



WHITE PAPER

INFORMATION MANAGEMENT SERVICES



DET NORSKE VERITAS
DNV ENERGY NORTH AMERICA

DNV Reg No: ENAUS454-010-2009
Version 1.0



<i>White Paper Title:</i> <h1 style="text-align: center;">INFORMATION MANAGEMENT SERVICES</h1>		<p style="text-align: right;"><i>DNV ENERGY</i></p> <p style="text-align: right;">1400 Ravello Katy, TX 77493</p> <p style="text-align: right;">http://www.dnv.com</p>
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<i>Date of Issue and Validity:</i>	April 01, 2009, updated annually	
<i>Admin Review by:</i> Susan Norman	<i>Position:</i> Admin Support	<i>Date:</i> March 2009
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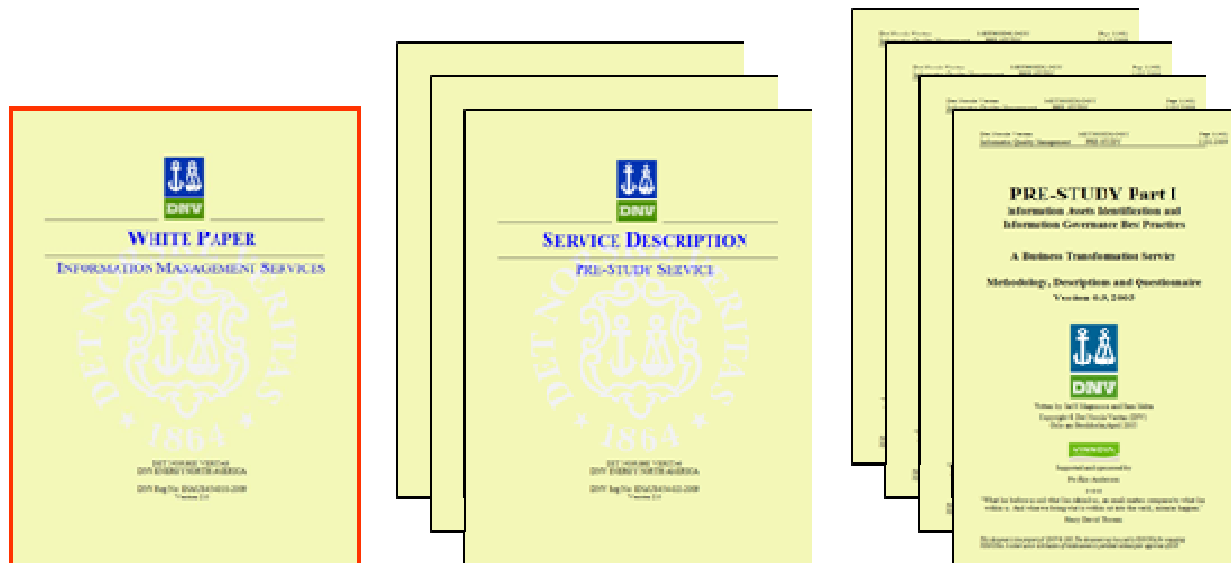
1 INTRODUCTION

Information is the life blood of any modern-day business. Companies succeed or falter based on the reliability, availability, and security of their information. But are most companies properly governing how their information is used, shared, and analyzed? The information that companies are busily generating, collecting, and mining offers a wealth of potential benefits. However, its use carries substantial risks. As a result, some organizations are forming formal governance bodies to create strategies, policies, and procedures surrounding the distribution of information inside and outside the firm.

From The Economist Intelligence Unit, October 2008

Det Norske Veritas (DNV) provides services to help customers in reaching their business objectives, whether that may be operational excellence, system improvements, risk management, legislation compliance or information management. Through our use of open international standards, modern technology and proven methods, we help turn information into valuable business assets. To learn more about our DNV and our services, please visit <http://www.dnv.com>.

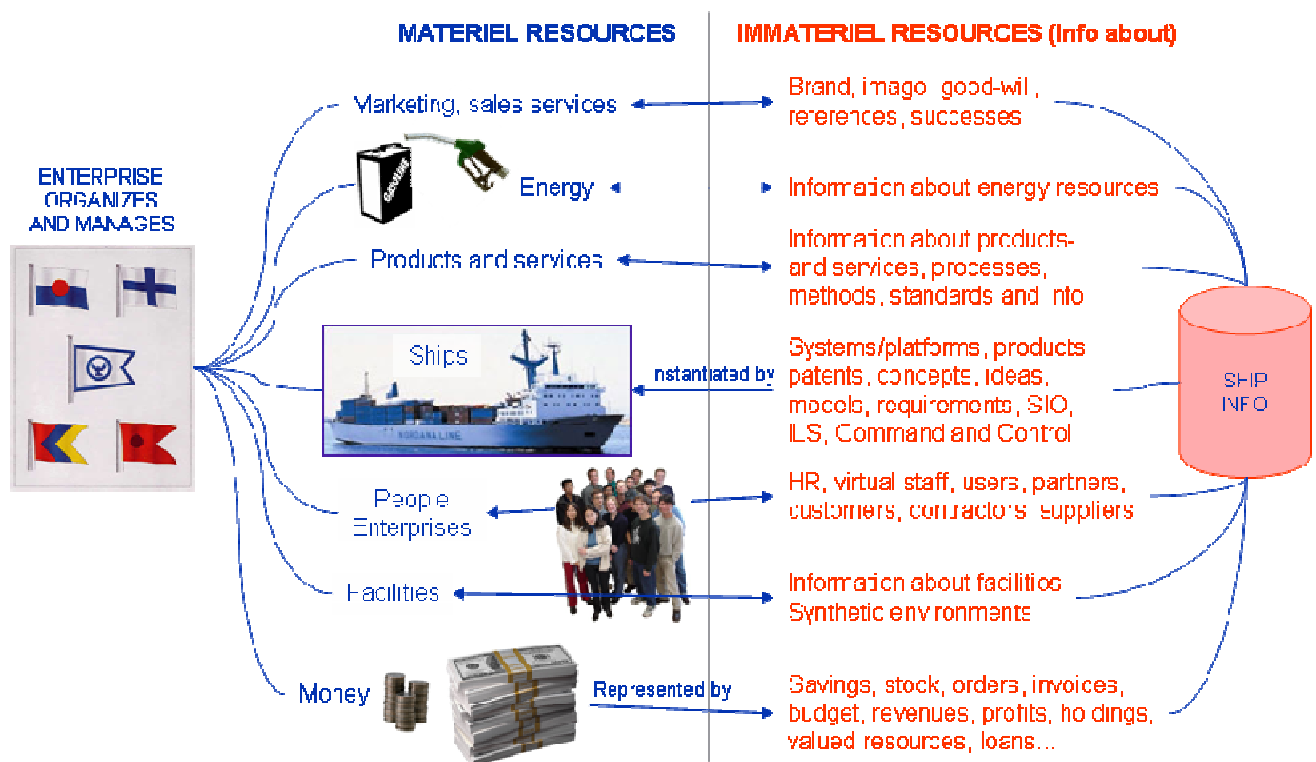
This White Paper is an open and fairly brief introduction to data and information as critical assets and it outlines our Information Management services. These services can be delivered globally and adapted to fit Customers experiences, requirements and needs. The next level of detail is our service descriptions, where each service is detailed as a statement-of-work. There are also supporting methodologies, standards, technologies, reference material and case studies that will aid the work and build understanding.



Picture: White Paper, followed by service descriptions and supporting material

1.1 About data- and information assets

Enterprises today are more aware that data- and information assets represent significant values, with direct influence on their financial performance and operational capabilities. Poor quality and poor management of data- and information resources are recognized as major cost drivers and a significant obstacle for business performance and improvement.



Picture: Materiel and Immaterial resources

Data refers to a collection of facts created or collected as the result of observation or processes within a computer system. This may consist of numbers, letters or pixels, at the lowest level of abstraction from which the meaning of information are derived.

By observing a thermometer, you collect data about the actual temperature, say the *numbers 67*. From that you put that data into a context of; *number + meaning (temperature, number-field, measured in degrees Fahrenheit) = information*. This will differentiate this data number 67 (degrees) from other observed data 67 (loaves of bread) or even 67 (years of age). You can now define a rule

(knowledge) stating; *IF data < 65 degrees THEN increase temperature OR IF data > 75 degrees THEN lower temperature* = knowledge of optimal living conditions. These are the building blocks of automation. Well defined data and information, combined with carefully scripted rules and triggers can enhance enterprise capabilities dramatically.

But, all data and information in an enterprise are not assets. We have a lot of data and information “floating around” that affects our daily life. But there are some business critical collections of data- and information assets, usually found in information systems, on local computers, in archives or in the head of skilled individuals.

We will in this white paper focus on data- and information assets that are already making a significant impact on the enterprise, or assess if there are important ones missing. These assets can be managed and maintained much like any other enterprise assets, to optimize their usage and value to the organization. Information Governance defines an organization’s strategy for exploiting information assets. Information Governance also includes managing the demand for information and facilitating information superiority in an enterprise through clear definition of organizational roles and responsibilities.

So, is information an asset? Yes, information can be regarded as an asset when it is used by and provides a value to an organization. Information continues to be an asset to an organization, if it is managed, stored, improved, maintained, shared and used over time.

So, has information a value? Yes, information can have a specific value, but... Information is different from other assets, because information assets don’t lose in value or disappear when they are used. In theory, an information asset can be used any number of times, by any number of users, without losing value. On the other hand, information assets can lose their value extremely quickly. If information has no meaning or use, or if it's not actual, updated, accurate, or if it's not delivered on time, or if we can't trust the information anymore - then it has no value.

1.2 Changes drives the need for Information Management

Change is the norm – and the world around us changes more rapidly than ever before. A few years ago we were making engineering drawings with ink and paper, which later was superseded by computer-based-drawings. We now have integrated product models that contain all the information we need to understand a complex system over its entire lifecycle.

These new information capabilities let us design and manufacture much faster and with higher precision. Information can also provide stability and resilience, allowing technologies and processes to change. It is a real and very tangible competitive advantage for those who understand and can use

these new capabilities. Today we see a number of paradigm shifts that drive and evolve our ability to manage and understand information:

- **Paper vs. Digital files.** We are going from manual handling of papers/documents with production, signatures, archiving and publishing, to computerized management of digitized information.
- **Layout vs. Content.** We are going from managing digitized papers (headlines, paragraphs, tables) to manage the actual content of information (description, requirement, capability).
- **Closed vs. Open.** We are going from proprietary, protected, locked in and closed information that could only be exchanged under tight control, to open (represented by open standards), widely distributed and shared information resources, but still under control.
- **Manual vs. Automatic.** We are going from manual document management processes, to fully automatic information processes that deliver a predefined and required result.
- **IT vs. Info Security.** We are going from protecting our Information Technology, i.e. computers, software and network connections, to focus our security measures on the information itself. To lose a computer is not a big deal – it can be easily replaced, but to lose the information that resides on the hard disk could be devastating.
- **IT vs. Info Governance.** We are going from managing infrastructure¹ (IT) which must be an issue for outsourcing, to managing assets (information).
- **Always on-line.** We are going from 8 hours of operation, to 24-7 availability, where everyone we are in business with is globally connected, on-line and prepared to share information.
- **ZERO.** A fairly new trend is the notion of zero. The introduction of Internet and the World Wide Web have brought a notion of zero-cost, information should be made free of charge, the control by computers has brought the notion of zero-failure and zero-lead time. New threats against our personal integrity have brought our tolerance to zero-risk and based on the commodity of computers and software, we now want zero-dependency to hardware and software.

¹ Hardware (computers, peripherals, servers), networks, software (operating systems, applications, imbedded software, protocols, interfaces), electricity, facilities, air conditioning, auxiliary power

1.3 The Information Technology (IT) trap

Enterprises need resilient solutions, due to rapid changes of markets and business enablers. Ted Friedman, Gartner: *There isn't a silver bullet. It isn't an IT problem. If you're only throwing technology at the problem, at best you'll only get some short-term, lukewarm benefits.*

Overconfidence in “quick fixes”, technological solutions, which claims to solve information problems, usually leads to:

- Sub-optimizations of vertical stovepipes
- Lack of coordination and interoperability leads to redundancies and inconsistencies
- Difficulty to utilize/exploit the full potential of information resources/assets
- Increasing information quality, legal and security problems
- Need to get some more “quick technology fixes” to overcome undesired consequences
- Delays, difficult to plan ahead, because “the next version” isn't installed yet
- Rapid expansion of complexity (patches, updates, bug-fixes, interfaces, exchanges)

1.4 Benefits

There are many benefits that can be drawn from an improved management of data- and information resources. Here are some examples:

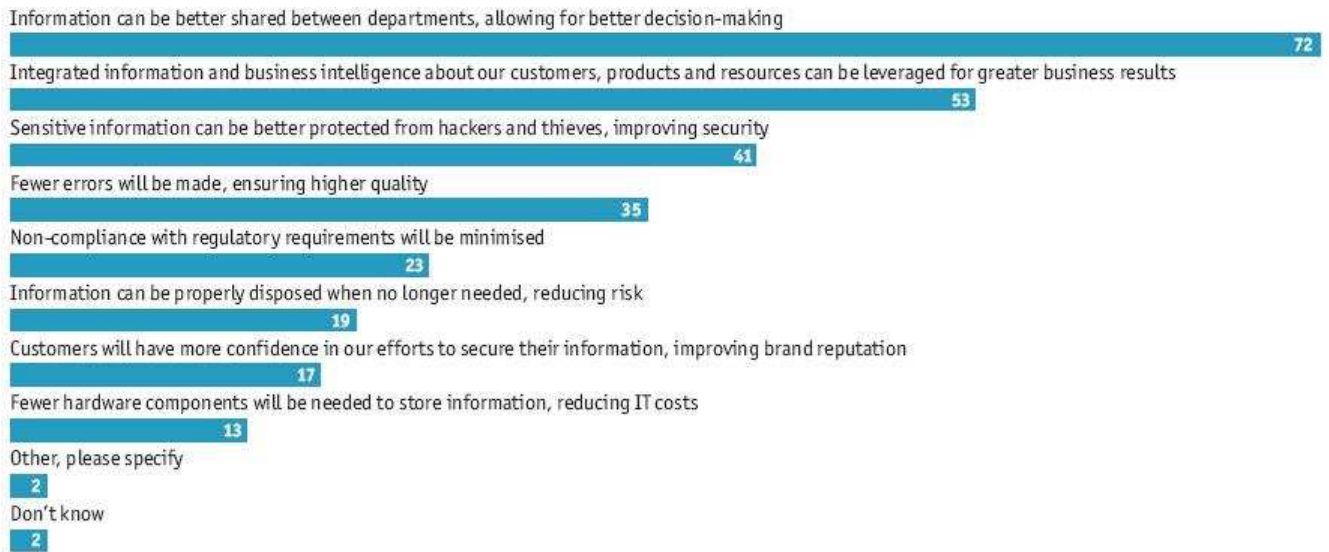
- Introducing data- and information as key assets for the enterprise will create new capabilities for the enterprise that generates economical value and evolves the business. Information gives the enterprise an opportunity for transparency and openness which will build trust and confidence among customers and employees.
- Digital data- and information requires less physical space and staff to manage vast amounts of documents. Less time spent on searching, retrieving, distributing and updating documents over time. Increased accuracy for Project-, Document-, Configuration-, Change- and Quality Management processes.
- Integrating, harmonizing and clean-up of fragmented information assets is fundamental when building for operational excellence, may that be Oil & Gas Production, Design,



Manufacturing, managing a Supply Chain or Command and Control troops. Less redundancies and inconsistencies together with improved information quality will improve decision processes and the actual precision of decisions; reduce risk and threat levels, reduce lead times, increase availability and present new opportunities to improve processes (automation, 24-7, global support), products and services.

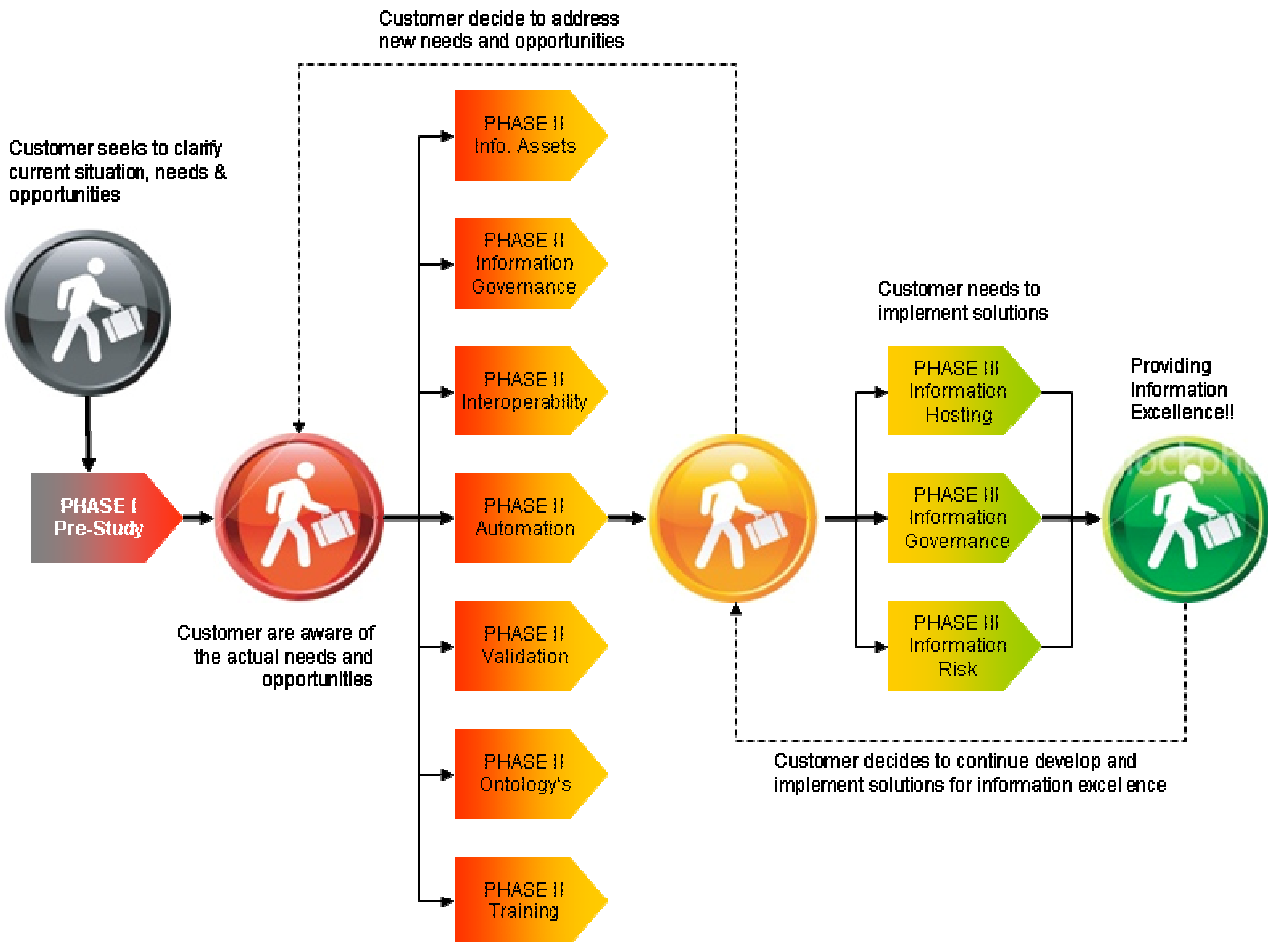
- Well managed information assets will be protected from intrusion, manipulation, theft, destruction or accidental mismanagement/usage. By understanding the risks, the enterprise can insure itself from future damages.
- Providing IT capabilities can be governed by performance-based-agreements (outsourcing) which can liberate finances, staff and facilities to handle more essential and valuable assets.

In your opinion, what are (or would be) the greatest benefits of an enterprise-wide information governance strategy at your company? Select up to three
(% of respondents)



Picture: Response from 192 senior executives. The Economist Intelligence Unit, October 2008

1.5 Introduction to DNV IM services



Picture: Flowchart over DNV Phased Information Management approach

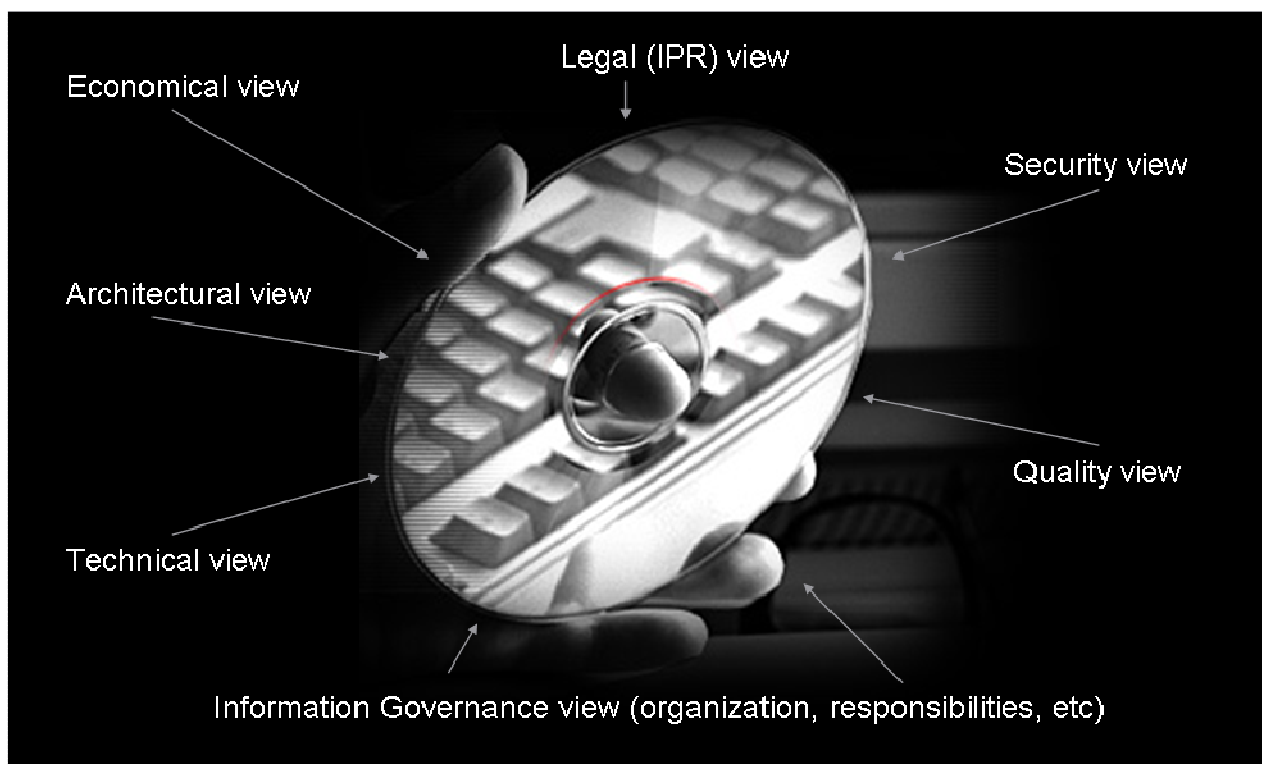
DNV has a three-phased approach for Information Management services. The first phase is to clarify the current information management situation, then to dig deeper into more specific problem areas, to finally provide new capabilities for the customer in the third phase. The following pages give an introduction to our services.

2 PHASE I – INFO. MANAGEMENT PRE-STUDY

FEW WOULD disagree that their corporate information is probably their biggest strategic asset.../...The problem with corporate information is that it's inevitably locked up in silos that range in size from one person's head to another through departments and regions.../...Unlocking such information is a huge challenge that needs to cross the boundaries of technology, politics, people and processes. This is probably one of the biggest challenges faced by reasonably sized organizations.

By Ramesh Manghirmalani

In order for the Customer to grasp all opportunities, we usually recommend beginning with the Information Management Pre-Study. This is a quick study (around 200 – 400 hours of work), tailored to identify and report on the current status of (1) business critical data/information assets and (2) information governance capabilities.



Picture: Located information assets, will be addressed from an Information Governance, Technical, Architectural, Economical, Legal, Security and Quality point of view.

1. DNV will meet with the Customer to decide initial and additional focus-areas (for example, current data/information assets and information governance, plus one or more from the list below) of the Pre-Study. Potential focus areas include:
 - Product Life-Cycle Information for Systems/Assets
 - Enterprise (HR, financial, customers, contractors, etc) data/information.
 - Technical Documentation, production, archiving, retrieving, usage.
 - Information Risk, where poor information can cause negative consequences.
 - Information Architecture, assessment and/or development.
 - Standards, best-practice assessment and/or development.
 - Information Interoperability, technical connectivity & semantic content sharing and exchange.
 - Information Governance, policies, plans, programs, metrics, guidance, organization, preparedness, training, objectives/targets/goals, etc.
 - Information Security, PKI, content classification, access control.
 - Intellectual Property Rights and other legal issues.
 - Economical valuation of current data/information assets.
2. Together with the Customer, DNV will arrange and hold a formal kick-off meeting (4-8 hours), where the project plan, initial focus-areas, resources, and expected reporting will be presented and discussed. Practical issues such as working facilities, information security, detailed planning for meetings and activities, observed risks and risk-mitigation and point-of-contacts will also be covered.
3. DNV will collect information required to perform the Pre-Study including the optional focus areas (as defined in activity 1). For example, we will ask Customer senior executives (CEO/COO/CIO/CTO/CFO) for selected plans, policies and guidelines on Information Governance, available enterprise and service oriented architectures, current information models and standards, corporate manual on administrative archiving, financial information and budgets concerning IT- and information management.



We might also ask Legal Counsel for Intellectual Property Right (IPR) related information and current legislation, rules and regulations that restrict the Customer in sharing or exchanging different types of information. We will ask the IT staff about networked resources (e.g. data marts/warehouses), users, major information systems, current and future plans and programs. We will ask Program Managers for policies on sharing or exchanging information with customers and contractors and vendors. We will ask the Security Officer for risk and mitigation plans for data/information resources. We will also ask Human Resources to estimate or show the number of registers, systems and databases for the Customer that have people information.

4. DNV will perform an initial analysis of the collected information to better understand which individuals and departments should be interviewed. This initial analysis will also help formulate initial questions. DNV will present and discuss the material collected with the Customer to carefully identify and schedule key individuals for interviews.

Our view is that all the knowledge needed to fully understand the issues and to take the right decisions, already exists within the organization. It is just a matter of finding and organizing it in a structured way so decisions can be made.

5. DNV will perform structured interviews with key individuals and evaluate the results to better understand the current situation. Interviewed people will be asked specific questions within their area of responsibility, but also some general open-ended questions, that will allow them to express their own thoughts and ideas.
6. DNV will then compile the available information that has been collected from the organization and individuals, perform a first integrated analysis, and identify and present top findings to get the Customer's feedback and to ensure that the form and content of the results match the Customer's expectations.
7. DNV will request and obtain missing information and data from the Customer. It might be necessary to perform more interviews or conduct additional in-depth investigation.
8. DNV will prepare the findings report, which will be approximately 50 pages. The final report normally consists of the following chapters:
 - Executive summary
 - The mission
 - Findings from focus area 1 (usually data/information assets and their current status)
 - Findings from focus area 2 (usually information governance and current status)
 - Findings from focus area n (usually no more than 5 focus areas)



- Recommendations
- Terms, definitions, indexes and references

The findings report will be presented to the Customer. PowerPoint presentation material will be developed and given. If requested in the Statement of Work and Contract, demonstration of tools, technologies or other features can be presented (i.e., development of Ontology).

9. The Customer will be asked to participate in a customer satisfaction feed-back survey.
Closing administration and final invoicing.

The objective of the Pre-Study is not to deliver the perfect or complete identification or status report of Information Assets and Information Governance abilities. Instead it is a structured approach to present the best result possible in a short time. The Pre-Study shall be regarded as an introduction to data-, information- and knowledge resources for the enterprise.

The Pre-Study shall not indulge in finding faults, but instead it shall note positive and strong areas and recommend areas for improvement. The findings report shall identify and give an appropriate status of both information resources and Information Governance. Strengths and weaknesses will be noted, best practices identified, recommendations and suggestions for further work shall be proposed.

Methods	Information Governance procedures The Pre-Study Methodology - Questionnaires
Deliverable/s	The findings report (approx 50 pages) PowerPoint presentation, that summarizes the report Any other agreed deliverable from decided focus areas
Schedule and time	Calendar time 6-12 weeks, 200-400 hours



3 PHASE II - SPECIFIC IN-DEPTH STUDIES

Gartner predicts that organizations who do not approach information management in a coordinated, enterprise manner, will fail in the first or second year at a rate of more than 90 per cent. Many organizations want to exploit their information assets and address issues surrounding information overload in order to achieve their efficiency, transparency and differentiation objectives. At the same time, they want to ensure appropriate safeguards and measures are in place to protect sensitive information and minimize risk. Despite the recognition of the importance of the issue, many organizations do not have formal information governance programs, or coordinated information management strategies in place.

“IT professionals have focused for too long on technology and not enough on information,” said David Newman, research vice-president at Gartner Symposium/ITxpo. “The business expects to have the right information at the right time to get the job done. It also expects information to be accurate and consistent. Furthermore, senior management expects that adequate controls and defined accountabilities are in place to assure compliance and reduce risk. That’s why information governance is top-of-mind among any of our clients today.

Gartner Group Says Start Managing Information, Not Just Technology

Based on the results from the initial Pre-Study or as a specific targeted need, the Customer has an opportunity to focus efforts on more specific areas. Findings from the pre-study, pressing needs and requirements from the Customer serve as specifications for the work. The following are examples of typical services that might be considered. Again, Customers can combine these (or other) services in many different ways.

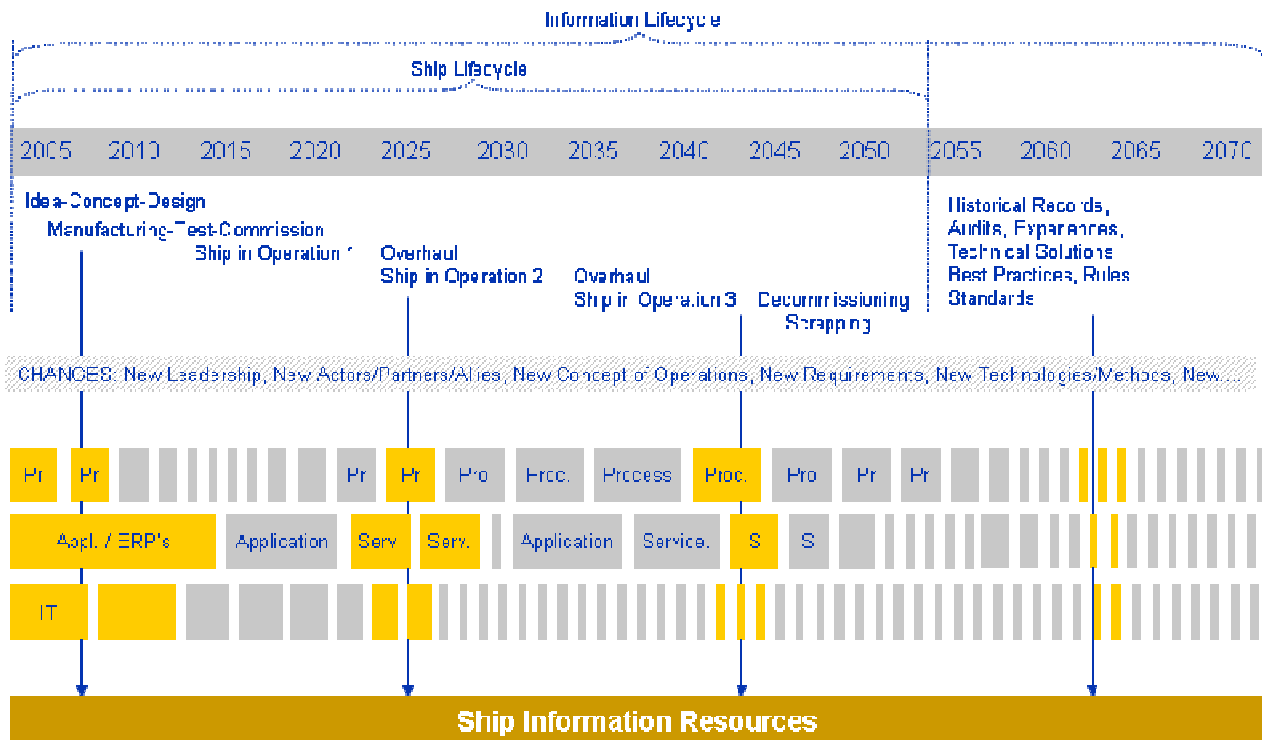
Digging deeper into the current information resources might disclose unexpected areas for improvements and lead the enterprise to gain new values, capabilities and business opportunities. Problems that relate to information might be hard to detect and understand, they are often misinterpreted and referred to failing business processes, technology shortcomings or supporting resources.

3.1 System/Product Life-Cycle Information.

As with any information resource, the initial approach would be a more comprehensive status-check, and then a clean-up to enhance the information quality. Usually system/product information is fragmented in a myriad of different information systems (RM, CAD, CAE, CAM, PIM, PDM, Planning, CM, ILS, LSA, TD, PM, QM, etc)². Organizations struggle to provide information exchange and -sharing capabilities between information systems. It consists usually of hard-coded

² Requirement Management or Risk Management (RM), Computer Aided Design (CAD), Computer Aided Engineering (CAE), Computer Aided Manufacturing (CAM), Product Information Management (PIM), Product Data Management (PDM), Configuration Management, Change Management or Contract Management (CM), Integrated Logistics Support (ILS), Logistics Support Analysis (LSA), Technical Documentation (TD), Program Management (PM), Quality Management (QM)

interfaces between systems and it is very costly to maintain. Sharing product information across the enterprise, providing traceability from ideas/concepts, through contracted requirements to delivered capabilities, functions and nuts-and-bolts is essential to be trustworthy, efficient and cost-effective.



Picture: When the enterprise changes over the lifecycle, processes will change (new processes will be created, outdated ones will be deleted and there might be new relations with others, etc). These changes influence design and behavior of applications/services and choice of information technology. The corporate information resource (brown) must be consistent, available and adaptable over time, so people can use current processes, applications and information technology to locate, retrieve, adapt and use product information. A well managed information resource will then enable resilience, stability and flexibility to be established for the enterprise. The information lifecycle is much longer than the lifecycle of the system it describes.

There could also be a need to harmonize reference data, insert rules, checks and controls to keep up the data/information quality, provide a means to protect proprietary information (technical solutions, patents, contracts, plans, programs, agreements, etc), add mandatory controls and attributes such as unified identifiers (instead of discipline related identifiers), add standard representation and structure,



add rules and triggers for automated controls, etc. There could be a need to find the best technical solutions and support to implement them.

Well managed product information will help with traditional problem areas such as contracting and handling of requirements, concepts, ideas, configurations and changes. Integration of product information over the lifecycle will provide a unified view over manufacturing, operations and logistics enabling supply chains to be fed with the right information at the right time. New services and products that requires integrated information can now be developed, marketed and sold, such as Performance Based Logistics (PBL), Simulated Based Design, Manufacturing and Procurement, Operations Excellence, On-Line-24/7-Helpdesk and Training, integrated network of vendors and suppliers.

Methods, Standards ³	ISO 15926, Integration of Life-cycle Data for Oil and Gas Production, reference data ISO 10303, Standard for Exchange of Product Data (STEP), and ISO 10303 AP 239, Product Life Cycle Support information (PLCS)
Deliverable/s	Information Architecture Proposal how to integrate and harmonize Product and Reference Information Proposal to implement solution, including tools (HW/SW) and Info. Governance compliance
Schedule and time	TBD

3.2 Enterprise information

Establishing support for your structured/unstructured enterprise information is a very good idea. One problem is that most technical solutions base the solution on what information the application need, and not on solving current information problems.

In the enterprise you will find information on employees, other HR⁴ information, payroll, finance, budgeting, accounting, invoicing, payments, legal council, competitors, customers, government regulators, production/operations, products, services, procurement, marketing and sales, contracting, facilities, supplies, internal/external support, business (markets, competitors, risks) intelligence, news, research and development, and a steady flow of emails, documents and files. Every type of information has its own special requirements, problems, concerns and opportunities.

³ ISO 15926 is a very strong standard for Energy, Maritime and Environmental sectors. ISO 10303 is a strong standard for Defense and Vehicle Manufacturing (cars, airplanes)

⁴ Human Resources information, such as insurance coverage, healthcare, pension, taxation, loans, and much more..



Enterprise information is usually not integrated, harmonized or distributed in just one copy; it is instead copied and widely distributed within the enterprise and changed/adapted to fit local users. Every bit of redundant information must be managed and adds therefore to the overhead. We all have seen the file with “corporate rules” that sits in the shelf, even if it’s published and available over the corporate intranet. Poor management might also be a source of failing quality and damaging inconsistency.

Understanding your enterprise information is therefore the key to success. From that, you can decide upon smart and adaptable technical solutions. Enterprise Information Portal (EIP) is one class of broad solutions that promises enterprise wide solutions and it comes in many names: Business (Intelligence) Portals, Corporate (Collaborative) Portals, and Enterprise Information Portals (Decision Processing Portals, Knowledge Portals).

DNV utilizes the experience we have from Defense environments, so we tend to call a corporate wide EIP for a Command, Control, Communication and Intelligence (C3I)⁵ function that provides shared situation awareness (monitoring, triggers, automated rules/agents, information fusion and decision support) including shared orders, plans, intentions, resource management (capabilities and its status) and intelligence.

Setting up Data Marts and Data Warehouses to support an EIP C3I function can be very effective. But basically, selected enterprise information must be cleansed, quality improved, authenticity established, classified, tagged for national and international laws, rules and regulations. The enterprise information should conform to the latest requirements on openness and transparency.

Building trust and interoperability without losing control of information security, respecting individual integrity and information related liabilities. And, probably most important of all, these new capabilities will influence the culture and the way of working with information. DNV will assume the role of a “change-agent”, training, adapting and helping users and organizations to quickly adapt to the new environment.

Methods, Standards

OLTP - On-Line Transaction Processing, Normalized data model
OLAP - On-Line Analytical Processing, De-normalized data model
Decision Support Databases, Data-Marts and Warehouses
Multilateral Interoperability Program (Enhanced MIP) or other EIP solutions

⁵ Command, Control, Communications and Intelligence (C3I) is a US DOD concept. The central focus of Command and Control is to provide structured support to the decision maker. Execution of decisions will be based on the ability to communicate with all levels of the organization. Intelligence capabilities are provided to fully understand the area of operations.



Deliverable/s	Description over available Enterprise Information Manage and execute initial clean-up Enterprise Information Architecture, ensuring interoperability Proposal to combine Portal technology and Data Warehouses Proposal to implement, including tools (HW/SW) and Info. Governance compliance
Schedule and time	TBD

3.3 Technical Documentation

Technical Documentation can easily be a white paper by itself. Most organizations experience an enormous flow of documentation. Documentation comes in various forms. It could be business related documents, correspondence, papers, presentations, news articles, publications, emails, reports, links to websites, ads and much more. Users are practically “showered” with information to read, to be aware of or to base decisions upon. Instinctively we do understand that this unstructured information is valuable and could answer many questions, but it takes too much time and effort to manage and sift through to get to the right data-points.

But, with a well structured classification system that describes your business and interests, most of this can be automated. There are tools that can digitize old paper documents and interpret text (Optical Character Recognition). Similar tools can understand graphical layouts of text and inserts formatting tags automatically. More advanced tools can understand content and automatically create search-indexes⁶, and there are tools that aggregates large documents and create abstracts, used for easy search and retrieval.

To understand what the legacy looks like is essential and very important when it comes to documentation. Over time, there have most likely been numerous technical solutions for how documents have been prepared, produced, archived, searched, retrieved and used. Finding realistic solutions on cleaning up the legacy is fundamental. But, careful prioritization is important not to waste financial and staff resources.

An enterprise heavy with paper documentation, would benefit from a well setup Document Management System (DMS), which would unify the handling of documents, create relationships (make them traceable) between documents and relations to Configuration, Logistics, Designed, Required, Contracted and other structures.

⁶ Good examples are tools from Autonomy, <http://www.autonomy.com/>.



Equally important is to control and manage templates (graphical layouts) separated from logical structure and content which can be described by standards such as: Document Type Definitions (DTD), XML Schemas, RELAX NG, ISO DSDL (Document Description Language) or numerous other proprietary formats and representations. To gradually go for more integrated information than documents, requires the enterprise to see how document content can be managed and maintained through database solutions. Also, there might be a need to see how documents can be integrated with other information.

Methods	ISO 8879 SGML (DTD), XML Schema (W3C) and OASIS S-1000D MIL-D-87269, Interactive Electronic Technical Manual (IETM) Database Supporting Taxonomies, Ontology's (OWL), Topic Maps (XML TM) W3C – The Resource Description Framework (RDF)
Deliverable/s	Legacy awareness and clean-up Documentation Architecture, a detailed subset of the Enterprise Information Architecture Propose and support setup of potential DMS tools (Documentum, Onotopia, Corena..) Develop and implement DTD, XML Schema
Schedule and time	TBD

3.4 Other information resources

There are many other internal and external information sources that DNV can look into. Customers might have a need to exchange, share or access assets like the Geological Data Library, Geo-Data Explorer (GEODE), NOAA weather data, information from local municipalities, state and federal organizations, research and development information, publications, infrastructure, communications, transportation, supply chains, import/export, operations, legal, various services, news, business opportunities, an much more.

One very important information asset, frequently overlooked, is reference data. All parts of an enterprise are in dire need to connect “corporate knowledge” in order to be functional. Reference data should be common and easily accessible for all. It could consist of symbols, images, ontologies, taxonomies, topic maps, terms, formats, descriptions, templates, registries, rules, constraints, models, data types, dictionaries, codes, acronyms, standard attributes, operative metadata, enterprise class libraries, metrics, criteria, processes, activities, logs, catalogues, links, relations, associations, annotations, classifications, certificates, access rights, usernames and passwords, versioning, different types of services, hardware- and software tools, interfaces, protocols, standards, guidelines, and much, much more. Finding the actual structure and representation can be a challenge, but it can be even more difficult to find an organization that can serve others with actual and updated reference



data, without being regarded as a threat.

Methods	ANSI X3.285-1998, Metamodel - Management of Sharable Data, based on ISO/IEC 11179 Taxonomies, Ontologies (OWL), Topic Maps (XML TM) ISO 15926, Integration of Life-cycle Data for Oil and Gas Production. ISO 19101-19140, International Standard for Geographical Information OASIS Directory Services TC W3C - Semantic Web Semantic Web
Deliverable/s	Reports on internal and external information assets and how to manage and use them Proposal and separate Architecture on reference / meta data
Schedule and time	TBD

3.5 Improve Information Governance

Information Governance (IG) addresses the management of data/information assets within an enterprise. IG defines roles, responsibilities, processes and metrics to assure an effective and rationale production, storage, maintenance, control and usage of these assets. IG assures that characteristics such as accuracy, completeness, timeliness and understand-ability are met.

In your opinion, what are (or would be) the greatest challenges in implementing an enterprise-wide information governance strategy at your company? Select up to three
(% of respondents)



Picture: Analysis from The Economist Intelligence Unit, October 2008

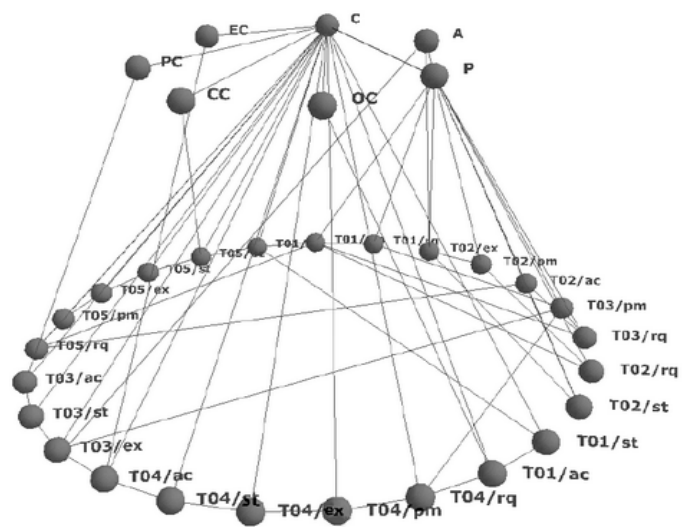
3.5.1 Policy.

DNV will assess, help to develop and implement Information Governance visions, objectives, policies (commitments) and strategies (including plans, programs and goals), guidance and training. DNV will recommend how to correctly manage these assets, define and assign roles and responsibilities and provide metrics so progress can be measured. DNV will assist the enterprise to draw the maximum benefit from identified data- and information assets. There might be a need to address worst case scenarios including safety, security, risks, liabilities and quality across the enterprise. DNV will help build awareness on consequences pertained from these scenarios and what is needed to mitigate these risks.

3.5.2 Information Infrastructure and -Architecture.⁷

DNV will define, model and implement the Information Infrastructure needed to capture, create, manage and maintain information over time, to harmonize the understanding of data/information and to make sure that all authorized users can access the right information at the right time.

The Information Architecture (IA) describes the information part of the information infrastructure. IA defines the foundation to correctly represent and structure information assets, how these assets relate to other internal and external information assets, information systems and supported from models, interfaces, meta- and reference data.

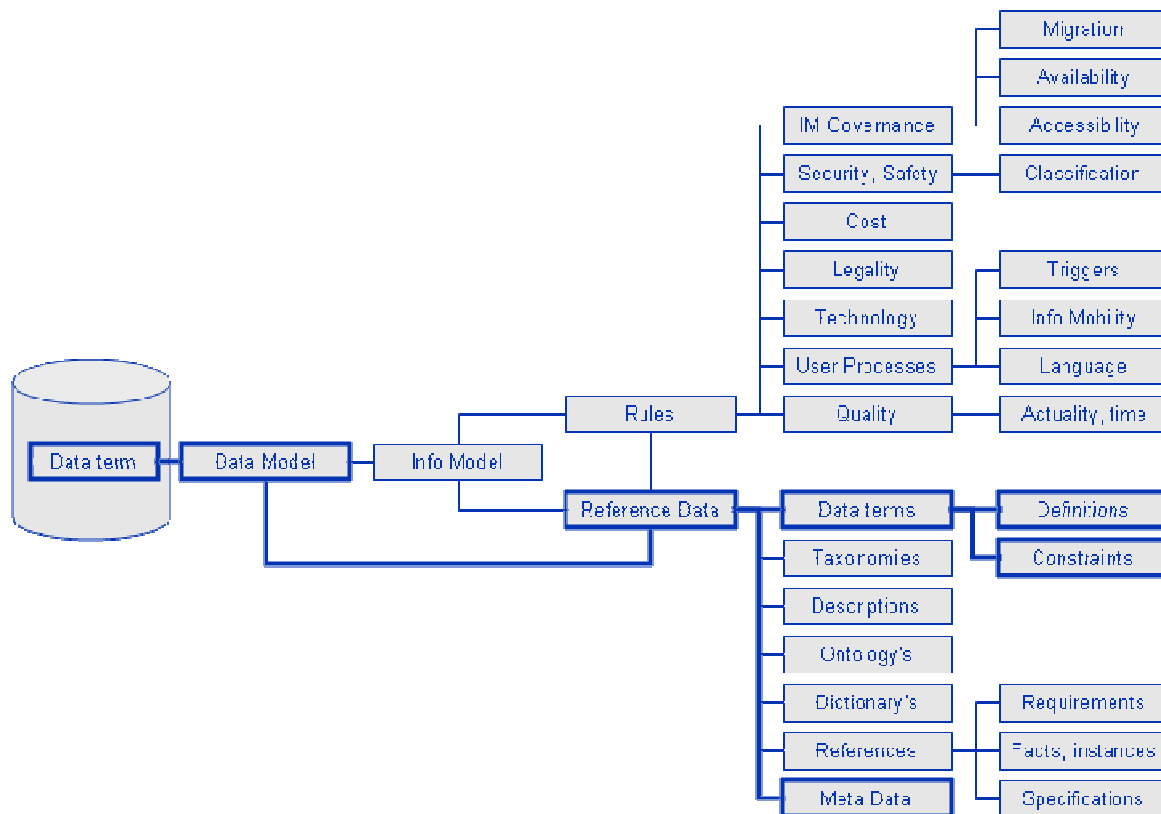


The IA will describe how information can flow between applications and be shared across enterprises. A well thought out and implemented IA will simplify procurement of applications or services in a Service Oriented Architecture (SOA). Most enterprise-wide applications such as

⁷ Picture: Information Architectures can be drawn in many ways. Here is one made by The Enterprise Architect, <http://www.theenterpriseearchitect.eu>, showing relationships between services and information assets.

Enterprise Resource Planning (ERP), Customer Relationship Management (CRM) and Enterprise Application Integration (EAI) assume that Customers have a well thought out Information Architecture.

3.5.3 Information Quality



Picture: Information Quality is much more than just the quality of the data term

There are six major information quality problems in most enterprises, which DNV will help to solve:

1. Inaccurate data, the quality of data rapidly degrades over time. There can be problems with spelling, wrong keystrokes, missing updates, corrupt data and more. A typical decay rate of customer information is 30% per annum (study by PWHC).
2. Incomplete information, information is missing or of so poor quality that it cannot be interpreted (unusable) or language, ways of expression and usage of acronyms make it hard

to understand. Nineteen percent (19%) of Information Quality issues relate to missing information (IAT survey).

3. Lack of conformity, information stored in a proprietary (non-standard) format is after some time unusable.
4. Inconsistent information, the same information in multiple systems often leads to inconsistencies; same data term has different meanings, definitions, representations and structures. This makes it difficult to impossible to merge without manual input.
5. Redundant information, multiple instances of the same information makes it almost impossible to understand where the “original source information” is. It is a big inhibitor of effective information management.
6. Lack of integrity, missing relationships (links) between information objects degrades quickly the quality of information and can make it very costly to correct.

Traditional quality management is post-reactive. By inspecting products or services as they are produced, you then scrap and rework those that do not conform to standards. But that will indicate that you use valuable resources to produce waste. We will make sure that this is avoided.

Our approach on data- and information quality is to introduce proactive means (quality as an integrated part of your processes and procedures) to avoid having poor quality information diluting the enterprise.

3.5.4 Information Security

Information security is divided into three major parts. The first is to ensure clear and positive identification of users. Anonymous users will not be allowed to gain any type of access to corporate data/information. DNV has a long experience setting up corporate Personal Key Infrastructures (PKI) and for global organizations also setting up Verification Authorities (VA's) to integrate and harmonize certification policies for a large number of Certification Authorities (CA's).

The second part is to classify the content of data/information in relation to well-defined classification schemes. Classification can have a lot of different flavors, the most common are security (i.e. open, confidential, secret, top secret, etc), then legal and then by subject or business area.

The third is to match the identification of users with the classification of content and to give users privileges that will assist them in accessing information and how to use it. Different information

assets might have different classifications and there are many internal and external users, which eventually will make information security quite complex.

3.5.5 Legal issues

Management and usage of information assets are regulated by national and/or international laws, rules, regulations and corporate policies. DNV would assist by providing legal counseling to ensure that Intellectual Property Rights, Copyrights and other legal limitations are handled in a correct way. If protected information (internal or external) is disclosed to the wrong parties or used in a wrong way, then there might be a risk for lawsuits. The following issues can be addressed and explored:

- Analysis of which applicable national and/or international laws, rules and regulations might affect the management and usage of data- and information assets.
- Ensure protection of distinctive signs, trademarks, names, geographical indications, innovation, design and the creation of technology, like patents, designs, trade secrets, ideas, concepts, plans and descriptions, contracts, agreements.
- Management of rights to use. If the enterprise has very limited or restricted access to important information, then that can be re-negotiated.
- Ensure that capabilities that ensures completeness, accuracy, correctness and authenticity is implemented and tested so digital information assets can be regarded as trusted and legally admissible evidence (if and when that is needed).

3.5.6 Economic Valuation

As stated before, information assets can have an economical value. Understanding its economical potential will help the top-executives to focus their attention on new services and products and to refine and improve information so it provide maximum yield. One goal might be to publicly express the value of enterprise immaterial data- and information assets in the balance sheet or as a note to the balance sheet, and by doing that boldly state that the enterprise recognizes these valuable assets.

But, before that, the enterprise will be required to clearly describe and use a proven methodology to analyze, measure and calculate the value and clearly show how the information asset is identified, distinct from other assets and how it is managed.

There are at least three valuation methods, or combinations thereof. The first is a classical



cost analysis to measure the costs to create or re-create the information. Second is a cash-flow analysis, where potential revenues from sales of raw data or refined information will be priced. Finally the third is a market value analysis, which simply indicates what the market/s is prepared to pay for the information.

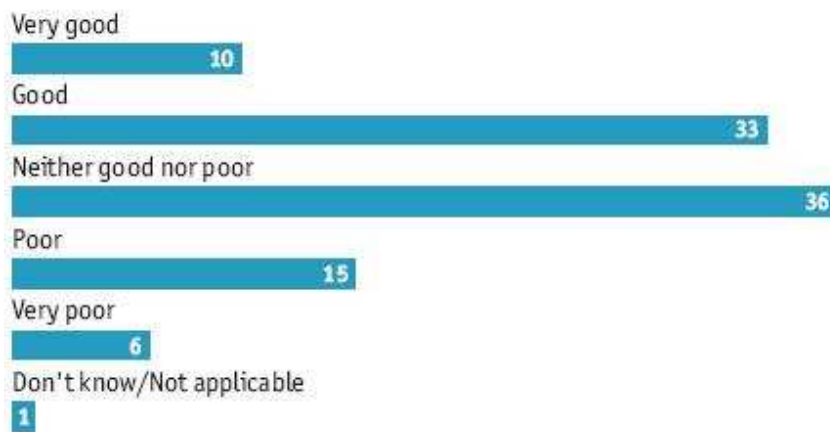
Another important area is to define metrics to account for and understand data/information assets. These metrics will help the organization to manage information assets and to take decisions. A metric could for example be “number of registers with HR-related information”. A goal could then be defined to reach one (1) register within three (3) years. Other metrics could be “the costs for HR information” and be broken out in sub-metrics, stating “the amount of staff and other resources needed to maintain HR information”.

Methods	ISO 9000, Quality Management and Quality Assurance Standards ISO 9001, Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation, and Servicing ISO 9004-2, Quality Management and Quality Systems elements - Guidelines for services The Department of Defense (DoD) Architecture Framework (DODAF) The UK MOD Architecture Framework Version (MODAF) JC2IEDM, Joint C2 Information Exchange Data Model DNV White Paper PKI Interoperability by an Independent, Trusted Validation Authority ISO 17799 Information Security The international accounting standard IAS 38 – Intangible assets ISO 8000 – information quality
Deliverable/s	Help, assist, guide and implement IG Vision, Objectives, Policy and Strategy and more specifically IG Info Security Policy, IG Info Architecture, IG Organization, IG Quality Plan, IG Regulatory Guide (Laws, Rules and Regulations), IG Models and Standards, IG Intellectual Property Rights, IG PKI for trusted users, IG Economical Value and Metrics.
Schedule and time	TBD

3.6 Achieving information interoperability

How do you rate your company's overall ability to integrate and share information across departments and necessary third parties?

(% respondents)



Picture: Analysis from The Economist Intelligence Unit, October 2008

In this day of specialization, globalization and constant changes, more attention will be placed on interoperability within an enterprise and with external partners, customers, suppliers and contacts.

By information interoperability we mean that it is the ability to interpret shared information meaningfully and accurately so it can be used and produce useful results for participating actors. To achieve this all actors must defer to common information-sharing prerequisites (models, standards, architectures, interfaces, reference / meta data, governance, IPRs, access rights, etc.).

DNV will assist in making information interoperability a reality. It could be to set up a shared environment for an offshore platform, keeping the information together for a large global supply chain, making the information flow between nations/government organizations, integrate and centralize the information for citizens, employees or patients, provide integration of shipping and port information to automatically generate arrival and departure times and port clearance documentation and give input to logistics systems for loading and unloading, integrate a large number of information sources to find “anomalies” and automatically react on those. Applications for interoperability can be found everywhere.



Important to note is that this is not based on information system integration, instead this should be done independently from hardware, software and applications. If the information that is going to be shared is outdated, missing, incomplete or incorrect, then that can cause havoc for every user who participates in the shared environment. It is therefore imperative that data- and information quality and -security prerequisites are correctly implemented. Having DNV as a neutral third party can make that adjustment easier.

Enterprise wide integration of product- and meta data will open up opportunities to share and exchange information across and between all users and disciplines that are involved in a targeted system/product. DNV delivers Product Models and Reference Data for mechanical products, systems, documents to support processes for cost effective design, fabrication, operation and maintenance.

DNV will evaluate and support implementation of Information Standards (IS) – such as ISO 15926 Reference Data, ISO 10303-239 (Product Life Cycle Support) and S1000D Technical Documentation, for preparing, integrating and exchanging product data between heterogeneous applications. DNV is currently managing the world’s largest PLCS implementation, and operates the first Reference Data Library based on ISO 15926.

Interoperability by using Web services and Semantic Web Technologies – applies modern software technologies for syntactic and semantic interoperability. DNV offers advanced integration solutions using the latest XML technology and Web Service standards to support collaborative work processes.

Methods	Information Governance procedures The Pre-Study Methodology
Deliverable/s	The findings report (approx 50 pages) PowerPoint presentation, that summarizes the report Any other agreed deliverable from decided focus areas
Schedule and time	Calendar time 6-12 weeks, 200-400 hours

3.7 Automated information processes

There are now new opportunities for enterprises to introduce automation. Most processes that are repetitive and rules-based can be subject for potential automation. A traditional business process reengineering approach will find processes that are outdated and non-relevant. But, by adding views of data/information management and usage, we can provide even more opportunity for automation.



There are normally a lot of manual processes in an enterprise that can be automated, which will save substantial amounts of time and resources and therefore money.

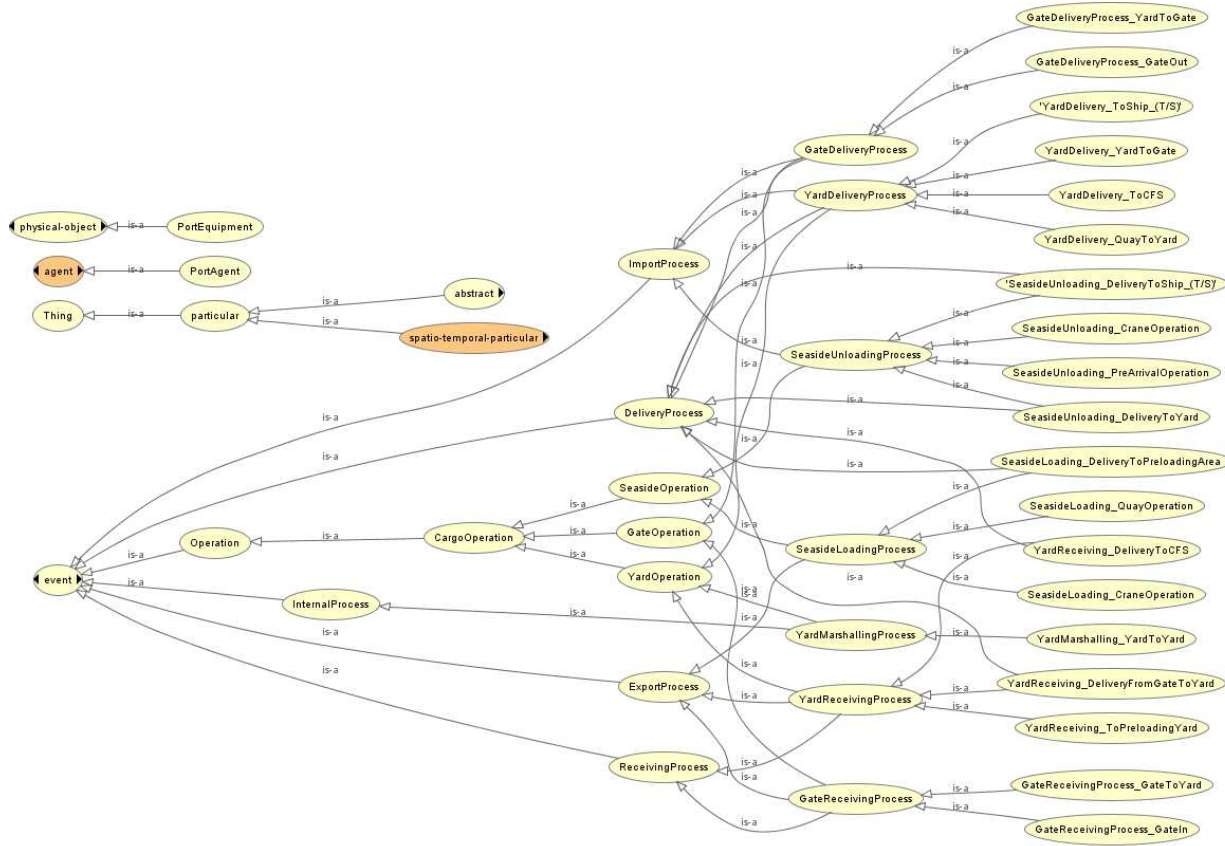
Information-based automation is based on well-structured information, and then it is supported by logical rules to describe actions and processes, triggers that can activate action, collectors that goes out to other information sources and extract data and information. There are also interpreters supported by more rules and supported by taxonomies, ontologies and sets of reference data, which can help understand the content. There might be fusion engines that aggregate large volumes to tiny fragments, without losing meaning and context.

There are numerous areas where automation can be introduced. Instead of printing, sending out and following up on thousands of invoices, payment can be handled as direct bank transfers, without losing the need for authenticity and accounting proof. Automation can help with gathering of information before meetings and merge it into a status report with prioritization and recommendations for decisions. Many organizations use automation to make decision processes more efficient and rational. There are organizations that use automation as a tool to constantly check large environments and volumes of information for anomalies and if found, to trigger a number of actions. Some even use automation to make extremely complex environments easier to understand.

Methods	ISA Standards, http://www.isa.org/ .
Deliverable/s	Propose areas for automation.
Schedule and time	TBD.

3.8 Building Ontology's

One of the specializations of our work has recently been to build quite advanced ontologies. These are based on the World Wide Web Consortium (W3C) OWL standard and are used to structure terms and definitions for specific business area. What makes DNV quite unique in this process is the combination between the competence to build ontologies and domain expertise to fully tailor class elements, definitions and relationships into a representative structure.



Picture: small slice of an ontology

Ontologies are the next step after defining dictionaries and taxonomies. With a correctly built ontology, one gives computers a great opportunity to understand and control the structure of data and information. Websites, databases and more can be automatically generated from ontology, and it can greatly support integration with other ontologies, data models or databases. This is invaluable when large amounts of data will be integrated from different information systems, or data is going to be automatically checked and processed.

More organizations require ontologies to be built in order to harmonize the understanding of an enterprise’s resources, products and services. DNV has the experience and expertise to quickly reach valuable results.

Methods	W3C OWL Various top ontologies
Deliverable/s	PowerPoint presentation to explain the Ontology



Protégé built Ontology, OWL files

Schedule and time

TBD

3.9 Information Validation

A very important service is to continuously manage information exchange and sharing interfaces. If the environment is based on proprietary solutions, then it will be even more essential to ensure the flow of information. Achieving dynamic and resilient solutions will require an increased use of standard formats, scripts, languages and protocols.

DNV will provide validation services to make sure that interfaces and protocols record, interpret and deliver the information in the right way.

DNV can provide validation of Software Interfaces according to standards. This will allow exchange of information according to a given standard by ensuring consistent encoding and interpretation by interfaces using standardized protocols and software components. DNV offers validation of a wide range of application interfaces according to international or proprietary standards.

DNV can provide validation of Data Sets according to standards. This enables practical use of Information Standards by ensuring that data exchange between applications and enterprises is based on the same syntax, structure and semantics. DNV offers validation of data sets according to international or proprietary standards.

Methods

Applicable information standards

Deliverable/s

Software interfaces
Data Sets
Other format descriptions, scripts and protocols (incl. DEX's)

Schedule and time

TBD

3.10 Information Training

Det Norske Veritas (DNV) together with a set of US and International partners provides key training in several data- and information related topics. DNV is a widespread and global organization and can provide adapted training in more than 100 countries and territories.



Training is an essential enabler for cost effective information governance. With new standards, evolving technologies and best practices emphasize the need for continuous learning and competence development on all levels of the enterprise.

The training addressed here are just a few examples of what we can provide within the field of Information Governance. Customers have a great opportunity to tailor their own agenda, location and duration. DNV will provide world class experts and very experienced practitioners within their fields of expertise.

DNV does the following training with our own resources:

1. DNV will provide training for the new ISO 8000 Information Quality Standard, understanding data- and information quality, understanding and using the standard, 3-5 days. ISO/TS 8000-110:2008 specifies general, syntax, semantic encoding and data specification requirements for master data messages between organizations and systems. The focus of ISO/TS 8000-110:2008 is on requirements that can be checked by computer.
2. DNV will provide training to improving Information Quality (IQ), 1 day. Based on findings from either the Pre-Study or specific Information Quality analysis, understand the data/information defect rate and information quality decay, and get a glimpse into what can be done to correct the problem. This can be expanded with:
 - Do-it-yourself 1, Assessing Information Quality, 2 days.
 - Do-it-yourself 2, Assessing Data Definition and Architecture Quality, 2 days
 - Do-it-yourself 3, Measuring Costs of Poor Quality Information, 2 days.
3. DNV will provide training to prepare for Information Management Pre-Study, experiences and methodology. Recommended for new projects, 1-2 day for introductory meetings and 1 day for kick-off, a total of 2-3 days.
4. DNV will provide training for Information Governance awareness, 1-2 days. DNV offers also a half-day executive course, which includes an overview of information governance, information standards and application of web technologies.
5. DNV will provide training for the ISO 15926 Standard for Integration of life-cycle data for oil and gas production facilities, standard suited for handling of reference- and meta data libraries, 3 days. ISO 15926 specifies a representation of information associated with engineering, construction and operation of process plants. This representation supports the information requirements of the process industries in all phases of a plant's life-cycle and the sharing and integration of information amongst all parties involved in the plant's life cycle.



6. DNV will provide training for the ISO 10303 STandard for Exchange of Product data (STEP), 5 days. STEP provides a representation of product information along with the necessary mechanisms and definitions to enable product data to be exchanged or shared. Applies to the representation of product information, including components and assemblies; the exchange of product data, including storing, transferring, accessing, and archiving. Defines the basic principles of product information representation and exchange used in ISO 10303.
7. DNV will provide training for the ISO 10303 AP 239 Product Life Cycle Support (PLCS), 5 days. The support domain and PLCS, the PLCS standard, why PLCS? The PLCS philosophy, PLCS and related standards, specifications for implementations (OASIS), DEX development methods and processes, DEX related concepts, methods for development, implementation and testing.

A training package can differ a lot, depending on how the course will be set up, when and where the training is going to be held, the type of topics, availability of trainers, travel, use of technical tools, duration and number of participants. A training package can be as described above, a combination of several courses, or based on new requirements.

Training usually starts at 0900 and continues until 1700, with breaks for lunch and refreshments. Continental breakfast, lunch refreshment breaks and course materials are always included in the package price.

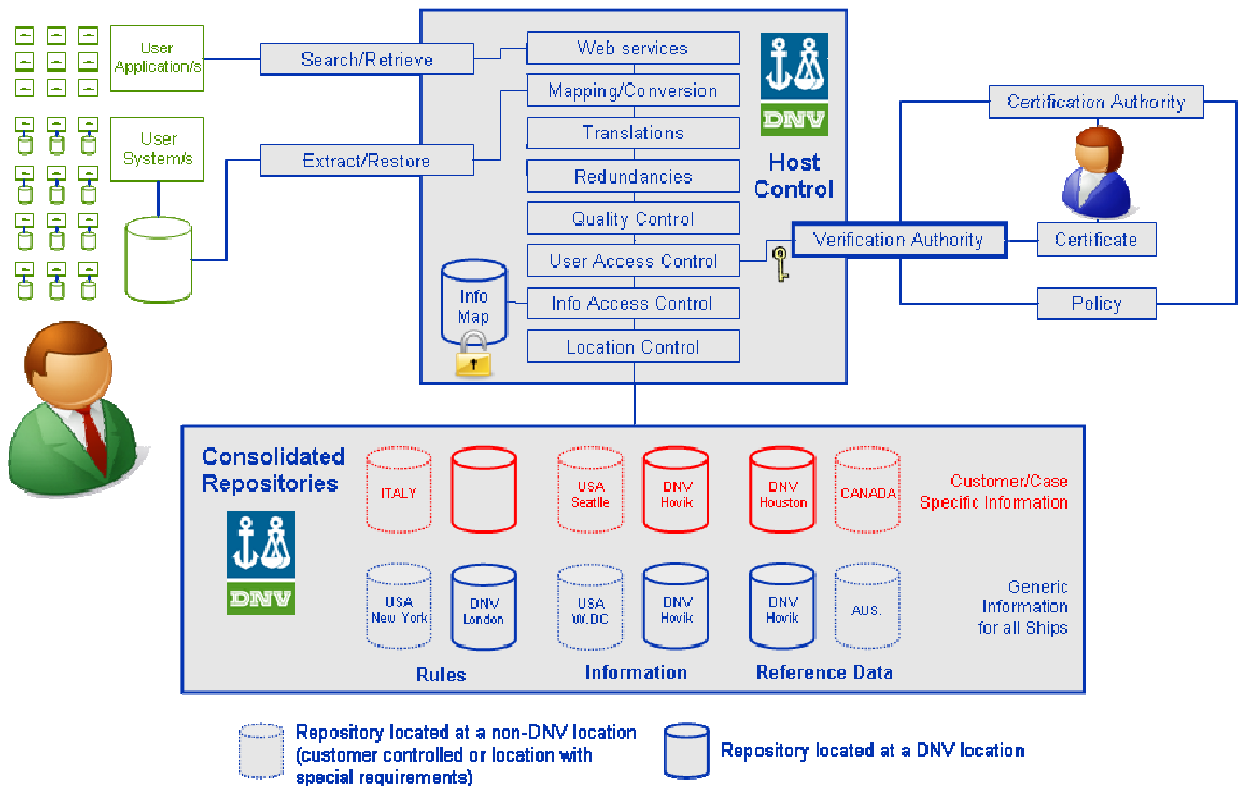
Methods	Various standards, methods and course material
Deliverable/s	Adapted training sessions for 1-100 people
Schedule and time	TBD

4 PHASE III – PROVIDING CUSTOMER EXCELLENCE

Information management is the Achilles heel in most organizations. An information governance strategy should be given high priority due to the need for better control over information assets. This avoids costly mistakes and enables action on business opportunities faster than the competition. Organizations cannot implement a successful information governance strategy without first exploring their information management capabilities. The majority of organizations cite multiple and significant challenges at this level, regardless of whether they have rules and process in place. Currently, capabilities do not match requirements.

Martin Atherton & Jon Collins, Freeform Dynamics Ltd, February 2008

4.1 Information Hosting



Picture: Architecture for the "information host" environment.

The Customer can outsource the information management problem to DNV. We are very confident that we can provide an outstanding service. DNV is currently hosting product information for close



to 5,500 vessels that are classed according to DNV standards and we make that information available 24 hours per day/7 days per week to users all over the globe and for the entire lifecycle of those vessels (which could be 20 years or more).

Setting up a shared information resource between customers and contractors can be very sensitive. Contractors do not want their information to be misused to prevent loss of future sales to other competitors, and customers do not want their information to be controlled by a contractor, inhibiting competition. Introducing a neutral third party information host, can ease that tension and provide an environment that poses no threat to anyone. Actors can concentrate on using information instead of worrying what the other party is going to do.

DNV will assume a role, similar to a bank, an “information bank”. Participants keep their information systems as they are, but releases information to DNV who integrates and harmonizes it with information from others. During the integration process, content is classed, controlled and cleansed. The information is then made available for all authorized users, regardless of the type of information system they are using. In order to ensure quality, security, maintainability and availability, DNV will translate, convert and adapt information to modern standards. A joint set of Information Governance pre-requisites will be established, users will receive training on how to connect legacy systems and new services to utilize the shared information assets.

Methods	Information Governance procedures Applicable standards, methods, best practices
Deliverable/s	Information Hosting of dedicated information
Schedule and time	Annual service commitment

4.2 Information Governance

DNV will assume the role as CIO Advisor, assisting the CIO with everything that is needed to build up and implement a fully functional Information Governance capability within the enterprise. DNV will train staff resources in the “tricks of the trade” so they can assume the responsibility themselves.

DNV can set up information governance from scratch, or fine-tune existing procedures and processes. What is important to note is that our approach to information governance takes focus on important data and information assets, and we will make every effort to find areas for improvement.

We also favor reduction of repetitive and rules-based manual information procedures, replacing them with automated processes. Using the full extent of new information governance capabilities will not



only make the working environment efficient and rational but also make it more rewarding and interesting than before.

One example could be: in the new environment there could be automatic agents collecting, integrating and aggregating information on new services and competitor capabilities. It might have been practically impossible to gain these types of results before, due to the sheer magnitude of the work. But, for computers, smart scripts and well structured information, there is no problem providing this.

DNV will not only help building information governance capabilities but also assist the customer with new opportunities to build a smarter, stronger, quicker, resilient, capable and more profitable enterprise.

Methods	Information Governance procedures Applicable standards
Deliverable/s	Senior Advisor, Information Governance specialist/s Other experts as needed
Schedule and time	Annual service commitment

4.3 Information Risk

DNV will assume the role of “Information Risk Manager” and through proprietary and open sources identify and mitigate risks and threats toward the enterprise.

Information Risk is a hyped⁸ business area, and in 99% of the cases, most solution providers actually mean risk with respect to information systems. They mean risks towards hardware, software, facilities, networks, non-authorized access, infrastructure and telecommunication.

That is not DNV’s approach. Again, we focus our efforts on the data and information assets themselves. Ensuring qualitative, trusted and reliable information across the enterprise will mitigate many risks. But more risks can be made visible by accessing the content of information and cross-referencing between proprietary and open sources, using rules, triggers and fusion agents to identify anomalies. The whole purpose is to define and understand risk/s toward the enterprise, its operations, staff, products and services, not forgetting customers, partners and suppliers.

⁸ Hyped means intensive or exaggerated public interest in a topic, service or product



DNV will from scenarios identify and define typical risks, their characteristics, effects and relations and from that build rules that can automatically sift through large amounts of information, continuously looking for indications of risks or “anomalies”. When detected and consequences are assessed, risks needs to be managed and mitigated through prioritization and evaluation of resources needed to fully mitigate the risk or just reducing its effects.

DNV will train the staff in managing information risk, and make it perfectly natural to include information risk in the corporate decision process.

Methods	Information Governance procedures Applicable standards
Deliverable/s	Senior Advisor, Information Risk specialist/s Other experts as needed
Schedule and time	Annual service commitment

5 DNV PROVIDED SOFTWARE, METHODS AND TOOLS

Det Norske Veritas (DNV) has over the years developed and implemented software solutions to enhance the effectiveness and rationality of services. Referred software packages are just some examples of what DNV has available. There is more software available that can provide adapted solution to your needs.

5.1 Brix Foundation

Brix Foundation is a set of configurable software modules design for knowledge management solutions in the maritime, offshore and process industries.

Brix Explorer is the application that provides access to your business processes, project templates, business rules, and DNV Software product portfolio, as well as any third party service. It provides personalised views for different users or user groups.

Brix Project Manager provides a powerful mechanism for knowledge management through a common project space for all project members. It enables project management (planning and follow-up) and supports project members with a working environment to execute their part of the work by providing detailed business process support through application integration, work description and a common document archive. Using Brix Project Manager as your organisation's knowledge management system, ensures delivery of consistent best practices.



Brix Workflow Manager is a full-scale workflow system allowing you to define your business processes as templates. The templates contain information regarding activities or tasks, information flow, application integration, user roles, and security aspects. You can use process templates to create detailed activity schedules. Each time you want to run a business process, a workflow is created based on its template. The system monitors and manages the running processes and updates project plans.

Brix Rule System is a full-scale rule system enabling knowledge such as business rules and design standards to be easily understood by engineers and designers. This industry knowledge can be shared among several applications. Brix Rule system allows rules to be changed from applications invoking the rule-engine, enabling “what-if” scenarios.

Brix Security provides an enterprise scale administration module, a flexible identity store, mechanisms for securing access to data as well as security providers for ASP.NET and Active Directory. Brix Security builds on security mechanisms provided by Microsoft .NET and Microsoft Internet Information Server.

Brix Document Service is used to integrate any third party document record and management system. If no such system is used, Brix Document Service provides basic document handling functionality such as search, retrieve, save, versioning, check in/out, and history.

Brix Product Model has three main aspects. Firstly, the product breakdown structure which involves all the physical aspects of an asset. Secondly, the different views of the product structure. Thirdly, support for monitor the condition of a structure. The product model is typically the target for maintenance planning, inspections, condition monitoring, rule check, trend analysis and knowledge transfer. Assessing and improving Brix is used by the Project Management Institute™ (PMI) in a solution that enables PMI-certified consultants or assessors to assess and improve any project based on PMI's best practices.

Brix Observation and Measurement. The observation and measurement module is typically used to deliver support for monitoring the condition of an asset. The observed condition of the asset is used as input to maintenance analysis, maintenance execution, compliance calculations, inspection planning, and condition reports. The observation and measurement capability store condition history enabling trends analysis.

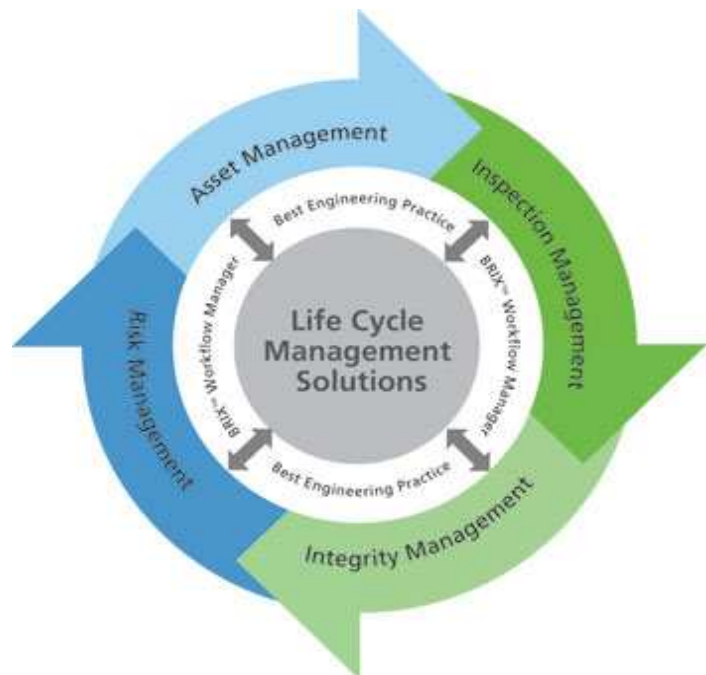
5.2 Asset Integrity Management

Configurable and scalable software solutions for managing integrity and enhancing performance of merchant ships, offshore and onshore assets.

A major challenge in today's asset operations is to ensure fitness for purpose of assets with optimal use of effort whilst complying with company policies and regulatory requirements. DNV Software realises that companies have different work processes and work procedures and our vision is to deliver solutions that are tailored to the individual companies, through configuration, thus supporting the best practices of the individual companies.

DNV Software's life cycle management solutions are aiming to meet the above challenges by providing services and software solutions for operators to:

- Make the right decisions in managing



the asset

- Plan the management of the assets
- Perform the management of the assets
- Enhance the performance of their assets
- Have access to all relevant asset data, current and history
- Have integrity status overview
- Enable transparency of asset data within and outside of company borders

5.3 Mathematical Modelling

For more than 20 years, DNV Software has been recognised around the world for the high quality of the mathematical models used in its products. Advances in technology are constantly incorporated into the DNV Software mathematical models, keeping our products at the forefront of the market. Our key areas of expertise are:



- Fluid discharge
- Atmospheric dispersion
- Vapour Cloud Explosions
- Liquid Pool Spread and Vaporisation
- Flashing, Droplet Formation and Rain-Out
- Jet Fire, Flash Fire, Pool Fire and Fireballs
- BLEVE
- Vessel bursts
- Toxic & Flammable Impact
- Likelihood analysis
- Probabilistic, reliability and sensitivity analysis
- Consequence analysis
- Risk analysis

The core competences within DNV Software used to develop the mathematical models are available directly to those who need them. Our dedicated team of mathematical modellers can undertake a wide variety of projects aimed at:

- developing new models
- undertaking experimental research
- providing an independent review of internal methods and tools or implementation of new methods within our commercial applications

The mathematical models form the backbone of our off-the-shelf software and they can also be customised to meet your modelling needs through our expert tools. These expert tools can be applied to a broad range of situations and are intended for users knowledgeable in the theory behind the models. In many cases they give access to model options or results not available through programs such as Phast or Phast Risk.

5.4 Risk Assessment

DNV Software has many years of experience in providing solutions to help you in managing your risks across the process and offshore industries. We have a wide range of products and services which can be customised and configured to meet your exact requirements. Our core areas of expertise include:

- Process plant safety
- Consequence modelling for hazardous chemicals
- Likelihood analysis
- Risk modelling
- Explosion, flammable and toxic effects modelling
- Quantitative risk assessment
- Inspection and maintenance planning
- Inspection and maintenance management systems

By partnering with other groups within DNV we can provide multi-skilled project teams providing software, services and technology to improve your management of risk and safety, increasing the effectiveness of your operational management.

We have a wide range of proven technology available either within our industry standard tools such as Phast Risk, Phast, Leak, Neptune, Orbit, Orbit+ and Summit or delivered to you as a part of a customised solution.

DNV Software has a long and successful track record of delivering risk based decision support solutions for the refining, petrochemical and process industries. We can provide solutions to assist your decision making throughout the plant life-cycle from design to operation, helping you to improve safety and reduce costs.

5.5 TenderSuite

Improved tender quality for the maritime industry - Web-based solution supporting the tendering process leading up to the contract. TenderSuite™ is a suite of software tools to support the specification phases of the project life cycle. New projects can be created according to the project structure in use, and you can easily maintain a type library of projects. Projects can also be exported to other systems, such as ERP and material management systems.



Investing in an efficient specification development and cost calculation tool could be crucial for winning tendering competitions and to reduce project costs and risk. TenderSuite is a web-based tool designed for efficient support of the tendering phase for project-centric industries.

We offer a specific maritime industry solution enabling deep, extensive and flexible collaboration within the company as well as with sub-contractors.

TenderSuite helps you to keep specifications updated in one environment and one common location.

- Avoid spending hours of searching for the correct text in a document which you do not remember the file name or location of, or that is located on a colleague's local computer.
- Avoid trying to find the current revision by looking at file naming or last saved date.
- Avoid having to send documents on circulation to colleagues and merging unconsolidated comments into the original document.
- Avoid documents growing tenfold by using 'track changes'.
- Avoid having to open and search through file after file to find some particular piece of text to reuse in a new document or project.

Why TenderSuite?

- Collaboration - One application, one database - many users, many locations
- Concurrency - Concurrent work, instantaneous updates on the same project or document
- Distribution - Online access across geographical and organisational borders
- Quality - From copying of old projects to template configuration and information reuse.
- Efficiency - Efficient search and complete access to structured information across projects

6 STANDARDS, BEST PRACTICES, REFERENCE MATERIAL AND CUSTOMER REF'S

The quantity and value of every organization's records are ever-increasing. Accordingly, there is a compelling need for more effective records management: both traditional media centric (paper) records as well as the new content centric (electronic) records. Today, the focus of laws and regulations pertaining to information is increasingly on process management – the way information is created and maintained over time. Court decisions also are increasingly reflecting the need for effective electronic information management processes.

By Cohasset Associates, Inc. October 2007

Reference / Meta Data	<p>ANSI X3.285-1998, Meta model - Management of Sharable Data., based on ISO/IEC 11179</p> <p>DC/DCMI, Dublin Core, standard for metadata, Dublin Core Metadata Initiative (DCMI).</p> <p>OASIS Directory Services TC</p> <p>W3C – OWL, The Web Ontology Language (OWL)</p> <p>W3C – RDF, The Resource Description Framework (RDF)</p> <p>W3C - Semantic Web Semantic Web</p>
Product Information	<p>ISO 10164, Configuration Management</p> <p>ISO 10303, Standard for Exchange of Product Data (STEP), and ISO 10303 AP 239, Product Life Cycle Support information (PLCS)</p> <p>ISO 13584, PLIB - Parts Library. ISO 13584 is a series of International Standards for the computer-sensible representation and exchange of parts library data.</p> <p>ISO 15288, System Engineering and System Life Cycle Processes (Information Mgmt)</p> <p>ISO 15926, Integration of Life-cycle Data for Oil and Gas Production. Part 1 introduction and an overview of the scope and purpose of ISO15926 Parts 2, 3, 4 & 7 - the main normative content of the standard that is those parts that primarily define requirements to be complied with. The core reference model, the core model extension for shape and geometry, reference data, and templates Parts 5 & 6 - parts concerned with the ongoing quality and administration of industry reference data. Parts 8 & 9 - parts that define a standard implementation using OWL/RDF and Facade technologies.</p> <p>ISO 18876, Integration of Industrial Data for Exchange, Access, and Sharing (IIDEAS).</p> <p>ISO 9004-7, Guidelines for Configuration Management</p> <p>MIL-STD-1388-1A, DoD Logistic Support Analysis, and MIL-STD-1388-2B, DoD Requirements for a Logistic Support Analysis Record (LSAR), and UK DEF STAN 0060, Application of Integrated Logistic Support (ILS), and</p>



	NCDM, NATO Corporate Data Model
	MIL-STD-2549, Configuration Management Data Interface
Technical Doc	ISO 8879, SMGL Standard Generalized Mark-up Language
	MIL-D-87269, Interactive Electronic Technical Manual (IETM) Database
	MIL-T-31000, General Specification for Technical Data Packages
	OASIS – XML, OASIS Access Control Mark-up Language TC
	OASIS DocBook TC
	S-1000D, International Specification for technical Publications using a Common Source Database
	W3C - XML Schema
Information Governance and other information	IDEF, ICAM (Integrated Computer-Aided Manufacturing) - IDEF0 (ICAM Definition Language 0) - IDEF1X (ICAM Definition Language 1 Extended)
	ISO 17799, Information Security
	ISO 19101-19140, International Standard for Geographical Information
	ISO 8000, Information Quality
	ISO 9000, Quality Management and Quality Assurance Standards, and ISO 9001, Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation, and Servicing, and ISO 9004-2, Quality Management and Quality Systems elements - Guidelines for services
	JC2IEDM, Joint C2 Information Exchange Data Model
	MIP, Multilateral Interoperability Program.
	OASIS ebXML Registry TC, and OASIS LegalXML eContracts TC
	OMG CWM, Common Warehouse Meta model
	UML, Unified Modelling Language
Books, papers, reference material	David S Alberts and Richard E. Hayes, Power to the Edge, command and control in the Information Age. June-2003
	DoD Architecture Framework Version 1.5, Volume I: Definitions and Guidelines, 23 April 2007



DOD CIO Strategic Plan, OSD CIO, Version 1, 2006

DOD Information Sharing Strategy, OSD CIO, May 2007

European Commission DG Information Society and Media, Study on the standardization aspects of eSignature, November 2007

Göran Skogsberg and Jarl S Magnusson, NBF Vision SAG Ledningskomponenter (red book), FMV, 2004

Internet Statistics <http://www.internetworldstats.com>

Jarl S Magnusson and Bryan Aucoin, Federated Governance of Information Sharing Within the Extended Enterprise, US DOD/AFEI, January 2008

Jarl S Magnusson, IRM Vision (blue book), Swedish Defence Materiel Administration, Edition 1 (2003), Edition 2 (2004)

Jarl S Magnusson, Proactive Law – and the Importance of Data and Information Resources, Stockholm University, Research paper, 2005

Jarl S Magnusson, Transforming Information to a Strategic Asset, DNV White paper, 2006

Boye Tranum, Managing Defence Systems in the Information Age, NATO 1999

Leif Buene, DNV Technical Report, PKI interoperability by an independent, trusted validation authority, DNV, 2007 and Leif Buene, The Validation Authority, A Single Trust Anchor for PKI Relying Parties, DNV, 2006

Michael Gullberg, m fl, STIL-ramverk, En ansats för samverkan i samhället (yellow book), FM, KBM, STIL, 2007

UK Ministry of Defence Architecture Framework (MODAF) Version 1.2 <http://www.modaf.org.uk> and MODAF META MODEL (M3) <http://www.modaf.org.uk/m3/>

NATO Architecture Framework (NAF) Version 3.0

NATO Product Data Model v4.10, 2001, Boye Tranum
NATO Implementation Guidelines v4.10, 2001, Boye Tranum

Peder Blomqvist, Försvarsmaktens Arkitekturramverk FM AR Version M5, Funktion 09100:55299/02 November 2002.

Customer Statements

”Pre-Study is like our intelligence gathering. Before you do any operations, you need to be aware of the situation. So, pre-study is a method for information situation awareness.”.

“Before we can address information security problems, we must first know what information to protect”.



“I need to know what data- and information we have, in our organization!”.

“It is required by Sarbanes-Oxley Act (SOX) to account for and trace back to our information and knowledge”.

“We want to show for our share holders that we have a significant economical value tied up in our information resources”.

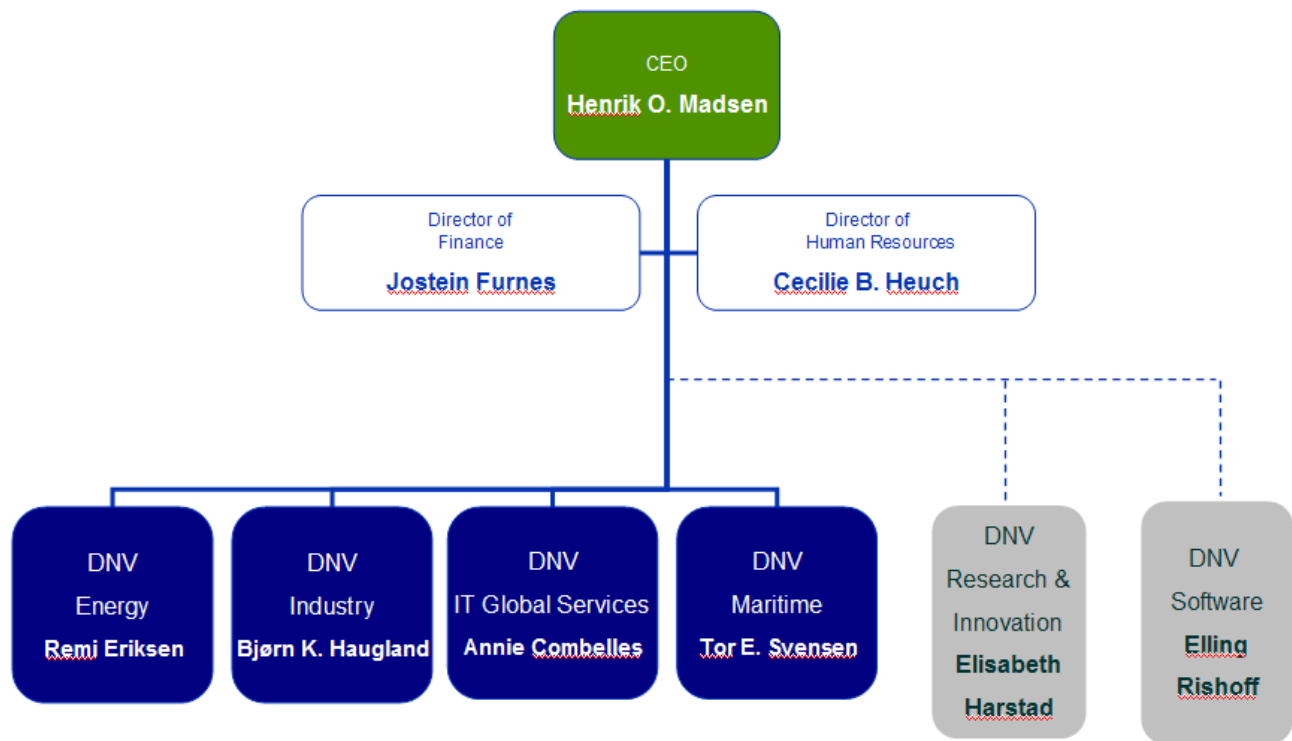
“Our product information lives for more than 50 years, and we need to understand how to manage that over time”.

“We would like to know where our information are, and how much we have, who’s responsible, our liabilities and how to avoid missed opportunities...”.

7 DNV AND DNV ENERGY

Det Norske Veritas (DNV) is a leading, independent provider of services for managing risk with a global presence and a network of 300 offices in 100 different countries. DNV’s objective is to safeguard life, property and the environment.

DNV assists its customers in managing risk by providing three categories of service: classification, certification and consultancy. Since establishment as an independent foundation in 1864, DNV has become an internationally recognized provider of technical and managerial consultancy services and one of the world’s leading classification societies. This means continuously developing new approaches to health, safety, quality and environmental management, so businesses can run smoothly in a world full of surprises.



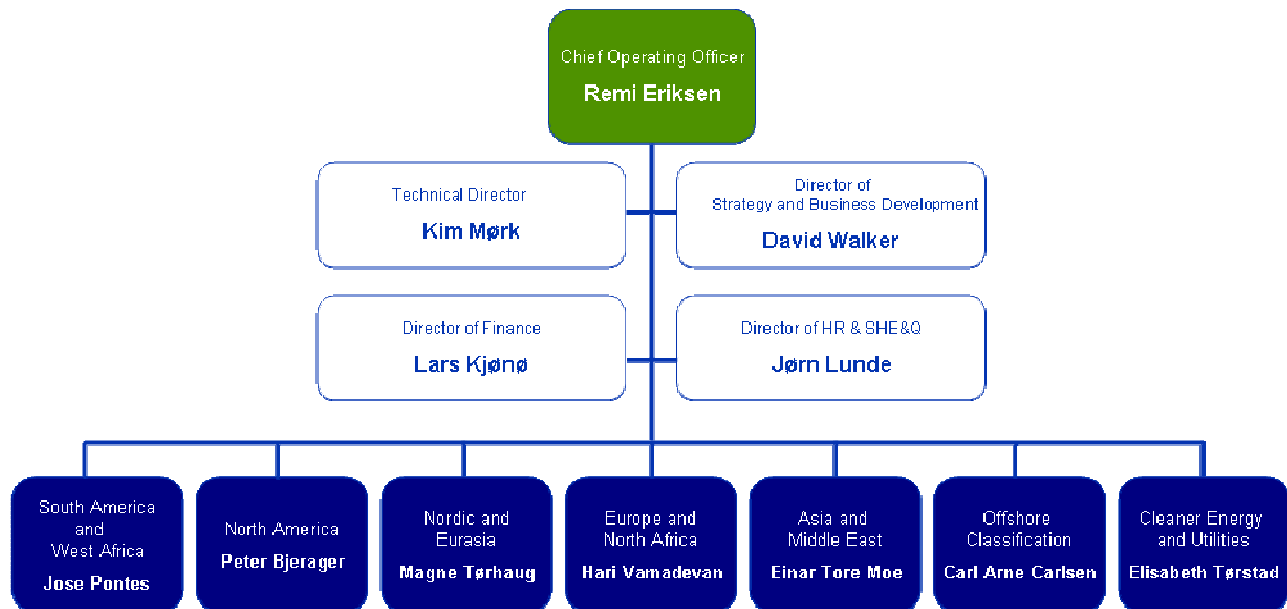
Picture: Organizational structure of Det Norske Veritas (DNV)

7.1 DNV Energy

DNV Energy is a leading professional service provider in safeguarding and improving business performance, assisting energy companies along the entire value chain from concept selection through exploration, production, transportation, refining and distribution. We have a firm base in DNV’s strong technological competencies, international experience and unique independence as a foundation.

DNV Energy is a leading professional service provider in safeguarding and improving business performance, assisting energy companies along the entire value chain from concept selection through exploration, production, transportation, refining and distribution. Our broad expertise covers Asset Risk & Operations Management, Enterprise Risk Management; Information Risk Management; Offshore Classification; Safety, Health and Environmental Risk Management; Technology Qualification; and Verification. More information can be found at our internet site:

<http://www.dnv.com>.



Picture: Our experienced consultants, engineers and support staff operate from close to fifty locations in five geographical operating units and two global market segment units. Our Information Risk Management staff is located in North America (Houston) and Nordic & Eurasia (Hovik, Norway).