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Scheme:	**Information & Communication Technologies**

Deliverable D11.3

Business Plan and Implementation Guide

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SEVENTH FRAMEWORK PROGRAMME

Start date of the project: **1st November 2012** Duration: **48 months**

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Executive Summary

This document is the deliverable D11.3 "Business Plan and Implementation Guide" of project FP7-318338 (Optique), an Integrated Project supported by the 7th Framework Programme of the EC. Full information on this project, including the contents of this deliverable, is available online at http://www.optique-project.eu/.

The document presents a generic business plan that allows companies to estimate and assess the commercial value of implementing Optique and to plan the necessary steps for successfully implement an Optique based system.

A white paper (Appendix A to this report) describes the implementation process with the necessary processes to implement Optique.

This deliverable succeeds deliverable D11.1 "Optique Initial Exploitation Report" and deliverable D11.2 "Market Analysis". The objectives served by this deliverable are:

- **O11.1:** Deliver a business implementation strategy, supported by an assessment model and practical guidelines to adopting Optique in the enterprise.
- **O11.2:** Deliver a software exploitation strategy, for the benefit of the partners and the European ICT industry, while protecting intellectual property created by the project.

Further work on the market analysis will be carried out in Year 4 of the Optique project, as part of the deliverable D11.4 "Commercialization of Optique platform".

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Contents

1 Introduction

In this document a business point-of-view discussion of Optique is performed, complementing the strategic and business impact vision and impact generation strategy discussion described in the Technical Annex, Part B3. The intention of this document is twofold. First, to give a basis for development of individual and enterprise-specific business plans where the use of Optique is a major component and second to give guidelines for implementing an Optique based system.

The primary focus group of this document is enterprises that plan to implement and/or commercialize an Optique based system.

1.1 Scope of this document

In the document D11.2 “Market Analysis” categories of stakeholders were listed and the possible effect of using Optique by such stakeholders was discussed. This list extended beyond the list of actors included in the notion of *Optique ecosystem* (described in the Optique project plan Description of Work (DOW), Technical Annex, Part B3). In this document, the list of stakeholders and use cases discussed is reduced to those that are actively involved in the pilot cases developed by the project and where facts about the trial installations and use case developments are available. The goals and incentives related to Optique adoption are discussed for each of these stakeholders as a basis for individual formulations of goals and objectives.

A next step in developing a Business Plan can be to identify the technical contribution and uniqueness of Optique in order to position Optique in the space of Big Data and the various data integration solutions. A gap-analysis comparing features of Optique against current paradigms and approaches to data access and data exploitation can be found in report D11.2 and is not further discussed in this document.

The value and benefits that Optique aims to deliver to adopting enterprises are described as problem-solution statements (value propositions), and exemplified through sample industrial use cases. This discussion was initiated in D11.2 and is continued in this document.

A list of generic major risks that should be considered when planning to implement Optique has also been included.

A white paper containing an implementation plan is also a requirement for the Optique project Year 3. We have chosen to include a generic implementation plan as Appendix A to this report with the ambition that this can be helpful when planning to implement Optique within an enterprise.

1.2 Next Steps

The implementation plan will be updated and extended as part of the work on D11.4 “Commercialization of Optique platform” (extending the original scope of D11.3). The continuation will focus on developing and refining the following aspects:

- Re-validate current content and update as necessary.

- Refine characteristics assessed for parameters of organizational maturity (Chapter 5 of D11.2, Barriers to Adoption).

- Risk Analysis (Chapter 6 of D11.2, Risk Analysis): Utilize feedback, experience and lessons learnt from the Optique training system distribution, evaluations of the public showcase and other dissemination activities of WP10 to further develop the list and analysis of potential major risks.

- Assess selected target companies for their level of readiness to successfully adopt Optique. Use the organizational maturity concept and parameters (Paragraph 5.2 of WP 11.2, Organizational Maturity Model) and the stakeholder analysis (Chapter 2 of D11.2, Stakeholder Analysis) as basis for this assessment. Include additional criteria as necessary. Use this assessment as foundation for estimating market size and potential.

2 A general business plan

2.1 The audience for this business plan

We take as a prerequisite when making this business plan document that one or more commercial companies have taken Optique research results and made them into a commercial software solution. This Optique commercial software can be bought and installed within an enterprise security framework or the solution can be bought as a cloud service.

The target audience for this business plan is enterprises planning to use the Optique as a platform for Ontology Based Data Access. The plan is not meant for Optique software vendors, not for the Optique project, and not for Optique cloud service providers.

2.2 Introduction to the business plan

The main intention with a business plan is to show how to grow a business from a stage A to a stage B. A business plan normally describes goals and objectives and how to achieve them. Core ingredients in a business plan are the process of designing future business models, choosing between candidate models, and describing the activities needed to enable a new business model to come live and be successfully operated over time.

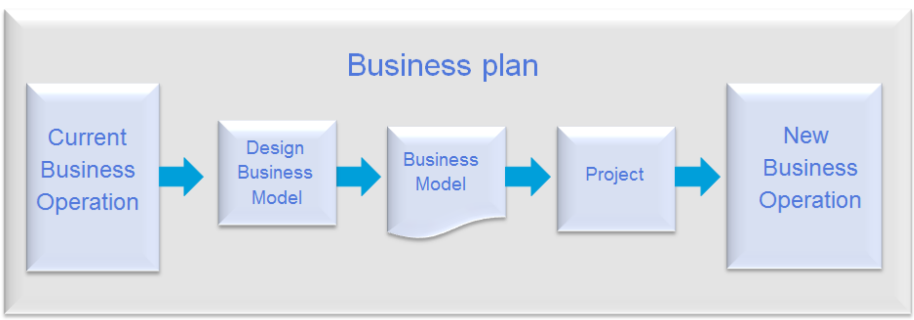

Figure 1, The Business plan development process

This document is part of the dissemination of Optique. Therefore the Optique platform is a key resource and enabler in our general business model. Our suggested business plan development plan is inspired by (i) The Business Model Generation [1] (www.businessmodelgeneration.com), (ii) analytic methods for comparing business models, and (iii) risk management. The financial part of a business plan plays a major role when selecting which alternative business model to choose. Investigating the financial pros and cons of alternative business models should be taken seriously. The example in Figure 2 illustrates cost and income for realising one specific business model and one way how elements in a business plan can be presented.

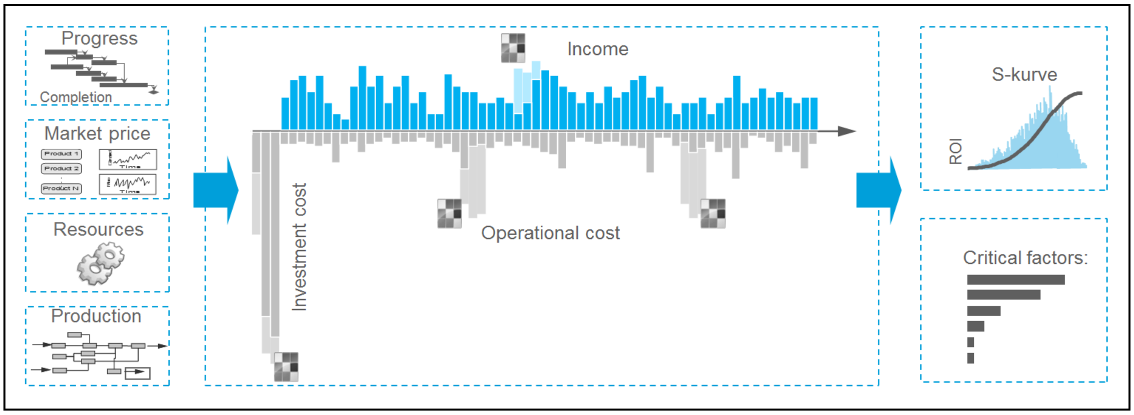

Figure 2, Examples of visual presentation of elements in a Business Plan

The intention with introducing the business plan development process is to exemplify how to achieve a successful implementation of Optique that can help a commercial entity to expand or improve its business. The business plan contains hints and checklists that may be helpful when a decision to implement or commercialize Optique is taken. The following main topics illustrated in figure 1 above are discussed in separate chapters below:

1. The process of designing future business models
2. Content of a business model based on Optique
3. The project enabling a process of moving from current stage to target stage.
4. Operating and change management of the business model

3 Designing a business model

A business model describes the rationale of how an organization creates, delivers, and captures value [1]. The business model must be aligned with strategies, mission, market roles etc., and stakeholders should be involved in the process. It's a good start to appoint a dedicated team, define roles, agree on an initial budget and establish a clear mandate for making a business plan.

Points to remember in this phase are:

- Decide if alternative business plans should be made for comparison
- How shall cost / revenue be estimated
- What is the risk management approach to the steps in the business plan
- Make a business model canvas, (which is just on part of the whole puzzle.)
- Define key milestones, and work breakdown structure for the project, but also for the whole set of business plan activities.

See literature Business Model Generation [1], PMI handbook [2].

4 A business model for users of the Optique platform

In this chapter we describe the building blocks of a business model. There are many ways of describing a business model and we have chosen to follow the guidelines in the Business Model Generation methodology [1, (online book)]. This methodology has good diffusion, has been in the market for some years, and there is a set of free online resources available. The Business Model Canvas is a template for developing new or documenting existing business models. Below is a business model canvas drafted to illustrate how this methodology can be used for Optique users.

The building blocks of the Business Model canvas consist of the following topics:

1. Customer segment
2. Value proposition
3. Channels
4. Customer relationship
5. Key activities
6. Key Resources
7. Key partners
8. Revenue stream
9. Cost structure

The methodology is further described in online material at e.g.:

- https://www.youtube.com/watch?v=QoAOzMTLP5s (2 minutes video).
- https://www.youtube.com/watch?v=RzkdJiax6Tw, (40 minutes video).

A draft of a business model canvas having Optique as a main enabler is shown in figure 3.

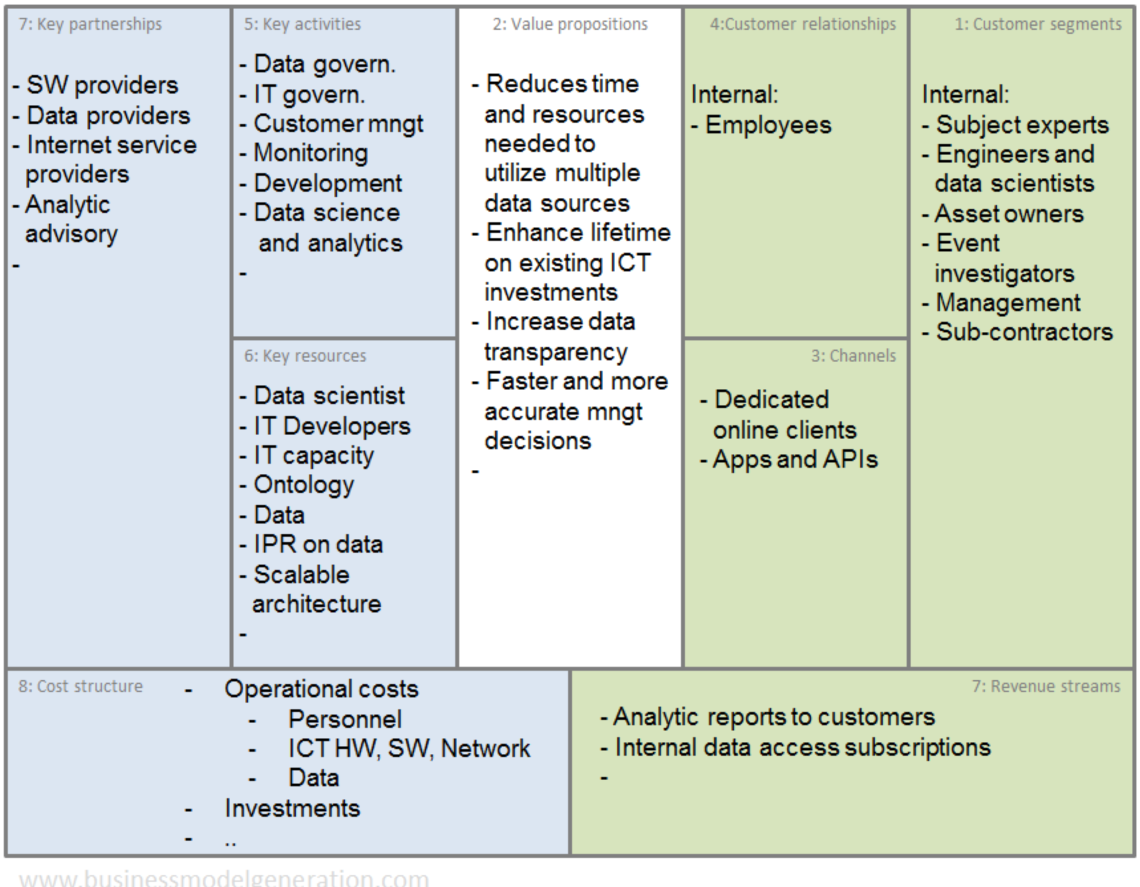

Figure 3, Business model canvas, example

Each of the building blocks is further described in separate chapters below.

4.1 Customer segment

In this business plan the customer is an enterprise user that has taken the decision to implement Optique. In existing documents Optique have described different type of customers and stakeholders. Examples of possible deliverables are listed in Table 5 “Some selected stakeholder groups, goals and roadmaps”.

4.2 Value proposition

An overview of benefits and value proposition of an Optique based business model is described in chapter 9,”Goals and objectives with implementing Optique” and in Table 4: “Benefits of adopting Optique in short, intermediary and long term”.

4.3 Channels

Channel used for bringing the value of Optique to its users are ordinary broad band access with tailored SLA and security mechanisms. In addition the Optique platform can be the backbone in an app. infrastructure or part of an eco-system consisting of a variety of system and data sources.

Delivery using cloud services is likely. The method of delivery of Optique will be tailored to different customer requirements for availability and security. Three models can be offered as examples:

- Internal in one enterprise.
- Public cloud delivery for trials, prototypes and small companies.
- Private or hybrid cloud for large customers with high requirements for SLA and security.

Successful application for oil and gas will need to support the SOIL network and security systems.

4.4 Customer relationship

We see a few variants of internal customer relationships in the enterprises using Optique. Firstly we see the employees in the enterprise where their work instructs are regulating the use of Optique. Secondly, we envisage that external partners or subcontractors access the Optique platform based on a security and subscription agreement to fulfil their engagements to the enterprise.

4.5 Key activities

The listed key activities in figure 3 are a starting point. The activities depend a lot on the context to which they are applied. A general overview of the activities and capabilities needed for operating an Optique based business model can be found in the Data Management Maturity Model [2]. This is one source for inspiration to enterprises setting up advanced multipurpose distributed data repositories. Figure 4 illustrates one way of grouping activities and showing their inter-dependencies.

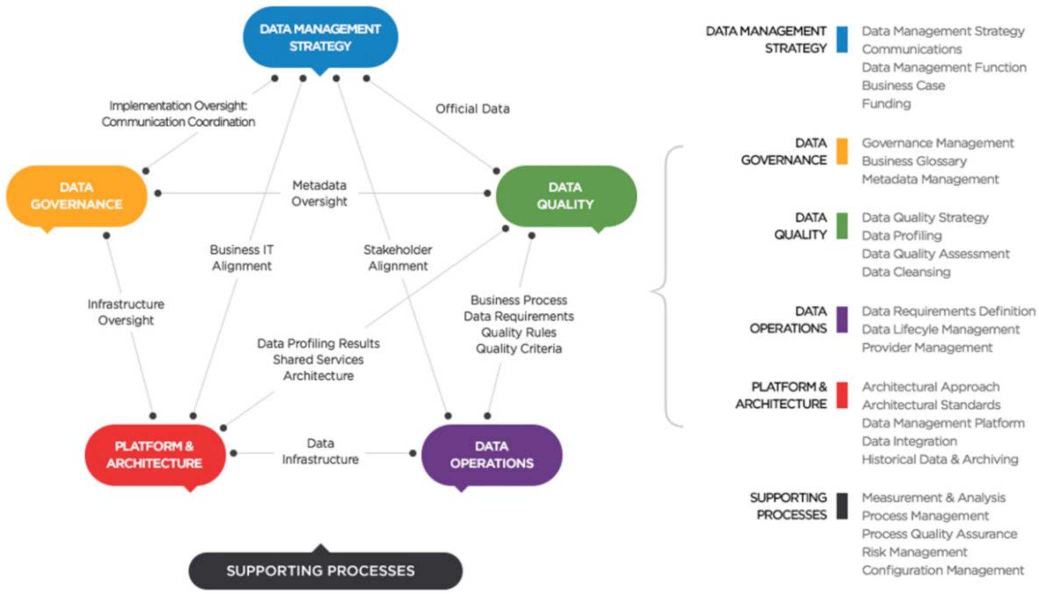

Figure 4, DMM data management processes grouped by categories.

4.6 Key Resources

These are the input, the muscles, that makes it possible to perform the key activities and operate the business model. Examples of resources are:

- Personnel like data scientist, IT Developers, data stewards, users etc.
- IT hardware and software capabilities and licenses
- Data, metadata, provenance data, ontologies eg.
  - Own data, open data, customer data, paid data
- Real-time data (Data streams)
- Intellectual rights to data and ontologies
- Scalable resources
- Scalable IT and data architecture
- Knowledge

4.7 Key partners

Partners can be grouped in e.g. :

- Technical: SW providers, IT services and, Data providers, Internet service providers
- Content providers/ Data providers
- Personnel resources, as Analytic advisory, IT development.
- Channel and marketing partners

4.8 Revenue stream

In a business plan for utilizing Optique the revenue stream is related to the values and direct and in-direct effects of faster and better decisions. Actual flow of cash between users and internal service provider of Optique depends on SLA and company tradition for internal invoicing regimes.

The revenue stream in this business plan is related to (a)reduce cost, (b) reduced time window for performing a task, (c) increased quality in data exploration and data science results and (d) new opportunities for merging and utilizing data.

4.9 Cost structure

The costs are primarily related to key partners and key resources. Cost should be estimated for at least 7 first years. Seen from a timeline the business plan costs are related to:

- Investment in:
  - Establishing the business plan activity
  - Making the business model
  - Executing the project
  - Additional key resources to enable the new business model to be activated
  - Competence/skills
  - Activating the new business model
    - Training, testing, demobilizing old systems, refine work procedures, implementation and more.
- Operational cost:
  - Running the business
  - Performing risk analysis
  - Plan and implement changes
  - Upgrades to the business model

Such costs should be as detailed quantified as possible and is important decision support information.

5 The implementation plan

Our model also requires a plan for an implementation project. A White paper based on the PMI's (Project Management Institute) recommended (PMP) Project Management Plan has been included as Appendix A. The plan does not repeat all project management processes as described by PMI but complements the processes with elements and discussions of issues that are relevant when an Optique system is to be implemented.

6 New business operations

As seen from the users of Optique's perspective.

A business plan will have short comings, the business model will only be a guide to how to operate the business, the enabling project and the success of operations of the business model utilizing Optique will be challenged.

To manage these types of challenges we give some advices to increase likelihood of having project success. Advice is related to topics like:

- Barriers to adoption
- Major risks to be assessed
- Be clear on objectives
- Monitor key success factors and take actions where needed
- Use checklists and good practice and maturity models
- Be aware of competing technologies (discussed in D11.2)

6.1 Barriers to Adoption

In the context of this report, the term "barriers to adoption" means any restriction for an organizational implementation and use of a technology and the consequent relative inability to prove its value during its lifetime.

Any barrier, perceived or real, to start using a solution will have impact on the perceived risk of engaging with the product and the expected value of the product for the company/organization in question.

We believe that barriers to adoption will vary the most according to companies' maturity with regards to technology and IT. We have created a "High level Organizational Maturity model" for data integration/big data to address these aspects. Appendix A contains an organizational maturity model and typical organizational and cultural barriers an enterprise should be prepared to face when implementing Optique.

Organizational maturity is defined as a function of the following parameters:

- Business Model and Process Maturity
- IT Infrastructure Readiness
- Data Integration Readiness
- Data Governance Maturity
- People (Resources, Competence & Management)
- Legal and liability issues

The three identified sub-categories of enterprises/end-users in the Stakeholder analysis are based on the hypothesis that the incentives to adopt a solution like Optique are largely dependent on the maturity of the company. Organizations that are early adopters of technology will normally be found in all three categories of maturity, but will typically exhibit similar patterns such as being data driven and agile when it comes to moving in the market and assessing new technology.

The different sub- categories of enterprises/end-users are described by typical threats and goals in the section below.

6.2 *Major risks to be assessed*

Some risks worth to consider and a discussion of possible consequences of these are included in this paragraph. The risks discussed are of a more general type and do not give the complete picture. A specific Business plan should therefore include a more comprehensive and company specific list of risks and an analysis of all risks relative to the business case.

6.2.1 Specialized knowledge and organizational maturity

Implementing Optique require specialized knowledge and organizational maturity. It is therefore considered to be mostly relevant for large customers. Experience has shown that sales cycles for such large customers are very long. Pretty much all customers within this category have already some sort of Big Data / Data Integration project running. Timing is therefore very important, as is compatibility with decisions already made by the customers.

6.2.2 Optique as a viable system

"Nobody ever got fired for buying IBM" – It is challenging for fluidOps / Optique consortium to gain a customer's trust for such strategic projects. The project needs to create trust that Optique will be a viable product also after the termination of the project and be able to give guarantees for this.
This will require one or more commercial entities to commit themselves to maintaining the Optique system.

6.2.3 Quality of academia provided open source components

Stability and continued support for open source components after the project close-out by the academic partners is a major risk to the viability of Optique. Continued focus by the academic partners on maintaining, supporting and further develop their components will be crucial to enterprises that decide to implement Optique.
Successful commercialization will require a professional software quality regime to be administered by the commercializing party. This will require well-managed requirements, development, test and release system that ensures commercial-grade quality, documentation and security in the commercial Optique components.

6.2.4 Optique as a concept and not a product

The project is, at this stage, offering a concept and not a complete integrated solution. The development program is running for four years and a complete integrated solution prepared for operational use will not be delivered before the end of this period. Demonstrators and pilots that exploit the full potential of Optique can therefore not be presented until near the close of the project.

We expect that the Optique system at the end of the project will be sufficiently mature to form the core of one or more products based on the Optique concepts. Pilots to demonstrate the effects of Optique will be developed as part of the Optique Partner Program. The ambition with the pilots is to demonstrate improved services, new services and how reduced costs can be achieved.

7 Key success factors for the business plan to succeed

The following table lists some key success factors for implementing Optique, together with a description of how each success factor can be evaluated.

#	Success factor	How to measure effects Effects to be expected
1	That measurable performance improvements are achieved by End-users when formulating and executing queries.	Measure the time to formulate and execute queries with alternative tools and compare with using Optique. Should be considerably reduced when using Optique.
2	That rapid formulation of intuitive queries using familiar vocabularies and conceptualizations can be performed.	Demonstrations and benchmarking The time to formulate queries should be considerably lower than with traditional tools.
3	Seamless integration of data spread across multiple distributed data sources, including streaming sources can be performed	Building demonstrators Seamless integration of data sources should be demonstrated.
4	Massive parallelism are exploited with the result that scalability far beyond traditional RDBMs is obtained.	Demonstrations and benchmarking Massive parallelism in data access should be demonstrated.
5	The turnaround time for information requests is reduced from days to minutes	Benchmarking Turnaround times for selected queries when comparing to traditional methods/ tools should show considerable improvement.

Table 2, Key success factors

7.1 Available offerings from Optique vendors.

Enterprises choosing Optique as an operational platform for their core business will place a lot of requirements on Optique vendors before they enter into a long-lasting IT-vendor dependency. Vendor evaluation regimes has a large flavour of dimensions like agreements, jurisdiction, support services, release and bug fix regimes, platform choices, integration capabilities, scalability e.g. So even if Optique becomes an brilliant architecture for ontology based data access, possible weaknesses in typically bundled offerings may put Optique out of business. When moving from academic pilots to main stream software offerings or service offerings, Optique providers will meet a large flavour of demands and requirements. In the Optique project the following principles have been discussed as basis for commercializing the Optique platform.

Use of the Optique SW:

- is free of charge for developing tests and pilots.
- requires licenses or subscription fees for the platform and domain Apps once a customer moves into production. And production is defined as. Per CPU, per physical machine, what about test environment, development, staging, cloud solutions etc.
- requires customers to pay product maintenance fees (unless software is offered as a service).
- will usually need some customization, thus consultants can be hired
- will require training the customer's own staff
- will be offered support by Optique partners e.g. DNV GL and fluidOps. Such support offerings will include general IT implementation assistance, IT risk assessments, data exploration, governance services and advisory, Information Quality and IT security advisory (DNV GL)
- More specialized services can be obtained from companies with expertise in semantic technologies and ontology building.
- Support from the universities will be available on a case-by-case basis.

8 Objectives with implementing Optique

The business goal of Optique platform is to increase resource optimization in information access and information utilization. Optique is a concept where data in several data sources are made accessible through ontologies. In addition to being an Ontology Based Data Access (OBDA) based system, the concept also includes End-to-End tools where advanced database access from multiple data sources in parallel can be performed and data from streams (sensors) can be operated upon. Optique also includes End-user data visualization and analytical tools. While the general approach of Optique applies to all industry sectors the more specific needs must be addressed in sector-specific specifications. In the paragraph below some general value propositions are discussed and further elaborated, as examples, into more suggested business goals and roadmaps for some specific business sectors.

8.1 Value propositions

Table 3 lists generic problems from a business perspective that enterprises are struggling with today or are likely to experience as they evolve. For each generic problem, the solution offered by Optique is discussed (using non-technical language). (This discussion was initiated in D11.2 and is further elaborated here.)

#	Problem	Solution offered by Optique
VP1	Enterprises have large amounts of high-quality data available in disparate data sources, but end-users cannot access this data without extensive support of intermediaries i.e. IT experts.	Optique closes the gap between end-users and data by enabling flexible, ontology-based queries (i.e. queries in a language familiar to the end-user). Optique leverages semantic technologies to enable on-demand integration of data from disparate sources independent of database structures.
VP2	Value extraction from data in an enterprise is often constrained by pre-defined data mappings, and limitations of the organization's infrastructure.	Optique leverages semantic technologies to enable on-demand integration of data from disparate sources independent of database structures. Optique enables enterprises to explore and discover new relations between data from different sources, and data platforms as needed in a cost-efficient manner.
VP3	Enterprises have to undertake large efforts and investments to extend their data platforms and integrate new data sources.	The flexibility offered by semantic technologies allows enterprises using Optique to easily scale their data platforms, rapidly deploy and evolve business models with high data dependencies, and avoid costly vendor lock-ins.

#	Problem	Solution offered by Optique
VP4	Turnaround times for traditional methods of accessing large volumes of data constrain time-windows for decision-making and lead to suboptimal decisions.	Optique reduces the turnaround time for data access by closing the gap between end-users and data sources, eliminating the need for IT experts and proprietary languages and technologies in the query process.
VP5	As volumes increase and data is harvested from multiple, unrelated sources, end-users of the data have poor insight into the origin, integrity and trustworthiness of the data.	Optique provides increased transparency between data and the end-users, informing the end-user about the origin of data and all transformations it has undergone, by tracking the data's provenance.
VP6	In many environments, the exponentially growing volumes of data generated by sensors and other MEMS[1] units is currently underutilized as a source of valuable information, often due to complexities such as the need for non-trivial correlation of real-time, streaming data with static data from other sources.	Optique equips experts with the ability to perform "continuous queries" on large-scale data streams received from multiple sources in parallel, and combine traditional data querying techniques with statistical methods for trend analysis. This enables data-driven business process automation, e.g. predictive diagnostics and automated dispatch of servicing.
VP7	With increased digitalization of business processes, IT infrastructure is becoming a bigger source of risk and enterprises are adopting more flexible and scalable infrastructure solutions leveraging virtualization and cloud computing.	Optique supports elastic computing schemes for distributed query planning and execution, allowing a more optimal utilization of available computing resources. This results in better trade-off between completion-time for queries and the cost of resource usage.
VP8	Big Data retrieval often requires reorganization of data, indexing of data and transfer to separate data sources for reporting. This makes data not time relevant for real time applications.	Optique allows real time access to static, temporal and streaming data sources, allowing analysis to be performed on real time data.

Table 3, Value propositions

8.2 Possible benefits with implementing Optique

Any enterprise adopting Optique will reap the value and benefits offered by Optique over time. Some benefits will be immediate quick-wins. Other benefits will be medium-term and long-term, transformational results.

[1] Micro-electro-mechanical system

Benefits		
Immediate	**Medium-term**	**Transformational**
Immediate benefits can quite easily be adopted by all types of enterprises and stakeholders without too much additional time and efforts spent. **Examples:** • reduced time in accessing information • reduced IT cost • new ways of using IT staff • more timely decisions • decisions based on more facts • able to make more and precise decisions • improved maintenance schemes • fewer shutdowns • reduced cost in spare parts • optimized utilization of costly equipment • more successful business decisions / hit rates • provenance/trustworthiness • compliance	These benefits will require some additional levels of insight and maturity. New information and new insights in own business will create opportunities that require some maturity to harvest. **Examples:** • increased knowledge • enhanced business • improved information quality • increased information value • collaboration between disciplines • improved management of performance and risk • information transformations • more efficient work processes • increased connectivity • better/new insight into own business • big data analytics • increased use of sensor data • predictive maintenance • better information for faster decisions • real-time monitoring • forecasting of events • optimization of asset utilization	To adopt transformational benefits the enterprise needs to achieve high levels of maturity and insight into its own business and information resources. Benefits in this area require high level agility, innovation and ability to change and implement new business models. **Examples:** • new knowledge • business improvements • new business deliveries • business transformations • industrial internet / internet of things • targeted marketing and sales • health diagnostics and targeted treatment • more knowledge about complex equipment / systems • intelligent operations • process and value chain optimization

Table 4: Benefits of adopting Optique in short, intermediary and long term

A business plan defines the overarching objectives with implementing Optique. To help in deciding more sector specific goals and objectives some example goals for some selected stakeholder groups are discussed and summarized in table 5. The organizational culture influences how projects are performed. An organization's degree of management awareness and willingness to adapt new technology, together with its willingness to take risks may also influence on the definition of such goals and objectives.

A stakeholder analysis that identifies customers, groups, and institutions with an interest in the results of Optique, both as commercial solutions and as an open-source platform, was included in the D11.2 report.

An overview of stakeholders and their goals, interest and influence is an important precondition for analysing the context and market for Optique, for formulating value propositions and identifying optimal communication channels. This was included in report D11.2. The stakeholder analysis also provides valuable input for developing dissemination material tailored for the different groups and can be a valuable part of a Business plan.

In this document, we have focused on some selected industrial sectors where an interest in Optique has been identified. Analysis of possible values for different stakeholders, e.g. end users, can be valuable input to the business plan. Also understanding which disruptive benefits Optique has to offer, and which business problems Optique addresses, is a key input to producing business plans and enterprise implementation guides for Optique.

Sector	Branch	Main goals	Possible effects	Suggested roadmaps
Oil and Gas	**Sub-surface**	• Increase user productivity by improved End-User access to Big Data.	• Improved access to existing datasets. • Lower dependency on scarce data scientists and IT experts.	• Further value extraction from big data . • Enabling data-driven performance improvements and innovation. • Empowering end-users to create new knowledge. • Improve query functionality. • Train users.
	Operations and Engineering	• Improved condition/ performance monitoring. • Improved efficiency in asset data management. • Reduced costs CAPEX/ OPEX	• Reduce risk for system emergency shut downs • Enable more efficient data acquisition processes	• Integrate sensor data with asset data to enable advanced analytics. • Faster on-line access to distributed transaction data, including streaming data sources. • Discuss how existing maintenance regimes can be improved by utilizing new technology.
	Management Information	Faster and better decisions based on more insight.	• Improved overview of operational status and operational influencing parameters.	• Identify, collect, integrate and present status information from disparate sources for improved management decision and information. • Provide efficient visual “dashboards”.

Sector	Branch	Main goals	Possible effects	Suggested roadmaps
Energy	Power grid operators	• Improve efficiency in management and overview and analysis	• Improved administration of power supply • Reduced risk for irregularities in power supply delivery • Improved customer support tools	• Demonstrate information sharing across business units, sites, etc., • Provide a more flexible and open extension of IT infrastructure for BI and data governance. • Outline efficient End-user tools.
	Operators of Critical technical equipment (windmills, turbines, generators, switches, transformers)	• Improved condition/ performance monitoring	• Reduce cost and reduce risks for emergency shut downs	• Master data management using ontologies (requiring less maintenance than traditional methods). • Inclusion of sensor data enabling more advanced analysis.
Maritime	Ship Condition Monitoring	• Change in monitoring and inspection regimes of ships		• Discuss how continuous condition monitoring of ship functions can influence and improve existing calendar based certification regimes.

Health & Life Science	Hospitals	Reduce risks for fatal accidents by making vital existing information available for hospital personnel.	• Improved information to patients and hospital staff. • Improved data security and information quality	• Integrate patient related information available in many disparate systems. • Enable access to relevant information for defined personnel through role specific ontologies. • Improve patient information security
	Biomedical Research	Allow rapid and simple access to diverse medical databases	• Faster and easier access to data for use in studies	• Integrate pateinet related information available in many disparate systems • Enable access to relevant information for defined personnel through role specific ontologies • Improve patient information security

Table 5: Some selected stakeholder groups, objectives and suggested roadmaps

9 References

1	Business Model Generation Osterweiler, A, Pigneur, Y., "Business Model Generation", Self-published, 2009. http://www.businessmodelgeneration.com/downloads/businessmodelgeneration_preview.pdf
2	Data Management Maturity Model, version 1.0, 2014. http://cmmiinstitute.com/data-management-maturity
3	Project Management Institute/ PMI. A Guide to the Project Management Body of Knowledge. http://www.pmi.org/pmbok-guide-and-standards/foundational-standards.aspx
4	ISO 31000:2009, Risk management – Principles and guidelines, provides principles, framework and a process for managing risk.

Appendix A: Implementation Plan Outline (White paper)

As required in D11.3, a white paper describing how to implement an Optique based system has been made. This White paper is included in this document (as this appendix).

The intention with this paper is to be an aid when preparing implementation plans for an Optique system. An exact project plan must be tailored to fit the needs of the specific project and also the particular requirements from each organization.

Introduction

Our Implementation Plan Outline uses the PMI (Project Management Institute) framework model as reference. The process groups in the PMI model are illustrated in Figure A1. Each process group specifies a number of specific processes. The processes that, in our opinion, are influenced by Optique or where special attention is necessary are discussed in this paper. More in depth descriptions of all processes are found in the PMI documentation[2]. This paper is based on lessons learned and best practices from implementing the pilots that have been part of the Optique project scope and also the pilots that have been part of the Optique partner program. PMI Project processes where we have no additional Optique related comments, have not been discussed. The descriptions in this document must therefore be regarded as a supplement to an Optique implementation plan, not as the complete plan.

It is important to note that the process groups in the Optique implementation plan are *not* to be regarded as sequential project phases. The processes may be executed in parallel or iteratively. A project plan, which is one of the deliverables from the Planning process, should describe the project phases and the deliverables from each project phase.

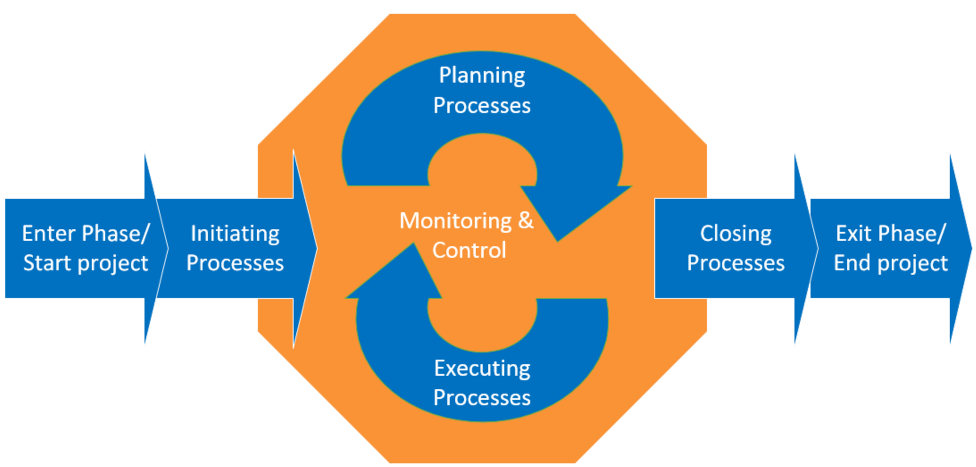

Figure A1. The Optique implementation reference model (based on the PMI process model)

[2] http://www.free-management-ebooks.com/dldebk-pdf/fme-project-process-groups.pdf

An Optique implementation plan could contain all or some of the PMI processes but will differ with respect to magnitude and type of project.

Enter Phase/ Start project

The Optique implementation is triggered when enterprise management decides to start the implementation of an Optique system.

Initiating processes

The initiating processes consist of those processes performed to define a new Optique implementation project or a new phase of an existing project. A project manager is appointed and the project mandate is formulated. Key stakeholders are identified and involved in the project as early as possible. This creates ownership to the project and help maintaining focus on stakeholder needs. Key stakeholder involvement is also necessary to secure alignment with organizational strategy and objectives. Stakeholders in this context are persons or organizations, who are actively involved in the project or whose interests may be positively or negatively affected by the performance of the project or of the results from the project. Stakeholders may also exert influence over the project, its deliverables, and the project team members. Stakeholders can be either internal or external.

The high level business expectations by implementing the Optique system is formulated and approved by the stakeholders. Clear descriptions of the specific Optique implementation project's objectives should be documented in the project mandate.

This list in table A1 is a summary of the Value Proposition and benefit analysis discussed in detail in document D11.2. It is included here as a suggested item list for further elaboration together with the stakeholders to formulate specific project goals to be included in the project management plan:

Objectives with implementing Optique	Measurable effects
Providing a tool to integrate large amounts of data from disparate sources.	Data, otherwise difficult to integrate, becomes available for end-users. Increased productivity by IT-experts who becomes facilitators rather than report producers.
Value extractions by leveraging semantic technologies to enable on-demand integration of data.	New relations between data can be explored and enable reasoning that is not possible with traditional tools.
The organizations data platform can be easily extended by including more source systems to the Optique configuration.	New systems can be introduced and gradually phased in while maintaining the old systems.
Reduce turnaround time for data access	Users can formulate and implement own queries with less support for IT specialists leading to

	more qualified and timely decisions
Improved data provenance	Increased transparency between data and the end-users, informing the end-user about the origin of data and all transformation it has undergone
Users can perform "continuous queries" on data streams	Data from streams can be combined with temporal and static data sources enabling real-time analysis to be performed.
By using terms and terminology familiar to the end-users in the ontology the users can more easily define queries in a language more natural for him.	Improved efficiency since difficult-to-understand field and table names are converted to something the user is familiar with.
Optique offers elastic computing schemes for distributed query planning and execution	Better trade-off between completion time for queries and the cost of resource usage.

Table A1: Value proposition check list to be reviewed with stakeholders

As part of the initiating phase the project manager is given the authority and resources to proceed with the implementation of the Optique system. Such authority and conclusions from the initiating processes is often in the form of a signed project mandate document.

<u>Planning processes</u>

The planning processes consist of those processes performed to establish the total detailed scope of the Optique implementation project. It defines and refines the necessary steps of implementing Optique. As a means to reduce risks an iterative implementation strategy is recommended. In an iterative process you will be able to verify and test parts of the system as soon as components of the system is ready and be able to introduce the Optique solution stepwise to the users. An iterative implementation strategy can also be a means to gain "quick-wins" where obvious positive effect situations exist by implementing Optique that can be easily exploited.

The project manager, together with his team, should prepare the Optique implementation project management plan which is the main outcome from the planning processes. When developing this plan it is decided which processes that shall be included and to what level they shall be described.

Project scope management specification contains the activities of collecting requirements, formulate the scope of the Optique implementation project, and create a WBS (Work Breakdown Structure).

Typical Optique activities **in addition to** the traditional project planning activities can be to:

Optique activities:	Description:
Plan installation and operation of an Optique system.	Select software and tools. Consult the partner program for best practices and experiences with e.g. the Optique pilots.

Decide support level and support agreements	Plan necessary SLAs (Service Level Agreements) that includes use of open source components and evaluate how sufficient support level can be achieved.
Create ontologies	Ontologies can either be handmade, bootstrapped and approximated. Optique will develop tools to facilitate this process (Bootstrapping of ontologies, approximation of ontologies).Specialist knowledge is required to build efficient ontologies.
Decide use of standard ontologies.	Investigate relevant standard ontologies and decide use.
Identify source data	Review source database schemas to identify items to be connected to the various resources in the ontology.
Secure sufficient agreements with data owners	Formalize agreements that conclude discussions regarding data ownership and rights to use.
Agree on APIs to systems	Investigate necessary APIs as early as possible, necessary adjustments and technical prerequisites that must be in place to make data exchange efficient.
Create the visual presentation of results and specify how the data shall be used.	Clarify requirements for Graphical User Interfaces, reports, data presentations and investigate which tools that best suits such needs.
Decide analysis that will be needed and which tools that best suits such needs.	Decide whether advanced analysis (Business intelligence) will be needed and clarify how such requirements can be met.
Make sure that the requirements for information security are according to expectations and reflect the criticality of the information.	Sufficient data security measures should be implemented.
Specify a regime for data quality management.	Integrating data from multiple sources may cause conflicts. The same with integration of data from both internal and external sources. A regime for measuring (where possible), resolving and assessing the possible consequences of not resolving quality issues

	should be established. (See separate specification of the data quality processes below)

Project time management: Define and sequence activities, specify resources to perform each particular activity, duration of the activities, constraints, dependencies between the activities and develop the implementation plan schedule (E.g. as a Gantt chart). This will follow the normal project management guidelines.

Project cost management:

Processes for managing costs and project budget must be established and followed up throughout the project.

Special cost items related to Optique	Description
Additional man-hour cost	Mobilization of specialist will probably be necessary and will add to the project budget. Necessary skills for implementing an Optique system are discussed in the paragraph Human resource management below.
Licence agreements	Necessary license agreements for implementing the Optique system should be investigated.
Hardware costs	Optique will not introduce any additional requirements for specific hardware

Quality management:

Quality management consists of two main processes. Quality Assurance is the process of auditing the quality requirements and the results from quality control measurements to ensure appropriate quality standards. Quality Assurance is the process of monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes. The ISO-8000, Data Quality standard describes how these two processes interact with each other and can be applied to a data environment with several data sources. Our recommended quality management approach is therefore based on this standard.

Quality issues related to an Optique implementation project	Description
Syntactical data quality checks	Verification against existing metadata. When metadata specifies valid types, formats,

	constraints, dependencies, etc. this can automatically be checked.
Semantic data quality checks	Verification against trusted sources. When a source is considered as correct, data can be checked against such sources automatically.
Pragmatic data quality checks	Specific check lists are specified and separate checks (manually) are run to verify if requirements in specifications, descriptions, user expectations, etc. are met.

Human resource management

Specialist knowledge areas that should be considered when implementing an Optique system

Special knowledge areas that an Optique project implementation manager (in addition to traditional project management knowledge areas) will be involved in may include:

Useful qualifications/ experiences	Level
General Project management knowledge and experience	Understand the advantages of an ontology based system and semantic technologies
Semantic technologies and ontology building	Able to build adequate ontologies. Knowledge about standard ontologies, SPARQL queries, RDF databases
Mapping specialists	Knowledge in mapping from source systems to ontologies. I.e. Relational to RDF mappings.
General IT technical knowledge base	Basic IT knowledge encompassing SQL and database management
Good understanding of user needs and of existing source databases will be an advantage	Good communication skills, able to go from user requirements to system specifications
Data integration experience	Knowledge about source system architectures
Information Quality	Knowledge about information quality standards and methodology
Information security	Information security standards and best practices

Project executing processes

Necessary infrastructure to install and operate the Optique system is provided and made available for the project team. The Optique implementation team is mobilized and training of the team is initiated. The basic Optique modules are installed. Ontologies are built and mappings are established. Queries are formulated by End-users. If procurement is planned, this is effectuated. Results are evaluated and quality assurance performed.

Monitoring and controlling an Optique implementation project

Monitoring and controlling an Optique implementation project consist of those processes needed to verify that the project is proceeding as planned, performing as budgeted and delivering as expected. These processes include monitoring of progress, cost control, verifying that quality assurance are performed and has the effect as expected.

Exit Phase/ End project

The project is terminated and the system is deployed. Project experiences and lessons learned are reported to the partner program.