

Moving CAD Data to Specialized Applications

Building a new type of modeling kernel



Presenters Bio

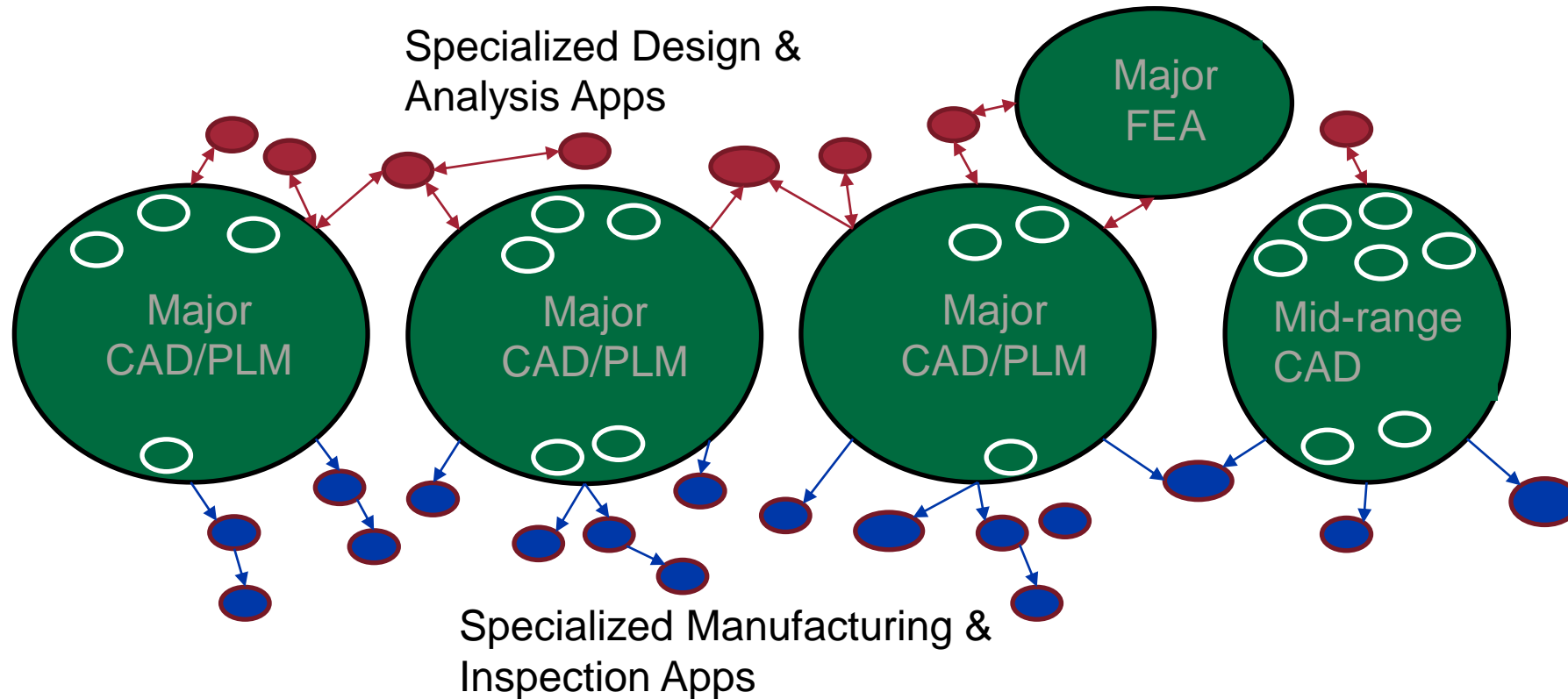
Global Product Data Interoperability Summit | 2022

John Wright McCullough

- GM Marketing, Kubotek Kosmos
- BSME, started in PC-CAD in the DOS era
- Baystate Tech - Software Developer
- CADKEY – Reseller Channel Management
- Kubotek – Product Management
- Onshape – Quality Assurance

CAD/PLM & Specialized Applications

Global Product Data Interoperability Summit | 2022



Data Needs to Move

Global Product Data Interoperability Summit | 2022

- **Special algorithms use unique data types or extents**
 - Potentially still evolving
- **Specialists are often part of an independent partner company**
 - Stable process built around their own set of tools
 - Not simple to provide appropriate permissions
- **Specialists are valued for domain knowledge**
 - Not UI expert in multiple CAD/PLM systems

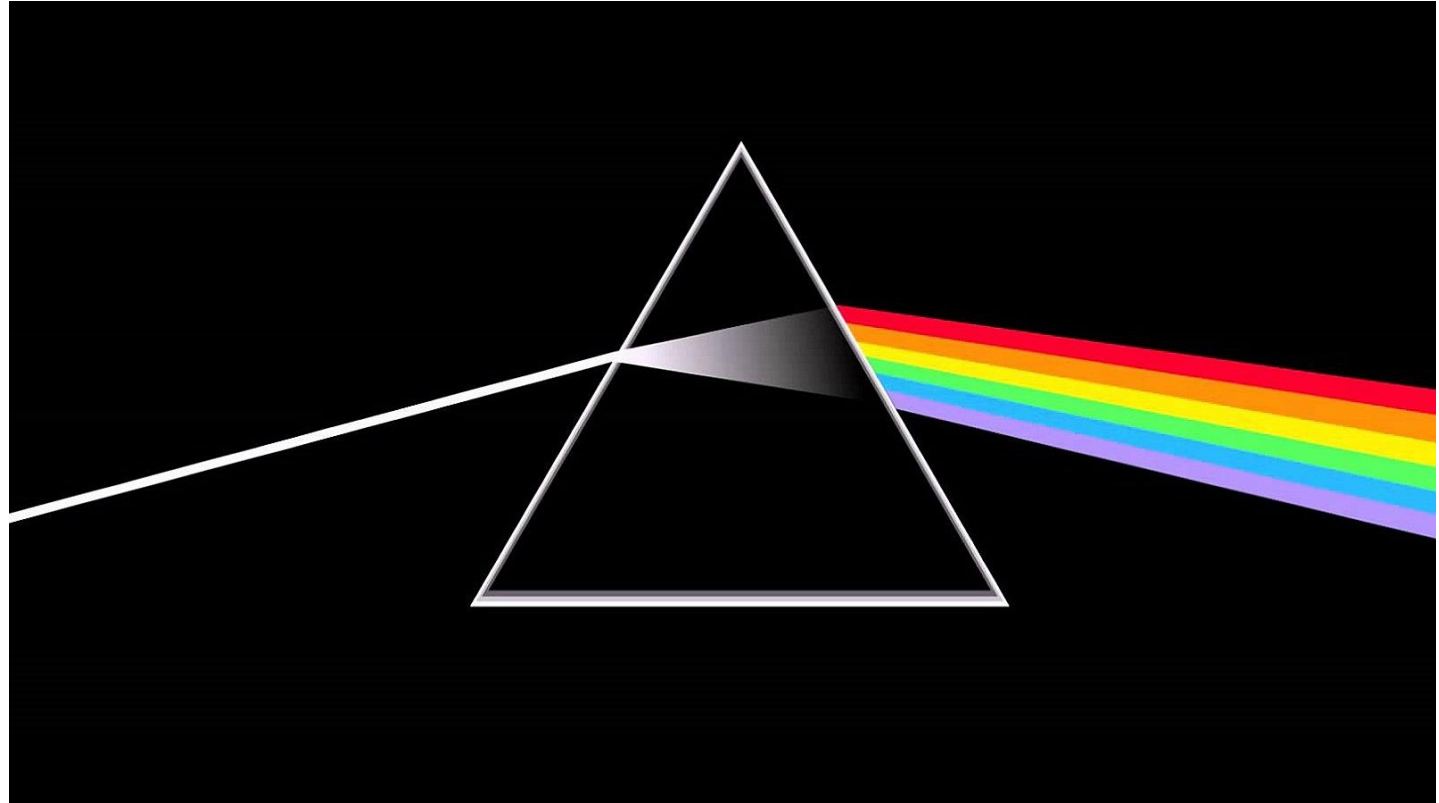
Specialized Application Examples

Specialized Discipline Example #1

Global Product Data Interoperability Summit | 2022

Optical Engineering

- Read precise B-Rep design data from many sources
- Modeling light energy
- Millions of rays
- 6-place decimal accuracy

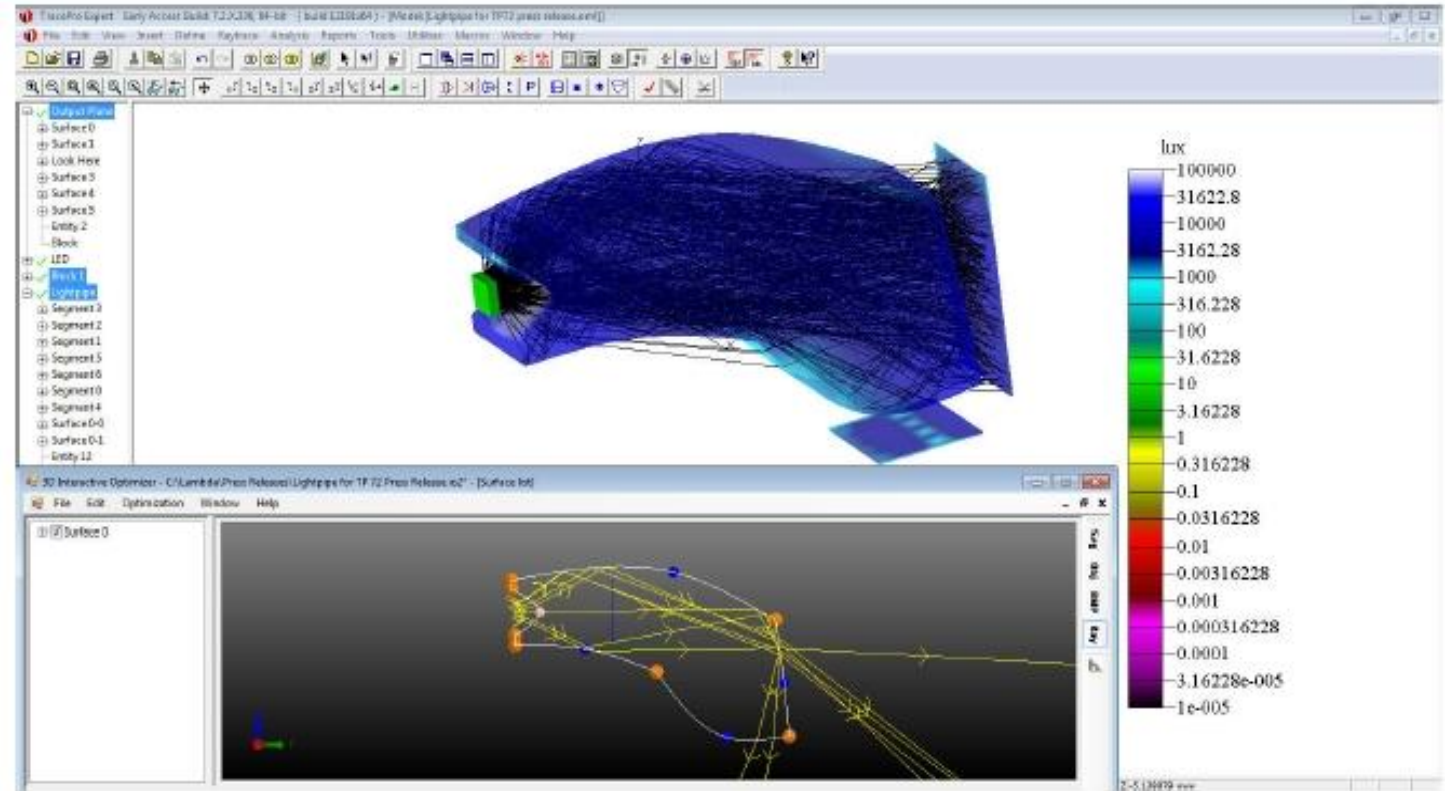


Specialized Application Example #1

Global Product Data Interoperability Summit | 2022

Lambda Research Corporation

- **TracePro**
 - Stand-alone Windows application
 - Use of Kubotek kernel since 2012
 - Now exclusively
 - 5x performance improvement
- **RayViz**
 - SolidWorks integration



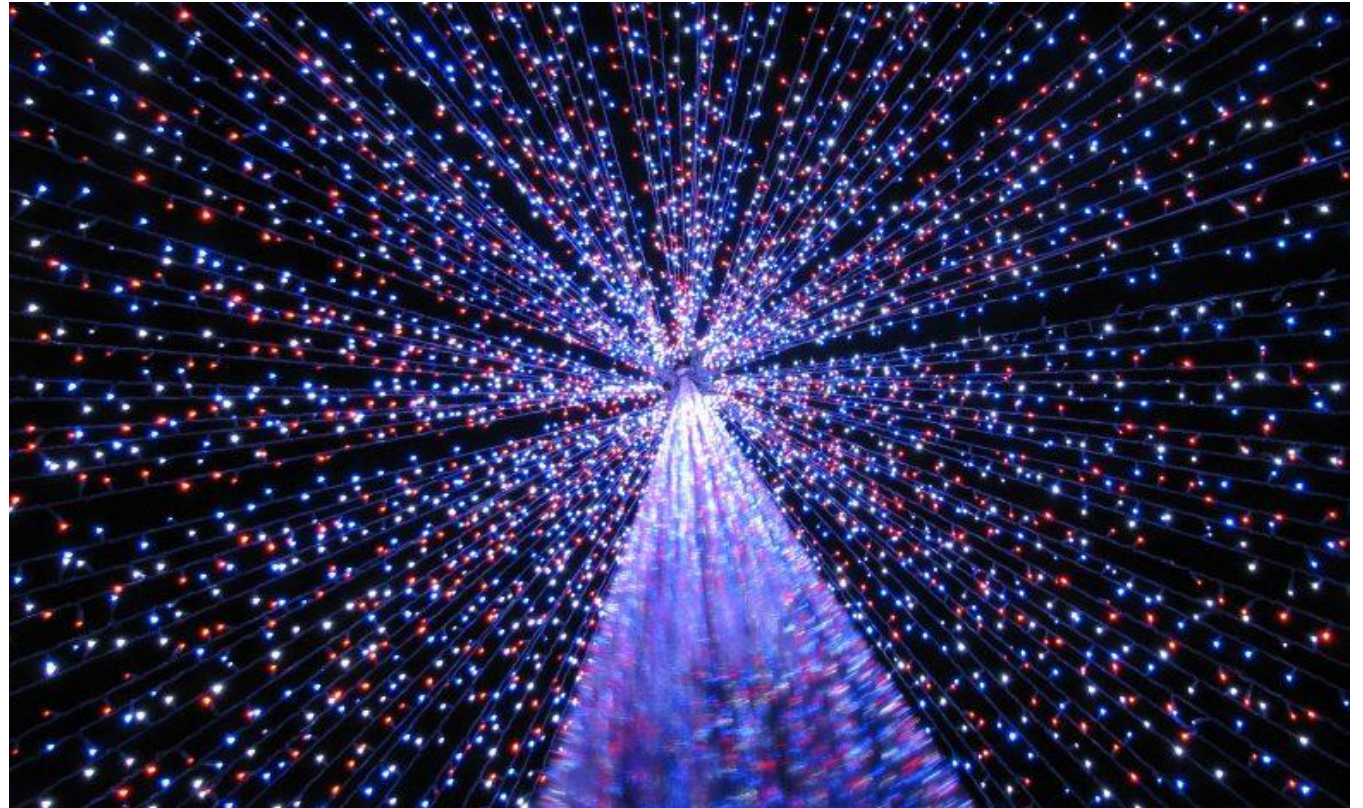
Specialized Discipline Example #2

Global Product Data Interoperability Summit | 2022

Metrology

- Read precise B-Rep design data from many sources
- Collect point data from inspection equipment
- Millions of points
- High decimal accuracy

Specialized Discipline Example



Specialized Application Example #2

Global Product Data Interoperability Summit | 2022

Verisurf Software, Inc.

- **VERISURF**
 - Mastercam database and UI
 - Visualize 3D inspection results
- **VERISURF Validate**
 - North American aerospace requires translation verification
 - Kubotek technology



Specialized Applications Summary

Global Product Data Interoperability Summit | 2022

- **Different needs than Major CAD/PLM**
- **Unique interfaces for experts in specialized disciplines**
- **Start from and rely on quality data from CAD applications**

Specialized Database Architecture

Precise Kernel Strategies

Global Product Data Interoperability Summit | 2022

Design Database

- **Complex geometry types structured around unique math algorithms**
- **Data type redundancy avoided**
- **Data precision optimized for typical design**
- **Stabilize homegrown & legacy data**

Interoperability Engine

- **Complex geometry types defined externally**
- **Redundant data types to support complex data from all systems**
- **All MBD entity/data types**
 - non-manifold, zero and one dimensional, mixed bodies
 - Annotations, metadata, attributes
- **Flexible support for precision**
- **Support data of any quality level**
 - Self-intersecting, slivers, approximated splines, etc.

Geometric Fidelity Example

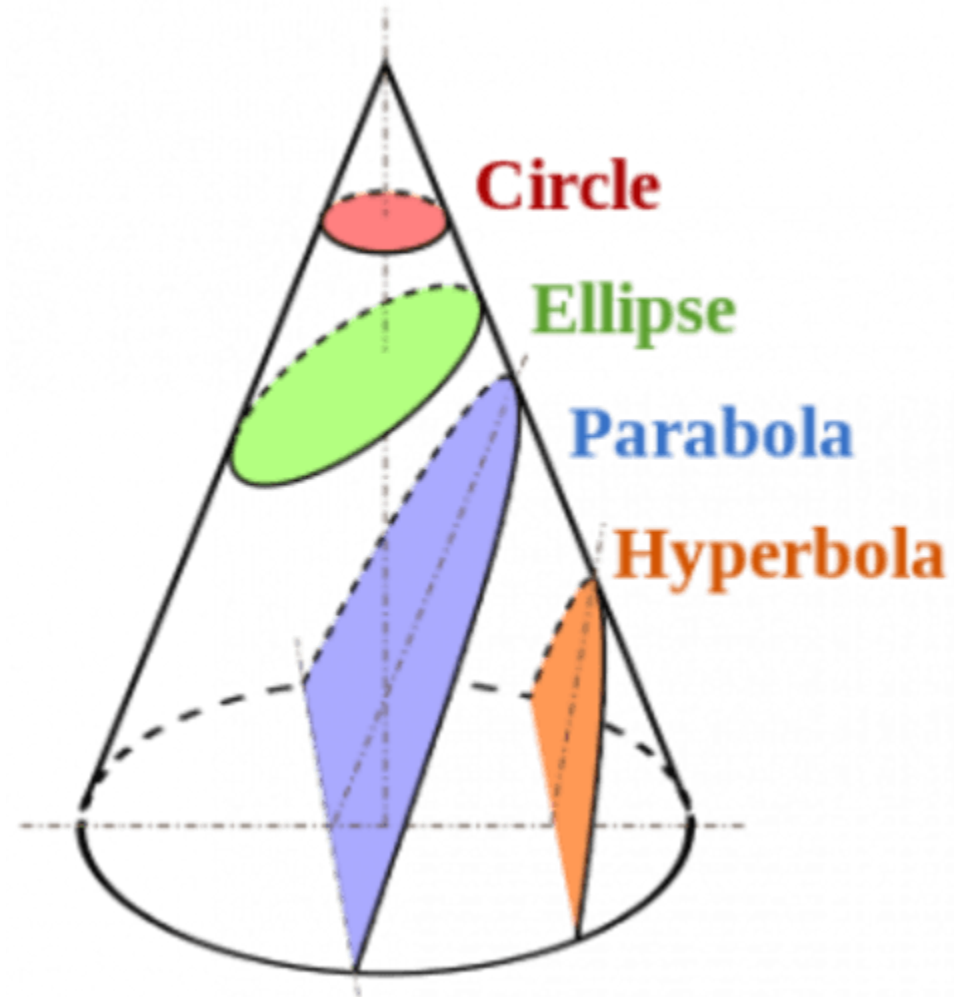
Global Product Data Interoperability Summit | 2022

Conics

- Circle: $(x-a)^2+(y-b)^2=r^2$
- Ellipse: $(x-a)^2/k^2+(y-b)^2/h^2=1$
- Hyperbola: $(x-a)^2/k^2-(y-b)^2/h^2=1$
- Parabola: $(x-a)^2=4p(y-b)$, $p \neq 0$

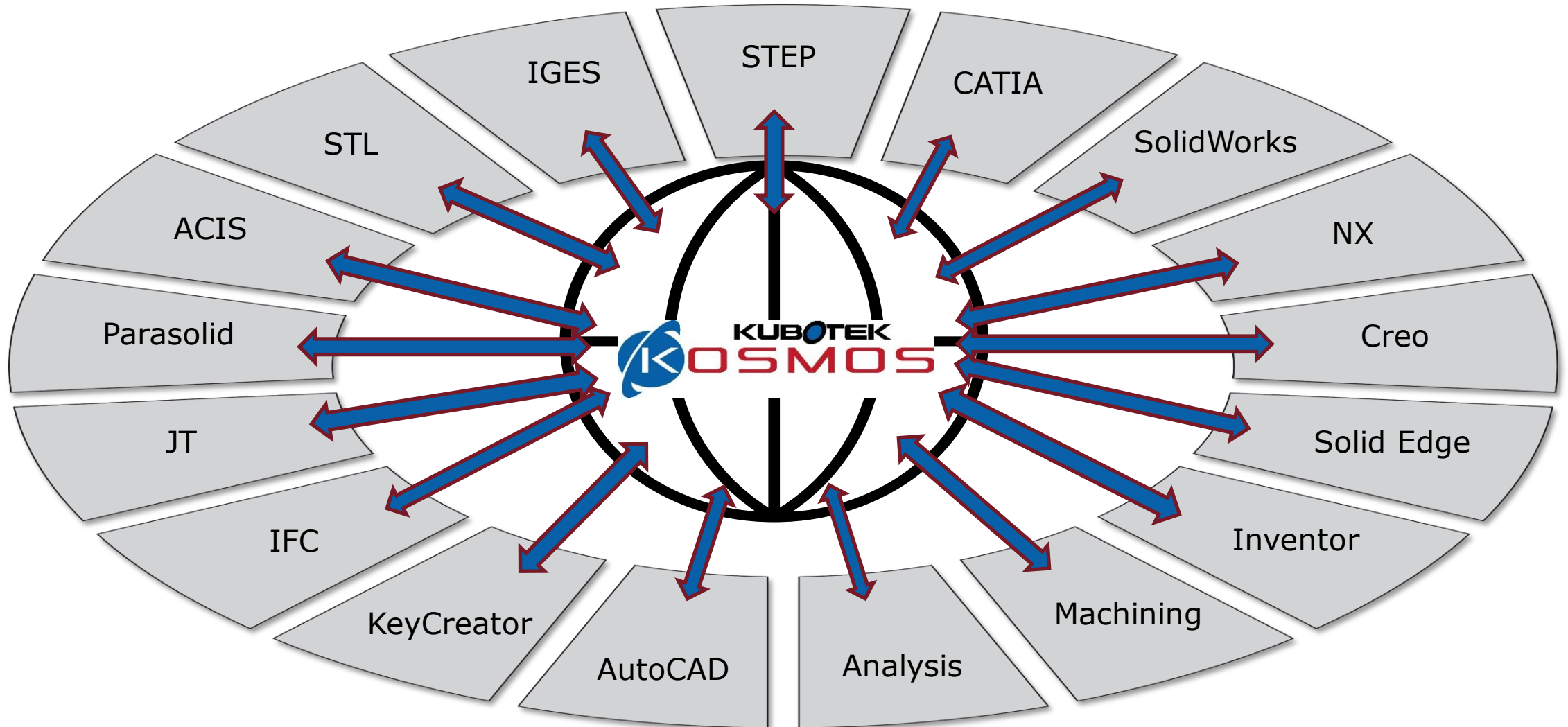
NURBS

- $C(t)=\sum_{i=1}^n N_i(t)w_i P_i / \sum_{i=1}^n N_i(t)w_i$



Format and Application Support

Global Product Data Interoperability Summit | 2022



Products and Questions

Global Product Data Interoperability Summit | 2022



3D Framework

Engineering Software
Development Kernel



Model Comparison Reporting &
Quality Compliance

Questions

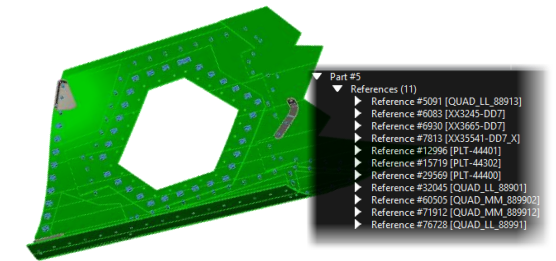
www.kubotek3d.com

John McCullough

JMcCullough@
KubotekKosmos.com



MCAD Visualization and Translation



KEYCREATOR®

Efficient & Agile CAD Tools for
Manufacturing

