

DIMACS/CCICADA Workshop on AI Powered Automation at Ports
March 30, 2026 - April 01, 2026

Initial Set of Breakout Group Themes with Sample Questions to Address

Theme I: What is different about automation in the age of AI? What are some obstacles involved in implementation of AI-powered automation in ports?

- What problems of ports might AI-powered automation solve that “ordinary” automation can’t?
- What are some of the most promising potential applications of AI-powered automation in ports?
- Why does AI-powered automation work well in some port processes/contexts and not in others?
- Is it necessary for the automation to be AI automation or is just “automation” a win in itself? Is there a path that implements automation, then migrates to the AI aspect over time?
- How can automation help in the linkages between ports and ships, trucks, trains, barges, or warehouses? For example, what is the role of autonomous trucks in carrying containers from ports to warehouses? Or the best role for robots loading bags of grain onto rail cars?
- What are the key obstacles that need to be overcome to successfully implement AI-powered automation in ports? Legal? Labor? Infrastructure needs? Technical? Safety and security?
- What makes some workers accept automation in ports more readily than others? How might this translate to acceptance of AI?
- What are some challenging engineering problems that are making it harder to make ports smarter?
- Which AI-powered automation tools for warehouses seem most likely to be useful in ports?
- Some cite stakeholder coordination in large-scale technological innovation as key to developing smart ports. What are roles of government, labor, and the private sector in achieving such coordination?
- What challenges arise for labor from the use of AI in ports? Are new training programs required? How can we prepare people to work alongside AI-powered devices in ports?

Theme II: What are some of the key optimization questions that arise in making ports smarter?

- Why are some tools of warehouse optimization not relevant for ports?
- What are the key metrics to optimize at smart ports? What are tradeoffs among goals for speed, efficiency, safety, energy use, and others? Can the use of AI make it possible to achieve most or all of these goals so they are not competing?
- What are some key multi-optimization problems for smart ports, and what are some potential approaches to them?
- What new applications of AI in ports suggest new optimization questions?
- What ROI does it take to make an AI-powered automated port practical?
- With rapidly changing conditions at ports, how can we optimize the use of tools such as digital twins that have mostly been used for static situations?
- The rapid growth of AI and automation in ports raises the possibility of decreased resilience due to a variety of new kinds of disruptions. What are appropriate definitions of resilience to use in various applications? What resilience-planning strategies can minimize the risk of disruptions from new technologies in smart ports?
- What are appropriate definitions of port capacity and how can automation be used to optimize it?
- Could optimization in ports lead to sub-optimal processes in a broader global supply chain?

Theme III: What are the special risks of increased use of AI in automation in ports and what countermeasures might mitigate impact of new kinds of disruptions?

- Are there new kinds of disruptions, such as new kinds of cyberattacks or certain kinds of physical attacks or accidents, that are more likely to have greater impact than before AI-powered automation?
- Ports are links in complex, global supply chains. Could automation risks in this component be dwarfed by other risks to port components or automation risks to other supply chain components?
- Does increased dependence on digital transactions and AI processes in ports pose a risk of a major supply chain disruption?
- What kinds of serious harm can machines that are given significant autonomy at ports cause?
- If autonomous processes in ports are disrupted, will humans still have the ability and capacity to operate a system at a comparable, or at least acceptable, level?
- Are AI-powered smart ports safer than ordinary ports?
- Do increasing collaborations between collaborative robots (cobots) and humans in ports raise safety issues for humans and what tools might enhance human safety?
- What are some of the countermeasures/mitigations for AI-powered automation in ports that will lower the risk of serious disruptions or minimize the damage from those disruptions?
- What is the role for design standards, simulation tools, digital twins, and government regulations for mitigating the impact of disruptions to AI-powered automation systems in ports?