Product Requirements Document (PRD)

D365 Manufacturing Execution Bridge (MEB)

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Document Owner: PRD Agent (Dynamic 360 Agentic Journey System)
Product Manager: TBD

📋 Executive Summary

Product Vision

Eliminate the visibility gap between Dynamics 365 Supply Chain Management and shop floor operations by providing real-time, bidirectional integration that enables manufacturers to achieve true end-to-end production visibility and control.

Business Value Proposition

- **Market Opportunity:** $1-2B D365 manufacturing market with 15-20% annual growth
- **Revenue Potential:** $50M ARR within 3 years targeting 200+ manufacturing sites
- **Customer ROI:** >300% within 18 months through operational efficiency gains
- **Competitive Advantage:** Native D365 integration addressing #1 customer pain point

Key Differentiators

☑ **Native D365 Integration** - Deep API access and ecosystem benefits
☑ **Real-time Bidirectional Sync** - Eliminate data silos between ERP and shop floor
☑ **Microsoft Ecosystem Leverage** - Power Platform, Azure AI, and Fabric integration
☑ **Industry Agnostic** - Support discrete, process, and mixed-mode manufacturing
☑ **Comprehensive OEE** - Complete equipment effectiveness monitoring
☑ **Edge-to-Cloud Architecture** - Offline scenarios and hybrid deployments

Investment Requirements

Total Investment: $15-20M over 24 months
Team Size: 30-40 FTEs (development, product, sales, marketing)
Break-even: Month 18 with positive cash flow by Month 24

🎯 Product Overview

Product Name

D365 Manufacturing Execution Bridge (MEB)

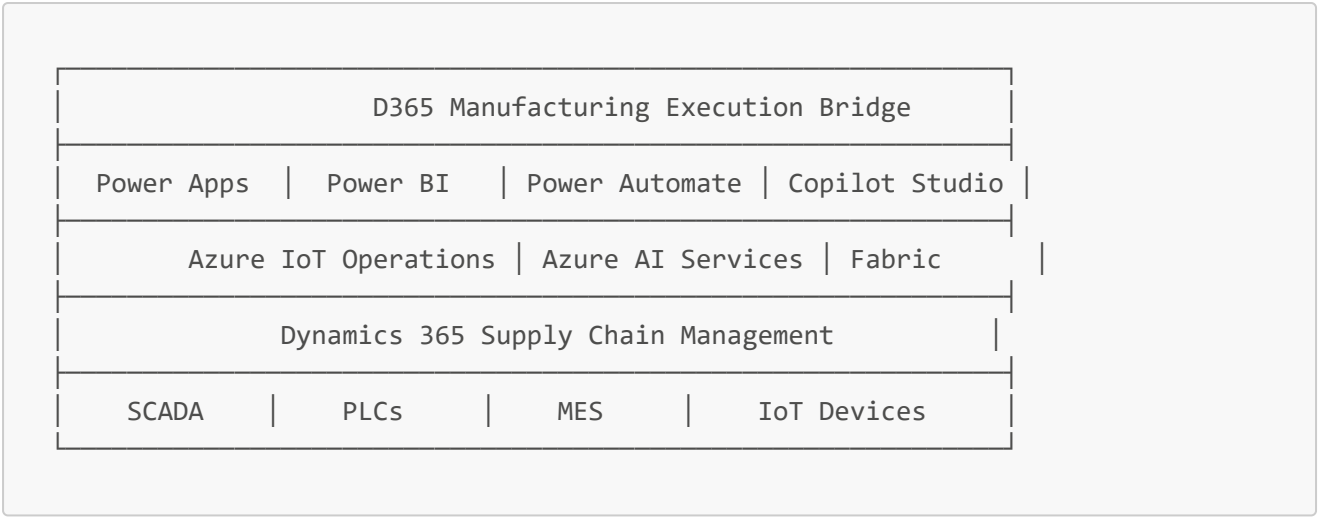
Target Market

- **Primary:** Mid-market manufacturers ($50M-$1B revenue) using D365 Supply Chain Management
- **Verticals:** Automotive, aerospace, electronics (discrete); chemicals, pharmaceuticals, food & beverage (process)
- **Geography:** North America (Phase 1), Europe (Phase 2), Asia-Pacific (Phase 3)
- **Use Cases:** Real-time shop floor integration, OEE monitoring, quality management, production visibility

Core Functionality

Module	Description	Business Impact
Real-time Data Sync	Bidirectional D365-shop floor integration	Eliminate data silos, improve accuracy
OEE Monitoring	Comprehensive equipment effectiveness tracking	10% average OEE improvement
Manufacturing Execution	Work order dispatch and completion management	15-25% labor productivity gain
Quality Integration	SPC, non-conformance, and CoA management	25% quality cost reduction
Predictive Analytics	AI-powered maintenance and optimization	Reduce unplanned downtime by 30%
Mobile Apps	Operator interfaces with offline capability	Improve operator efficiency 20%
Manufacturing Intelligence	Advanced analytics and KPI dashboards	Data-driven decision making
Multi-site Management	Centralized visibility across locations	Scale operations efficiently

Integration Architecture



📋 Functional Requirements

🟢 Must-Have Features (Phase 1)

FR-001: Real-time Production Data Synchronization

Priority: Critical
Description: Establish bidirectional, real-time data synchronization between D365 SCM and shop floor systems.

Acceptance Criteria:

- Data synchronization latency <5 seconds for production transactions
- Support for 20+ industrial communication protocols (OPC-UA, Modbus, Ethernet/IP)
- 99.9% data integrity with automatic error detection and recovery
- Configurable data mapping between shop floor and D365 data models
- Real-time production order status updates reflecting actual progress

FR-002: Overall Equipment Effectiveness (OEE) Monitoring

Priority: Critical
Description: Provide comprehensive OEE calculation, monitoring, and reporting integrated with D365.

Acceptance Criteria:

- Real-time OEE calculation (availability, performance, quality components)
- Machine-level and line-level OEE tracking with historical trending
- Downtime classification and root cause analysis integration
- OEE benchmarking against industry standards and targets
- Integration with D365 asset management for maintenance correlation

FR-003: Manufacturing Execution Workflow Management

Priority: Critical
Description: Manage complete manufacturing execution workflows from dispatch through completion.

Acceptance Criteria:

- Automated work order dispatch based on D365 production schedules
- Operator instruction delivery with visual work instructions
- Real-time material consumption tracking and inventory updates
- Labor tracking with skill-based resource allocation
- Production completion reporting with variance analysis

FR-004: Quality Management Integration

Priority: Critical
Description: Integrate in-line quality data capture with D365 quality management.

Acceptance Criteria:

- Real-time quality data collection from inline inspection equipment
- Statistical Process Control (SPC) charts with control limit monitoring
- Automatic non-conformance detection and workflow initiation
- Certificate of Analysis (CoA) generation integrated with D365 quality
- Quality trend analysis with predictive quality alerts

🟡 Should-Have Features (Phase 2)

FR-005: Mobile Manufacturing Applications

Priority: High
Description: Comprehensive mobile applications for operators, supervisors, and maintenance personnel.

Acceptance Criteria:

- Native mobile apps for iOS and Android with offline synchronization
- Operator interfaces for work order management and data entry
- Supervisor dashboards for real-time production monitoring
- Maintenance technician apps for work order and inspection management
- Barcode/QR code scanning for material traceability

FR-006: Predictive Analytics and Intelligence

Priority: High
Description: Leverage Azure AI Services for predictive maintenance and optimization.

Acceptance Criteria:

- Machine learning models for predictive maintenance scheduling
- Production capacity forecasting based on historical and real-time data
- Quality prediction using process parameter analysis
- Energy consumption optimization recommendations
- Bottleneck identification and resolution suggestions

🟡 Nice-to-Have Features (Phase 3)

FR-009: Multi-Site Manufacturing Management

Priority: Medium
Description: Support multi-site manufacturing operations with centralized reporting.

FR-010: Regulatory Compliance Management

Priority: Medium
Description: Automate regulatory compliance tracking and documentation.

Non-Functional Requirements

Category	Requirement	Target Metrics	Validation Method
Performance	Real-time data processing	<3s response, <5s latency, >10K transactions/hour	Load testing with production simulation
Scalability	Multi-tenant architecture	1-1000+ sites, linear scaling, 99.9% availability	Horizontal scaling tests
Security	Enterprise-grade security	SOC 2 Type II, 256-bit encryption, MFA support	Security audits, penetration testing
Availability	High availability system	99.9% uptime, <5min recovery, <1hr RPO	Availability monitoring, DR drills
Integration	Native D365 integration	100% API coverage, <1% failure rate, 95% protocol compatibility	Integration testing
Usability	Intuitive user interfaces	>8/10 satisfaction, <30min training, 100% mobile responsive	UX testing, training measurement
Compliance	Regulatory support	100% audit trail, e-signature support, automated reporting	Compliance audits, validation

Stakeholder Analysis

Primary Stakeholders (High Influence)

Manufacturing Operations Managers

- **Interests:** Real-time visibility, OEE improvement, quality management
- **Engagement:** User advisory boards, beta testing, success stories

IT Directors

- **Interests:** D365 integration, security, system reliability
- **Engagement:** Technical reviews, security validation, advisory committees

Executive Leadership

- **Interests:** ROI, competitive advantage, risk mitigation
- **Engagement:** Executive briefings, quarterly reviews, success metrics

Microsoft Partnership Team

- **Interests:** D365 ecosystem expansion, joint revenue growth
- **Engagement:** Strategic partnership, co-marketing, technical collaboration

Secondary Stakeholders (Medium Influence)

Shop Floor Operators

- **Interests:** Simplified processes, reliable performance
- **Engagement:** Design workshops, usability testing, training

System Integrators

- **Interests:** Implementation opportunities, technical expertise
- **Engagement:** Partner enablement, training, revenue sharing

Quality Managers

- **Interests:** Regulatory compliance, quality data integrity
- **Engagement:** Compliance validation, feature prioritization

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📊 Success Metrics & KPIs

Customer Success Metrics

Metric	Target	Measurement	Timeframe
OEE Improvement	10% average improvement	Before/after analysis	6 months post-implementation
Production Visibility	95% real-time accuracy	Data accuracy measurement	Continuous monitoring
Quality Performance	25% incident reduction	Quality incident tracking	12 months
Customer ROI	>300% within 18 months	Financial impact analysis	Quarterly assessments

Business Performance Metrics

Metric	Target	Measurement	Timeframe
ARR Growth	$50M within 3 years	Revenue tracking	Monthly/quarterly
Customer Satisfaction	NPS >70	Quarterly surveys	Quarterly
Market Share	15% of D365 SCM market	Market analysis	Annual
System Performance	99.9% availability	Uptime monitoring	Continuous

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🗓️ Product Roadmap

Phase 1: Foundation (Months 1-8)

Focus: Core Integration & Basic MES Connectivity

Key Deliverables:

- D365 SCM API integration and authentication
- Basic shop floor data synchronization (OPC-UA, Modbus)
- Fundamental OEE monitoring dashboard
- Real-time production order status updates
- Beta customer validation (3-5 pilot sites)
- Microsoft partnership establishment

Success Criteria:

- Working prototype with D365 integration
- 3 beta customers successfully deployed
- Basic OEE improvement demonstrated

Phase 2: Intelligence (Months 9-16)

Focus: Advanced Analytics & Mobile Applications

Key Deliverables:

- Advanced analytics and predictive capabilities
- Comprehensive quality management module
- Mobile manufacturing applications (iOS/Android)
- European market expansion
- System integrator channel partner program

Success Criteria:

- 25+ customer sites deployed
- Mobile apps general availability
- European market entry

Phase 3: Ecosystem (Months 17-24)

Focus: Vertical Solutions & Global Expansion

Key Deliverables:

- Industry-specific solutions (automotive, aerospace, chemicals)
- Complete Microsoft Fabric and AI Services integration
- Asia-Pacific market expansion
- Partner marketplace optimization
- Advanced manufacturing intelligence capabilities

Success Criteria:

- 200+ customer sites deployed
- $50M ARR achieved
- Global market presence established

Key Milestones

Month	Milestone	Success Metric
3	D365 API Integration Prototype	Technical proof of concept complete
6	First Beta Customer Deployment	Customer validation achieved
8	Foundation Phase Complete	Production-ready core features
12	Mobile Apps GA & European Launch	Market expansion successful
16	Advanced Analytics Release	Predictive capabilities deployed
20	Industry Vertical Solutions	Specialized solutions launched
24	Global Market Presence	Full ecosystem capabilities

💰 Business Model & Pricing

Revenue Streams

1. **Subscription Revenue:** Monthly SaaS fees per manufacturing site
2. **Professional Services:** Implementation and customization services
3. **Training & Certification:** Customer and partner education programs
4. **Premium Support:** Enhanced support contracts with SLA guarantees

Pricing Strategy

Tier	Price/Site/Month	Features	Target Customer
Basic	$2,500	Core MES integration, basic OEE	Small manufacturers, pilot sites
Professional	$5,000	Advanced analytics, quality mgmt	Mid-market manufacturers
Enterprise	$10,000	Full capabilities, predictive AI	Large manufacturers, multiple sites

Financial Projections

Investment: $15-20M over 24 months

- Development team: $8M (30-40 FTEs)
- Microsoft partnership: $2M
- Infrastructure: $1.5M
- Sales & marketing: $3M
- G&A: $1.5M

Revenue Projections:

- Year 1: $5M ARR (25 sites)
- Year 2: $20M ARR (100 sites)
- Year 3: $50M ARR (200+ sites)

Break-even: Month 18 with positive cash flow by Month 24

⚠ Risk Assessment & Mitigation

Technical Risks

Risk	Probability	Impact	Mitigation Strategy
D365 API limitations/changes	Medium	High	Close Microsoft partnership, early API access
Shop floor integration complexity	High	Medium	Phased approach, standard protocols
Performance/scalability challenges	Medium	Medium	Cloud-native architecture, load testing

Market Risks

Risk	Probability	Impact	Mitigation Strategy
Microsoft competing solution	Medium	High	Strategic partnership positioning
Economic downturn	Low	High	ROI-focused value prop, flexible pricing
Slower customer adoption	Medium	Medium	Change management support

Business Risks

Risk	Probability	Impact	Mitigation Strategy
Competitive response	High	Medium	Native D365 advantage, innovation focus
Talent acquisition challenges	Medium	Medium	Competitive compensation, remote work
Partnership dependency	Medium	High	Diversified channel strategy

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☑ Validation Checklist

Market Validation

- ☑ **Research Confirmation:** MES integration identified as #1 priority
- ☑ **Customer Demand:** High demand validated across target segments
- ☑ **Market Size:** $1-2B addressable market confirmed
- ☑ **Competitive Gap:** Limited native D365 MES solutions identified

Technical Feasibility

- ☑ **D365 API Capabilities:** Core integration requirements validated
- ☑ **Architecture Patterns:** Real-time, event-driven design confirmed
- ☑ **Microsoft Ecosystem:** Power Platform and Azure integration verified
- ☑ **Performance Requirements:** Scalability and reliability achievable

Business Case Validation

- ☑ **Financial Projections:** $50M ARR and customer ROI >300% validated
- ☑ **Investment Requirements:** $15-20M total investment justified
- ☑ **Go-to-Market:** Microsoft partnership and channel strategy confirmed
- ☑ **Competitive Positioning:** Native integration advantage sustainable

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🚀 Next Steps

Immediate Actions (Next 30 Days)

1. **Technical Planning Phase:** Transition to Technical Planning Agent for detailed architecture
2. **Microsoft Partnership:** Initiate formal partnership discussions and API access
3. **Team Formation:** Begin recruitment for core development team
4. **Customer Validation:** Conduct detailed interviews with 10+ target customers
5. **Competitive Analysis:** Deep dive analysis of existing MES solutions

Phase 1 Preparation (Next 90 Days)

1. **Technical Architecture:** Complete system design and technology stack finalization
2. **Development Setup:** Establish development environment and CI/CD pipeline
3. **Partnership Agreements:** Finalize Microsoft partnership and channel agreements
4. **Beta Customer Recruitment:** Secure 3-5 pilot customers for initial deployment
5. **Funding Secured:** Complete Series A funding round for development investment

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Document Status: ☑ Complete and Ready for Technical Planning Phase
Next Agent: Technical Planning Agent for detailed implementation roadmap
Approval Required: Executive team and Microsoft partnership validation

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This PRD provides the comprehensive foundation for developing the D365 Manufacturing Execution Bridge, addressing the critical market need for seamless shop floor integration with Microsoft's manufacturing ecosystem.