



From Paper to Practice: Building the Future of Electronic Grossing Protocols

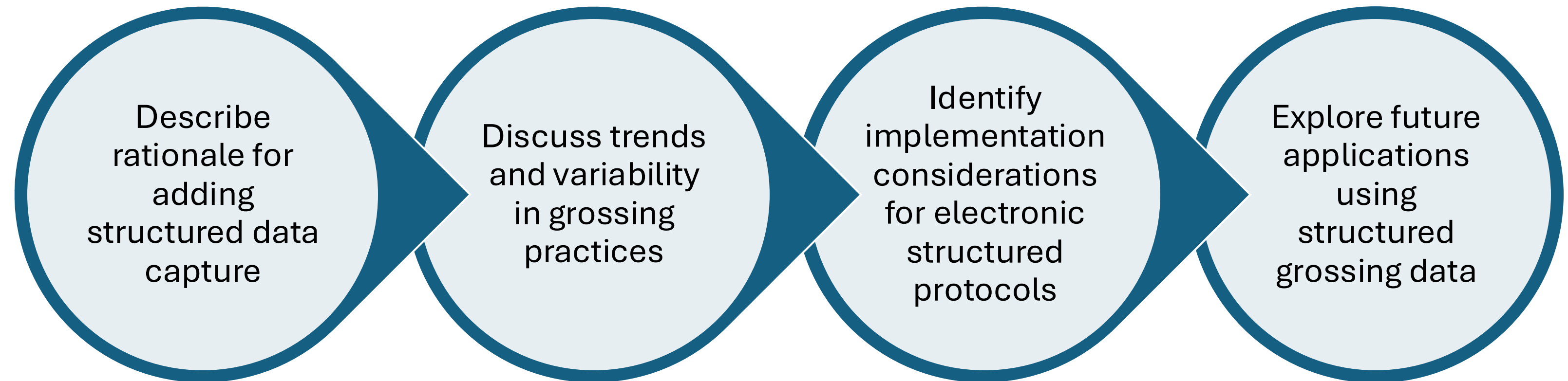


Disclosures

- American Association of Pathologists' Assistants
- Panel of National Pathology Leaders
- Mopec Clinical Advisory Board
- Consulting: mTuitive, AstraZeneca

The work presented today was conducted as part of my role with the AAPA. No other organizations listed contributed to this work or presentation, and no external funding was received.

Learning Objectives

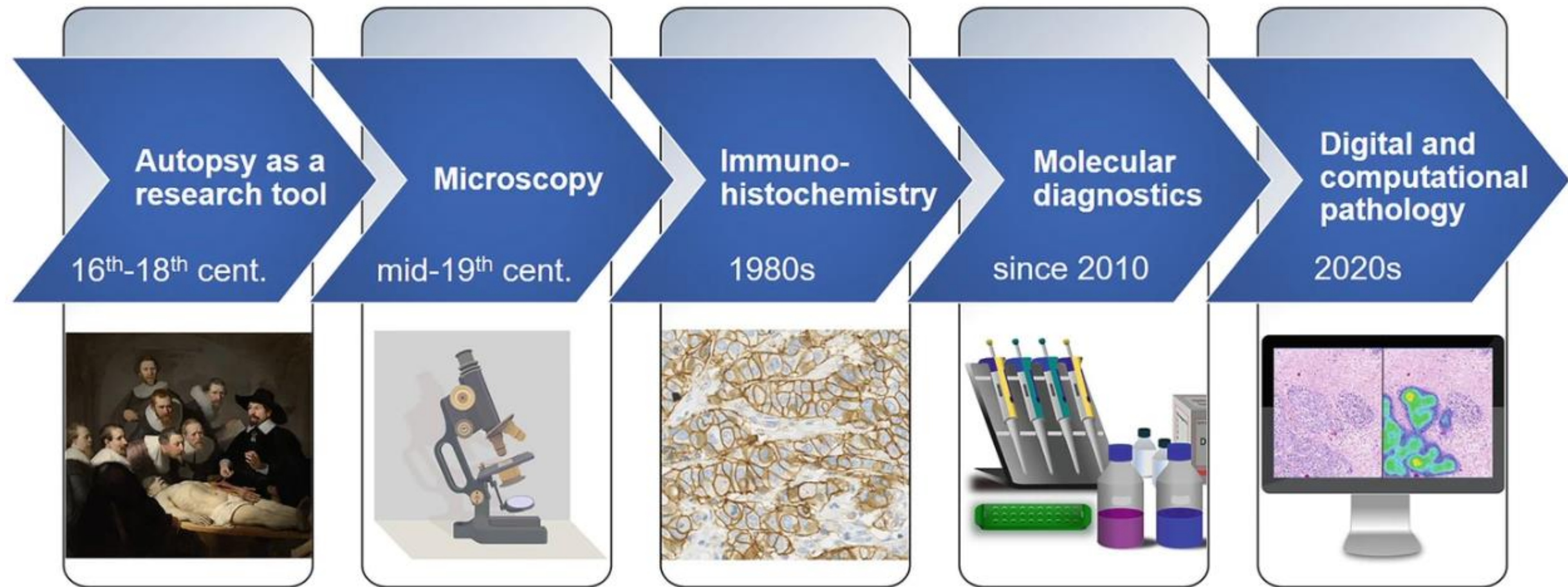




The Case for Structure and Standardization

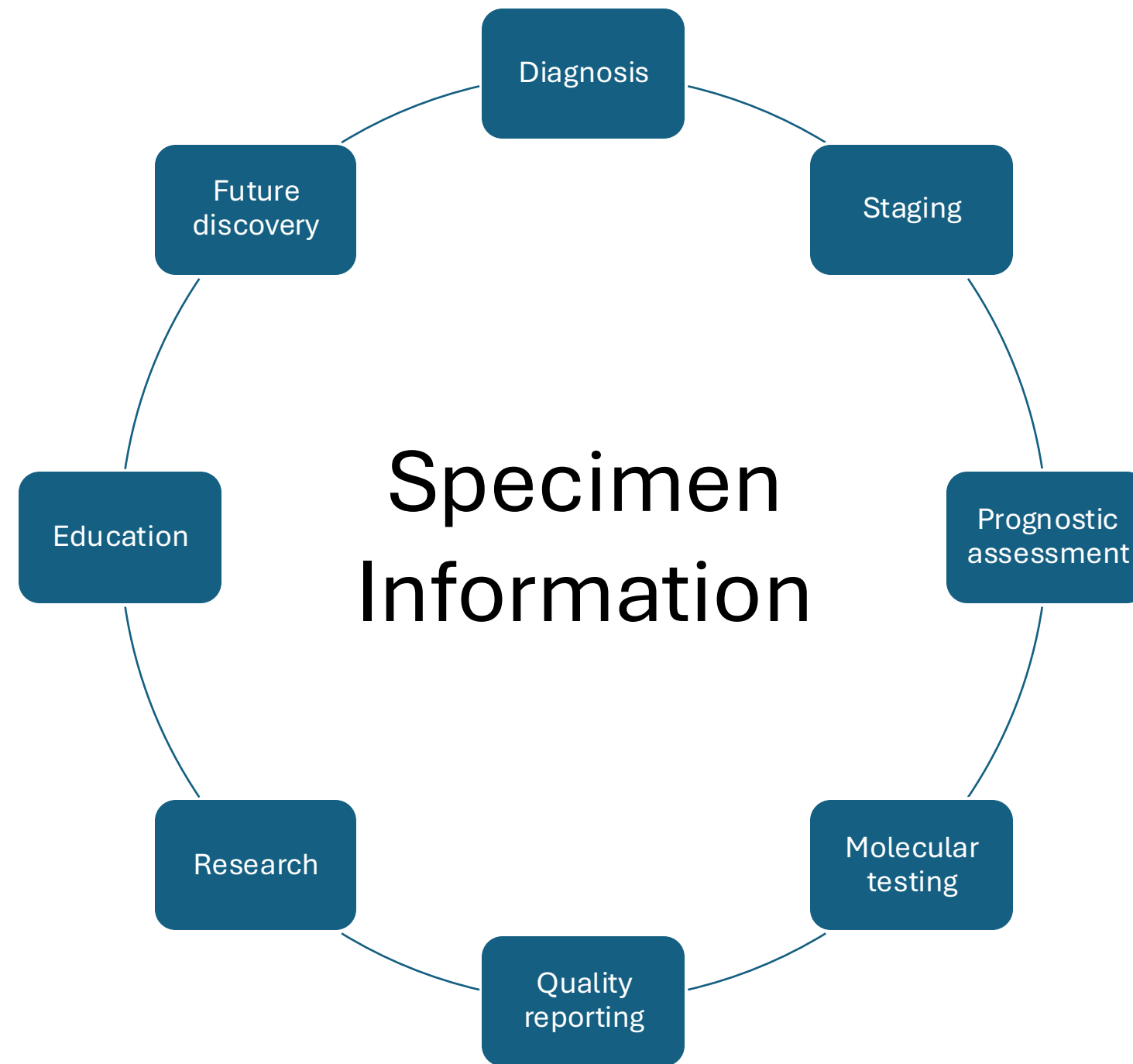


Pathology is Continuously Evolving



Kiehl, TR. (2022). Digital and Computational Pathology: A Specialty Reimagined. In: Ehsani, S., Glauner, P., Plugmann, P., Thieringer, F.M. (eds) The Future Circle of Healthcare. Future of Business and Finance. Springer, Cham. Creative Commons Attribution 4.0 International License

The Gross Exam Matters More Than Ever



Information Needs Structure

Low anterior resection A

Received in formalin, labeled with the patient's name, MRN, and "low anterior resection" is a previously opened, low anterior resection (20.5 cm in length x 6.1-10.0 cm in circumference) with two stapled margins. The specimen has been resected 6 cm beneath the peritoneal reflection, which is involved in the prior cut. The proximal portion of the specimen has been resected with a mesocolonic pedicle that measures up to 5 cm in length. Distally, the mesorectal envelope is complete. The serosa is pink and glistening. The radial margin is inked black.

On opening, there is a 3.0 x 2.5 x 1.0 cm stellate firm white mass in the rectum, which straddles the anterior peritoneal reflection. The mass abuts the muscularis propria and has a homogeneous cut surface. The mass involves 35% of the colon circumference, without stricture. The mass is located 4.0 cm from the radial margin, 4.5 cm from the distal margin, and >5.0 cm from the proximal and mesenteric margins.

Diverticula are present in the proximal colon, without perforation or abscess. The remaining colon mucosa is pink with a normal folding pattern and sectioning shows a bowel wall thickness averaging 0.5 cm.

Multiple lymph node candidates (0.2 – 1.2 cm in greatest dimension) are dissected from the pericolonc adipose tissue. Sectioning through the lymph nodes shows 2 grossly positive lymph nodes, with nodal tumor size ranging from 0.5 – 0.8 cm. Each node has a firm, white cut surface and no evidence of extranodal extension. A gross photograph is taken.

Low anterior resection B

Submitted in formalin in one container for gross and microscopic examination, labeled with the patient's name, MRN, and "low anterior resection" is a low anterior resection (20.5 cm in length x 6.1-10.0 cm in circumference). The specimen has been resected 6 cm beneath the peritoneal reflection. The proximal portion of the specimen has been resected with a mesocolonic pedicle that measures up to 5 cm in length. Distally, the mesorectal envelope is complete. The bowel margins are received stapled but the bowel is previously opened. The serosa is pink and glistening.

Opening the specimen reveals a 3.0 x 2.5 x 1.0 cm stellate firm white tumor that involves 35% of the colon circumference, without stricture. The circumferential margin is inked black. The tumor is located 4.5 cm from the distal margin, and >5.0 cm from the proximal and mesenteric margins. Sectioning through the tumor shows a homogeneous cut surface which abuts the muscularis propria. The tumor is 4.0 cm from the circumferential margin.

The remaining colon mucosa is pink with a normal folding pattern and sectioning shows a bowel wall thickness averaging 0.5 cm and multiple intact diverticula.

Multiple lymph node candidates (0.2 – 1.2 cm in greatest dimension) are dissected from the pericolonc adipose tissue. Sectioning through the lymph nodes shows 2 grossly positive lymph nodes, ranging from 0.5 – 0.8 cm, each with a firm, white cut surface and no evidence of extranodal extension. A gross photograph is taken.

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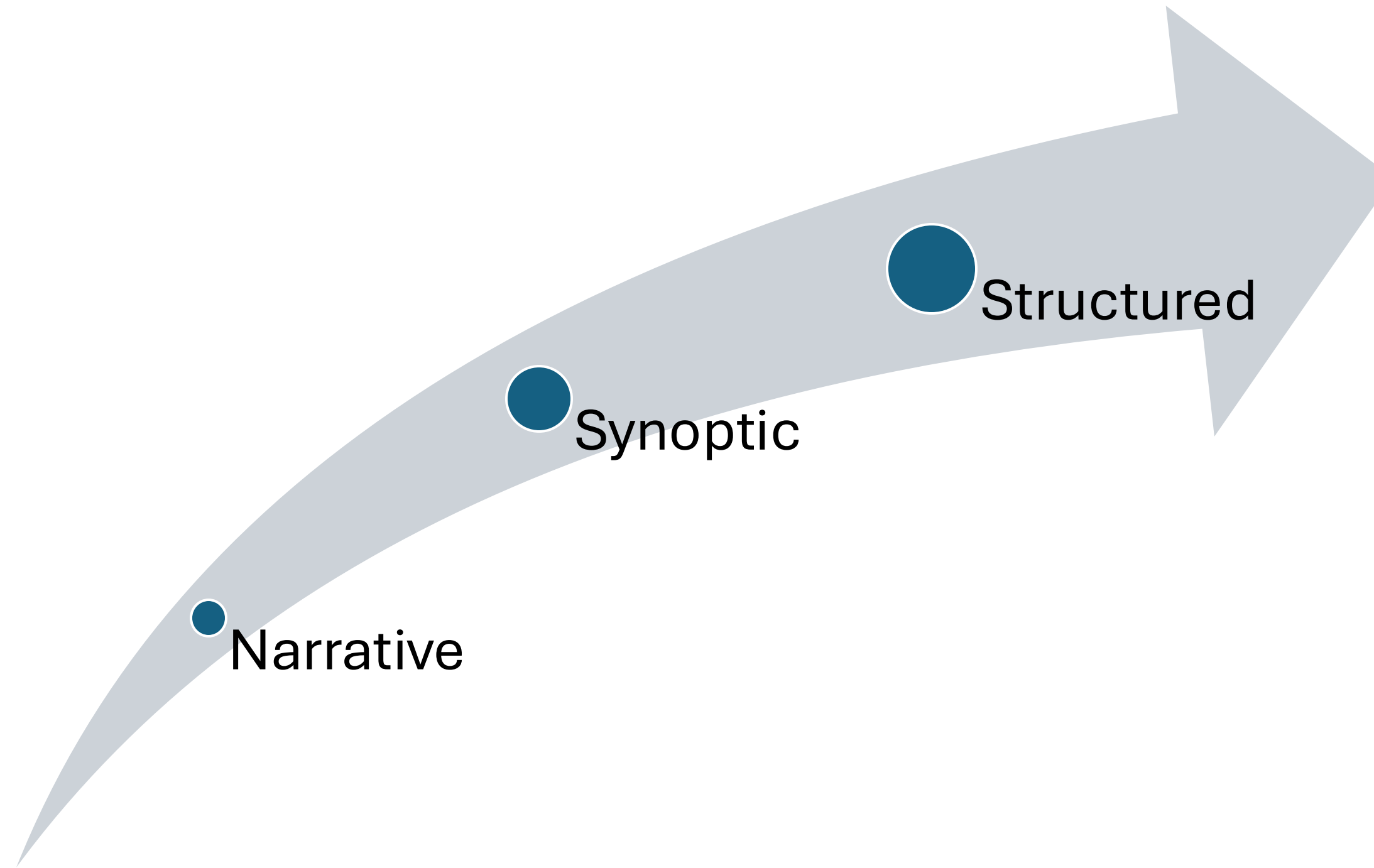
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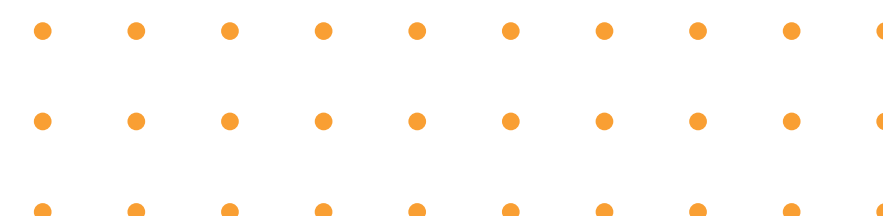
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The Cost of Narrative

	Narrative
Human-readable	✓
Standardized	◐
Searchable	✗
Reusable	✗
Interoperable	✗
Analytics	✗
AI-ready	✗

The Evolution of Documentation





Synoptic Reports Improve Consistency

SPECIMEN

Specimen Labeling: Rectosigmoid colon
Specimen Type: Low anterior resection
Fixation Status: Formalin (10% NBF)
Specimen Orientation: Based on anatomy
Specimen Integrity: Received previously opened
Macroscopic Evaluation of Mesorectum (required for rectal cancers): Complete
Mesorectum present 6 cm below peritoneal reflection, and was received partially cut, but otherwise appears complete
Ink Key: Radial margin: black

Specimen Component Dimensions

Rectosigmoid colon: 20.5 cm in length, ranging from 6.1 to 10.0 cm in circumference

MACROSCOPIC TUMOR

Refers to macroscopically suspicious lesion(s), pending microscopic confirmation

Macroscopic Tumor: Present

Number of Tumors: 1

Macroscopic Tumor Characteristics

Macroscopic Tumor Size in Centimeters (cm): 3.0 x 2.5 x 1.0 cm

Macroscopic Tumor Site(s): Rectosigmoid

Rectal Tumor Location: Straddles the anterior peritoneal reflection

Macroscopic Appearance of Tumor: Ulcerated, endophytic, pink, well-circumscribed, firm

Macroscopic Tumor Perforation: Not identified

Macroscopic Extent of Tumor: Tumor macroscopically abuts the muscularis propria

MACROSCOPIC MARGIN ASSESSMENT

Margin(s) Involved by Macroscopic Tumor: No macroscopic margin involvement

Macroscopic Distance of Uninvolved Margin(s) from Tumor:

Distal margin: 4.5 cm

Radial (circumferential) margin: 4.0 cm

Mesenteric and proximal margins are greater than 5.0 cm

ADDITIONAL FINDINGS

+Macroscopic Appearance of Uninvolved Tissue: Proximal diverticula without perforation or abscess

REGIONAL LYMPH NODES

Macroscopic Lymph Node Assessment: Lymph node(s) present

Number of Possible Lymph Node(s) Identified: 19

+Location(s) of Possible Lymph Node(s): Pericolonic

Size of Lymph Node(s): 0.2 to 1.2 cm in greatest dimension

Macroscopic Tumor Involvement of Sectioned Lymph Node(s): Possible tumor identified in sectioned lymph node(s)

Number of Sectioned Lymph Node(s) with Possible Tumor: 2

Appearance of Sectioned Lymph Node(s) with Possible Tumor: Firm, [pink-white](#)

+Size of Largest Nodal Tumor Deposit: 0.8 cm

+Greatest Dimension of Largest Lymph Node with Macroscopic Tumor: 1.2 cm

+Macroscopic Extranodal Extension (ENE): Not macroscopically identified

MACROSCOPIC SUPPLEMENTAL INFORMATION

+Blocks Optimized for Ancillary Testing: A4-A5

+Cold Ischemia Time (primary resection specimen): Less than or equal to 1 hour

+Fixation Time: Less than 6 hours

+Time Specimen Removed from Body: 1:30 pm

+Time Intact Specimen Placed in Formalin: N/A

+Time Sliced / Sectioned Specimen Placed in Formalin: 1:35 pm

Clinician requested expedited processing

Supplemental Analytical Resources: Specimen photograph(s)

CASSETTE SUMMARY

[\[\]](#)

Structured Data Changes What's Possible

Information exists

disrupted	5.0 cm	yellow	tumor	hemorrhage	
intact	cystic	mass	8.2 cm	clear fluid	
ill-defined	white	2.5 cm	lesion	at posterior margin	
1.5 cm	stellate	rubbery	white	scar	
ulcerated	3.0 cm	pink	firm	mass	

Information is organized

Size	Border	Color	Integrity	Lesion	Margin Involvement	Other
5		yellow	disrupted	tumor		hemorrhage
8.2			intact	cystic mass		clear fluid
2.5	ill-defined	white		lesion	posterior	
1.5	stellate	white		scar		rubbery
3	firm	pink		mass		ulcerated

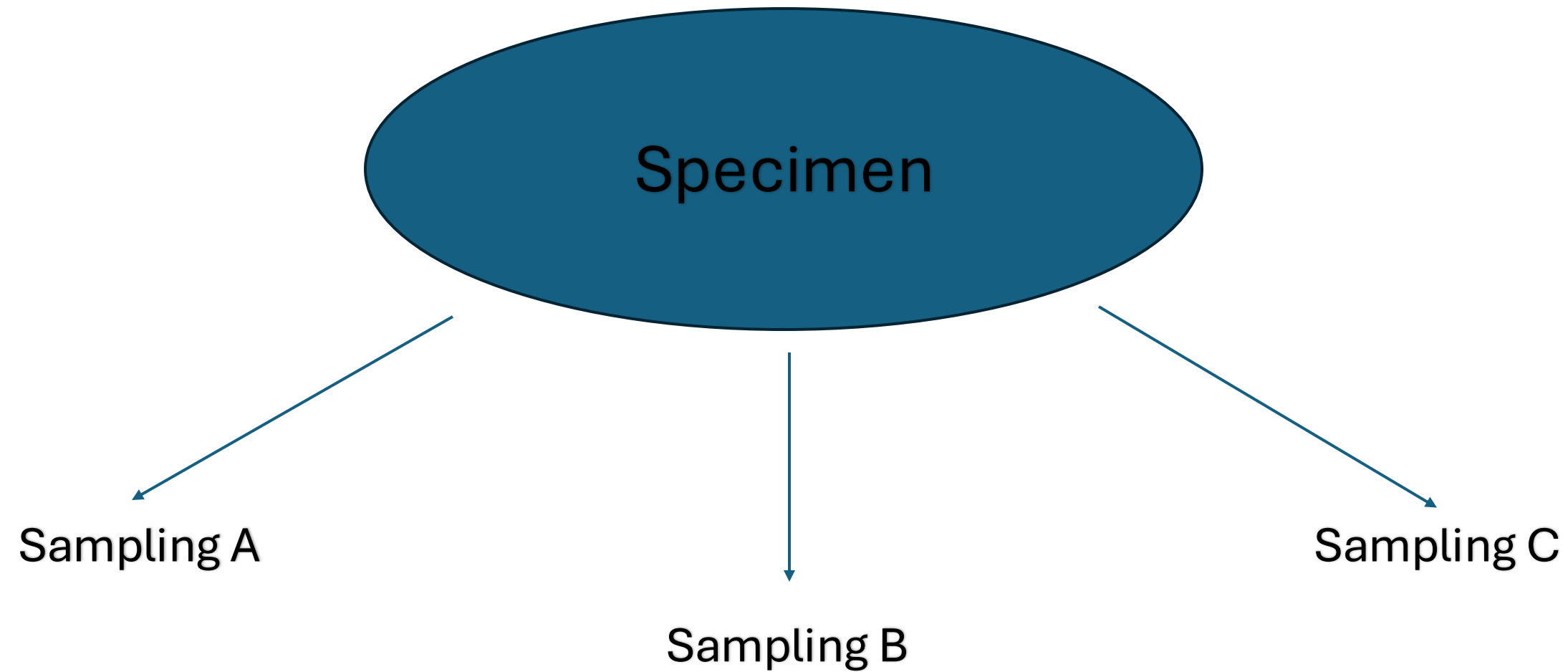
Information becomes usable data

Size	Border	Color	Integrity	Lesion	Margin Involvement	Other
5		yellow	disrupted	tumor		hemorrhage
8.2			intact	cystic mass		clear fluid
2.5	ill-defined	white		lesion	posterior	
1.5	stellate	white		scar		rubbery
3	firm	pink		mass		ulcerated

From Documentation to Data

	Narrative	Synoptic	Structured
Human-readable	✓	✓	✓
Standardized	◐	✓	✓
Searchable	✗	Limited	✓
Reusable	✗	Limited	✓
Interoperable	✗	Limited	✓
Analytics	✗	Limited	✓
AI-ready	✗	Limited	✓

How Much Variation Exists?



Some variation is insignificant. Some may have clinical implications.

Block Submission Survey: Key Findings

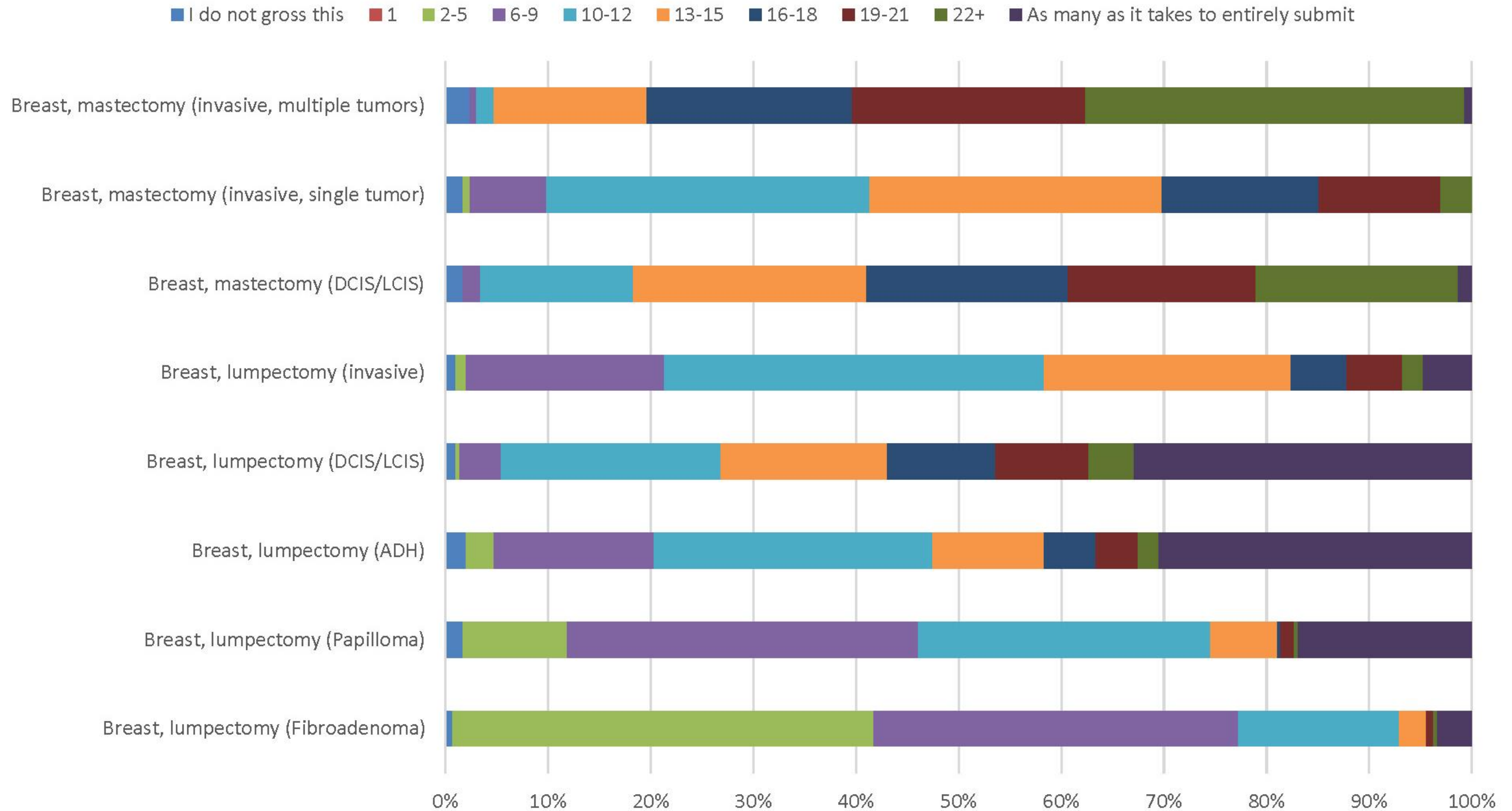
Where Practice Already Aligns

- ✓ Complete submission of AH/EIN endometrium **(97%)**
- ✓ SEE-FIM for BRCA patients **(93%)**
- ✓ Neoadjuvant scar sampling
 - Esophagus **(94%)**
 - Colorectal **(85%)**
- ✓ All lymph nodes in colon cancer **(88%)**
- ✓ Pediatric tumor necrosis reporting **(83–92%)**

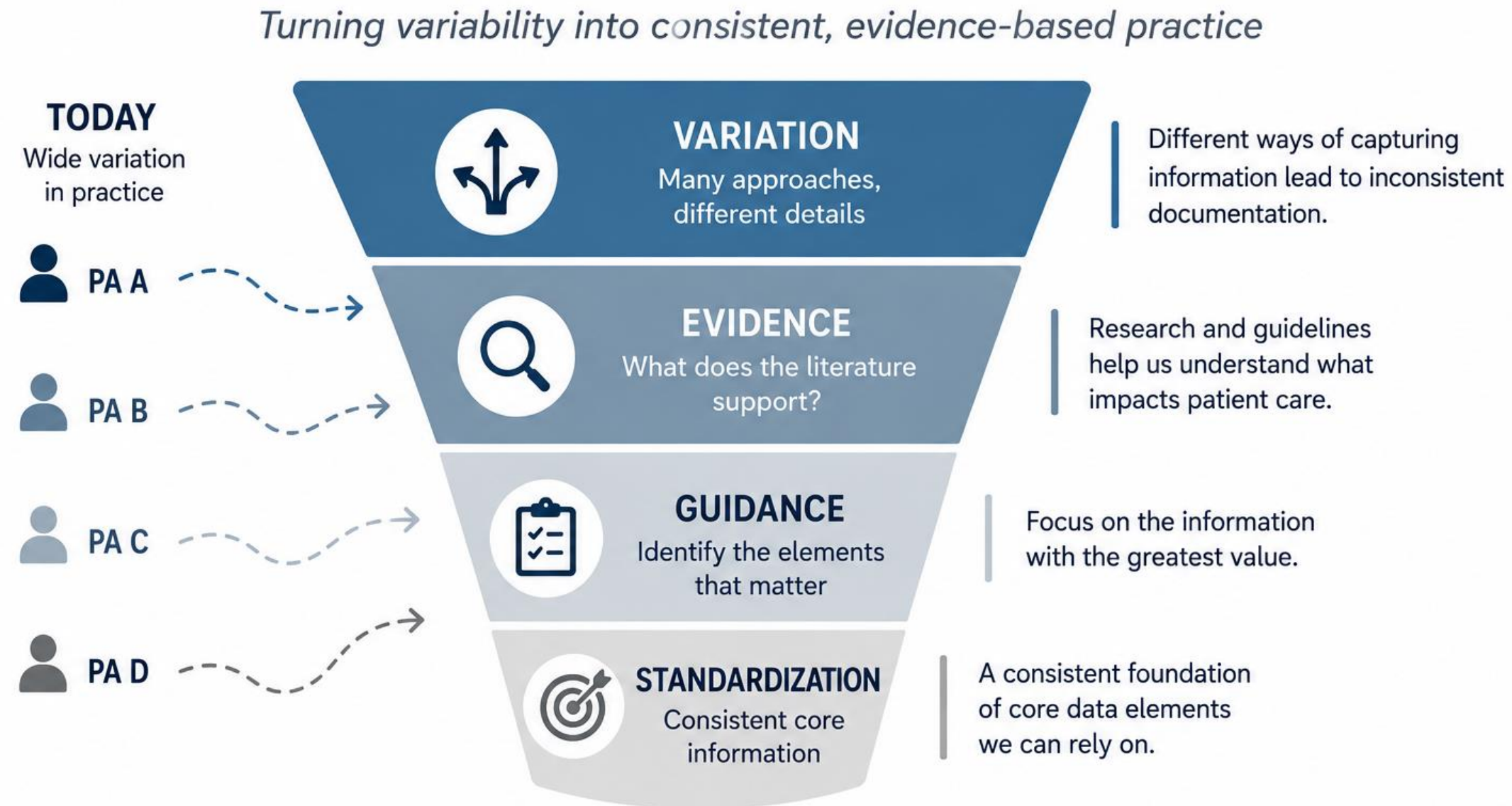
Where Standardization Could Help

- Neoadjuvant specimen sampling
 - Breast & lung
- Prostate and bladder sampling
- Bone tumor mapping
- Ground-glass lung nodule sampling
- Borderline ovarian tumor sampling
- Thyroid nodule sampling
- Pancreaticoduodenectomy sectioning
- Management of cold ischemia time
- General sampling strategies

Block Submission for Breast Specimens



From Variation to Standardization



The goal is not to eliminate variation. *It is to reduce unnecessary variation.*

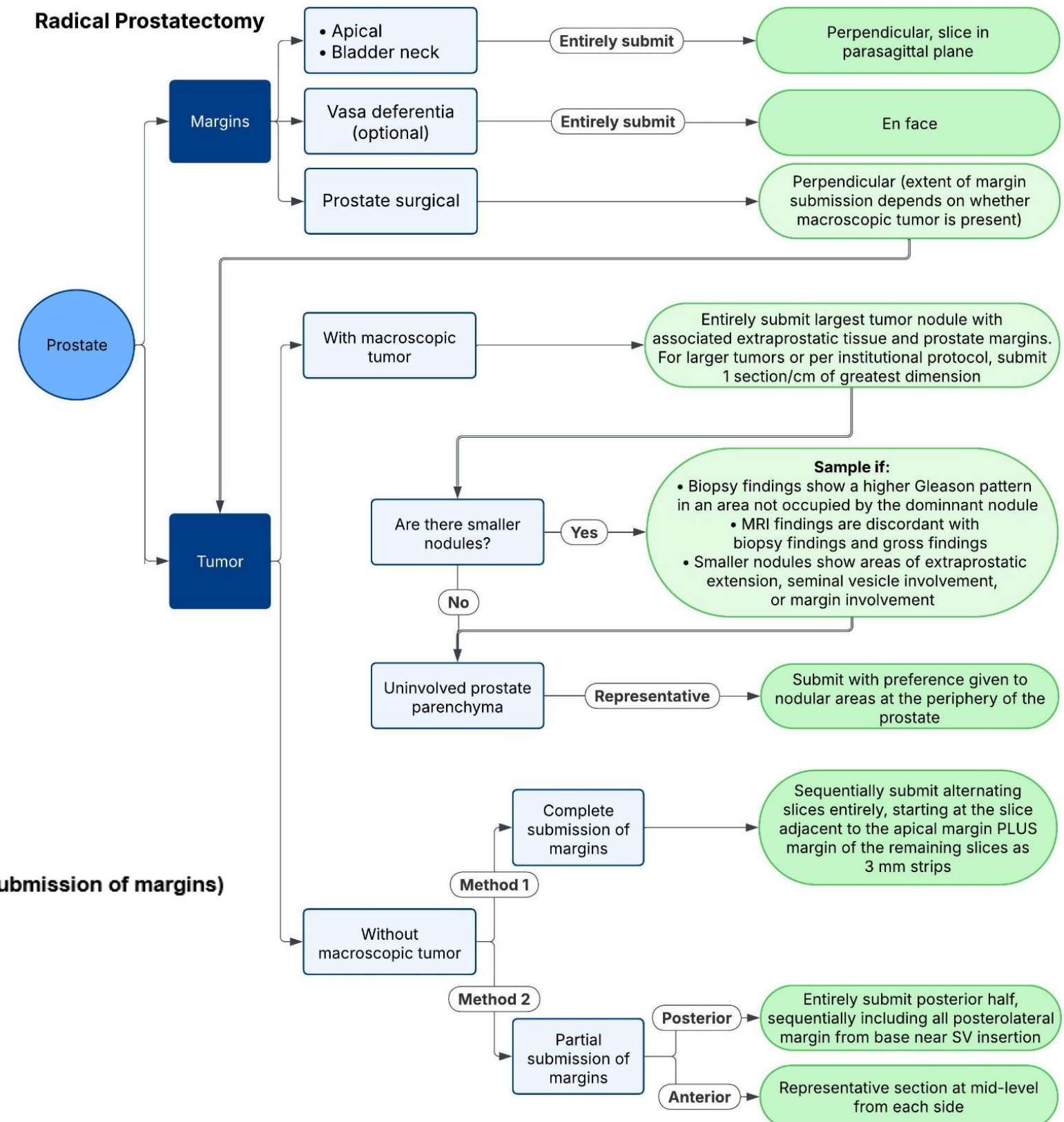
Graphic created with ChatGPT (OpenAI), 2026.

- **Tumor**

- Macroscopic Tumor Identified
 - Entirely submit the largest tumor nodule with associated extraprostatic tissue and margins, plus the apical, bladder neck, and seminal vesicle sections (described elsewhere).
 - Alternatively, for larger tumors or per institutional protocol, submit 1 section per cm of greatest tumor dimension.
 - Sample smaller nodules if:
 - Biopsy findings (if available) show a higher Gleason pattern in an area not occupied by the dominant nodule.
 - MRI findings (if available) are discordant with biopsy findings and gross findings.
 - Smaller nodules show areas of extraprostatic extension, seminal vesical involvement, or margin involvement.
 - Submit representative uninvolved prostate parenchyma with preference given to nodular areas at the periphery of the prostate.
- Without Macroscopic Tumor
 - Method 1, complete submission of margins (**Figure 2**): Sequentially submit alternating slices entirely, starting at the slice adjacent to the apical margin, AND submit the entire margin of the remaining slices as 3 mm strips.¹¹
 - This is the recommended approach when tumor is not seen or less than the entire prostate is submitted.
 - *It is likely that the margin rims will fit in 1 cassette per slice. This method ensures all extraprostatic extension and positive margins are captured.*¹¹
 - Method 2, partial submission: entire posterior, representative anterior (**Figure 2**): Sequentially submit the entire posterior half and a representative section of mid anterior from each side.¹

Radical Prostatectomy (without macroscopic tumor, method 2, partial submission of margins)

Entire right apical margin, perpendicular: ____
Entire left apical margin, perpendicular: ____
Entire posterior prostate from apex to base: ____
Left mid anterior prostate (insert slice #): ____
Right mid anterior prostate (insert slice #): ____
Entire right bladder neck margin, perpendicular: ____
Entire left bladder neck margin, perpendicular: ____
Right vas deferens margin, shave, and right seminal vesicle base: ____
Left vas deferens margin, shave, and left seminal vesicle base: ____



Preserving Professional Judgment

Standardize the framework.
Not the thinking.

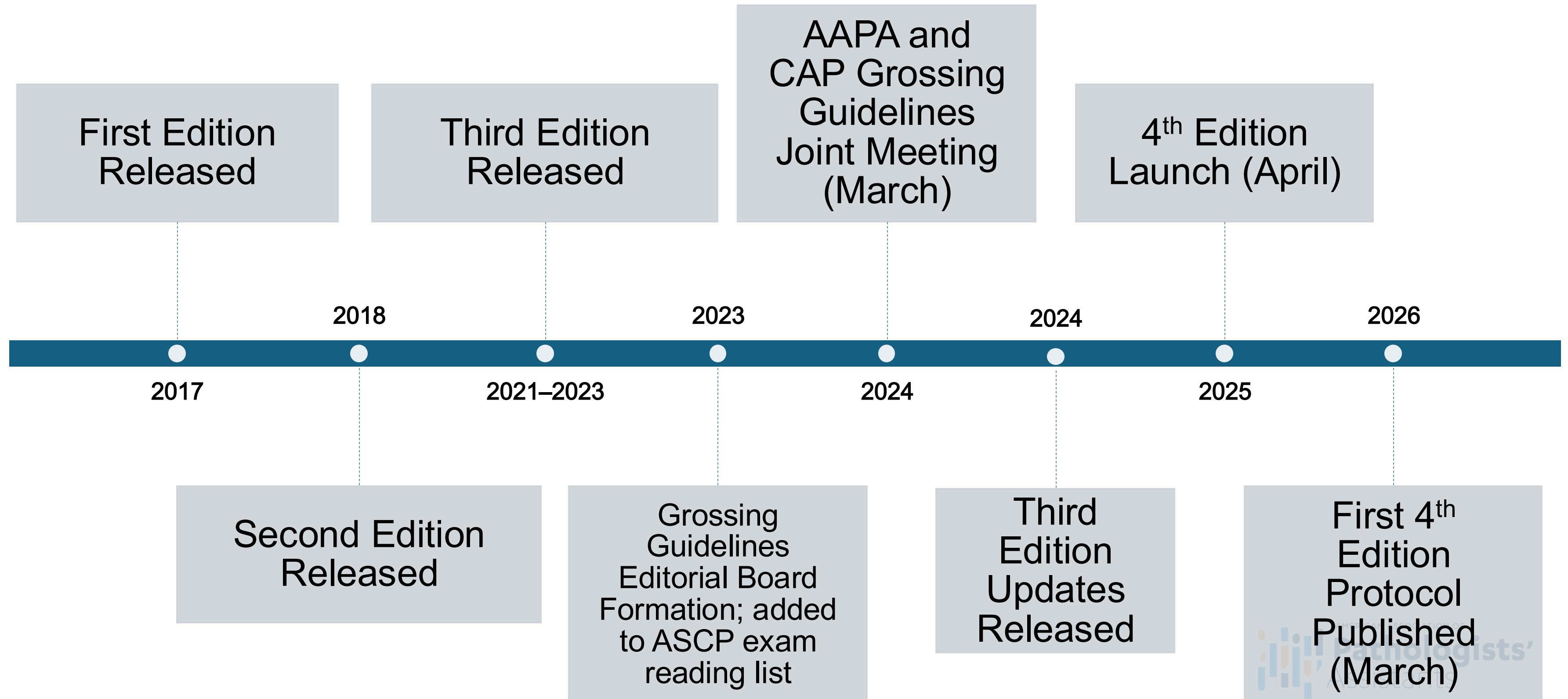


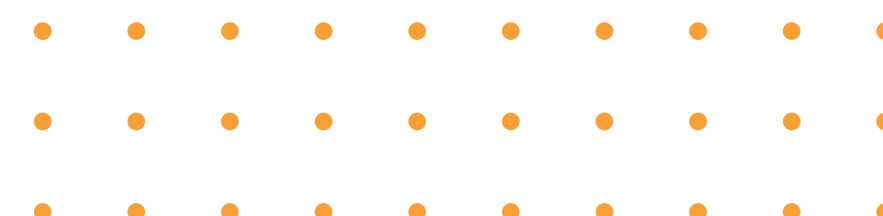


From Guidelines to Workflow



Evolution of the Grossing Guidelines





Electronic Protocols: the next evolution

Standardize

- *Evidence-based and -informed guidance*
- *Consistent data capture*

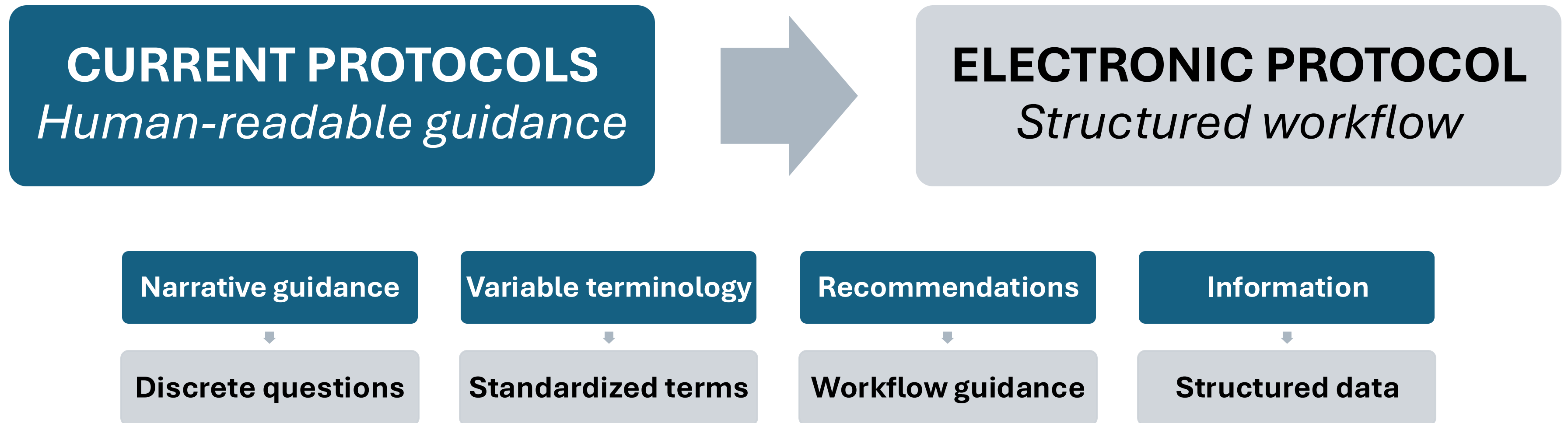
Integrate

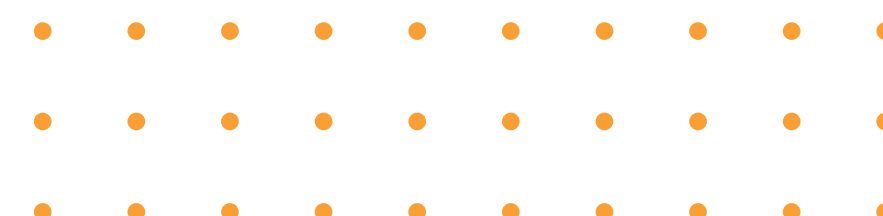
- *Guidance and data capture into the workflow*
- *Work across vendor systems*

Unlock

- *Gross exam data for downstream use*

Translating Content To Workflow





Designing for the Bench

Relevant

- Flows with grossing process
- Logic filters questions
- Required vs. optional

Supportive

- Decision guidance
- Sampling recommendations
- Ensure all required information is present in gross
- Highlight updates

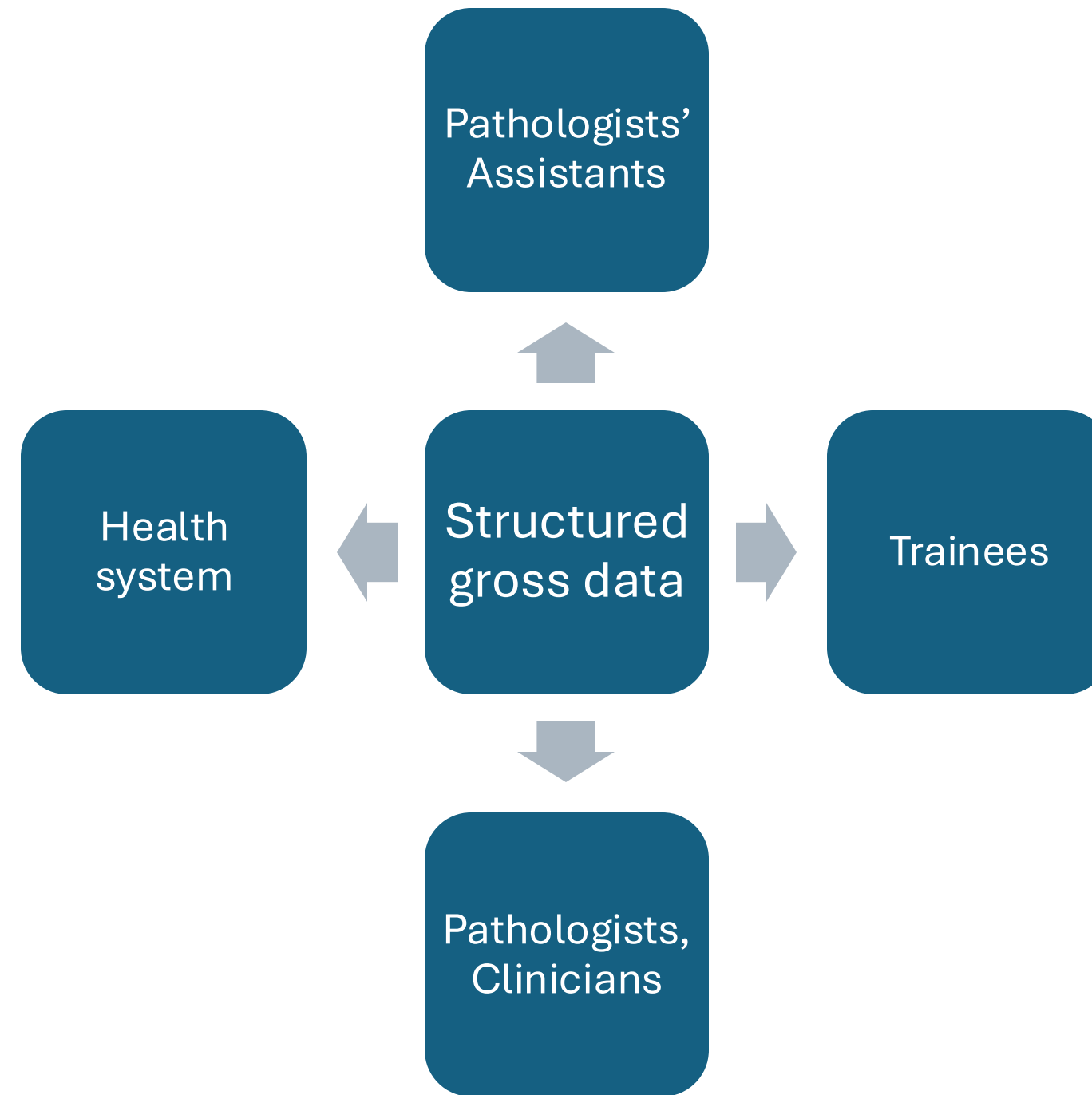
Practical

- Efficient return from interruptions
- Hands-free navigation
- Auto-advance
- Easy editing and proofing
- Flags missing information

Flexible

- Defaults for common specimens
- Customizable for outliers
- Preserves professional judgment

The Vision: One Protocol, Different Needs



The Vision: Better Information for Pathologists

Consistent

Connected

Intelligent

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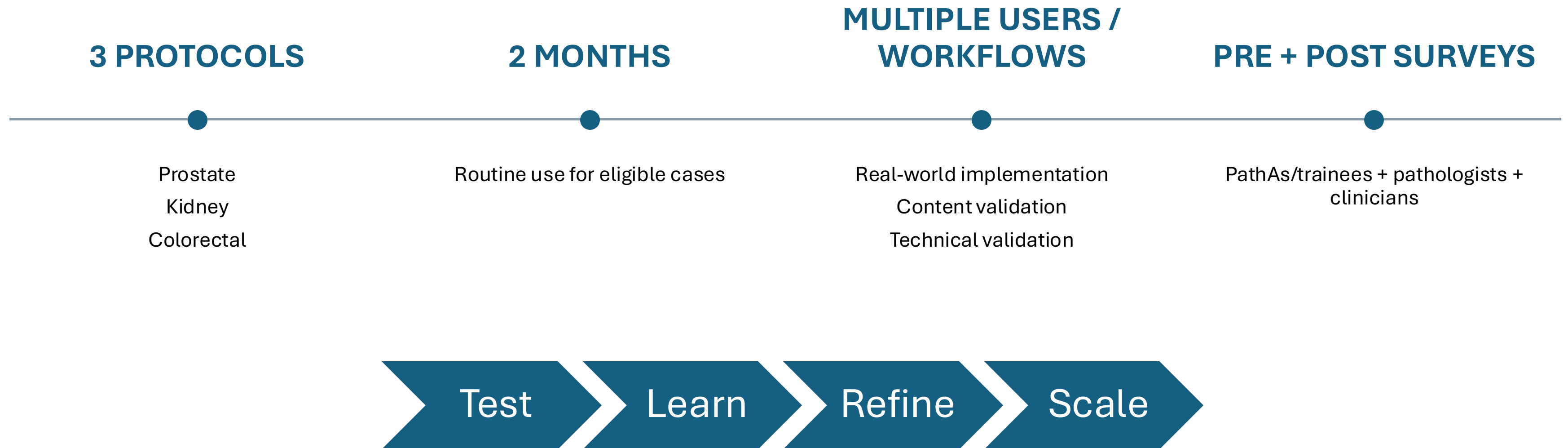
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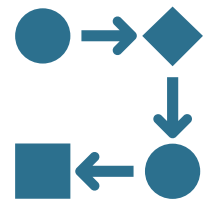
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The Structured Grossing Protocols Pilot

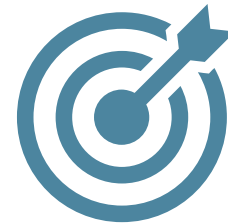


What We Hope to Learn from the Pilot



Workflow

Does it reasonably work within existing workflows?



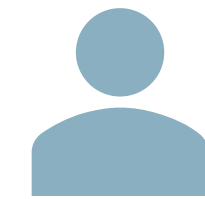
Usability

Does it provide value?



Impact

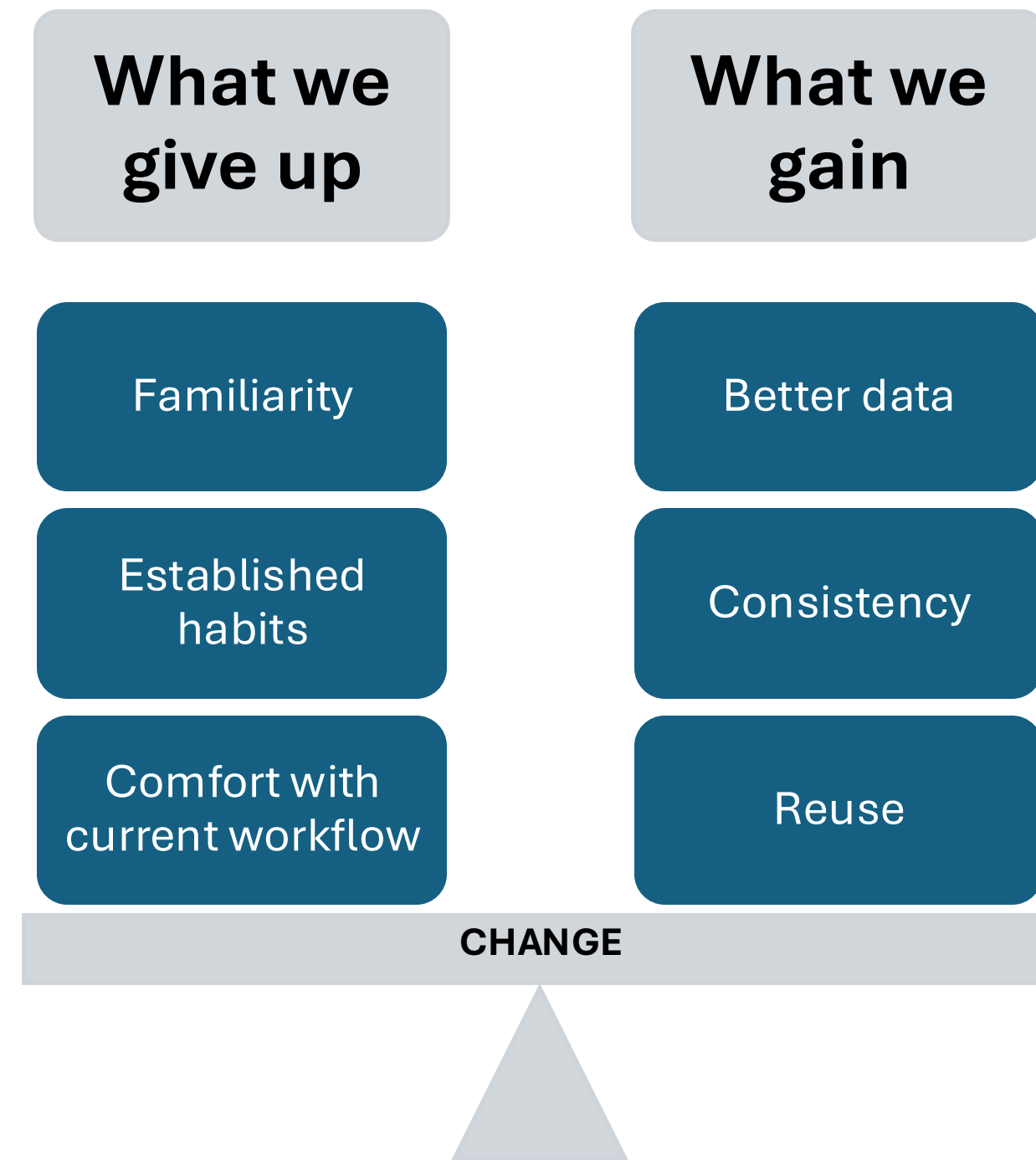
Does it improve consistency, completeness, and quality?



Implementation

What does it take to deploy across laboratories and vendors?

Adoption is About People



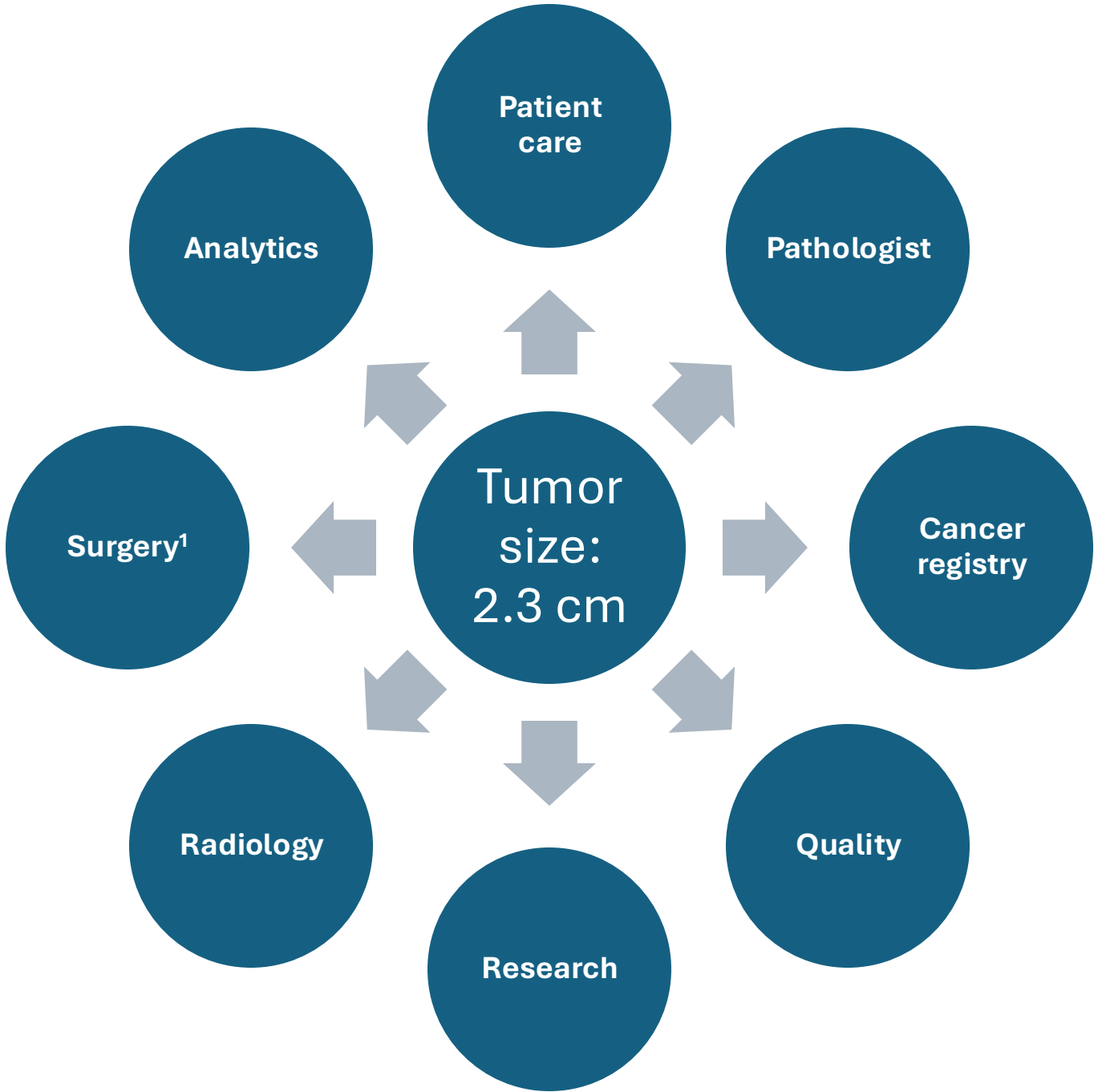
The value has to justify the change.





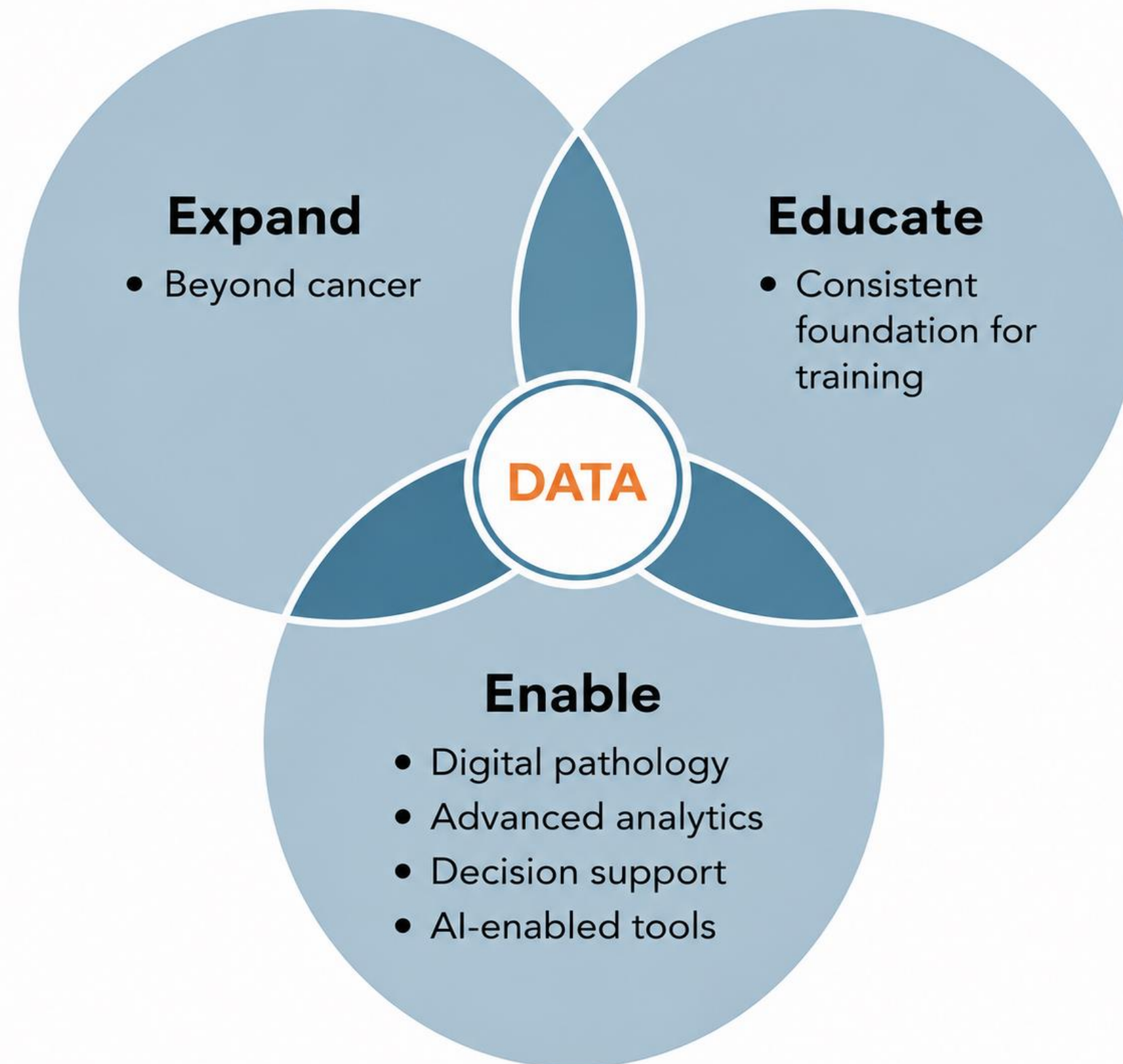
Shaping The Future

One Observation, Many Uses



¹ Bisra G, Rabel B, van der Westhuizen N. Using Pathology Synoptic Reporting Data to Create Individual Dashboards for Pathologists and Surgeons. *Arch Pathol Lab Med.* 2024;148(2):190-199. doi:10.5858/arpa.2021-0542-OA

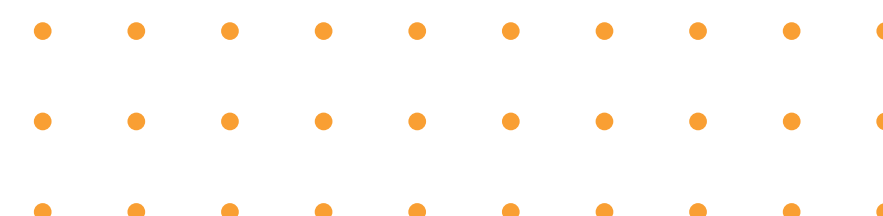
Tomorrow's Tools Depend on Today's Data



Why PathAs Must Lead



Graphic created with ChatGPT



Help Shape the Future of Grossing

Subsection Author positions

- Vagina, Cutaneous SCC, Pituitary NET, Bile Ducts (Perihilar, Intrahepatic, Distal Extrahepatic)

Editorial Board positions

- Hematologic Section Author, Molecular Author

Other

- Flow chart development, electronic protocol development

Pilot participation (future)

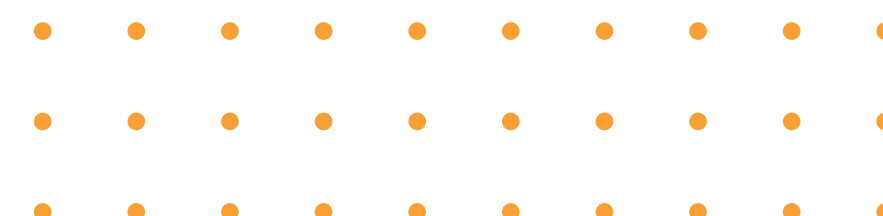
- PAs and pathologists use 3 pilot protocols

The Future Starts at the Bench

Technology isn't the goal.
Helping patients is.



Credit: Diego Vicente, MD
Surgical oncologist
Naval Medical Center San Diego



Acknowledgments

AAPA Grossing Guidelines Committee

- Editorial Board
- Subsection Authors
- Flow chart development

Collaborators & Support

- CAP staff & reviewers
- Vendors
- Survey participants
- AAPA Staff

With Special Thanks To:
Jon Wagner, Connie Thorpe,
and the AAPA Board of Trustees, *past and present*

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Thank You!

