

# Chapter 9

## From Dashboards to Decisions: Prescriptive Agentic Supply Chain Control Towers

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### **ABSTRACT**

*Control towers have matured from descriptive dashboards into prescriptive, agentic decision systems that sense, understand, decide, act, and learn across multi-enterprise networks. By combining streaming data fabrics, digital twins, graph/causal forecasting, optimization and reinforcement learning, and multi-agent coordination, modern control towers close the loop from prediction to execution with adjustable autonomy and safety guardrails. Control towers have matured from descriptive dashboards into prescriptive, agentic decision systems that sense, understand, decide, act, and learn across multi-enterprise networks. By combining streaming data fabrics, digital twins, graph/causal forecasting, optimization and reinforcement learning, and multi-agent coordination, modern control towers close the loop from prediction to execution with adjustable autonomy and safety guardrails.*

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## 1. INTRODUCTION

Control towers have matured from descriptive dashboards into prescriptive, agentic decision systems that sense, understand, decide, act, and learn across multi-enterprise networks. By combining streaming data fabrics, digital twins, graph/causal forecasting, optimization and reinforcement learning, and multi-agent coordination, modern control towers close the loop from prediction to execution with adjustable autonomy and safety guardrails. This chapter synthesizes architecture patterns, sector use-cases (after-sales, pharma/healthcare, energy/LNG, construction logistics, public procurement), and socio-technical lessons, drawing on multi-agent systems (MAS) foundations and prescriptive analytics research. We propose a reference model, a nine-step implementation roadmap, and evidence-based metrics to scale governed autonomy while improving service, cost, resilience, and sustainability. We also identify research gaps in standardization, interoperability, longitudinal impacts on workforce and performance, and assurance at scale (Giannakis & Louis, 2016; Lau et al., 2008; Liotine, 2019; Koot et al., 2021; Patsavellas et al., 2021; Domínguez et al., 2020; Smyth et al., 2024; Handfield et al., 2020; Zhu et al., 2020; Srivastava et al., 2022).

The first generation of control towers aggregated KPIs and events into descriptive dashboards, useful for visibility but dependent on manual interpretation and slow cross-functional action. The second generation added predictive analytics (ETAs, demand, at-risk orders) and “what-if” simulation. The third generation—prescriptive, agentic control towers—integrates intelligent decisioning and execution: optimization and RL policies choose actions, multi-agent coordination negotiates across network actors, and workflows/APIs implement changes with human-in-the-loop where needed (Lau et al., 2008; Giannakis & Louis, 2016; Domínguez et al., 2020; Smyth et al., 2024; Patsavellas et al., 2021). Deployed well, these towers compress decision latency, reduce stockouts and expedites, stabilize service under disruptions, and align decisions with ESG and risk constraints (Zhu et al., 2020; Handfield et al., 2020; Koot et al., 2021; Srivastava et al., 2022).

From dashboards that simply showed yesterday's numbers to intelligent systems that continuously sense, decide, and act across complex global networks, supply-chain control towers have undergone a profound transformation. In their earliest form, control towers were essentially sophisticated reporting rooms: walls of screens, or later browser-based dashboards, displaying a consolidated view of orders, inventories, and transportation events. Their promise was visibility—the idea that if managers could see everything in one place, they could resolve problems faster and coordinate more effectively. Visibility alone was not enough, however. Over time, supply chains became more global, product life cycles shorter, customer expectations more demanding, and disruptions more frequent. Managers no longer

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