2026324 FW-HTF-P: Teaming Transplant Professionals and Artificial Intelligence Tools to Reduce Kidney Discard - PI: Casey Canfield, Missouri S&T, canfieldci@mst.edu
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Thousands of procured kidneys are discarded each year and some represent lost opportunities to get patients off dialysis and increase lifespans. To develop an AI decision support system, we:

(1) engaged 39 transplant center, organ procurement organization, and transplant patient stakeholders to document a **transplant work system architecture** to identify opportunities and challenges for redesigning this work process [1-2]
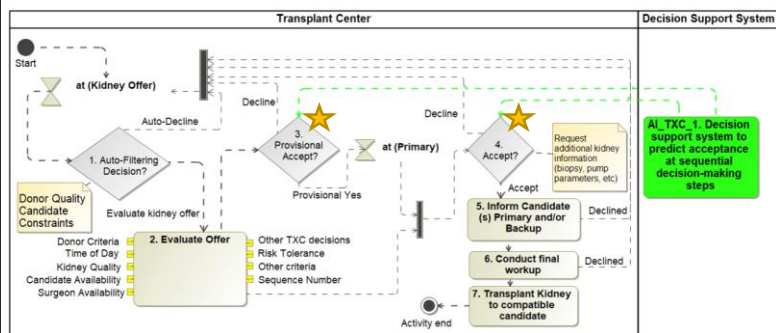

Figure 1. Activity diagram for transplant center kidney acceptance with 2 starred decision points for an AI [2]

(2) developed a **proof-of-concept deep learning model** to predict whether transplant centers will accept a particular kidney [2]
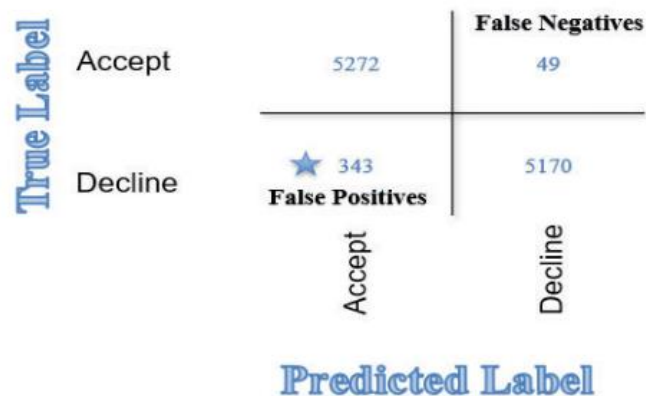

Figure 2. Confusion matrix for preliminary deep learning model with 96% accuracy predicting historical labels [2]

(3) performed **human subject experiments** to estimate how uncertain information influences risky decision-making in the context of betting on basketball games [3]
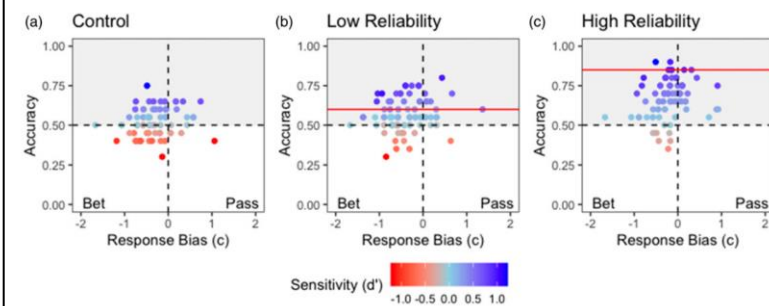

Figure 3. Accuracy increased as AI reliability increased, but there was no effect on response bias. The AI helped users determine when to not act (i.e., pass on bets) [3]

Relevant Publications: [1] Threlkeld, R., Ashiku, L., Canfield, C., Shank, D., Schnitzler, M., Lentine, K., Axelrod, D., Battineni, A. C. R., Randall, H., Dagli, C. (2021). Reducing Kidney Discard with Artificial Intelligence Decision Support: The Need for a Transdisciplinary Systems Approach. *Current Transplantation Reports*, 8, 263-271. **[2]** Ashiku, L., Threlkeld, R., Canfield, C., & Dagli, C. (2022). Identifying AI Opportunities in Donor Kidney Acceptance: Incremental Hierarchical Systems Engineering Approach. Proceedings of the *IEEE Systems Conference (SysCon)*. **[3]** Elder, H., Canfield, C., Shank, D. B., Rieger, T., & Hines, C. (2022). Knowing When to Pass: The Effect of AI Reliability in Risky Decision Contexts. *Human Factors*. **[4]** Ashiku, L., Al-Amin, M., Madria, S., & Dagli, C. (2021). Machine learning models and big data tools for evaluating kidney acceptance. *Procedia Computer Science*, 185, 177-184. **[5]** Subramanian, H. V., Canfield, C., Shank, D. B., Andrews, L., & Dagli, C. (2020) Communicating Uncertain Information from Deep Learning Models in Human Machine Teams. *Proceedings of the American Society for Engineering Management*.