Tulip Snapshot

OVERVIEW

- **Founded:** 2014, Spin-Out from MIT
- **Employees:** ~50
- **Offices:** Somerville, London

INDUSTRIES

- PHARMA
- APPAREL
- A&D
- AUTOMOTIVE
- HEAVY INDUSTRY
- ELECTRONICS
- MEDICAL DEVICES

COVERAGE

- THE WALL STREET JOURNAL
- CIO JOURNAL
- AutomationWorld
- TechCrunch
- The Boston Globe
- 451 Research
- Microsoft
- BOSCH
- KOLVER
- DMC
- DATALOGIC

AWARDS

- Technology Pioneers
- Gartner Cool Vendor 2017
- IDC Innovator 2017
- Frost & Sullivan
- DEX

SELECTED PARTNERS

- BCG
- Infosys
- McKinsey & Company
- TRIMECH
- JURAN
- DMDII
- AWS
- BOSCH
- KOLVER
- DMC
- DATALOGIC

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PHARMA 4.0 PROMISE

- Complete removal of paper
- Continuous Verification
- Performance based controls
- Digitized quality tools (Quality 4.0) – enabler quality to keep up with manufacturing digitization
- Data Integrity, Process Maps, Process Data Maps
- Critical thinking enabler
- Integrated planning and training
- Preventative and predictive maintenance
- Smart environment monitoring
PHARMA 4.0 REALITY

- Very few flexible products available
- Huge costs for anything handling GxP data
- Pharma software incumbents have a top down approach.
- New technologies slow to become available for pharma.
- Often machine/software suppliers look to ‘lock’ companies into their eco-system.
- Integrations between machines and systems very expensive and hard to validate
So Far Existing Manufacturing Software Hasn’t Delivered

Hard/Impossible to use by operators and supervisors

Complex and expensive to implement, deploy, and maintain

All-or-nothing, high risk implementation approach

Lock in to predefined workflow / processes. Software is D.O.A

Inefficient process: IT doesn’t understand OT problems
Our Platform Consists of Three Components

MANUFACTURING APP BUILDER

SELF-SERVICE
Add logic to your apps without writing any code

PLUG AND PLAY IOT
Easily connect all your devices to Tulip.

SHOP-FLOOR IOT

MANUFACTURING ANALYTICS

ACTIONABLE INSIGHTS
Measure and monitor actionable data through visual analytics.
Tulip is Used to Augment & Optimize Human-Centric Processes

SHOP-FLOOR PROCESS

CLOUD MANUFACTURING APP

REAL-TIME PRODUCTION DATA

✓ SAAS DELIVERY
✓ SELF-SERVICE
✓ RAPID TIME TO VALUE

Process Optimization
**Tulip Drives Numerous Shop-Floor Use Cases**

**VISUAL WORK INSTRUCTIONS**
Guide operators through standard work

**TRAINING**
Simplify and continuously improve your training procedures

**AUDIT & QUALITY**
Replace paper forms with IoT-enabled apps

**MACHINE MONITORING/MAINTENANCE**
Real-time visibility into every machine

**JOB TRACKING & VISIBILITY**
Gain visibility into shop-floor KPIs

**DIGITAL LEAN**
Power digital lean tools and dashboards
Getting Started
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GxP Compliance

Factorytalk Partnership

Deployment Topologies / Options

Example Timeline of a GxP Deployment

Initial Deployment Details + Success Criteria
## Regulatory Environments (QMS + Validation)

- Quality Management System Required for all Pharma and med device customers
- Engaged with Life Sciences consultants for QMS implementation. Tulip company training ongoing.
- Target go-live Q1’19
- ISO 9001, ITAR, AS9100 next...

### Audit Trails

### App Approvals: Pharma / Med Device / Aero Requirement
Partnership / consultants in place to help our clients deploy a GxP compliant Tulip Platform.

Full turnkey implementation services (Design/config/Test/Training/Support)

- GxP Project Management
- Technical Specialists
- Compliance Consultants
- Full Validation Lifecycle
Deployment Topologies

Current Options

Cloud

On Premise

Private Cloud

Future Options

Hybrid

Tulip Appliance / VM

Tulip Cloud

Tulip VM on Pvt Cloud

Tulip Cloud

Tulip Appliance / VM
## Example Timeline

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<td>Leverage analytics engine to begin building business case</td>
<td>Identify new use cases / facilities</td>
<td>Expansion contract review / MSA finalized</td>
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### PROCESS DETAILS

**1 month**
- Define Use Cases (URS)
- Introduce FT team
- Define Initial Deployment
- Introduce C-team member
- Vendor Registration
- Contract Review

**2 months**
- Deploy initial stations
- Provide Training
- IoT Device Integrations Delivered
- System Integrations initiated

**1-3 months**
- Leverage analytics engine to begin building business case
- FT fully engaged
- GxP Project Management
- Evolve applications

**3-6 months**
- Evolve applications
- Complete system integrations
- Identify new use cases / facilities
- Site licensing

**>1 year**
- Expansion contract review / MSA finalized
- Identify new use cases/facilities
- Site licensing
Initial Deployment Details

Type of Deployment
- Cloud
- On-Prem

Use Case
- Work Instructions (Productivity, Inline quality)
- Paperless Initiative (Quality/Audit)
- Process Visibility

Who makes up the team?
- On-site Lead
- Procurement / Supplier Relationships
- MES Lead
- IT
- Electrician
- Ops
- Legal
- Quality and Validation
Initial Deployment Details

Number of stations
- Initial deploys range from 5-10 stations (5 minimum)
- Work with the client to determine the initial deployment
  - Ex: 4 assembly stations, 1 roaming tablet, 1 analytics station

What type of equipment will be needed?
- Tulip Hardware
- 3rd Party hardware
- Networking

Key dates
- Kickoff
- Training
- Deploy Stations
- Weekly standing meetings w/ C-team
Initial Deployment Details - Building the Business Case

- **Tangible benefit examples**
  - FPY / Productivity
  - Rework reduction
  - Defect reduction
  - OEE

- **Intangible benefit examples**
  - Reducing training time
  - Metric visibility
  - Data driven decisions
  - Root cause analysis done faster
  - Reduction of data transcript time from the data collection endpoints, transcript and analytics creation
  - Real time information available.
  - Training, control, and people performance follow up.
  - Friendly and flexible interface configurable as needed and desired

- Digital Andons (alarms on variables that affect quality)
- Electronic Poka Yoke in order to enhance standardized work
- Historic data available to identify complicated stages during set up (Analytics)
- Paperless operations
- Eliminating transcript time
- Eliminating manual time studies