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Management and Development Model for Open Standards (BOMOS) version 2
PART 1: THE FUNDAMENTALS

"A standard that is not managed is not a standard!"

"It is never too early to look into opportunities to manage a standard."

"Developing and managing a standard is not a temporary project, which means that financing it as if it were a project is not appropriate."

"Developing and managing a standard is a process that must be aligned to the situation involved and will therefore be done in a different way for each and every standard."

"No standard is ever complete!"

"The openness of a standard is entirely dictated by the way it is developed and managed."

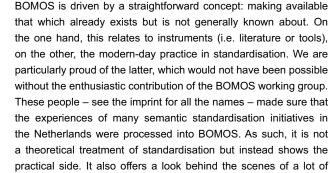"A sustainable standard is a standard that is both open and managed."

A word of thanks

For us, the writing of BOMOS had parallels with developing standards: an activity in which the drive and motivation were stronger than purely work-driven. Accordingly, things got out of hand and what started as a brief manual has since become a serious work.

BOMOS is driven by a straightforward concept: making available that which already exists but is not generally known about. On the one hand, this relates to instruments (i.e. literature or tools), on the other, the modern-day practice in standardisation. We are particularly proud of the latter, which would not have been possible without the enthusiastic contribution of the BOMOS working group. These people – see the imprint for all the names – made sure that the experiences of many semantic standardisation initiatives in the Netherlands were processed into BOMOS. As such, it is not a theoretical treatment of standardisation but instead shows the practical side. It also offers a look behind the scenes of a lot of semantic standards.

To us, BOMOS is a reflection of our work on standardisation and interoperability. We hope it inspires you in your activities in the field of standardisation.

Erwin Folmer & Matthijs Punter

Enschede, December 2010

Erwin Folmer

Matthijs Punter

'Speed dating', 'gas guzzler', 'anti-globalist': I don't know how old you are, but when I was in primary school these words were not in the dictionary. It seems there are often moments in our daily lives when our existing vocabulary falls short, and we feel the need for new forms of expression which lend expression to the things we see, feel or otherwise experience a little more precisely, efficiently or attractively. The language I learned in 1970 turned out not to be a fixed standard, but has been constantly updated and renewed. We 'all 'vote' on these innovations, simply by using or not using these new words. Without being aware of it, we all 'manage' the languages we speak.

The book is about language: the language computers use to communicate with each other. These languages are semantic standards: i.e. agreements on how computers should represent terms. For example, 'billing address', 'employee', 'location', 'wage tax', 'planning permission' etc. If we want to make sure that the computers used by government, industry and individuals can communicate about these types of terms, they urgently need semantic standards. This interoperability (was that in the dictionary in 1970?) of computer systems is essential if we wish to stay ahead in the Netherlands with an efficient government and competitive business.

Good semantic standards are living things, like normal languages. The world is changing, and every day we optimise processes and come up with new possibilities for cooperating and exchanging data. A standard that does not move with the world is soon redundant. Not only do semantic standards have to be set, they must also be updated continuously to suit the new needs of the users. Setting a standard is like having a child: you're stuck with it for the rest of your life! That's why we have published this book.

Hans Wanders
CIO Randstad,
Chairman SETU

BOMOS (Beheer- en OntwikkelModel Open Standaarden) is about setting and managing standards, especially semantic standards. This is often a difficult game involving many parties with various interests, insights and visions. It is also often an ongoing struggle between complying with international standards and meeting specific Dutch needs. BOMOS is intended to support this.

Personally, I have for years been involved in SETU (='bridge'), the standard with which the suppliers of flexible labour (temporary employment agencies, secondment agencies etc.) and their clients can exchange data. I recognise a lot of the challenges and dilemmas the authors of this book outline: how do you set up a SDO (Standard Development Organisation)? How do you deal with software suppliers? How do you organise continuous funding? How can we promote adoption? What is a suitable degree of openness? When should you release a new version? How do you deal with international standards? The SETU standard has now been accepted by the government and included by the Standardisation Board on the list for 'comply or explain'.

The authors have successfully translated the complex material into applicable suggestions. The BOMOS working group, in which a large number of standards are represented, ensures that the whole process is illustrated with practical examples to avoid an over-reliance on theory. With BOMOS, a SDO can take its first steps towards inclusion of their standard in the list for 'comply or explain'.

Enjoy reading!

1. Introduction

1.1 Cause

The management and development of standards is no easy task. Nevertheless, standards are often developed without considering the further development and management of the standard. The cause of this is often the use of project funding to develop a standard, or a corresponding facility. This does not fit well with the continuous development and management of standards.

1.2 Purpose

The purpose of this publication is to assist organisations in managing and improving standards. Questions which this publication aims to answer include:

How can we as an organisation develop (and continue to develop) and manage the standard?

How can we set up development and management in such a way that it can be called an open standard?

How can we improve the adoption of our standard by users?

These concrete questions formed the basis of causing the Nederland Open in Verbinding (The Netherlands in Open Connection) program agency to create a tool together with the standardisation community in order to improve the form of the development and management of standards in the broadest sense. This tool developed into the Beheer- en OntwikkelModel voor Open Standaarden (BOMOS – Management and Development Model for Open Standards), with aids for an open interpretation for the management.

Chapter 3 goes more deeply into the way in which BOMOS can be used.

1.3 Target group

BOMOS is intended to support and inspire standardisation communities and their clients in the structural design of the management and further development of standards.

1.4 Reading guide

This booklet comprises two parts:

Part 1 – the fundamentals

The Fundamentals contains the core of BOMOS; the activities model, and a brief summary of the topics discussed further in part 2.

Therefore, we advise everyone to start with part 1. If your interest is only general, on the basis of a policymaking or management role, then this provides sufficient background and context.

Part 2 – in-depth

If you are active in standardisation communities yourself, you can move smoothly into reading part 2, which comprises more background and practical tips. On the basis of part 2, BOMOS can be applied to standardisation practice.

1.5 Approach

In 2006 the CMO (Community Model Open Standaarden) working group, working group of the Bureau Open Standaarden (later renamed Standardisation Forum Office) at GBO. Overheid (later renamed Logius), began work on this topic. The result, a memorandum, was made available by Bureau Forum Standaardisatie and formed the starting point for the development of BOMOS version 1.

The approach selected for the development of BOMOS was a structured discussion with a small group of experts from the semantic standardisation organisations in which knowledge was shared regarding the relevant topics. This led to version 1 of BOMOS in 2009.

Following the first publication, a new series of meetings took place in 2010. The users of the first version were also represented. Their experiences and new insights were used to develop and expand BOMOS further.

This approach anchors the knowledge of the organisations which are concerned with the development and management of standards; such as Geonovum, Kennisnet, CROW, InformatieDesk standaarden Water (IDsW[1]), Stichting Elektronische Transacties Uitzendbranche (SETU), the Nederlands Normalisatie-instituut (NEN), the Kwaliteits Instituut Nederlandse Gemeenten (KING), the TNO research organisation and others.

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[1] Standardisation organisation in the water sector. Part of the Informatiehuis Water from 1 January 2011.

2.1 Context: standards for interoperability

The main reasons for organisations to aim for interoperability are effectiveness and efficiency in cooperating with, for example, partners, suppliers and customers within the chain. A lack of interoperability is costly, as a range of studies show. For example, the cost of the lack of interoperability in the automobile industry in the United States is estimated at a billion dollars, and a design period that is two months longer than is strictly necessary[2]. The government also has an interest in aiming for interoperability, but has an additional reason from a social point of view. For example, consider the consequences of an emergency if the various emergency services were not interoperable. In addition, issues of interoperability arise in themes such as the electronic patient dossier and the young people at risk referral index. Standards are an important model in achieving interoperability, and in addition, important for supplier independence.

Standards come in all shapes and sizes. There are a great many classifications of standard types, but within government the European Interoperability Framework[3] is used as a guiding principle. This distinguishes between technical and semantic interoperability, which also means a distinction between technical and semantic standards. The technical (infrastructural) oriented standards can often be transferred one-on-one from international consortia. Standards of a semantic nature often require a Dutch user group (community) in order to develop a national profile. In the context of Dutch law and/or Dutch specific business (and government) processes, it is necessary to adapt international standards to the Dutch situation.

Features of semantic standards[4]:
- They are often a specific interpretation of international standards.
- They are often for a specific intrinsic problem:
  - e.g. 'vertical': information exchange for a particular sector: Geo domain, Education, Care, etc.
  - e.g. 'horizontal' information exchange for a particular function: Purchasing, Billing, etc.
- They are often developed and managed within the domain (the sector), and not by formal standardisation organisations.
- The core of the standard is the semantic (meaning), not the technique.

This document is less applicable to technical standards which are often developed in an international context within formal standardisation organisations such as W3C, UN/CEFACT, ETSI, ISO, CEN and IETF.

A semantic standard never stands alone, and often has multiple relationships with other international standards, including technical ones. We also often see stratification within the semantic standard: The international semantic standard which standardises the basic semantic for a particular problem domain and offers room to standardise additional agreements within a specific context (such as a country). These extra agreements on top of the international standards are sometimes called an application profile, but are also regularly designated with the term 'semantic standard'. Vocabularies (code lists etc.) are often set within the application profile or semantic standard and beyond the standard as they have their own dynamics and therefore other management procedures may apply.

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[2] See: Brunnermeier, S.B. & S.A. Martin (2002). Interoperability costs in the US automotive supply chain. Supply Chain Management 7(2), pp. 71-82.

[3] See: http://ec.europa.eu/idabc/en/document/2319/5644.html

[4] The term Business Transaction Standards is often used as a synonym for semantic standards, which gives a good impression but in principle excludes vocabularies (value lists) or dossiers (e.g. patients dossier) as standards as they are not transactions.

This gives us three levels of semantic standard: the international, the specific context (e.g. national), and the vocabularies. Keeping the development and SDOs of these international standards in harmony is an important task.

The semantic standards to which this document applies may apply in the government context (G2G, G2B and/or G2C context), but in practice, this document is equally applicable beyond the government context.

The development and management of standards differs from the development and management of other products such as platforms and software. A platform is a combination of information, system, organisation and interface for the purpose of service. Both internally within the platform and on the interface of the platform with the world beyond, various types of standards may be used including semantic standards. This relationship between a standard and platform applies equally between a standard and software. Standards have different users and other challenges such as harmonising with communities and international standards.

This doesn't mean that the semantic standardisation discipline cannot learn from other disciplines such as the world of software. Models from these disciplines may be usable. In particular, the BiSL framework for functional management can be used to some extent, and this has been taken into account in the development of this document[5].

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[5] For more information on BiSL: Best Practice – BiSL – Een framework voor Functioneel Beheer en Informatiemanagement (A framework for Functional and Information Management), Remko van der Pols, Ralph Donatz, Frank van Outvorst, Van Haren Publishing, 2005.

Management and Development of Standards
(in short: management)
All activities aimed at working structurally on, making available and keeping a standard or set of standards which always fits the current needs of the parties concerned.

A distinction can be made between development and management. The **management** of standards concerns making available and updating of existing standards on the basis of new preferences and requirements without actual functional expansion. This includes, therefore, distributing the standard through a website, for example, providing support, collecting preferences and requirements and issuing new versions.

The **development** of standards relates to the development of a standard as a solution for a new functional area. This may mean that on the basis of this development, the existing standard is expanded or a new standard is created.

Management and development, in the broad sense, for a standard also includes topics like adoption and certification.

SDO
Standards Development Organisation – an organisation that develops and/or manages a standard or a set of standards.

Community
Each specific community or group in the electronic (governmental) field which is involved in the development and/or management of a specific standard or set of standards on the basis of an explicit collective need. As such needs are often felt in both private and public domains, a community can be a form of public-private partnership.

Open standard
An 'open standard' refers to a standard which complies with the following requirements (in accordance with the Netherlands in Open Connection plan of action and the European Interoperability Framework):

1. The standard is adopted and will be maintained by a not-for-profit organisation, and its ongoing development occurs on the basis of an open decision-making procedure available to all interested parties (consensus or majority decision etc.).
2. The standard has been published and the standard specification document is available either freely or at a nominal charge. It must be permissible to all to copy, distribute and use it for no fee or at a nominal fee.
3. The intellectual property - i.e. patents possibly present - of (parts of) the standard is made irrevocably available on a royalty free basis.
4. There are no constraints on the re-use of the standard.

Semantic interoperability
This means that cooperating parties allocate the same meaning to the data that is exchanged.

Semantic standards
Agreements on the meaning of data or information.

Working group
A group within the community with a demarcated subactivity with a clearly defined end result as its objective.

For more information on interoperability and standards:

Accelerating the use of Open Standards in the Netherlands:
https://noiv.nl/service/english/

European Interoperability Framework (EIF):
http://ec.europa.eu/idabc/en/document/2319/5644.html

Dutch Government Reference Architecture (NORA):
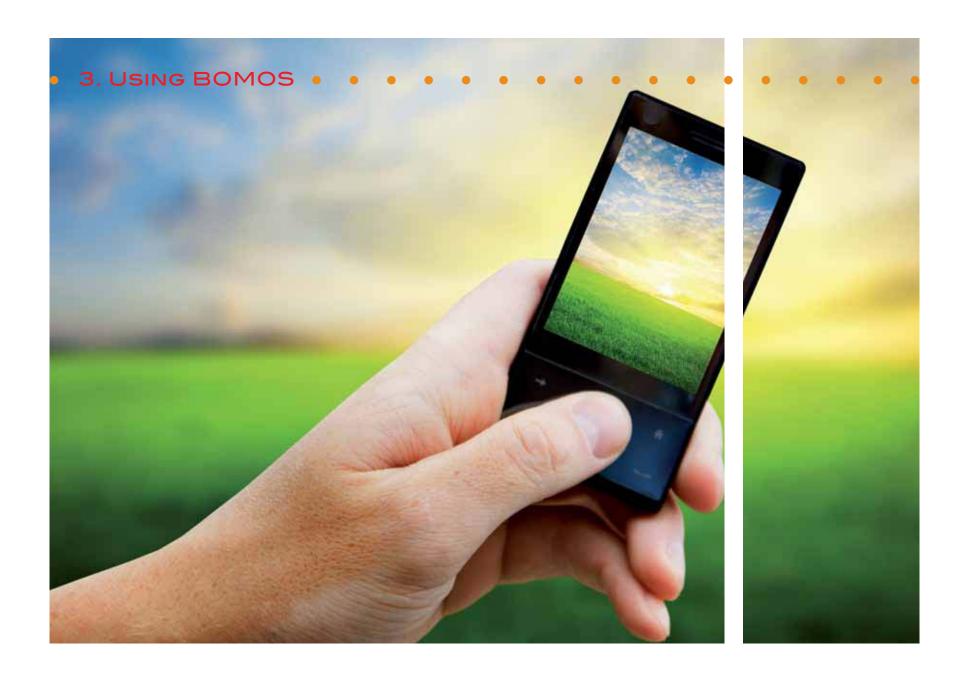http://www.e-overheid.nl/atlas/referentiearchitectuur/nora/nora.html

List of semantic standards and background information:
http://www.semanticstandards.org

Dutch Interoperability Agenda:
http://www.forumstandaardisatie.nl/fileadmin/OVOS/bijlage_bij_CS04-11-06A_Interoperabiliteitsagenda.pdf

How can BOMOS be used?

There are several options:
1. As a tool in the further development of management organisations (SDOs)
2. As background information
3. As a guideline

3.1 BOMOS as a tool in the further development of SDOs

The most important application of BOMOS is as a tool in the further development of SDOs. Many SDOs arise from an initial project or programme. This is sometimes linked to a particular platform. The management of the standard may then be dependent on the operational management of that platform. In order to be able to deploy the standard more widely, further assessments are required. BOMOS helps with this.

Another application is the founding of a completely new SDO's. If organisations choose to agree a standard in a sector, then making financial and managerial as well as content-related agreements is unavoidable. BOMOS is then a guiding principle which can be used to make these agreements.

There are a number of possibilities:

1   Is there already a standard?
Sometimes there is no such standard, and it must be developed. The operational management chapter (chapter 7) deals with the collection of the correct preferences for and requirements of the standard. The bridge can then be laid to the management process.

2   Setting up the management process
This starts with the scope of the management process: what is the management process to be set up for? To manage a single standard or multiple standards?

On the basis of this, BOMOS can be used to make a decision in terms of:
- the management activities (strategic, tactical, operational).
- the supporting activities.

A conscious choice can be made with BOMOS regarding whether to set up certain management activities, but there are also hints and tips for the setting up itself.

Kennisnet and Surf Foundation – NL-LOM

NL-LOM is a standard for metadata in educational material. This standard is a harmonisation of two sector-specific standards by Kennisnet (Content Zoekprofiel) and Surf Foundation (LORElom) respectively. Once this standard was developed by a working group the two organisations used BOMOS to make decisions in setting up the management process and organisation.

3   Has a SDO already been set up?
A form of management has often already been set up. In that case BOMOS can be used to:
- check that all activities are still compliant, or whether strategic and tactical activities can be handled in addition to the operational.
- improve the transparency of the process.

4   Dealing with specific problems

There are often specific problems. BOMOS can be used to make improvements according to best practices and reference models in matters such as:

- *Quality:* how can we measure and improve the quality of a standard?
- *Adoption:* how can the adoption of a standard be accelerated? Which resources can be used?
- *Funding:* how can the financial model of a SDO be improved, for example in the case of declining funding or changing preferences?
- *Validation and certification:* how can we check that implementations of a standard comply with the set specifications? What are the options?

3.2 BOMOS as background information

BOMOS is suitable for use as background information for those commissioning standards, for example. Part1 was developed for this and provides a basis. Knowledge of the management of standards is essential for all involved in standardisation.
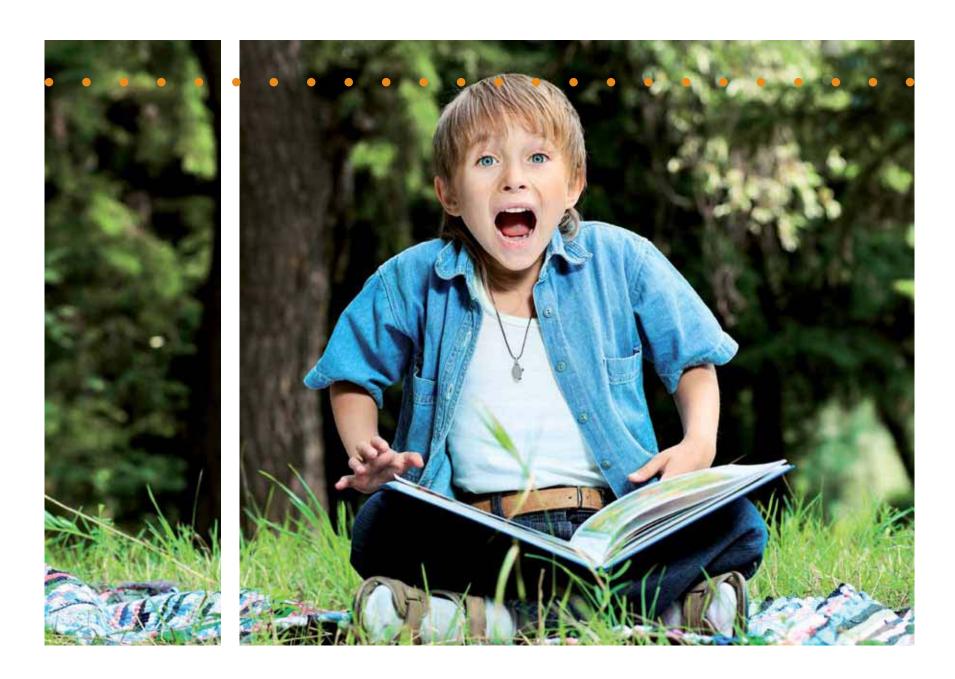
In part 2, we outline solutions which are practice oriented: where possible, examples are used to indicate the level of acceptance of the solution in practice, which standardisation organisations are experienced with it, and what recommendations are appropriate. In other words, valuable background information of practical situations.

Another example is the use of BOMOS as a tool for administrators and policymakers to indicate what the transparency of standards means in concrete terms.

3.3 BOMOS as a guideline

Various organisations use BOMOS as a template or even a guideline for the management of their (open) standard. Although this is not what BOMOS was primarily developed for, it may be used as a rough checklist and as an intrinsic explanation of certain decisions. However, BOMOS is not prescriptive. This is not possible, as setting up the management of standards is situation-dependent to a large extent.

Another example is the use of BOMOS as an aid for important topics related to the criteria of the government's list for 'comply or explain'. The following chapters therefore deserve special attention: 4, 6, 7, 8 and 10.

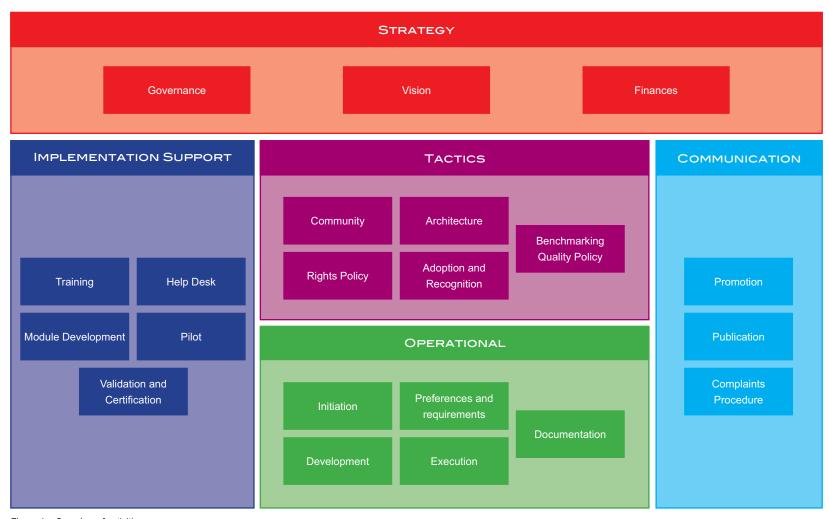# 4. The model: activities for development and management

Strategy		
Governance	Vision	Finances

Implementation Support
- Training
- Help Desk
- Module Development
- Pilot
- Validation and Certification

Tactics
- Community
- Architecture
- Benchmarking Quality Policy
- Rights Policy
- Adoption and Recognition

Operational
- Initiation
- Preferences and requirements
- Documentation
- Development
- Execution

Communication
- Promotion
- Publication
- Complaints Procedure

Figure 1 – Overview of activities

Figure 1 depicts the main model of BOMOS: a stratified structure of activities required for the development and management of an open standard.

The structure comprises a number of elements:
- Three main layers: strategy, tactics and operational.
- Two supporting layers: implementation support and communication.
- Multiple activities per layer which can be carried out.

4.1 Interpretation varies according to situation

The interpretation of the development and management activities are situation-dependent: this means that different situations can lead to different interpretations and still lead to an optimum result. In the case of all activities, this can be carried out in a 'minimum' or 'maximum' scenario, or may not be relevant to a particular organisation. The model describes only which activities may be necessary. It is down to the founder of an organisation for the development and management of standards to select and set up the relevant components on the basis of the model provided here. Where relevant, any advantages and disadvantages of a specific interpretation are given.

It is also impossible to indicate core activities due to the situational dependence, but it should be clear that 'governance' should always be organised so that decisions can be made. Depending on the situation it can then be determined which activities are to be prioritised. The figure shows the three traditional layers: strategy, tactics and operational. They are flanked by two supporting processes: communication and implementation support.

The model may give rise to the suggestion that the activities are isolated, as no relationships between them are indicated. The opposite is true: many activities are related, both within each main group and between them. The harmonisation of activities is therefore essential. The model does not say anything about the organisational form or layout of a SDO. In practice, multiple activities can be carried out for a single part of the organisation or multiple parts of the organisation can be involved in a single activity. Chapter 6 goes into this in greater depth.

4.2 The activities from the model

The stated activities refer to the following:

- **Strategy:** Directing activities related to the strategic (long) term:
  - *Governance:* spreading policy through one's own administrative organisation (such as the legal form); the household rules (the charter), as well as forming alliances with other organisations. Controlling decision-making is crucial (see box).
  - *Vision:* developing an intrinsic vision of the direction of development. The spot on the horizon in the long term.
  - *Finances:* having a financial model for the long term that guarantees income in accordance with the need.

- **Tactics:** Steering activities at tactical level, including:
  - *Community:* It is essential that the right stakeholders take part in the community and that an imbalanced community is not created in which only a certain type of stakeholder (e.g. supplier) actively participates in the community. This task encompasses the monitoring and promotion of a good composition of the community.
  - *Adoption and recognition:* Creating an adoption strategy to ensure that the market adopts the standards. Part of the adoption strategy may be striving for recognition by external 'status providers', for example the 'comply or explain' list[6], or publishing the standard as an NEN document (NTA, NPR or standard).
  - *Rights policy:* Implementing policy in the field of intellectual property and copyright around the community's intrinsic products. Also the community access policy and the rights (and obligations) of the participants in the community. A distinction can possibly be made here between the various roles that participants in the community may have with other rights and obligations.
  - *Architecture and road mapping:* Marking out and testing the intrinsic lines and monitoring in outline the cohesion between the intrinsic products of the community, and also products from outside the community such as bordering standards to prevent overlapping. What deserves special attention is the relationship with the international standardisation community (see box). By road mapping we mean marking out the intrinsic line; for example, outlining the standardisation agenda for the years ahead. The version

[6] http://www.open-standaarden.nl/open-standaarden/
lijsten-met-open-standaarden/

management policy is another important part of road mapping.

- *Quality policy and benchmarking:* It is important to attend to the quality of the standards through a quality policy. This may result in the introduction of a quality check, for example, before a standard is published. Benchmarking involves comparing one's activities to similar organisations in order to identify any potential improvements. Monitoring the use of the standard can play a significant part here in arriving at concrete steering measures.

International standardisation

Harmonising with the international standardisation is an important activity. The standards must match as well as possible, so that interoperability can also be achieved at an international level. Specific preferences and needs must also be brought into the international standardisation community.

Some sectors (such as the geo domain) are very internationally oriented, and in practice, international harmonisation is a substantial activity in such cases (15% of the budget).

- **Operational**, the executive activities that lead to new versions of standards such as:
  - *Initiation:* identification of new ideas (for example, for a new specification and new working group) and all activities associated with setting them up successfully (e.g. analysis of interests, business case, agenda).
  - *Preferences and requirements:* drafting the preferences and requirements of the specification to be developed and

managed, also known by the name Maintenance Requests (MRs).
  - *Development:* at conceptual level, the intrinsic development of solutions for the ideas, preferences and requirements set during previous phases. These solutions are, separate from technology where possible, intended for further elaboration in the specification or a new version of it.
  - *Execution:* implementing the actual amendments based on the conceptual solutions in the specification and any technical filling in.
  - *Documentation:* providing a suitable reflection of the results of the primary management process. Not only the availability of the specifications but also offering the possibility of a historical overview of requests for amendments (maintenance requests) and their current status.

- **Implementation support**, supporting activities aimed at promoting the implementation of the standard, including:
  - *Training:* Offering training opportunities to the various user groups, varying from an information meeting to a course (also online).
  - *Help Desk:* Offering support to various user groups, by phone or e-mail according to a service level agreement (e.g. responding to queries within 24 hours). Drafting and updating a frequently asked questions list can also be a help desk activity.
  - *Module Development:* (Encouraging the) development of widely distributed software modules implementing the standard. This can be done by encouraging the market to develop software, or, if the market is stagnant, developing and distributing one's own software in order to get the market moving.

- *Pilot:* Testing the implementation of the specifications. With some standardisation organisations, holding one or more pilots is mandatory before the standard can be released officially.
- *Validation & Certification:* Providing opportunities to test the accuracy of the implementations (validation). This may have an official procedure that leads to the certification of an organisation or product. Making the validation and certification processes mandatory is also an option.

Module development and Certification are risky activities which actively intervene in the market. They should be carried out as carefully as possible and outside the organisation where possible. See chapter 13.

Validation

Most SDOs provide aids for the validation of the use of standards, such as:
- Geonovum: http://www.geonovum.nl/diensten/valideren
- Kennisnet: http://contentketen.kennisnet.nl/validatie
- SETU: http://www.setu.nl/validatie (only accessible for users in SETU).

The technology that enables the validation of semantic standards is highly generic. This also makes it easy and inexpensive to offer a validation test. The validation services for the EduStandaard and SETU standards use the same eValidator (www.evalidator.nl) in the background.

- **Communication:** supporting activities aimed at creating support for the standard, including:
  - *Promotion:* Propagating the usefulness/necessity/advantages of the standard.
  - *Publication:* Making the standard accessible/known, as well as the current state of affairs, preferably on the internet.
  - *Complaints Procedure:* Guaranteeing that complaints are taken seriously by handling them according to a meticulous procedure. Complaints can also be viewed as suggestions for improvement.

A management and development model for standards alone creates a foundation, but it does not resolve all standardisation issues. Choices must be made on various levels with regard to setting up the management process for standards. A number of issues are current at management level:

For example:

- Adoption: how do you encourage it?
- Open: I hear people talk about 'openness' but what does it mean?
- Business case: What is the eventual result?
- Funding: How much does it cost? And what are good sources of income?

In addition, signals from the community reach management in the case of every standard. For example, signals regarding:

- The quality of the standard leading to problems or dissatisfaction.
- Suppliers who want to be certified in order to create a distinct profile.

These topics are dealt with in detail in section 2 – IN-DEPTH. Each subject is briefly summarised in this chapter.

The organisational structure (chapter 6)

The activities in the activity model are performed in an organisational structure which often comprises an executive organisation which receives orders from the management. The executive organisation works with working groups to fill in those orders. In addition to the working groups, separate suppliers and/or advisory bodies can be set up.

The management and development activities can be placed with one's own organisation, but in the case of specific tasks, other organisations such as formal standardisation organisations, knowledge centres or sector organisations can be called upon. There are a range of potential legal forms for the SDO, the foundation being the most common.

The operational process for the development and management of a standard (chapter 7)

Collecting ideas and requirements for a standard is an important step in the operational process and can be done in a variety of ways, from workshops to online. These preferences and requirements then undergo a process before being included in the standard. Version management is an important issue, as too many versions can be the kiss of death for the adoption of a standard. The operational process of standardisation is often thought of as lengthy and inefficient. Methods which use Web 2.0 applications or the pressure cooker concept make it possible to develop standards more quickly and cheaply.

The open realisation of a standard (chapter 8)

We all want open standards, but other than a definition, we have little grasp on what an open standard actually means. Using 10 criteria, including the obvious Open Intellectual Property Rights as well as less obvious criteria such as Open Change (who determines when a new version is made available?) and One World (1 standard for 1 global problem). The 10 criteria are made measurable so that a standard can set its own openness and deploy processes for improvement.

Relationship with other standards (chapter 9)

Semantic standards are extremely complex because of their relationships with other standards. In order to achieve interoperability, a combination of technical, syntactic and semantic standards is required first of all. Semantic standards can be identified as horizontal and vertical (domain) standards. In addition, there is a distinction between international standards and the national interpretation of them. These types of standard are also called agreements or application profiles. They also make use of vocabularies (code lists). All the varieties of standards have to be managed. Therefore, an international standard alone is not enough: often, it will not solve the problem of interoperability. The semantic standards are often developed outside the formal standardisation organisations (such as NEN and ISO) but often have a relationship with formal standards which is awkward because of the potential lack of openness in these standards. At national level, we are often faced with national interpretations of international standards, which brings about a complex relationship that demands a strategy. Do we apply the changes to the standard internationally, too, or do we simply adapt the international standard? Strategies have been drawn up for this purpose.

Finance: costs and income (chapter 10)

Few figures are known regarding the returns and costs of standardisation. Even so, we know that standards add value economically. There are advantages in the field of network effects, preventing vendor lock-ins and reducing transaction costs. Apart from all the major advantages, it can be difficult to draw up a balanced budget for the standard. A standard has development costs while the returns are hard to realise; especially returns which are not in conflict with openness. A growth model is outlined for the returns. Temporary finance which is suitable for the start-up is not suitable for continuous management. Without structural finance, the most obvious form would be to work with membership fees or offering paid-for services. The consequences for openness are limited in that case.

The business case of standards is an important subject. On the basis of our experience with a standard for the jewellers' sector, we outline a three-step approach to drafting a simple business case. This does not lead to firm figures but will give an idea of the how the costs and profits are distributed among the various stakeholders.

Adoption: promoting the use of standards (chapter 11)

The value of a standard is formed to a significant extent by the number of users. After all, the more users, the easier it is to exchange data via the standard in a particular sector or group of organisations. A lot of standardisation organisations aim therefore to accelerate the adoption of their standards.

There are various types of resource for this: communicative (information, promotion etc.), financial (implementation subsidies, financing specimen projects, offering implementation tools, etc.) and legal (enforcement, for example through 'comply or explain'). It is important that you select the right resource. This is dependent on what is called the chance of adoption in the network of organisations (collective business case) and for individual organisations (business case for individual organisations).

Quality of standards (chapter 12)

Over the years, the quality of standards will gain in importance. We sometimes forget that standards are not the goal in themselves, but interoperability. A poor-quality standard will not lead to interoperability, and it will often take some time before we realise that interoperability is not being fully realised in practice. Research has shown that most SDOs find that the quality of the standard can be improved and that this leads to an improvement in interoperability. As such it is important that we improve the quality of standards. On the basis of the existing models, including those from software engineering, an initial version of a quality model is proposed in which quality concepts such as effectiveness, reliability and practicability are developed further. Applying this quality tool can improve the quality of standards.

Conformance, certification, validation (chapter 13)

Often, once a standard has been around for about two years the need for certification arises. Suppliers are keen to exploit their implementations of the standard and certification can help in this. The SDO could offer certification with various objectives (promoting interoperability or adoption or funding) which may have different consequences and are not always easily combined. Certification is complex and, in fact, it is recommended that one starts with validation and the creation of a list of suppliers using the standard. With validation, conformance to a standard can also be monitored with a low threshold.

Example of use: Geonovum case (chapter 14)

Geonovum used BOMOS to record their management and development procedure. This was done following a testing procedure for the list of mandatory open standards from the Standardisation Forum and Board.

Following initial orientation regarding the content of BOMOS, the interpretation of the management of activities at Geonovum is examined for each layer in the model. In addition, a number of aspects in the field of openness are recorded using BOMOS.

Conclusions and practical tips (chapter 15)

BOMOS part 2 closes with three firm recommendations which we will also mention here in brief:

1 Create continuity of development and management of a standard by:
   •   Ensuring a stable/structural funding model (chapter 10).
   •   Placing core tasks with a structural not-for-profit organisation (chapter 6).

2 Describe the content of the tasks package on the basis of the BOMOS activities model (chapter 4).

3 Create openness by describing the 10 points of Krechmer for the standard (chapter 8).

Management and Development Model for Open Standards (BOMOS) version 2
PART 2: IN-DEPTH

Contents

6. The development and management organisation (SDO)

This chapter goes into the organisational aspects in greater depth: what is the organisation's structure? How can it be organised? What are the potential legal forms and how can tasks be placed with others?

6.1 Organisational structure

Chapter 4 summarises the various activities which may take place within a standardisation community. Figure 2 outlines a rough organisational structure for this. An important point is the separation of activities in the executive organisation and decision-making by management.

The management commission is a (not-for-profit) executive organisation that is responsible for a large share of management tasks. The management unites the needs of its backers and

is mandated by them to decide on matters which concern the standard. Management and the executive organisation prefer to work with monocratic points of contact. The management is largely responsible for the 'decision-making' task. In practice, management meets a few times a year, which must not hinder the required decision-making. The management must give the executive organisation sufficient mandate. In practice, we see that some decisions are also submitted in writing (e-mail) to board members for approval, or that the responsibility for certain activities (e.g. communications) is placed with a single member. This makes it easier to hold bilateral consultation between the executive organisation and the board member responsible and also to make intermediate decisions (and may serve as an alternative to the monocratic points of contact).
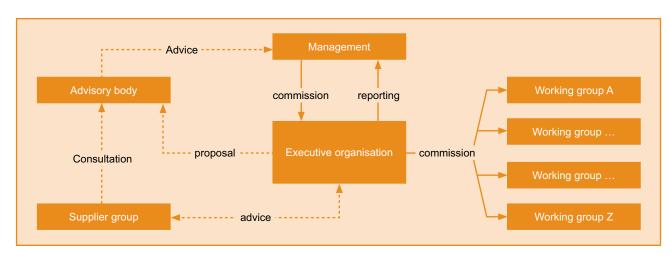

Figure 2 – Organisational structure

The main thing is that it should be clearly established which decisions are to be made during the management meeting, which ones can be submitted in writing (e-mail), which ones can be made by a specific board member, and for which decisions the mandate lies with the executive organisation.

In practice, annual plans are often used to formulate the management's commissioning of the executive organisation. On the basis of reports on the annual plan, the executive organisation then reports back to the management. The annual plan describes which tasks are to be carried out, which working groups exist or are to be set up, the objectives of the working groups etc. The annual plan is approved by the management and is as such the commission for the executive organisation. The model in chapter 4 can serve as a stepping stone for designating tasks in the annual plan. The annual plan also enables reaching agreements on the tasks to be outsourced (see paragraph 6.2).

The actual development of the standard takes place in working groups in which the users of the standards take part. The working groups are coordinated by the executive organisation. Often, the actual developments are drawn up by the executive organisation on the basis of discussions within the working groups. The results of the working group, a new version of the standard, can be established by the management and released as a new version. The decision-making regarding who determines what (management/working group) must be clearly defined.

Preferably, a distinction is made between different levels of changes to standards, so that the more minor changes can be dealt with by the working group concerned or the executive organisation itself, and only the most fundamental changes require the involvement of the management up to a management decision. A working group that is continuously overruled by management is not tenable.

An advisory body may be set up if necessary in order to assist the management with advice, both requested and unrequested. The results of a working group will in that case go to the advisory body as a proposal, and that body will advise the management. The advisory body should preferably consist of independent and undisputed experts, and may be a means of strengthening independence and expertise. It is important that these experts are selected on the basis of their knowledge and experience and not on the basis of interests or the representation of an organisation; after all, they are only asked for advice. Interests are represented by the management.

A typical categorical demarcation of working groups takes place according to the following (stratified) lines:
- architecture
- processes/services
- data/messages
- technical standard/transaction standard
- security

Another commonly used definition is on the basis of the problem domain: for example, the SETU has two working groups, Bemiddeling (Mediation) and Verwerking (Processing). The Bemiddeling working party is involved with standards from quotation requests to the placement of temporary staff, while the scope of the Verwerking group runs form placement to billing. In practice, in the case of more complex standards, certain categories of working group (e.g. 'data') will be divided into working groups according to problem domains (e.g. 'billing') which achieve a combination of the two classifications.

Suppliers deserve special attention. This is often a controversial issue among not-for-profit SDOs. They are often crucial to the success of a standard ('no working standard without correct implementation') but suppliers can also have conflicting interests. In principle, suppliers can also act simply as participants in the standard and take roles in the working groups up to participation in management. In practice, software suppliers often make useful contributions in working groups, and it is therefore highly recommended that suppliers are granted access to the working groups. There is often some fear that suppliers will make too emphatic a mark on the standard. A separate supplier group as indicated in figure 2 is an option in that case, offering suppliers a platform on one side while on the other they can be kept out of the working groups and management. Software suppliers are then united within a supplier group which can advise the executive organisation and hold talks with the advisory body.

The decision-making within the working group may be dependent on the potential participation of suppliers and also the positions of the suppliers. In practice, the choice of the extent of influence will also depend on the way the community is organised; if the development of the standard is driven by the interests of the software suppliers, then they will want to exert a greater influence on 'their' standard. If the development is driven by the needs of a (government) user then they will want to exert a greater influence.

The figure outlines a simple basic structure of management, executive organisation and working groups. An advisory body and/or supplier group may optionally be added. In addition to these outlined possibilities there are many other alternatives, some simple, some more complicated. Whichever structure is chosen, the reports of the various bodies should preferably be made public. See also chapter 8, the open interpretation.

6.2 Implementing management and development tasks

There are a range of options for the interpretation of development and management tasks in an organisational structure, varying from placement with a standardisation organisation to handling the whole thing in one's own organisation. The aim is not to set up a management and development organisation for every standard. Practice shows that few existing organisations are geared to the full range of tasks, and as a result many standardisation communities have still opted to set up their own organisations. Some of the tasks are then placed with the internal organisation while some can also be placed with other types of organisation. See figure 3 for the options.

The model distinguishes between not-for-profit and profit organisations. This distinction is relevant in the scope of openness (see chapter 8). If the management of a standard is placed with a profit organisation then it cannot be an open standard! This does not mean that commercial organisations cannot develop open standards on the commission of a management (organisation), or donate them to a not-for-profit SDO post-development. The standard should always be developed and managed in a not-for-profit way, making a not-for profit organisation the most obvious choice.

An initially obvious option is placing the management tasks with formal standardisation organisations. The world has however changed in comparison to twenty years ago when the majority of the standards were developed by these formal organisations. These days, most standards are developed outside of the formal standardisation organisations in a variety of forms of consortia, and the number is growing. This is extremely significant in the case of

semantic standards. This is partly due to the slowness of processes within formal standardisation organisations, but particularly the lack of actual knowledge and expertise. Knowledge of the domain is essential for semantic standards.

This does not mean that formal standardisation organisations[7] do not have their value; quite the opposite is true. They possess a potential added value on a number of points. For example, in raising the status of the standard. As such, NEN3610 was developed by Geonovum, but also released as a NEN standard for extra status. In addition, secretarial support for working groups is another area that can be placed externally. However, one must always organise the intrinsic knowledge oneself.

Research organisations such as universities and institutes are another possibility for placing tasks. The advantage is the wealth of knowledge but there may be a lack of domain knowledge or knowledge of the specific use. The opposite applies to sector organisations; the advantage here is the superb domain knowledge but the disadvantage is a lack of intrinsic standardisation/ICT knowledge. Standards, including the semantic, are often far beyond the scope of sector organisations. The subject is quickly dismissed as a matter for the boffins, which it is not in essence: domain knowledge is actually of great importance for semantics.
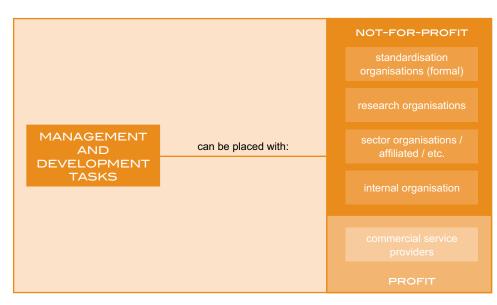

Figure 3 – Placing management and development tasks

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[7] Formal standardisation organisations are: NEN (national), CEN/CENELEC, ETSI (regional: European) and ISO, IEC & ITU at global level. Other well-known organisations are not in principle formal standardisation organisations, and are often designated as industry consortia such as W3C, OMG and IETF.

Example: Informatiehuis Water:

An example of the importance of domain knowledge is, for example, the semantics between adjacent knowledge domains. One example is the chain: sewerage, water purification and the discharge of purified water into the surface water within the Informatiehuis Water. This so-called waste water chain comprises three parties, each with its own language and information systems, while the same semantic terms are referred to under different names on the interfaces. With domain knowledge, an executive organisation can check that they are indeed talking about the same semantic terms and therefore the same data.

Setting up one's own organisation is an option, as is deploying commercial service providers. The latter is somewhat in conflict with the principles of openness. The internal organisation is the most common option for the core of development and management tasks. Many domains now have their own organisations with knowledge of the domain and standardisation, such as Geonovum, EduStandaard, CROW, Informatiehuis Water, SETU, KING, etc. The core of their work includes the strategic management activities as identified in the model (chapter 4), and to a great extent the tactical and operational activities also. In this case, some activities can easily be outsourced, which may even be the better option.

A number of suggestions:

- **Module Development:** Module development is risky to place within the SDO. This makes one both supplier and rival of parties within the community. It is better to encourage module development outside the SDO, possibly in the form of open source software. This may also encourage other suppliers to support the standard and/or get involved in its development. The best approach depends on the characteristics of the community.
- **Certification:** The independence of the certifying body is essential in the case of certification. Normally, the SDO sets the framework for testing and then outsources the actual testing (on the basis of this framework) to external parties specifically aimed at testing and certifying.
- **Architecture/Road Mapping/Benchmarking;** The support and execution for this suits research organisations in the broad sense (in addition to knowledge institutions, organisations such as CBS for benchmarking). For benchmarking in particular, this is better placed with an external organisation.
- **Communication;** often suits a sector organisation which already has a communications system. This must of course be an organisation that is a perfect match for the standard and is prepared to take on the communication as an important task. Communication around the management and development process of a standard demands specific knowledge of this management and has a specific target group, such as software suppliers. This should be recognised by the sector organisation. Other options include the communications divisions of other or partner organisations.

We can broadly conclude that there are options for placing the development and management tasks with:
1 Existing organisations
2 New organisations
3 A combination of the two

Placing all tasks with an existing situation may sound ideal, but there is no organisation that is equipped for the complete range of tasks on its own. Even organisations like NEN, Standardisation Forum, The Netherlands in Open Connection, etc. are not set up for this.

Therefore, in practice it is often necessary to set up a new organisation, if there is no organisation aimed at standardisation within the domain. Option 3, the combination of the two, means that certain tasks are picked up by this (new) specific domain standardisation organisation while others are handled by other types of organisations, in accordance with the description in this paragraph on outsourcing tasks.

6.3 The organisational form

Whether only a portion of or all tasks are to be executed by the new organisation, the new organisation must in either case be set up, which requires a legal form. The Netherlands has countless organisational forms[8]. The openness of the standard is an absolutely essential point of departure. The definition of openness prescribes that the standard (and decision-making) is placed with a not-for-profit organisation. This rules out many of the organisational forms, leaving only a few, which are:

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[8] Sole trader, general partnership (VOF), limited partnership, private limited company (BV), limited liability company (NV), foundation, cooperative, association, government body – in various forms.

1 Foundation
2 Association
3 Government organisation (as a generic term)

The foundation
[http://nl.wikipedia.org/wiki/Stichting]:
A foundation (Stichting) is a legal person created through a notarised deed by one or more natural or legal persons. It generally has a board and a chairman, secretary and treasurer. The board is the only mandatory body. There may also be a supervisory board to supervise the foundation board. In contrast to an association, the foundation has no members. It may have donors but they do not have rights to participate. It may also include volunteers.

The association
[http://nl.wikipedia.org/wiki/Vereniging_(rechtspersoon)]
An association is a legal person under Dutch law. It is usually created by a deed drawn up by a notary. This is not essential but without the notary the association has limited authority (the board members are primarily liable). When an association is set up with a notary, there are also bylaws. These at least state the aim of the foundation, the members' obligations, the convening of the general (members') meeting and the appointment/dismissal of board members. An association has an aim, which may not be the distribution of profit among its members. This does not mean that profit may not be made, but that it must be used for a particular purpose (such as the aim of the association, sharing knowledge, improving quality, charity etc.) An association has members. These are people who have joined the association because they support the aim. The members usually make a contribution to keep the association running. They have an influence on policy through the general (members') meeting (ALV). Such meetings are held at

least annually and all members are invited and entitled to vote. The ALV has all authorities not controlled by law or the bylaws and is therefore the highest body in the association.

The government organisation
[http://nl.wikipedia.org/wiki/Overheidsorganisatie]
There are various forms of government organisation, which makes a brief description impossible. The deployment of a government organisation works in a number of ways: one government organisation as SDO for all standards relating to the government, or one government organisation for each standard. In addition, a single government organisation can handle the management by itself, while multiple governments may also unite. This may take place in an association, for example.

The choice of legal form should be thoroughly considered, taking into account such matters as the simplicity of setting up. In the case of a foundation, it may be difficult for government to take part, and a foundation may not have members. In the case of the association, the major power of the ALV is significant. However, it is simple to demonstrate openness in the case of both the foundation and the association. In both cases, the bylaws are important; in fact, they determine the mandate of the roles within the organisation.

Despite the fact that the foundation may not have members, they do refer to members in HL7 Nederland although formally they are known strictly as "affiliates". SETU has no members but participants. HL7 Nederland describes the set-up of the organisation in the public document "Nadere regeling democratisering HL7nl 2004", published on their website[9].
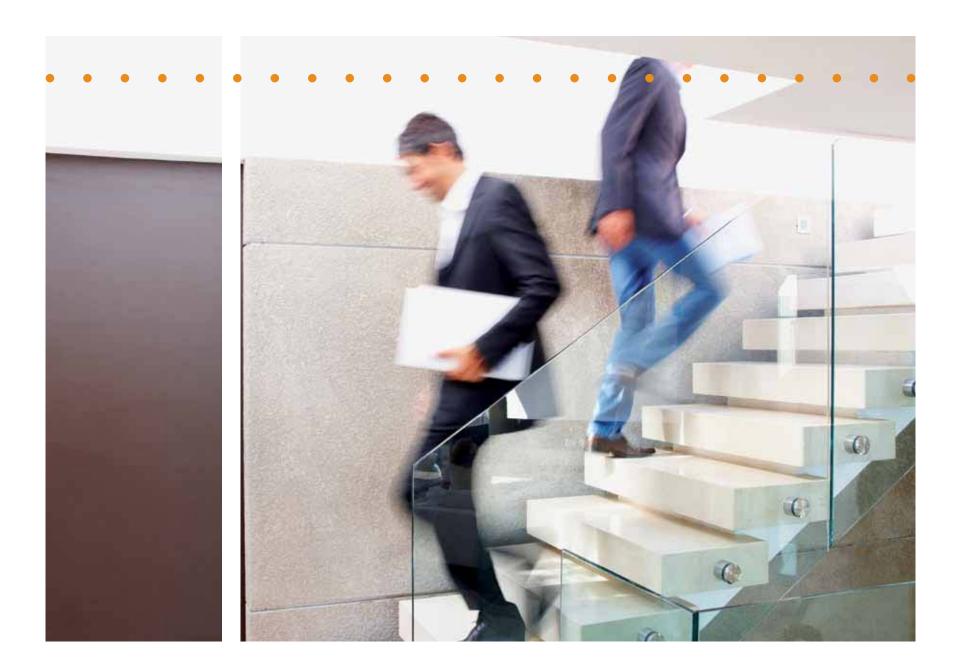
A partnership without legal form can work well in practice for management, but can be a disadvantage in practical matters as the partnership does not, as such, have the authority to enter into agreements; one of the partners must always sign the agreement. Potential disadvantages attached to this are the loss of identity, being bound by the rules and limitations of the partner; less decisiveness etc. The advantage of this type of organisation is that it is straightforward to set up or terminate without legal consequences.

The organisational set-up can, to some extent, reduce or make more explicit the informality. The informality of participants in standards is definitely a serious matter in the scope of a sustainably applied standard.

Examples of legal forms:

Geonovum (geo domain), SETU (flexible labour) and HL7 Nederland (care) are examples of organisations which have opted for the foundation form.

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[9] http://www.hl7.nl/ventura/engine.php?Cmd=see&P_site=407&P_self=7477&PMax=225&PSkip=0&PMax=860

In addition to the 'hard' interpretation, focus on the 'soft' facets too

This chapter largely describes the relatively 'hard' interpretation of the organisation; the pitfall is to lose sight of the 'soft' facets. In the case of standardisation, the soft factors are often essential to the success of a standard. Forming a consortium in which parties trust each other and can work together constructively without every incident jeopardising the existence of the consortium is an exceptionally social and organic process.

7. Operational process for the development and management of a standard

The primary standardisation activity is the operational process: How will the standard ultimately be developed?

A number of aspects are significant here:
- How are the preferences and requirements collected?
- How are the preferences and requirements translated into concrete proposed changes?
- How are decisions made regarding proposed changes?
- How are versions of standards managed?

7.1 Collecting preferences and requirements

The most important step is perhaps the gathering of preferences and requirements. This has to be done when drafting a new standard and when modifying an existing standard.

A feature of the open standard is that everyone can submit his or her preferences. This group is ideally as large as possible – after all, this increases the support for the standard. It might be that the management of the standardisation organisation has set certain directions which may restrict this. This limitation may, for example, affect the overall functional scope of the standard.

There are a range of options for collecting preferences and requirements:
- Setting up a **website** or **wiki** where users can post their ideas. The likes of Kennisnet and Surf Foundation have set up such websites. Users can also discuss ideas or proposed changes.
- Via **formal consultation**. This poses the parties involved in the standard a formal question regarding future developments, preferences or requirements.
- By organising **workshops** or **discussions** with stakeholders

from the community. Current developments can be discussed during these meetings. For example, one of the participants may have a new development that is also relevant to the others. This development may then bring about the broadening of the standard.

Whichever form or combination of forms is chosen: ultimately, this process should lead to a list of preferences and requirements which have to be evaluated.

Gathering preferences and requirements is an ongoing process. It may sometimes be worthwhile for the SDO to actively encourage the community to provide preferences and requirements.

When drawing up a new standard, a 'pressure cooker' process may be followed which gives the initial impulse for the standard in a short time with a number of key players. An example of this is given at the end of this chapter.

7.2 Preparing proposed changes

Not all ideas or preferences automatically lead to a proposed amendment to the standard. There are, roughly speaking, the following options:
- The idea is more a question which is specific for the implementation with a certain party: for example, if an organisation has little experience with the standard. In such cases, support may be offered from the community or the SDO in resolving the problem. There is then no need to amend the standard.
- A wish or idea concerns the amendment or expansion of the existing standard. This may arise from changed legislation, changed processes or of other changed needs. For example:

the 'SoFi' number [Social Security/Fiscal Identification Number] has to be replaced by the 'BurgerServiceNummer' [Citizen Service Number].

- The proposal relates to fundamental changes to or broadening of the standard. For example:
  - Functional expansion, such as the Standaard Uitwisselings Formaat (StUF- Standard Exchange Format) proposal, used not only for the exchange of basic data (StUF-BG), but also business information (StUF-Zaken).
  - In addition to semantic standardisation, also establishing how data is to be exchanged at transport level. For example: establishing that certain XML messages can only be exchanged via SOAP.
  - Applying the standard in new sectors.

When indicated by the submitting party, the wish or requirement should be recorded as a 'request for change'.

Depending on the set-up of SDOs, secretaries or supporting experts can perform an initial sorting using the categories stated. An initial estimate can also be made of the impact of a proposed amendment. Allowing secretaries or supporting experts to do this can make the final evaluation run more smoothly later on. It is important that a neutral role is taken primarily: in the case of an open standard, this is ultimately decided by the standardisation community.

Sometimes, preferences and requirements may fall outside the operational process and require decision-making by the board of the standardisation organisation at tactical and strategic levels. They can then be passed on to the management.

7.3 Evaluation and decision-making

The list of 'requests for change' must be checked over periodically. The requests should be evaluated and decisions made on whether to apply the change to the standard.

Method of decision-making
There are various ways of organising the decision-making. An open standard requires a majority decision or consensus. In the case of consensus, everyone must agree on the proposed change. In the case of a majority decision, at least half plus one must approve the proposed change.

Sometimes, decisions can be made by a working group, and sometimes by a higher body. In that case, a working group will usually provide important advice on the change. Ultimately, it is important that all parties concerned can be involved in the decision-making process.

Points to note
A range of aspects must be examined during evaluation and decision-making:
- The method of fitting into the standard: is it technically possible to adapt the standard and what steps are required to do this?
- The impact of the change on existing systems and processes.
- The added value of the change (in ITIL terms, the business justification): what will it bring in and is this proportionate to the costs?

7.4 Working groups and stakeholders

Working groups are an important tool in collecting, preparing and evaluating change requests. Despite openness, the participation in working groups can be limited. A distinction is often made between

types of stakeholder, partly because the working group should reflect the stakeholders. NEN uses a stakeholder analysis, in which the stakeholders are identified by using a generic value chain. They are as follows:

	Stakeholders	Description
1	Direct users	End user of service, process or product
	Sector organisations direct users	As a group, in the form of interest groups
2	Favourable organisations / clients Sector organisations of favourable parties	Organisations which set the conditions the product or service must fulfil. For example, clients. Legal conditions are set by lawmaking bodies (see 9).
3	Advisory organisations Sector organisations of advisory parties	Organisations which can advise other interested parties (e.g. engineering firms, consultancies etc.)
4	Executive / user / service-providing organisations Sector organisations of executive / user / service-providing parties	**Product normalisation:** organisations which use/apply the product in their services towards end users (e.g. contractors, installers). **Service normalisation:** organisations which provide a process of service to the end user (e.g. debt counsellors).
5	Producers / suppliers of main product Sector organisations of producers / suppliers of main product	In the case of **product normalisation**, this is the main producer/supplier. In the case of **service normalisation**, this category is not used. The role of 'producer/supplier' is fulfilled by the executive, service-providing organisation
6	Producers/suppliers of attached products and services Sector organisations of producers/suppliers of attached products and services	In the case of **product normalisation**, this concerns producers / suppliers of products which appear in the product chain as raw materials, semimanufactures or residual/waste products. In the case of **service normalisation**, this concerns the providers of supplementary products.
7	Research and knowledge institutions	Institutions which supply knowledge or carry out research without a direct commercial interest. For example, educational establishments, laboratories, research institutes.

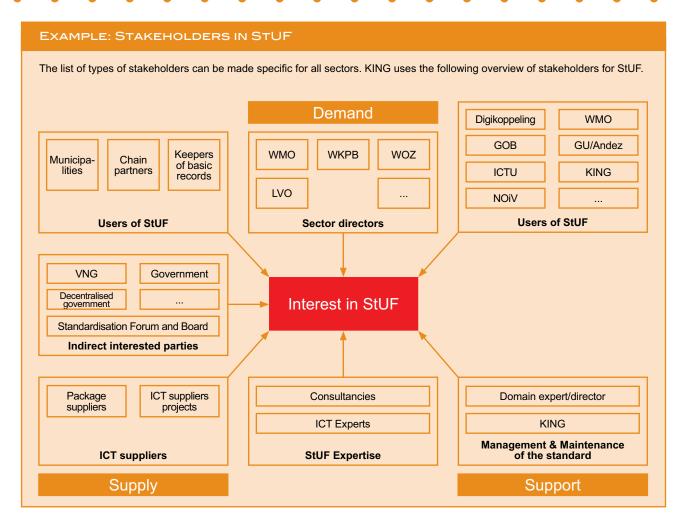|	Stakeholders	Omschrijving
8	Inspecting bodies	E.g. inspection services, certifying bodies
9	Legislative bodies	Governments
10	Existing/new initiators	Parties undertaking alternative initiatives comparable to NEN (standards, certification schemes, guidelines etc.)
11	Those who determine the context of the greater whole	Organisations (e.g. foundations, platforms) involved in a generic way.

Figure 4 – Stakeholders in the value chain (source: NEN)

Example: Stakeholders in StUF

The list of types of stakeholders can be made specific for all sectors. KING uses the following overview of stakeholders for StUF.

Demand

Users of StUF
- Municipalities
- Chain partners
- Keepers of basic records

Sector directors
- WMO
- WKPB
- WOZ
- LVO
- ...

Users of StUF
- Digikoppeling
- WMO
- GOB
- GU/Andez
- ICTU
- KING
- NOiV
- ...

Indirect interested parties
- VNG
- Government
- Decentralised government
- ...
- Standardisation Forum and Board

Interest in StUF

Supply

ICT suppliers
- Package suppliers
- ICT suppliers projects

StUF Expertise
- Consultancies
- ICT Experts

Support

Management & Maintenance of the standard
- Domain expert/director
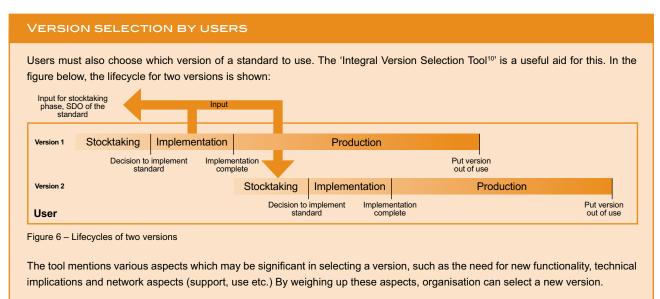- KING

Figure 5 – Example: stakeholders in StUF

7.5 Transition to new version

A standard is (ideally) used by a large number of organisations. Changing a standard therefore has potentially a high impact. It may lead to a large number of systems and processes needing to be updated. Apart from a conscious choice for each change request, this demands that the SDO also considers the general version management policy.

First of all, it is important to record the types of version. For example, there may be 'major releases' which contain a major change, but also 'minor releases' which are merely minor adjustments. It must be clear to users which version of the standard they may use. Can one use two versions at the same time or not?

Within the standard, this also sets requirements in the field of migration and compatibility between versions. Sometimes, provisions are made within the standard to enable this. For example, standards are often made backwards compatible up to a particular version. If there is such an agreement, it is a good idea to make this explicit. In this way, users of the standard can prepare for this in making choices regarding the version to be used.

Version selection by users

Users must also choose which version of a standard to use. The 'Integral Version Selection Tool[10]' is a useful aid for this. In the figure below, the lifecycle for two versions is shown:

Figure 6 – Lifecycles of two versions

The tool mentions various aspects which may be significant in selecting a version, such as the need for new functionality, technical implications and network aspects (support, use etc.) By weighing up these aspects, organisation can select a new version.

[10] See: http://www.integrate-project.nl/

7.6 Fixed cycle

In order to prevent any surprises for users, it is best to work with a fixed cycle of release times. These principles must be set at strategic and tactical level: they do after all influence the operation of the SDO.

Many organisations opt to implement a major release once a year at the most, supplemented where necessary by a 'minor' release with only small changes. For example, think of the correction of minor errors in the specifications, adding examples, etc.

With this choice, a clear annual schedule can be created for the operational process. For example: a number of workshops in January, change requests in the working group in April, and in June set the actual changes. The second half of the year can be used to follow users' experiences and help with the transition to new versions. Any corrections can be included in a 'minor' release in December.

The version numbering can also be linked to this cycle. On the basis of three positions, for example, x, y and z (for example version 3.1.5), x may for instance correspond with the main version (the selected development path), y with the major release and z with the minor release.

Tip: minimise the number of changes

It is wise to keep the number of changes to a minimum. After all, a change may mean that users of the standard have to adapt systems or processes. *The fact that the maximum number of changes per year is set does not mean that there must automatically be that many new versions.*

Example: Aquo standard

In the case of the Aquo standard, proposed changes are classified according to impact. Medium-sized changes are – after approval – implemented twice a year, in June and December. Changes with a high impact on Aquo users are implemented once a year, in June. The company always asks users to respond to the proposals. They can respond to a proposed change through participation or by sitting on a Change Advisory Board (CAB). If a CAB needs more time to make a recommendation, the change is included in a later version.

7.7 Relationship with other standards

In many cases, there is a relationship with another standard. For example, an international standard for which an application profile has been developed. In addition to changes from one's own community, in such cases, one must take into account changes to the underlying (international) standard.

It is important to identify this in the change process. Three aspects are especially important:

- Agreements must be made regarding the extent of a fixed relationship between one's 'own' standard and the related or underlying standard: can a version be used at random? Or is a particular version prescribed?
- In the case of changes to the international/underlying standard, one must determine whether this will have an impact on one's own standard.
- One must determine if there is a relationship and if so what relationship there is between the release schedule and version number of one's own standard and the underlying standard.

Chapter 9 looks at the relationship with other standards in greater depth.

Case: Pressure Cooker – a standard in a week in the waste sector

A comment that is heard often is that developing standards is a slow process that can take years. That is the traditional view, but who says that you have to follow the old, traditional process?

It can clearly be faster. The concept of 'Pressure cooker' is used in the waste sector to develop standards. In the space of a week, the interfaces between different systems in the waste sector were standardised[11]. For example, the interface between the mini-container and the refuse truck, and the interface between the refuse truck and the back office of the municipal waste processor.

After a working group week, with an average of 15 participants from the waste processors and the suppliers, in which the standards were examined one by one, there were two weeks of computation by an external supervisor, and then a two week review period by the working group before the standard was delivered to the steering group. From the start of the working group, there was a standard within two months.

The quality
There is a danger that this will affect the quality: a poor standard could cause a lot of trouble in the future. The quality of the standard is strongly related to the participants in the pressure cooker. A remarkable phenomenon is that members of the working group form contacts within their organisation to collect extra information. Directly related to this is the Achilles heel: if a working group has not prepared adequately and lacks the necessary local information, this cannot be included in the pressure cooker. The quality and preparation of the working group members are therefore very important.

An important initial indicator is the review process; if a lot of fundamental choices are put up for discussion again during the review process and lead to changes to the intended standard, this is not a positive indication of the quality. After all, the first version of a standard is never perfect. New insights and errors are always discovered during implementations, regardless of the use of a pressure cooker. A perfect standard is not the aim: a workable standard that helps to solve the problem is.

[11] https://noiv.nl/actueel/nieuws/2010/06/23/afvalbranche-maakt-werk-van-kabinetsbeleid-open-standaarden/

Points to learn from:

Important points to learn from are:

- A pressure cooker is an excellent means of efficiently developing a standard. The quality still has to be proven, but there is an impression that the working group determines the quality of the standard.
- A clear scope; what is known in standardisation circles as 'scope creep' is a greater risk in the pressure cooker process.
- Not wanting too much, too long: more experiences are required to determine the optimum length and content, but there is certainly an optimum; at a certain point, the magic is gone.

The pressure cooker is not used much in the world of standardisation yet, although the idea comes from international standardisation meetings where the working group members sometimes spend days concentrating on a standard. The 'pressure cooker' can greatly reduce the length of the standardisation process. This can also make the development of standards more efficient and therefore cheaper, which is always a good thing.

Case: The Web 2.0 method – XCRI in education

A modern method of developing standards could also mean using the new working methods offered by "Web 2.0": interaction via the internet. This makes valuable meetings on site necessary less often and can add dynamics to the development of the standard. In addition, the information is highly open, and it works on building a community to bring development, management and support closer together. Using Web 2.0 means in practice the use of a wiki and/or forum; on a wiki, people work collectively on a piece of intrinsic knowledge (the standard), and online discussions can take place in a forum. Other Web 2.0 options include video (or speech) conferencing over the internet, using for example Skype or other tools. This may be a cost saving in relation to the traditional standardisation telephone conference where calls are made to expensive international numbers. There are also Web Seminars nowadays, in which the latest information on the standard is shared. This last form is in practice more 'broadcasting' than interactive exchange. Web 2.0 has a low threshold and is generally lower in cost than the traditional possibilities.

A standard developed using this Web 2.0 method is the XCRI12 standard in education: XCRI uses 3 methods of involving the community online:

1. Forum: For discussion and queries regarding anything to do with XCRI.
2. Blog: For news and announcements.
3. Wiki: For the documentation of the standard and the development of the documentation for the new versions of the standard.

The application of Web 2.0 possibilities can make the development of standards more efficient. The extent and the options which can be successfully applied depend on the context of the standard. There are numerous standards which have set up a Forum and closed it again after some time due to a lack of active participation in the Forum.
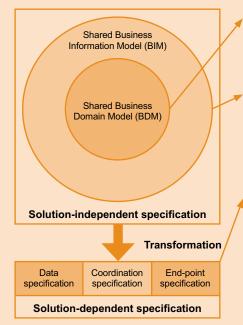
XCRI is a relatively simple standard; it standardises education-related information for exchange. The exchange takes place in a small, active community. This may be why it works in this situation. A small community, and not too complex in terms of content, can mean, for example, that discussions about a standard can be held in a forum easily and that the group can work together in a Wiki. In the case of complex (and also sensitive) subjects, in a large community, the question remains whether these options will work.

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[12] See: www.xcri.org

MOSES – MODEL-BASED DEVELOPMENT OF SEMANTIC STANDARDS[13]

A recent approach for the development of a standard is based on a business information model and a business domain model as a basis for the development of a standard.

With this approach, a Shared Business Domain Model (BDM) is developed. Next, a Shared Business Information Model (BIM) is specified. These semantic models are then translated into a solution model. This may be messages or data models for databases.

Shared Business Information Model (BIM)

Shared Business Domain Model (BDM)

Solution-independent specification

Transformation

| Data specification | Coordination specification | End-point specification |

Solution-dependent specification

Business Domain Model (BDM)
Represents the common business environment. The context and structures which are at the core. This encompasses business objects, potential events and control specifications.

Business Information Model (BIM)
Deals with the information flows in and around the organisation. What are the information requirements and the exchange rules? Includes interaction vocabulary and handling rules in the form of information objects and accompanying actions and control specifications.

Solution Model (SOM)
Represents the translation of independent specification to specific solution structure. The agreed response to the question of how data exchange, process coordination and handling can be realised.

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[13] MOSES was developed by TNO. See www.tno.nl/standaardisatie.

Openness is an important aspect of a sustainable standard. A definition of an open standard is given in paragraph 2.2. But what does this entail for the SDO?

8.1 Krechmer's open standard model: ' 10 requirements'

Ken Krechmer[14] has developed a model which makes the openness more tangible and allows the comparison of standardisation organisations. In the model he distinguishes between the various aspects of openness (requirements) and the various perspectives on standards. As perspectives and roles he uses the developer of the standard, the implementer of the standard in a product, and the user of a standard (product into which the standard is processed). Not all aspects of openness are of equal interest to every role, as the model shows:

Requirements	Developer	Imple-menter	User
1. Open Meeting	X		
2. Consensus	X		
3. Due Process	X		
4. One World	X	X	X
5. Open IPR	X	X	X
6. Open Change	X	X	X
7. Open Documents		X	X
8. Open Interface		X	X
9. Open Access		X	X
10. Ongoing Support			X

Figure 6 - Krechmer's 10 criteria model

These 10 criteria for open standards entail the following for the SDO:

1. **Open Meeting** means that everyone can take part in the standardisation process. No stakeholders are excluded. It is also important to enable participation on a 'per meeting' basis at a low cost. This also enables students and SMEs to take part. Meetings must be clearly announced and there should be as few barriers as possible to stakeholders taking part. A SDO must treat the stakeholders who wish to take part sparingly. In many cases, it is not easy to mobilise sufficient stakeholders who wish to actively participate. Therefore, rather than building barriers, encouragement is more appropriate. To make meetings open only to a certain group of (paying) stakeholders would be a pitfall.

2. **Consensus** concerns decision-making within an organisation. Is there an organisation or group of organisations that is dominant? In principle, every participant should have equal rights and be able to take part in the decision. The pitfall is to have a dominant group (e.g. the board or parties making significant financial contributions) which has total control.

3. **Due Process** concerns the processes of how voting rounds are organised and the processes for requests for the reconsideration (appeal) of decisions. There must be procedures for complaints and they must be transparent. The same applies to procedures for decision-making and particularly the process for resolving potential stalemates. The pitfall is to fail to organise this.

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[14] For further information on the model: Krechmer, K. (2009). "Open Standards: A Call for Change." IEEE Communications Magazine (May): 88-94. Older versions on internet: www.csrstds.com/openstds.pdf and www.csrstds.com/OpnStdsCallforAction.pdf

4. **One World** means that ideally, the same standard is used for the same purpose worldwide, partly to prevent barriers to trade. Of course, this does not mean that it would not be possible to create a new standard for a specific purpose or context. But it does mean that a regional or national standard does not need to be created if a global standard is sufficient. In general terms, One World also means that the standardisation organisation is not compartmentalised or blinkered, developing a standard without knowing about other standards or initiatives. The pitfall is to be blinkered as a standardisation organisation and only concerned with one's own standards while good standards are available, even if they are only half-formed. Open means open in relation to other standardisation organisations in order to develop things which join up rather than overlap. Another pitfall is to opt for a limited scope for the standard to be developed or managed; for example, national rather than global.

5. **Open IPR** (intellectual property rights) is the aspect that is discussed the most, where in particular 'royalty free' and 'irrevocable' are the key words in the definition of open. Standardisation organisations and suppliers have for a long time tried to include 'RAND' (Reasonable and Non-Discriminatory) in the definition of openness. As such, these standardisation organisations often fail to comply with the definition of open in this way, which means that these many standards are perceived to be open while they are not open by definition in this area. The definition of an open standard does not lack clarity, and avoids discussions on RAND; for example, what is reasonable? This leads to a great deal of discussion. The standard should be royalty-free and irrevocably available. The pitfall is to fail to organise this, which is the case with many semantic standardisation organisations. The intentions are good (open), but failing to arrange this explicitly can lead to

future problems. Similarly, there are often no provisions for the rights to the contributions of 'volunteers' from external bodies in working groups. This is a potential danger to the sustainability of the standard.

6. **Open Change:** If a supplier is only compelled to make the standard openly available, but can make changes himself at any time, the benefits of the standard will never be achieved and that one supplier will hold the power. An open method of implementing changes in the standard is of great importance, but has not so far received much attention. Standardisation organisations which do not comply with open meeting, consensus and due process cannot by definition comply with open change. An open realisation can be achieved by describing change processes in which no party has a special status in decision-making. The pitfall is not setting up the change process openly, because, often, no attention is given to it.

7. **Open Documents** means that all documents are openly available. This means that not only the standards themselves but also 'works in progress' must be available, as well as minutes of meetings, etc. This enables the users of the standard to examine the complete background. The pitfall is to make only the standards themselves openly available.

8. **Open Interface** is mainly relevant for technical standards, and concerns allowing suppliers space for closed expansions, and also room for backward and forward compatibility. The pitfall: not addressing backward compatibility and allowing space for temporary expansions (forward compatibility).

9. **Open Access:** End users often rely on the fact that their suppliers have implemented the standards correctly. In order to achieve

'Open Access' it must be possible to test the implementation of the standard (conformity); that can be done through conformity testing (test protocols) up to official certification. Another option involves so-called 'plugfests' which demonstrate the interoperability between different implementations of a standard. The pitfall is to first postpone then cancel. The standards must reach a certain level of maturity in order to have any meaning. Therefore they are often postponed, which is followed by cancellation. An open realisation means making the uses of the standards in implementations openly visible, for example by publishing implementation lists.

10. **Ongoing Support** is supplying support for the standard throughout the lifecycle. The pitfall is stopping providing support when the suppliers' interest wanes. An open realisation means at least that the lifecycle of a standard is described, so that users are given a guarantee of the support of the standard. Ideally, the support should only decline if there is no further interest in the standard among end users.

Many of the current discussions around openness concern only two aspects of openness: 'One World' and especially 'Open IPR', while the other aspects remain underexposed as a result. All these points help in setting up as open as possible a standardisation organisation. Up to now, we do not know of any organisation that is completely open on all points. Completeness openness on all points is a utopian ideal, but these are points of interest, and may help the thought process involved in making standardisation more open. It is worth knowing that the formal standardisation organisations in many cases do not comply, or only partly, with aspects 6-10.

8.2 Concrete tips for openness

On the basis of the above, a few concrete tips can be given:
Make decision-making open by:
- Publishing the minutes of the various meetings.
- Consensus decision-making.
- Not excluding parties from meetings.
- Making a website with all documents (including drafts) available for free.
- A clear change procedure.
- Making the standard testable through test procedures, validation, certification and/or plugfests.
- Arrange structural finance.
- Pay a lot of attention to the relationship with other standards in the environment.
- Explicitly setting out rights; intellectual property rights to the standards, copyrights on documents, the contributions of persons in working groups and in developing the standards.
- Establishing version management: how to deal with backward and forward compatibility, as well as establishing the support on the basis of the standard's lifecycle.
- Establishing the aspects of development and management in a document.

Document

Many SDOs have a document in which (a number of) the aspects of development and management are described. Some organisations which have published this are:

- KING has described these aspects for StUF[15]. Not all aspects from BOMOS are set out here for StUF but issues such as release policy and the process for submitting change requests are well explained.
- Another example is the Informatiehuis Water (formerly: IDsW), where BOMOS is used as a guide[16] in managing the Aquo standard.

8.3 A practical example: the realisation in the case of Aquo

As previously stated, when applying Krechmer's model it quickly becomes clear that openness is not a black/white issue and there are a few points that are not completely open with every standard. There may be a good reason for this, or it may be changed in the future. However, transparency of the extent of openness is a strong plus point[17]. The example of Aquo (formerly IDsW, now: Informatiehuis Water) demonstrates this perfectly. Even in the case of the Aquo standard, which was judged sufficiently open by a group of experts, there were points for improvement[18]:

Requirement	Aquo realisation
Open Meeting	In principle, everyone, including parties who are not directly part of the covenant, has access to the management procedure.
Consensus	Decision-making consists of two things: the managerial/financial decision-making and intrinsic decision-making. The former is reserved for (paying) partners, the second is open to all, therefore beyond the partners. The exception is that the suppliers have an advisory voice in the decision-making process in the case of changes; this is a conscious choice to prevent technology from influencing the semantics too much. This may be the case if a proposed change makes the information exchange more transparent, for example, but is difficult to implement in applications.

Table 1 – Krechmer applied to Aquo (Continued from page 31 and 32)

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[15] See: http://www.kinggemeenten.nl/content/stuf

[16] See: http://www.idsw.nl/aspx/download.aspx?File=/publish/pages/4458/handboek_idsw_v300_idsw_1-organisatie.pdf

[17] See also: "Openheid van standaard moet transparant zijn" – interview with Ken Krechmer by Erwin Folmer: https://noiv.nl/actueel/nieuws/2010/09/22/ken-krechmer-openheid-van-standaard-moet-transparant-zijn/

[18] The table is derived from the first part of the Handboek IDsW: http://www.idsw.nl/aspx/download.aspx?File=/publish/pages/4458/hand-boek_idsw_v300_idsw_1-organisatie.pdf

Requirement	Aquo realisation
Due Process	There is a clear procedure for proposed changes and new standards in which the various roles and moments of decision are clearly described.
One World	Where possible, one tries to connect to other standards or specify them further (e.g. ISO, CEN and NEN standards). Where a good standard exists in other sectors, IDsW refers to this standard from Aquo (e.g. IMRO, IMKL). Where there is an overlap between standards, one aims to harmonise it or if this is not possible, to provide mapping so that the relationship between the standards can be seen (e.g. SIKB, IM-Metingen). ▶

Requirement	Aquo realisation
Open IPR	The standard can be downloaded free and is made available under the Creative Commons licence: • Reference: Users refer to the Aquo standard if they use this. • Non-commercial. The standard may not be used for commercial purposes. This mostly concerns selling the documentation on; obviously, this does not apply to implementations of the standard in information systems. • No derived works. The standard may not be processed by users but should be transferred as published. In the case of third-party input in the development of the standard via proposed changes or participation in working groups, these third parties have no further rights to the use and further publication of this contribution.
Open Change	An open procedure and open meeting is used for the management and maintenance of the standard and cannot independently implement changes to the standard. ▶

Requirement	Aquo realisation
Open Documents	The specifications of the tested partial standards and supporting aids are free to download for all from the website. There are no relevant restrictions (Creative Commons). Working documents and minutes are not always available on the site but they are on request. Improvements are being made to improve the availability of these documents to the outside world.
Open Interface	Closed expansions of the Aquo standard are only possible if they do not conflict with the standard itself (they must be expansions). Backward compatibility is supported in the case of changes where possible; forward compatibility is supported by IMWA and UM Aquo in the sense that it is possible to define extensions which may later become part of the model itself.

Requirement	Aquo realisation
Open Access	At present, Aquo does not provide for 'open use' although work is underway on an Aquo hallmark and GML exchange messages with a simple XML scheme validation can be checked. For applications based on the various data models, conformity is less straightforward to determine. In practice, Informatiehuis Water can advise on this although there is no mark to determine whether an application is 'Aquo compliant'. This is inherent to the fact that this is a semantic standard. With the research into certification and validation, the first steps towards 'open use' have been taken. On the basis of the research, a further implementation strategy will be set which will be effected mainly in the Informatiehuis Water.
Ongoing Support	The life cycle of the Aquo standard (and parts of it) is not described at present. The decision-making around whether or not to phase out a part of the standard runs via the regular change procedure and is tested by the control group and approved by the steering group. With the transition from IDsW to the Informatiehuis Water, the ongoing support of the standard is safeguarded.

8.4 Making the model testable

The Krechmer model is an ideal starting point but can be supplemented to provide a more practical way of implementing it. To that end we have worked out criteria in terms of variables per criterion. These variables are better related to the practical situation. Finally, scores can be allocated per variable; this also makes openness between standards comparable. In theory, this should mean that a minimum score can be defined if we wish to have an open standard. However, that does not do justice to the fact that certain variables are more important than others.

The model on the following page is an interpretation of Krechmer's 10 criteria and is a tool for implementing the management activities in an open way.

> The Standardisation Forum tests standards for openness among other things for inclusion in the 'comply or explain' list. Krechmer's criteria are also included in this broader test. The model presented here is in greater depth, intended to help in lending form to openness and cannot be used in the formal process for inclusion in the 'comply or explain' list. More information on the test criteria can be found on the Forum website.[19]

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[19] See: http://www.open-standaarden.nl/aanmelden/criteria-voor-de-aanmelding-van-open-standaarden/

Criteria	Variable	Notes	Score
1. Open meeting	1. Entrance fee	Is there an entrance fee for standardisation meetings? It is affordable for the different types of participants? Free (2 points), Affordable (low or diversified rate) (1 point), or expensive (0 points).	0 / 1 / 2
Anyone can take part in the standardisation process.	2. Accessible meeting locations	Meeting locations are selected in such a way that travel costs are kept to a minimum for all.	0 / 1 / 2
	3. Open to all	Any organisation or person can, in principle, take part in the development of the standard.	0 / 1 / 2
	4. Open calendar	Is the meeting calendar available online and up to date? Well in advance?	0 / 1 / 2
2. Consensus	1. Open process	The process of standardisation is public so that it is clear to all how matters are decided.	0 / 1 / 2
The foundation of an open standard is consensus.	2. Procedure in case of no consensus	There is a procedure in case no consensus can be reached.	0 / 1 / 2
	3. Equal vote	All stakeholders have equal votes in the decision-making. This prevents the occurrence of dominant stakeholders.	0 / 1 / 2
	4. External review	The results of the standardisation meetings are published to enable external organisations and persons to review the results. This is also intended to improve quality.	0 / 1 / 2
	5. Open agenda	It is possible for any stakeholder to raise an agenda item.	0 / 1 / 2
3. Fair standardisation process	1. Technological method	Is there an established working method around the intrinsic approach to standardisation, using described technologies?	0 / 1 / 2
Established procedures to guarantee consensus throughout the standardisation process.	2. Processing rules	Is there a set of rules in which the procedures and protocols of the standardisation process are set out (way of voting, possibilities of appeal etc.)?	0 / 1 / 2
	3. Independent chairperson	Are the standardisation meetings chaired by an independent person, to ensure that the interests of all stakeholders are given proper attention?	0 / 1 / 2
	4. Opportunity of appeal	If one is not satisfied with the decision-making within a standardisation meeting, are there opportunities to submit complaints to a higher body? This body examines the situation and is authorised to take action.	0 / 1 / 2

Criteria	Variable	Notes	Score
4. Open IPR	1. Rights made public	The way in which legal matters are arranged around the standard should be public.	0 / 1 / 2
Intellectual property rights around the standard as open as possible.	2. Legal impediments	The fewer legal impediments to the use of the standard, the more open the standard is.	0 / 1 / 2
	3. Joint licences	The same licences apply to amendments to the standard as to the original, so that amendments cannot be subjected to legal impediments.	0 / 1 / 2
5. One world	1. Harmonisation	To what extent does the standard fit with other standards?	0 / 1 / 2
The standard may be used worldwide for the same purpose.	2. Independence of location	To what extent does the standard comprise elements which are unique to a specific geographical location? An open standard should comprise as few of these elements as possible to increase its range of application.	0 / 1 / 2
6. Open documents	1. Open drafts	The draft documents relating to the standard are public.	0 / 1 / 2
Documents relating to the standard are public.	2. Open specifications	The specifications of the standard are public.	0 / 1 / 2
	3. Open minutes	The minutes of meetings are public.	0 / 1 / 2
	4. Open procedures	The procedures (such as Consensus and Fair standardisation process) are public.	0 / 1 / 2
	5. Open distribution	The distribution of the documents referred to above is free to all.	0 / 1 / 2
7. Open interface	1. Compatibility	Different versions of the standard are, where possible, compatible with each other, i.e. different versions are interoperable at a basic level.	0 / 1 / 2
Compatibility and confor-mance lead to interoper-ability.	2. Implementations in accordance with specification	The standard describes explicitly what conforming to the standard entails and the criteria that must be met, so that which implementations conform to the standard may be transparent.	0 / 1 / 2

▶

Criteria	Variable	Notes	Score
8. Open access	1. Testing validation	The standard can be tested to ensure it is implemented correctly. A low-threshold test option.	0 / 1 / 2
There are methods of testing conformance and certifying.	2. Validating conformance	A conformance test can be performed, of which validation is a part. The result is recorded in a document.	0 / 1 / 2
	3. Certifying conformance	A test that takes place on the basis of conformance rules, the results of which are published and which may lead to a certificate.	0 / 1 / 2
	4. Disability support	The standard takes into account those with a disability and complies with the applicable guidelines.	0 / 1 / 2
9. Ongoing support	1. Support throughout the lifecycle of the standard	The standardisation organisation provides support to the users throughout the lifecycle of the standard (from start to finish). Especially at the end of the cycle, when there may only be a small number of users and the temptation to cease support is present.	0 / 1 / 2
The standard is supported until there are no users left.			
10. Open change	1. Release of new version	Who determines when it is time to work on a new version of a standard and when it should be released? Consensus also applies here.	0 / 1 / 2
Changes to the standard on the basis of openness.	2. Submitting requests for change	Who may submit requests for change, and are they fairly treated (according to a set procedure)? No parties should be excluded from this.	0 / 1 / 2

Table 2 – Testing with Krechmer and expanded upon by Lammers, Folmer and Ehrenhard[20]

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[20] Lammers, R., Folmer, E., & Ehrenhard, M. (2010). Narrowing the Gap between Open Standards Policy and Practice: The Dutch E-Government Experience. Paper presented at EGES 2010 (part of WCC2010). Available at www.semanticstandards.org

8.5 Open realisation with Open Source Software

A part of the task model is 'module development', i.e. the organisation can develop software in which the standard has been implemented. It is dangerous to do this 'commercially' as a standardisation organisation will become a rival of other suppliers in the market. The support for the standard by other suppliers will then sharply decrease. Developing on the basis of open source can partly prevent this. The open source module into which the standard is worked then becomes free, so that commercial suppliers can pick it up, and in time the standardisation organisation can let go of it. As such it is mainly a means (incentive) to get the market moving.

Furthermore, Open Source Software is an excellent alternative to closed source software. The main difference is the business model. It is important for the adoption of a standard that it is implemented in all software, regardless of the business model. It is to some extent hazardous from an adoption perspective to give a certain type of supplier priority treatment as this can create resistance from other suppliers.

Open Source Software should in no way be confused with open standards. They are in fact two different concepts, and from the point of view of interoperability only open standards are essential.

As outlined in chapter 2, interoperability is the goal and standards are the means. This chapter discusses this relationship between different standards.

9.1 The layered structure of standards

In order to achieve interoperability (exchangeability) between organisations or systems, a complex set of standards is required. This makes the subject matter highly complex, because it is no longer about choosing or managing a single standard, but a set of standards that are highly interrelated in some areas. In this case you can divide them into standards for technical matters and standards for the semantics of information exchange. The interoperability framework[21] in Figure 7 shows this; examples of standards that can be used for this are given in brackets.

Common Semantics	Vertical Industry Language: Human Resource (HR-XML)	Vertical Industry Language: (more than 100)	Vertical Industry Language: Healthcare (HL7)	Semantic Interoperability
	Horizontal Language (OAGIS, UBL)			
Common Syntax (XML)				Syntactical Interoperability (often part of technical interoperability)
Common Messaging Mechanism (Web Services)	Service Composition (WS-BPEL)			Technical Interoperability
	Service Discovery (UDDI)			
	Service Description (WSDL)			
	XML Messaging (SOAP)			
Common Communication Mechanism (Internet)	Transport (HTTP, SMTP, FTP, BEEP)			
	Common Networking (TCP/IP)			

Figure 7 – Interoperability framework complete with standards

[21] Based on: Jian, H. & H. Zhao (2003). A Conceptual Model for Comparative Analysis of Standardization of Vertical Industry Languages. Paper presented at the Workshop on Standard Making: A Critical Research Frontier for Information Systems, Seattle.

Technical interoperability requires that choices be made, a technical philosophy associated with a family of standards is often chosen here; there really are not that many choices. As a communication mechanism, for example, the internet with standards like TCP/IP, HTTP, etc. is a rather obvious choice. With regard to the messaging (transport) mechanism there may be more choice, but nowadays Web Services are also an obvious choice as a family. Choosing Web Services leads to a choice for the individual standards (such as SOAP, WSDL, etc.). An example of an alternative is the family of ebXML standards. Incidentally, choosing these technical standards alone is not enough. To achieve interoperability, profiles are usually also required on top of these standards, describing how the options should be specified in the standards. Although this may not be domain-specific, it is now often specified per domain, especially to be able to offer users a complete interoperability solution in combination with the semantic standards.

Finally, the technical standard XML is currently an obvious choice. In the past EDI used to be the technology of choice. It is still often used in existing situations, but no longer in new situations.

The technical standards are a precondition, but the real challenge lies with the semantic standards that focus on the meaning of the information exchange. Vertical semantic standards are geared towards a specific sector, whilst horizontal ones are cross-sectorial.

In practice, vertical standards are necessary to fit in with the context of the organisation. Vertical standards may constitute a further specification of horizontal standards, see the following paragraph for this.

In order to make things even more complex, there are standards that are used to create standards. One example is the UML standard as a language for drawing diagrams which, for example, contain the process and data models of a standard.

9.2 The relationship with international standards

BOMOS focuses on the semantic standards. Semantic standards are unbelievably complex in comparison with other standards and are developed and managed differently. Most of the IT standards are already being developed outside of the official standardisation organisations (like ISO and NEN), namely in so-called industrial consortiums such as W3C and OASIS. If, however, we consider semantic standards, things are taken yet another step further, as they are largely developed by their own organisation (e.g. HR-XML by the HR-XML Consortium, RosettaNet by the RosettaNet consortium, etc.). An overview of semantic standards can be found at www.semanticstandards.org.

Practice shows us that a distinction between horizontal and vertical standards alone is too limited. International vertical standards often require a further specification, for example, within the context of a country (like the Netherlands) before they can fit in perfectly with the business processes in that context. This is necessary to achieve interoperability. Standards are then created on a national level, also called arrangements or application profiles, which contain a further specification of an international standard. In addition to this,

specific code lists are often also added for the national context. This leads to the following classification:

- International horizontal standard
- International vertical standard
- National standard/application profile/arrangement/taxonomy
- National vocabularies, code lists, etc.

This is also reflected in the organisations: HL7 is the international standard, but you also have HL7 Netherlands. For the international HR-XML, SETU creates Dutch HR-XML profiles.

All types, regardless of whether they are international horizontal standards or national code lists, should all be developed and managed! Please note: this does not mean that all four classifications must be used for a particular application domain. In practice any random combination may occur, depending on the situation.

During the adoption phase, people sometimes state that they only want to adopt the international standard instead of the national one. They usually argue that they do business on a global scale, or that the international standard would be more widely applicable or known. In practice, however, this will result in limited interoperability, seeing that the international standard will not fit in as nicely and will often also have too many degrees of freedom. As interoperability is the purpose of standards, this is not a sensible choice. People should focus on the national standard that ensures compatibility with international standards and the best possible application in the Dutch context.

An important point for consideration here is that, for example, in a situation with an international vertical standard in combination with a national application profile, a different name should be used for both to prevent confusion in practice.

9.3 EXAMPLES OF THE LAYERED STRUCTURE OF STANDARDS

Example 1: Temporary employment sector
The SETU standard[22] is a specific profile based on the HR-XML standard for the specific context of hiring flexible workers in the Netherlands. In turn HR-XML[23] uses the horizontal language of OAGIS[24], which is used in various sectors. The difference in name between SETU and HR-XML prevents confusion in practice, because by indicating that a party is SETU-compliant, you immediately know that they are compliant with the national application profile.

In the example for the temporary employment sector, the OAGIS standard is used, which provides a basis and is used in many different sectors. Based on the OAGIS standard, HR-XML specifies no less than 100 standards specifically for the Human Resources domain. One standard here is the timesheet, which has been further specified in the Netherlands by SETU in the standard for timesheets and expenses. Within this standard, code lists are used that are not standardised by HR-XML, for example, a list of hour types that may appear on a timesheet.

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[22] See: www.setu.nl

[23] See: www.hr-xml.org

[24] See: www.oagi.org

Type:	Example: Temporary employment sector
International horizontal standard:	OAGIS
International vertical standard:	HR-XML (e.g. the timesheet specification)
National standard/application profile/arrangement	SETU (e.g. standard for reporting hours & expenses)
National vocabularies, code lists, etc.	SETU code lists (e.g. hour types)

Table 3 – Example of the layered structure in the temporary employment sector

Example 2: Education
EduStandaard[25] creates and manages application profiles (called "arrangements" by EduStandaard) for the Dutch education sector. They use different international standards for this, including the IMS family, but also specifically IEEE LOM (Learning Object Metadata) for metadata. In turn the EduStandaard arrangements use vocabularies.

Type:	Example: Education
International vertical standard:	IEEE LOM
National standard/application profile/arrangement	EduStandaard NL LOM
National vocabularies, code lists, etc.	'Language and arithmetic reference framework' vocabulary

Table 4 – Example of layered structure for learning materials metadata

IEEE LOM is an education standard for attaching metadata to learning materials. However, the fact that countries have different education systems requires a national application profile. There are many for IEEE LOM, such as UK LOM Core (UK), CanCore (Canada), NORLOM (Norway) and NL-LOM for the Netherlands. Different vocabularies are used within this application profile, for example, the 'Language and arithmetic reference framework', which is intended to provide a picture of the actual basic knowledge and skills of language and arithmetic. The vocabulary consists of levels with a natural structure, independent of age and education type, to promote the continuous learning curves in the field of language and arithmetic. This vocabulary is used for attaching metadata to learning materials, to indicate which level is pursued by the learning materials (classification).

Other examples
XBRL is an example of an international vertical standard (in the financial sector) for which national taxonomies have been drawn up, for example, the US GAAP or the SBR programme in the Netherlands.

In connection with e-invoicing the Dutch government has chosen an international horizontal standard (UBL) and has then itself developed an invoice model to limit the degrees of freedom. In other words, this is also a national application profile to ultimately achieve interoperability, with the difference that this application profile has not yet really been standardised. Incidentally, for e-invoicing relating to flexible employment, the Dutch government has chosen the standardised SETU invoice model, in which the international horizontal OAGIS standard is used.

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[25] See: www.edustandaard.nl

Finally, a structure can also be created within the standards themselves in various ways. The following example is taken from the StUF standard, where we can see family relationships within StUF between vertical sector models and horizontal standards. Additionally, this example also illustrates that within the semantic StUF standards, technical matters are also arranged on the bottom layer (protocol bindings), which normally do not belong in a semantic standard. This 'transport layer' is often included anyway, to be able to offer an overall solution for the domain in terms of interoperability, despite the fact that this transport subject is not sector-specific.
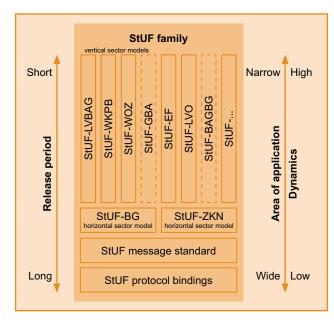
Table 5 – Example of structure within the StUF standard.

9.4 Cross-sector interoperability silos

Due to the sector-specific approach of the semantic standards, people start fearing for 'silos' of standards. Cross-sector interoperability is not resolved and may even become more and more difficult. The potential problem is widely known and people are coming up with solutions for this, but so far they have failed due to very limited adoption and a lack of support. This may have two reasons:

1 The problem of cross-sector interoperability is not yet considered to be a burning issue, as there are even greater challenges in the sector.

2 The proposed technical solutions are often highly complex. One example of a technically beautiful solution is the UN/CEFACT Core Components standard. This standard is roughly ten years old, but it could use a boost in terms of its adoption.

The core of the solution is probably not related to technology, but to the SDOs active in the various domains. They will have to start acting less compartmentalised and should collaborate more with their fellow SDOs in related sectors. Improvements have been made here in recent years, partially based on the 'open' school of thought, because there are no competing standards in an 'open world' (see paragraph 8.1) and standards fit in perfectly with each other.

9.5 The relationship with formal standards

The previous paragraphs clarify that semantic standards have a layered structure in most cases and, as a result, build on or use other standards. An interesting point here is an issue that is generic for the development of standards, but emerges clearly in the pressure cooker (see chapter 7): the handling of formal (e.g. ISO, CEN, NEN) standards. This is because the basic principle is that

existing standards are to be reused as much as possible rather than reinventing the wheel.

There are a number of difficulties relating to formal standards:

1. Not being able to view the formal standards

A number of times it was reported during the sessions that an existing formal standard could already contain a (partial) solution. However, nobody knew for sure, because nobody had viewed the standard because that is subject to costs. Even though the costs may be limited, the barrier is too high. Now the supervisor had to purchase the standard at the end of the day, only to sometimes find out after three minutes that the standard could not be used. This hinders rapid progress (in the pressure cooker). In practice, it turns out that even 'free registration' (e.g. with Geonovum and SETU) is considered too high a barrier.

2. The costs during the development of standards

The average costs for a formal standard are roughly 100 euro per standard. This is a relatively small amount for the development of a new standard, and may at most be a waste if it does not turn out to be relevant after purchase. A greater problem, however, is the number; the number of standards to be purchased is hardly ever just one. For the waste sector pressure cooker, not only did the DIN standard have to be purchased, but also NEN, EN and ISO standards, where an ISO standard consists of four parts that have to be purchased separately. In that case not only the costs increase, but also the frustration with the whole fuss. This fuss is often also related to the purchasing process within an organisation. People quickly start thinking 'just leave it; it will probably not be useful anyway'.

This problem can be eliminated by registering the workgroup/ pressure cooker with NEN, seeing that NEN workgroups have unlimited access to the standards. However, registering the workgroup with NEN is also subject to costs.

3. Reuse

The value of the formal standards is high. Enough useful things were also found in the existing formal standards for the waste sector pressure cooker, which definitely meant that the wheel did not have to be reinvented. Only then it becomes unclear how the formal standards allow reuse. There are two options:
a) Referring to the formal standards, but that leads to costs for implementation (see point 4).
b) Copying part of the formal standard.

The latter is particularly useful if the formal standard has a much wider scope (or applies to a different domain), but the choices can also be perfectly used for 'our' standard. This does, however, lead to questions about the openness of the end result. NEN uses a rule of thumb that 10% may be copied after consulting with NEN. The latter is also necessary to allow NEN to check if any patents are breached that may be based on the formal standards.

4. The cost of implementation

If a reference is made to an existing formal standard, each supplier that wishes to implement this standard will have to purchase this formal standard. Our own standard may very well be open and freely available, but we are still creating an adoption barrier with the reference, and a possible risk of incorrectly implementing the standard, if the decision is made during implementation not to purchase the formal standard. All implementation parties are therefore encumbered with costs, creating an adoption and interoperability barrier anyway, even though that was not supposed to happen.

9.6 Strategies for handling localisation profiles

If we want to use an international standard in a national, sector-specific context, we create a significant dependence. The relationship between the national and international standards can be specified in various ways, depending on the context and the chosen strategy. Ideally, the international standard would be adopted in full, but practice has shown us that an international standard can hardly ever be adopted verbatim; sometimes changes are limited: only a few things that have to be added for the specific national context in order to achieve interoperability.

The following situations may occur:
- The specific context requires expansion of/changes to the standard
- The standard contains many superfluous items, creating additional complexity that is not required for the specific context
- Errors are found in the international standard
- Things are missing in the standard that are not specific to the context
- There is a need for a new standard.

Generally speaking, the following activities can then be performed[26]:
- Make changes to the international standard (and not copy the changes to the international standard) (Adaptations)
- Enter **permitted** extensions to the standard (Extensions)
- Remove things from the standard (Omissions)
- Temporarily change the standard (we apply the desired changes to the international standard, but we then need a temporary solution until the international standard has been changed) (Temporary Adaptations)

[26] See: Folmer, Van Bekkum, Verhoosel: Strategies For Using International Domain Standards Within A National Context: The Case Of The Dutch Temporary Staffing Industry. Paper presented at the ITU-T Kaleidoscope event 2009. Available at www.semantic-standards.org
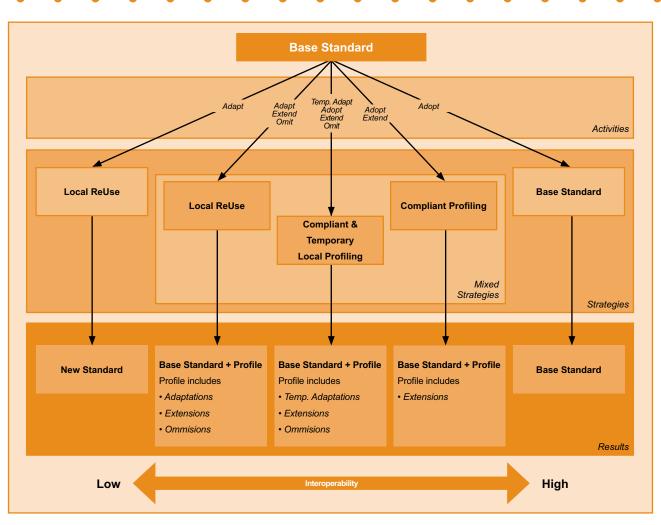
Figure 8 – Strategies for profiles

The strategies:

Strategy	Characteristics
Local Re-Use	We reuse the international standard, but adapt it to fit the requirements and create a new standard.
Local Profiling	A profile (that does not meet the international standard) on top of the international standard, in which all the changes have been implemented.
Compliant & Temporary Local Profiling	A profile in which basically only permitted extensions are included, but that also contains temporary solutions to matters brought in internationally that justify a temporary solution. These temporary solutions do not comply with the international standard.
Compliant Profiling	Extensions only in a profile that complies with international standards.
Comply	Verbatim copying of international standard without any changes or extensions.

Table 6 – Overview of possible strategies

Especially to make interoperability internationally possible, it is important to keep in line with international standards and to choose a strategy on the right side of the figure, where possible compliant profiling. That, however, requires compliance with the international standard and that is subject to costs, among other things, for visiting the international standardisation meetings. This is necessary for pursuing interoperability in an international context.

Profiles in SETU

SETU uses Compliant & Temporary Local Profiling as a basis. This means that SETU is a profile on top of existing standards, currently the HR-XML SIDES standard (the Base Standard). The profile contains:

- Temporary adjustments for shortcomings in the HR-XML standard. Solutions to these shortcomings are added to HR-XML and SETU implements a temporary solution in the profile until the new version of HR-XML is released and is applied by SETU.
- Permitted extensions: e.g. two Chamber of Commerce registration numbers have been added to the invoicing standard. These numbers are not widely used globally, as a result of which they are not part of the HR-XML standard. This addition has been made to a part of the standard that has been defined for country-specific extensions, which makes it a permitted extension.
- Omissions to make the scope narrower: the HR-XML standards contain lots of functionality that is irrelevant to application in our context. In order to reduce the complexity and improve interoperability, any functionality that is not used is removed; i.e. SETU prescribes that certain functionality from HR-XML not be used.

Developing and managing a standard structurally costs money. The amount depends greatly on the context and dynamics of the standard and making generic statements about this is not easy. The initial developments often start with projects starting with budgets from 30,000 euro to many times that. An initial project does not lead to a standard right away either; a workgroup will study the possibilities and scope of a standard. After the initial development, the standard should be structurally managed and further developed. There are known cases in which the management was organised with budgets of 250,000 to 900,000 euro (per year). So far little research into this has been conducted, except for the Ethernet standard: this technical standard cost $10 million to develop[27]. Other information taken from literature is that the proceeds of selling ISO standards cover half the costs incurred by ISO for the development and management of the ISO standards[28].

10.1 Generic benefits of standardisation

The available figures may well be limited, but enough economic research has been done into the advantages and disadvantages of standardisation. The following table[29] presents a summary:

	Positive effects	Negative effects
Compatability / interface	• Network externalities	•Monopoly
	• Avoiding Lock-ins	
	• Increased variety of systems products	
Variety reduction	• Economies of scale	• Reduced choice
	• Building focus and critical mass	• Market concentration
Information standards	• Facilitates trade	• Regulatory capture
	• Reduced transaction costs	

Table 7 – Positive and negative effects

The following are mainly relevant to (domain) standards:
- Positive network effects (value increases with the number of users)
- Prevention of supplier lock-ins
- Increased variety of products and services
- Economies of scale
- Reduced transaction costs.

[27] See: Spring, M. B., & Weiss, M. B. H. (1995). Financing the Standards Development Process. In B. Kahin & J. Abbate (Eds.), Standards Policy for Information Infrastructure (pp. 289-320). Cambridge: The MIT Press.

[28] See: Best, K., Reducing the Costs of Standards Activities, http://support.kavi.com/documentation/white_papers/reducing_costs.pdf

[29] Based on: Blind, K. (2004). The economics of standards; theory, evidence, policy. Cheltenham [etc.]: Edward Elgar.

10.2 Costs and income

It is, however, possible to consider the possible cost items and income of the management of standards. The balance sheet summarises these.

Debit	Credit
Development costs	Structural budget
Management costs	Project funding
Communication	Membership fees
Membership costs	Government funding
(+ travel expenses)	Provision of services
Business operations (auditor)	Licences
Accommodation	Donations
Goodwill	
Tooling (licences)	
Funding costs	

Table 8 – Debit and credit for developing and managing standards

Debit

The principal costs will basically be related to the personnel costs for the primary task of the organisation: the development of new functionality and the maintenance of existing functionality in the standards. The standards are published and possibly also promoted; these are subject to communication costs. Apart from personnel costs, examples of communication costs are costs for setting up a communication platform, organising meetings, the website and, for example, printed matter.

Specific software tools are often used, such as data modelling software, which are subject to licence costs. Another potential cost item is participation in related standardisation organisations, which is subject to membership costs. In several communities this item may vary from 0 to 15% of the total budget and above. Additionally, travel expenses are often also necessary for international meetings. Standard costs for business operations also apply, such as costs for ICT facilities (office computer equipment), accommodation and costs for the annual accounts auditor.

Goodwill can also be considered a cost item. In this case goodwill is the investments that have to be made within the environment that do not contribute directly to the standard itself, such as attending meetings and account management. These are often investments intended to create goodwill from others in return (as result). Finally you have the funding costs, which indicate the activities used for generating income for the standardisation activities. Depending on the funding model, these may be costs for recruiting members up to applications for funding and the like.

The relationships may shift over time, for example, in a certain phase of a standard the development can be temporarily halted and the focus can be shifted to communication to improve the adoption of the standard. In line with this, the costs will shift from development to communication.

Credit

Potential sources of income, for example, are stakeholders that make funds from the structural budget available for the standard. This can be a ministry, but can just as well be a sector association or special-interest organisation. In the same way, these organisations can also temporarily make (project) funding available for a certain purpose. Additionally, in view of the social and economic importance of standards, there often also are opportunities for government funding. This funding may also be a source of income, but obtaining

it can be a lengthy process and there may be restrictive conditions regarding the use of the money.

Structural types of funding are preferable over temporary (project-related) types of funding. This is because nobody would want to implement a standard for which it is uncertain if it will still be managed next year because the standard uses project funding that is about to end. Additionally, structural funding is a requirement for inclusion in the comply or explain list of open standards from the Standardisation Forum.

Other potential income types are related to the standard itself. It is possible to ask for money for downloading the specification documents, or it can be linked to the use of the standard. Neither of these types is beneficial to the adoption of the standard. In practice there is a lot of resistance against paying for standardisation documents, regardless of the amount. It is, however, the business model currently used by NEN for its standards. Within the context of openness (see chapter 8), it is not wise either to ask for money for the documents or for use of the standard. However limited the amount, it makes the standards less open in any case. In practice draft versions of these standards are therefore often used, because those can still be distributed freely.

Providing services related to the standard is another possibility. Examples are consultancy relating to the standard or implementation consultancy. Offering services, for example, in the form of a central message broker or other types of software/hardware provision are other possibilities. Finally, income could be linked to services provided in the field of validation and certification. Certain risks, however, are attached to all of these types of services. Apart from being a SDO, the organisation also becomes a service provider.

This may lead to conflicts: especially other service providers in the market may consider this unfair competition. The service product provided and the standard itself may also become intertwined; if it turns out that the product itself does not fully support a certain part of the standard, it may be decided to change the standard rather than investing in a product that does fully support the standard. Clear scoping of which services are to be provided by the SDO and which are to be left to the market is essential.

Apart from structural funding from the budget of a major stakeholder, the most obvious source of income is a (membership) contribution by the stakeholders. The three key terms 'interest-payment-control' can be used for this to recover the costs from the same parties that benefit. Different types of organisations may have different contribution rates related to the potential proceeds for the stakeholder by using the standard. It speaks for itself that a party making a vital contribution to the management of a standard would also like to influence it. This is subject to the risk that the interest (and therefore control) is considered equal to the financial contribution. This affects the openness.

For a mature standard it is easier to generate income from the standard itself or related services, but care should be taken to minimise the resistance created against the standard. A standard that can fund itself from income, for example, from membership and licence fees, can still be an open standard. Making a profit is absolutely forbidden. To prevent this, the organisation type may play a key role.

10.3 Suitability of income sources
The previous paragraph presented an overview of potential income. The choice of income sources to be used is situational, but this paragraph tries to provide support when making choices for suitable sources of income.

The suitability of a type of income is generally determined by whether it:
- balances costs and income
- is open and transparent
- has enough support

In other words, sources of income that are not supported, are not transparent and make a profit for the SDO are unsuitable.

Determining which sources of income are suitable requires a distinction between different situations:
1. Distinction between development and management
2. Level of maturity: distinction between a tried-and-tested standard and a standard in the initial phase of its life cycle

We also use three basic assumptions:
- compatibility with open standard (accessible)
- adoption non-restrictive
- payment is made where the benefits are.

Based on these basic assumptions, licences have a doubtful status due to the limited openness, but especially because they restrict adoption. This applies both to paying for the specification document and to paying for use of the standard. As this is undesirable, it is not considered to be a potential source of income for an open standard.

Re 1. Distinction between development and management
A distinction between initial development and ongoing management is relevant, because the former is generally easier to fund than the latter. In most cases customers are willing to fund projects involving a particular issue to which the standard is the solution. Once the standard has been developed in the project, however, it becomes a

lot more difficult to find the continued funding for the management. The initial customers regularly withdraw, or they at least require a lot of convincing of the usefulness and necessity of continued funding. This is why explaining what is meant by ongoing management is necessary: adjusting the standard to the changing environment. Examples are changes to legislation, changes to dependent standards or innovations in a technical field. Ongoing management may, however, lead to a new version of the standard. (Incidentally, management is sometimes defined more narrowly, for example by NEN, e.g. keeping the standard available on a website; in this case management cannot lead to a new version of a standard.)

Project and government funding are basically fine for incidental matters such as the initial development, but also for specific extension of the standard. Seeing that these are not structural, however, it is not as useful to use these sources for the management of a standard. Structural funding from a budget (e.g. funding by the government) is naturally an ideal scenario, but not every SDO can benefit from this. If this is unavailable, it becomes more or less necessary to consider a membership model. The extent to which the membership model is desirable (sometimes also called contribution or participation because a foundation cannot have members) depends on the benefits exclusively enjoyed by the members and the cost aspect. If everyone can participate at diversified rates, this will be an acceptable alternative, for example, by type of organisation and turnover. The membership fee may not be a major barrier for any of the participants. If membership does not come with any benefits, nobody will be willing to participate. The advantages of membership are related to two points:
- Visualising that the organisation supports the standard. (e.g. logo on website, this works two ways: the logo of the participating organisation on the standard's website and vice

versa, the participating organisation being allowed to use the standard's logo on websites and flyers)
- Participation in workgroups. Participation in workgroups is often highly valuable, as it provides knowledge of the processes in the sector and the future development of the standard.

Attaching benefits to membership has consequences for the openness of the standard; the right balance should be found here.

Some standardisation organisations differentiate between rates for controlling members and participating members. This does, however, create some doubt in relation to openness. Organisations sometimes also try to gain lots of income from suppliers, but this may damage the adoption of the standard.

Re 2. Level of maturity
If a standard has a high level of maturity, characterised by broad adoption of the standard, services provided by the SDO are another potential source of income. Examples are various types of service provision:

- certification
- training
- implementation support

Certification can be implemented in various ways, also as a means of generating financial income (see chapter 13, Certification). With regard to training, examples are organising training days or complete courses relating to the standard. The margins on a training course can be a source of income, especially in combination with certification (making it mandatory to follow the course for the certificate). Finally, implementation support is a means that can be used in a 'light' way from

providing paid recommendations about the correct use of the standard up to performing complete implementation processes. This also makes the SDO a market player, and that comes with disadvantages.

In short, providing services is a source of income that offers more and more possibilities for income as the standard becomes more mature.

A source of income that is not used very often in practice, but should not be excluded for the future, is donation. In particular structural donations are a good type of funding.
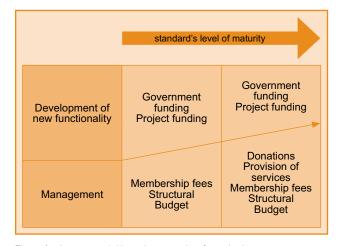
This leads to the following model:

Figure 9 – Income model based on maturity of standard.

Incidentally, the costs for managing a standard do not remain the same over the years. Some cost items may change significantly. Nowadays we see items such as tactical management rise significantly, especially

due to the relationships between the many (international) standards that require aligning. If the adoption of the standard is a success, an item like implementation support may also rise sharply.

10.4 Cost savings for standardisation

People naturally ask whether standards cannot be developed and managed more cheaply. That is not easy, because many standardisation initiatives, in particular relating to industrial standardisation, have the following characteristics:
- minimal cost orientation
- amateurism in the positive sense of the word

This means that the budgets are often limited and that standardisation organisations have to make choices between what is and is not feasible within the budget. A relevant question therefore is how sensible the minimal cost orientation is in relation to the quality of the standard and the adoption of the standard.

Developing a complex standard may cost millions; the principal costs are not for the SDO, but for the individual participants such as:
- the volunteers' time
- the travel and meeting expenses
- membership fees and costs for purchasing other standards

Efficiency could possibly be improved with regard to the time required for the standardisation process. Time is money and the development process for standards often is extremely time-consuming. Saving time in the development process could save a lot of money. One example of this is the pressure cooker in the waste sector, in which the foundations for the standards were laid in a week.

The various standardisation organisations in each sector sometimes tend to reinvent the wheel, usually out of ignorance, which also leads to inefficiency. For example, the development and management processes could probably be copied from another standard rather than developing them in-house. Additionally, for example, the core of a validation service is the same for each XML-based standard; yet many SDOs still build their own validation service. In general it can be stated that the use of online tools could make the use of volunteers more efficient. The following table[30] summarises a number of suggestions to make standardisation more efficient:

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[30] Based on: See: Best, K., Reducing the Costs of Standards Activities, http://support.kavi.com/documentation/white_papers/reducing_costs.pdf

Part of standardi-sation process	Efficiency can be improved by:
Drawing up a charter	A specific and detailed charter strictly determining what is in/out of scope of the standardisation initiative.
Setting up development and management processes	Reuse of descriptions (e.g. use of procedural documents from other standardisation organisations).
Establishing a SDO	Reuse of tools, such as use of eValidator, but also tools to create standards (e.g. the Standard Developer Kit used by SWIFT).
Preparation	Optimum and strict planning with allocation of work activities. Also defining clear wishes and requirements for the solution to prevent scope creep (scope creep is the phenomenon that the scope of the standard gradually shifts during the development process). Additionally identifying the sources (other standards) that could potentially be reused already at an early stage.
Development process	Innovative development approaches for standards (e.g. use of a pressure cooker), but also tools such as a wiki where you can work together.
Review of the standard	Efficient review process and use of templates to collect comments.
Confirmation of the standard	Online tools for voting.

Table 9 – A more efficient standardisation process

Saving costs by means of innovative approaches in the development process can also be a pitfall. The face-to-face meetings are a major cost item. Cheaper alternatives are telephone conferences or mailing lists and IRC chats. Especially in the open source community, people believe that face-to-face meetings are superfluous and that asynchronous communication should be sufficient, also for operating globally in every time zone.

Developing open source software, however, is not the same as developing an open standard. Using the same process could therefore be a pitfall. Standards involve complex matter and functionality, where mutual understanding and also trust are highly important. Direct communication, face-to-face meetings and telephone conferences are important here. Efficiency means using the right amount of face-to-face meetings, teleconferencing and possibly mailing lists, among other things, for dealing with technical matters.

In other words: innovative development approaches, such as the pressure cooker and use of Web 2.0 (see chapter 7), may definitely result in cost savings, but they will never replace costly face-to-face meetings.

10.5 The business case

The business case for standardisation is a subject often heard. Before the decision to invest can be taken, an insight into the business case is required first. This actually involves several business cases:

1. The business case for the standard (i.e. the chain)
2. The business case for an individual organisation to implement the standard
3. The business case for a new version of a standard.

The first business case is of interest to the government for adapting the standardisation policy. This business case is naturally also relevant to the standardisation organisation, but it is not of much use to an individual organisation. It requires a different business case specific to its role in the chain.

Quantitative research into the business case for standardisation is difficult to perform and does not always yield useful insights. This does not mean that qualitative research is never relevant and cannot be performed properly. The insight of knowing which parties will benefit and identifying the organisations that will not benefit from it is already valuable information. In addition to this, it is valuable to know which parties will benefit relatively more than others, even though they play the same role. The market leader, for example, may not benefit as much as the runner-up, just like an organisation with a modern back office could benefit more. Based on these insights, the behaviour of the participants in the workgroups could be explained.

The quantitative business case is difficult, because standards are not a goal, but a means to achieve the goal of interoperability. The business case is then basically about interoperability. In line with this, projects usually do not have the aim to implement a standard in practice; they are aimed at realising interoperability, for example, for purchasing. This means that the business case for the project is broader than the standard, for example, we regularly see projects that switch from a paper exchange to a digital, standardised exchange, which will also involve process optimisation. This makes the standard a (key) part of a much larger project. It is difficult to establish which proceeds and costs can be allocated to the standard within the larger project. In addition to this there are qualitative benefits, which should then be expressed quantitatively.

Special attention should also be paid to business case type 3: replacement standard, new version. It is relatively easy to draw up the business case for this, but in practice it cannot be made positive. One example is e-invoicing: if an organisation already uses e-invoicing, e.g. with UBL or SETU, the business case for a new standard (UN/CEFACT Cross Industry Invoice) cannot or can hardly be made positive. As a result, you will always see old standards (e.g. EDI) in use for a prolonged period of time, because there is no positive business case for the new/other standard, as long as there are no interoperability issues. One of the most successful standards worldwide, RosettaNet (www. rosettanet.org), also illustrates this: despite the fact that this standard developed an XML version years ago, there is hardly any migration from the old EDI version, and the adoption of the XML version remains low.

Preparing a business case

Despite the difficulties stated and the various attempts that have already been made[31], we will try to describe an approach that may provide an insight into the business case. The approach described in this paragraph has been used to prepare a business case for a semantic standard in the jeweller's sector[32]:

Step-by-step plan:

1. Describe the current situations and future scenarios and identify stakeholders.

2. Determine the costs and benefits in the chain based on the framework.

3. Allocate the costs and benefits to the various stakeholders.

4. (Try to quantify the costs and benefits for each stakeholder).

The first three steps are explained here:

1. Describe the current situations and future scenarios and identify stakeholders.
The first step starts with an analysis of the stakeholders: what are the parties that have a relationship with the interoperability issue for which a possible standard may provide a solution. The NEN stakeholder analysis can be used to identify the stakeholders (see paragraph 7.4).
Following this, the current situation is analysed: what are the starting positions of the primary stakeholders. In this case the picture of the future scenario with the standard should also be clear, setting the migration pathways from the current situation to the future scenario.

The figure illustrates this for the primary stakeholder in this example: the jeweller. The aim of the implementation naturally is to ensure that as many parties as possible end up in future scenario 1 or 2 and start using the standard.
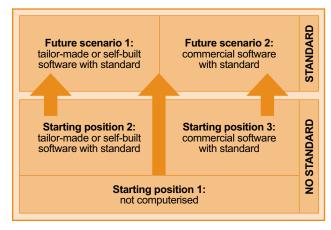
Figure 10 – Starting positions and future scenarios

2. Determine the costs and benefits in the chain based on the framework
A cost-benefit model is prepared in step 2. In a generic sense, what are the one-off investments, the operational costs and the benefits that apply to the standard. For many standards these will be more or less the same, which is why you can start with the model from the jeweller's sector and adapt it where necessary. The model from the jeweller's sector is shown on the next page.

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[31] For example, in the Integrate project, see: www.integrate-project.nl.

[32] Based on: Staal, M., Lieverdink, A. (2009). Ketendigitalisering in de Juweliersbranche: kosten-batenanalyse, TNO report.
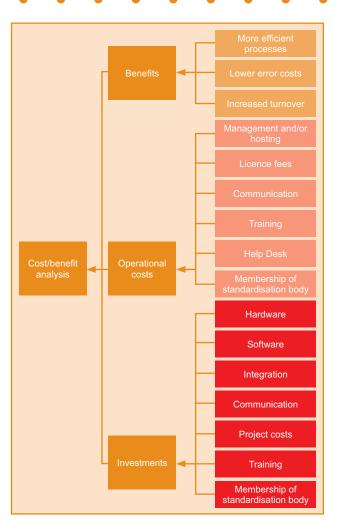
Figure 11 – Framework for cost-benefit analysis

3. Allocate the costs and benefits to the various stakeholders.
In most cases the different costs and benefits aren't allocated to the same stakeholders. Some stakeholders might benefit more then others. This is why it is necessary to allocate the costs and benefits to the various stakeholders in the network. To do this, costs and benefits are examined in more detail. Possible options are indicated in Figure 11.

On the next pages is an example of this for the standardization of electronic transactions between jewelers and goldsmiths.

Income	Jewelers	Goldsmiths
Additional turnover		
Turnover from new services and activities due to time savings	$\varnothing$	$\varnothing$
Greater sales and turnover volumes	$\varnothing$	$\varnothing$
More efficient processes / cost savings		
Lower costs for introducing article cards	$\oplus$	$\oplus$
Cost savings by reducing administrative work	$\oplus$	$\oplus$
Cost savings for sending purchase orders	$\varnothing$	$\varnothing$
Savings by reducing leftover batches that need to go to clearance sales	$\oplus$	$\oplus$
Operational costs		
Software		
Possible additional licence costs for software	$\oplus$	$\oplus$
Incorporating changes to the standard into the software	$(\varnothing)$	
Investments		
Software		
One-off investments for the development of in-house software	$(\oplus)$	$(\oplus)$
Training for developers of in-house software	$(\oplus)$	$(\oplus)$
Key: $\oplus$ = applicable, $(\oplus)$ is only for parties with in-house systems, $\varnothing$ are limited		

Figure 12 - Costs and benefits for jewellers and goldsmiths

Benefits	Software suppliers
Additional turnover	
Additional income from licences for new customers	
Additional income from licences for use of the standard	$\oplus$
Operational costs	
Management of standard & updating of software	$\oplus$
Investments	
Software	
One-off investments for modification of the software	$\oplus$
Training	$\oplus$
Key:$\oplus$ = applicable,$\oslash$ are limited	

Figure 13 - Costs and benefits for software suppliers in the jeweller's sector

Based on this easy step-by-step plan, insights into the business case for a standard can still be easily created without focusing completely on the numbers. Naturally, an attempt can be made after step 3 to express the costs and benefits identified in money.

Many standardisation organisations look for opportunities to promote the use of their standard. This can be done in various ways. One strategy for this is called an adoption strategy.

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Factors for successfully adopting a standard

Workgroups of the Standardisation Forum have revealed a number of critical factors for success that played a role in the adoption of various standards:
1 The standard should be mature; otherwise nobody will dare to invest.
2 Adoption of a standard requires time, sometimes several years.
3 The benefits should be clear to everyone; benefits for the business process, social benefits and financial ones.
4 There should be a committed problem owner, especially because adoption takes many years; true commitment is essential.
5 A critical user mass is required.
6 A dominant party or dominant process can greatly encourage adoption.
7 There should be an active community that is involved with the development and use of the standard.
8 Money is required for support, training, remuneration, etc.
9 Use a healthy mix of adoption means.

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11.1 Choosing the right means[33]

It is not easy to choose the right strategy for promoting the adoption of a standard. Sometimes this kind of strategy is not required and the standard is fully 'carried' by parties in the field. Often, however, a standard is related to a more general development. One example of this is a standard for digitisation of a chain. The introduction of the standard is then related to the question of whether an organisation will start working with that digitisation.

The means for adoption can be divided into three groups:
- Financial: the *'carrot'* – encouraging adoption by facilitating the use of the standard. Examples of means are the provision of funding or offering implementation instruments that reduce the costs of an implementation.
- Communicative: the *'lecture'* – informing people about the benefits for organisations offered by the standard. For example, by writing articles or by organising seminars.
- Legal: the *'whip'* – forcing the use of a standard. For example, by including the standard in the list of open standards for 'comply or explain' of the Standardisation Forum.

Usually there is not just one strategy that is always fitting. The choice will depend on the existing and desired situation, and on many circumstantial factors. Means for adoption, for example, may differ in or depend on:
- the choice of the target groups to be primarily addressed: all the users, specific users, software suppliers
- the means that are being used: temptation, contracts, legislation, commercial enforcement
- the approach: start on a small scale or large straight away; first a small group or the whole target group right away; first a small part of the standard and more later on

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[33] Based on the Integration Adoption Instrument, see www.integrate-project.nl

- the existing situation in the target group: is data traffic already commonplace there? Are they already using older or other standards?
- the dominant benefits that should come with the standard or the dominant issue for which it provides a solution: where is more to be gained from the standard? Where are the costs greater? Who feels more restricted by the current limitations?
- intrinsic aspects of the standard: how complex is it? What is its scope? What knowledge is required to apply it?

11.2 Step-by-step plan

The Integration Adoption Instrument describes five steps that are used to make the right choices for adoption in a particular sector of organisations:

Step 1: Suitability
There should be a close match between the standard and the questions in the relevant sector:
- How bad is the interoperability issue?
- How complex is the nature of their interactions?
- Does the standard fit in well with this?

Adoption can only be successful if there is sufficient matching.

Step 2: Individual business case
It is then important to investigate what the target group looks like exactly:
- Which parties are involved?
- What does the business case look like for them?
- How much room for change is there in that business case?
- Is there, for example, a party with a 'first mover' advantage?

This provides a good picture of the business case per organisation (type) in the network. A stronger individual business case results in higher individual chances of adoption.

Step 3: Collective analysis
Apart from the individual business cases, the collective business case should also be analysed. What benefit does the standard offer the network of organisations as a whole?

A stronger collective business case results in greater collective chances of adoption.

Step 4: Choice of means and planning
The means that are fitting for the individual and collective adoption chances should then be considered.

Higher individual chances of adoption usually result in a communicative means. This is because the chances are already high that an organisation decides to adopt the standard.

Average individual chances of adoption usually result in a financial means. People require a slight push to proceed with adopting the standard.

Low individual chances of adoption usually result in a legal means. Without force an organisation will probably not proceed to adopt the standard.
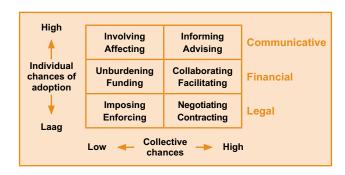
Figure 14 – Chances of adoption and fitting means

Examples of adoption means

Informing/providing advice
- Organising an information event
- Information days
- Presentation at a conference
- Articles in magazines
- Providing advice about use of the standard

Involving and influencing
- Preparing a collective business case and distributing it
- Documenting cases
- Publishing a list of users
- Open standardisation process
- Establishing a feedback group
- Community building
- Establishing a collaboration platform
- Reconciling software suppliers of users

Collaborating and facilitating
- Test bed for implementation of the standard
- Performing joint pilots
- Organising a plugfest
- Realising partnerships
- Validators
- Business case tool
- Reference implementations

Unburdening and funding
- Funding for implementation
- Financing of implementation at software suppliers
- Preparing a specific action plan
- Introducing your own implementation, which acts as a 'broker'
- Certification
- Free implementation support

Negotiating and contracting
- Administrative incorporation at users
- Preparing a covenant
- Preparing a contract between managing actor and chain parties

Imposing and forcing
- Imposing using the list of open standard for 'comply or explain'
- Legal force

Plugfest as a means of adoption

A so-called 'plugfest' (also called a 'connectathon') is a means of adoption relating to collaborating & facilitating. The idea of a plugfest is to invite suppliers that have implemented the standard to an event and test the interoperability between the suppliers/systems there and then using scenarios.

During a plugfest, the implementation of a standard is tested during a meeting by investigating whether the standard manages to establish the intended information exchange. Scenarios can be used to test this. In these scenarios, steps are completed that are also completed during regular daily use of the standard. The scenarios are geared towards the exchange of information between applications.

If a scenario is not completed successfully, an investigation can be launched into the cause of this. Please note: this is not always caused by the implementation of the standard; there may be other causes that stand in the way of interoperability. Where possible, the problem is resolved there and then, after which the scenario is completed once again.

Purpose of a plugfest
From the perspective of a standardisation organisation, holding a plugfest can provide a positive contribution to:

- **interoperability**: plugfests offer suppliers that have implemented the standard the opportunity to test the implementation of that standard against other implementations from other suppliers. Any errors can be corrected immediately or at a later stage and parts of the standard that still appear to be insufficiently clear in their specification are revealed in this way.
- **transparency**: after a plugfest suppliers know with which colleagues they can collaborate based on the standard. If an audience is present at the plugfest, they will be given an insight into the way in which various suppliers handle the standard and which applications from suppliers work together well.
- **adoption**: suppliers can distinguish themselves by participating in a plugfest. By inviting an audience, the standard can also be brought to the attention of end users.

An example: plugfests in educational practice
In collaboration with Kennisnet, NOiV organised two plugfests relating to the Kennisnet standards for digital learning materials. Both times the plugfest was well visited both by suppliers and by end users. Prior to the plugfest, close contact was maintained with participating suppliers and they were asked to supply learning materials in advance. These materials were tested by Kennisnet in advance and, based on the results, suppliers were given a second chance to supply an improved package of learning materials. The scores for the second test were also announced during the event. During the plugfest suppliers were given the opportunity to show how well they were able to use learning materials stored in the standard in their software. At the same time, users were given the opportunity to see if their own materials worked in various applications from different suppliers. Almost all the suppliers that participated the first time also participated the second time. A few even joined in

for the second test. The winners of the plugfest incorporate the results in their company's promotion material.

Learning points, points for consideration, dos and don'ts
- Choose: a plugfest geared towards interoperability is completely different to a plugfest geared towards adoption/transparency. A plugfest geared towards interoperability may, for example, be private, geared towards supporting suppliers, and fitting for the early phases of a standard's life. A plugfest geared towards adoption is very open, with publicity, geared towards transparency and fitting for a mature phase of a standard's life. This requires that a choice be made.
- Clearly determine what is tested and how. This might not involve the entire standard, but only parts of it. Communicate the test criteria and the test process.
- Suppliers are the central part of a plugfest. You should therefore involve them early.
- Create a profit for suppliers. One example is to combine the plugfest with an opportunity to demonstrate their products to end users. You could also arrange media attention for the standard and the supplier.
- All the participants are winners! This should also be communicated, as the participants show their vulnerabilities and assist in creating transparency. That cannot be said of parties not participating.
- Allow suppliers to prepare well. You could also provide assistance for testing implementations prior to the plugfest, for example, using other validation techniques.
- Make sure enough people with expertise are present during the plugfest to help with the implementation of the standard. These may be employees of the standardisation organisation, but also external experts.
- Working with a panel is not advisable, as this results in subjective scores and costs a lot of time to prepare.

Picture of an American Plugfest in the healthcare.

11.3 Factors for adoption

Another way of considering the adoption of a standard is by analysing the factors that contribute to the adoption process[34]. Instruments are associated with each of these factors, which could improve adoption:
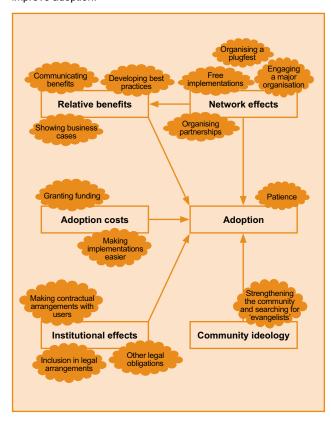

Figure 15 – Factors that affect adoption and the associated means

- **Relative benefits** contribute to the adoption of a standard. An organisation benefits from using a standard. These benefits can be visualised more by:
  - communicating benefits
  - presenting business cases
  - developing best practices
- High **adoption costs** have a negative effect. You can try to reduce these costs, for example by:
  - Granting funding
  - Making implementations easier, for example, by making tools available.
- **Institutional effects** relate to arrangements pursuant to the law or within a sector, which have a more or less mandatory character for the use of the standard. Instruments include:
  - Making contractual arrangements with users
  - Inclusion in statutory arrangements or via the list for 'comply or explain'
  - Other legal obligations
- One important factor often overlooked is **Community ideology**. A strong community relating to a standard may contribute to its adoption. Strengthening the community and, as a result, searching for possible 'evangelists' may improve adoption.
- Increased use strengthens itself due to **network effects**. This may therefore also form part of the adoption strategy, for example, by convincing a major organisation to start using the standard, by organising partnerships, free implementations or by organising a plugfest.

[34] See: Lammers (2010) The Adoption of Open Standard Inter Organizational Systems – Extending the Traditional Economic Perspective.

11.4 Adoption within user organisations

Usually, a standardisation organisation mainly has a network perspective on the adoption of their open standards. A different perspective is that of an individual organisation. This individual organisation has to make choices relating to the standards to be used.

The Standardisation Forum has published a booklet entitled 'Steering towards Open Standards'[35]. This booklet outlines the possibilities for an organisation to steer towards the adoption of open standards in a targeted manner. Means for steering include:

- *Compliance management*: in which an organisation defines how it handles mandatory standards.
- The *IT policy*: in which an organisation roughly defines the policy relating to ICT and open standards.
- *Architecture management*: the models and principles (including the standards to be applied) that make up the ICT landscape.
- *Portfolio management*: the quality criteria for projects, the use of resources for ICT innovation and modernisation projects. This, for example, may be important for allocating resources to a migration to a particular (new) open standard.
- *Purchasing and supplier management*: the requirements to which suppliers are subject.
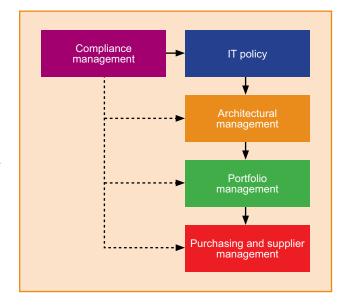
Figure 16 – Processes within an organisation that can be used to steer the adoption of open standards

For a standardisation organisation these are reference points for promoting adoption within a specific party. It is also related to the means of adoption that can be used by a standardisation organisation. For example:

1. By using legal means (comply or explain, incorporation in the law), an organisation is forced to determine how a particular standard is to be embedded within the compliance management process.

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[35] See: http://www.open-standaarden.nl/gebruiken

2. By providing examples or reference models, an organisation may be encouraged to include a standard in the target architecture. An example of this is the inclusion of StUF as part of the municipal model architecture (GEMMA) in several municipal reference models.
3. Using financial resources, the migration to a standard can be given a higher priority within the portfolio management process.
4. Finally, by offering model specifications, for example, adoption can be accelerated with regard to purchasing. The manifestos for 'open suppliers' of Nederland Open in Verbinding (The Netherlands in Open Connection) are another example of steering on the purchasing side.

Support for municipalities by KING

Among other things, KING helps municipalities in their role of awarding authority by:
- offering standard specification texts, which they can use in their schedule of requirements to inform their suppliers of the correct use of the StUF standard.
- providing an insight into the supplier market and their products.
- offering training materials.

Among other things, this ensures that the StUF standard is being used in an increasing number of locations.

The quality of semantic standards requires attention[36].

Many organisations pursue interoperability, where semantic standards are a means to achieve this goal. In recent years, many semantic standards have therefore been introduced. However, little is known about the quality of semantic standards. That is surprising, as the quality of those standards will doubtlessly affect the extent to which the goal of interoperability can be achieved.

Contrary to other disciplines, such as software engineering, little literature and knowledge is available about what constitutes a high-quality standard that provides an effective contribution to interoperability. This also defines our term 'quality': fitness for use! (definition by quality guru Juran). The government policy is mainly geared towards the openness of a standard, but this is only one aspect of quality. A high-quality standard is undoubtedly an open standard, but the reverse is not necessarily true: an open standard does not have to be a high-quality standard by definition. Incidentally, when standards are assessed by the Dutch government for the 'comply or explain list' a great deal of emphasis is put on openness, but they also acknowledge that there are more quality aspects (usefulness, potential and impact) that are included in the assessment for inclusion in the list.

Semantic standards are usually developed by organisations themselves and not within major standardisation organisations. This may affect their quality; this will at least cause the quality of semantic standards to differ greatly.

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[36] This chapter is based on the PhD research by Erwin Folmer into the quality of semantic standards at Twente University and the Integrate project (http://www.integrate-project.nl).

12.1 What do the standardisation organisations themselves think of the quality?

A study among 37 SDOs for standards (including international standards such as XBRL, HR-XML, ACORD and HL7 and national standards such as SETU, StUF and Aquo) revealed that over 90 percent of the preparers of standards surveyed believe that the quality of their standard can be improved (see Figure 17). Additionally, a vast majority also believes that improving the quality of their standard will contribute to improving interoperability.
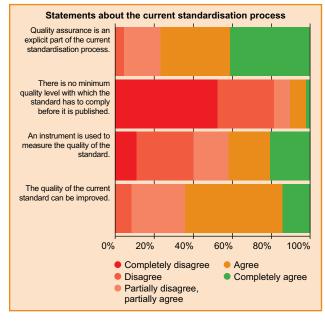

Figure 17 - Standardisation organisations on the quality of their standards

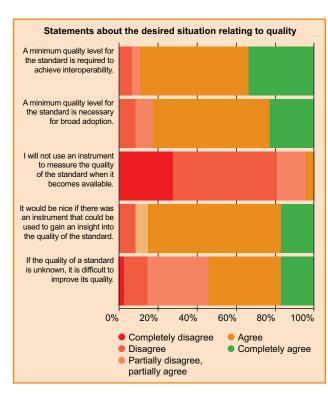**Statements about the desired situation relating to quality**

Figure 18 – Standardisation organisations on the quality of their standards

12.2 What should then be done?

The study also revealed that the quality of a standard is essential for achieving the ultimate goal of interoperability (over 90 percent of the respondents have that opinion). Less convincing but still clearly present is the relationship between the quality level and the chances of successfully adopting a standard. In other words, there is room for quality improvements that could lead to improved interoperability and greater adoption of the standards. It is difficult, however, to improve the quality if the quality is unknown. The respondents (over 80 percent) want to use an instrument to determine the quality of their standards, but this should be available first.

Incidentally, the results also show that standardisation developers are definitely willing to create high-quality standards and are open to a critical view of their work by applying a quality instrument. A possible lack of quality of a standard has several causes, but that does not include the motivation of the standardisation developers. Previous research has shown that, especially for semantic standards, the developers are intrinsically motivated; this means that they view their work as their hobby.

The relationship between the budget and the quality of standards is a more likely aspect. Standards are often developed with a tiny budget, which undoubtedly affects their quality, for example, if the standard is released because the budget has run out, while another round of reviewing and processing would produce a better standard.

Another possible cause is the lack of standardisation expertise, because it is still not considered to be a true profession widely enough. Trying to please everyone while standardising with workgroups does not create a positive contribution either. Too many options are regularly included in standards to make all the participants in workgroups happy. The result is a standard that is too complex, cannot be implemented very well in practice and results implementations which are not interoperable, but all with the standard.

12.3 A quality instrument

What does an instrument that we can use to provide an insight into the quality of a standard look like? Developing a quality instrument requires

a lot of knowledge: what is a high-quality standard? Which quality aspects affect this, and how can they be measured? But also about the subject itself: what is a semantic standard? What components make up a semantic standard? The 'quality thermometer' will have to be put into those. It is necessary to know what the quality thermometer may look like, but also where we can put it. This is complex matter that is still in its infancy. For the time being, an initial version of a quality model is now available.

This initial version is mainly based on the domain of software engineering, where quality has been a focal point for years. This has led to several ISO standards (in particular ISO 9126) that describe the quality of software. Based on this, the quality model for semantic standards depicted in Figure 19 has been distilled and tested with experts.

The main categories are:
Efficiency: the extent to which the standard offers and implements the functions that are explicitly or implicitly required in the specific situation.

Reliability: the extent to which a standard continues to perform at a specified level under specific conditions, such as incorrect implementations or differences in implementation between parties.

Usefulness: the extent to which a standard can be understood, learned and used/applied by users in the specific situation.

Portability: the extent to which a standard has the possibility for use in different environments.

Maintainability: the extent to which a standard can be easily modified to a changing situation.

Level of adoption: the extent to which the standard has been accepted by different parties.

Openness: The extent to which the standard meets the criteria for openness in the field of intellectual property and (maintenance and management) processes.

The quality model in Figure 19 does not show the full specification of each quality attribute. To illustrate: the quality attribute Maturity (under Reliability) contains several attributes, such as Stability. These attributes may in turn contain several metrics, and they also record how the value of the metrics contributes to the final value of the attribute. A simple example: the metric for the Stability attribute is the number of releases of a standard in the past five years. By means of the scoring mechanism, a potential measurement of one release (in five years) could result in the value 'highly stable' for the Stability attribute. However, the lower layers of detailing for attributes and metrics are still under development. Fortunately there is a lot to build on, for example, the specification of openness in chapter 8 can be used as the basis for further detailing of the quality attribute Openness.

12.4 Using the quality instrument
The relationship between interoperability and standards is goal-means. Without considering the quality aspect, standards are viewed as a holy grail too often. The standard becomes the goal instead of a means for achieving interoperability in an effective and efficient way. Shifting the focus to the quality of standards prevents standards from becoming a goal in themselves and will strengthen the relationship between standards and interoperability.
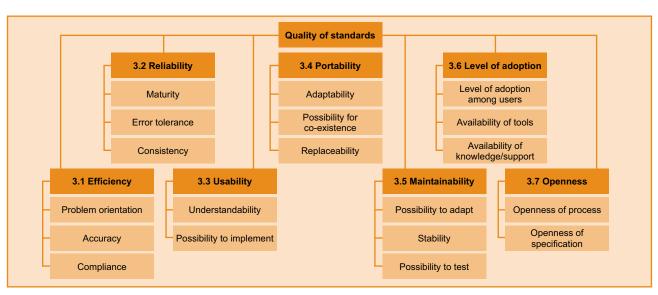
Figure 19 – Quality model for standards based on ISO 9126, among others.

The current quality model may not be finished, but it is still a starting point that can be used to analyse the quality of a standard. During development, the costs for a quality measurement are also considered; especially the hours are relevant and valuable here. The basic principle is that it should be possible to perform the quality measurement in only a few hours, limiting the costs and allowing the proceeds to quickly exceed the costs. It is mainly suitable for standardisation developers themselves who know their own standard well and can use the model as a reference framework for analysing their own standard. Always download the latest version of the quality instrument from www.semanticstandards.org.

The key question is what kind of standards are produced by using

the quality instrument. In short:
- a model for looking at the standard: a fresh view
- insight into what affects the quality of a standard
- ideas for improving the standard
- ideas for modifications to the standardisation process

It helps the standardisation developer to look at the standard with a fresh view and get a feeling for how the quality can be affected. During use the standardisation developer will develop ideas of how to improve the standard or discover possibilities to modify the standardisation process in order to improve the quality.

In its ultimate form, the quality instrument is a measuring instrument

(like a thermometer) for standards, in other words, a complete piece of equipment including a 'tool' and 'user manual'. We currently have a usable quality model with strong foundations that can be used as a 'pair of glasses' for assessing standards in practice.

Example: quality measurement at SETU.

A test quality measurement based on a draft version of the quality model was performed on the SETU standard. Based on this study it is impossible to give an explicit opinion of its quality, like a report mark, or a value such as perfect, satisfactory or not satisfactory. It does, however, give the impression that no significant shortcomings are found with regard to its quality and supports the idea that the quality of SETU is pretty high. More importantly, a number of possibilities for improvement were identified, which is exactly what the instrument is intended for. In random order, the most important suggestions for improvement are:

1. Modification (broadening) and lining-up of the described scope of the standard and wherever the standard is used.
2. A stricter standard (fewer options) will result in improved interoperability.
3. Keep obsolete materials separate from the current documentation on the website.

An unexpected eye-opener for SETU is the amount of obsolete documentation on the website, including obsolete versions of the standard. The results are valuable for SETU and will be used as a starting point for a quality boost.

13. Conformance, certification, validation

This chapter discusses all possible forms of certification, compliancy testing, validation and other forms of assessing the application of the standard, possibly with a reward. We use certification as a container term for all forms of this.

Once the standard has been developed and adopted by the market to a certain extent, the certification question will almost always arise at some point. Sometimes the suppliers are the ones that, as early adopters of the standard, like to distinguish themselves positively in the market with a hallmark (in other words: they would like a return on their investment as early adopters). Sometimes implementations also turn out not to be interoperable in practice, which gives rise to the question of certification for guaranteeing interoperability. These differences already show that certification can be used differently, simply in order to answer different questions.

13.1 Purpose of certification

From the perspective of a standardisation organisation, certification may contribute positively to:

- *Interoperability and transparency*. If correct use of the standard is marked with a certificate, it will be easier for organisations to find collaboration partners with whom they are interoperable.

- *Improving adoption*. Giving early adopters the opportunity to distinguish themselves positively. For suppliers it may become a necessity to obtain a certificate, because otherwise they would drop out of the market. Certification may then, for example, be demanded in tendering processes.

- *Finances*. Certification can be used as a potential source of income for financing the management of standards. The

assumption here is that users of the standard pay for its development.

These are different targets that are not always compatible: for example, the assessment for an interoperability certificate will have to be more thorough than for an adoption certificate. This means that the costs for its performance will be higher, meaning that the 'profit' generated by the certificate is lower, that it will therefore contribute less to the finances of a standardisation organisation and that the costs are more likely to be balanced.

Summarising, certification can be used as:
- An instrument for interoperability
- An instrument for adoption
- A financial instrument

13.2 Who or what can be certified?

In a certification process, something or someone is always being certified. This may be a private individual, an organisation, an implementation process, a product or even a project. It is, however, necessary to make a choice; it is not possible to issue the same certificate to both a person and a package (for example).

Organisation: An organisation can be certified if, for example, the organisation has committed itself to certain arrangements, such as the implementation of the standard before a particular date or a certain number of implementations. Additionally, an organisational certificate can also serve as an indicator certificate. An organisational certificate may, for example, be issued when the standard has been implemented a minimum number of times in projects, products, people or processes.

Private individuals: A person can be certified based on his knowledge and expertise, for example, by following and successfully completing a training course, or by (demonstrably) performing a certain number of projects with the standard.

Projects: Semantic standards are often used for the exchange of information. A project performed by two (or more) organisations, in which products may also be used, can then be certified.

Products: For many standards it is crucial that the standard is implemented in products and services that are offered on the market. By purchasing a certified product, an organisation can easily use the standard.

Implementation process: If the process (the approach) is certified, this will create trust in the results of that process. In the event of standardisation, a project approach for use of the standard in projects could be certified, which creates trust that the project results will contain a successful implementation of the standard.

Training materials: If the training course or the training materials are certified, this creates trust in the knowledge obtained in order to perform a project on the basis thereof.

When the certificate is granted, this usually includes the use of a logo that is issued by the SDO. Openness and preventing intellectual property rights does not mean that no protected logo may be used. This naturally does not stand in the way of openness.

13.3 To what may certificates relate?

There is a force field between the number of certificate types issued and the number of requirements set for each certificate. On the one hand, it is desirable to keep the number of certificate types limited, to prevent that an organisation has to complete a large number of certification processes (the 'value' of a certificate will also drop if the number of types increases). On the other hand, it is not desirable that an organisation should be able to support all the parts of the standards to be developed in order to be certified. A general certificate may not be very significant, while everyone will be completely confused if there are 20 specific certificates.

In most situations a semantic standard consists of a family of standards. One thing to consider is the level at which the certification should be introduced: for the entire set or for a partial functionality (often: the standard). You should also remember that each version number of a standard will then have its own certificate: the number will quickly explode.

Having a large number of certificates is unwise if adoption is the goal of certification, seeing that the recognisability and value of the certificate are reduced in this case. Additionally, there should also be an incentive, for example, to implement a new version, e.g. by issuing a new certificate. Part of the solution to limit the number of certificates is limiting the validity of the certificate. Instead of issuing a SETU timecard v1.2 certificate, a SETU timecard 2010 certificate (stating that SETU timecard v1.2 is the version of the standard) could, for example, be an alternative that loses its value in 2011 or 2012. This eliminates the version issues.

There is a risk of overdoing things here though: for example, if new versions of a standard have to be released to balance the finances of the SDO.

13.4 Who issues the certificate and who does the assessment?

There are logical candidates for the issuing of the certificate: the SDO, the sector association, formal standardisation organisations (such as ISO/NEN), independent knowledge institutes (such as TNO), certification institutes (e.g. DNV) or other representative organisations. There is an important difference between the assessor and the issuer. Both roles may be in the hands of the same party, but may also be assigned to different parties, which guarantees a certain independence and reliability. The latter is recommended, as the reliability of a certificate is highly important. The issuer has the ultimate responsibility and issues the certificates, and also prepares the assessment framework. The performance of the assessment (based on the assessment framework) may then be performed by another or even several other parties. This does, however, make the assessment framework subject to certain requirements, as the results of the assessment should be the same regardless of the assessor.

In many cases the issuer and preparer of the assessment framework could be the standard SDO, either in collaboration with the trade association or not. The performance may then be placed in the hands of an independent knowledge institute, certification organisation or several consultancy firms. If the assessment has a light nature, the division will not be as logical.

The division between issuer and assessor contributes to the independence of the assessment and, if fixed-price arrangements can be made about the costs of the assessment, the (financial) risks for the standardisation organisation are also limited. Decisions can still be made about who the point of contact is, where the certification application can be submitted, the use of certificate/logo and, among other things, a complaints procedure.

The requirements package is the public version of the assessment framework and provides the requirements that should be met by the implementation for the certification applicant. The assessment framework is not publicly available and indicates how the measurement/assessment will be performed.

There should also be an appeal procedure with a party acting as point of contact if there is a difference of opinion about the certificate being granted or refused.

13.5 What aspects are assessed?

Conformance to a standard is not trivial. Most semantic standards are expressed in XML Scheme. In order to make statements about conformance, it is not sufficient to check if the XML instance validates technically with regard to the XML Scheme. The latter can technically be done perfectly (even though several XML scheme validators will have to be used to obtain useful results), but it says nothing about the question of whether the correct information has also been entered in the right locations. If, for example, Amsterdam is the value of the 'Surname' element and 'Jansen' is the value of the 'Town/City' element, this will technically validate fine (unless town/city should contain a value from a list), but it will most probably still not comply with the standard. This semantic validation is difficult to perform. The previous example may have been clear, but imagine it involved the elements 'place of birth' and 'town/city'; in this case correct use cannot be checked without documents or other materials.

Additionally there is a difference between hard assessment (undisputable and significant with regard to interoperability) and soft assessment (disputable or not significant with regard to interoperability). An example of soft assessment is the promise by

an organisation to implement the standard by signing a covenant: it cannot be disputed (covenant has been signed or not), but its significance with regard to interoperability is currently limited. It should be clear that soft assessment is relatively easy and hard assessment more complex.

The exact specification of the assessment procedure (the assessment framework) and the aspects on which the assessment will be performed (requirements package) should be recorded and depend on the situation. We will, however, suggest a number of starting points:

• The assessment should be as objective ('hard') as possible, so that it can be demonstrated unambiguously in certification processes why a party is being certified or not. This prevents unnecessary discussions and risks. Furthermore, the assessment can only be performed on matters laid down in the standard (or the requirements package).

• Apart from the structure of messages (syntax), it is also desirable to check the contents of messages. This can partially be done by using business rules laid down in the standard. In some cases it is also desirable to assess the relationships between messages.

People, for example, are easier to assess based on an exam. Organisations are easy to assess based on intentions and promises. The process is also relatively easy to assess, but for projects, products and organisations (other than based on intentions) things become more complex.

There are other variations relating to the situation that for an organisational certificate the organisation may only use the standard (and nothing else), or uses the standard in a number of cases (percentage), or at least once (they will then be 'capable of doing so').

Some certificates require that a number of XML instances (examples) be submitted, which are then validated. It is then obviously necessary to think about what could be considered a good number of examples, and people should also realise that the source of the examples cannot be guaranteed: they may have been manually prepared rather than being produced by the system to be certified.

13.6 Tools for choices relating to certificates

So far this chapter has shown that certification is a complex matter and that several choices can be made.

The figure shows quite simply that goals relating to adoption and finances can be combined to a certain degree, but that a goal relating to interoperability in particular requires a different implementation of certification compared to other goals.

Purpose of certificate:	What is being certified:	Number of certificates:	Depth of assessment:	Issuing:
Interoperability	1. Projects 2. Products 3. Organisations	Many and highly specific	Depth with hard assessment for certainty and significance for interoperability.	Separate issuing / assessment
Adoption	1. Organisation 2. Products 3. People	Few	Soft assessment, but should contain an incentive.	SDO or separate issuing / assessment
Finances	1. Organisations 2. People 3. Process 4. Products	Few (for value) but regular renewal	Soft assessment, very superficial and as a result easy to perform.	SDO or separate issuing / assessment

Figure 20 – Specification of certification

13.7 Other forms of certification

One disadvantage of certification is the impact it has on the market. This means that people have to be prepared for legal proceedings (e.g. if a supplier sues the SDO because it also wants a certificate), but also that the SDO loses its independence and, as a result, support. Alternatives are then often used, either as a first step or to avoid taking any risks. Apart from certification we also have validation. Certification basically means putting on a stamp after a successful validation. However, if the goal of certification no longer applies, the validation may be subject to more lenient requirements. Despite the fact that the 'stamp' is not used, validation can still be partially used for the same goals:

Interoperability: the same test can basically be used both for certification and validation, but without the stamp.

Finances: fees can also be charged for a service geared towards validation. That will, however, never be much more than the actual validation costs, so it will never become a cash cow.

Adoption: having a help desk available for asking validation-related questions helps adoption. Certification will, however, have a much greater effect on adoption.

Especially the goal of interoperability can be perfectly achieved with validation and is already being used by many SDOs. Tooling is available for this and has a low barrier (e.g. the eValidator[37], or configuring open source tools yourself).

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[37] See: www.evalidator.nl

A plugfest is used to show interoperability within the chain by demonstrating that several connected systems can work together. A plugfest with an adoption goal is a public demonstration of interoperability by several suppliers and is also a form of public validation, the results of which are a form of certification, as the winner will be promoting its success in commercial materials. Both certification and plugfests are geared towards creating transparency for the market, getting the market moving. But a plugfest can also be used for purposes of interoperability, as a result of which the plugfest is given a private character and the results are not published. See chapter 11 for more information about plugfests.

Validation also analyses individual systems, but without the goal of creating transparency of the market; its goal is providing support towards organisations and projects. Finally, pilot projects can be launched to test interoperability within the chain.

Please note that it could very well be possible to use validation for the goal of interoperability and to set up certification for adoption or financial purposes in a different way. The following figure shows the purposes for which the various concepts can be used.

Means:	Suitability:	Risk/effort/return:
Certification	• If validation experience has been gained. • If parties are claiming to be compliant, but they may not be.	Risk: High Effort: High Return: Continuous
Plugfest (adoption purposes)	• If adoption is going reasonably well, but a few parties are still lagging behind. • For a relatively new standard.	Risk: Medium Effort: Medium Return: Once
Validation service / Help Desk	• Continuously supporting the market. • Improving the quality of the implementations.	Risk: Low Effort: Medium Return: Continuous
Plugfest (interoperability purposes)	• Supporting the market. • Gaining an insight into whether the standard is adequate in practice and how it is being used.	Risk: Low Effort: Medium Return: Once
Pilot support	• Initial practice with the standard. • Still possibilities to modify the standard. • Important project, as forerunner for other projects.	Risk: Low Effort: Low Return: Once

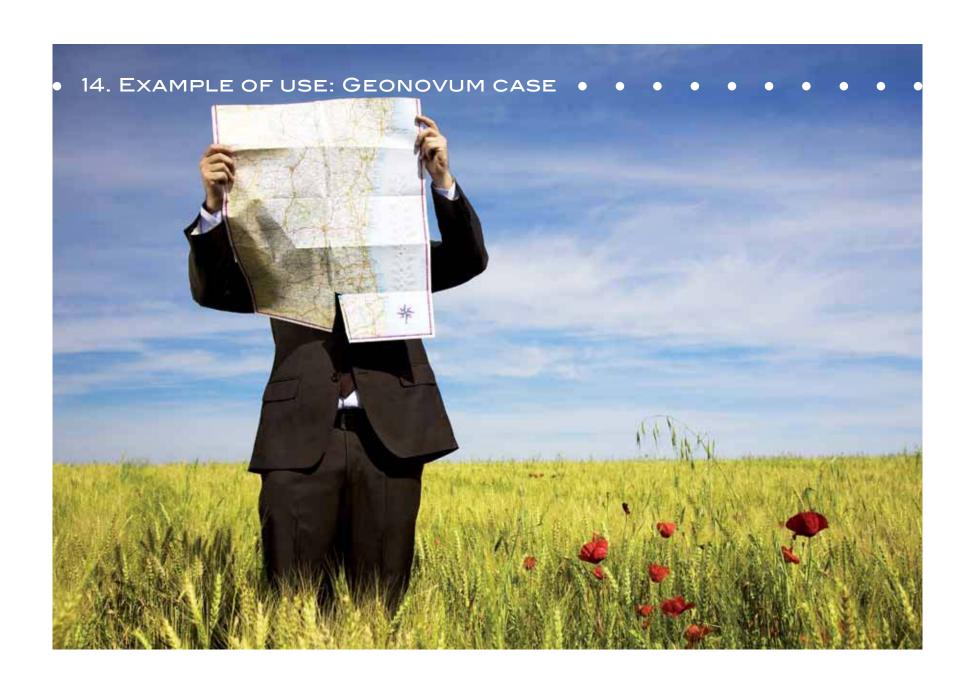Figure 21 – Different forms of certification/validation and their impact.

13.8 Practice

Whereas validation is very common, this definitely does not apply to certification. In general it is considered 'dangerous' and should only be used if it has been set up very carefully. It is quite significant after all: if a supplier does not receive the certificate, it may therefore experience adverse effects in the market. The supplier may commence legal proceedings to acquire the certificate. This leads to costs for the SDO and negative publicity. Additionally, the standardisation organisation often also depends on the knowledge of suppliers in the workgroups in order to establish the standard. The supplier may also cease its participation in the workgroup. The standardisation organisation may lose its neutrality, which is detrimental to adoption and the further development of the standard.

As a result, several semantic standardisation organisations have considered certification, but certification has not being widely used so far. We think it will only be a matter of time though; calls for certification are only growing louder with the emergence of standards.

HR-Certify.org

HR-Certify.org has been established for HR-XML to certify organisations that use HR-XML standards. The goals of the certificate are to generate income for HR-XML and to improve adoption. Interoperability is definitely not a goal of this certificate. The fee to be paid is linked to the membership level, up to maximum of $6000. As a result, it has become an important incentive to register as a member of HR-XML. Certificates are available for 13 different standards within the HR-XML family, about half of which are different certificates for different versions of each standard. Certification is performed on the basis of supplying a number of representative examples, which are then validated. There is, for example, no test for the way in which the examples are generated. HR-XML uses several tools for the technical validation, as certain things that technically validate correctly for one validator may not by definition validate correctly for another validator. If the validation is successful, the organisation may use the HR-XML certified logo for a period of two years.

14. Example of use: Geonovum case

14.1 Background

Digital geographic information is used in many places. Examples are maps and models of the environment. In order to work with these properly, it is important that this information is shared. This allows authorities and companies to perform their work more efficiently, because they all – literally – have the same view of the world.

The government established the Geonovum Foundation in 2007. The purpose of Geonovum is promoting the development, standardisation and innovation of the geoinformation infrastructure. To achieve that goal, Geonovum manages the various standards required for this. Additionally, Geonovum acts as the link between policy and implementation for the development of the required infrastructure (by the business community and government parties). The basic activities of the foundation are laid down in a long-term plan that runs until 2013. In addition to this, specific assignments are carried out for others. This case primarily relates to the management of the various geostandards.

The foundation has an independent board, a Supervisory Board and a programme council. Financially the foundation is supported by the Ministry of Economic Affairs, Agriculture & Innovation, the Ministry of Infrastructure and Environment, the Land Registry (Kadaster), TNO and the Association of Provincial Authorities (Interprovinciaal Overleg, IPO).

14.2 Developments

The most important framework for Geonovum is INSPIRE, a European directive relating to geoinformation. Pursuant to this directive, countries are obliged to establish a geoinformation infrastructure and exchange geoinformation according to certain standards. Geonovum translates these obligations to the Dutch situation and uses international standards for this.

Standards managed by Geonovum are:
- framework of standards for the Netherlands Geographic Information Infrastructure (NGII)
- geoinformation basic model (NEN3610)
- metadata standards for geography and web services
- services for making geoinformation available

Most of the standards are based on international standards from ISO and OGC (Open Geospatial Consortium). Geonovum develops and manages the Dutch profiles for these international standards. Additionally, Geonovum takes care of coordination with other specific Dutch standards (such as StUF).

Many suppliers of geosoftware have also developed their own profiles. To be able to work properly together within a chain, it is, however, desirable that organisations use the profiles prepared by Geonovum as much as possible to improve interoperability.

In order to improve the adoption of the geostandards managed by Geonovum, it was decided in 2009 to submit it for inclusion in the 'comply or explain' list. The following aspects were revealed during the procedure (among others):
- Openness was not guaranteed in all cases. It was unclear how this filtered through from the international standards to the Dutch profiles.
- The management procedure had not been explicitly laid down in a document from which parties could derive rights. As a result, it could not be established if the management procedure was sufficiently open.

Even though the procedure confirmed that the standards managed by Geonovum are basically good standards that improve interoperability

and supplier independence, they could not yet be included in the list.

Geonovum then decided to verify the management procedure based on BOMOS

14.3 Approach

There was a management procedure in practice, but it had not been laid down in a document. BOMOS was used:

1. as a guideline for recording the development and management process
2. as a guide for tightening up activities and creating extra focus where required

The following approach was then taken:

Step 1: Getting to know BOMOS
The first step was getting to know the concepts in BOMOS. For this a presentation was held at Geonovum by a standardisation expert. Copies of the BOMOS booklet were also distributed within the organisation.

Step 2: Making a list of activities
The various management activities were then placed within the BOMOS framework. These are the activities described in chapter 4. In other words, it goes beyond merely the operational management activities. It also involves strategic and tactical activities. To create the list, practical experience, annual plans and project plans could be used. This resulted in a structured overview of activities. A summary has been included in the next paragraph.

Step 3: Making choices
BOMOS was then used to state explicitly for a number of points

which choices form the basis for the management and development process. Openness, for example, was an important choice, but choices for the financial model were also stated explicitly.

In order to meet the requirements for inclusion in the list of open standards, it was laid down clearly with regard to operational management that all stakeholders have access to the management process and that decisions are made in an open and transparent way.

Step 4: Laying down choices in a management document
Finally, the choices were laid down in a management document. This management document was published on the Geonovum website (www.geonovum.nl).

14.4 Management processes in line with BOMOS

To get an idea of the subjects addressed in the various parts of the management document, here are a number of the management activities described on the basis of BOMOS:

Strategic activities
- **Governance:** Geonovum uses a Supervisory Board that periodically sets the performance plan. Specific steering is performed by a programme council that convenes every quarter.
- **Finances:** the government provides basic funding. Reports about this basic funding are to be submitted every year.

Tactical activities
- **Architecture:** Geonovum actively adjusts to international developments, such as OGC and the ISO committee involved with geostandards. In addition, they participate within Europe as part of

CEN for the development of INSPIRE. Preliminary voting rounds take place within NEN standards committee 351 240 for Geoinformation. Geonovum acts as its chairman.

- **Collaboration:** Geonovum actively seeks collaboration with infrastructural standard organisations. Organisations involved here include Logius and ICTU, which develop standards for the infrastructure of the e-government. Digi-coupling is an example of this.

- **Roadmap:** A roadmap contains the specific course of development for the near future. This roadmap has been prepared based on the BOMOS classification of activities.

- **Version management:** It has been established that a major version change, in which the structure of the standard is modified, may only be released once a year. Minor changes may be implemented twice a year, provided these are backwards compatible. Minor errors must be corrected as
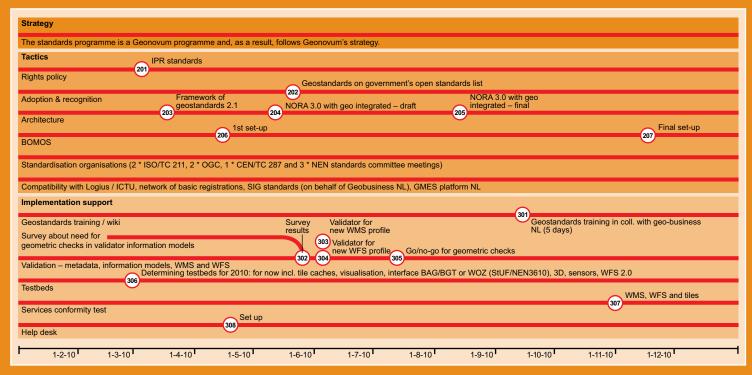

Figure 22 – Example of Geonovum roadmap

quickly as possible. In the version number this is expressed as X.Y.Z, where X stands for a major change, Y for a minor change and Z for an error correction.
- **Change protocol:** A change protocol states how version changes are to be implemented. Five steps are used here: start of a new process, contents, testing, decision-making and implementation.
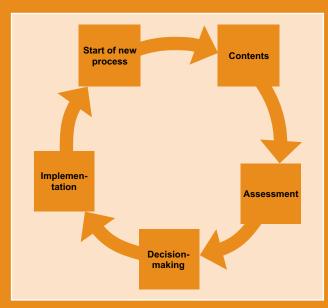

Figure 23 – Geonovum change process

For each step the management document states how it should be completed.
- **Community:** Geonovum has an extensive network; the website serves as a platform and information medium for this network.

Additionally, there is a formal community in the shape of the NEN standard committee. Temporary workgroups are also used to work on the assessment of change proposals.
- **Adoption:** the standards have been submitted for the 'comply or explain' list. They also want to accelerate adoption by means of the 'geostandards framework'.
- **Rights policy:** Creative Commons BY-ND has been chosen as the licence type for the published standards.

Operational activities
- **Initiation, reporting:** everyone can submit a change proposal via the website. The staff at Geonovum incorporate these in an overview.
- **Development:** The roadmap is used to develop extensions to the standard.
- **Implementation:** The change protocol is used to determine whether a change proposal will be implemented. This is eventually decided by the Programme Council.
- **Documentation:** Changes are implemented in the documentation. This not only involves the formal specification, but also other supporting resources (diagrams, validation, etc.).
- Pilots and testbeds can be used to test proposed changes.

Implementation support
- For users there is a **help desk** they can contact with questions about the standards and their implementation and use.
- Various resources are provided for **Training and advice**: wikis, train the trainer and workshops.
- A **validator** can be used to test to what extent an implementation meets the standard. There are plans to develop this into a conformity test in the future.

Communication

- Various communication activities take place in connection with the **change process**. They are geared towards obtaining input/ responses and announcing the results.
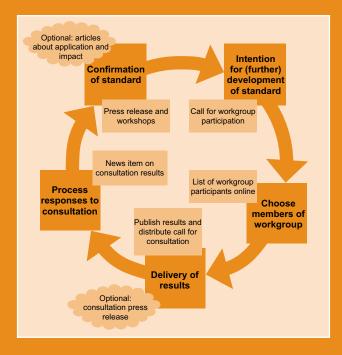

Figure 24 – Communication in connection with the development process

- Apart from this there are additional activities, such as **workshops, publications and presentations** to convey knowledge about the geostandards managed.

14.5 Specification

The final specification is laid down in a management document. This management document clearly shows which activities are performed and which choices were made as a result.

This management document can be downloaded from: http://www.geonovum.nl/sites/default/files/201007_beheer_basis_ geo-standaarden_v1_0.pdf

An important gap in the knowledge of standards is the establishment of the development and management process. This document tries to act as a guide for establishing a development and management process within an organisation. Additional emphasis is put on how development and management can take place in an open manner.

The document also states that the development and management of standards is complex matter, with many different tasks that may or may not be specified, and may be specified in various ways, depending on the context of the standard.

The document also shows that openness has many sides, more than people would realise based on the definition of an open standard. The 10 Krechmer points are partially forgotten in practice, as a result of which there is a lot of hidden closedness. Based on these points people can try to specify the development and management in a very open manner. Here the points stated, combined with the concrete tips, are mainly suitable for initiating the thought process relating to this.

The goal is and remains creating a sustainable standard that contributes to interoperability. It can only be sustainable if the development and management process has been established at a high-quality level. This document provides a contribution to lift the development and management of standards to a higher level and, as a result, create sustainable standards. It speaks for itself that a sustainable standard is an open standard that is managed in a sustainable way!

To conclude, here are three concrete tips:

1. Create continuity of development and management of a standard by:
   a. Taking care of a stable/structural funding model (chapter 10).
   b. Putting core tasks in the hands of a structural not-for-profit organisation (chapter 6).

2. Describe the specification of the task package based on the BOMOS activities model (chapter 4).

3. Create openness by describing the 10 Krechmer points for the standard (chapter 8).

Just like a standard, BOMOS is never finished; new insights may be created based on new experiences. Different opinions about the subject matter are also possible. This document may also give rise to questions when you start working with it.

The Netherlands in Open Connection invites you to share your questions and comments with us. You can do this by contacting the authors Erwin.Folmer@noiv.nl or Matthijs.Punter@tno.nl., or by contacting the NOiV Help Desk: info@noiv.nl

CREDITS

About the authors

Erwin Folmer MSc. works as an Open Standards Specialist for The Netherlands in Open Connection (NOiV) and focuses specifically on open semantic standards for various government sectors. He also works as a standardisation expert for TNO, and he works for Twente University as a researcher in the field of standardisation. Erwin was also responsible for the development of the SETU standards in the temporary employment sector and is the chairman of the international HR-XML SIDES workgroup. Erwin manages a website about semantic standards: www.semanticstandards.org

Matthijs Punter MSc. works as a standardisation expert for TNO. He advises businesses and Governments on the use of open standards and embedding them in procedures and architectures. Focus areas are the use of open standards within Governments and the use of standards for collaboration in networks of organisations.

The following people have contributed to the establishment of BOMOS: Hans Overbeek and John Oldenhuizing (both Overheid heeft Antwoord©), Marcel Reuvers (Geonovum), Jan Kees Meindersma (Kennisnet), Myriam de Jong and Huibert-Jan Lekkerkerk (both IDsW / Informatiehuis Water), Erik Saaman (Renoir), Marcel Bakker and Hedwig Miessen (both The Hague Municipality), Paul Oude Luttighuis (Novay), Jan Pieter Eelants (CROW), Larissa Zegveld and Joël van der Elst (both KING), Frans de Liagre Böhl (SURF Foundation), Jelte Dijkstra (NEN), Dennis Krukkert (TNO), Joris Gresnigt (Standardisation Forum Bureau) and the NOiV team.

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