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PART I · THE ATOMIC WORLD

AGI Unblocks Automated Goods Movement by Killing Exceptions

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An employee reads a teleautograph message in the trainmaster's office at Chicago Union Station, 1943. Coordinating rail traffic required the movement of information alongside the movement of trains.
Photograph by Jack Delano / Library of Congress.

SUMMARY

Goods movement today is fast when on the move, whether by boat, train, or truck, and bottlenecked at the handovers between modes, at ports or depots. The U.S. has made only partial moves to automate these facilities. The bottleneck within automated facilities is "the exception": machines that encounter anomalous situations, and cease operations out of an abundance of caution. Clearing the anomaly requires an accountable human to say it is safe to proceed. Exceptions are why so much of a container's journey—for rail-bound boxes, the better part of a week—is the dwell time at a handover facility. AGI can remove this bottleneck by supplying the two things the exception demands: judgment, to dismiss the false flags and clear true faults; and accountability, so the warrant to proceed no longer queues behind a person. An always-on monitor that sees everything, records everything, and can be audited and insured makes handovers at machine speed possible, and dwell times a fraction of today's.

AT THIS MOMENT, IN A CONTAINER YARD SOMEWHERE IN THE U.S., AN AUTOMATED stacking crane has stopped dead, because a container has landed an inch off where the crane expected it. Out of an abundance of caution, it has flagged a "safety exclusion zone" that includes its block-mate and both cranes in the adjacent block, all of which have also gone out of service. In some other yard, a hiccup in the router has briefly broken the wireless signal to a driverless cart that ferries containers between the stacks and a loading bay. The cart has also halted, waiting for permission to return to work. Because of incidents like these, Long Beach Container Terminal, the first fully automated container terminal in the country, suffers partial downtime of 20 minutes to an hour per incident.[1] The downtime only stops when a human being, appropriately trained, walks out, inspects the machine, and is satisfied that it is safe to proceed.

The promise of freight automation is greater efficiency. Today, the biggest bottleneck on that efficiency is human judgment. Call this pattern "the exception": the moment a machine that can do the work stops because of something anomalous, and waits for an accountable human (accountable because he or she has been trained, and whose labor is therefore expensive) to advise, it is safe to proceed. In a world where trains, container ships, and trucks are fully automated—a world that, incidentally, we don't need AGI to build—goods will move fast within modes, because exceptions while goods are in transit will be few. But even in this pre-AGI world, transit of goods *between* modes will still be slow, as it is today, when boxes change modes at human speed.

AGI will permit us to finally do handovers at machine speeds. It will give machines judgment, so that false alarms do not get flagged and work stoppages vanish. And it will also give machines accountability, so that clearing real anomalies no longer depends on a human being the one who must assume legal responsibility for it. In short, AGI is the final frontier for automating our goods-movement chain.

Today, that frontier is wide. At the Port of Los Angeles and Long Beach this July, import containers from ships bound for a truck dwelled there for just over three days. Those bound for a train dwelled more than *six*. Set against a fast trans-Pacific crossing of roughly two weeks, this means that dwell time at the port runs from a sixth to nearly a third of the overall trip to this point.[2]

This is a problem we have fitfully attempted to solve, but after two decades of attempts, port automation in the U.S. has little to show for the effort.[3] It's true that automated quay-cranes have lowered operating expenses by as much as 35 percent over the old baseline, which is a success; but operators expected productivity to rise by at least that much. Instead it has fallen, by as much as 15 percent.[4]

1 Charlie Bartlett, "The Paradoxes of Port Productivity," *The Loadstar*, December 17, 2024.

2 Pacific Merchant Shipping Association, "San Pedro Bay Ports Container Dwell Times for July 2026," August 20, 2026.

3 See Theo Notteboom, Athanasios Pallis, and Jean-Paul Rodrigue, "Automated Terminals in the United States," in *Port Economics, Management and Policy*, 2nd ed. (London: Routledge, 2026), chap. 6.6.

4 Fox Chu, Sven Gailus, Lisa Liu, and Liumin Ni, *The Future of Automated Ports* (McKinsey & Company, Travel, Transport, and Logistics Practice, November 2018).

So automation lowered the costs but increased delays, courtesy of the exception. The machines are fast when they are working, but halt whenever something anomalous happens. It's true that before the automated machines, when humans ran the equipment, anomalies happened. In many of those cases, though, the operators' experience and judgment allowed them to route around the issue, or pause to assess before continuing safely. Automated equipment lacks these qualities, so they "fail safe" and shut down to zero, taking neighboring machines with them.[5] Human experience and judgment is then deployed, as it was before, but with the particular burden of accountability for liability, which slows the process down. AGI is the key to unlocking this process, because AGI offers observation and judgment at scale.

Imagine a port, warehouse, or other depot as a panopticon, filled with cameras monitored 24/7 by AGI agents. Nothing else has changed, which means that the facility is replete with anomalies: boxes placed a few inches off mark, seals where the characters are smudged enough to suggest a discrepancy with the manifest, or a cart that briefly lost its signal. Most of the time, these anomalies are false flags, not genuine faults. The AGI agents, always looking, track and dismiss these the way a human would: they look, use their judgment, and carry on. In those instances where a true fault has emerged, the system fails safe, and the AGI agents review, ensure safe resolution, and clear them, in a fraction of the time it takes today.

One may wonder why any of this needs AGI. Can't machine vision dismiss false flags now? Surely a trained worker at a monitor could clear these, the same way that robotaxi firms have remote assistants that guide their vehicles through confusing situations.[6] And it's true, they could, but as they are accountable too, they cannot move quickly. A human signs off at the speed of his or her own judgment while the queue builds.

Conversely, with AGI observing, there is always an alert monitor, one that always sees and, crucially, never forgets. Gate imagery, equipment telemetry and the messages already flowing between parties become a continuous account of every handover. Because that account is continuous, the machine holding it can be accountable. Because its judgment and the bases for it are recorded and maintained, it can be audited. And what is audited can be insured. The warrant to proceed, liability and all, passes to the machine.

Skeptics will doubt that bringing AGI into the mix will do much good. A single incident today costs Long Beach operations minutes to an hour, but the dwell time that requires elimination lasts for days. That's because exceptions have ripple effects; because handovers are riddled with halts, everyone builds time for them into their buffers. Each truck and train that gets a handover is given a long window, handover appointments are made for days later than they could be, and cranes work conservative sequences. Each buffer insures against a stoppage, and is incurred whether or not the stoppage happens.

5 On the cascade from a single fault to a block of idled cranes, see Bartlett in footnote 15 above. For the broader pattern of unmet automation expectations, see Theo Notteboom, Athanasios Pallis, and Jean-Paul Rodrigue, "Container Terminal Automation," in *Port Economics, Management and Policy*, 2nd ed. (London: Routledge, 2026), chap. 6.6.

6 See Andrew Miller, "Waymo's Remote Assistance Isn't Scandalous," *Changing Lanes*, February 17, 2026.

Minutes of downtime become days of dwell, which means reliably eliminating the former removes the latter as well.

Reliable elimination is not guaranteed to happen on day 1 of AGI. If it arrives before 2030, it will collide with the longshore master contract, which bars fully automated terminals on the East and Gulf coasts until September of that year. (A different union operates on the West Coast, which is why Long Beach could automate at all).[7] If it arrives after, it will move slowly: the first insurer asked to underwrite a machine's sign-off will expect a risk premium commensurate with the novelty of the situation. The process will be slow to start, but will pick up speed, as every exception cleared on the record makes the next handover easier to give away.

The value of AGI to goods movement is judgment as a commodity. AGI that can watch and record, and attest to what it has understood, will set dwell numbers a fraction of today's—and the first one to do it will spur everyone else to follow. Each link in our goods-movement chain is already fast, and the day after AGI, the connections between them will be, also.

ABOUT THE AUTHOR

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7 Pacific Maritime Association, "Contract Highlights"; United States Maritime Alliance and International Longshoremen's Association, *Master Contract*, effective October 1, 2024, art. XI, § 1(b).