

Tulip Overview

Pharma 4.0

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

TC TechCrunch

The
Boston
Globe

451 Research

AWARDS



SELECTED PARTNERS



COVERAGE

THE WALL STREET JOURNAL.
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AWARDS



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

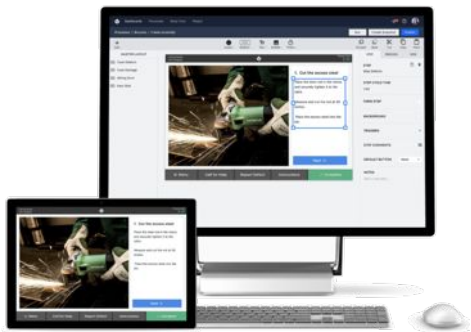


Inefficient process: IT doesn't understand OT problems

Manufacturing Software, Reimagined

Our Platform Consists of Three Components

MANUFACTURING APP BUILDER



SELF-SERVICE



Add logic to your apps without writing any code

SHOP-FLOOR IOT

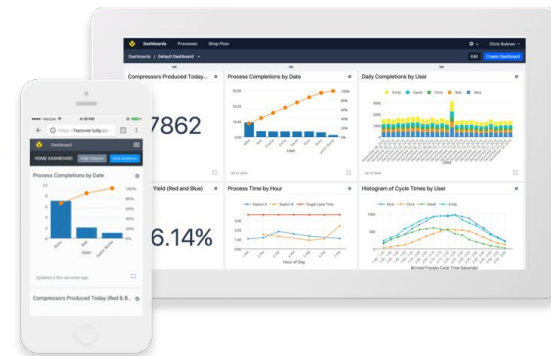


PLUG AND PLAY IOT



Easily connect all your devices to Tulip.

MANUFACTURING ANALYTICS



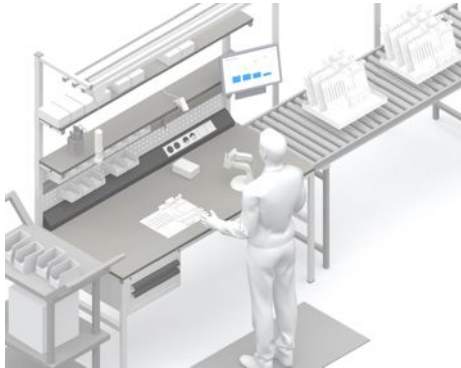
ACTIONABLE INSIGHTS



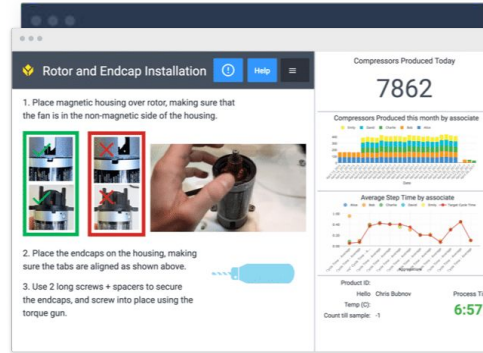
Measure and monitor actionable data through visual analytics.

Tulip is Used to Augment & Optimize Human-Centric Processes

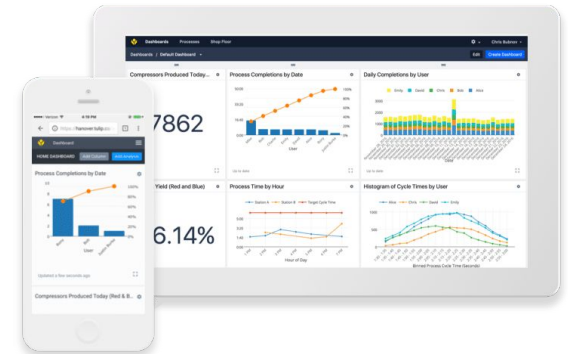
SHOP-FLOOR PROCESS



CLOUD
MANUFACTURING
APP



REAL-TIME
PRODUCTION
DATA



PROCESS
OPTIMIZATION

✓ SAAS DELIVERY

✓ SELF-SERVICE

✓ RAPID TIME TO VALUE

Tulip Drives Numerous Shop-Floor Use Cases



VISUAL WORK INSTRUCTIONS



Guide operators through standard work



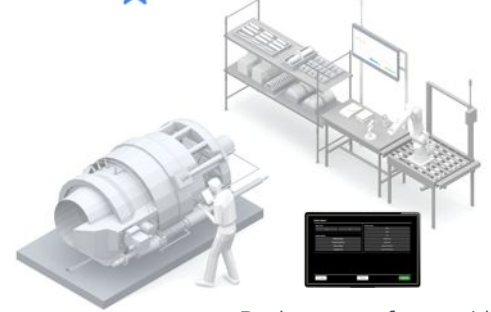
TRAINING



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



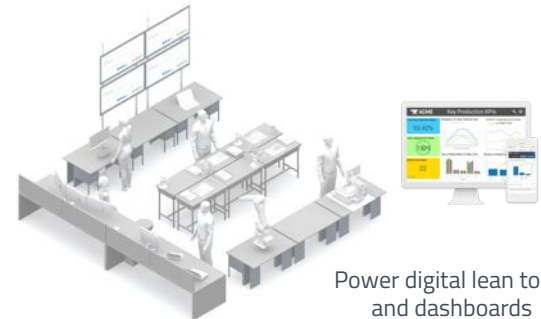
JOB TRACKING & VISIBILITY



Gain visibility into shop-floor KPIs



DIGITAL LEAN



Power digital lean tools and dashboards

Getting Started

Table of Contents

GxP Compliance

Factorytalk Partnership

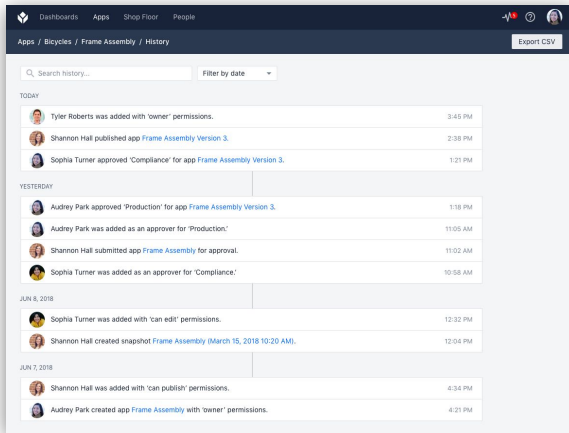
Deployment Topologies / Options

Example Timeline of a GxP Deployment

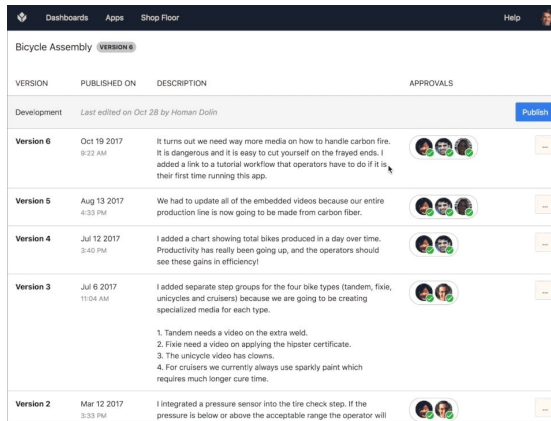
Initial Deployment Details + Success Criteria

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...

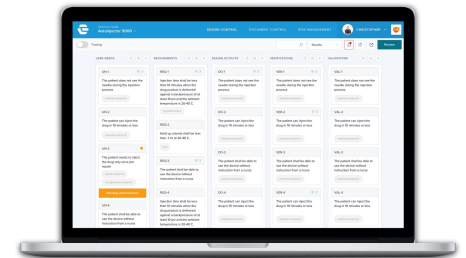


Audit Trails



App Approvals: Pharma / Med Device / Aero Requirement

Factorytalk+



Factorytalk+

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



Tulip Cloud



On Premise



Tulip Appliance / VM

Private Cloud



Tulip VM on Pvt Cloud



Future Options

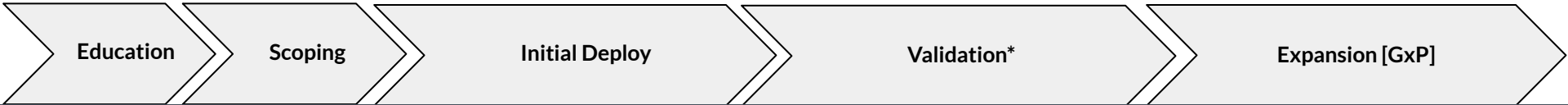
Hybrid



Tulip Cloud



Example Timeline



PROCESS DETAILS

Demos	Define Use Cases (URS)	Deploy initial stations	FT fully engaged	Tulip deployed into GxP environment
Onsite Visit	Introduce FT team	Provide Training	GxP Project Management	Evolve applications
Identifying Stakeholders	Define Initial Deployment	IoT Device Integrations Delivered	Evolve applications	Identify new use cases/facilities
Security Discussions	Introduce C-team member	System Integrations initiated	Complete system integrations	Site licensing
Engagement Model Review	Vendor Registration Contract Review	Leverage analytics engine to begin building business case	Identify new use cases / facilities Expansion contract review / MSA finalized	

TIME

1 month	2 months	1-3 months	3-6 months	>1 year
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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