PHILIPS

Computational pathology

Amplify your
Expertise

Helping you do what matters most

Pathology is at a
turning point

Pathology is the keystone of cancer care

Today pathologists impact a huge range of clinical pathways and treatment decisions in cancer care. As treatments continue to grow in complexity and volume, pathology and laboratory services must deliver timely diagnoses for effective, individualized cancer treatments. Increasingly detailed diagnoses will become more dependent on pathologist skills and knowledge.

Pathology practice under pressure

At the same time, pathologists face growing pressure within rapidly evolving and increasingly complex healthcare systems. New cancer diagnoses are expected to grow 70% in the next 20 years[1] while pathology resources are constantly diminishing. How can pathologists respond to this challenge?

### Leverage your expertise with technology

Combining technological innovation with expertise can help pathologists have a positive impact on healthcare systems and patient outcomes. More than ever, pathologists need a committed diagnostic technology collaborator who understands their needs, demonstrates know-how and offers a proven track record of implementing scaled digital workflows and innovative diagnostic technologies.

1) Reference: WHO World Cancer Report 2014
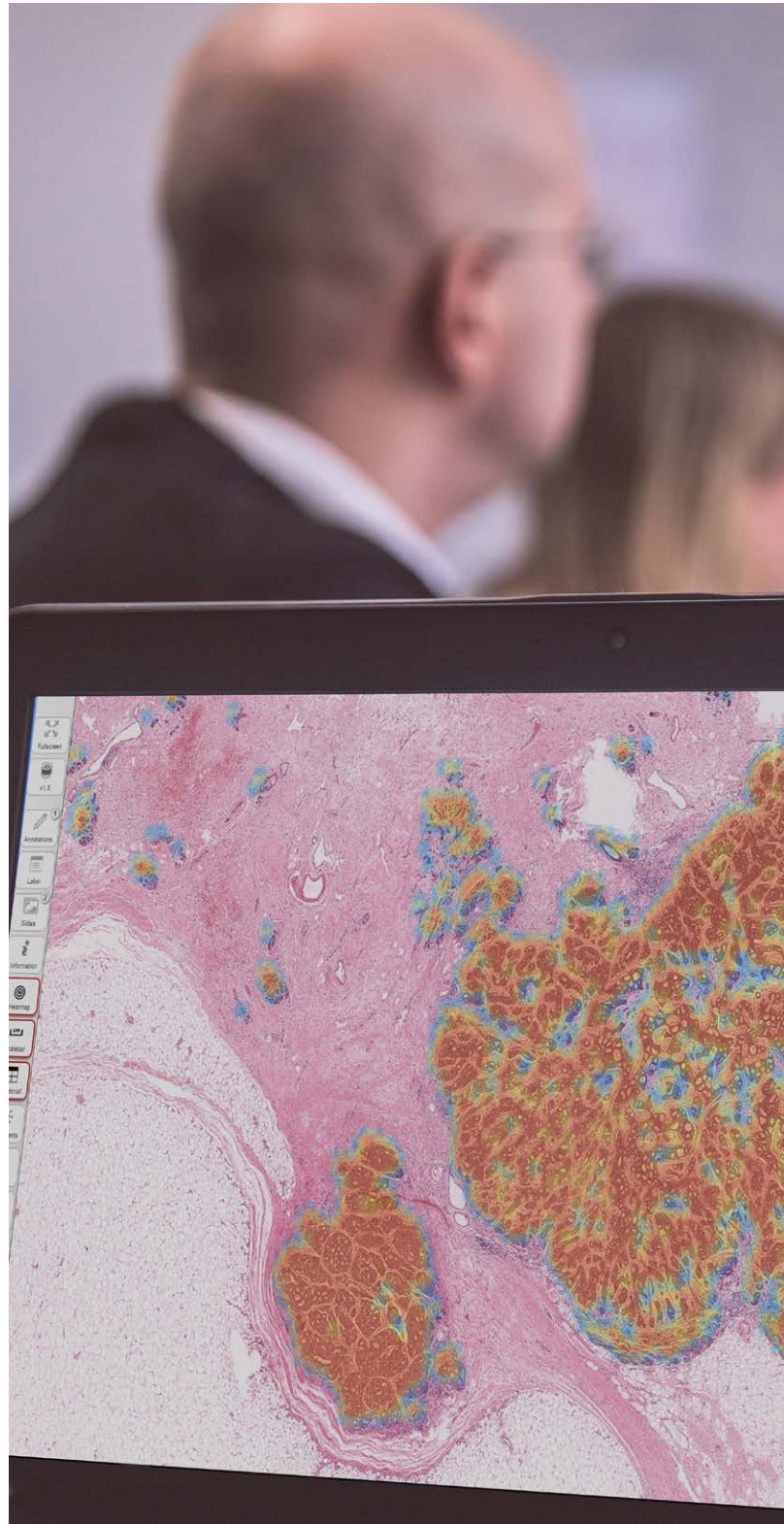
Computational Pathology
Freedom to pursue deeper insights
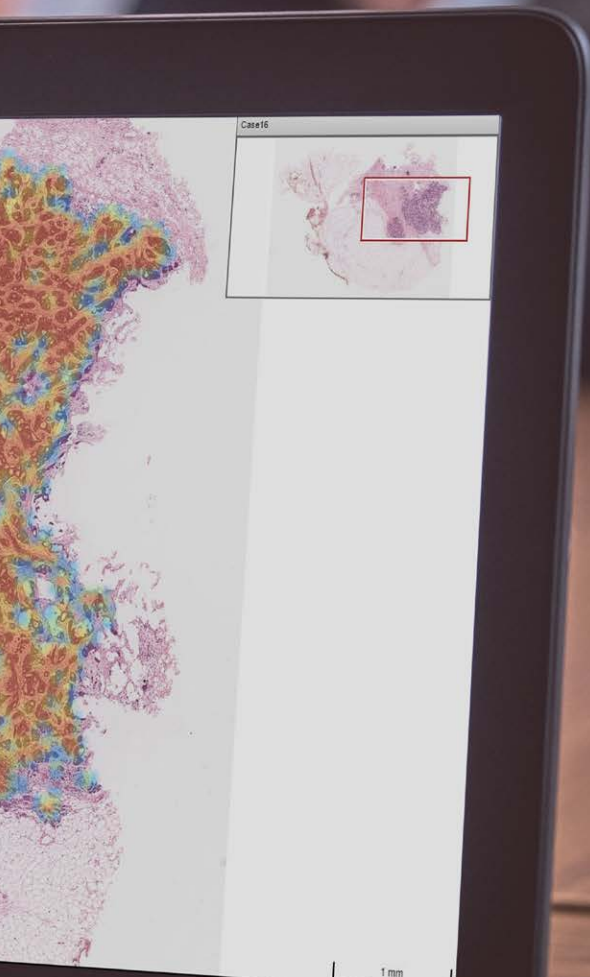
Analytics tools to realize precision pathology

The role of transformative technology is key for the delivery of precision medicine – case in point being, Next Generation Sequencing (NGS). Similarly, digital imaging can help pathologists mine richer information from tissue than possible with the naked eye alone. Improved scanning, storing and processing have made it possible to pursue the big mission of applying deep learning techniques to pathology.

Computational pathology: an aid to the pathologist

The true potential of computational pathology applications could be harnessed by embedding them seamlessly in the workflow today to aid the pathologist in spending his or her time on the most critical tasks. In the future, computational pathology will also help streamline multi-disciplinary information to generate patient-specific interpretive insights and advance cancer care.

Powered by you

Technology can amplify expertise, confirm judgements and hone instincts. Alone, however, it cannot address the current and future challenges facing cancer care. Your informed perspectives and specialist skill sets are key to unlocking its power.

Philips vision for Computational Pathology

Our vision is to offer solutions for computational pathology along three strategic directions:
- **Clinical diagnostics:** Applications that aid the pathologist in routine day-to-day diagnosis
- **Molecular pathology:** Guiding tumor markup for macrodissection and subsequent quantification of tumor nuclei percentage
- **Research & biomarker discovery:** Web based image and data management platform

Impactful clinical decisions
need accurate information

Aiding the pathologist with tissue quantification

We aim to standardize and support confident diagnosis in the pathology lab with a suite of clinical applications. Seamlessly integrated into your lab's workflow, these applications could be used for routine pathology reporting.

Breast IHC panel offerings

To begin with, we will offer applications for research use of Breast IHC semi-quantification through our partnership with Visiopharm[1]. We will offer digital image analysis applications from Visiopharm® that support you in semi-quantification of HER2, ER, PR and Ki-67 assessment[1].

– Designed to conduct automated and objective analysis of digital images from Philips IntelliSite Pathology Solution[2] and multiple reagent vendors
– Multiple independent studies on HER2 APP show a reduction in number of inconclusive (2+ scores) through use of the APP[3].

1) Visiopharm is the legal manufacturer of the breast IHC applications (HER2 APP, Breast Cancer; ER APP, Breast Cancer; PR APP, Breast Cancer; Ki67 APP, Breast Cancer). The applications are CE-IVD for Europe and Research Use Only for United States and Rest of the world.

2) Philips IntelliSite Pathology Solution is CE-IVD marked. In the United States, the Philips IntelliSite Pathology Solution is pending DeNovo.

3) HER2 APP, Breast Cancer – Package Insert – 6th Edition, Revision 20160206
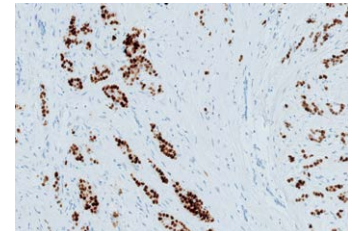
HER2
Analyses manually outlined regions of interest (ROI) and reports a HER2 connectivity score as well as a classic HER2 Score for the given region of interest.
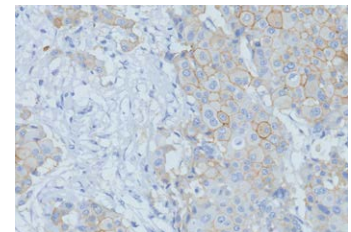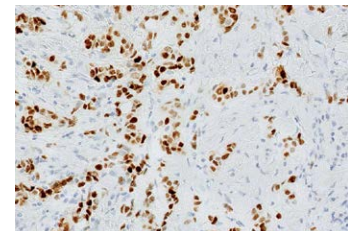

ER
Quantifies ER positive and negative nuclei in breast tumors and reports the results as the percentage of positive cells, the H-score (histo-score) or the Allred score for the given ROI.
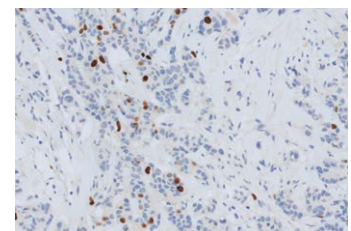

PR
Quantifies PR positive and negative nuclei in breast tumors and reports the results as the percentage of positive cells, the H-score (histo-score) or the Allred score for the given ROI.

Ki67
Quantifies Ki-67 positive and negative nuclei in breast tumors and reports the results as the proliferation index (percentage of positive cells) for the given ROI.

Use smart research analytics
to unlock the potential of tissue

Guiding molecular pathology

Analyze solid tumor tissue samples fast and enhance the quality and reliability of macro dissection, nucleic acid extraction, and molecular profiling. TissueMark[4] application automatically annotates the tumor tissue boundary for you. This provides a tissue map for macro-dissection. It also measures the percentage of tumor nuclei to inform sample quality and tumor purity for molecular profiling.

TissueMark

Image analysis applications for lung[5] and breast tumor identification. The quantitative and color coded heat map of tumor probability gives you visual information on tumor location and differentiation from stroma, inflammation, and necrosis.
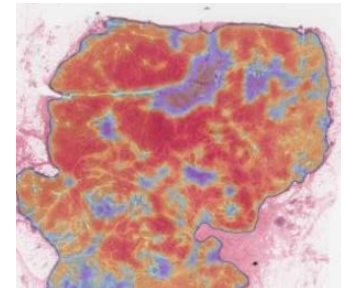
Speed up research and biomarker discovery

Access, import, store, and search large volumes of genomic, molecular and image analysis data associated with pathology images using our research web-based image and data management system Xplore[4].

Xplore provides a central hub to create, interrogate, share and manage archives both for individual and collaborative studies. You can define study hierarchy, datasets, and fields, and import whole slide or TMA (tissue micro array) images.

Xplore

Image and data management system to support your research with storage, sharing, TMA scoring and archiving. The application also allows you to manually score TMAs online as well as create virtual TMAs thereby enabling you to evaluate new tissue biomarkers quickly and easily. TMA scoring map templates, and an automated de-array help you to segment and identify TMA cores easily.

4) TissueMark and Xplore are research applications. PathXL is the legal manufacturer and is a Philips company
5) For non-small cell lung cancers only

Impacting care
in oncology

Cancer incidence and related healthcare costs continue to grow. There is a big need to diagnose and treat patients in efficient settings with a focus on the best care. The key? You must combine using the best imaging and therapy capabilities, patient experience and lowest cost with the goal to improve patient outcomes.

We help make this possible with tools and services for confident decision making. With Philips HealthTech, offering oncology solution across the health continuum, the future of personalized oncology is within your reach.
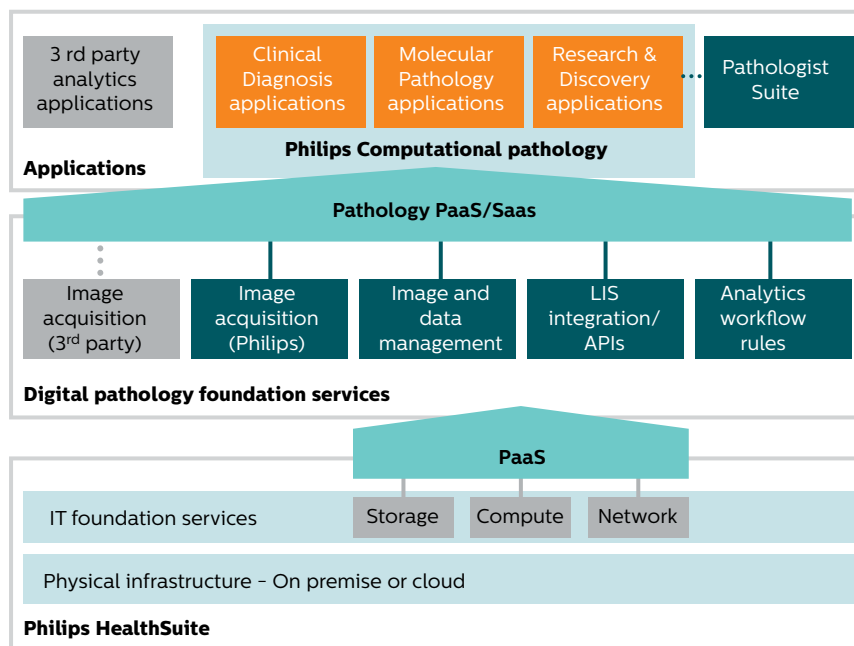
Philips IntelliSite **open platform**

Philips IntelliSite open platform is the foundational architecture that will help enable our vision for computational pathology.

Philips IntelliSite Pathology Solution[6] is planned to be an open, collaborative, digital image creation, management and analysis platform that is modeled on Web 2.0. We aim to stimulate 3rd party apps, from industry, academia or the open source community to be developed and deployed on the IntelliSite open pathology platform accessing its full and transparent data.

Philips open platform and ecosystem for pathology is based on Philips HealthSuite to bring multiple benefits. Philips HealthSuite digital platform offers the foundational storage infrastructure as well as the core services needed to develop and run a new generation of connected healthcare applications.

3 rd party analytics applications	Clinical Diagnosis applications	Molecular Pathology applications	Research & Discovery applications	...	Pathologist Suite
	Philips Computational pathology				

Applications

Pathology PaaS/Saas

Image acquisition (3rd party)	Image acquisition (Philips)	Image and data management	LIS integration/ APIs	Analytics workflow rules

Digital pathology foundation services

PaaS

IT foundation services	Storage	Compute	Network

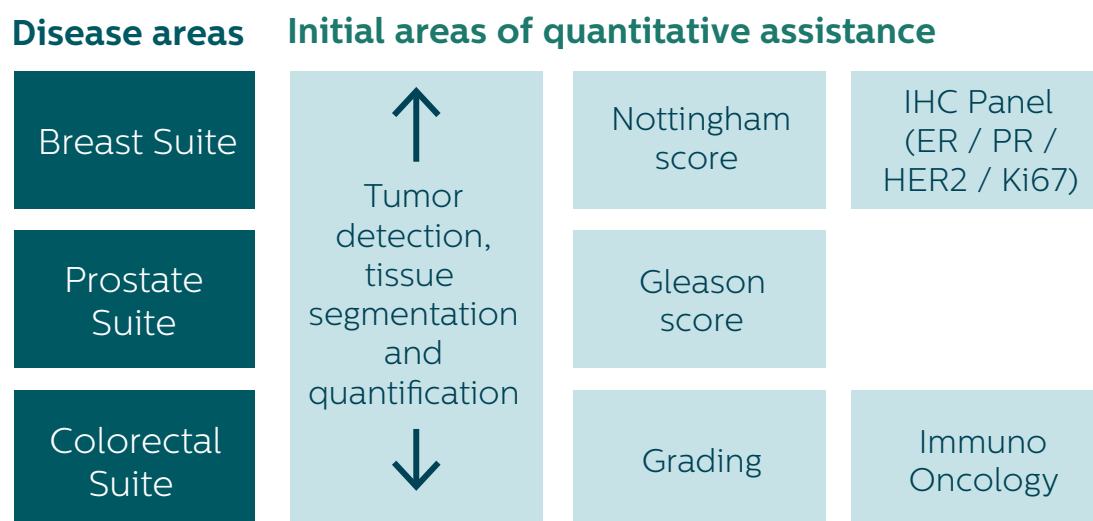| Physical infrastructure – On premise or cloud |
|---|

Philips HealthSuite

High level architecture of the Philips IntelliSite pathology solution as deployed on an IT platform. The IT services are provided to the pathology platform by a Platform as a Service (PaaS) style interface. The Pathologist Suite and other front-end applications can be consumed as a Software as a Service (SaaS).

6) Philips IntelliSite Pathology Solution is CE-IVD marked. In the United States, the Philips IntelliSite Pathology Solution is pending DeNovo.

Next generation in
pathology testing

Philips is developing its tissue and image recognition technology to support you in the future for routine diagnosis as well as tissue based research and discovery.

Our roadmap aims to address some of the toughest clinical problems.

Disease areas

Initial areas of quantitative assistance

Breast Suite		Nottingham score	IHC Panel (ER / PR / HER2 / Ki67)
Prostate Suite	Tumor detection, tissue segmentation and quantification ↑ ↓	Gleason score	
Colorectal Suite		Grading	Immuno Oncology

In support of your clinical diagnosis, it is our aim to build a suite of algorithms that help you identify and segment tumor, as well as supporting you in complex diagnosis such as grading as well as immuno-Oncology applications.

Philips, empowering you to lead the change towards improved patient care

www.philips.com/computationalpathology