



GTTN

Global Timber  
Tracking Network

WG1

# Standardisation - Discussion paper

Creating a joint reference framework

2017 June 14



# WG1 Standardisation - Discussion paper

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## 1. Goal of this paper

The goal of this document is to discuss, before the official start of the working group in October, what would be the most useful activities for working group 1 (WG1).

**Goal of WG1:** concentrate the creative and scientific thinking of all timber tracking experts in a few concrete improvements of the methods and their international acceptance

The project description of GTTN2 mentions the following tasks for the WG on standardisation:

- 2.1.1 Reviewed GTTN **guidelines** on sampling of reference material
- 2.1.2 Development of **recommendations** for data analysis on the **quality** of reference data and for the assignment of test material to geographic origin
- 2.1.3 **Guidelines** on methods for common data analysis of genetic and stable isotopes on geographic origin
- 2.1.4 Compilation of **test labs evaluation** reports

In what follows more information will be given about **standards** and their link with the **quality** of (i) reference data and (ii) results of tests on timber species and/or origin. **What is then expected from you** is to comment on the draft roadmap for WG1 outlined in the last chapter of this document where/if needed and to complete the tables in Annex.

## 2. Why standards?

### 2.1 What do we mean with standards?

With standardisation we mean here **harmonisation of method application** to prevent proliferation of different ways to apply timber tracking tools (i) to guarantee quality of data being entered in the GTTN database, (ii) to guarantee **quality** of test results to further promote timber tracking tools and (iii) to stimulate an increase in the **quantity** of service (nr. of species and regions of origin) by enabling effective collaborations and building capacity.

To this end all **standards, guidelines, protocols, best practice guidelines, best practices, standards of global best practice**, ... whatever they are called need to be unified.

### 2.2 Benefits of standards?

**Standards create legitimacy** as they are based on the principle of consensus, *i.e.* 'general agreement, characterized by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process that involves seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments'. Standards will hence help GTTN reach its goal of operationalising the timber tracking tools, by building a reliable reference database and service portfolio, and by facilitating **dissemination and implementation of knowledge** [EU 2013].

Knowledge diffusion (open access) has become the focus of **innovation**, rather than knowledge creation (patent protection). Standardisation can hence be seen as a kind of open innovation process and standards as its output represent a new type of innovation indicator [Blind 2016].

In an interconnected and globalised world, international standards can avoid a race to the bottom and bolster **healthy and fair competition** [Gurria 2014]. Besides, participation of developing countries in international standardisation will promote their access to world markets and technical progress [ISO Action Plan for developing countries 2016-2020].

The standardisation process can often **highlight issues** that might not previously have been apparent, will ensure due consideration is given to the validation of procedures and protocols [EU 2013].

#### WHAT WE CAN LEARN FROM THE “CRISIS” IN US FORENSIC SCIENCE

Before we start our working group it's good to reflect on the current timber tracking procedures to **identify where exactly WG1 activities can make a difference in building the GTTN's reputation**. Here some statements from the article [Forensic Pseudoscience](#):

*One serious problem with those tests is that they allow for **high levels of subjectivity**. (...) the outcome (...) is not necessarily repeatable from examiner to examiner. (...) Without any **external standard** against which to check the results, the examiner can never be wrong. (...) “an extended, indefinitely complicated series of fallible practices through which evidence is collected, transported, analyzed, and quantified.” There are endless ways in which analysts can bungle their task. (...) adoption of consistent standards in every subfield and the creation of a unified federal oversight entity. (...) pleas for the introduction of **basic quality control**. (...) The localized, disparate, and unmonitored nature of so much forensic practice makes for **massive nationwide inconsistency**.*

At least two lessons can be learned from this: (i) reference data need to be developed conform internationally accepted methods, (ii) international standards will be essential for long term confidence in timber tracking tools.

### 2.3 Reputation of timber tracking tools

In a recent brochure on timber testing techniques [NEPCon 2017] the following statements are made:

*the validity and robustness of the results are not guaranteed and rely on a **range of factors** such as number of samples taken, **quality of the laboratory** and availability of reference samples (...) one of the disadvantages of this technique (...) success rate of extracting testable DNA (...) ask labs what their success rates are before signing any contract*

→ These uncertainties trouble the image of timber tracking tools. While standardisation will not remove method related uncertainty, **GTTN standards** can remove user specific uncertainty by specifying protocols/procedures that should be followed for selected steps of the methods (f.ex. sampling, DNA extraction). Bringing together expert knowledge to develop the standards will simultaneously lead to method optimisation. In this way process standards can give methods that might already be accepted by the scientific community via publication in peer reviewed journals, credibility also outside the academic environment.

Besides, the availability of process standards will be helpful to labs that want their overall quality management **ISO 17025** accredited, which will remove even more of the user specific uncertainty.

Guaranteeing an impeccable reputation of timber tracking tools is the common goal across all disciplines and sectors and should therefore be the goal of this working group.

### 3. Where to use standards?

Which steps, in the procedure of any of the timber tracking techniques, are so critical that you would not trust the results of others - and why then would a customer, whether law enforcer or private company - if the method used was not the same as yours?

☑ **Critical steps** can be made reliable by standardising them. This would not only guarantee confidence in the database by making deposited reference data trustworthy, but also in the test results. To identify critical steps, all steps from sampling up to interpretation of results should be run through, for all timber tracking tools, with these **questions to ask**:

- Does it matter which methods have been used for this step to develop reference data that everyone will trust?
- Does it matter which methods have been used for this step to identify/check timber species or origin to get universal acceptance of the findings?

→ If we speak about quality of data/findings we mean that we can trust the data/findings and this should be independent of the aim of the species/origin test (inform or prove).

☒ **Steps that are not critical** should not be standardised. Sharing of the diverse protocols would however serve the goal of GTTN to build capacity and increase services, *i.e.* the number of species and regions for which tests can be performed. Part of the GTTN website could be structured to share these protocols (examples: [PrometheusWiki](#), [ENFSI](#)).

## 4. Types of standards

### 4.1 Formal standards<sup>1</sup>

*An ISO International Standard represents a global consensus on the state of the art in the subject of that standard.*

#### 4.1.1 Process standards

Formal standards are developed and approved via national, European or international standards bodies. As GTTN has a global playing field, the formal standards of interest here are the ones of the [International Organization for Standardisation \(ISO\)](#).

#### Different types of ISO standards:

- Workshop Agreement
- Publicly Available Specification
- Technical Specification
- Full standard

Normative documents

- Technical Report
- Guidelines

Informative documents

Informative documents provide background to a technical area or assist with the application or interpretation of a full standard. Normative documents contain requirements which must be met in order for claims of compliance with the standard to be certified. The [difference between the types](#) of normative documents lies in the [maturity of the particular topic](#) and the [level of consensus](#) that can be achieved:

#### **Workshop Agreement (WA) ► emerging**

Consensus documents developed as the output of a workshop, in areas which are not the subject of more formal standardisation undertaken within Technical Committees\* and that are produced quickly (typically in 10-12 months) to address specific market requirements.

Example: IWA 3:2005 Image safety -- Reducing the incidence of undesirable biomedical effects caused by visual image sequences (withdrawn\*)

\* All other types of standards need to be developed within an existing technical committee [[TC list](#)] (or you need to establish a new one).

\* After 3 (+ 3 years) WAs are transformed into another standard type or withdrawn.

#### **Publicly Available Specification (PAS) ► developing**

To promote a common approach to subject matter that itself is under development and to evaluate utility, repeatability, reliability and uncertainty, of procedures. Usually developed in less than 12 months. Act as an early stage deliverable to encourage a move towards more formal standardisation.

Ex.: ISO/PAS 28000:2005 Specification for security management systems for the supply chain

<sup>1</sup> [EU 2013]

**Technical Specification (TS) ► developing**

Similar to PAS but for subject matter that is at a more advanced stage of development.

Example: ISO/TS 20281:2006 Water quality -- Guidance on statistical interpretation of ecotoxicity data

**Full standard ► maturity & unanimity**

Timeframe: 3 - 4 years from proposal to publication (reviewed first after three years then every five years).

Example: ISO 16269-4:2010 Statistical interpretation of data -- Part 4: Detection and treatment of outliers

Examples of informative documents:

**Technical report**

ISO/TR 79:2015 Reference materials - Examples of reference materials for qualitative properties

**Guidelines**

ISO Guide 35:2006 Reference materials -- General and statistical principles for certification

↳ also contains much information that can be equally applied in the production of in-house reference materials [UNIDO 2009]

ISO/IEC Guide 59:1994 Code of good practice for standardization (currently under revision)

**CONCRETE ► HOW GTTN COULD DEVELOP ISO STANDARD(S)**

GTTN joins the technical committee [Chain of custody of wood and wood-based products](#) as a [liaison organisation](#)

Currently it's still a Project Committee (PC), which develops only 1 standard and is then disbanded. However, they plan to transform it into a Technical Committee (TC) which can develop as many standards as necessary. If the proposal gets accepted in Oct. by all ISO members the first meeting would take place **beginning 2018**.

GTTN **convinces min. 5 countries** in the TC of the interest of our proposed standard(s) during a TC meeting

A **working group** is established within this TC with GTTN leading but the interested parties of the WG need to be **in balance**

GTTN members join individually as experts of their National Standardisation Bodies or as experts from GTTN. When joining a TC **copyright** declaration forms have to be signed.

One or more **technical specifications** are developed (following some [ISO principles](#)). Costs are the time investment and the travelling costs for the meetings

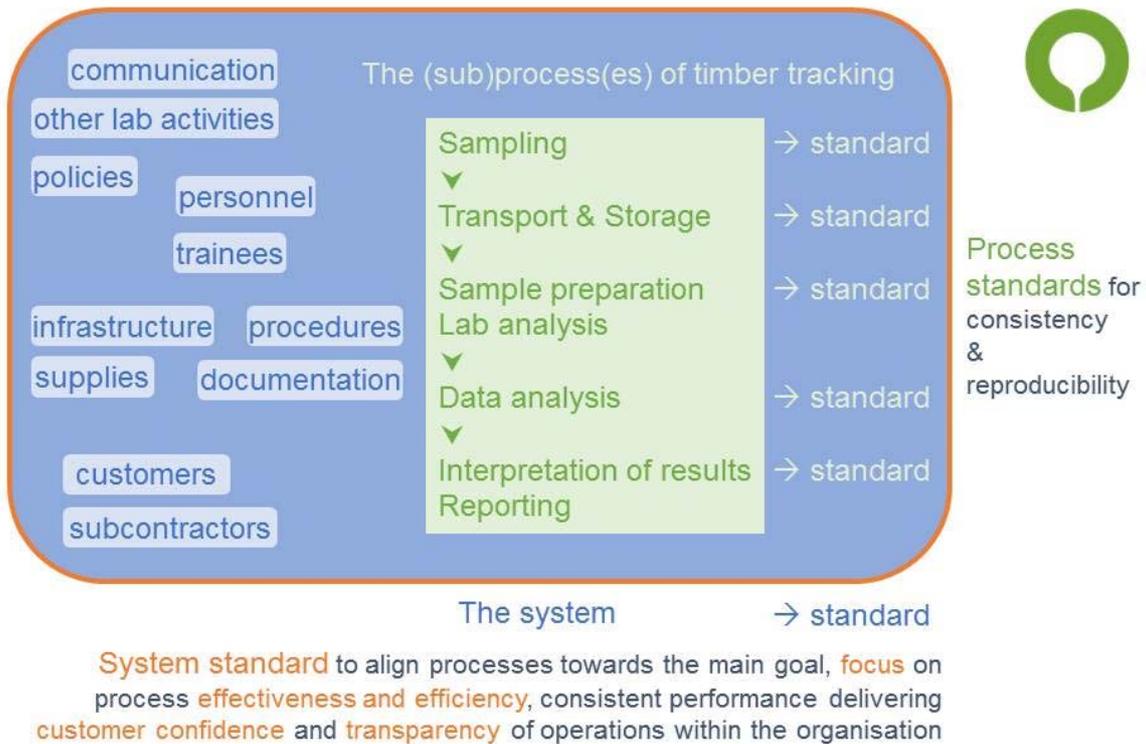
Buy standard(s) (on average 74€)

Demonstrate compliance via 1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup> party conformity assessment as needed

Standards can be made available for free although this requires negotiation with the ISO central secretariat.

### 4.1.2 Management standards<sup>2</sup>

Next to standards for processes, products and services there are also **management standards** that make sure all separate units work together for the common goal of the system.



A management system standard can be useful for all labs as it helps to **coordinate individual processes and procedures** and **continuously improve** them for optimal support of the goal, whether it is providing evidence on species/origin of timber for general use or for use in court.

The management standard that specifies the general requirements for the competence to carry out tests, including sampling is the ISO/IEC 17025:2005<sup>3</sup>. It is for use by laboratories in developing their **management system for quality, administrative and technical operations**. It covers testing and calibration performed using standard methods, non-standard methods, and laboratory-developed methods. However, as it prefers the use of standard methods (methodology should be documented and validated), the activities of WG1 will also be helpful to become ISO/IEC 17025:2005 accredited.

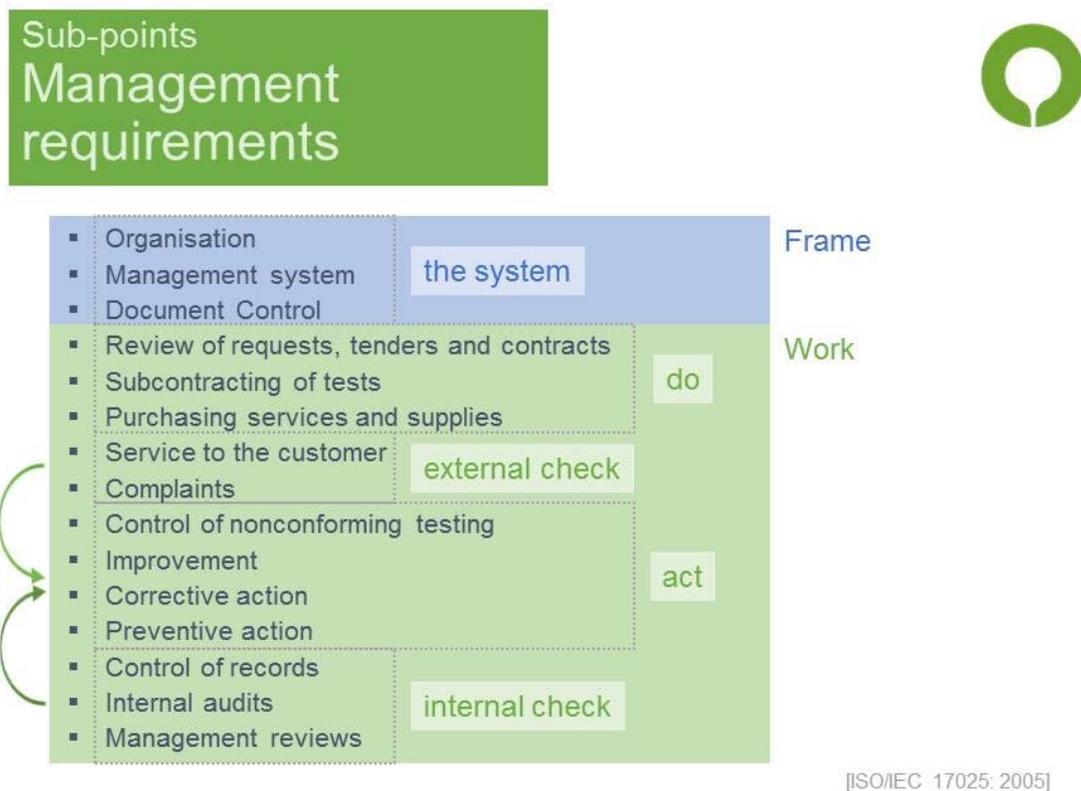
<sup>2</sup> ISO/IEC 17025:2005

<sup>3</sup> The general quality management standard is the ISO 9001 from which the ISO 17025 is derived to deal only with the parts relevant for labs carrying out calibration and testing activities.

Any particular lab will be accredited for only a specific list of methods and not for all methods. The lab needs to select methods to define the [scope of the accreditation](#) it applies for [[guidance document](#)]. Methods selected should be those that are performed frequently, with little subjective content and where accreditation would be advantageous for environmental, commercial or legal reasons<sup>4</sup> [UNIDO 2009].

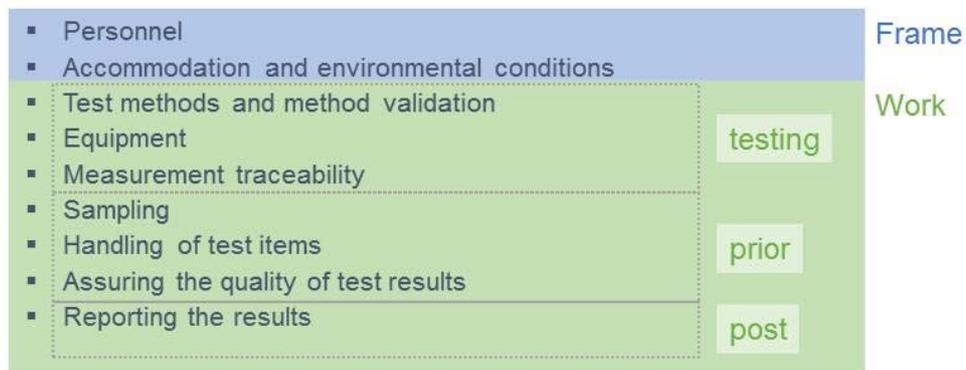
 [The FIRMS Network](#) is certified to the international quality standard ISO9001 for the approval of forensic practitioners in the field of isotope forensics.

The standard is composed of management requirements (human resources, infrastructure and administration needed to perform, check and act) and technical requirements (accounting for factors determining correctness and reliability of tests). The points dealt with in the ISO/IEC 17025:2005 are given below. Tools like the UNIDO guidebook (2009) are available to assist testing labs in setting up a quality system conform the ISO norm.



<sup>4</sup> In many countries data generated for environmental or legal reasons must be covered by accreditation to be acceptable [UNIDO 2009].

## Sub-points Technical requirements



In 2008 the International Potato Center in-vitro genebank was the first to be ISO accredited in the world. They mentioned the extensive process and protocol level documentation helped them [manage the departure of key staff](#) as new staff could quickly be incorporated [Galsworthy et al. 2009].

### JUNK SCIENCE! WHAT WE CAN LEARN FROM THE HUMAN CASE

Different labs developed their [own working methods](#) independently and only few are accredited. Human DNA profiles can only be entered in national databases when typed in ISO/IEC certified laboratories. This measure was taken after the [quality of the results](#) had been [called into question](#) more than once. However, the evolution of the [ISO 17025:2005](#) accreditation in the field of forensic DNA [cannot be separated from sharing the procedures for the interpretation of the data](#). Statistics are still a challenge. To generate a reliable genetic profile is not always trivial and sometimes the [interpretation can be subjective](#).

[Ricci 2014]

→ Management system standards should go hand in hand with the publication of methods in peer-reviewed scientific literature (and the development of process standards) to reach a maximum level of trust in test results.

## 4.2 Informal standards

### 4.2.1 Criticism on ISO standards

Although the author of the blog criticising ISO standards is anonymous, it's still useful for the working group to be aware of the pro but also of the contra arguments. So here some anti-ISO propaganda (?) from [ISOwatch](#) and others:

*Contrast the approach of the closed inspection industry with the open research community, for example, Nature's Protocol Exchange. The slow movement of ISO committees is quite different to the availability of hundreds of protocols that can be commented upon by users. It shows the helpful, responsive way that research can work. [Ref]*

*For all we know, millions are being wasted on screening labs for "quality" that actually makes no difference. You'll find a little evidence for that, but nobody cares. [Ref]*

*The complexity required of the "quality system" inevitably means failures will be present. They probably won't be important but inspectors can find them by trawling the evidence you are forced to accumulate against yourselves. [Ref]*

*no guarantor of the technical quality (...)The true test of an international standard is fair and open access to the standards development process [Ref]*

*most ISO standards are not available free of charge (...) Some cases where standardisation process was influenced by lobbying [Ref]*

ISO standards are not without criticism. Justly so? The idea of harmonisation of methods anyway corresponds to the goal of our working group and bringing more structure in the quality management of your lab can equally never be a bad thing. If the implementation of ISO standards is just is discussable. So then the question is: are there [alternatives to ISO standards](#)?

#### 4.2.2 Alternatives to ISO standards

An alternative for the management system standard is [self-declaration](#), i.e. simply apply the standard's requirements without going for accreditation as f.ex. DoubleHelix did:

*All laboratories conducting tests to support CertiSource certification are implementing policies and procedures equivalent to ISO 17025 for testing and calibration laboratories.*

An overview of the dis/advantages of mere compliance vs. registration is given [here](#) for ISO 9001 (of which ISO 17025 is just a derivative specifically for testing labs).

More drastic alternatives are proposed for the ISO 26000, 'Guidance on social responsibility' [Moratis 2015a,b] that can be seen as alternatives for ISO standards in general: (i) [engaging](#) stakeholders in development and evaluation of the method/management system you want to standardise, (ii) participation in voluntary initiatives (with attention for contents and international acceptance of standards), (iii) providing [transparency](#) about performance of the process/system (f.ex. via illustration of the method in a publication) and (iv) seeking second or third party judgement (f.ex. via peer review of the method as in *Nature Protocols*).

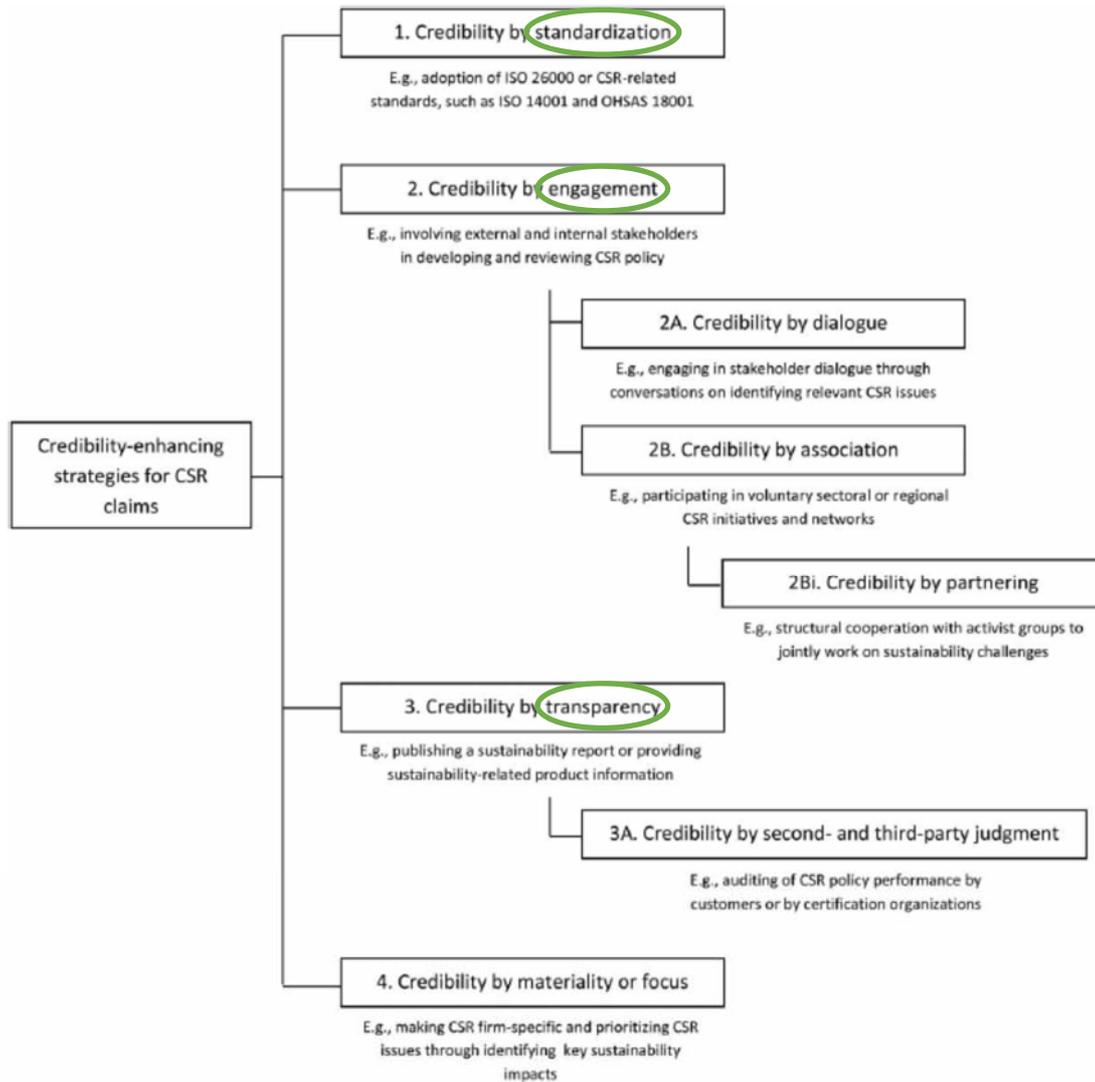


Figure 1. Taxonomy of ISO 26000-derived credibility strategies.

The following [informal standards](#) can be seen as examples of the above mentioned voluntary initiatives in combination with stakeholder engagement. Informal standards are developed and approved via organisations or individuals instead of by standard bodies. Examples of informal standards relevant to GTTN (see also Annex 2):

- [Scientific WG on DNA Analysis Methods](#)  
😊 This could be a good example of what GTTN could be for timber tracking methods. International acceptance should then result from the stakeholders participating in the development of the standard(s).
- European Network of Forensic Science Institutes > [Best Practice Manuals](#)
- International Society for Forensic Genetics > [Recommendations](#)
- American Society for Testing and Materials International > [Standards](#)
- Barcode Of Life > [Standards & Guidelines](#)  
↳ Re-activate [Tree-BOL initiative](#)? (with focus on GTTN relevant tree species)
- Reston Stable Isotope Laboratory > [Methods & SOPs](#)

- Forensic Isotope Ratio Mass Spectrometry Network > [Good practice guide](#)

→ A deeper search should be done to dig up already existing standards that can be used/adapted for timber tracking. Special attention should go to f.ex. other fields where barcoding is already more advanced (animals, humans), other fields that have the same problem of degraded DNA (archaeology, anthropology, ...).

## 5. Towards a roadmap for WG1

**Identify and agree** > on critical steps of the methods (see action plan below) **Tasks for the Oct. meeting**  
> on particular needs from the user side



**Select** methods and steps within those methods that are of highest **priority** to be worked on in the frame of GTTN2 for the development of (i) formal and (ii) informal standards.

**Update the task list** for WG1, set milestones, assign (sub)task leaders.



**Write** standardised procedures for the selected steps and methods.

- For informal standards: general templates can be found f.ex. [here](#) (for specific ones see §4.2.2)
- For formal standards:
  - i. get in contact with the relevant ISO technical committee
  - ii. templates can be found [here](#) and guidelines are available on how to write standards in general [ISO 2016. How to write standards?] and specifically for SMEs [ISO 2013 Guidance for writing standards taking into account micro, small and medium-sized enterprises' needs]



**Apply** standards

→ if writing of the standards was a **shared process** and hence the end result is a/are **consensus document/s**, application should follow automatically

→ **Pending issue**: the standards to be developed will set the requirements for entry of data in the database and uptake of labs in the service portfolio. How can this be checked?

A reference database with data that are generated via unknown methods will hinder the sound interpretation of test results. Data generated via known but different methods will impede their wider use (f.ex. grouping data of different providers).

→ Identify methods and steps which would benefit from a **hands-on training** in addition to the written standards

→ Discuss the need and possibilities for a communal, open-source, **unified computing environment** for data cleaning, exploration, inference and testing



**Review** standards

A procedure has to be established to revise the by GTTN developed formal as well as informal standards to guarantee their utility over time.

## ACTION PLAN

In preparation of the meeting in Oct., complete the following tables

- listing the different **steps of timber tracking methods**:
  - that are critical and need harmonisation but for which formalisation is too big a cost (> informal standards)
  - that are critical and worth transforming in an ISO standard
  - that are not critical but for which sharing of protocols would be useful to build capacity

(Annex 1)

- listing **existing standards** (in/formal) for all methods that could be directly used as such or from which ideas could be taken to develop new ones (Annex 2)
- listing the **needs of (potential) service seekers** (Annex 3)
- listing **existing reference data** for the different methods, species and origins (Annex 4) that will be shared with WG2 and WG3

During the meeting in Oct.

1. Identify priorities and reach consensus on which steps of the timber tracking process and for which methods procedures will be standardised (formal or informal) within the frame of GTTN2 (end: Dec 2019)
1. Where are extra protocols needed to integrate results of timber tracking methods?
2. Evaluate existing standards and particular needs of the user side and their impact on the activities of WG1.
3. Update the WG1 task list, set milestones for the next two years, assign (sub)task leaders, core groups and support groups for the different tasks agreed.

## Reference list

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Ricci, U. (2014). "Establishment of an ISO 17025:2005 accredited forensic genetics laboratory in Italy." *Accreditation and Quality Assurance* 19(4): 289-299.

UNIDO (2009). Complying with ISO 17025. A practical guidebook for meeting the requirements of laboratory accreditation schemes based on ISO 17025:2005 or equivalent national standards. Vienna, United Nations Industrial Development Organization.

## Annex 1: Draft list of (non)-critical steps for the different timber tracking methods

When filling the table use the following colours:

**In orange:** steps worth transforming into an ISO standard

**In blue:** steps that need harmonisation but for which formalisation is too big a cost (so far)

**In black:** non-critical steps for which sharing of protocols would be useful to build capacity

Processing stage	Wood anatomy	Genetics		Stable isotopes	Spectroscopy
		Reference samples	Test samples		
Sampling design					
Transport					
Sample storage					
Lab work					

Data analysis					
Data storage					
Data interpretation					
Integration of methods					
Reporting/Data interpretation by customer					

## Annex 2: Draft list of existing standards that could be used/adapted for timber tracking

Expertise	Initiative	Scope	Field	Website
general	ASTM	draft standard templates	general	<a href="https://www.astm.org/COMMIT/TEMPLATES/lead_template.htm">https://www.astm.org/COMMIT/TEMPLATES/lead_template.htm</a>
	ASTM	existing standards by category	general	<a href="https://www.astm.org/Standards/category_index.html">https://www.astm.org/Standards/category_index.html</a>
genetics	ForensicDNA	interpretation of data	humans	<a href="https://sites.google.com/site/forensicdnastatistics/">https://sites.google.com/site/forensicdnastatistics/</a>
	ISFG	Scientific recommendations on relevant forensic genetic issues	humans	<a href="https://www.isfg.org/About">https://www.isfg.org/About</a>
	SWGDM	discuss, share, and evaluate forensic biology methods, protocols, training, and research	humans	<a href="https://www.swgdam.org/">https://www.swgdam.org/</a>
	ENFSI	Best Practice Manuals	humans	<a href="http://enfsi.eu/documents/best-practice-manuals/">http://enfsi.eu/documents/best-practice-manuals/</a>
	ENFSI	Forensic guidelines	humans	<a href="http://enfsi.eu/documents/forensic-guidelines/">http://enfsi.eu/documents/forensic-guidelines/</a>
	BOL	Standards & Guidelines	life > <a href="http://www.barcodeoflife.org/content/resources/standards-and-guidelines">trees</a>	<a href="http://www.barcodeoflife.org/content/resources/standards-and-guidelines">www.barcodeoflife.org/content/resources/standards-and-guidelines</a>
stable isotopes	RSIL	Standard Operating Procedures	water, rock, biological samples	<a href="https://isotopes.usgs.gov/lab/methods.html">https://isotopes.usgs.gov/lab/methods.html</a>

	FIRMS	Good practice guide for isotope ratio mass spectrometry	different materials	<a href="http://www.forensic-isotopes.org/gpg.html">http://www.forensic-isotopes.org/gpg.html</a>
spectroscopy				
wood anatomy				

**Annex 3: Needs of (potential) service seekers**


## Annex 4: Existing reference data sets for timber tracking

The aim of this list is to get an overview of what is already available (the table will be shared with WG2), to identify the gaps and hence the focus of GTTN (the table will be shared with WG3). In addition, [knowing the resolution and reliability of existing reference data will help developing the required standardised guidelines](#) for effective timber tracking (the reason why this table is also a task of WG1).

Method	Species	Origin	Resolution	Reliability
Wood anatomy	<i>na</i>			
Genetics				
Stable isotopes				
Spectroscopy				

With support from



by decision of the  
German Bundestag

[www.globaltimbertrackingnetwork.org](http://www.globaltimbertrackingnetwork.org)

The objective of the Global Timber Tracking Network (GTTN) is to promote the operationalization of innovative tools for wood identification and origin determination, to assist the fight against illegal logging and related trade around the globe. GTTN is an open alliance that cooperates along a joint vision and the network activities are financed through an open multi-donor approach. GTTN phase 2 coordination (2017-2019) is financed by the German Federal Ministry of Food and Agriculture (BMEL).