

Connecting the Clouds in AEC & EPC: Where to Start?

CIMdata PLM Leadership Webinar Series

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#cimdatawebinar

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Agenda

- Introduction
- Fundamentals of Cloud Services
- The Role of the Cloud in AEC & EPC
- Issues to Consider
- Crafting a Plan
- CIMdata's Perspective

Presenter's Profile

Your presenter's professional background



- Ed Martin, Director, AEC & Manufacturing Convergence Consulting Practice

- Over 36 years of PLM and manufacturing industry experience in the disciplines of product development, manufacturing automation, lean manufacturing, and systems engineering.

Before joining CIMdata, Ed was Sr. Business Line Manager for Autodesk; Product Line Manager for Delphi Corporation, and Product Engineer at General Motors. He has held management positions in the manufacturing industry and PLM software and services industry, including responsibility for strategic planning, product management, manufacturing strategy, product and industry marketing, and strategic business development.

Ed has driven the development of new solutions and championed the adoption of new technologies ranging from 3D laser scanning to configure/quote solutions and 3D layout.

Our Mission...

Strategic management consulting for competitive advantage in global markets

CIMdata is the leading independent global strategic management consulting and research authority focused exclusively on the PLM market.

We are dedicated to maximizing our clients' ability to design and deliver innovative products and services through the application of PLM.

AEC & Manufacturing Convergence Practice

Practice overview

- The AEC & Manufacturing Convergence Practice serves manufacturers, AEC & EPC services firms, owners / operators and solution providers who are interested in capitalizing on the opportunities for information and workflow convergence

Strategic Focus

Bridge the flow of information and integrate processes across:

- Manufacturing
- Facility and infrastructure:
 - Design & engineering
 - Construction
 - Operations & maintenance
 - Decommissioning and recommissioning

Customer Benefits

- Develop new business models and opportunities
- Reduce waste from project proposal through commissioning
- Reduce budget and timeline contingencies
- Improve quality and compliance
- Improve efficiency and effectiveness of operations and maintenance
- Improve project lifecycle economics

Our Services...

Creating, disseminating, and applying our intellectual capital



Research

- Market research & analysis
- Technology research & analysis
- Reports & publications
- Market news
- Member services...

Education

- Executive seminars
- PLM Certificate Programs
- Technology seminars
- Int'l conferences & workshops
- Best practices training...

Consulting

- Strategy & vision
- Needs assessment
- Solution evaluation
- Best practices
- Quality assurance
- Program management
- Market planning...

Delivering strategic advice and counsel through a comprehensive, integrated set of research, education, and consulting services

PLM Transformation

Services for Industrial Organizations—improving your PLM-related processes



CIMdata's PLM consulting methodology—transforming your business for a competitive advantage!

A comprehensive set of services tailored to fit your specific needs...

Our PLM Transformation Clients...

A sampling of CIMdata's international industrial clients (1 of 2)

A&D



Auto



Fab & Assembly



High-Tech



Our PLM Transformation Clients...

A sampling of CIMdata's international industrial clients (2 of 2)

CPG/F&B/Process

Kimberly-Clark
Dow
GMCR
Altria
JTI
Coca-Cola
P&G
McCORMICK
CSM
GOODYEAR
LEGO
DSM
BRIGHT SCIENCE. BRIGHTER LIVING.
amcor
Imperial Tobacco

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DOOSAN
Doosan Power Systems
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ENERGY SOLUTIONS
Rijkswaterstaat
adidas
NIKE
JPL
Jet Propulsion Laboratory
Samsonite
MERWEIDE

Other

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VIT
KONGSBERG
IDS Infotech Ltd.
Cranfield UNIVERSITY
KACST
NTNU - Trondheim
Norwegian University of Science and Technology
財團法人資訊工業策進會
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Questions?

Please use the GoToMeeting chat panel

- We're hoping that the anonymity of the chat window might help participants ask more questions
- If you want to ask a question on the record, we'll certainly let everyone know you're asking
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Cloud Services—Understanding the Terms

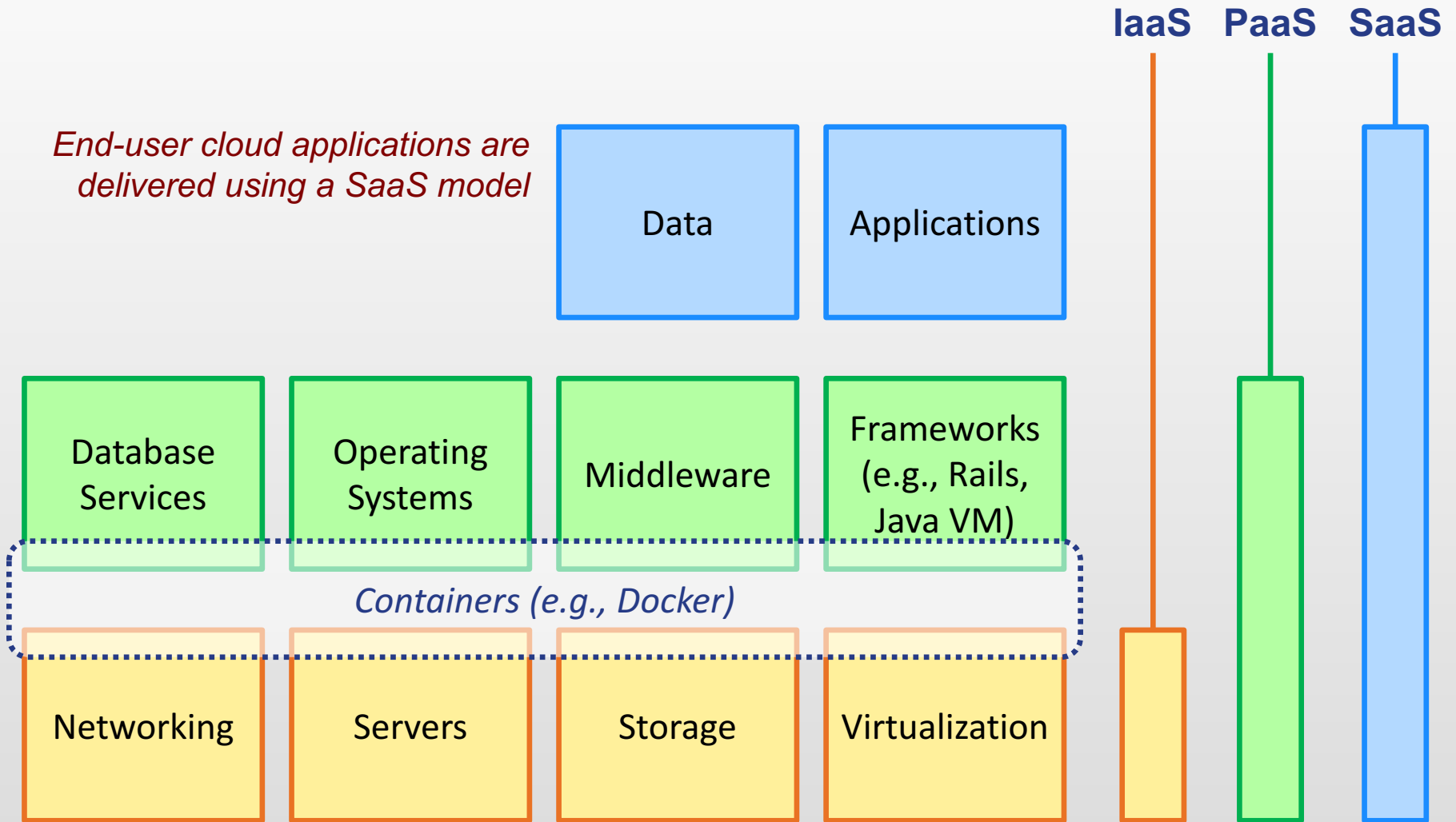
Definitions per US National Institute of Standards and Technology (NIST)

3	Service Models	Software as a Service (SaaS) Platform as a Service (PaaS) Infrastructure as a Service (IaaS)
4	Deployment Models	Public Cloud Hybrid Cloud Community Cloud Private Cloud
5	Essential Characteristics	On-demand self-service Broad network access Resource pooling Rapid elasticity or expansion Measured service

The NIST Definition of Cloud Computing, NIST Special Publication 800-145, <http://csrc.nist.gov/publications/PubsSPs.html#800-145>

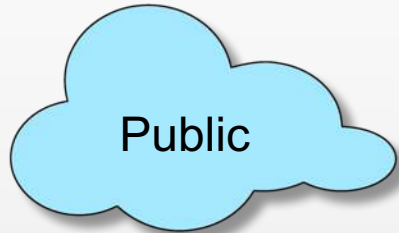
Cloud Service Models

Definitions vary, but the IaaS / PaaS / SaaS hierarchy is widely recognized



Cloud Deployment Models

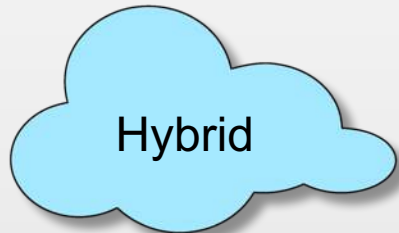
Each model involves different tradeoffs among flexibility, security, and cost



**Shared
resources**

**Public access
with system
security via
cloud provider**

**One to many
organizations or
individuals**



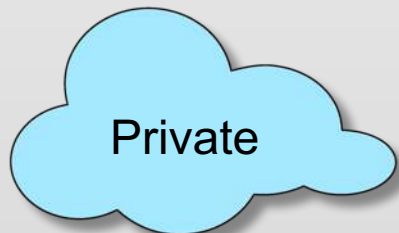
Private or community cloud with integration to a public cloud to provide managed backup, application peak load balancing, and/or other services per organization-specific policy



**Dedicated
resources**

**Multiple
perimeters**

**Accessed by
multiple
organizations**



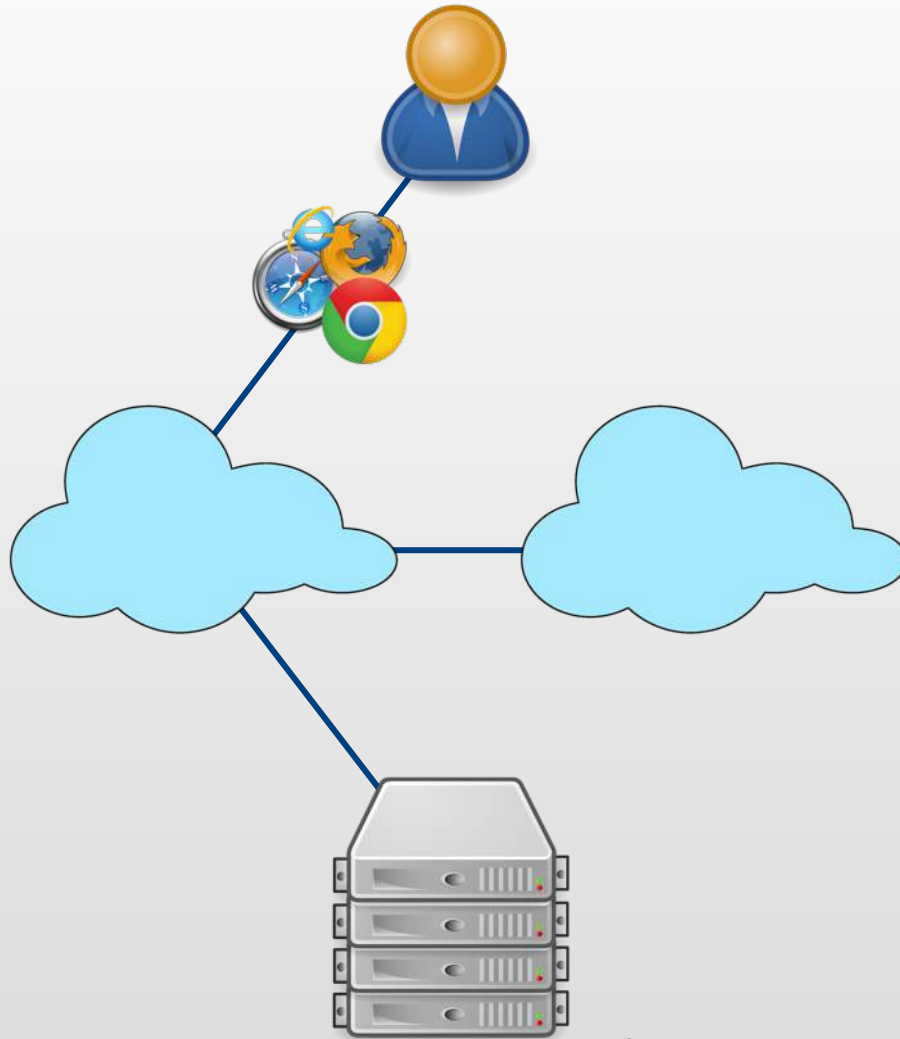
**Dedicated
resources**

**One
organization
perimeter**

**Accessed by
one organization**

Interaction & Integration Model

Modern cloud services provide powerful and flexible interaction models



- REST API* interfaces are used for most native web microservices
 - Also browser interfaces for users
 - Uses five http 'verbs': POST, GET, PUT, PATCH, DELETE
 - Can be synchronous or asynchronous
 - Typically communicate using JSON or XML formats
- But other models are valuable for specific use cases:
 - Message routing
 - Publish & subscribe
 - SOAP with XML

* REpresentational State Transfer (REST) / Application Programming Interface (API)

Security—What is the Real Risk?

Robust security involves much more than choosing a private vs public cloud



- IT staff security certifications
- Application sandboxing
- AI-based network monitoring
- DDoS defenses
- Next-gen IPS
- Network firewall

- End-to-end encryption
- Role-based access permissions
- Strong password policies
- Multi-factor authentication

Leading cloud providers employ highly trained staff and deploy advanced technologies to protect infrastructure and applications—customer security non-compliance and custom integrations tend to be the weak points.

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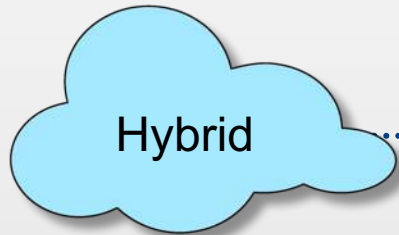
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Which Cloud?

Public-cloud SaaS is a good model for most AEC & EPC projects



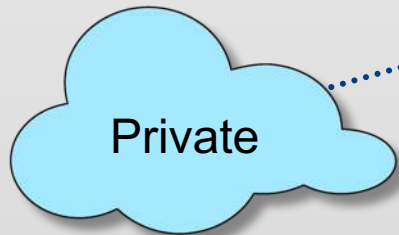
The low cost, scalability, wide accessibility, and low IT overhead demands of a public cloud model make it ideal for many AEC & EPC projects involving multiple organizations



A hybrid cloud can be a fit for an organization which needs a private or community cloud but wants to take advantages of public cloud capabilities or resources



A private or community cloud is appropriate for an organization with specific regulatory compliance or security requirements which cannot be met through an available public cloud service.



Public Cloud Strengths for AEC & EPC

Public cloud solutions provide significant collaboration and integration capabilities

General benefits:

- Low upfront investment
- Flexible pricing models
- Rapid scalability
- Project collaboration
- Remote access
- Integration via web APIs

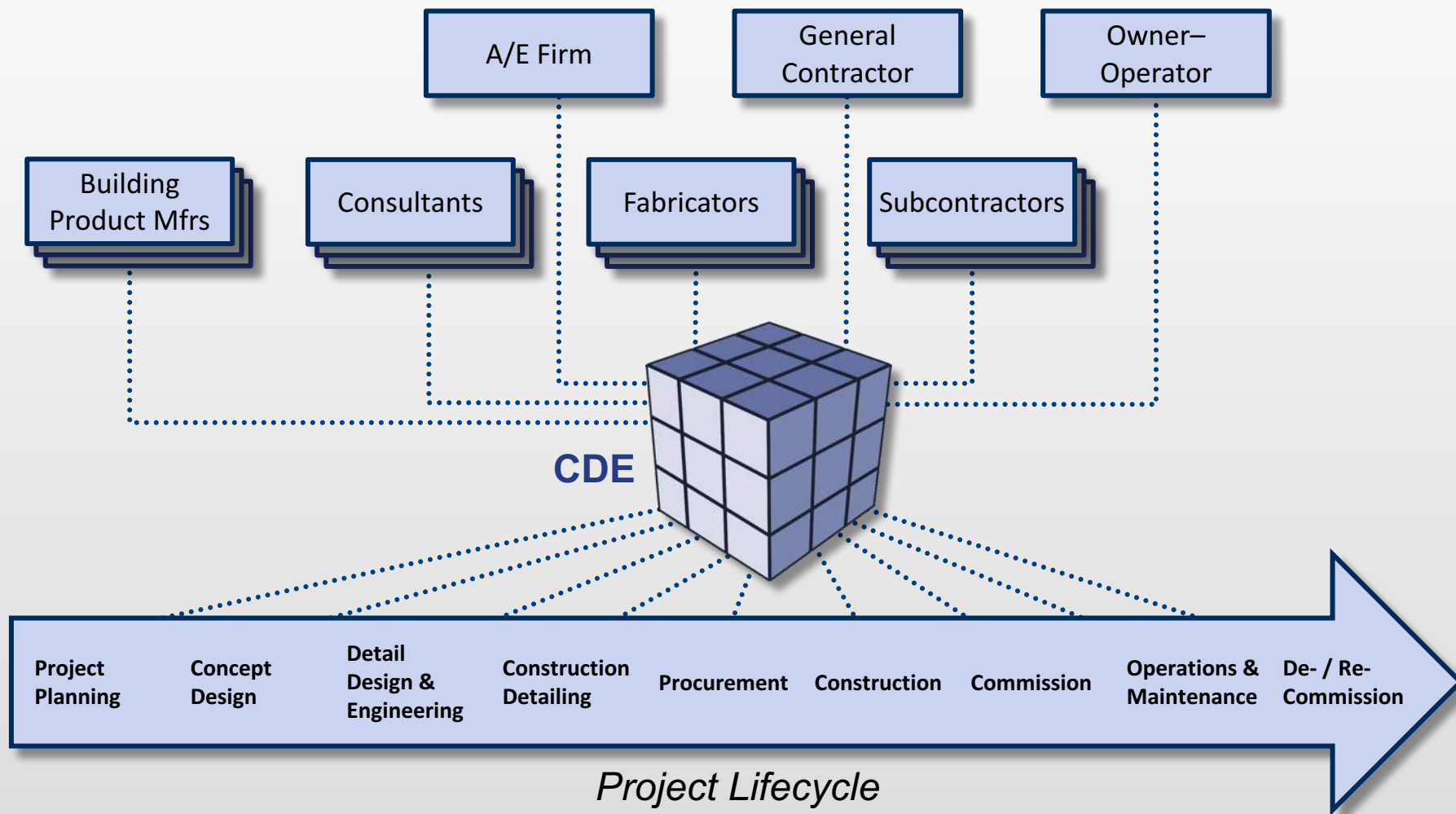
Specific applications:

- Project performance analytics
- Design optimization
- Virtual design & construction (VDC)
- Project management
- Change management
- Content & document management
- Field management
- Construction management
- Product & specification catalogs

A public cloud is an ideal platform for establishing a Common Data Environment (CDE)

A Common Data Environment in the Cloud

The cloud can be a platform for establishing a Common Data Environment (CDE)

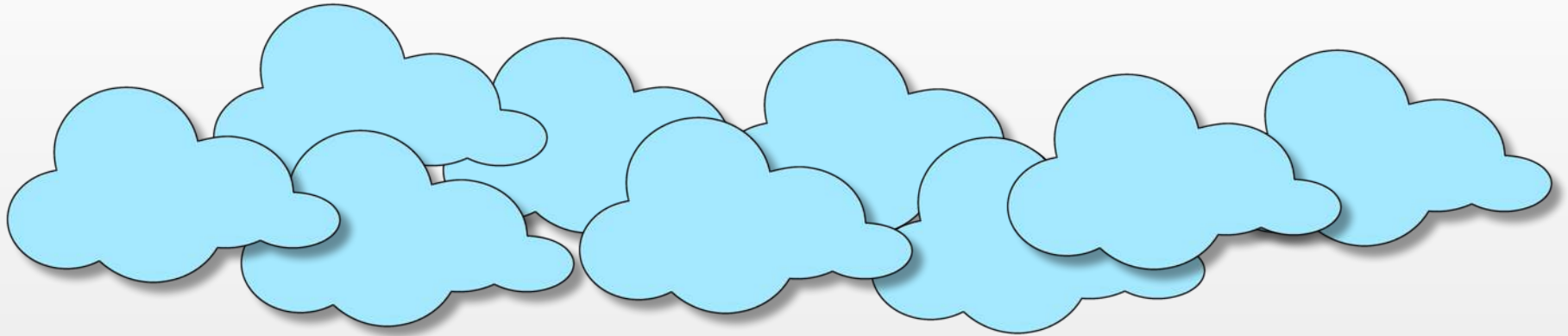


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Forecast: Cloudy, a Chance of Data Deluge

Cloud strategy must be planned and managed



- The nature of cloud services makes it easy for individuals and departments to adopt them incrementally, but ...
- A piecemeal approach to adopting cloud services can create a host of problems
 - Integration complexity = number of cloud services **squared** (worst case)
 - Challenges of managing users, access rights, and security policies increase
 - Cloud “siloes” can emerge, causing fragmentation of processes and data
 - User interface proliferation can impact productivity

SaaS Solution Considerations (Part 1)

Provider strategy, terms of service, and support

- Platform strategy

- Does the provider have a platform strategy, or is the service a point solution?
 - The strongest platforms combine an open and well documented API, robust developer support, and a large, active community (network multiplier)
- What integration capabilities exist through prebuilt integrations and/or partnerships?

- Stability

- A SaaS provider provisions application logic, data storage, and processing—if the service disappears for any reason, critical business processes are frozen
- It is important to understand both the financial stability of the provider and its commitment to long-term development and support of a cloud service

- Support

- What are the provider's support policies? Hours? Costs?
- Are self-service support channels available? Premium support tiers?
- What qualifications are support staff required to have?

SaaS Solution Considerations (Part 2)

Service level agreements, availability, and security

- Service level agreement (SLA)

- What service levels is the provider willing to commit to?
- What business terms apply in case of service outage, data loss, or a security breach?

- Availability

- Does the provider provide transparency and proactive communications about planned and planned downtime and maintenance?
- Where are the datacenters, and what disaster recovery protections are in place?

- Security

- What security processes are in place at the datacenter and for data transmission?
- How do you support multi-factor authentication, password recovery, and encryption?
- Do security experts carry high level certifications such as OSCP and/or GPEN?
- When were the latest audits completed, and to what standard (NIST, ISO 27001, SSAE 16, ISAE 3402, ...)?
- Will the provider attest to compliance with X (your critical compliance standard)?

SaaS Solution Considerations (Part 3)

Privacy, data retention, and architecture

- Privacy

- Where is data stored, and what laws apply?
- What privacy policies apply for access to and usage of data?

- Data ownership

- What if any ownership or usage rights are claimed by the provider or any third party for data or metadata stored in or generated through use of the service?
- Will existing data be accessible if service is discontinued? For how long?
- What means exist to export data from the service? What limitations apply?

- Architecture

- Does the application have a multi-tenant or single-tenant architecture?
 - Single-tenant provides more isolation, but is expensive to set up and maintain
- If multi-tenant, how many tenants share a single instance? How is data isolated among tenants? Is there a single shared database, is database sharding used, or is there a single database for each tenant?

SaaS Solution Considerations (Part 4)

Solution fit, migration, and adoption

- Solution fit

- How well does the solution fit our business needs and existing workflow?
- Is there any ability to configure, customize, and/or extend the solution?
 - Some customizations provide useful flexibility, for example configuring or adding new data fields to support specific processes or integrations with systems such as CRM or ERP
 - Built-in scripting support can also be useful in the right hands
 - Configuration is generally safe, but be **very** careful with customization

- Migration

- What tools are available to aid migrating existing data to the service?
- Does the provider offer consulting services or partners to assist with migration?

- Adoption

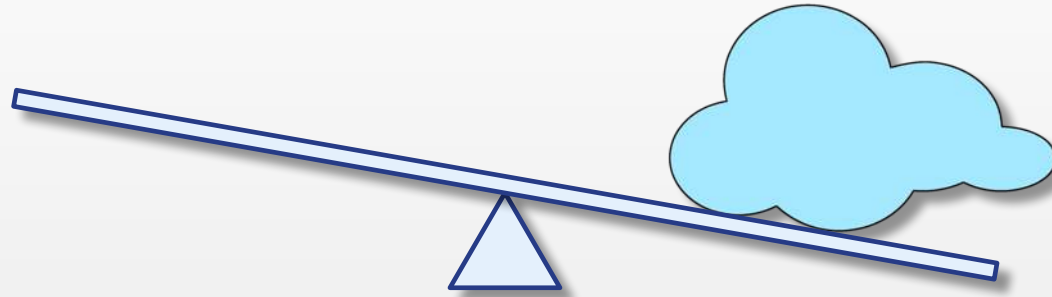
- What training is needed and available to support adoption?
- Does the provider provide dedicated customer success representatives?

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How to Weigh a Cloud?

When deciding where to start, play to the strengths of the cloud



Less Relevant *for now ...*

- BIM modeling* (massive datasets)
- Security-critical projects
- Established business processes (if they are working well today)

** New SaaS applications promise to deliver high performance modeling by maintaining the design database in the cloud*

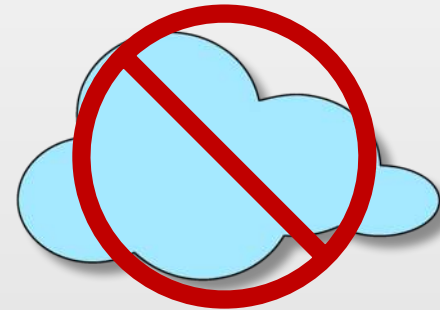
More Relevant

- Processes involving multi-organization collaboration (change & project management)
- Mobile and field use cases (punch lists, inspections)
- New initiatives & replacement of underperforming systems

Take the Long View

Avoid incrementalism, and adopt a platform-oriented strategy

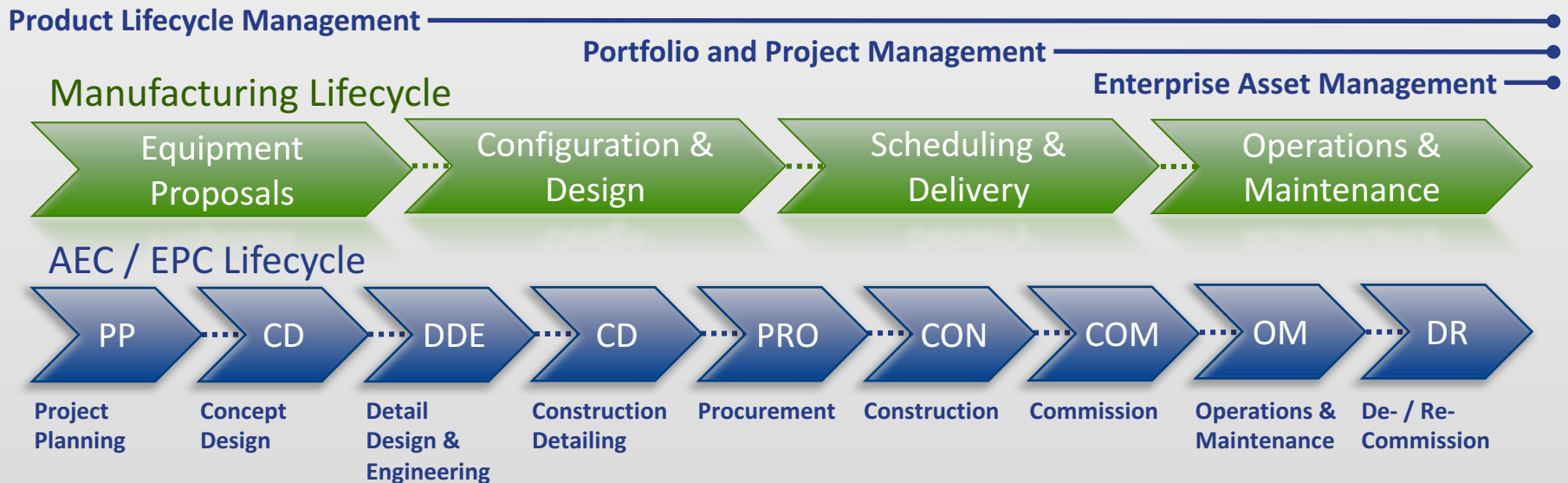
- “Cloud chaos” is a recipe for disaster
- No single provider currently provides a complete end-to-end cloud solution
 - Nor would it be wise to limit yourself to a single provider in the future
- The best approach is to choose one or two core platforms, and then augment those with carefully selected applications



Start with the Business Process

Strategize and prioritize

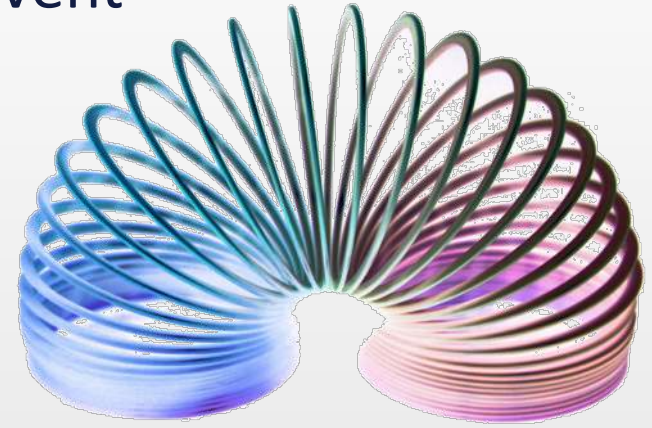
- Study existing business processes across the **entire** lifecycle, identify inefficiencies from processes that:
 - Cause significant delays or consume disproportionate resources
 - Cross multiple organizational boundaries
 - Generate “multiple versions of the truth”
 - Involve paper-based field work



Stay Flexible

Flexibility is a key advantage of the cloud—take advantage of that strength

- Cloud adoption is a journey, not an event
 - Based upon a business process assessment, identify and quantify a portfolio of fast-payback opportunities
 - Don't pursue a “big bang,” but instead progressively grow cloud capabilities
 - Develop a roadmap with checkpoints to assess progress, measure financial benefits, and consolidate learnings
- Success depends upon combining a long term strategy with:
 - Clear objectives and metrics
 - Selection of the best business partners
 - Nimble decision making
 - Constant learning and skills development



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CIMdata's Perspective on the Cloudy Future

Themes for the next three to five years

- The rise of the platform
 - The market will evolve to a handful of AEC & EPC cloud platform solutions that benefit from the network multiplier effect
 - “Specialist SaaS” providers will thrive or perish in this ecosystem of platforms
- Challenges and progress on security
 - Ongoing breaches (not necessarily in AEC & EPC) will drive continued evolution of security solutions and security thinking
- Learning from data
 - The aggregation of huge datasets within cloud platforms will create an opportunity to analyze and improve customer business processes
 - This is a perfect application for machine learning—identifying patterns and predicting optimal actions will become the source of competitive advantage

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**Dates may be subject to change*

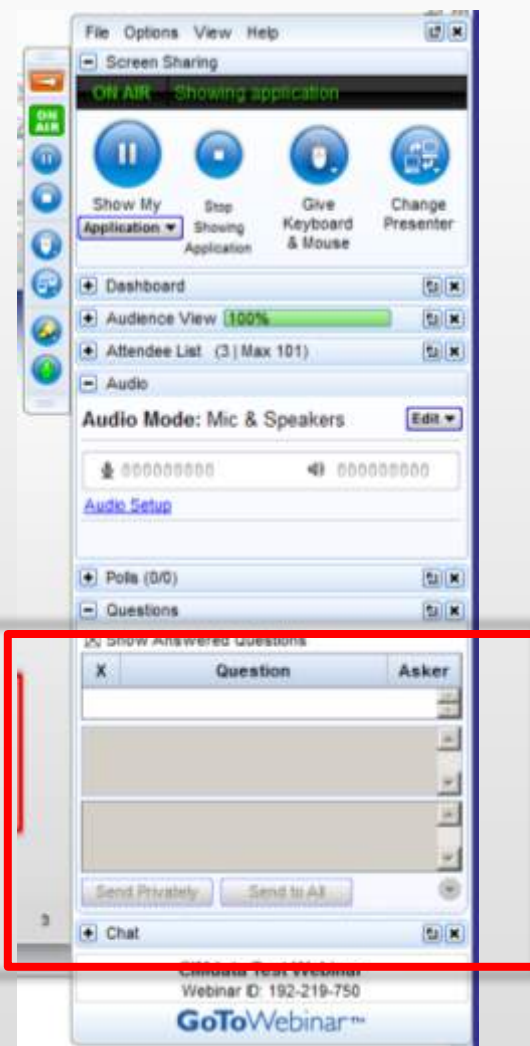
2017 CIMdata Leadership Webinars

- Scheduled for the second Thursday of each month
- Join us on February 9, 2017 for the next complimentary CIMdata Educational Webinar
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- “Why Connected Intelligent Products need Semantic Web Technology”
- Check-out our CIMdata On Demand channel at <http://www.cimdata.com/en/resources/complimentary-educational-webinars> for an archive of past CIMdata Leadership Webinars

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