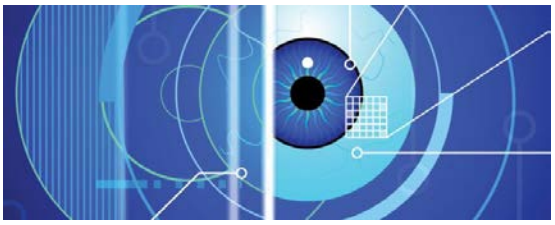

Cognition and Medical Image Perception Think Tank

Questions to Guide/Prompt Think Tank Deliberations

IDENTIFYING CRITICAL QUESTIONS IN PATHOLOGY AND RADIOLOGY FROM THE PERSPECTIVE OF PRACTICING CLINICIANS
1. What are the perceptual and/or cognitive questions that clinicians themselves want answers to? a) What are clinician (observer) tasks? (E.g., Find both low and high conspicuity targets in large, volumetric, and multiparametric datasets). b) What are the greatest image perception challenges for radiologists and pathologists? What types of solutions will have the greatest impact? c) How have efforts in computer aided detection to date aided clinical radiology and pathology practice, and how have these efforts fallen short? What can we learn from past efforts to design research related solutions that are more useful in supporting routine clinical practice?
2. What are ways to address these and other clinically-informed questions through cognitive and perceptual research?
3. How do we develop an ongoing dialog between researchers and clinicians that will generate useful research questions, going forward?
4. What is the best way to ensure that AI is developed in a broad interdisciplinary context, rather than in isolation? How can we ensure that clinical, perceptual, and cognitive perspectives are integrated into the development process, rather than treated as afterthought? 5. How do we develop and maintain dialog between computer vision (AI) and human vision (in medical imaging)?
6. What role can and should industry play in the development of research-related tools to improve clinical diagnostic accuracy and/or throughput?
7. What are the implications of the shift to 3D imaging? What do we need to know about current 3D or volumetric or multi-slice platforms that should inform future platforms?

IDENTIFY BARRIERS THAT HINDER COLLABORATIONS BETWEEN RESEARCHERS AND CLINICIANS AND IDENTIFY POTENTIAL SOLUTIONS.
8. How can we address publishing culture differences? Publishing of Medical Image Perception research in the main radiology outlets is uneven. How to remedy?
9. How should clinicians assess medical image perception research? What are the good journals? How to know when research should be a guide to practice?
10. How to facilitate networking between researchers and clinicians?
11. How can we address the pressures on clinicians, both as researchers and as research subjects, that impede medical image perception research?
PERSPECTIVES FROM ADDITIONAL AGENCIES
12. How can we develop a support network for medical image perception research that crosses institutions?
13. Different agencies have different missions. How can NIH, NSF, FDA etc. work together to facilitate medical image perception research? What is the best division of labor?
IDENTIFY WAYS TO ELEVATE MEDICAL IMAGE PERCEPTION'S PROFILE WITHIN THE MEDICAL IMAGE COMMUNITY.
14. What are essential elements of a communication plan to achieve greater visibility?
15. How can the organizational structure within radiology and pathology departments incorporate perception and cognition research? Joint appointments in radiology/pathology departments could aid in experimental design & grant writing. Would this be mutually beneficial? Feasible?
16. Cognition and perception need a presence in medical and specialist training. So, how do we go about implementing this?
17. Training and Education – how can we incorporate findings from perception and cognition into medical education? a. How does changing paradigms impact practicing physicians?
18. CME. How to get CME credit for doing some of perception/cognition studies?

PINPOINT RESOURCE NEEDS TO FACILITATE TRANSDISCIPLINARY RESEARCH.
19. Sustainability. a) How can we make infrastructure like the RSNA perception lab sustainable? b) Other venues to recruit clinicians as participants? c) How do we sustain the ongoing dialog between researchers and clinicians?
20. Technological Resources. How do we implement technological advances? a) For example, using eye tracking technology as radiologists read in a natural setting is limited because we don't have good access to the state of the stimulus (What image is in what location on the screen, now?) b) This could be solved by collaboration with industry to standardized workstations to produce an output file that tracked its use. This would generate very large data files that could be mined for meaning.
21. Promoting Medical Image Resources. Many researchers have inquired about a repository of images from different modalities. a) The Cancer Imaging Archive (TCIA) organizes and catalogs clinical and research images so that they may be used by the research community. b) National Biomedical Imaging Archive (NBIA) is an in vivo image repository.
WHAT ARE THE FUTURE GOALS AND HOW TO EVALUATE PROGRESS?
22. What do we take from this meeting, and what do we do next?
23. **If NCI holds another meeting in 2024,** how would we know whether or not the 2019 meeting had any impact?