Optimizing Consults and Second Opinions:

How Compact, On-Demand Whole-Slide Imaging (WSI) Delivers High-Quality & Timely Diagnoses

Prepared by Grundium and based on expert insights from
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Executive Summary

Pathology is the definitive standard for diagnosis in modern medicine. Targeted therapies, complex oncology regimens, and multidisciplinary care all depend on accurate pathology reports that arrive in time to shape clinical decisions. Yet workforce shortages, growing case complexity, and rising expectations for subspecialty review are stretching traditional consult workflows to their limits.

Glass-slide consults remain common but are increasingly misaligned with this reality. Packing and shipping slides introduces days to weeks of delay, risks damage or loss of irreplaceable material, and adds communication overhead as images, reports, and clinical data travel through separate channels. Simply hiring more subspecialists or placing more microscopes at each site is not feasible for most health systems.

Digital pathology — and specifically whole-slide imaging (WSI) — offers a practical alternative. The technology is mature, image quality is high, and regulatory bodies have recognized WSI as equivalent to glass for primary diagnosis when appropriately validated. At The Ohio State University (OSU) Wexner Medical Center, nearly all anatomic pathology work is now signed out digitally, with an archive of millions of whole-slide images.

Within this environment, compact, on-demand scanners such as the Grundium Ocus family have become “front-line” devices at community sites that connect directly to academic expertise. A hub-and-spoke network linking Wooster Community Hospital and other regional hospitals to OSU demonstrates what is possible: local scanning, rapid digital transmission, real-time or near-real-time consults, and shared review for complex cases.

This white paper describes, from a pathologist’s perspective, how compact WSI systems can:

- Shorten consult turnaround times and reduce variability
- Improve access to subspecialty review without adding travel or courier burden
- Enhance community pathologists’ professional satisfaction and confidence
- Support scalable, secure, and validated workflows across large health systems
- Lay the foundation for AI and advanced analytics as digital adoption grows

> *“Our goal is to give the best diagnosis in a timely manner to all patients. It doesn’t matter where they are in our system.”*

1. Clinical Context: Why Consult Workflows Must Evolve

As practicing pathologists, we occupy a critical junction in patient care. Therapeutic choices in oncology, transplantation, inflammatory disease, and many other areas depend on pathology that is accurate, complete, and available when clinicians need it.

1.1 Workforce Pressures and Case Complexity

This responsibility is increasing even as resources tighten. The United States faces a limited and aging pathology workforce, with uneven distribution of subspecialty expertise across geography. At the same time, cancer care and associated staging systems have grown more complex, and tumor boards expect detailed, subspecialty-level input on a growing share of cases.

For many hospitals, local pathologists manage a broad range of specimens while relying on tertiary centers for confirmation in rare or challenging situations. Subspecialty consults are not a luxury; they are a safety net for both patients and practitioners.

1.2 The Central Role of Consults and Second Opinions

Consults and second opinions serve several key purposes:

- Confirming or refining diagnoses for rare or complex entities
- Resolving discrepancies between pathologic findings and clinical impressions
- Providing subspecialty input on borderline, equivocal, or high-stakes cases
- Meeting quality assurance requirements tied to case complexity

Historically, these consults have been almost entirely glass-based. Slides travel from community sites to academic centers and back again, often accompanied by separate packets of reports and clinical information. Even with efficient couriers, this model is fragile and slow.

2. The Limits of Traditional Glass-Slide Consults

Most pathologists know the “glass consult” workflow well: slides are selected, packaged, shipped, accessioned at the referral center, reviewed when they reach the front of a queue, and eventually returned. Some steps can be optimized, but the core limitations remain.

2.1 Turnaround Time and Variability

In practice, consult turnaround times for external expert opinions often range from several days to multiple weeks, depending on shipping schedules, accessioning queues, and the need for additional testing. Each handoff adds variability and potential delay.

For patients, this delay is substantial. Longer intervals between biopsy and definitive diagnosis can increase anxiety, complicate scheduling of surgery or systemic therapy, and — in some cases — lead to treatment being initiated or altered without full pathology information.

> *“If you want a specific consultant, it might take two to three weeks. That’s the glass slide world.”*

2.2 Risk to Physical Material and Communication Friction

Glass slides are inherently fragile. They can be broken during transport, misplaced in transit, or held up in accessioning. When paraffin blocks travel, there is also a small but real risk of loss of

the only remaining tissue. Pathologists and clinicians spend time tracking down missing material rather than focusing on patient care.

Communication adds another layer of friction. Images, reports, and clinical notes often move through separate channels. Incomplete information or transcription errors can lead to additional calls, addenda, and delays. Each manual step in the relay increases the chance of misalignment.

2.3 Evidence That WSI Is Ready for Routine Consult Use

A decade ago, one could reasonably question whether digital images were adequate for everyday diagnosis. That debate has been largely resolved. Multiple studies and regulatory decisions support the conclusion that WSI is non-inferior to glass when appropriate validation and training are in place.

OSU's trajectory illustrates this shift. Over time, the institution has moved from pilot projects to broad routine use, now signing out the vast majority of anatomic pathology work digitally and maintaining a large archive of whole-slide images. Within this ecosystem, digital consults are simply an extension of daily practice rather than an experimental add-on.

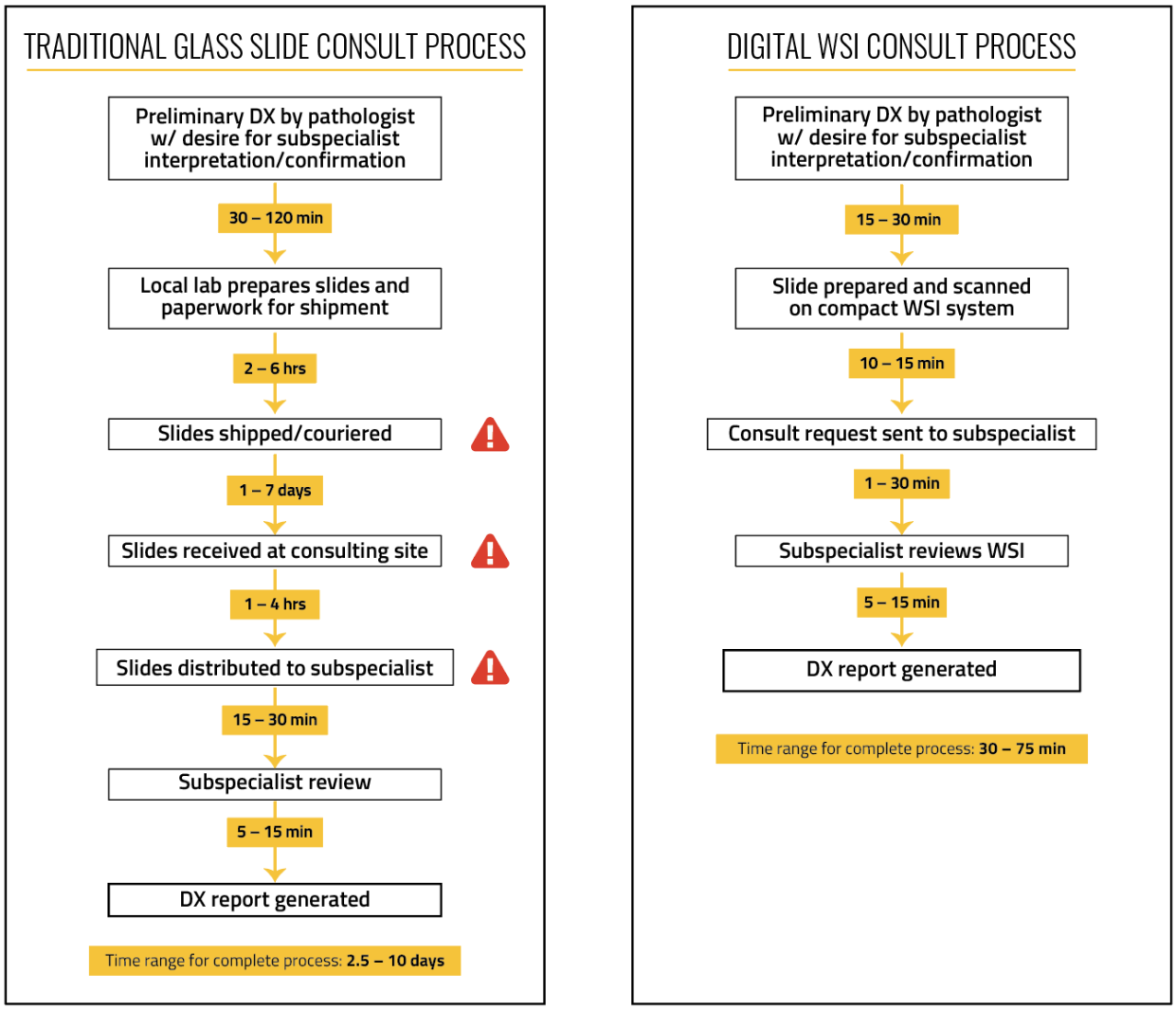

Figure 1. The Consult Bottleneck. Traditional glass consult pathway (multi-step shipping and review) vs. digital consult pathway (single local scan, immediate remote review).

3. Compact, On-Demand WSI in a Hub-and-Spoke Network

The digitally enabled consult pipeline between OSU Wexner Medical Center and Wooster Community Hospital shows how compact WSI can transform regional workflows.

3.1 Architectural Overview: Hub and Spoke

OSU functions as the academic hub, with approximately forty subspecialty pathologists who sign out anatomic pathology cases, lead programs, and participate in tumor boards. Community hospitals, including Wooster, operate as spokes. Each spoke has local Ocus scanners that can digitize slides at the point of care and send images securely to OSU.

Direct courier of glass between Wooster and OSU is now reserved for special situations. In routine practice, slides are scanned locally, uploaded to the image management platform, and made available for subspecialty review without leaving the community hospital.

3.2 A Day-in-the-Life Consult

From the community pathologist's point of view, a typical digital consult proceeds as follows:

1. A challenging or high-stakes case is identified.
2. Slides are loaded onto the local compact scanner and digitized.
3. Images are automatically transferred into a secure digital environment linked to OSU.
4. The community pathologist sends a consult request and link to the relevant subspecialist.
5. The OSU pathologist reviews the case on-screen, often in real time or with only a short delay.
6. Additional stains or follow-up studies can be requested promptly if needed.

This interaction increasingly occurs in near real time. Data from OSU suggest that using local scanning and digital consults reduces turnaround time for many cases by more than 90% compared to shipping physical slides.

3.3 Why Compact On-Demand Systems Matter

High-throughput scanners remain essential for large academic centers digitizing thousands of slides per day. However, they are not always practical in smaller hospitals or satellite labs. Compact, on-demand scanners such as the Grundium Ocus portfolio offer several advantages at the spokes:

- Small physical footprint; they fit easily in histology labs or on a pathologist's desk
- Simple, intuitive operation suitable for histotechnologists and pathologists
- Image quality sufficient for routine consults and subtle cytologic assessment
- Flexible deployment close to where cases arise

From the consultant's perspective, once a slide has been scanned and uploaded, the device disappears into the background. The scanner becomes the invisible front end of a digital consult network.

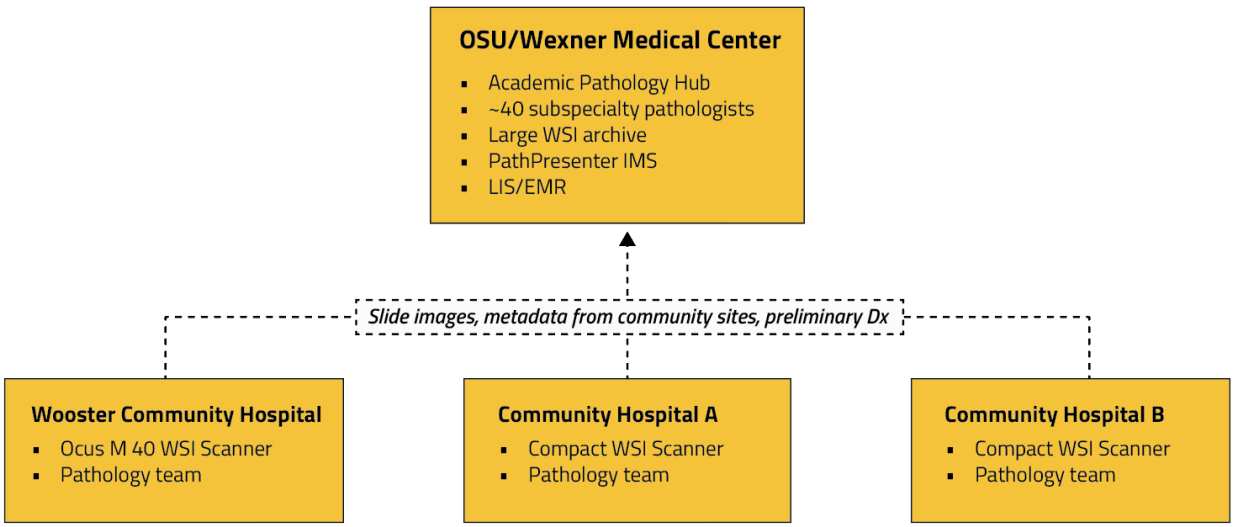

Figure 2. Hub-and-spoke Digital Consult Model. Local histology teams scan selected slides on compact WSI devices at community sites, then share digital images and case information with OSU subspecialists, who provide consult opinions without physical slide transport.

4. Implementation: Stakeholders, Validation, and Workflow

Technology alone does not create a functional consult program. Sustainable adoption depends on aligning institutional leadership, IT, and pathology around a clear vision.

4.1 Three Essential Stakeholder Groups

At OSU and its partner hospitals, three groups have been critical:

- **Administration** – sets strategic priorities, allocates budget, and supports change management
- **IT and Information Security** – ensures secure connectivity, device management, and integration
- **Pathology and Laboratory Staff** – define workflows, perform validation, and manage day-to-day use

Neglecting any one of these constituencies risks stalled projects or underused systems.

4.2 Clarifying Vision and Scope

Before equipment arrives, it is worth answering a few basic questions:

- What clinical problems are we trying to solve first (e.g., consults, frozen sections, ROSE)?
- How many sites and pathologists will participate in the initial rollout?
- What volumes and turnaround expectations are realistic?
- Over what time frame do we plan to expand use?

Having this vision up front avoids mismatches between expectations and capabilities and guides decisions about whether compact scanners, high-throughput devices, or a combination is most appropriate.

4.3 IT Security and Network Integration

Most health systems now have established processes for bringing new devices onto the network. Typical steps include:

- Completion of a security questionnaire by the vendor
- Review by information security and network teams
- Definition of network segmentation and access controls
- Configuration of VPNs or secure tunnels where needed

In OSU's experience, the primary constraint is often IT team bandwidth rather than technical limitations of the scanners. Early engagement and clear timelines help keep projects moving.

4.4 Validation and User Readiness

From a patient safety and accreditation standpoint, validation is non-negotiable. A practical approach includes:

- Defining the intended use (e.g., consults, primary diagnosis for certain specimen types)
- Selecting representative cases across tissue types and difficulty levels
- Having pathologists review cases digitally and on glass, then comparing results
- Achieving pre-specified concordance (for example, ≥87% for key diagnostic elements)

Once devices are validated for institutional use, each pathologist who will sign out cases digitally should complete a focused individual validation set to become comfortable with navigation, artifact recognition, and subtle differences between digital and glass.

The purpose is not to create obstacles but to demonstrate that, for the defined use case, digital reads are clinically interchangeable with traditional microscopy.

4.5 Training and Integrating into Daily Workflow

The final phase is integrating digital tools into everyday work:

- Training histotechnologists to load slides, initiate scans, and troubleshoot basic issues
- Training pathologists to access images, annotate, and link them to LIS or EMR data
- Adjusting existing workflows so that digital consults become the default rather than an exception

Minor problems inevitably emerge — occasional network hiccups, mislabeled cases, questions about storage or backup. Identifying and resolving these issues before go-live prevents frustration later.

> *"There will be issues. You want to iron them out before you go live for successful adoption."*

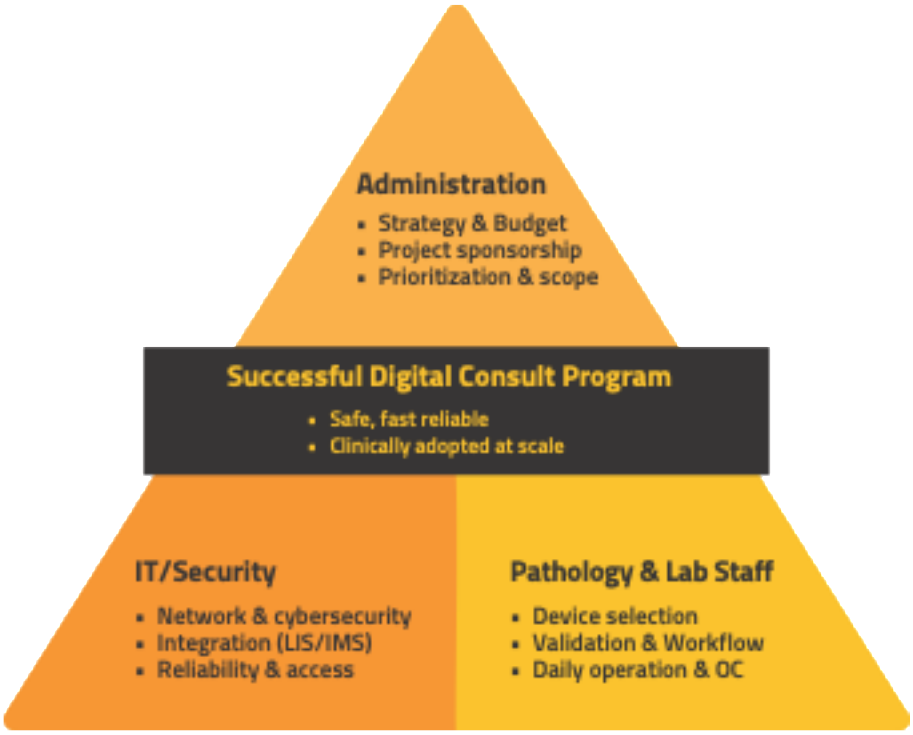

Figure 3. Three pillars of Successful Digital Pathology Implementation. Digital consult workflows are sustainable only when administration, IT/security, and pathology/lab staff are aligned. Each group owns a distinct set of responsibilities that together enable safe, reliable, and clinically useful digital pathology.

5. The Community Pathologist's Experience

The value of digital consult workflows becomes especially clear from the community pathologist's perspective. Dr. Melinda Schumacher's experience at Wooster illustrates how daily practice changes.

5.1 Remote Work and Reduced Travel

Historically, covering multiple hospitals in a regional system often required a rotation model: driving between sites, carrying cases, and balancing local responsibilities with trips to the academic center. Digital consults allow pathologists to remain physically present where they are most needed while having virtual access to the entire network.

Centralization through WSI does not eliminate the need for on-site presence — medical directorships, frozen sections, and certain procedures still require local pathologists — but it significantly reduces the time spent traveling purely for slide review.

5.2 Turnaround Time and Shared Review

For community pathologists, reduced turnaround time is one of the most tangible benefits. Difficult cases no longer sit in a shipping queue; they can be scanned and shared quickly.

Equally important is the ability for both community and academic pathologists to look at the same digital slides at the same time. This simultaneous visibility supports:

- Real-time joint review
- More efficient tumor board preparation
- Clearer communication with clinicians

Cases that might previously have required multiple phone calls or delayed follow-up can now be resolved in a single shared session.

5.3 Diagnostic Accuracy, Confidence, and Professional Growth

Digital consult workflows do more than move cases faster. They create a structured environment for feedback and learning. By seeing how their impressions align with subspecialty opinions, community pathologists can calibrate their thresholds and refine diagnostic criteria.

Over time, this improves confidence and reduces the sense of isolation that can come with solo practice. Collaborative digital review makes difficult cases feel like a team effort rather than a solitary burden.

> *"Through the specialist pathologist's guidance, we can work up the case efficiently… and that makes the job a lot more fun."*

5.4 Case Study: Historic Comparison Without Glass

One case Dr. Schumacher described involved a liver core biopsy in a patient with a remote history of malignancy. The key question was whether the current lesion represented recurrence or a new process.

Under a purely glass-based model, retrieving slides from the original case would have required locating and shipping archived material from the academic center — a process that might take days and risk damage or loss.

Instead, she opened archived digital slides of the primary tumor directly from OSU's EMR, placed them side-by-side with the new biopsy, and compared them in real time. This allowed a more confident diagnosis without additional courier steps or delays.

6. Technical and Operational Considerations

A digital consult network is only as strong as its weakest technical link. For pathologists to adopt and sustain digital workflows, the system must be trusted as part of routine care.

Key considerations include:

- **Image quality** – High-resolution images that support confident evaluation at all magnifications
- **Reliability** – Devices that are available when needed, with minimal maintenance overhead
- **Integration** – Seamless links to image management platforms (e.g., PathPresenter), LIS, and ideally EMRs
- **Workstations** – Clinical-grade monitors, adequate graphics performance, and sufficient bandwidth

When these elements are in place, the technology fades into the background and pathologists can focus on diagnosis rather than on the mechanics of image acquisition.

7. Clinical and Organizational Value

The value of a digital consult network can be viewed at three levels: the patient, the clinician/pathologist, and the health system.

- **Patients** benefit from shorter intervals between biopsy and diagnosis, fewer repeat procedures, and more timely treatment decisions. Faster, well-supported consults reduce uncertainty and improve the patient experience.
- **Clinicians and pathologists** gain from clearer, evidence-based reports delivered at the right time. Tumor boards and multidisciplinary conferences are better supported when subspecialty input is readily available and digital slides can be shared on screen. Pathologists experience less travel burden and greater opportunity for collaborative review.
- **Health systems** see more rational use of human and financial resources. Courier costs and slide-tracking overhead decrease, while scarce subspecialty expertise can be deployed across a wider geography without proportional increases in staffing. Digital consults also create a durable image archive that supports quality assurance, education, and research.

8. Looking Ahead: AI and Advanced Analytics

Although this white paper focuses on consult workflow, it is impossible to ignore the additional capabilities that emerge once slides are routinely digitized.

Dr. Schumacher highlighted several tasks that are essential but time-consuming for pathologists: counting mitotic figures, estimating tumor cellularity, assessing eosinophils, scoring Ki-67, measuring tumor volume, and screening large specimens for small foci of disease.

These are precisely the kinds of repetitive, rule-based tasks where AI and image analysis can assist.

Most pathologists would readily offload such tasks to reliable algorithms, provided that final clinical responsibility remains with the human expert. By implementing compact WSI scanners and digital consult workflows today, institutions position themselves to adopt AI tools tomorrow without having to re-engineer basic infrastructure.

9. Conclusion: A Pathologist's View of "What Comes Next"

From a pathologist's standpoint, the case for integrating compact, on-demand WSI into consult workflows is now strong. The combination of workforce pressures, increasing case complexity, and patient expectations for timely care makes traditional glass-based consults feel increasingly out of step.

The experience of OSU and Wooster Community Hospital shows that modest, targeted deployment of compact scanners at community sites can:

- Enable rapid, secure digital consults with academic subspecialists
- Reduce turnaround time and variability for high-stakes cases
- Improve collaboration and professional satisfaction for community pathologists
- Support rational system-level use of limited subspecialty expertise

For institutions considering a similar path, the next steps are straightforward:

1. Define the clinical questions you most need to address.
2. Engage administration, IT, and pathology early and explicitly.
3. Choose appropriate devices for both hubs and spokes.
4. Validate carefully, train thoroughly, and integrate digital workflows into daily practice.

Digital pathology is no longer about proving that tissue can be viewed on a screen. The question now is how we organize our work so that patients receive accurate diagnoses as quickly as possible, wherever they enter the health system.

Authorship & Contributors

This white paper was prepared by Grundium, drawing on the clinical and operational experience shared during a Dark Daily webinar on consult efficiency and digital pathology adoption.

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Editorial Note

This white paper synthesizes content from the Dark Daily webinar “Driving Consult Efficiency: How a Premier Healthcare Organization Uses Compact Whole-Slide Imaging for Consults and Second Opinions,” along with additional context from Grundium’s work with digital pathology programs.

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