CM and DM Challenges in a Model-Based Enterprise

or a Universe of Data

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For the 2019 MBE Summit

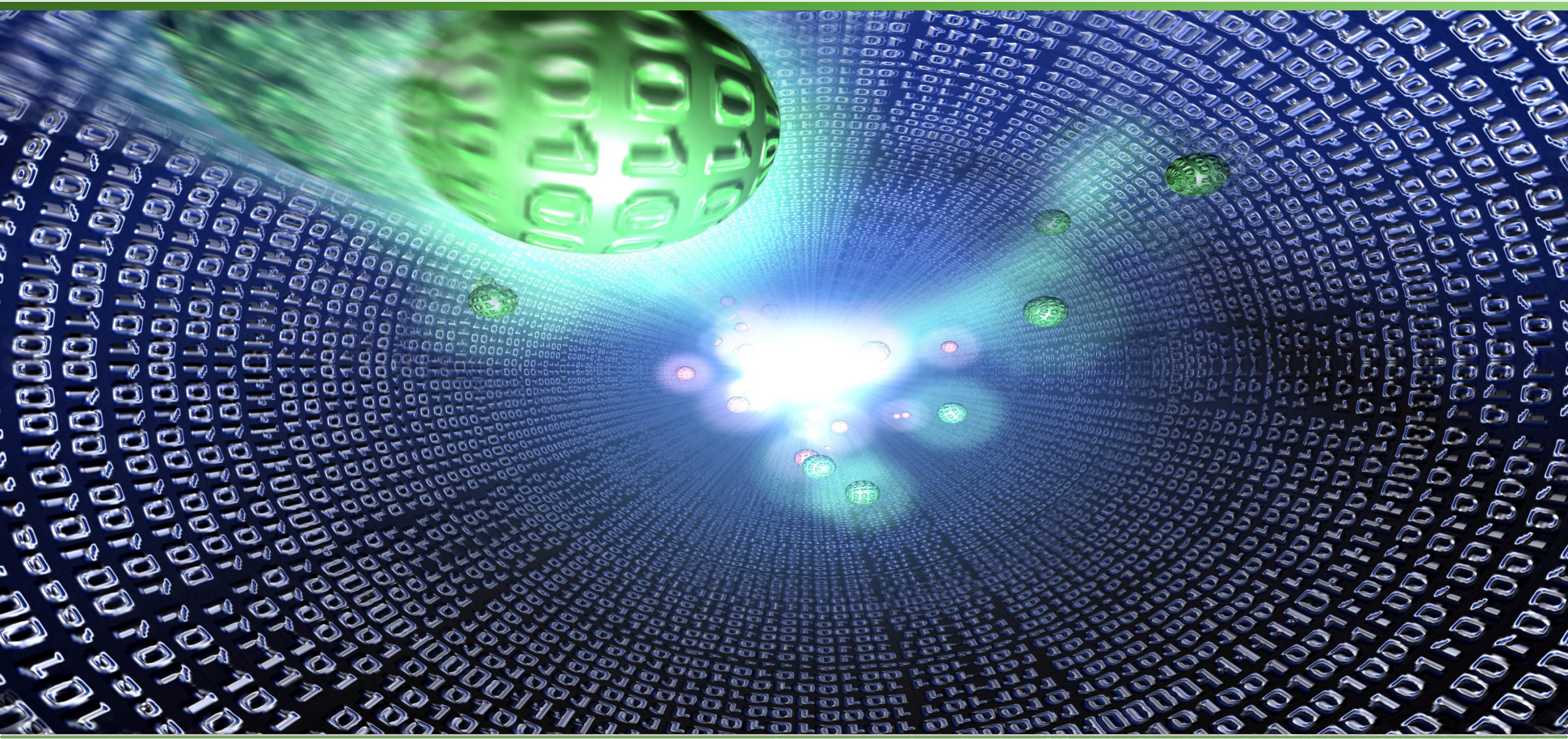
Introduction – Roy Whittenburg

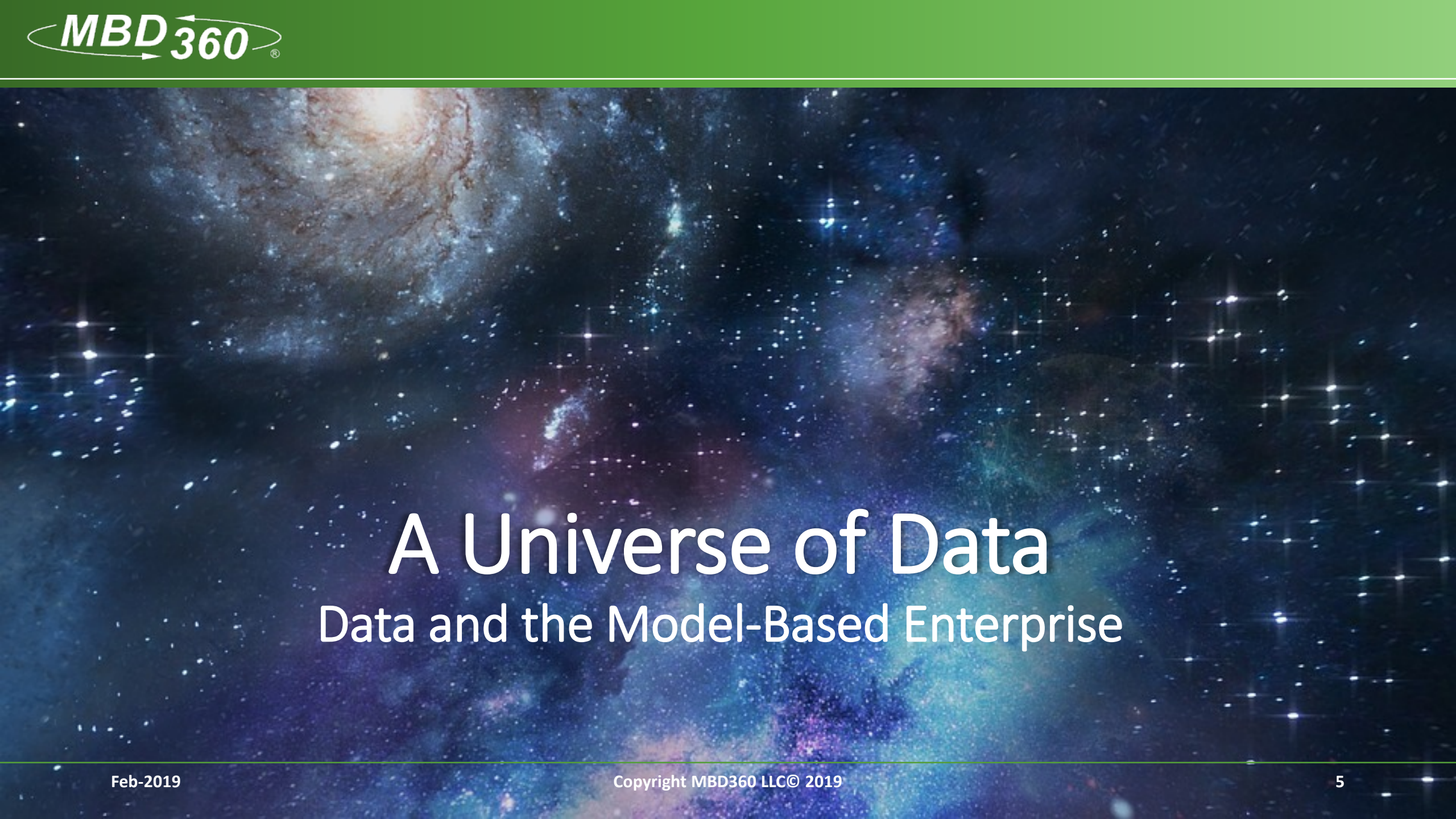
- President and Owner of MBD360 LLC
- 28 Years of Experience in Engineering, IT, and Project Management
- Diverse Work Experience:
  - Telecommunications
  - Transportation
  - Defense
- Standards Work
  - Co-Chair of MIL-STD-31000A Data Delivery Team
  - Chair of ASME Y14.47
  - Charter Member of ASME MBE Standards Steering Committee

Agenda

- A Universe of Data
  - Data and the Model-Based Enterprise
- A Universe of Change
  - Proliferation of Data
- The Alchemy of Data
  - Data Set Structure and Use
- Questions

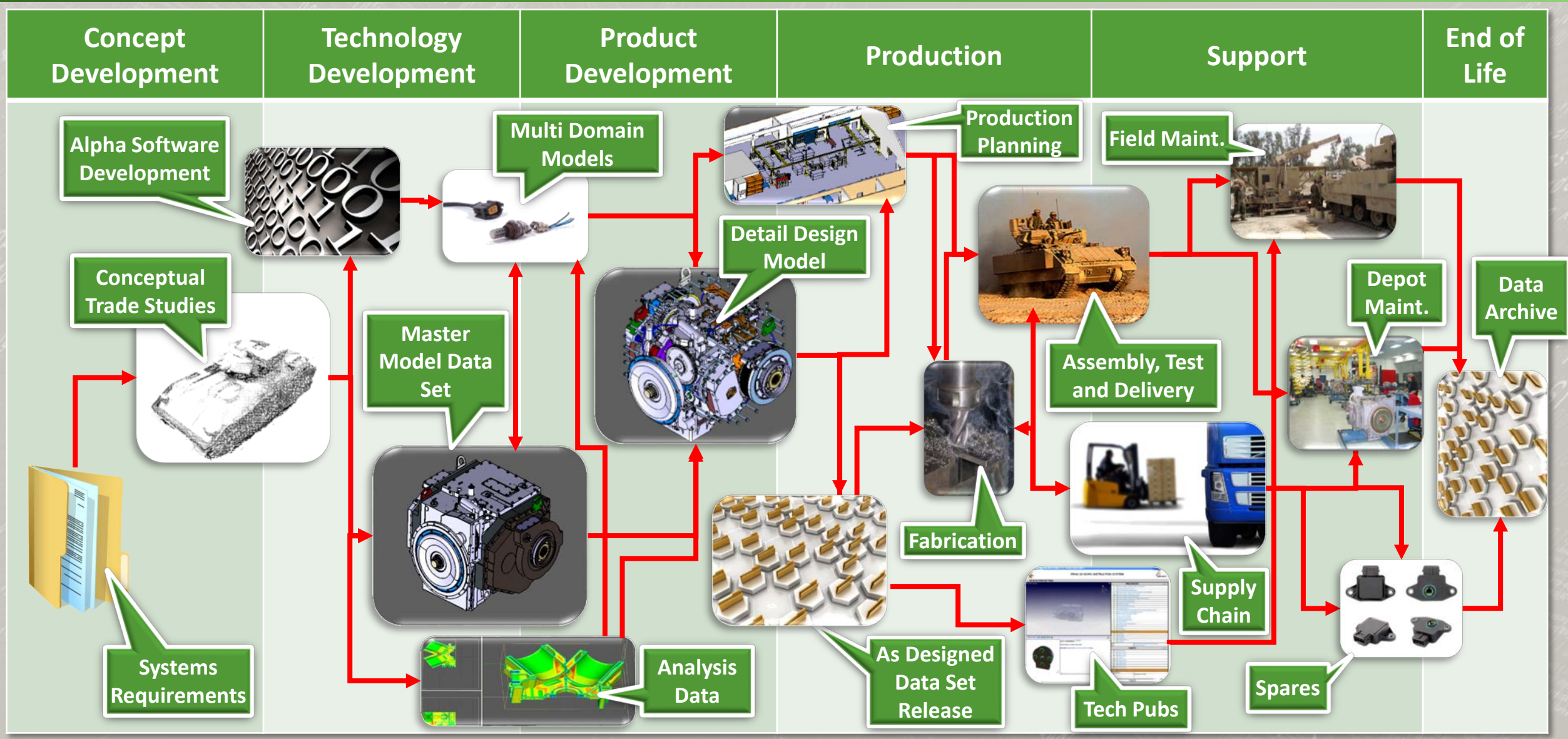
Are You Ready for a Trip Down the Rabbit Hole?





Simplified Digital Threads Running Through the Lifecycle

Concept Development	Technology Development	Product Development	Production	Support	End of Life



The Enterprise Data Inventory is Massive

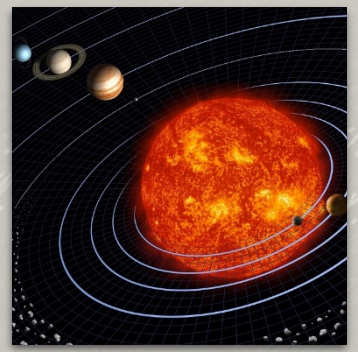
Breaking the Universe Down

The Enterprise is a Universe

A Department is a Constellation

A Business Unit or a Galaxy

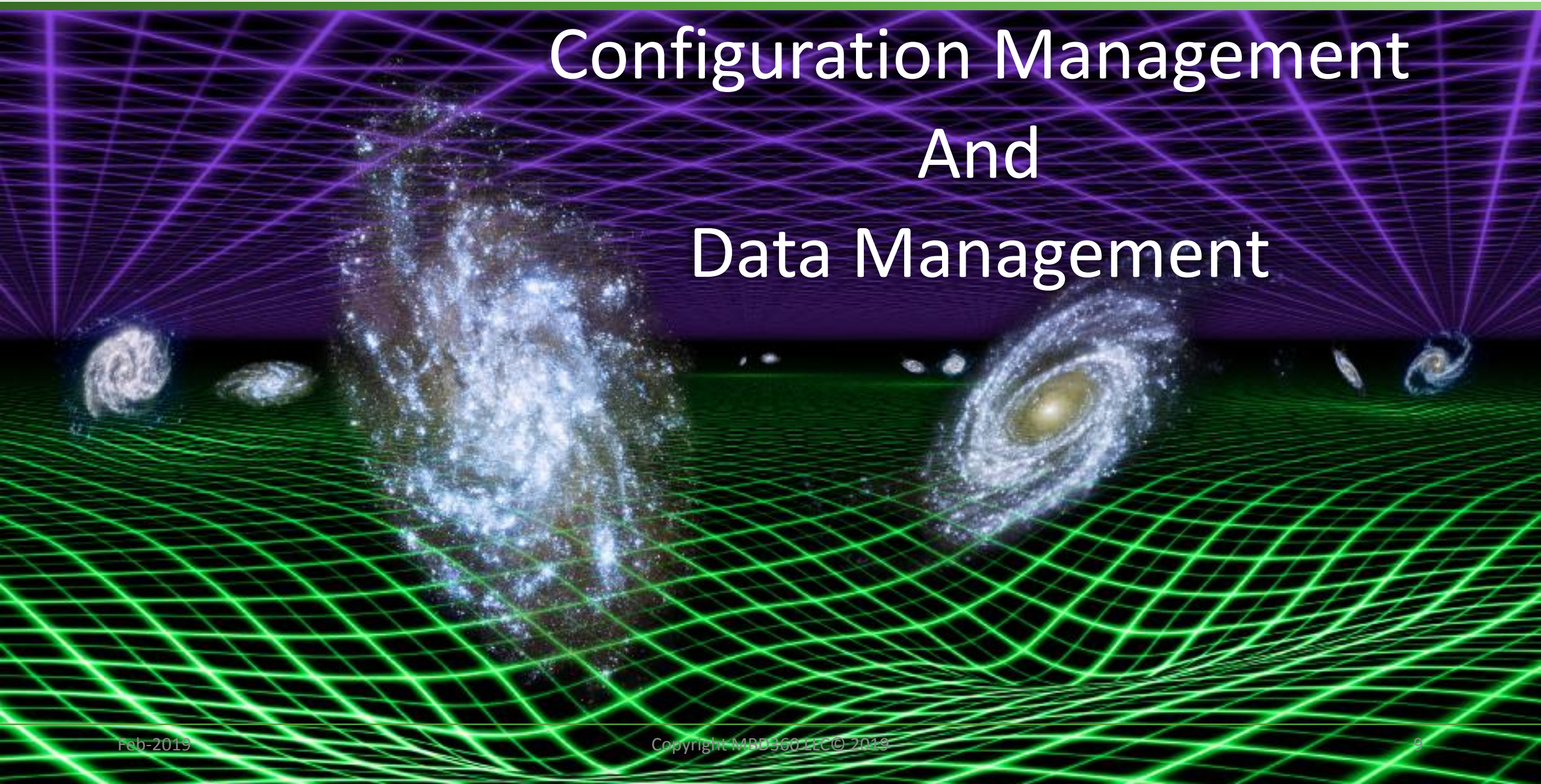
A Functional Team is a Solar System

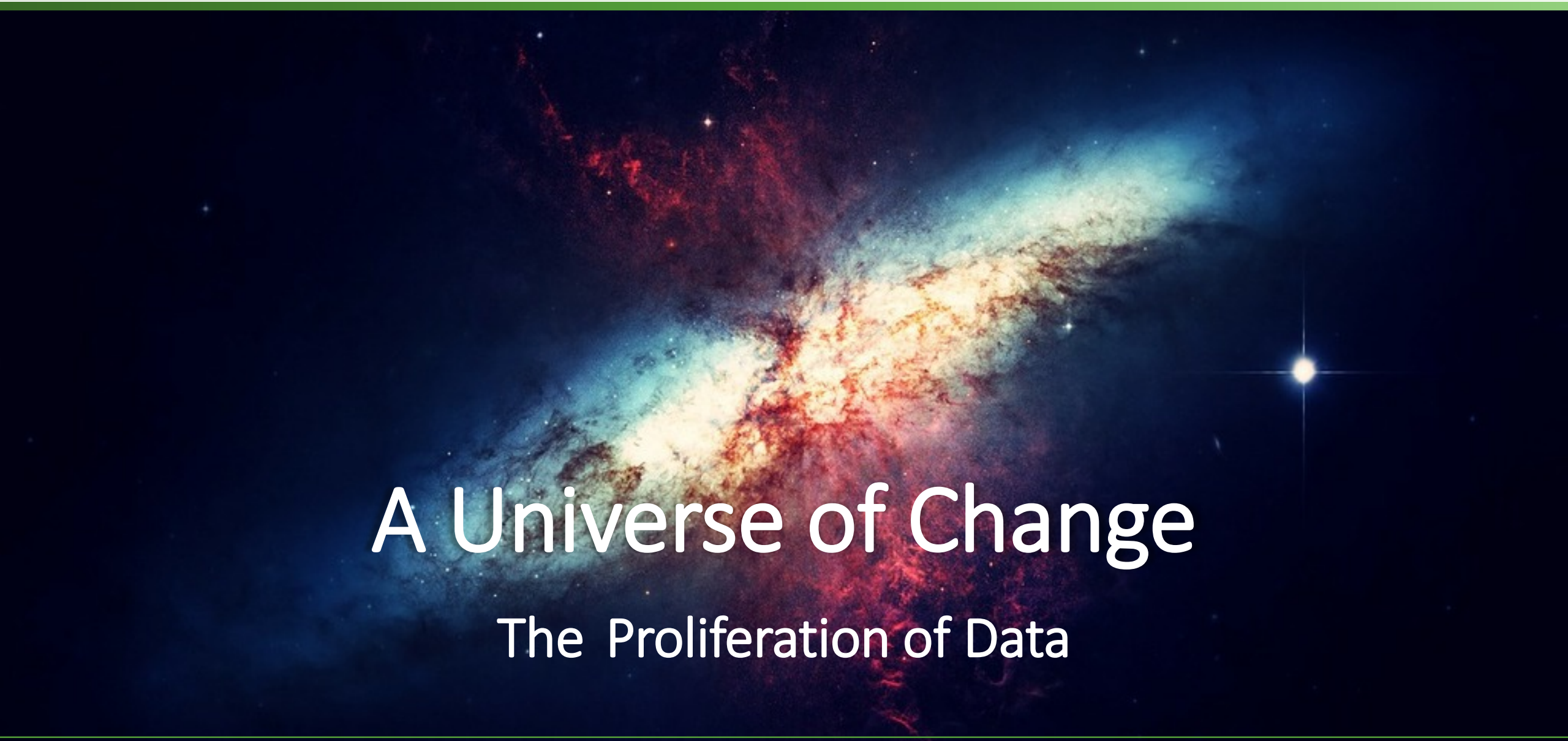


A Location is a Cluster

A Person is a Planetary System

Configuration Management And Data Management

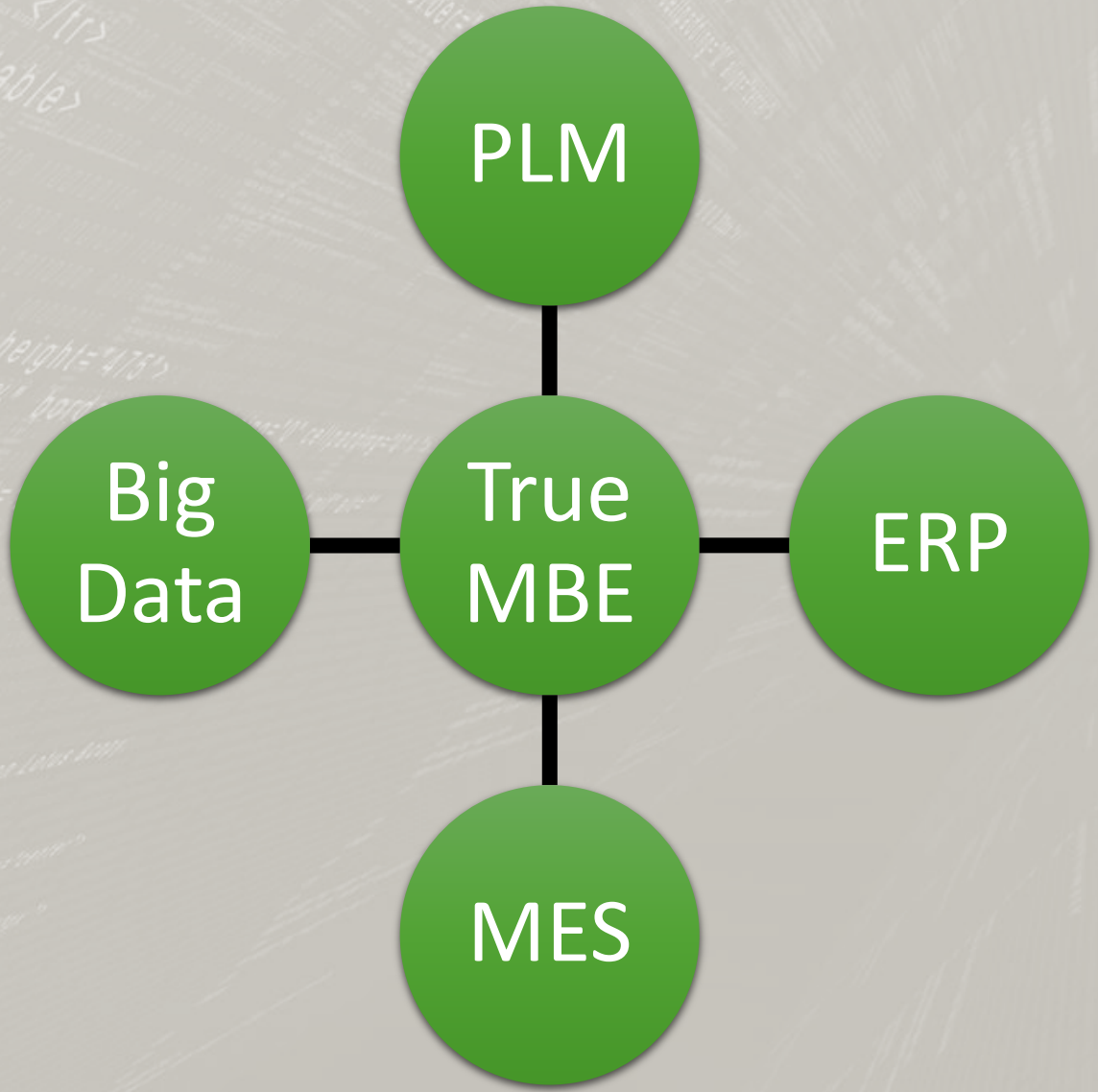




A Universe of Change

The Proliferation of Data

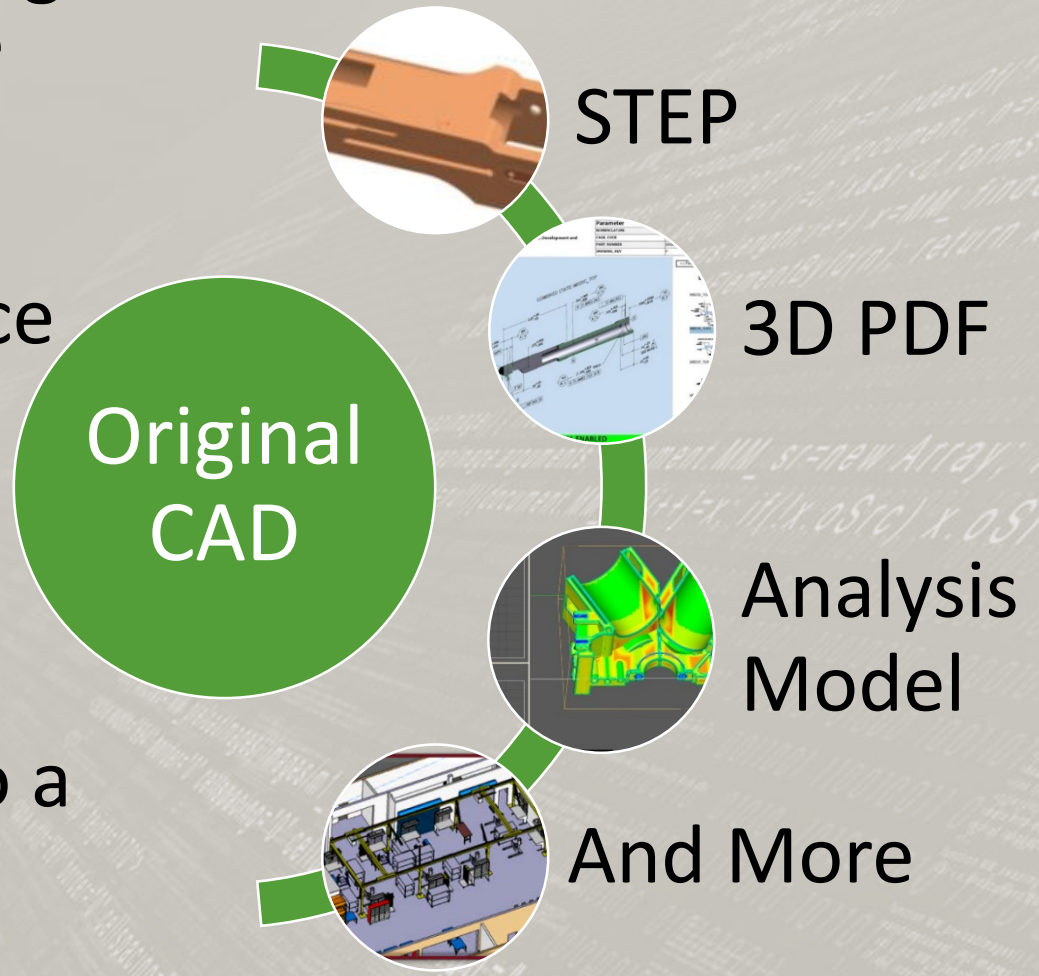
The Good and the BAD



- One of the great attributes of a true Model-Based Enterprise (MBE) is that the data is connected
- A consequence of this is that change can proliferate through the enterprise at great speed
- This fact alone means that it is more important than ever to control the change process
- If left uncontrolled a bad change can move through the enterprise as quickly as a good one

Derivatives and Their Effect on Change

- In the modern design and manufacturing environment the use of a derivative file is more common than the original file
- To many downstream users the derivatives are their authoritative source
- The consequence of this is that the derivative files must be kept in sync with the original authoritative source file
- This can actually mean that a change to a derivative file causes a change to the original authoritative source file



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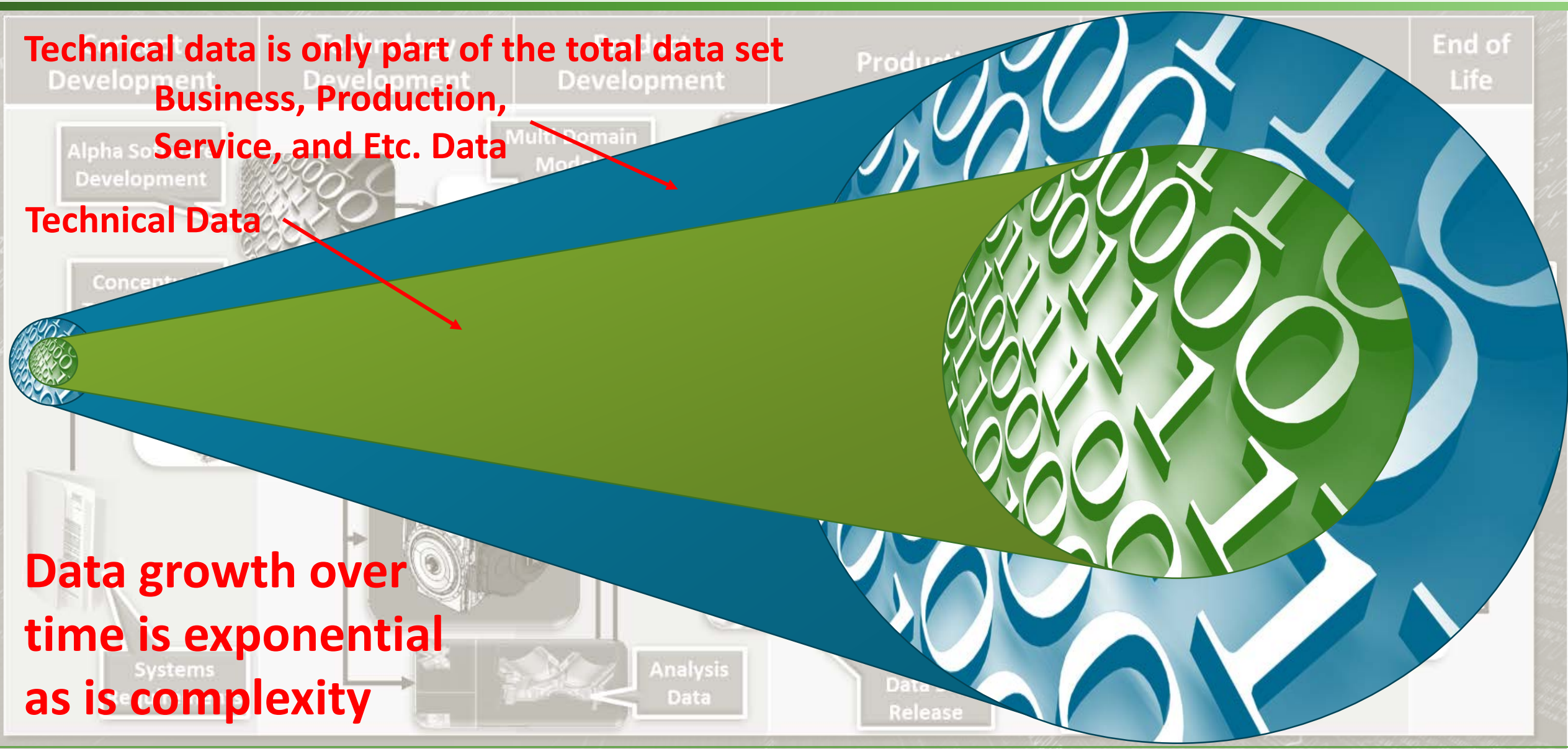


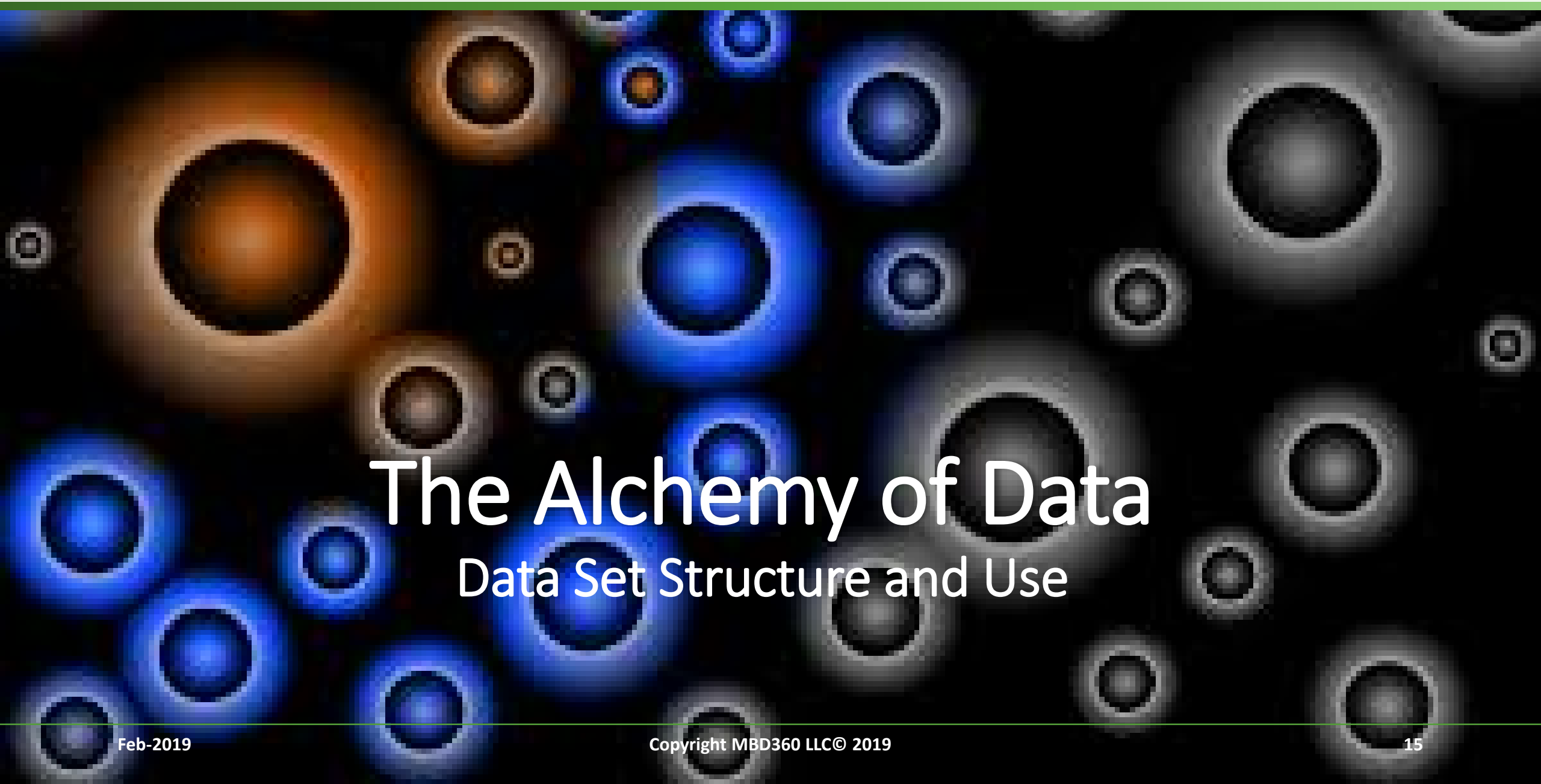
More Types Of Data

Business

Service

Process

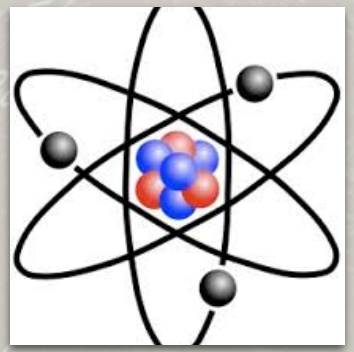
Etc.



The Alchemy of Data

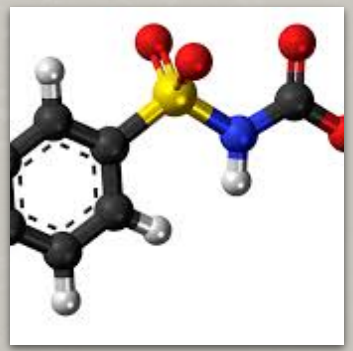
Data Set Structure and Use

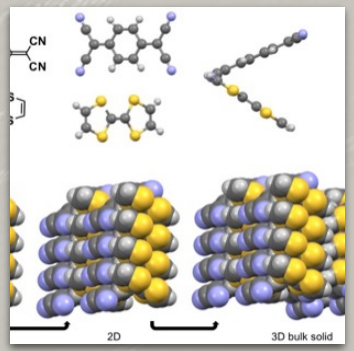
The Fundamental Elements



Data Files are Like Atoms

Data Sets are Like Molecules





Compounds are Like Products

If we continue our analogies to understand the relationships of data, the lowest level of data can be compared to the atomic building blocks of matter

The States of Matter

Solid
Design is One
Data Category

Liquid
Production is
Another Category

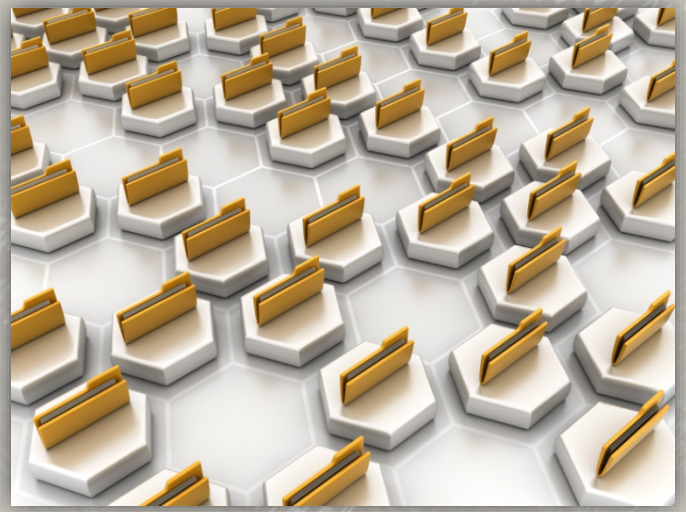
Gas
Service is Another
Category

Plasma
Decommissioning
Is the Final
Category

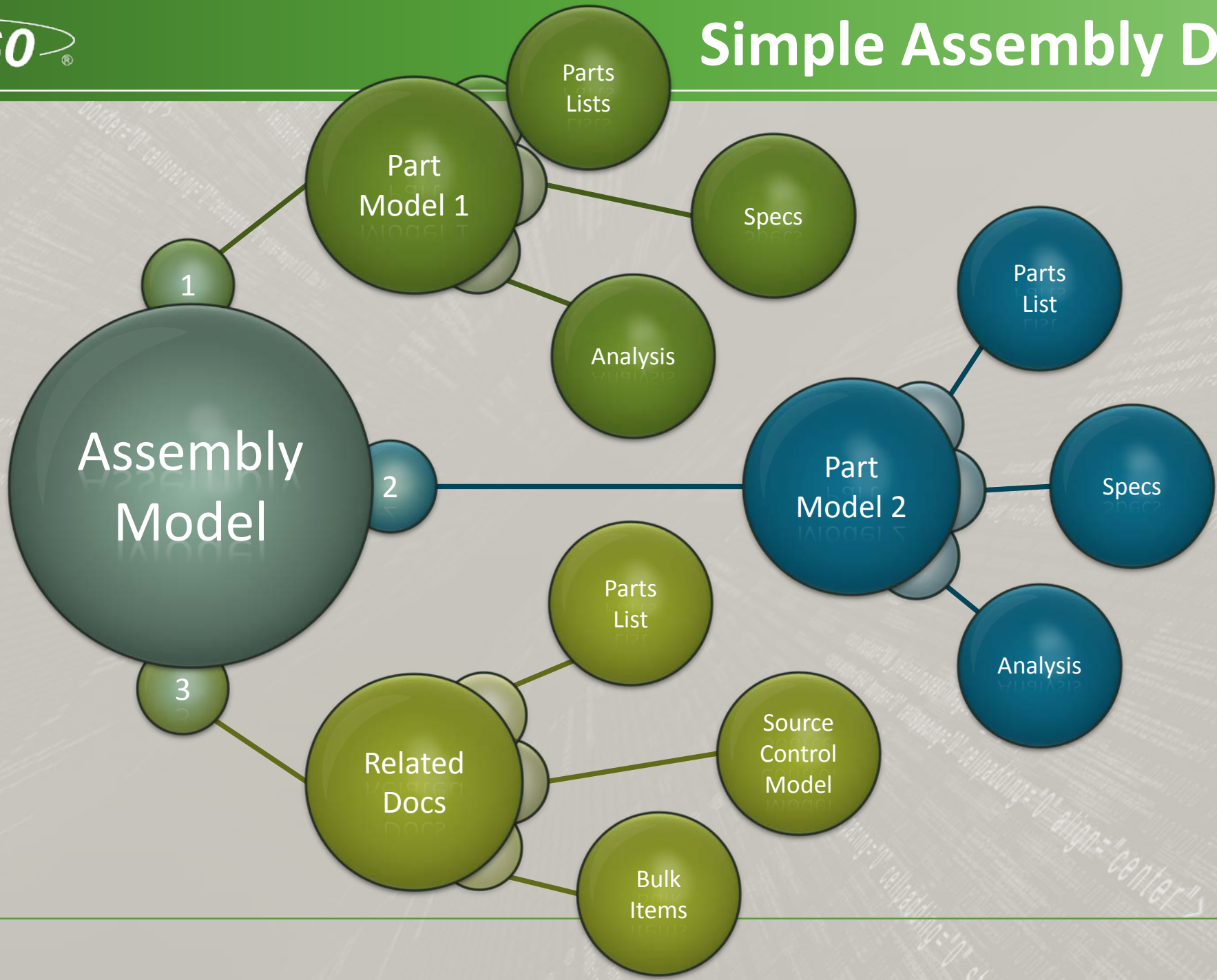
Not Just a CAD Model But a Dataset

Basically a Dataset is a collection of related data files

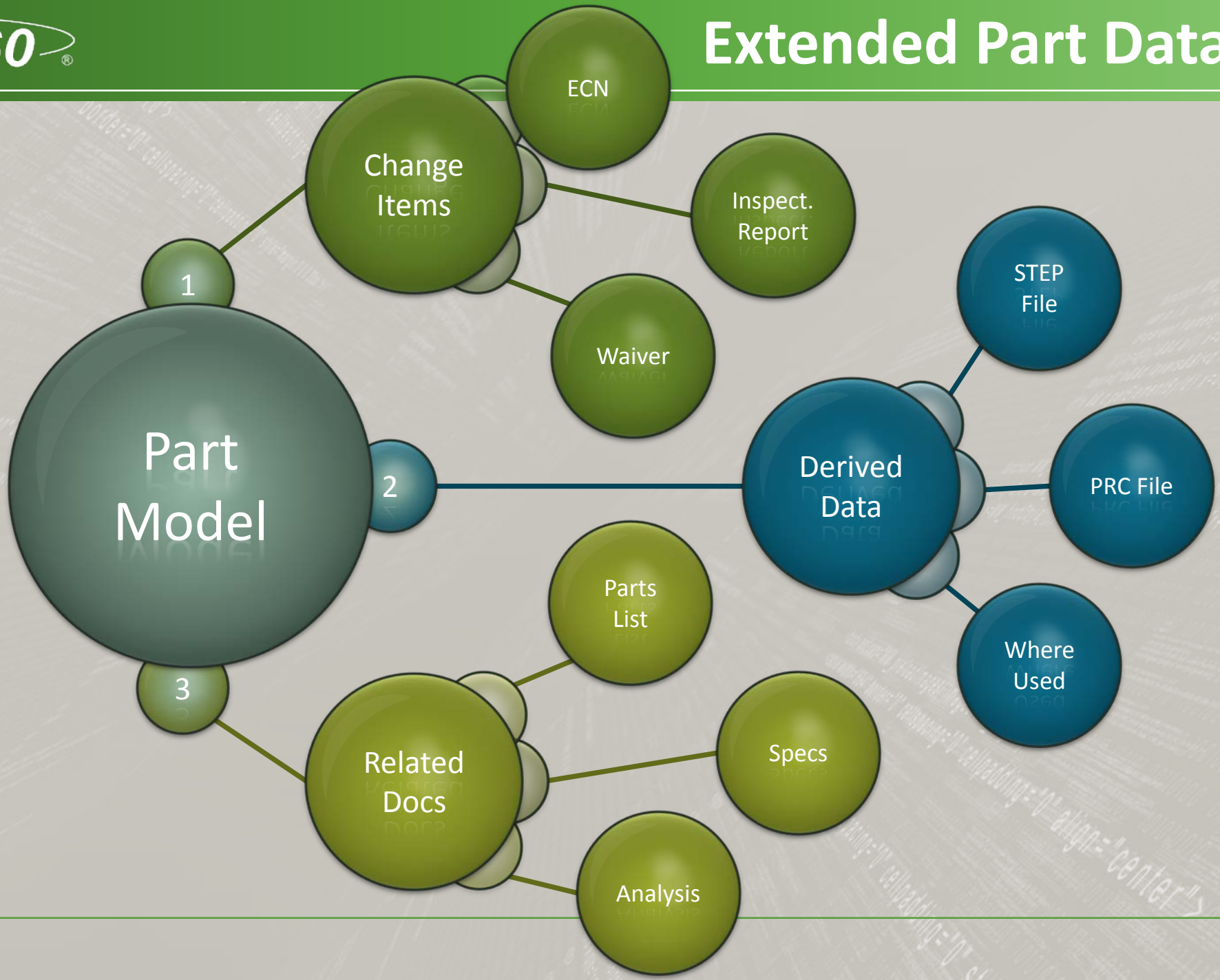
- A product definition dataset is a collection of CAD files and supporting documentation defining a single product
- It is not uncommon in today's environment to still have the CAD model (with minimal annotations) associated to a drawing, this would form the core of a dataset
- Many other files can be related to the dataset:
  - Separate Parts Lists
  - Specifications
  - Analysis
  - Material Specifications
  - Related Components



Simple Assembly Dataset

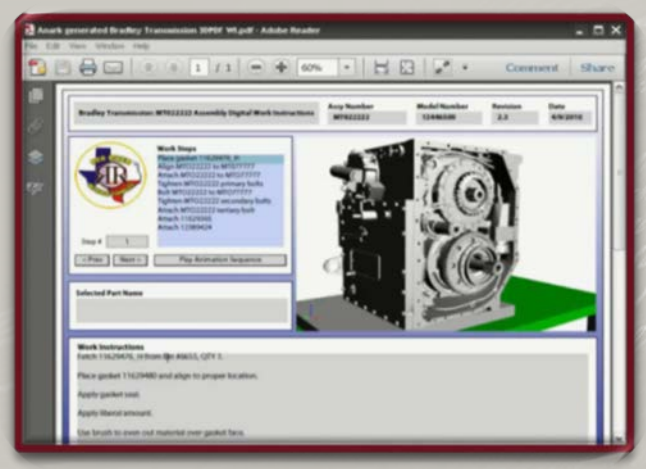


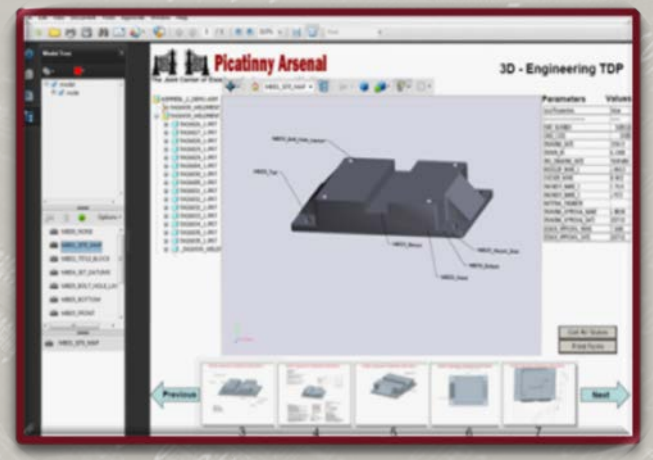
Extended Part Dataset



Point Of Use Data Sets

- In the downstream user environment each consumer has their own data needs
- These data needs are met by specific data sets referred to as Point Of use Data Sets (PODS)
- To these users the PODS are their authoritative data source
- The PODS should be a mix of derivative and original data that must be kept in sync



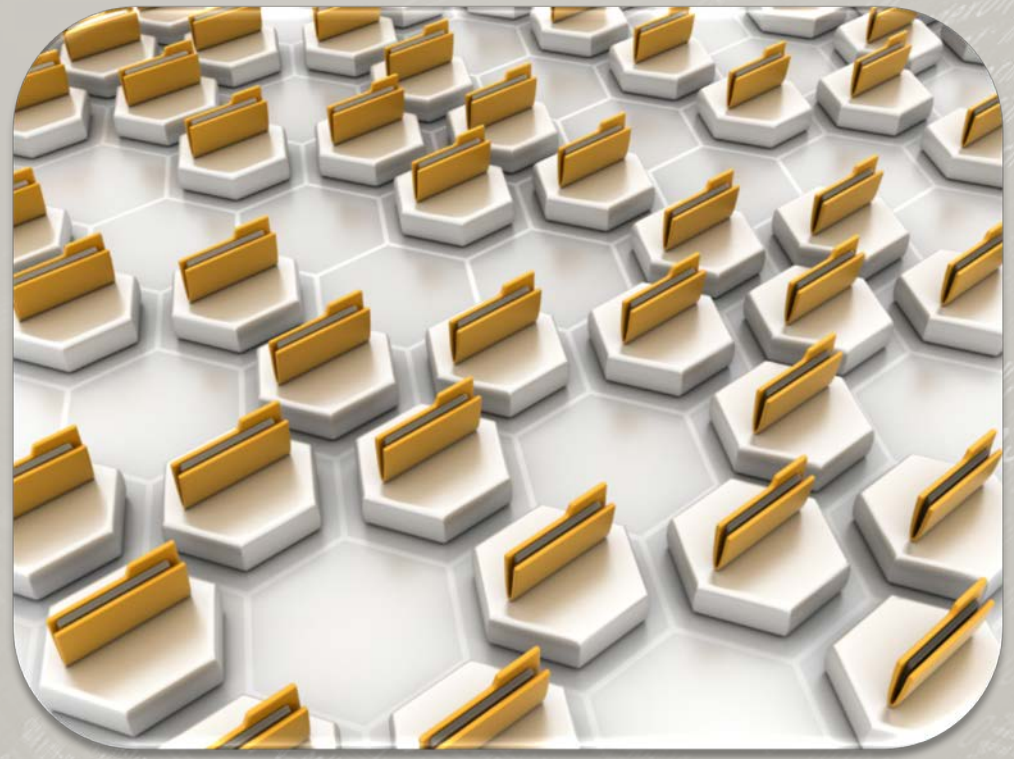


Data Pedigree

- In the universe of MBE data full of derivatives and PODS, it becomes vital to be able to trace the linage or pedigree of a given piece of data
- The reason is that only by understanding where a piece of data comes from can one understand if it is authoritative for their use or if it is just a piece of reference data
- A pedigree also helps determine the overall quality of the data

Revisioning Data Set

- If the Data Set is the primary building block of any configuration then it stands to reason that it must be revision controlled
- Preferably, the data set would hold a single master revision (A, B, C, etc.) while each of its elements iterate in a controlled manner
- This is not unlike a baseline, in fact a data set could almost be considered a mini baseline



Regardless of Size the Data Must Be Managed

- Traditional document based CM practices are not practical for MBE
- Data Sets must be treated like single entities with regards to baselines and revisions
- The relationships and metadata are just as important as the data itself
- What form do the deliverables take and how do you deliver them?
- Access must not only be managed but constantly controlled

These are just some of the challenges facing Model-Based CM

Questions?