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VENDOR LOCK ANALYSIS IN SUBSURFACE DATA MANAGEMENT IN XYZ ORGANIZATION AND ITS IMPACT ON STATE DATA SOVEREIGNTY

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Abstract

Vendor lock-in is a situation where users of a product depend on one provider and cannot switch to another provider without large costs and a long time (Opara-Martins, Sahandi, & Tian, 2016). So, there is a potential monopoly that can be done by vendors. Oil and gas data processing in the XYZ Organization, especially for subsurface data processing, tends to lead to vendor lock practices where the management of subsurface data is very dependent on the application used at this time, the data used is not open and applies internationally so that there is a vendor lock where the processed data cannot be used after the expiration date. It is also at risk of data ownership where XYZ organization and other institutions cannot easily process the data because the standard data used is limited to the applications currently used. The vendor lock has the potential to disrupt state data sovereignty because the control of data processing only depends on certain vendors.

Keywords: data sovereignty; vendor lock; integration and interoperability; PPDM

Introduction

Oil and gas are one of the strategic and vital non-renewable natural resources that play an important role in the supply of industrial raw materials and the fulfillment of domestic energy needs (Law No. 22 of 2001) so that their management must provide the greatest prosperity and welfare impact for the people. In line with Article 33 paragraph (3) of the 1945 Constitution of the Republic of Indonesia which states that the earth, water, and natural resources contained therein are controlled by the state and used for the greatest prosperity of the people (Khan, Amyotte, & Amin, 2020).

This includes oil and gas data as stated in the Regulation of the Minister of Indonesia's Ministry of Energy and Mineral Resources Number 7 of 2019 concerning the Management and Utilization of Oil and Gas Data, it is explained that oil and gas data belongs to the State of the Republic of Indonesia and is controlled by the Government (Umam, Nugraha, & Fathoni, 2019). The management and utilization of the data itself aim to support; a) preparation and determination of work area; b) formulation of technical policies; c) implementation and supervision of exploration and exploitation activities, and

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d) research and development as well as other activities to support investment in upstream oil and gas business activities.

The same regulation explained that all parties have a responsibility on data and information to always maintain its confidentiality and will not disclose or divulge it to anyone who is not entitled to it. In addition, the processing of oil and gas data and information should not be monopolized by certain parties by conducting vendor locks so that the processed data cannot be used after the membership contract period for the use of a system ends because this is contrary to Article 5 of the Minister of Energy and Mineral Resources No. 7 of 2019 (Dillon, Wu, & Chang, 2010).

(Barrera-Rey, 1997) in his research found that data sharing carried out by oil and gas companies shows that this is made by companies and the government gives better results and is by current conditions. This is positive because the company can avoid exploration failures and market failures. The Directorate General of Oil and Gas of the Ministry of Energy and Mineral Resources (2020) in its 2020 Performance Report said that through the Minister of Energy and Mineral Resources No. 7/2019 the government has encouraged open access to data for investors. In addition, the government has also played an active role in providing new data from the completion of the 2D seismic data acquisition of the 32,200 km Open Area (Oktaviani, Siregar, Sarkawi, & Novianti, 2020).

In connection with data processing on oil and gas, especially subsurface data at the XYZ Organization, it is an activity to provide a very important source of information in decision making. Decisions taken in planning and implementing oil and gas exploration and exploitation activities cannot be separated from the results of analysis based on subsurface data to then become the basis for making decisions on aspects of energy security (Ge & Helfert, 2008). In producing quality and reliable supervision over the planning and implementation of Exploration and Production (E&P) activities, a system is needed that can directly access subsurface data generated by the activities of the Contractors of Production Sharing Contract such as studies, surveys, and exploration and exploitation drilling. The data collected, namely well data, needs to be used for the continuity of the main business processes in the XYZ Organization such as Approval For Expenditure, Work Planning & Budgeting, Place Into Services, production supervision, asset recording, and others in order to carry out the XYZ Organization's main tasks. All of these data need to be integrated with each other using a data model that uses open standards so as to avoid vendor lock conditions.

Vendor lock-in is a situation where users of a product depend on one provider and cannot switch to another provider without large costs and a long time (Opara-Martins et al., 2016). So, there is a potential monopoly that can be done by vendors. According to the researcher's observations, oil and gas data processing at the XYZ Organization, especially for Subsurface data processing, has a tendency to lead to vendor lock practices.

This can be seen from the emergence of advanced application procurement initiatives by utilizing a data management platform that has been established using an application for 4 (four) years for the Subsurface Data Management System (SDMS). The procurement initiative is in the form of Procurement of Exploration Integrated Database

Application Services where this work requires the use of applications sourced from the same provider.

Refer to Press Release of Professional Petroleum Data Management (PPDM) (2020), The Ministry of Energy and Mineral Resources (ESDM) has suggested the use of PPDM in standardizing data management in Indonesia by stating that the transition of the standard data model to PPDM version 3.9 and using it as a basis to explain information requirements (Kozman, 2013).

The conditions described in the background above can put the XYZ Organization in a vendor lock trap due to the following conditions:

1. XYZ organization no longer has the freedom to access oil and gas data because of its dependence on certain products
2. XYZ organization cannot choose applications freely due to dependence on the data standards used
3. XYZ organization finds it difficult to develop and create new initiatives because it is limited to innovations provided by certain vendors
4. The XYZ organization as a representative of the government is limited in terms of mastery of oil and gas data which indicates the threat of state data sovereignty
5. Opening opportunities for fraud in procurement initiative practices

Therefore, the researcher wants to study further the consequences of vendor lock treatment on the subsurface database management system in XYZ Organization and determine alternative solutions to prevent vendor lock on XYZ organization.

Research Methods

Based on the background, existing phenomena and research objectives along with literature review, this research methods will be following step below:

1. Determination of the problem to be investigated in the form of potential vendor locks in the management of the Subsurface Data Management System
2. Literature review to obtain various supporting data related to the problem being researched in order to gain insight and research basis
3. Identify the presence of Vendor Lock in the subsurface database management system and propose alternative solutions
4. Conducting data source collection
5. Analyzing the results of the Forum Group Discussion using a risk matrix assessment

The population in this study is the IT team, principal subsurface data management and the end users in Jakarta. The sampling technique or method used in this research is purposive sampling. Purposive sampling is sampling with certain considerations (Sugiyono, 2018).

The number of samples in this study were 13 peoples. In addition, data collection obtained through expert justification, several parties will be involved in the data collection process those who are directly involved in the management of the Subsurface Data Management System.

Primary data were obtained using the following data collection techniques:

a) Interviews, interviews are conducted to obtain information and data from certain individuals for information purposes. As for the informants, the interview aims to obtain information about personal self, potential, willingness and ability to "empower" from individuals (Koentjaraningrat, 1977). Researchers have prepared a number of guiding questions to ask the informants face-to-face (directly) in order to get answers or explanations from the informants who were given orally. Researchers record answers and explanations and then collect them as research data according to the purpose and focus of the research
b) Focus Group Discussions (FGDs) A great way to bring together people with similar experiences or backgrounds to discuss a topic of particular interest. Several parties that will be involved in the data collection process include: IT team, principle subsurface data management and end users with a total of 3 (three) FGD participants.

Secondary data is obtained by conducting a literature study to support, complete and improve primary data, both internally and from various sources, both report data and other published data.

Results and Discussion

1. Data Collection

At this stage the data collection was carried out through the interview process as input for this research. Interviews will be conducted through discussion sessions with the IT team, Data Department Team, User, and Principles of the Subsurface Data Management System software.

a. Based on discussions with the IT Head, Bapak RU, the following conclusions as below:
   1) The procurement of the Subsurface Database Management System (SDMS) application is intended to support the continuation of the process of collecting and managing subsurface data. The SDMS application will provide users with easy access to verified subsurface data through an interface for processing and analyzing subsurface data in carrying out the evaluation, recommendation, and analysis process for fast, efficient, and accurate decision making.
   2) This data management application will then supply data that is used by the data processing application to carry out further analysis activities
   3) The keyword as a main concern in managing this subsurface data is the data model. The data model used must be able to provide flexibility for various applications to use it so that the database is not locked only in certain applications.

b. Based on discussions with the Data Department Head, Bapak VEH, the following conclusions as below:
   1) As a continuation of the procurement of subsurface data management tools based on an integrated solution framework (applications and databases) to support the function of monitoring and controlling upstream oil and gas business activities,

especially those related to the evaluation of national oil and gas resources and reserves, and help make it easier for investors to obtain information on Subsurface data that will be offered by Oil and Gas.

2) Compliance with government policies through the Minister of Energy and Mineral Resources Regulation No. 7 of 2019, namely carrying out data administration using the established catalogue standards.

c. Based on discussions with User from Exploitation Department, Bapak FA, the following conclusions as below:
   1) Model data used can be accessed using any application as long as the user has SQL skills. The challenge is how to find out the metadata that applies to model data. With this condition, it can be said that is not a vendor lock.
   2) For information that most of the systems in the international world come from Schlumberger, IHS, Halliburton and other major principles where one of the user countries is the UK which is very concerned with data. Norway itself uses its contracts every seven years where the last year is used for data migration to the new system that won the procurement,
   3) Prosource from Schlumberger is the most convenient to use compare to Haliburton and IHS, especially in the features it provides is quite complete.

d. Base on discussion with SDMS principle PSM, Ibu MK, the following conclusions as below:

   Situation where cost of changing to a different vendor or service provider is so high that the client is basically client is stuck with the original vendor or service provider. This creates problem with the client where it lacks of freedom to choose a better product or services, lack of flexibility to negotiate prices and better services due to non-existent competitors which affects interoperability issue (Ahlgren, Hidell, & Ngai, 2016). Vendor lock possibly happens when client has financial pressure, under staffed or can't afford business operation to be interrupted due to changes.

   - Eg: a customer bought a product and that product require a specific services that is sourced from the same vendor. If the vendor services or product decline in quality, the customer has to almost accept the low quality product as switching to a different vendor is too much hassle or costly. Vendor-lock in usually creates issues with integration as it is pretty much a closed concept whereby vendor has more control than the client most times.
   - Eg: If you are locked into certain cloud provider, when the time comes to move databases during cloud migration which involves moving data to a totally different type of environment which requires a different data reformatting. Possible additional costs incurred as the need to hire extra staff to support the migration work.

e. Discussion with SDMS principle KDK, Bapak RS, the following discussion as below:

Vendor Lock is the occurrence of a monopoly on a product where the customer becomes dependent on the vendor providing the product. This vendor lock also results in a limited product or system flexibility in terms of interoperability with other systems. In terms of data impact, actually, it is in terms of data access where the existence of the data is in our control, but in terms of access to the data, we must use applications made by the vendor with standard data formats that are not common. For now, the Open standard can be used as a solution to avoid vendor locks, but it is also necessary to think about how many vendors or principles follow it so that the open standard itself does not become a lock at some point in the future. Need to explore other solutions such as OSDU open-source community. In other countries, rules for using open standards are not mandatory. The use of data standards is left to the user but in practice, companies use these open standards. Actually, above the implementation of the standard itself, there is something more important, namely data governance, which includes data quality, hierarchy, rules, and RACI.

f. Discussion with SDMS principle IMS, KMH, the following discussion as below:

Vendor Lock is the data is vendor locked by proprietary format application that only can be consumed by the particular software. If we want to use other applications, we need to do export and data migration. There are two reasons at least, first obviously for a commercial reason to ensure they continue to sell the license, and the second one is perhaps when they build the software, they never think to do exchange the data. This is not only happening in oil and gas but also in other industries that often monopolize one or two big industries. Vendor lock-in is common in the IT industry.

There is no other country except Indonesia that the vendor lock is governed by the government because usually there is up to the operator to decide what system they want to use. IHS never switch to standard PPDM, his standard data is dynamic. IHS can support what the customer needs, if you want the PPDM standard, it can be done, and if you want to use OSDU, he can do it too, IHS is flexible to do that. IHS does not build a base on the PPDM system and also does not OSDU. In fact, for open standard subsurface management, apart from PPDM, there are others that are more popular, namely OSDU, but this OSDU we have to do it with cloud technology while PPDM plays on-premise. The only thing that we want to do is go to the cloud.

g. Focus Group Discussion with Data Department Team, the following discussion as below:

1) The database as a data source, if you apply the principle of data storage in accordance with the rules of writing a database, it can be said that it has certain

standards, in this case the SDMS that has been built since 2017 using Oracle has followed these rules, so far it can be said that the data can be used because Its database format uses a standard database in general (Abu-Libdeh, Princehouse, & Weatherspoon, 2010).

2) When we talk about application, it is specifically intended only for certain data models, so only this application can read the data model, therefore it is necessary to provide understanding/training in terms of using this database.
3) Here the problem arises when the organization wants to use other applications because the data is a proprietary model that can only be read by previous applications. To be able to use the data in this database, data migration must be carried out into the new data model used by the new application that will be used. So, this is a potential vendor lock where there is dependence on application providers in terms of database use because the data model used is the provider's proprietary. This factor causes the organization to always carry out a license every year. In this case, the provider has a bargaining position in service offerings and pricing, while the organization as a customer has no other choice.
4) Vendor lock is a situation where the information in the database can only be used for a limited time only through certain applications belonging to the provider while the data model used is not public.
5) Referring to lewis 2013 research on the need for interoperability in cloud computing, it can be stated that standards are important to be able to connect one application to another, the analogy is that English is not an international language so that everyone can connect with one another in the same language.
   As stated in the Ministerial Regulation no. 7: 2019 and its derivatives, that the standard used is an internationally accepted, general and open standard which then in the Ministry of Energy and Mineral Resources Decree/SE stated that the standard used is PPDM.
6) In terms of managing SDMS data, the data referred to is state-owned data which is controlled by the government in its management. When there is a vulnerability to the availability of the data where there is dependence on the vendor, it means that there has been a problem with state data sovereignty.
7) Vendor Lock on SDMS actually no longer talks about whether there is potential, but in fact vendor lock has already occurred. It can be seen in licensing procurement where the organization does not have extensive price bargaining because there are no competitors with the standard model in use at that time.

2. Data Analysis

1) Define Scope on Wells Module Only

Based on the Decree of the Secretary-General of the Ministry of Energy and Mineral Resources Number 013 K/03/SJD/2019 concerning Metadata Standards for the Administration of Upstream Oil and Gas Data, the Well data are as follow:

Table 1
Well Data

1.	**Well data**	
	1.1 Well Summary	Areas, wells, business associate licenses and authorizations, facilities, stratigraphy, coordinate systems.
2.	**Well Logs**	
	2.1 Print Well Log	Areas, wells, business associate licenses and authorizations, records product and information management
	2.2 Digital Image Well Log	Areas, wells, business associate licenses and authorizations, records product and information management
	2.3 Digital Well Log	Areas, wells, business associate licenses and authorizations, records product and information management
3.	**Well Report**	
	3.1 Print Well Report	Areas, wells, business associate licenses and authorizations, facilities, records product and information management
	3.2 Digital Image Well Report	Areas, wells, business associate licenses and authorizations, facilities, records product and information management
	3.3 Digital Well Report	Areas, wells, business associate licenses and authorizations, facilities, records product and information management
4.	**Well Seismic Profile**	
	4.1 Well Seismic Profile Digital	Areas, business associate licenses and authorizations, wells, seismic, records product and information management
	4.2 Well Seismic Profile Dara Stored in Media	Areas, business associate licenses and authorizations, wells, seismic, records product and information management

2) Mapping data the PPDM Standard

This activity is to map data types from data with data standards to PPDM data standards so that the level of compliance with PPDM open data standards can be known as required by applicable regulations. The steps are taken in mapping this data are as follows:

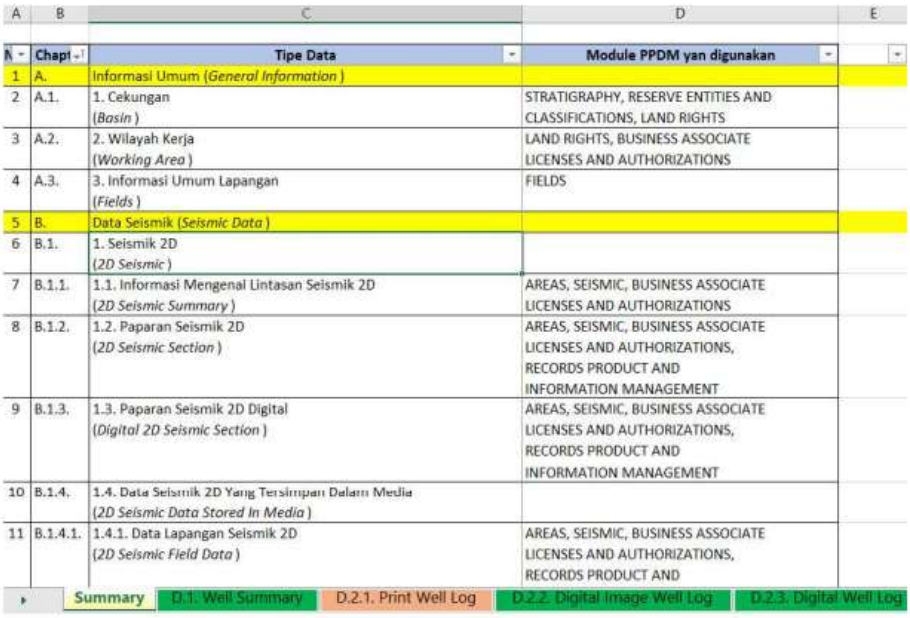
- PPDM-Mapping Table based on regulation
- Making PPDM View based on Mapping
- Migration of data from PPDM staging to PPDM scheme

3) PPDM Data Mapping

Based on the Decree of the Ministry of Energy and Mineral Resources regarding the Metadata Catalogue Standard for Oil and Gas and assessment data available in SDMS, a data mapping of data types between PPDM is made as follows:

1. Basin
2. Working Area
3. Field Information
4. 2D Seismic Summary
5. 2D Seismic Field Digital Data
6. 2D Seismic Processed Data
7. 2D Seismic Field Digital

8. 2D Seismic Proc Digital
9. 2D Seismic Nav Digital
10. 3D Seismic Summary
11. 3D Seismic Field Digital Data
12. 3D Seismic Proc Digital Data
13. 3D Seismic Nav Digital
14. Well Summary
15. Digital Image Well Log
16. Digital Well Log
17. Digital Well Report
18. Well Seismic Digital
19. Well Samples
20. Well Core Samples
21. Digital Technical Report



N	Chapt	Tipe Data	Module PPDM yan digunakan
1	A.	Informasi Umum (*General Information*)	
2	A.1.	1. Cekungan (*Basin*)	STRATIGRAPHY, RESERVE ENTITIES AND CLASSIFICATIONS, LAND RIGHTS
3	A.2.	2. Wilayah Kerja (*Working Area*)	LAND RIGHTS, BUSINESS ASSOCIATE LICENSES AND AUTHORIZATIONS
4	A.3.	3. Informasi Umum Lapangan (*Fields*)	FIELDS
5	B.	Data Seismik (*Seismic Data*)	
6	B.1.	1. Seismik 2D (*2D Seismic*)	
7	B.1.1.	1.1. Informasi Mengenai Lintasan Seismik 2D (*2D Seismic Summary*)	AREAS, SEISMIC, BUSINESS ASSOCIATE LICENSES AND AUTHORIZATIONS
8	B.1.2.	1.2. Paparan Seismik 2D (*2D Seismic Section*)	AREAS, SEISMIC, BUSINESS ASSOCIATE LICENSES AND AUTHORIZATIONS, RECORDS PRODUCT AND INFORMATION MANAGEMENT
9	B.1.3.	1.3. Paparan Seismik 2D Digital (*Digital 2D Seismic Section*)	AREAS, SEISMIC, BUSINESS ASSOCIATE LICENSES AND AUTHORIZATIONS, RECORDS PRODUCT AND INFORMATION MANAGEMENT
10	B.1.4.	1.4. Data Seismik 2D Yang Tersimpan Dalam Media (*2D Seismic Data Stored In Media*)	
11	B.1.4.1.	1.4.1. Data Lapangan Seismik 2D (*2D Seismic Field Data*)	AREAS, SEISMIC, BUSINESS ASSOCIATE LICENSES AND AUTHORIZATIONS, RECORDS PRODUCT AND

Figure 1
Example of PPDM - data mapping

Then the creation of 16 data types in the SDMS master data to be mapped to PPDM is also carried out. Data Type this is a data type that is generally needed in SDMS. The 16 data types are as follows:

1. Working Area
2. Well Summary
3. Borehole Summary
4. Marker
5. Log datafile
6. Log Channel

7. Deviation Survey
8. Survey 2D
9. Survey 3D
10. Seismic Datafile
11. Check shot Data
12. Check shot Header
13. Production Monthly
14. Production Daily
15. Perforation
16. Document

Figure 2
Example of PPDM mapping data

4) Oracle View

Based on the previous list of data types, 16 MDM VIEWs and 21 PPDM VIEWs were created in the XYZ_SDMS scheme as a data source from which later this data will be extracted from VIEW to PPDM Staging. The list of Oracle VIEWs created is as follows:

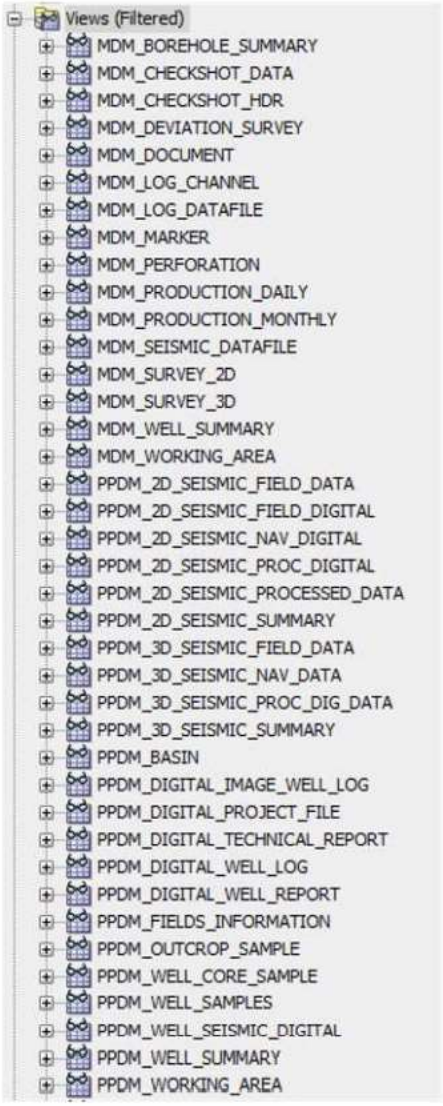


Figure 3
Oracle View

5) Schema Database

There are 2 oracle schemas related to those created in the SDMS database, namely schema PPDM39 and PPDM Staging schemes. The PPDM STAGING scheme is a scheme that functions as a temporary scheme. All required data from SDMS has been exported to this schema based on Oracle VIEW which have been made previously. The source of the schema data comes from the XYZ_SDMS schema. If you see, this scheme is less than the number of VIEWs created in the past, this is because there are multiple views that represent the same data type to only 22 VIEW whose data is exported to 22 tables in PPDM Staging.

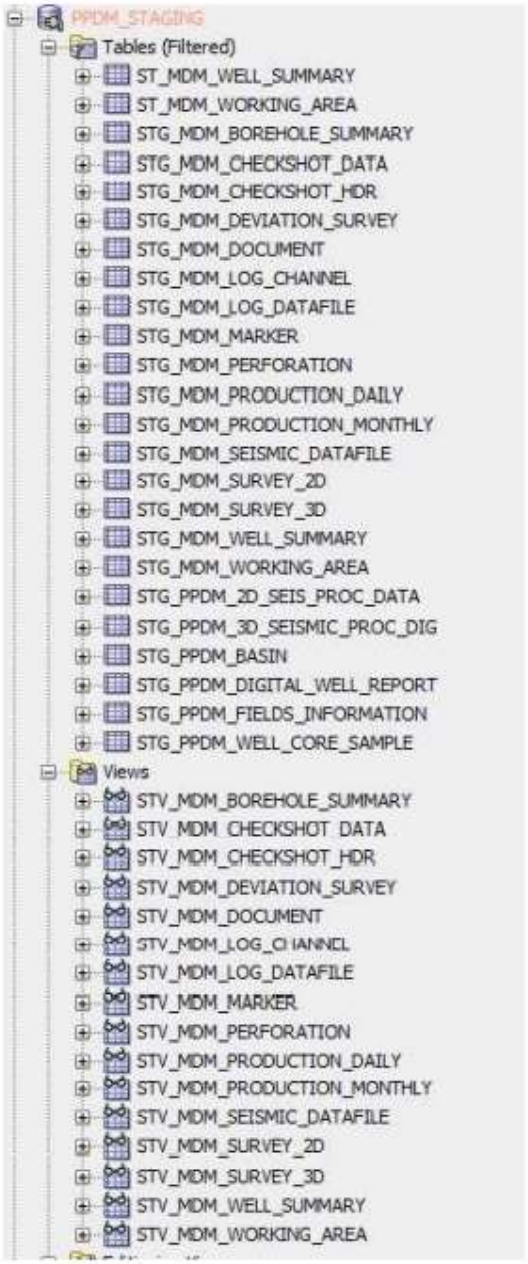


Figure 3
PPDM Stagging Schema

3. Risk Assessment Vendor Lock Analysis In Subsurface Data Management And Its Impact On State Data Sovereignty

Results According to the assessment, the use of subsurface data management software might result in vendor-locks, which has a negative impact on state data security. This is then examined using a risk matrix by distributing questionnaires to 12 experts with more than ten years of experience in the oil and gas business. 91.7 percent of the experts who completed the poll agreed that there was a potential vendor lock on the usage of subsurface data management software, while 8.3 percent disagreed.

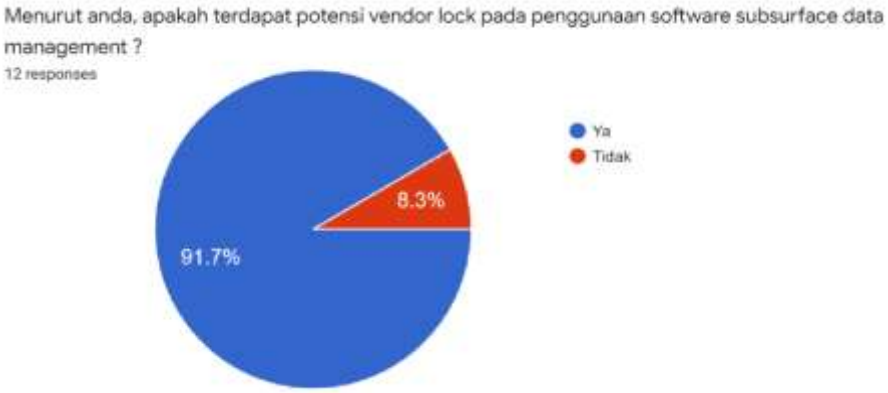


Figure 5
The Number Of Experts Who Stated That There Is A Potential Vendor Lock On The Subsurface Data Management System

Question "In your opinion, is there a potential vendor lock in the use of subsurface data management software?"

As shown on Figure 5, the risk analysis is performed on the potential dangers that may arise if the software that potentially cause this vendor-lock is continued to be utilized by the 91.7 percent of experts who concur that there is a potential vendor lock. Risk analysis is determined using the findings of the key person's (expert's) rationale based on the risk rating value (risk rating). The results of the mapping (risk map) produce a risk rating of each critical factor (Figure 5).

a. Risk Assessment – Data Sovereignty

Figure 6 shows that the risk factor that has the highest risk rating value of 25 (extreme) and must be stopped, where the possibility of occurrence is very high and has a very dangerous impact on the country's data sovereignty. This extreme or very high occurs in scenarios of potential theft of state secret data and information. This means that this function must be a major concern, because it is included in a very high risk. For the scenario of a country that does not have full power over data access, having a risk rating of 20 (very high) is a condition that must receive serious attention, where in practice the database is fully owned by the state but in terms of data access, the state does not have the flexibility to choose applications because The database uses a standard data model that is not common (closed) which can only use certain applications. Meanwhile for the third scenario, namely the disruption of state data availability, it has a risk rating of 12 which has a probability of occurring, but the impact is quite risky, this also needs attention because as the impact of this vendor lock, data availability will be disrupted.

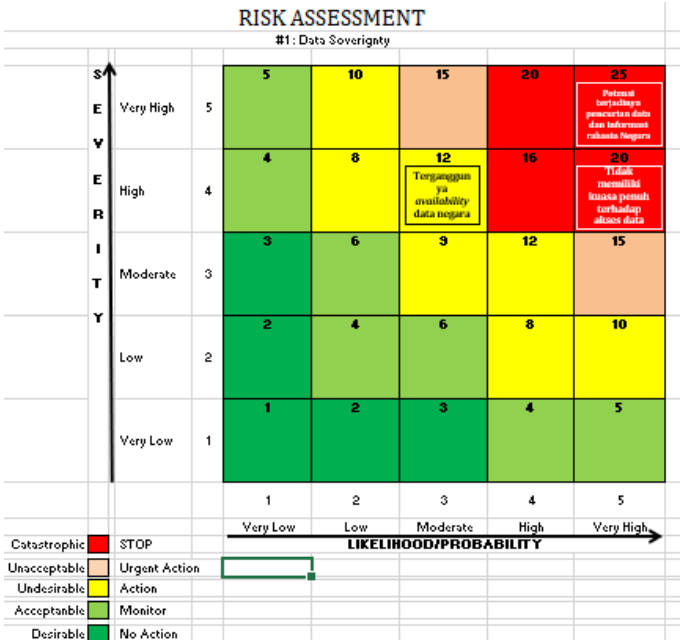


Figure 4
Risk Assessment – Data Sovereignty

Remarks:
Disruption of availability of state data = Disruption of state data availability Potential for theft of state secret data and information = There is a potential for theft of state data and information confidentiality Does not have full power over data access = Do not have full access to state data This potential vendor lock does not only threaten the sovereignty of state data but can threaten the operations of domestic companies operating in the same industry, therefore a risk analysis is carried out on the potential risks for the company's operations as follows.

b. Risk Assessment – Company Operations

Figure 7 shows that the highest risk rating value of 20 (very high) occurs in the scenario of State Dependence on certain vendors due to Limited and inflexible software selection. This means that this function must be a major concern, because it is included in the very high risk if the use of this software continues. For the next scenario, namely the company's low bargain positioning against vendors and the high cost of migration between vendors, having a risk rating of 16 (very high risk) is in a condition that must be given serious attention, where the company's inability to bargain with vendors is crucial and the high cost of migration that must be used. According to the experts, these four scenarios have a high probability of happening and have an impact that is difficult for the company to handle.

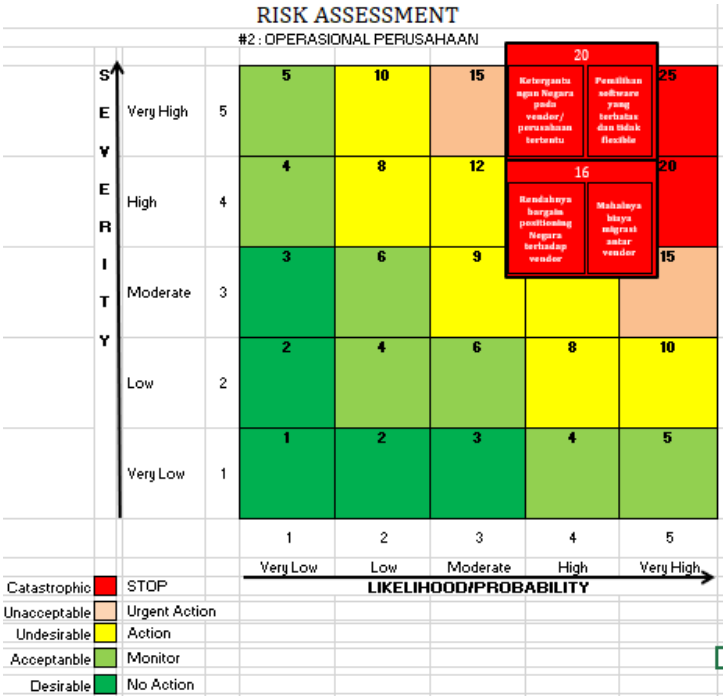


Figure 7
Risk Assessment – Company Operations

Remarks:

Adanya ketergantungan terhadap vendor tertentu = There is dependence on certain vendors Adanya keterbatasan dan flexibilitas dalam pemilihan software = There are limitations and flexibility in software selection Rendahnya daya tawar terhadap vendor = low bargaining power against vendors Mahalnya biaya migrasi = The high cost of migration.

From the results of the risk analysis using the risk matrix above, a new risk matrix can be created to see how much impact it will have if a vendor lock occurs on the use of subsurface data management software in the Oil and Gas Industry in Indonesia.

c. Risk Assessment of Vendor Lock Potential

Figure 8 shows that vendor-lock clearly threatens state data sovereignty and has the highest risk rating value of 18.78 (very high risk). As for the risk to the company's operations, it has a value that is not much different from the risk value of 18 (very high risk). Therefore, from the results of the risk assessment, it can be seen that the use of software that has the potential for vendor lock must be stopped and anticipated from the start.

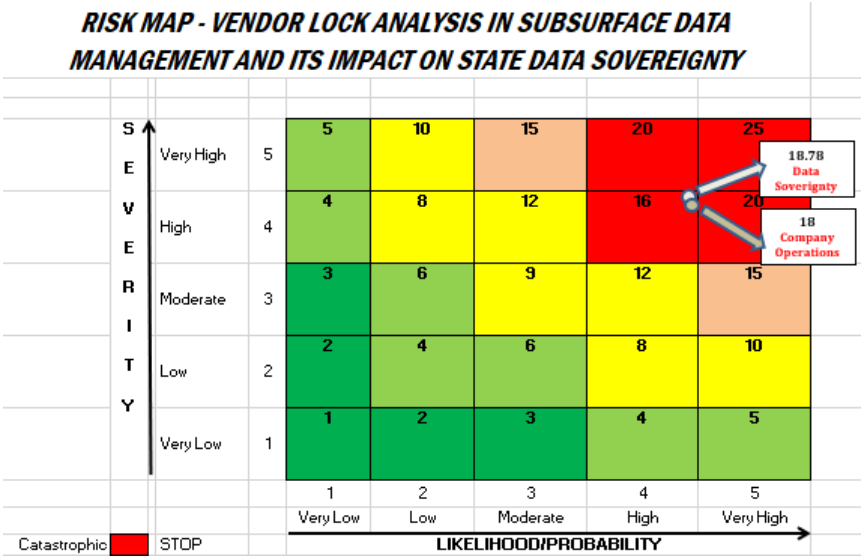


Figure 5
Risk Assessment of Vendor Lock Potential

4. Validation

This research validation is divided into two sections. The first is a Focus Group Discussion (FGD) aimed at the XYZ Organization staff. The goal of this FGD is to collect feedback on risk assessments model and analysing the validate the likelihood of threats found through threat modelling. The second validation step is to conduct interviews with practitioner participants to solicit recommendations and comments on the research model, specifically risk assessment.

- Based on the results of the FGD conducted with the Data Department team, Bapak VEH, Bapak AS, and Ibu TN, the following conclusions were obtained:
  a) The potential for a vendor lock to occur is very possible and has actually occurred, therefore it is necessary to take a preventive measure in accordance with the regulations
  b) The risk from the risk matrix is a bit exaggerated, but it is true that the existence of a vendor lock can threaten the sovereignty of state data.
  c) The Indonesian government, through the Ministry of Energy and Mineral Resources, has issued regulations regarding the prohibition of vendor locks and requires the use of open international PPDM standards to avoid the use of closed data standards that lead to vendor locks.
- Based on the interview results with Ibu MK, the following conclusions were obtained:
  a) Vendor lock causes data to be managed in silos so that if business units do not communicate on the same platform or standard, it will be difficult to identify trusted data sources to analyse and report across business units that benefit the organization as a whole.

b) The main benefit of an open standards data platform is that it supports integration between different service providers, business areas through common supported formats, data workflows, references and technologies.
c) The only problem is for legacy app providers as it will be costly and time consuming to implement this standard.

- Based on the interview results with KMH, the following conclusions were obtained:
  a) Vendor locks are common in IT and not just in the oil and gas industry
  b) For open standard subsurface management, apart from PPDM which works on on-premise, there is a more popular one, namely cloud-based OSDU.
- Based on the interview results with Bapak RS, the following conclusions were obtained:
  a) The effect of vendor lock on data sovereignty is in the limited access to the data we have this is because the dependence on the applicable standards is not common.
  b) For now, Open standards can be used as a solution to avoid vendor locks, one of which is PPDM, but other solutions need to be explored further, such as the OSDU open-source cloud community.

Conclusion

Based on the results of the research on mapping data to PPDM data standards, it is known that data migration with standard cannot necessarily be directly mapped between tables to PPDM standards. The first thing to do is create a staging area by creating an oracle view database. Then the staging area is mapped to the PPDM table.

The standard data used in the SDMS application currently can only be accessed using the application. The PPDM open data standard as required by the ESDM ministerial regulation. Thus, it can be concluded that with data standards has the potential for vendor lock.

Refer to the risk analysis, the Vendor Lock poses a threat risk to the availability of oil and gas data and a risk of compliance with regulations attached to oil and gas data processing so the vendor lock has the potential to disrupt state data sovereignty due to access and control of data processing only depends on certain vendors. The international open data standards for subsurface data processing can prevent vendor lock as it supports integration and interoperability between disparate service providers with the use of a common standard data model.

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