Connecting the Digital-Thread:

The Right Data to the Right Place at the Right Time

Anark Corporation

September 19, 2017

Presentation Agenda

- **Anark Overview**
- **Digital Thread and 3D Model-Based Enterprise**
  - **Basic Definitions**
  - **Industry Challenges & Opportunities**
  - **Solutions, Performance Benefits, ROI**
- **3D PDF & HTML Capability Overview**
- **Cloud & Web Based Digital Content & Active Collaboration**
- **Technology Demonstration & Deployment Q&A**
- **Conclusions**

Anark Corporation Overview

Global Product Data Interoperability Summit | **2017**

Leading provider of visual collaboration software and solutions to industry leaders since 2000

Empowering Model Based Enterprise & Digital Thread revolutions within Aerospace, Defense, Automotive, Energy, Industrial, Electronics, and Medical Equipment Sectors

Most capable, production-proven **automated data transformation and publishing platform** on market today.

Growing, profitable company, with world-wide network of technology, integration, and channel partners

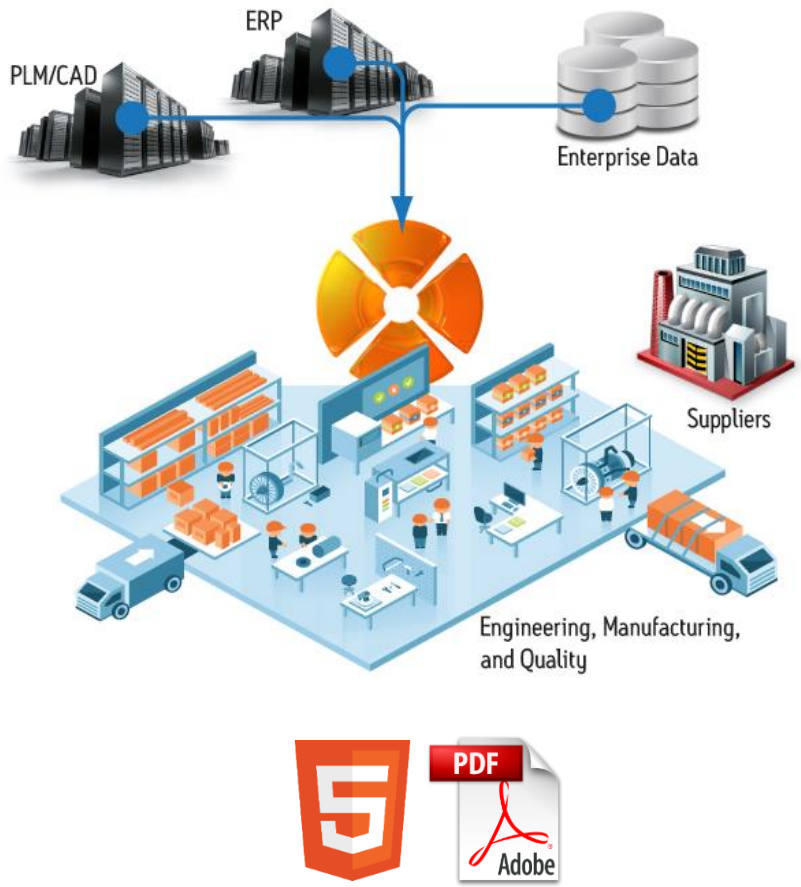
Anark Corporation HQ in Boulder, Colorado

Employees, Dev & Integration Partners in multiple locations in North America and India

Anark Core & MBEWeb – Connecting the Digital Thread

Anark enables global manufacturing companies to complete the Digital Thread, by delivering the right information to the right place at the right time:

- Enables PLM and CAD users to easily transform critical CAD, PLM & ERP data into powerful, role-and-use-case-specific 3D PDF documents and HTML5 web content that can be consumed on virtually any device.
- Empowers knowledge workers along the Digital-Thread to communicate and collaborate more effectively and securely throughout engineering, manufacturing, supply-chain and field service operations.
- Supports powerful model-based (MBE) process change, yielding higher quality products, accelerated release cycles, and reduced scrap and material waste, netting substantial cost savings for OEMs and their suppliers.



Industry Dynamics & Opportunities

- Manufacturers under increasing pressure **to improve quality, reduce waste, comply with regulations and satisfy customer demands**
- Innovators are embracing **automated digital processes for efficient data-sharing and collaboration throughout the enterprise and supply chain** is essential to establish & retain competitive edge
- OEMs and suppliers increasingly pursuing, highly effective **approach that permeates traditionally siloed functional perspectives to deliver a connected, visually collaborative Digital Thread across the extended enterprise.**
- **Rise of emerging technologies and processes**, such as **cloud, big data, mobile and the internet of things** are enabling manufacturers to **realize their Digital Thread objectives more efficiently and cost effectively.**
- Forward-thinking companies are realizing **truly remarkable return on investment** - **Coming to market faster with higher-quality products at substantially reduced costs** throughout **engineering, manufacturing, supply-chain** and **field-service** operations

What is the Digital Thread?

The ***digital thread*** refers to the **communication framework that allows a connected data flow and integrated view of the asset's data throughout its lifecycle across traditionally siloed functional perspectives**. The digital thread concept raises the bar for delivering "the right information to the right place at the right time."

The ***digital thread*** should provide a formal framework for controlled interplay of authoritative technical and as-built data with the ability to access, integrate, transform, and analyze data from disparate systems throughout the product lifecycle into actionable information. The product lifecycle includes**: Design, Procurement, Test & Evaluation, Production, Field Operation, and Sustainment Services**.

--Industry Week

What are MBD & MBE?

- ## 3D MBD/PMI – Model Based Definition

  3D engineering Product Definition <u>defined using</u> 3D CAD Tools

  3D model-based dimensions, tolerances, annotations, views

- ## 3D MBE – Model Based Enterprise

  Reuse of 3D MBD <u>outside</u> of 3D CAD systems

  3D model-based drawings, TDPs, inspection documents, RFQ's, manufacturing process

"A fully integrated and collaborative environment founded on 3D product definition detailed and shared across the enterprise; to enable rapid, seamless, and affordable deployment of products from concept to disposal."
– Model-Based-Enterprise.org

Why Digital Thread & Model Based Process?

Global Product Data Interoperability Summit | **2017**

***Sources**: Benchmark & research studies presented by LNS Research, US Navy Naval Air Command, and National Institute of Standards & Technology (NIST)*

Transform and Publish Technical Content for the Extended Enterprise

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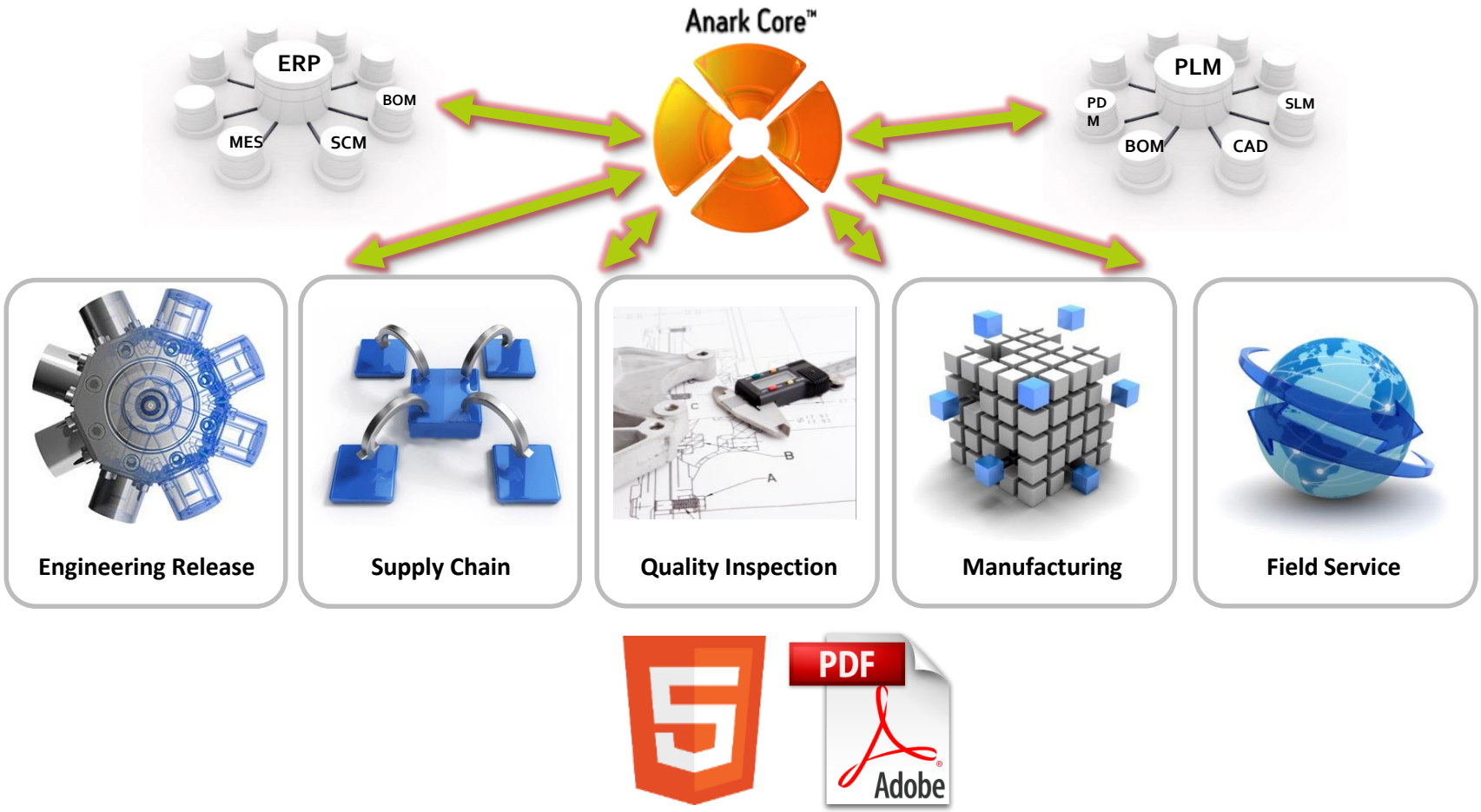


Anark MBEWeb: Digital Thread Across the Extended Enterprise

Visual Collaboration and IIOT for the Knowledge Worker

- Allows siloed knowledge workers across the extended enterprise to communicate and collaborate with fit-for-purpose, authoritative technical web content from any device.
- Publish content with Anark Core into MBEWeb with up-to-date content derived from PLM, ERP, and other critical data sources.
- Built with scalable cloud technologies that can be installed on-premise, with access control established from PLM, ERP, or independently from MBEWeb, insuring the protection of authoritative technical content.

Product & Content Demonstrations

URL and QR Code for Accessing MBEWeb Demo

https://goo.gl/LRmmSX

Username	anarksales
Password	ANARsales!

3D PDF & HTML5 – Ideal Formats for Data Sharing & Collaboration

3D PDF Capabilities:

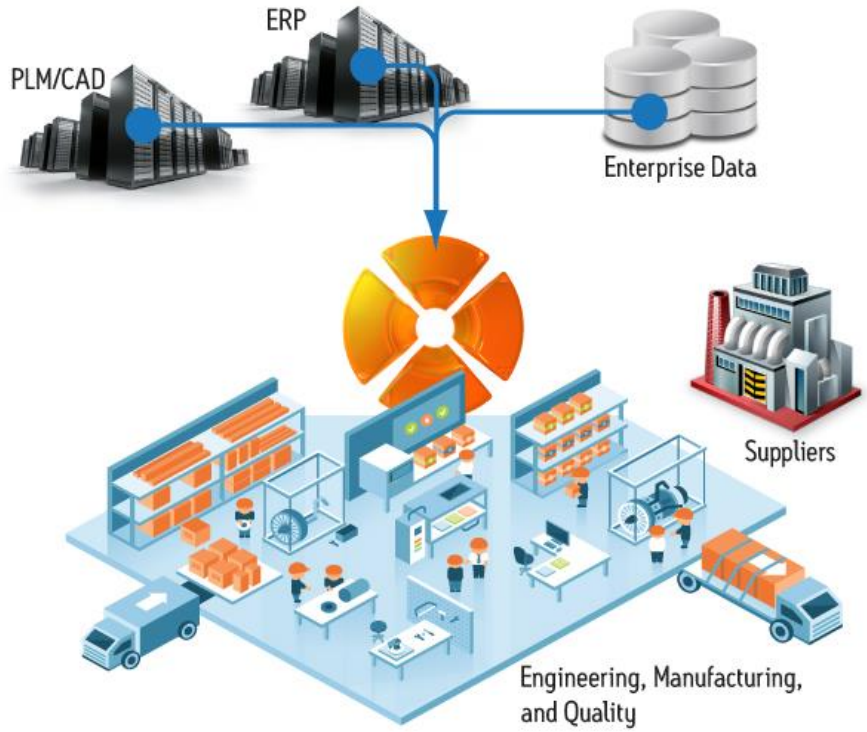
- ISO Standard & free to consume using ubiquitous Adobe Reader
- Can serve as contractually binding document
- Well suited to complex use-cases where data from multiple enterprise sources is required for template-based publishing
- Security of the PDF Container
- Involves certain limitations inherent in the PDF standard and Adobe Reader
- Limited to windows-based mobile devices
- Struggles with extremely large files--impeding collaboration and sharing

HTML5 Capabilities:

- Universally available W3C standard plus WebGL for 3D content enables unfettered data consumption
- Extremely well suited to complex use-cases where data from multiple enterprise sources is required for template-based publishing
- Available on virtually all devices
- Virtually limitation free, supporting more advanced MBE/Digital Thread needs
- Allows content to be streamed, eliminating most file size issues

Keys to a Successful, MBE-Enabled Digital-Thread

1. Ability to access, combine and share critical engineering, manufacturing, and operational data
2. Support for multiple data types – multi-CAD (with PMI), as well as **2D drawings**, and **tabular data** such as **parts lists, notes, product requirements**, and **field service** data
3. Flexible, template driven publishing with open-standard formats (**3D PDF & HTML5 with WebGL**)
4. **Fit-for-purpose content available for desktop, web, and mobile users** for all supported use cases
5. Effective and flexible collaboration – commenting, markup, measurement, “conversations”
6. Server-based **automatic document generation & regeneration** based on source data changes
7. Commitment to **culture & process change**



Q&A

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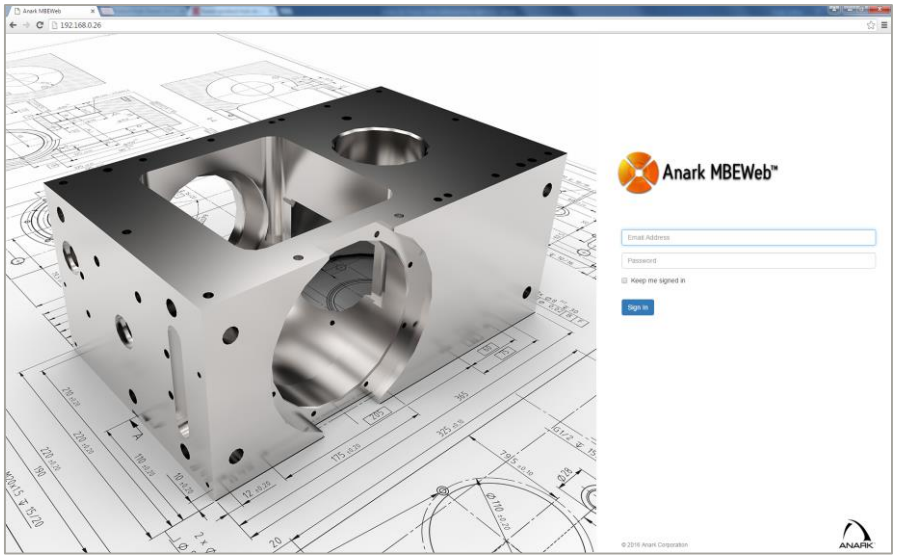
MBEWeb Benefits Over PLM, Custom Portals, SharePoint



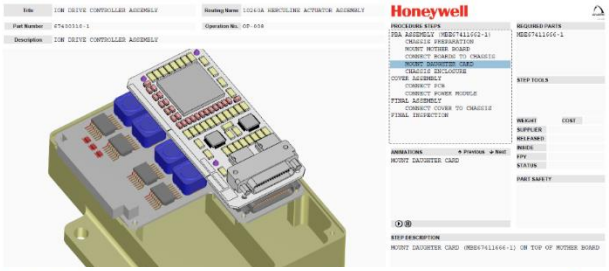
- **Inexpensive compared to PLM licenses**. Allows the system to be used widely across the extended enterprise.
- **Easy to deploy, easy to use system** does not require specialized user training often required for PLM software. Reduced IT and user support costs.
- **Role-and-use-case-specific content** can be published instead of hunt and peck for documents in PLM systems. More efficient access to critical data.
- **Content can be accessed from virtually any device**, anywhere in the enterprise: supply chain, manufacturing, customers. Allows flexibility with paperless access.
- **Integrated content-centric collaboration** supports critical technical conversations within the extended enterprise. More efficient than email-based collaboration.

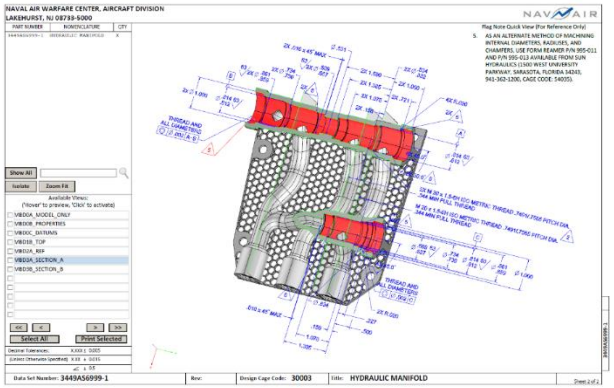
Anark Platform Overview

- Automated, easy to deploy, enterprise software that enables manufacturers to leverage valuable engineering design data and manufacturing information to deliver down-stream “fit-for-purpose” documents and content.

- Anark Core publishes accurate, high fidelity **3D PDF** and **3D HTML5** engineering release and manufacturing process content from virtually any CAD, PLM, or ERP data source.

- **Anark MBEWeb**—Cloud-based software that hosts template-driven, technical HTML5 content inside the firewall for all supported downstream use cases, with search and collaboration capabilities for knowledge workers throughout the extended enterprise.





3D MBE Process Benefits

	Performance Benefits	MBE Contributors to Savings
1	**Easier to Accurately Interpret Information**	• Accelerates execution of process steps and overall pace of assembly. • Eliminates costly errors caused by misinterpretation.
2	**50% Reduction in Tooling Design & Fabrication Costs**	• There is no need to remodel the original design (typically from 2D Drawings) around which the Tooling/fabrication processes will be designed • 'Original engineering design intent' is more easily and quickly understood by the tooling designer
3	**30% Reduction in Overall Assembly Time**	• Complete Assembly process can all be seen within 1 - 3D PDF MBE document. • The exact assembly process, animated in 3D leaves less room for shop floor confusion or delays
4	**20% Reduction in Manufacturing and Supplier Scrap and Rework**	• Manufacturing and Supplier process documents automatically updated when an Engineering change or new version occurs • Both Manufacturing and Quality gain a much clearer idea of the Engineering Designers Key Characteristics, Important Assembly Datums and Sequence

***Source**: US Dept. of Defense, Analyst reports & studies presented at conferences*