Schlumberger

Understanding the OSDU Opportunity

A Schlumberger Guide to the OSDU Data Platform

What is the purpose of this guide?

This concise guide to the Open Group Open Subsurface Data Universe™ (OSDU) Forum, provides an introduction, overview, and look at what's next. The guide provides information ahead of the R3 release, known as the Mercury Release, of the OSDU™ data platform.

A note on terminology: The abbreviation OSDU is often used interchangeably. In general usage it often refers to the OSDU Forum, but can also refer to its technical output—the OSDU Data Platform. To avoid any confusion, here we are using "the OSDU Forum" when we are referring to the organization and "OSDU Data Platform" for the technical output. Where we just say "OSDU" we mean both (the totality of technical output, standards, principles). OSDU™ is the official name of the standard and will be used appropriately.

Similarly, the words 'data ecosystem' and 'data platform' are used frequently in this document. They are not interchangeable, but their meanings overlap. Broadly speaking, 'data ecosystem' refers to a network of interacting components that directly or indirectly consume, produce, or provide data and other related resources. A data platform is an integrated technology solution that allows data to be governed, accessed, and delivered to users, data applications, or other technologies for strategic business purposes.

The OSDU Data Platform Mercury Launch will be on March 24, 2021. Unlike previous releases (R0, R1, and R2), which were deployed among operators by a small number of OSDU founder members, purely for experimental, learning, and troubleshooting purposes, the Mercury Launch will be the first release available for operational use by the wider industry. The Mercury Launch is the first release to include the open source DELFI data ecosystem code contribution from Schlumberger.

This guide is for you, if you are:

- A technical user of E&P data and petrotechnical software,

- In a digital leadership role in oil and gas, looking after digital transformation, IT integration, or data,

- An executive in oil and gas seeking to better understand the digital landscape.

This guide will help you navigate the emerging industry conversation around the OSDU data platform, giving you an overview of what's likely to happen and when—and, crucially, what that will mean to you and your organization.

This document was produced by the OSDU team at Schlumberger. Schlumberger is a member of the OSDU Management Committee (OMC) and contributed open sourced code from its DELFI data ecosystem to the OSDU Forum in August 2019.

The authors of this guide are actively involved in the OSDU Management Committee, sub-committees and project teams, as well as having an in-depth understanding of the DELFI data ecosystem.

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What is the OSDU?

The OSDU, or more precisely, the Open Group Open Subsurface Data Universe™ Forum is a cross–industry collaboration, to develop a common, standards–based and open basis for an E&P data platform that will bring together exploration and development data. Its output is free code as well as data standards that operators or third parties can use.

The OSDU Forum aims to establish a shared approach to organizing and handling subsurface data, as well as developing the tools operators and third parties need to build on this shared foundation.

It's an open source/open standards project. All code will be released for open use and the E&P community is encouraged to feed their work on the code back into the project.

There are currently (March 2021) over 194 members of the OSDU Forum, including oil and gas operators, service companies, system integrators, cloud service providers, and academic institutions

What will the OSDU enable?

The OSDU Data Platform will unlock the key promises of digital transformation in E&P, namely:

- Enable secure, reliable, global, and performant access to all subsurface and wells data;
- Eliminate current data silos to enable data to move seamlessly between workflows;
- Accelerate the deployment of emerging digital solutions
- Empower innovation through an open, standards-based ecosystem

Operators that use the OSDU Data Platform to deploy their own data platform will find much of the work required has already been done. This enables them to focus on specific requirements rather than reinvent the basics.

Petrotechnical users gain greater compatibility of tools across domains and easier access to data in a cloud environment.

Third-party developers benefit from a clearly defined framework of standards that ensure their applications can run in any E&P digital environment that has adopted the OSDU Data Platform. Additionally, there will be a market and user base for applications developed to OSDU standards.

By accessing the OSDU Data Platform operators can deploy their own unified, cloud–based data platform or data ecosystem

Schlumberger and OSDU

In August 2019, Schlumberger contributed the data ecosystem developed for its DELFI cognitive E&P environment to the OSDU Forum as open source code.

DELFI

At that point, the Schlumberger open source data ecosystem had run successfully in the cloud since 2017. The Schlumberger code will now form a major part of the R3 release of the OSDU Data Platform and Schlumberger has dedicated significant resources to all parts of the OSDU project.

Trygve Randen, digital subsurface solutions director, Schlumberger, explained the move at the time: "We decided to go all in with the OSDU in recognition of the fact that cracking the data platform challenge would be the key catalyst for profound digital transformation in E&P, acknowledging that the way we organize, handle, and access our data as an industry would not be an area of competitive focus. When everybody is able to use a common basis for storing data in the cloud, innovation—and healthy competition— will take off in the apps and tools that use that data."

This approach is reflective of the Schlumberger commitment to openness that began in 2006 with the introduction of the Ocean* software development framework for the Petrel* E&P software platform.

Since then, Schlumberger has been progressively enhancing its software openness and developer capabilities. In 2010, Schlumberger added the Ocean Store, which enables an entire community to develop on top of the Petrel platform and other Schumberger software products. Today, there are more than 92,000 active licenses, over 1,500 active developers, and 50 plus E&P companies using the Ocean framework and actively developing on it.

Openness

Schlumberger is committed to openness. This represents a fundamental shift in the E&P industry's philosophy. Value, in our industry, is increasingly created through a healthy mix of collaboration and competition. The OSDU data platform will enable this mix—and openness is the key.

The three pillars of DELFI openness:

- The liberation of data to flow uninhibited across domain and system boundaries;
- The ability to connect platforms and applications—own or third party;
- The power to differentiate by using open APIs and open source code to build solutions that achieve new levels of flexibility, automation, and innovation custom-made for a specific business operation.

The DELFI cognitive E&P environment

The DELFI data ecosystem is the foundational data layer for the DELFI environment and we have continued to connect and enrich the data ecosystem to enable effective sharing of data across the full range of E&P applications.

Over 200 person years of development have been invested into this robust data ecosystem for the E&P industry. Its radically data-centric approach aligns with the core principle of the OSDU Forum.

Following the contribution of the open sourced DELFI data ecosystem into the OSDU Data Platform code, the OSDU Data Platform sits at the heart of the DELFI environment.

Customers of the DELFI environment are already using the OSDU Data Platform source code, and customers transitioning to the DELFI environment are effectively transitioning to the OSDU Data Platform.

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Solving the data challenge in E&P

Solving the problem of how to store, organise and access subsurface data in a way that is compatible with the performance needs of digitally trans–formed workflows, growing data volumes and cross–domain collaboration is difficult. In fact, this challenge has proven more difficult than most in our industry (and partners from the tech sector) originally anticipated.

However, this is not a field where operators seek to differentiate them–selves from one another. It is therefore an obvious area for collaboration. Moreover, it is an opportunity to overcome the single biggest barrier to releasing the full potential of digital technology; by the E&P industry agreeing and adopting common standards that will foster innovation and increase performance.

The business impact of OSDU Data Platform is profound:

- Removing silos between domain teams creates a single coherent operation from exploration to production, leading to improved decisions, faster responses, and enhanced efficiency

- The need for costly and time-consuming data transfers will be eliminated when all data is accessible by all applications.

- Increases in the choice of software available is the impact of a shared, standardized data platform with free-flowing data. Customized, fit-for-purpose, and transformative technologies and solutions will become more accessible and affordable for all operators using the platform. A new era of innovation will support substantive increases in capabilities to drive quantum leaps in performance.

- With a view of the global data available, operators can make faster decisions and pursue E&P business strategies with greater confidence in success

Who will benefit from the OSDU?

The entire oil and gas community including third-party and periphery organizations, can benefit from the OSDU Data Platform.

By accessing the OSDU Data Platform operators can deploy their own, unified, cloud-based data platform or data ecosystem in order to leverage digital technologies and solutions and transform workflows.

It's also for third-party suppliers who wish to offer software and services in the E&P industry that rely on any kind of cloud-based data platform.

For example, the DELFI* cognitive E&P environment from Schlumberger will run on the OSDU Data Platform, it can either be offered as part of the DELFI environment or connected to a customer's OSDU Data Platform deployment. In fact, the open source data ecosystem that the DELFI environment runs on, known as the DELFI data ecosystem, forms the foundation of upcoming OSDU Data Platform releases.

Efforts are underway to make the benefits of the OSDU Data Platform available to operators with data residency requirements seeking an in-country or on-premise solution.

The OSDU Forum is currently focused on upstream data and applications only, though this may change in the future.

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Why does E&P need the OSDU?

We need the OSDU Data Platform, because our current ways of storing, sharing, accessing, and handling data are incompatible with the digital future of our industry.

For example, most systems in existence today cannot cope with the performance needs and sheer scale of digitally transformed workflows—both as data volumes grow and automation workflows demand intensive access to data. A cloud-native OSDU Data Platform deoployment will scale up to meet these demands, enabling and unlocking data-based insights.

Digital transformation initiatives in E&P currently suffer from the following challenges, which an OSDU Data Platform delopyment can address elegantly:

- Data is an underutilized asset
- Data is typically siloed and therefore doesn't lend itself to cross-domain collaboration and efficient decision-making
- There is often a lack of common understanding of how data is handled
- There can be a lack of trust in data, because its lineage is not available as context
- Duplication of effort and fragmention of approaches; in a time where the industry needs to achieve new levels of efficiency

Through the OSDU Forum, the industry is finding a common solution to these challenges together, because it has proven difficult for individual operators to do it in isolation.

For example, it has taken Schlumberger almost five years—200 person years of coding—to develop the open source data ecosystem, the foundations of which it contributed to the OSDU Forum in August 2019.

Pooling resources to continue building a framework for how we handle and organize our industry-specific data means we can create a workable solution faster. It also means that this framework is better suited to break down the silos between domains and ensure cross-compatibility—be it with E&P operators, cloud vendors, software houses, or data sources.

What are the benefits of the OSDU?

For business leaders:

Standardize for efficiency and enable innovation.

Accelerate the delivery of new domain solutions by removing the data platform and data access as a point of friction across the industry.

For technical users and data scientists:

Seamlessly access data of known quality and lineage across domains; focus on the science not on searching for data.

Experience improved assistance from software solutions to accelerate domain analysis and results generation.

Collaborate more effectively with peers in their own domain and beyond, to amplify cross-domain analysis and insights.

For digital chiefs:

Fast-track digitalization efforts with a harmonized, industry-specific data platform; access an ecosystem of twenty-first century players.
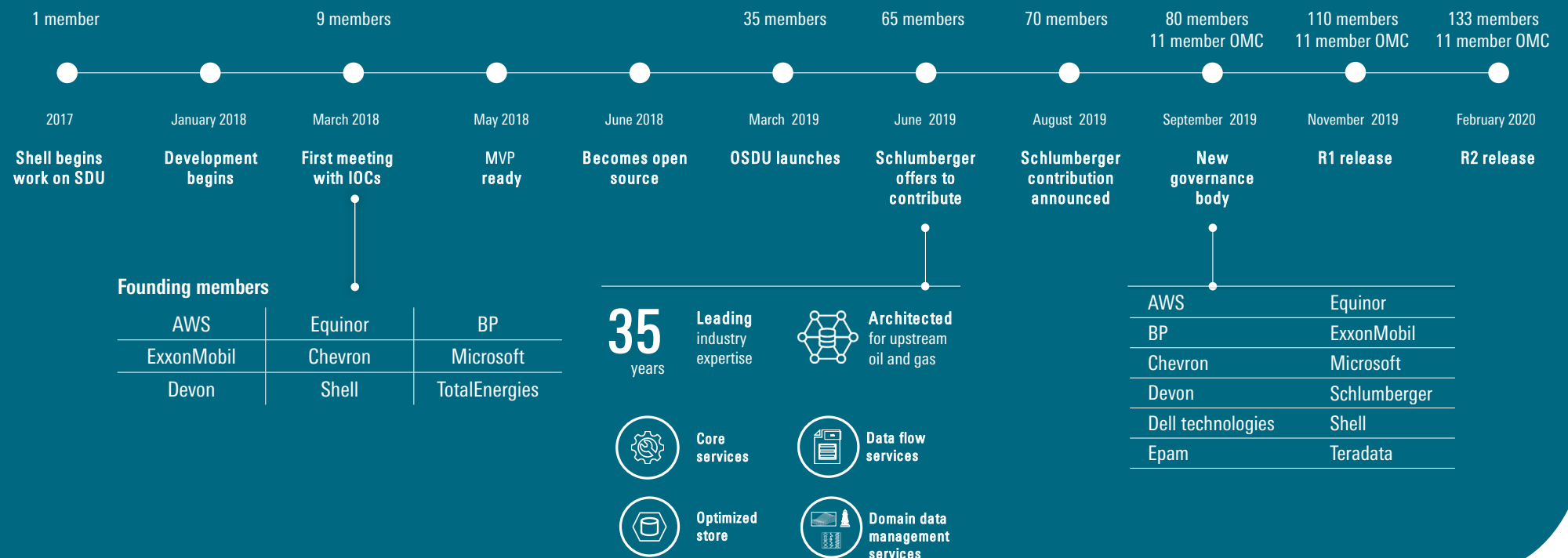
Benefit from a cost-effective model leveraging concepts around subscriptions/software as a service (SaaS) to elastically scale up and down based on an ever-changing business climate.

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The history of the OSDU

The OSDU Data Platform began as the SDU (Subsurface Data Universe) at Shell in 2017, when the company's digital team met with its exploration team and learned about the difficulty in finding the right subsurface data.

After creating first designs and partnering with a cloud vendor during 2017, development of the SDU began in earnest in January 2018, as an internal project at Shell. A first minimum viable product (MVP) was ready in May 2018.

In March 2018, the initial meeting with other international oil companies (IOCs) to discuss the potential of tackling the SDU jointly as an industry solution, took place. A first meeting of eight IOCs followed in June, during which the Open Group was selected as a partner for what was now an open source project.

1 member	9 members		35 members	65 members	70 members	80 members 11 member OMC	110 members 11 member OMC	133 members 11 member OMC
2017	January 2018	March 2018	May 2018	June 2018	March 2019	June 2019	August 2019	September 2019	November 2019	February 2020
Shell begins work on SDU	Development begins	First meeting with IOCs	MVP ready	Becomes open source	OSDU launches	Schlumberger offers to contribute	Schlumberger contribution announced	New governance body	R1 release	R2 release

Founding members

AWS	Equinor	BP
ExxonMobil	Chevron	Microsoft
Devon	Shell	TotalEnergies

35 years
- Leading industry expertise
- Architected for upstream oil and gas
- Core services
- Data flow services
- Optimized store
- Domain data management services

AWS	Equinor
BP	ExxonMobil
Chevron	Microsoft
Devon	Schlumberger
Dell technologies	Shell
Epam	Teradata

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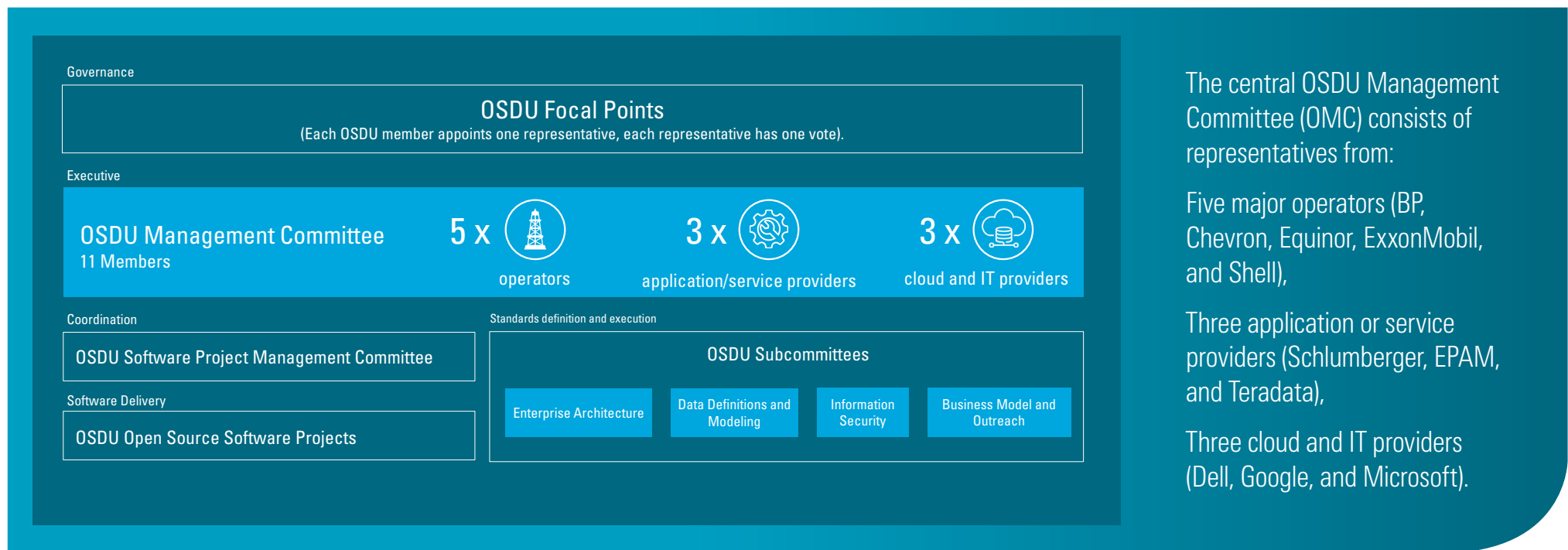
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Who's building the OSDU Data Platform?

The development of the OSDU Data Platform is organized and managed through a fully open–source development forum—the OSDU Forum— under the guidance of The Open Group.

The members of the OSDU forum include a large number of oil and gas operators, service companies, leading cloud providers, consultancies, academic and governmental organizations. An up-to-date members list can be viewed here, on the Open Group website.

The organizational structure is shown below. It is based around membership at organizational level. Individuals may contribute to the OSDU Forum, but cannot join.

Governance

OSDU Focal Points
(Each OSDU member appoints one representative, each representative has one vote).

Executive

OSDU Management Committee
11 Members

5 x operators

3 x application/service providers

3 x cloud and IT providers

Coordination

OSDU Software Project Management Committee

Standards definition and execution

OSDU Subcommittees

| Enterprise Architecture | Data Definitions and Modeling | Information Security | Business Model and Outreach |

Software Delivery

OSDU Open Source Software Projects

The central OSDU Management Committee (OMC) consists of representatives from:

Five major operators (BP, Chevron, Equinor, ExxonMobil, and Shell),

Three application or service providers (Schlumberger, EPAM, and Teradata),

Three cloud and IT providers (Dell, Google, and Microsoft).

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Is the OSDU Data Platform available for deployment now?

The full commercial deployment of the OSDU Data Platform is planned for after the Mercury Release March 24, 2021. However, the code from the DELFI data ecosystem, which forms the foundation of the OSDU Data Platform, is available now through the DELFI environment.
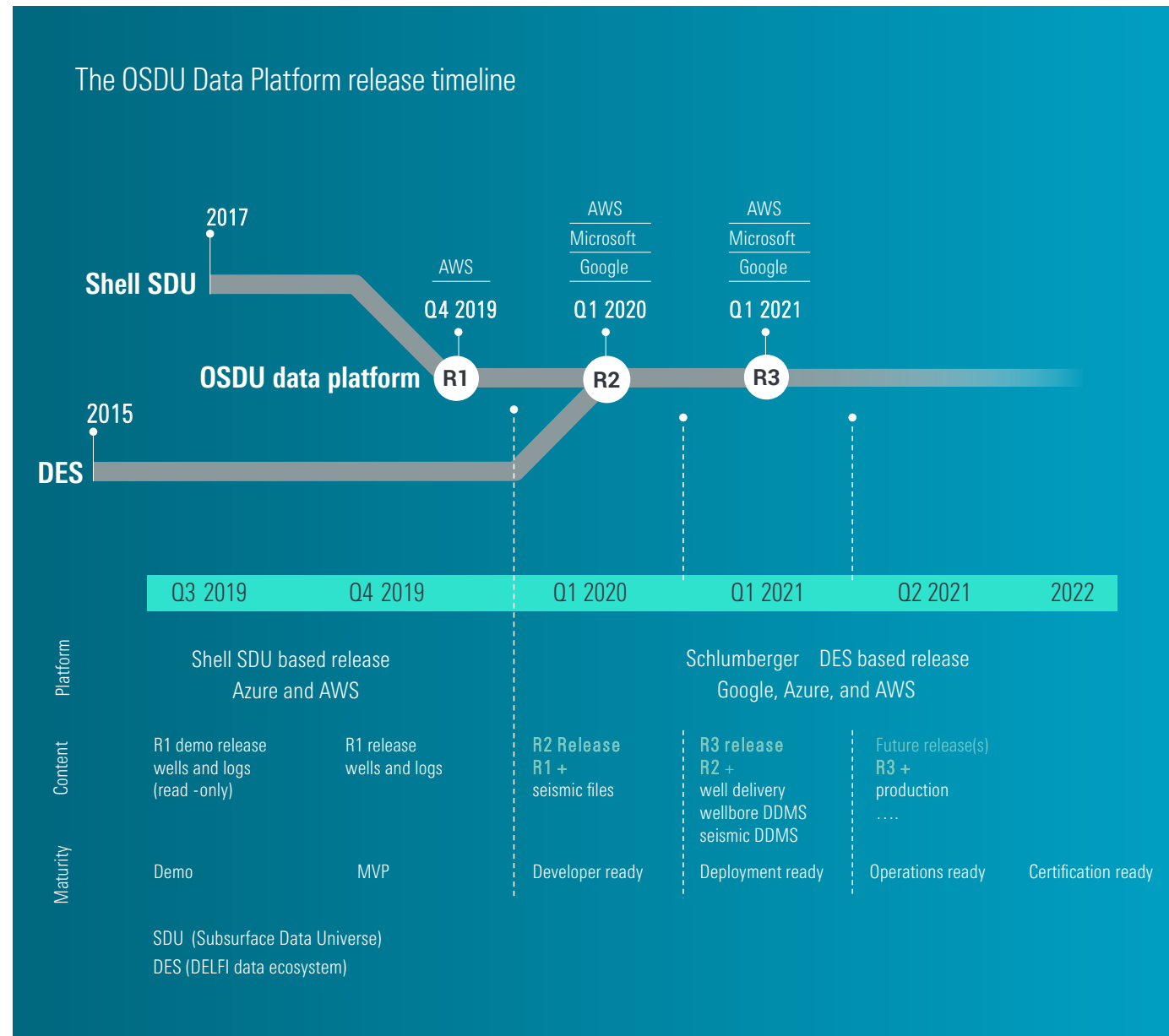
This represents the only cloud-based E&P data ecosystem based on the open source infrastructure of the OSDU Data Platform available prior to its launch. Future releases of the OSDU Data Platform will also be based on open-sourced Schlumberger code.

The first commercially deployable code will be made available to developers (operators and third parties) later in the year (in releases R3 and R4/V1.0—there is more on this on the following pages).

OSDU in 2020—the months ahead

The release roadmap for 2020 takes the OSDU Data Platform from a developer-ready R2 release (based on Shell's initial code, with seismic data capability added), to deployment-ready (R3) release and operations-ready (R4) release later in the year. Once operations-ready, R4 will become the official "V1.0" of the OSDU Data Platform.

R3 is the first release to include the full open-sourced DELFI data ecosystem contribution by Schlumberger. These releases make working code officially available for operators and third parties to use to build their own solutions.

The OSDU Data Platform release timeline

Q3 2019	Q4 2019	Q1 2020	Q1 2021	Q2 2021	2022

Platform

Shell SDU based release
Azure and AWS

Schlumberger DES based release
Google, Azure, and AWS

Content

| R1 demo release wells and logs (read -only) | R1 release wells and logs | R2 Release R1 + seismic files | R3 release R2 + well delivery wellbore DDMS seismic DDMS | Future release(s) R3 + production …. |

Maturity

| Demo | MVP | Developer ready | Deployment ready | Operations ready | Certification ready |

SDU (Subsurface Data Universe)
DES (DELFI data ecosystem)

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What to do now: Optimize your opportunity

What you can do to optimize the opportunity the OSDU Data Platform presents to your organization depends on your current situation.

If you have an active deployment of the DELFI environment you do not need to take further action. You will have access to the OSDU Data Platform when it is available as this is the foundation data platform for the DELFI environment.

If your organization is an operator, which is not currently involved in the OSDU Forum and has not deployed, or is not planning to deploy, the DELFI environment, your recommended course of action at this time is to research and understand the opportunities, to see how the OSDU Data Platform roadmap could dovetail with your digital transformation agenda.

You may then decide to use a shared data reference architecture to build your own solution, consider a deployment of the DELFI environment, or wait until other third-party offerings become available.

If you are an in-house or third-party developer or a data broker, now is a good time to get involved—an opportunity to understand more and run tests with the code ahead of its release. The resources section at the end of this document provides further reading and details of next steps.

Who will miss out?

There is no need for any relevant organization that wants to become involved in the OSDU Forum to miss the opportunity, whether they get involved now, or choose to do so later. Industry anticipation for the OSDU Data Platform will grow in the coming months, with increased visibility in certain media. This is not least because a big part of the industry is involved in the project. However, this does not mean that involvement now is your only option. If you decide to join, it is better to do so when the time is right for your organization.

What you can do now, if you feel the time is right, is to begin planning your transition to an OSDU Data Platform-based system.

What's next for OSDU?

After the important Mercury Release, more data types, including those relating to well delivery and real-time production operations, will be added to the OSDU Data Platform. Work on this has already begun.

The major code releases this year mean the industry can start adopting the OSDU Data Platform and developing connected solutions. Third-party developers can start building apps or whole solutions.

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Some technical detail

What is the OSDU Data Platform, from a technical perspective?

The OSDU Data Platform will be a reference architecture and a reference implementation for cloud-native subsurface data platforms. It will not in itself be a truly production-ready subsurface data platform.

It will include generic and domain-specific application programming interfaces (APIs) that third parties can use to ensure any applications or microservices they are developing will run on OSDU Data Platform-based systems.

The core principle underpinning the OSDU standard is the separation of data and applications, so the data can be accessed by any OSDU Data Platform-compatible application and in a variety of contexts (independent, for example, of the cloud vendor used).

The visual on this page shows the shape of a future E&P data environment built on the OSDU Data Platform, with an API layer connecting the common/non-proprietary infrastructure with any proprietary or vendor applications through which a user accesses data.

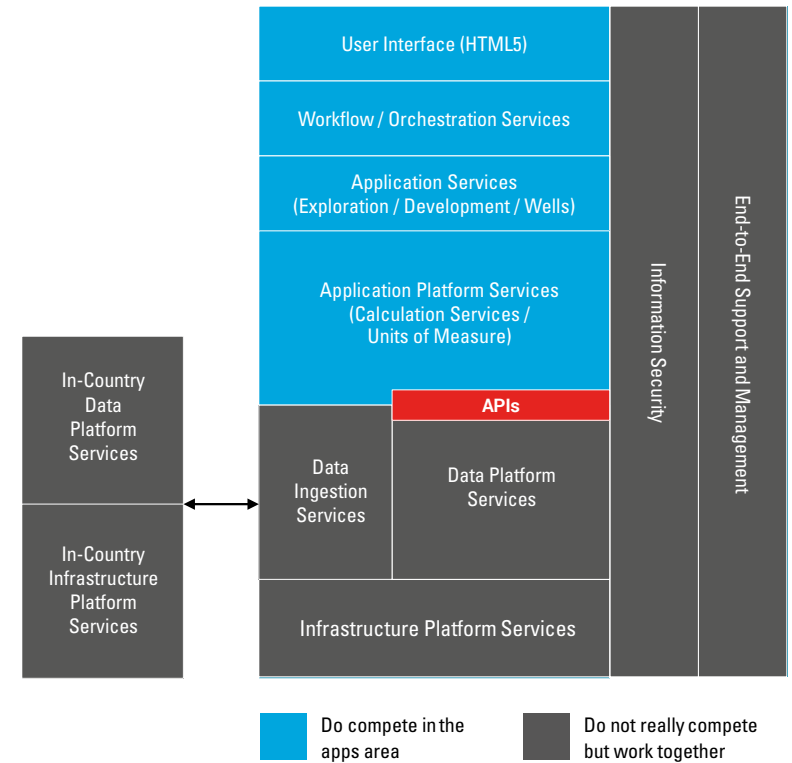### What do I need to integrate with the OSDU Data Platform?

Once the OSDU Data Platform is deployment ready, either your organization or a third-party vendor can develop the proprietary applications that turn it into a working E&P data platform. This is necessary for using the OSDU Data Platform in a meaningful way.

If your organization has a deployment of the DELFI environment, the OSDU Data Platform is already integrated as part of your DELFI solutions.

The OSDU Data Platform is designed for the cloud, therefore running a data platform deployment requires the services of certain cloud vendors. OSDU R1 is available for deployment on Amazon Web Services (AWS) and Microsoft Azure public cloud platforms. For OSDU R2 Google Cloud Platform and Red Hat® OpenShift® on IBM Cloud™ are included.

In-country solutions are part of the OSDU roadmap, but will not be available immediately.

There is a project underway to offer managed service options for smaller operators within the Mercury Release timeframe. Schlumberger also offers dedicated, agnostic transition services for almost any type of OSDU Data Platform deployment, based on its experience of deploying its DELFI data ecosystem —this includes support for customers with data residency constraints.

User Interface (HTML5)

Workflow / Orchestration Services

Application Services
(Exploration / Development / Wells)

Application Platform Services
(Calculation Services /
Units of Measure)

In-Country Data Platform Services

APIs

Data Ingestion Services

Data Platform Services

In-Country Infrastructure Platform Services

Infrastructure Platform Services

Information Security

End-to-End Support and Management

Do compete in the apps area

Do not really compete but work together

Will there be OSDU-certified apps?

Certification gives buyers assurance of a solution's conformance to standards and best practices, and may be offered as part of the OSDU project.

Any certification system for OSDU-based data platforms will follow the deployment-ready Mercury Release. There cannot be any legitimately OSDU-certified solutions before then.

Currently, the plans for certification are at a platform level, meaning there will be no "OSDU-certified" apps for the time being.

When, or indeed if, available, certification guidelines will be published on the Open Group OSDU website.

Please note that any solutions in the marketplace that claim to be OSDU-compliant or OSDU-certified have not been verified or endorsed by the Open Group, they are merely claims by the provider itself.

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Schlumberger is a major player in the OSDU Forum, providing technical resource and know–how to its software projects, as well as its management and subcommittees. Our team has been running and deploying the core of what is to become the commercially–available OSDU Data Platform since the launch of the DELFI environment in 2017.

As such, Schlumberger has a wealth of OSDU Data Platform knowledge and experience that we place at our customers' disposal, in the form of informal initial discussions, or as part of a transition or consultancy project.

The OSDU team at Schlumberger

	Jamie Cruise	Head of Products Data
	Raj Kannan	DELFI Enterprise Advisor
	Vicky Stanley	Data Marketing Manager
	Richard Jebb	Communications and Media Manager

Use these links to find more information, or contact us to discuss the OSDU opportunity with an expert:

› OSDU website	**www.opengroup.org/osdu**
› Enterprise Data Management Solution for the OSDU Data Platform	**https://www.software.slb.com/products/ schlumberger-enterprise-data-management- solution-for-osdu**
› Digital-transformation services	**www.software.slb.com/digital-transformation**
› Contact us	**www.software.slb.com/osdu-contact-form**

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