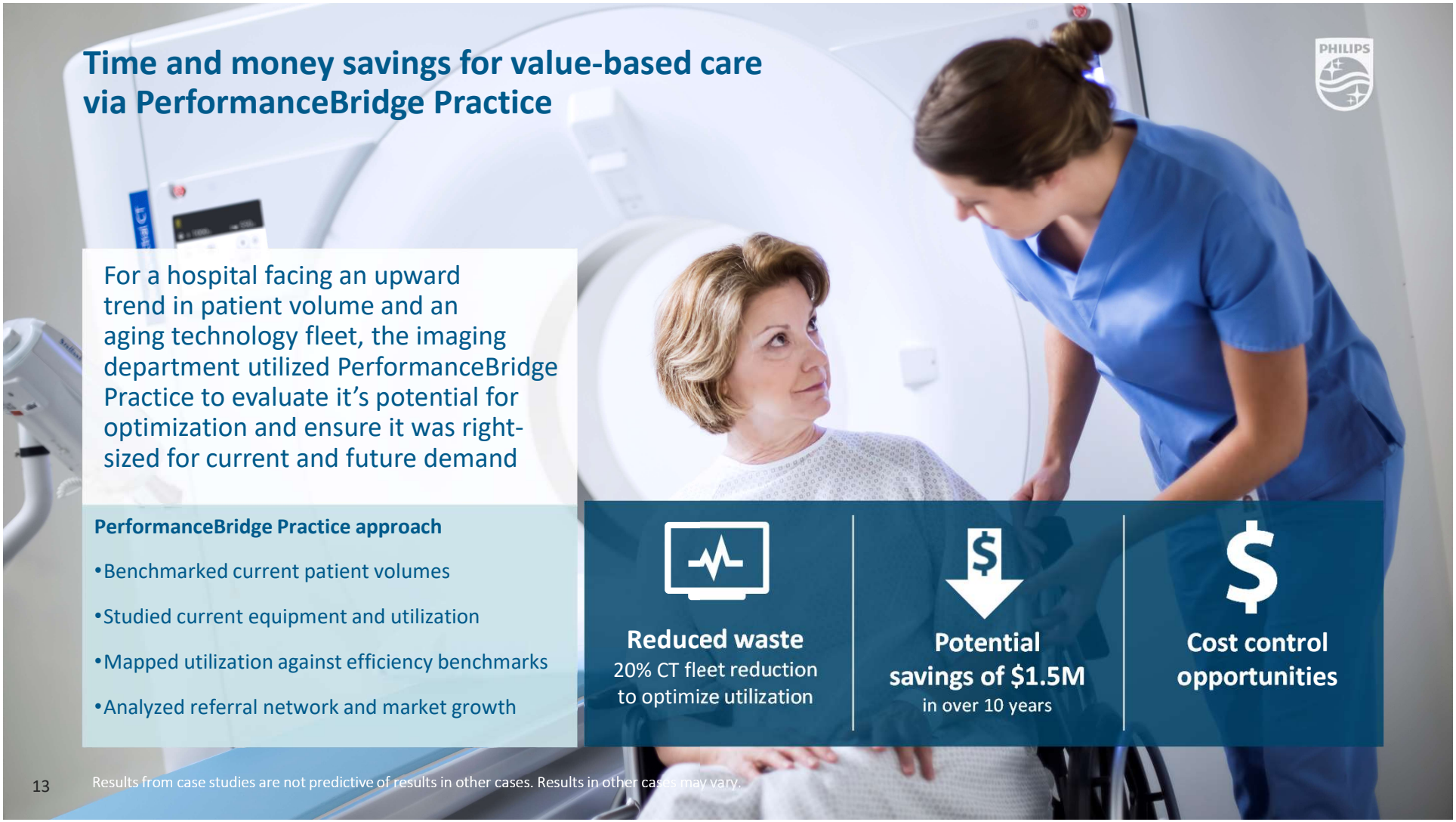
**20+ minutes of time savings**
in changeover time

**Improved patient and staff experience**



Results from case studies are not predictive of results in other cases. Results in other cases may vary.

# Time and money savings for value-based care via PerformanceBridge Practice



For a hospital facing an upward trend in patient volume and an aging technology fleet, the imaging department utilized PerformanceBridge Practice to evaluate it's potential for optimization and ensure it was right-sized for current and future demand

**PerformanceBridge Practice approach**

- Benchmarked current patient volumes
- Studied current equipment and utilization
- Mapped utilization against efficiency benchmarks
- Analyzed referral network and market growth

**Reduced waste**
20% CT fleet reduction to optimize utilization

**Potential savings of $1.5M**
in over 10 years

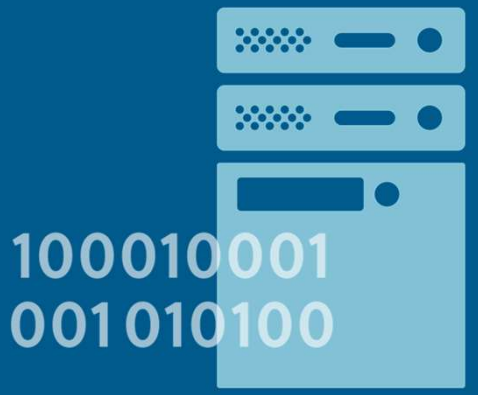
**Cost control opportunities**



Results from case studies are not predictive of results in other cases. Results in other cases may vary.

# Challenge: Data sizes

- On a per individual basis, assuming a healthy subject evolves into a cancer patient, over a 10-year period
  - Genomics: 1 TB
  - Epigenomics: 2 TB
  - Transcriptome: 0.7 TB
  - Whole body imaging: 1 TB
  - EMR: 0.5 TB
  - Histopathology: 2 TB
  - Wearables: 0.5 TB




- ~ 8 trillion bytes of data – the number of degrees of freedom in the data is greater than the number of people on the planet

Genomics: http://massgenomics.org/2014/11/brace-yourself-for-large-scale-wholegenome-sequencing.html, size between 100GB - 80TB.
Epigenomics: larger than genomics data
Transcriptome: https://www.researchgate.net/post/How_much_hard_drive_space_is_needed_to_store _RNA-Seq_data. Base file 270GB. Processed files 3-4x larger.
Imaging: 512x512x1000 slices x 4 bytes = 1TB
EMR: typical file sizes
Histopathology: 1 TB/image
Wearables: https://www.quora.com/How-much-data-is-created-every-day-by-wearabledevices-and-medical-sensors, multiple GB/day, over 10 years.

# Final remarks

- Adaptive intelligence represents a dramatic opportunity to improve healthcare in general, and radiology specifically
- The north star for how radiology will evolve is the **enablement of precision medicine**, a single patient view that will improve outcomes and lower cost
- Many point solutions utilising adaptive intelligence exist today (image formation, simpler acquisitions, better images, optimised workflow, radiomics/radiogenomics, etc.), next leap forward is to integrate offerings into seamless and complete disease-centric solutions
- We must be judicious about applying AI where it is most useful, and recognise where there are unrealistic expectations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