Pervasive Datacenter Architecture (PDx™) Design Guide:

OPTIMIZE DATA EXCHANGE WITH AWS OUTPOSTS

CONTENTS

CURRENT STATE **CHALLENGES**

Data Gravity poses a significant challenge to traditional IT architectures. Typical problems with current architectures include:

+ Legacy architectures constraining performance
+ Complexity driving up storage total cost of ownership
+ Compliance difficult to maintain with data sprawl
+ Siloed data preventing analytics enablement

CALL TO **ACTION**

This solution guide is intended as a companion to the Optimize Data Exchange with AWS Outposts Blueprint found in the Pervasive Datacenter Architecture (PDx™) library.

Leverage this guide and the companion blueprint to build your centers of data exchange which:

+ Optimize data exchange between users, things, networks and clouds
+ Maintain data compliance and sovereignty
+ Enable real-time intelligence across workflows

OVERVIEW

EXECUTIVE SUMMARY

The digital economy is remaking both private and public enterprises across all industries, transforming how they create and deliver value.

To succeed, companies need to:

+ Operate ubiquitously and on-demand
+ Augment workflows with real-time intelligence
+ Serve customers, partners and employees across all channels, in all business functions and points of business presence

This is forcing IT to re-architect towards a decentralized infrastructure which:

+ Removes data gravity barriers
+ Accommodates distributed workflows
+ Solves global coverage, capacity and ecosystem connectivity
+ Integrates the physical and virtual worlds within proximity of centers of data exchange, interconnected to digital ecosystems and tailored to business needs

The global datacenter platform to enable this is PlatformDIGITAL®

USING THIS GUIDE

This guide is intended for:

+ Business Strategists
+ Technology Leaders
+ IT Architects
+ Those responsible for the design and implementation of technology solutions

This solution guide is intended as a companion to the Optimize Data Exchange with AWS Outposts Blueprint found in the Pervasive Datacenter Architecture (PDx™) content library.

The PDx library contains blueprints, architectural patterns and design guides for common building blocks and use cases.

Together, these documents provide a roadmap for the successful deployment of solutions to real-world digital transformation use cases. They cover critical steps and important considerations when architecting and implementing.

To obtain a copy of the blueprint and other documents related to PDx™, please visit: www.digitalrealty.com/PDx-Library

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STORYBOARD

SET CONTEXT

Strategic considerations, recommendations and what is driving them

Current state constraints and challenges with data exchange

Future state capabilities and objectives of an optimized data exchange architecture

APPLY METHODOLOGY

Introducing PDx™ methodology, aligning business requirements with technical objectives

Checklists to ensure PDx steps are executed and required information is collected

Point of presence strategy aligned to business requirements and objectives

DESIGN SOLUTION

PDx™ methodology and library to support activation of optimized data exchange

Advantages unlocked by optimizing data exchange

Experience and capabilities to assist you on your digital journey

KEY TAKEAWAYS

Digital business requires a new data-centric infrastructure architecture, one that localizes data aggregation, staging, analytics, streaming and management at global points of business presence.
PDx™ methodology helps you to:

+ Triangulate business, infrastructure and architecture requirements to determine data availability and retention requirements by location
+ Create portfolio view of applications and workloads with data sources to tailor infrastructure deployments for in-motion/at-rest data exchange
+ Enable global workflows and integrate ecosystems with distributed data management hosted at points of B2B data exchange

This improves performance and data compliance control necessary to support exploding volume, variability and velocity of data creation, as well as processing and storage to accommodate digital business. The strategy brings the users, networks, systems and controls to the data, which removes barriers of data gravity and creates centers of data exchange to scale digital business.

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STRATEGY MODEL: OPTIMIZE DATA EXCHANGE

SCENARIOS	DRIVERS	ACTIONS	OUTCOMES
Pressure to realize the benefits of data-driven business	High complexity and poor productivity across the data and analytics stack	Integrate public and private data sources across distributed workflows	Faster data-driven insights and decisions
Need to improve performance of data-intensive business and operational systems	Poorly performing mix of cloud and legacy apps frustrate users and partners, impacting business	Distribute business applications near data and fixed systems to improve performance	Increased business productivity
Proliferation of applications, data, devices and service providers	Spiraling IT infrastructure costs, tech debt straining an already over-taxed IT organization	Deploy regional data hubs to modernize infrastructure and streamline app integration	Improved IT sustainability
Demand to ensure compliance with data residency globally	Grafting controls onto legacy data stores risks compliance failure	Geographically align data storage for compliance	Reduced cost

FACTORS TO CONSIDER

Existing centralized models not sufficient

Current architectures do not address cost, performance, security and scalability

FACTORS TO CONSIDER

Where centers of data gravity exist

What users, applications, and data are required for key workflows

Data needs/feeds for physical systems, production lines

KEY TAKEAWAYS

The digital economy is remaking both private and public enterprises across all industries, transforming how they create and deliver value. Data is a key driver of the digital economy, and enterprises need to:

+ Operate ubiquitously – meet the customer in their market
+ Service on-demand – real-time is the new reality
+ Augment systems with real-time intelligence

They need to serve customers, partners and employees across all channels, business functions and points of business presence. This is forcing IT to implement a decentralized infrastructure that removes data gravity barriers to accommodate distributed workflows, which vary by participant, application, information and location specific needs. Combine this strategy with PDx™ methodology and blueprints to optimize data exchange, enabling distributed workflows at global points of presence.

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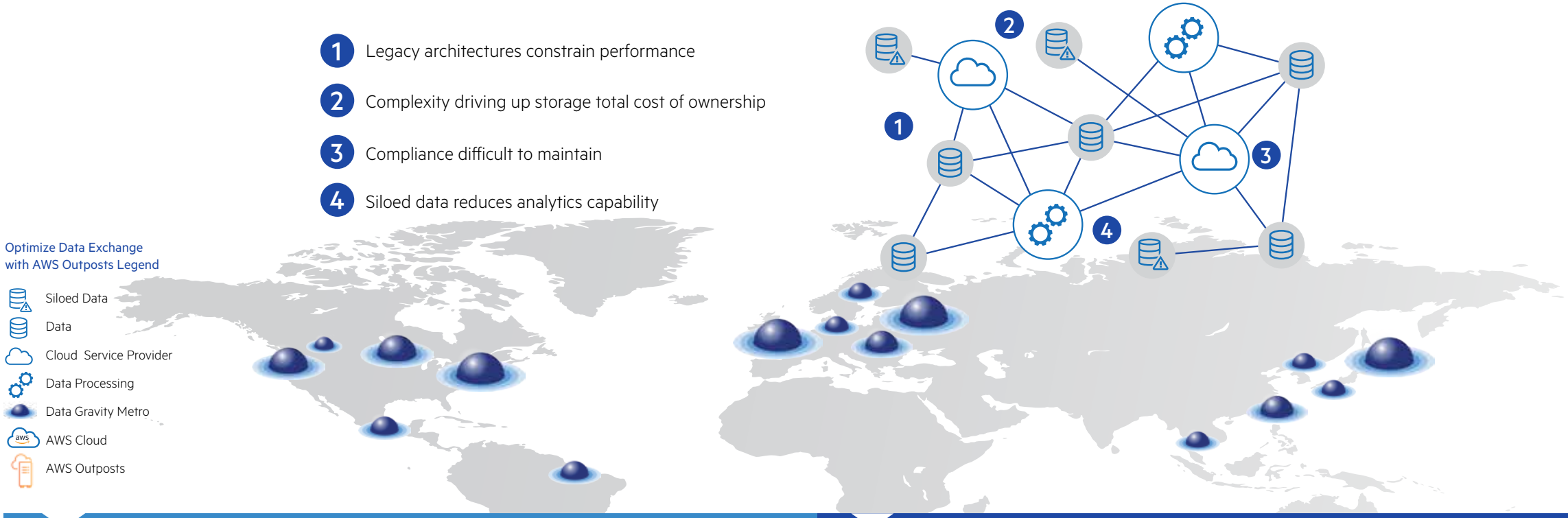
TODAY: CURRENT STATE CHALLENGES

1. Legacy architectures constrain performance
2. Complexity driving up storage total cost of ownership
3. Compliance difficult to maintain
4. Siloed data reduces analytics capability



KEY TAKEAWAYS

+ Legacy architectures have not been implemented consistently, resulting in fragmentation, which inhibits performance and increases risk
+ Inadequate cloud connectivity and sub-optimal storage placement drive up the total cost of ownership for storage
+ Data architecture and governance models historically not designed with multi-region workflows in mind, increasing compliance risk
+ Siloed data creates barriers to analytics, which enable new business opportunities

BEST PRACTICES

Recognize the gaps in this architecture. The problems with this approach include:

+ Architecture – lacks a consistent and coherent foundation to enable data exchange
+ Cloud – uses inefficient connectivity to connect data and applications
+ Compliance - data storage and access methods drive sprawl, cost and risk
+ Analytics – data not unlocked to enable new business models based on data

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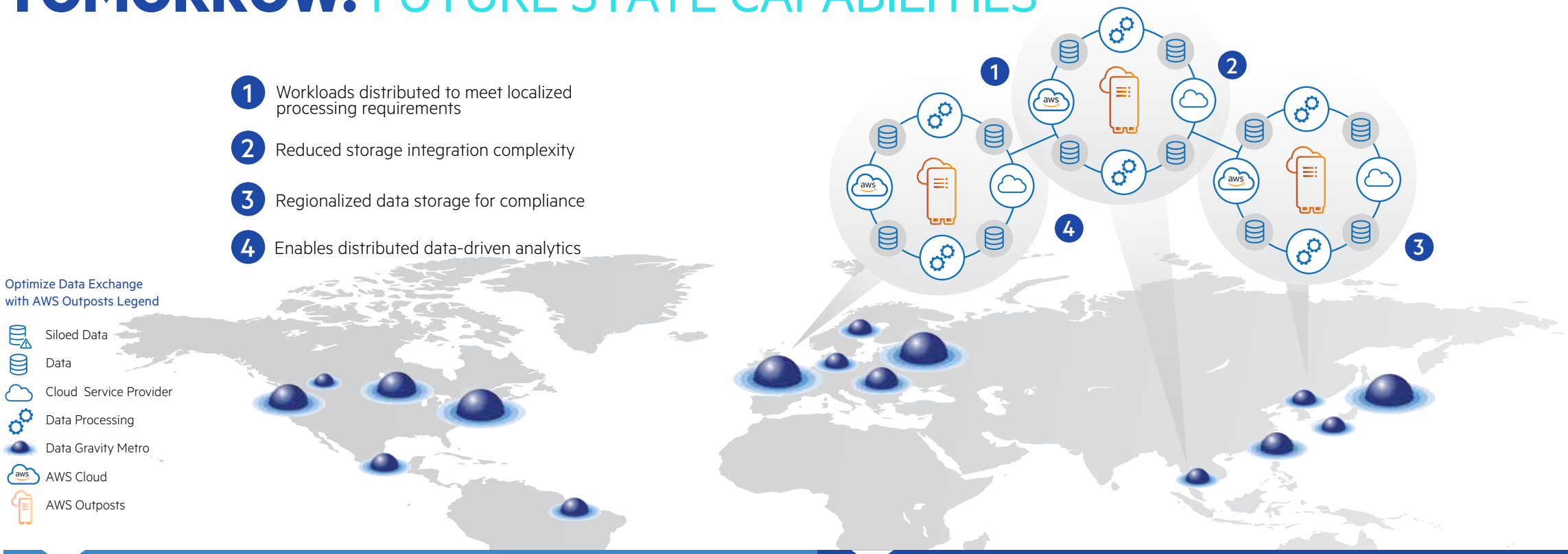
TOMORROW: FUTURE STATE CAPABILITIES

1. Workloads distributed to meet localized processing requirements
2. Reduced storage integration complexity
3. Regionalized data storage for compliance
4. Enables distributed data-driven analytics



KEY TAKEAWAYS

+ AWS Outposts deployed in centers of data exchange provide consistent hybrid-IT capabilities with reduced execution risk
+ Balancing storage by using services in AWS Outposts, as well as adjacent storage platforms reduces integration complexity and allows optimized price/performance for workloads
+ Using Outposts to localize compute and storage capacity provides consistency and reduces risk while complying with data regulations
+ Integrated AWS services in Outposts enable faster deployment of capabilities, such as analytics and AI which can drive differentiated business outcomes

BEST PRACTICES

Solve for Data Gravity and expand your Hybrid-IT capabilities by:

+ Placing hubs powered by AWS Outposts at business points of presence, where there are identified participants and centers of data exchange
+ Leverage AWS services integrated in Outposts to increase IT business responsiveness while ensuring data residency and compliance
+ Plan data architectures intentionally with compliance, geography and B2B data exchange in mind

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A PROVEN APPROACH: PDx™ METHODOLOGY

PLAN ZONES
Plan distributed workflows at business points of presence requiring centers of data exchange

DEPLOY FOOTPRINTS
Deploy fit for purpose footprints matched to workflow profiles and workload attributes interconnecting participants at centers of data exchange to enable distributed workflows

IDENTIFY PARTICIPANTS
Identify the users, applications, data, and things that will participate in distributed workflows

MAP WORKLOADS
Map workload types with performance attributes required to support participants in distributed workflows

KEY TAKEAWAYS

PDx™ provides a methodology and repeatable strategy to enable your digital workplace, covering how to:

+ Plan distributed workflows where your customers/partners/employees engage
+ Identify users, apps, data, and things that will participate in distributed workflows
+ Map workload types with performance attributes to ensure a performant quality of experience
+ Deploy fit for purpose footprints to support your digital workplace

BEST PRACTICES

+ The digital workplace supports new business models that require a new IT architectural approach, incorporating a holistic view of business and technical requirements
+ Apply this model to each use case to accommodate distributed business workflows that vary by location, type, and participant
+ Apply the output of the PDx™ approach against established architectural blueprints from the PDx™ library to create a tailored IT plan for your digital workplace

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PDx STEP 1

PLAN Zones of Data Exchange

Checklist

ACTION	ACTION STEP	COMPLETE
1 **DOCUMENT LOCATIONS**	• Legal Presence • Employee Concentration/Branch Office • Ecosystem Partners • Regional Headquarters	☐
2 **DETERMINE WORKFLOWS**	• Revenue • Risk & Regulatory • Collaboration/Decision Support • General Purpose	☐
3 **BUILD WORKFLOW OPERATIONAL PROFILE**	• Priorities x Workflow x Location • Downtime acceptable • Data loss acceptable	☐

KEY TAKEAWAYS

To optimize data exchange, first plan distributed workflows at business points of presence requiring centers of data exchange

Three main actions:

+ Document Locations
+ Determine Workflows
+ Build Workflow Operational Profile

BEST PRACTICES

+ Location-based design considers users, data, clouds and AWS regions which will support Outposts
+ Understanding workflows, and placing emphasis on revenue, risk and regulatory workflows and designing from that perspective solves for business requirements first instead of as an after-thought
+ An optimized data exchange architecture begins with an inversion of traditional architectures, bringing key people, applications, clouds and things to the data

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PDx STEP 2

IDENTIFY Distributed Workflow Participants

Checklist

ACTION	ACTION STEP	COMPLETE
4 DOCUMENT USERS	• Employees • Customers • Ecosystem • Things	☐
5 DOCUMENT APPLICATIONS	• Applications and supporting services • Data repositories and data types	☐
6 DETERMINE WORKLOADS	• Latency sensitive (i.e. Interactive) • Throughput sensitive (i.e. Distribution) • Scale sensitive (i.e. Analytic) • Security sensitive (i.e. Ecosystem)	☐

KEY TAKEAWAYS

Optimizing data exchange requires you to identify users, apps, data and things that will participate in distributed workflows

Three main actions:

+ Document users (and user types)
+ Document applications (and supporting data repositories)
+ Document workloads (and their characteristics)

BEST PRACTICES

+ Designing around users and what they are using is critical in order to avoid performance and security issues that can plague legacy architectures
+ Document the data requirements to ensure compliance with regulatory issues and ensure that all dependencies are satisfied before deployment decisions are made
+ Consider what workloads will reside in the AWS Outposts environment, as well as what applications, data and supporting services the Outposts will require
+ For workloads in Outposts, document which can operate in the hosting AWS Region and which must remain resident on the local environment

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PDx STEP 3

MAP Workloads and Performance Attributes

Checklist

ACTION	ACTION STEP	COMPLETE
7 WORKLOAD ATTRIBUTES	• Concurrency and messaging behaviors • User or event-driven workflow • Compute and I/O dependencies • Policy enforcement requirements	☐
8 SIZE WORKLOAD	• Daily workload volumes • Size and variability of data sets, files, content • Exception-based processing needs • Response time, availability, priority tiers	☐
9 WORKLOAD PROFILE	• Sensitivities x Attributes x Sizing • Cross reference with workflow profile • Combine reference with participant profile	☐

KEY TAKEAWAYS

Successfully optimizing data exchange necessitates that you map workload types with performance attributes to support participants in distributed workflows

Three main actions:

+ Determine workload attributes
+ Size workloads based on key characteristics
+ Create workload profiles to inform infrastructure requirements

BEST PRACTICES

+ Consider carefully the requirements for workloads (including dependencies between workloads) interaction with data to ensure that performance targets can be met
+ When sizing workloads, be mindful of dataset sizes and time of day considerations to avoid performance problems that can result from concurrency or oversubscription
+ Understand what services will be required and what services are available on Outposts, and consider what "flavor" of Outposts will be implemented (compute, memory, graphics or I/O centric)
+ A comprehensive workload profile considers both priority and performance and takes into account the business criticality of the workflow that a given workload supports

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PDx STEP 4
DEPLOY Fit for Purpose Footprints

Checklist

ACTION	ACTION STEP	COMPLETE
10 **PROFILE DETAILS**	• Workflow Profile (type(s), priority, location, downtime, data loss) • Participant Profile (users, applications, data sources) • Workload Profile (type, attributes, sizing, dependencies)	☐
11 **DETERMINE DEPLOYMENT**	• Public Cloud w/adjacent datacenter • Hybrid Cloud w/adjacent datacenter • Private Cloud w/adjacent datacenter	☐
12 **SELECT FOOTPRINT**	• Network Hub • Control Hub • Data Hub • SX Fabric	☐

KEY TAKEAWAYS

Deploy fit for purpose footprints matched to workflow profiles & workload attributes interconnecting participants at centers of data exchange zones to enable distributed workflows

Three main actions:

+ Aggregate Profile Details
+ Determine Deployment Strategy
+ Select Footprints

BEST PRACTICES

+ For each workload, determine whether it will be supported by public, private or hybrid cloud and what scale will be required to support the workload profile
+ Determine what services are needed to support the workload, including network and security services, and determine if they will be in-cloud or adjacent to the cloud
+ Select the footprints required to support the deployment - for example, in addition to a Data Hub, it is likely that a Control Hub will be deployed to provide security and a network hub to provide optimized access to the data sources in the Data Hub

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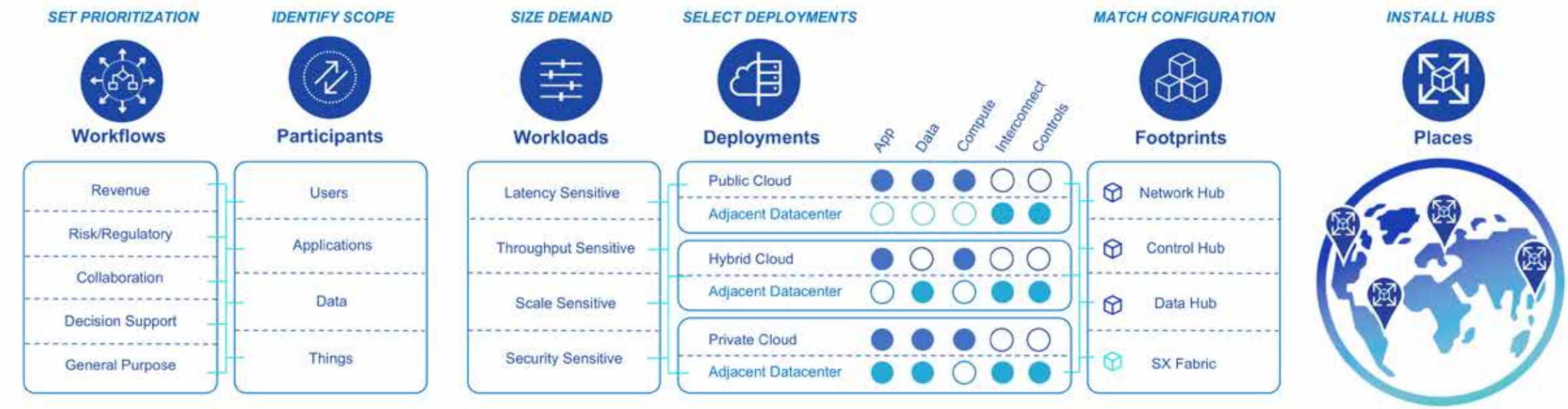
DESIGN MODEL: Optimized Digital Workplace Deployment



KEY TAKEAWAYS

In the previous steps, you have mapped the demand profile of the workflows, participants and workloads. Now you must select deployments and match the configuration of supporting footprints. Use the design model to select appropriate footprints, and be certain to factor in the architectural standards of your organization in the deployment. With this data, you now can deploy complete digital points of presence in key centers of data exchange. It is typical to have multiple footprints deployed in multiple zones in order to support the demands of your workloads and couple complimentary or supporting services. This point of presence strategy that incorporates these elements is how the PDx methodology drives success.

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TOOLKIT: Methodology and Blueprints

PDx™ METHODOLOGY

PDx Optimize Data Exchange with AWS Outposts BLUEPRINT

KEY TAKEAWAYS

To Optimize Data Exchange, leverage the entire PDx™ Toolkit. The Pervasive Datacenter Architecture (PDx™) library consists of strategy, methodology, blueprints and architectural patterns designed to inform, codify and expedite your IT deployments. The Optimize Data Exchange with AWS Outposts Blueprint outlines the three simple steps needed to enable a digital workplace:

+ Implement data staging/aggregation to maintain compliance and data sovereignty
+ Integrate public/private data sources to optimize data exchange between users, things, networks and clouds
+ Host data and analytics adjacent to network ingress/egress points to enable real-time intelligence across distributed workflows locally and globally

By applying the PDx™ methodology along with using the Optimize Data Exchange blueprints, you will create a target state architecture tailored to your specific requirements.

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VALUE IMPACT

OPTIMIZE DATA EXCHANGE BETWEEN USERS, THINGS, NETWORKS & CLOUDS

Truly consistent hybrid experience

Integrate public/private data sources in private environment

Direct connect to public data sources on the same platform

MAINTAIN DATA COMPLIANCE & SOVEREIGNTY

Provide a single global data center platform of secure, compliant data centers & hybrid IT

Host data locally between cloud & edge and public & private environments

Store and process data that needs to remain in private environment

ENABLE REAL-TIME INTELLIGENCE ACROSS WORKFLOWS

Deliver intelligent real-time responsiveness & reduce amount of data transferred

Remove performance limitations with data-centric architecture

Distribute business intelligence within proximity of users and data

KEY TAKEAWAYS

Using the Optimize Data Exchange with AWS Outposts Design Guide and Blueprint to determine data placement and interconnection, you can achieve this type of value. Data Gravity forces a new architecture, one that inverts traffic flow and brings users, networks and clouds to privately hosted enterprise data. This means that data needs to be hosted locally, whether it is in the public or a private domain. With this new architecture, Data Gravity barriers are removed, and new capabilities are unlocked. PlatformDIGITAL® provides a ready-made environment to deploy AWS Outposts. Additionally, pre-sized and validated deployment options are available that significantly de-risk and reduce time to implement.

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YOUR PARTNER: Platform and Enablement

PlatformDIGITAL®

FIT FOR PURPOSE INFRASTRUCTURE

Customers can tailor infrastructure deployments to any size, scale or configuration to meet business needs on PlatformDIGITAL®

FIT FOR PURPOSE INTERCONNECTION

Customers can optimize right-size connectivity via a fabric of physical and virtual direct interconnections to whom they need on PlatformDIGITAL®

MISSION CRITICAL EXPERTISE

Customers can harness the expertise from operationalizing the most complex global data center facilities on PlatformDIGITAL®

GLOBAL COVERAGE

6	Continents
22	Countries
47	Metros
280	Data Centers

INTERCONNECTED SYSTEMS

700+	Network and Content Providers
600+	Cloud and IT Providers
800+	Enterprises

ALWAYS ON ALWAYS AVAILABLE

24/7	Support
365	Days per year
99.999%	Uptime

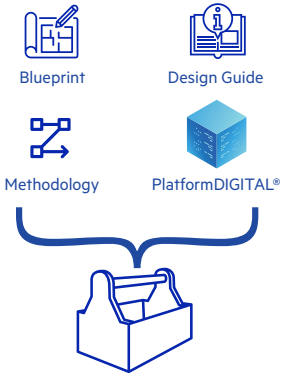
Visit: www.digitalrealty.com/platform-digital

PROVEN EXPERIENCE

PDx™ Blueprint – Solution Enablement Workshop

PDx™ WORKSHOP

PDx™ TOOLKIT



SCOPE
+ Pre Workshop Call
+ ½ Day Workshop
+ 2 Week Elapsed Time

DELIVERABLES
+ Tailored Blueprint
+ Value Model Strawman

BENEFITS
+ Identify Optimization Opportunities
+ Accelerate Time to Value
+ Compress Time to Execute

Combining our PDx™ methodology, blueprints and the power of PlatformDIGITAL® can solve for the needs of digital transformation.

Our expert Solution Architects can help accelerate your transformation with workshops built to leverage the PDx™ methodology, customized to your unique requirements.

Send an email to workshop@us.digitalrealty.com to coordinate your workshop (include “Workshop” as subject line).

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PROCESS MODEL

PLAN

Plan distributed workflows at **business points of presence** requiring centers of data exchange.

IDENTIFY

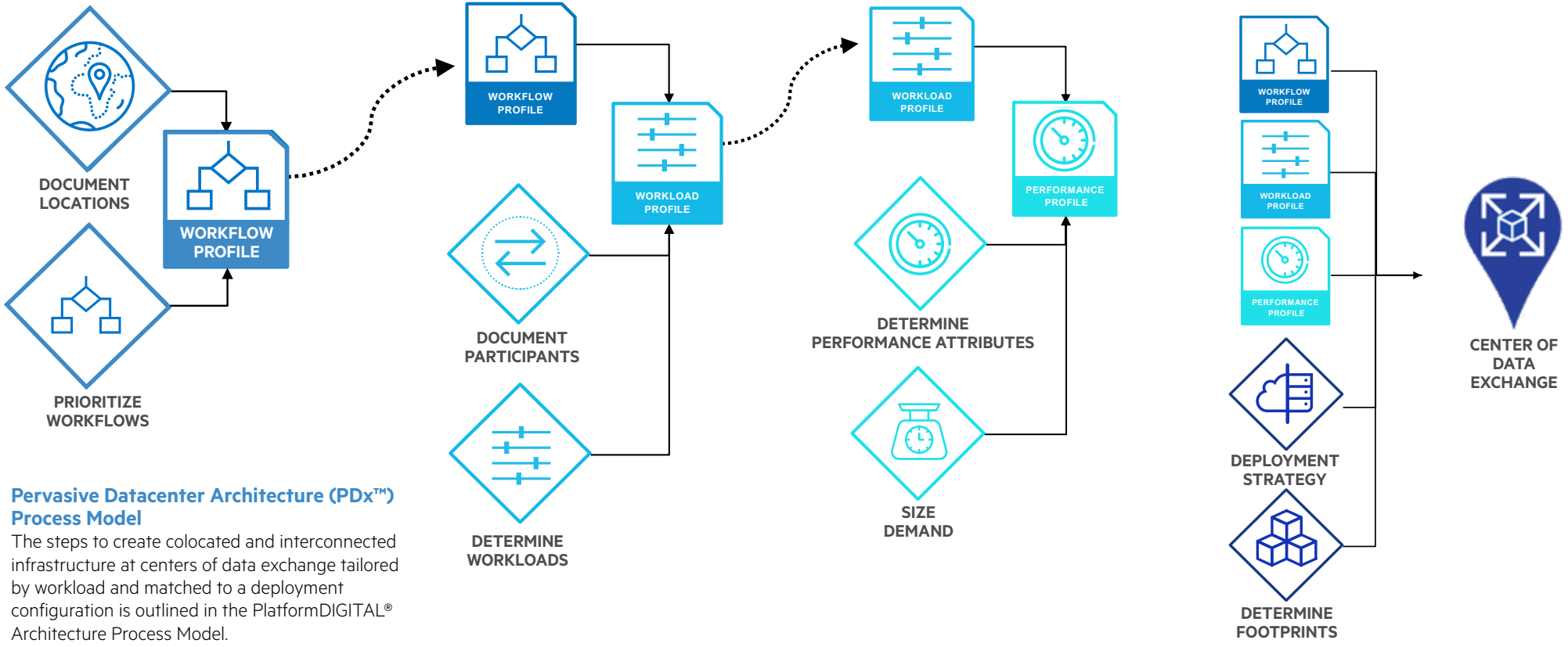
Identify the **users, applications, data and things** that will participate in distributed workflows.

MAP

Map workload types with **performance attributes** required to support participants in distributed workflows.

DEPLOY

Deploy **fit for purpose** footprints **matched to workflow profiles and workload attributes** interconnecting participants at centers of data exchange zones to enable distributed workflows.



Pervasive Datacenter Architecture (PDx™) Process Model

The steps to create colocated and interconnected infrastructure at centers of data exchange tailored by workload and matched to a deployment configuration is outlined in the PlatformDIGITAL® Architecture Process Model.

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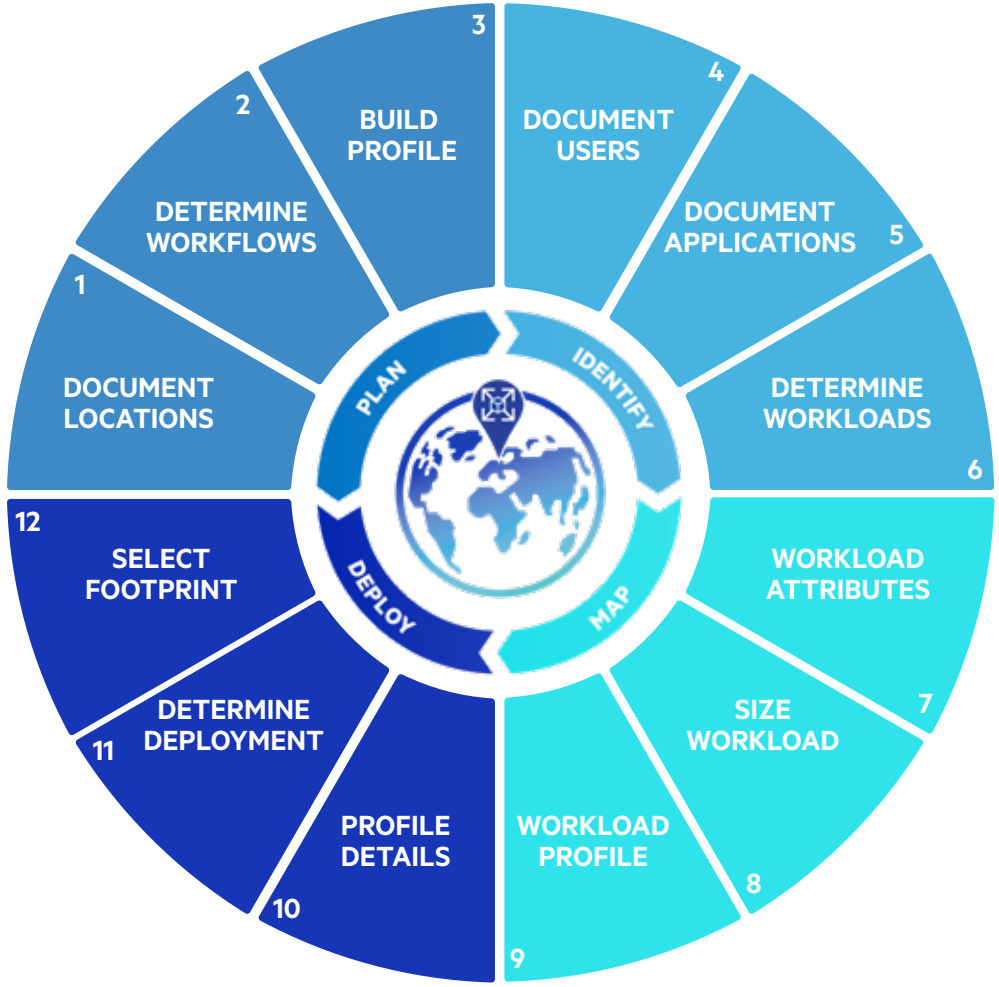
INTEGRATED CHECKLIST



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