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Open Hearing for EcoSpold Data Format v1 Revision

Commented Summary of Feedback Received

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1 Introduction

This paper is a summary of the open hearing process conducted for the revision of the EcoSpold data format v1.

The open source EcoSpold data format v1 (EcoSpold v1) has been launched in 2000 and is the most widely used data exchange format for LCI data. Theecoinvent Centre was the first to use this data format for their own LCI database. Other databases adopted the format, and all important LCA software tools have an interface to use datasets in EcoSpold format.

Some limitations have been identified in the practical use of the EcoSpold format, so that theecoinvent Centre decided to launch a revision process. This revision will eventually lead to a new version of the format: EcoSpold v2.

An expert working group has been formed to input to the revision process. It was decided that an open hearing should be conducted among users of the EcoSpold format, in order to collect their input and wishes for a new EcoSpold format v2.

2 Timeline

Here is a timeline of the open hearing process for the revision of the EcoSpold v1 format. ¹

- Invitation Letter with Excel and DOC sent: Oct 29, 2008
- Reminder sent out: Dec 12, 2008
- Deadline for submissions: Dec 15, 2008
- Open Hearing Feedback presented to Working Group: Jan 14, 2009

The revision process of EcoSpold v1 is still ongoing. The expert working group has created several alpha versions as basis for their discussion.

Publication of the first beta version of EcoSpold v2 was in May 2009. Based on this first beta, testing and software development can begin, in order to verify the practicability of the format. The final beta version is expected in summer 2009.

The release of EcoSpold v2 is due in spring 2010.

¹ Note that while this open hearing focussed on data format issues, a feedback process for issues regardingecoinvent database content was run in parallel.

3 Participation and Response

The experts invited to participate in the open hearing and submit their input for the new EcoSpold data format version were contributors to theecoinvent database, former dataset authors, LCA software makers and renown LCA experts. The invitation was sent out to 56 people.

There were 10 invalid e-mail addresses, bounces, or out-of-office replies. Active feedback was received by 13 people. Out of these, 7 replied without delivering any additional content. Typical answers were e.g. *"I have no suggestions to add"* or *"I do not have any special wishes regarding format of EcoSpold from my part"*.

6 people delivered feedback. While three had more general comments on the EcoSpold format, three delivered actual content by filling in the Excel sheet or document provided for this purpose. The overall count of individual feedback items from these three submissions summed up to 48.

The submitters were asked to prioritize their feedback items on a 1 to 3 scale (with 3 meaning "highest priority / must have item", 2 meaning "medium priority / nice to have item" and 1 marking items with low priority). There was an even distribution of item priorities. Priorities 1 to 3 had 16 items each.

All items have been fed into the discussion of the expert working group at an early stage. The list below is a summary of the feedback items received. Each item has been commented, in regard to how it was addressed in the new version of the data format.

4 General Comments on EcoSpold v2

Some general changes in the format have been agreed upon within the working group. These changes can be summarised under the following headings:

Structural change:

In EcoSpold v1 the three types of datasets (elementary flow, process, and impact category) were all handled within the same dataset structure, distinguishing them mainly by the value of field 201. This concept has been completely reorganized in EcoSpold v2, introducing separate dataset definitions for these three. "Process" will be called "Activity". "Elementary flows" will be called "Exchanges with environment".

There will be master lists for allowed "Elementary flows" as well as for "Products and Wastes" and "Locations". The references to entries in these master lists will be made through UUIDs.

Note: The impact category dataset definition has not yet been fully determined, and will be tackled by the working group at a later stage in the format development.

Facilitating database maintenance and extension:

- Option for parent-child relationships between processes
- Option for expressing geographical information using GIS coordinates
- Option to use formulas and variables in numerical fields
- Use of UUIDs for internal references in datasets
- New product list and waste list in parallel to the existing "elementary flow" list
- New field to declare macro-economic scenario for forecasted processes

Better support for alternative modelling options and data exchange with ILCD:

- Option to declare the market model used for a process
- The direct linking of process name and single product output name has become obsolete. The explicit reference flow section (fields 400 to 502) in EcoSpold v1 has been replaced in EcoSpold v2 and is now handled through the use for the determining product the option "0=ReferenceProduct" in the field outputGroup for intermediate exchanges (products and wastes).
- Reduction of the number of fields that are required
- Waste allowed as an input type
- New field to declare technology level for process (new, modern, current, old, outdated)
- New field to declare process as a market process
- Addition of joker elements to enable simpler extension of the format

Support for mass balances, energy balances and monetary balances:

- The category/subcategory concept for processes/activities has been dropped. Instead, options have been introduced to declare multiple classification schemes, tags, and multiple properties of exchanges, e.g. price, dry mass, water content, energy content, elementary or substance composition
- New field to declare annual production volume
- New output type: "addition to capital goods"

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- New field to declare product transfer coefficients (outputs relative to inputs)

Support for language versions:

- Option to add language versions for all text fields

Support for better documentation:

- Option to add images
- Option to add more than one validator
- Fields for uncertainty information made more general and adding numerical fields for the pedigree matrix

5 Incorporation of Feedback

Below is a table with all feedback items received. The column "Implementation in v2" contains the comments to these items submitted.

We invite all submitters to continue discussion with the expert working group and contribute actively to the creation of the new EcoSpold format. You can use the following e-mail address to contact the working group: ecospold@ecoinvent.org

Item Identifier	Relates to Field	Comments by Submitter	Prio	Implementation in v2
ItemOpenHearing01	Process / Exchange GeneralComment SpoldID 3792	add new field for pedigree matrix		The whole topic of uncertainty has been restructured in EcoSpold v2. New fields 1869 through 1880 allow for inclusion of a qualitative assessment of data quality indicators based on a pedigree matrix.
ItemOpenHearing02	Process	add new field for price		The possibility to add price information has been created in EcoSpold v2 by introducing properties for exchanges. Fields 2000 through 2050. Price can also be one of the pre-defined properties, which can be defined in the "Product and Waste Flows" master list.
ItemOpenHearing03	Process / data entry by person SpoldID 302	change order		Not changed in new format version, as it should be no problem to import first the complete persons section from the XML file.
ItemOpenHearing04	Process / data generator and publication person SpoldID 751	change order		Not changed in new format version, see above comment for ItemOpenHearing03
ItemOpenHearing05	Process / number SpoldID 200	change field length, has to be a UUID		Field 200 has been changed to a UUID. All ID fields are now UUIDs.
ItemOpenHearing06	Process / source additional authors SpoldID 1003	change: impossible to parse, each additional in own field		After considering this feedback item carefully, no changes made in EcoSpold v2. The "Source" section is already much more refined than a simple "Source" text field. Parsing should be possible with comma separators.
ItemOpenHearing07	Process / dataset information timestamp SpoldID: 204	add new field timestamp for last 'updated'		Creation of additional date field in the meta data section relating to the dataset. Three timestamp fields are now available: "creationTimestamp" which is automatically generated date when the dataset is first created, "lasteditTimestamp" which is automatically generated when dataset is saved. Additionally there is a file date (time and date when the dataset file was created).
ItemOpenHearing08	Process / dataset information Spold IDs 200-	add new field, ability to link to the UUID of the unit process from which it was generated (parentUUID')		The type "process" is now referred to as "activity". The new fields 100 through 195 describe the activity. Field 105 (activityID) is a UUID field. Field 120 (parentActivityId) is a reference to a parent dataset UUID if the current dataset is an inherited child process.
ItemOpenHearing09	Process / dataset information Spold IDs 200-	add new field, ability to group the same processes and track it as it evolves over time		See comment above for ItemOpenHearing08 . A family UUID as suggested has not been implemented, but tracking of

		(familyUUID)		dataset changes should be possible through timestamp fields (see response to ItemOpenHearing07) and the versioning of the dataset.
ItemOpenHearing10	Process / exchange Spold IDs 3700-	add new field: an optional unique resource identifier (url) for a technosphere exchange where the dataset can be downloaded. The url is intended for machines, and the provided file must be a valid Ecospold file, ending with .xml. This field is useful for many reasons (it helps manage the reality of decentralized LCA information), but it will also allow software to begin making LCA calculations in a 'semantic web' style way where it is not necessary for everything to be in one database. This one simple field alone will provide researchers with a great new capability, and will make Ecospold VERY fertile ground on which cutting edge, 'cloud' LCA software can be developed.		After discussions of the working group it was decided not to implement URIs in EcoSpold v2, but rather use UUIDs
ItemOpenHearing11	Process / Process Information, Reference Function category/subcategory Spold IDs 495, 496	Category/Subcategory is not actually a hierarchy, so it shouldn't be managed this way, idea: use tags		The reference function has been replaced, see general comment above. The category/subcategory concept for processes has been dropped. Instead, a possibility for multiple classification schemes has been introduced. Existing categories / subcategories from EcosSpold v1 are converted into a classification system. The idea of the submitter to use tags was picked up. A tag field is introduced for processes, (175). Valid tags can be defined.
ItemOpenHearing12	Process / Process Information, Reference Function category/subcategory Spold IDs 495, 496	Change multiple occurrence, use tags or allow unlimited number of subcategories in the 'hierarchy'		See comment above for ItemOpenHearing11
ItemOpenHearing13	Process / exchange Spold IDs 3700-	Change multiple occurrence, same logic for Ecosphere flows		The reference function has been replaced, see general comment above. The category/subcategory concept for elementary flows will be maintained but is renamed to compartment/subcompartment. Tags only per activity dataset, not for individual exchanges.
ItemOpenHearing14	Process / exchange Spold IDs 3700-	Add field, flexible exchanges: a way to describe the 'ideal' technosphere in/out in case it becomes		Technology scenarios in EcoSpold v2 are handled on the process level, but not on the exchange level.

available later, idea: use tags

Exchanges have properties, but no tags. Exchanges don't have a location any more. The direct linkage between process name and former "reference function" flow is not given any more. Therefore several activities may have the same product output. Additionally, it is not necessarily required to link to a fixed activity any more. If supplyingActivityId (field 1520) for an intermediate exchange remains empty, the exchange itself will just point to the UUID to identify the name of the product (using Product and Waste master list).

As for the example you gave, the market model concept might offer a solution (specialActivityType, field 115, value 1). You could have a "market mix" with CA and RER as input activities.

ItemOpenHearing15	Process / dataset information Spold IDs 200-	add field, knowing what products are substitutable for what is important for more dynamic, market-based, LCAs, may want to include a space for an unlimited number of UUID product categories	 This issue has been addressed in the EcoSpold v2 format with the possibility to use different market models. The implementation in the format is to allow definition of special activity types (field 115) and to be able to provide market activity datasets. These have all relevant processes as inputs. The implementation in EcoSpold v2 hence is different from what has been suggested, but should fit the requirement for more dynamic, market-based LCAs.
ItemOpenHearing16	Process / amount Spold ID 404	remove, This is a redundant entry, as the output of every process is part of the latter information (3707). Also, why must product output be scaled to 1 kg?	 This topic has been addressed and resolved by abandoning the "Reference Function" section. Amount can only be found in the the "Exchanges" section for "Exchanges with Environment" and "Intermediate Exchanges". As for the necessity to scale all exchanges to an amount of "1" unit, this has been dropped. See contrasting ItemOpenHearing36
ItemOpenHearing17	Process / unit Spold ID 403	remove, see above ItemOpenHearing16 , a process has no unit	 Done by abandoning the "Reference Function" section, see first part of the above comment for ItemOpenHearing16
ItemOpenHearing18	Impact / amount Spold ID 404	remove, an impact category has a unit (e.g. kg CO2-eq) but not an amount	 Input accepted and most likely to be implemented. The impact category dataset definition has not yet been finished.
ItemOpenHearing19	Elementary / amount Spold ID 404	remove, an elementary flow has a unit (e.g., kg), but not an amount	 Done by abandoning the "Reference Function" section, see first part of the above comment for ItemOpenHearing16 . Quantity of elementary flows in the EcoSpold v2 format is handled in field 1020 (amount) in the "Exchanges With Environment" section.

ItemOpenHearing20	Process / CASNumber Spold ID 502	remove, a process is not a chemical, hence it cannot have a CAS number	 Done by abandoning the "Reference Function" section, see first part of the above comment for ItemOpenHearing16 . CAS numbers are now to be found in fields 1100 (CASNumber) in the "Exchanges With Environment" section and the "Intermediate Exchanges" section. Field 502 holds CAS number in the "Exchanges with Environment" master file.
ItemOpenHearing21	Process / Formula Spold ID 499	remove, see above ItemOpenHearing20 . A process has no chemical formula	 Done by abandoning the "Reference Function" section, see first part of the above comment for ItemOpenHearing16 . Chemical formula to be found in field 499 (formula) in the "Exchanges With Environment" section and the "Intermediate Exchanges" section.
ItemOpenHearing22	Process / location Spold ID 662	unclear if elementary flows can have a region code as well. The text speaks about the process and the impact categories, and not about the elementary flows	 Processes will be referenced in EcoSpold v2 via new field 400 (geoReferenceId) which contains a UUID as reference to ValidRegionalCodes.xml file with detailed geography information. See detailed documentation of geography handling. Former field 662 (locationShortname) used as optional descriptive short name of the location referenced by geoReferenceId, e.g. the regional codes of EcoSpold v1. No geography for elementary flows, as they are not separate from the activity.
ItemOpenHearing23	Process / type Spold ID 201	change, no need to have a separate indicator for unit processes (1) and multioutput processes (5). A multioutput process is also a unit process	 This issue also resolved by separating the data structure for elementary flow, process and impact category (see comment above for ItemOpenHearing09). Field 201 has a changed range and only accepts values 1 = "Unit process" or 2 = "System terminated". The old EcoSpold v1 codes "0=System non-terminated", "3=Elementary flow", "4=Impact category" and "5=Multioutput process" are no longer used!
ItemOpenHearing24	Process / name Spold ID 3702	there are no intermediate products in EcoSpold, change and rename all processes into real process names, and all products into real product names, not ISO conformous, a new category "Product Dataset" should be introduced	 The direct linking between the process name and the single product output name is not required any more in order to ensure ISO conformity. A "Products And Wastes" master list is introduced. The working group decided not to introduce a distinction between "product dataset" and "process dataset", but clarified for field 401 (activityName) that "the activity name should be descriptive of the main activity and whenever possible related to the determining product". Regarding the generally accepted wish to be able to

ItemOpenHearing25	Process General Comment	relates to the above ItemOpenHearing24 , once products are introduced, one should also introduce the possibility that a product is a waste that flows from one production process to a waste treatment process	 Resolved. See also above comment for ItemOpenHearing24 . As for the possibility to identify flows to waste treatment processes please see comment for ItemOpenHearing42 . The value "3= WasteToTreatment " in former field 3504 (outputGroup, new field ID 1510 in EcoSpold v2) along with the separation of the sections "Exchanges With Environment" and "Intermediate Exchanges" now allows to distinguish explicitly, if an output is a waste.
ItemOpenHearing26	Process General Comment	Once products are introduced, it would also be nice to have a field for the price	 The possibility to add price information has been created in EcoSpold v2 by introducing properties for exchanges. Fields 2000 through 2050. Price is also one of the pre-defined properties for product and waste flows, which are managed in a master list. Same issue as ItemOpenHearing02
ItemOpenHearing27	Process General Comment	EIOA and hybrid LCA are rapidly gaining ground. Please consider revising the format such that EIOA and hybrid data may be stored as well	 We have carefully considered if the format can store EIOA and hybrid data and have found no restrictions towards these data types. We have added three special activity types (field 115): market activities to accommodate the difference between production output in basic prices and consumption mixes in purchasers prices, residual activities to identify IO-data explicitly, and import activities to allow the handling of product import data for a national mass or monetary balance per product.
ItemOpenHearing28	Impact / name Spold ID 401	The name of the impact category is in principle fine here. However, the implementation in ecoinvent is wrong. For instance, the name "GWP 20a" is the name of the characterization factor, not of the impact category	 Dataset definition for impact category to be determined later.
ItemOpenHearing29	Impact General Comment	would be very convenient to develop the datasets to include normalization data and weighting factors	 Dataset definition for impact category to be determined later.
ItemOpenHearing30	Process / Uncertainty General Comment	uncertainty should be entered using a mean, sd95, min, max, etc. But the result from a Monte Carlo simulation is a distribution that is not necessarily Gaussian or lognormal, but can have a weird shape. More data (e.g., median,	 Even though the whole topic of uncertainty has been restructured in EcoSpold v2, the new version of the format doesn't go as far as to provide a possibility to enter additional information for distributions (such as median, skewness,

ItemOpenHearing31	Process / Name Spold ID 401	skewness, kurtosis) Is there still a 80 character limit? Should be higher (256?)	 Field 401 remains at 80 characters. The working group discussed this issue and decided that this is sufficient for the name, keeping in mind user interaction on the user interface (e.g. dropdown lists). It is recommended not to code content into the name.
ItemOpenHearing32	Process / LocalName Spold ID 490	Is there still a 80 character limit? Should be higher (256?)	 No more "local*" fields in the new format, but introduction of multi-language support. Field length for translated names remains at 80 chars.
ItemOpenHearing33	Process / Synonyms Spold ID 491	Could be very helpful, but not used very consistently in ecoinvent	 This feedback item refers to the use of this field in the ecoinvent database, as one database using the EcoSpold format. Field 491 (synonym) remains part of EcoSpold v2, as a possibility for everyone who uses this format. The ecoinvent centre will discuss internally how to use this field in their work.
ItemOpenHearing34	Process / Formula Spold ID 499	Not used very consistently in ecoinvent	 This feedback item refers to the use of this field in the ecoinvent database, as one database using the EcoSpold format. Field 499 (formula) was abandoned in EcoSpold v2, see comment for ItemOpenHearing21 .
ItemOpenHearing35	Process / CAS Number Spold ID 502	Not used very consistently in ecoinvent	 This feedback item refers to the use of this field in the ecoinvent database, as one database using the EcoSpold format. Field 502 (CAS Number) remains part of EcoSpold v2, as a possibility for everyone who uses this format. The ecoinvent centre will discuss internally how to handle CAS numbers in their dataset generation in the future. CAS Number field abandoned for process, see above comment for ItemOpenHearing20 .
ItemOpenHearing36	Process / Amount Spold ID 404	since this is always 1 i.e. one f.u. as given by unit 403 (and it would IMHO be dangerous to have <i>anything but 1</i> this field should be deleted	 Done. See above ItemOpenHearing16 that also suggested removal. This topic has been resolved by abandoning the "Reference Function" section. As for the question whether the amount MUST be "1", the working group decided to abandon the requirement that the reference output shall be 1. Avoiding misuse is a question of appropriate mass balancing and validation, which has become easier by the introduction of properties (e.g. dry mass and water content) for all exchanges.
ItemOpenHearing37	Process / statisticalClassification	obviously it is wrong to use a EU-only	 A new section "Classification" which comprises multiple

	Spold ID 501	classification for an international database (but as this is a non-required field, who can use advantageously it anyway?)		occurrence fields 300 (activityClassificationSystem) and 301 (activityClassValue) was introduced, allowing specification of classification systems and determining the activity within the respective system. The ecoinvent database has, for example, decided to use the ISIC classification in the future.
ItemOpenHearing38	Process / location Spold ID 662	OK to have, but has anybody ever done anything with this? Currently seems more like an addition to Name 401		Also see ItemOpenHearing22 , addressing the same problem. Processes will be referenced in EcoSpold v2 via new field 400 (geoReferenceld) which contains a UUID as reference to ValidRegionalCodes.xml file with detailed geography information. See detailed description of geography handling. Former field 662 (locationShortname) to be used as optional descriptive short name of the location referenced by geoReferenceld, e.g. the regional codes of EcoSpold v1.
ItemOpenHearing39	Process-Exchanges / mostLikelyValue Spold ID 3797	would propose to use the mean value as maximum Likelihood value in case of triangular distributions (uncertaintyType 3708 = 3) and drop this unused field (<i>see full text of submission</i>)		The whole topic of uncertainty has been restructured in EcoSpold v2. The parameters for each of the distributions are now explicitly defined.
ItemOpenHearing40	Process-Exchanges / standardDeviation95 Spold ID ??	suggest name change to something pertaining to all possible distributions (<i>see full text of submission</i>)		See comment for above ItemOpenHearing39 . The whole topic of uncertainty has been restructured in EcoSpold v2.
ItemOpenHearing41	Process-Exchanges/ inputGroup Spold ID 3503	very awkward, un-intuitive handling of this field		Field 3503 has been changed. Since "Exchanges With Environment" and "Intermediate Exchanges" are now separate sections the value in this field for "Exchanges With Environment" can only be "4= ToEnvironment ", while in the "Intermediate Exchanges" section this field can take the following values: "1=Materials/Fuels", "2=Electricity/Heat", "3=Services", or "5=From Technosphere (unspecified)". Solution somewhat different than suggested by feedback submitter, but should cover all requirements.
ItemOpenHearing42	Process-Exchanges/ outputGroup Spold ID 3504	very awkward, un-intuitive handling of this field, with apparently some unused ballast. why can't it be text? "to Techno" (also for allocated parts), "to Bio". (=downstream). Could actually be merged with inputGroup 3503 into a new "direction" field.		Field 3504 has been changed. Since "Exchanges With Environment" and "Intermediate Exchanges" are now separate sections the value in this field for "Exchanges With Environment" can only be "4= FromEnvironment ", while in the "Intermediate Exchanges" section this field can take the following values: "0=ReferenceProduct", "2=By-product", "3=WasteToTreatment", "5=!Stock Additions". Solution somewhat different than suggested by feedback submitter,

ItemOpenHearing43	Impact / Name Spold ID 401	Never was happy with how some LCIA names just read "total" and you have to look at Cat and Subcat to get an idea what it was about	but should cover all requirements. [2] Dataset definition for impact category to be determined later.
ItemOpenHearing44	Impact / Name Spold ID 401	suggest new field: related to above ItemOpenHearing43 , maybe an abbreviation to LCIA-methods would be good, (eg "EI99II eco-qual tot" instead of "eco-indicator 99 (I,I) total ecosystem quality impact") which could be consistently used for charts.	[2] Dataset definition for impact category to be determined later.
ItemOpenHearing45	Process / Location Spold ID 662	suggest new field: if some kind of geolocation code (i.e coordinates) is used in the future, it might be a good idea to add also a "fuzzyness" parameter. Alternatively use polygon paths	[2] The "geography" issue was raised by all feedback submitters (see ItemOpenHearing22 and ItemOpenHearing38). Processes will be referenced in EcoSpold v2 via new field 400 (geoReferenceId) which contains a UUID as reference to ValidRegionalCodes.xml file with detailed geography information. In the location master data a polygon path in KML format is defined. See detailed documentation of geography handling.
ItemOpenHearing46	Elementary / subCategory Spold ID 496	suggest new field: I always thought that the distinctions of "air, low population density" and "air, high population density" were rather arbitrary, because no quantitative measure of "high" or "low" was given. Suggest use geolocation	[2] The idea to use geolocation has been adopted in EcoSpold v2 by having a geographical format using KML, where you can relate the location of the emission to specific population densities, rather than specifying an activity by country or region, if operating with distinct emission areas with different population densities (within these countries and regions). Both with the current system and the new, the key is of course to decide how to classify the population densities, i.e. how many distinct densities are needed (currently 2) and where is the border between them (in what density group does a specific geographical grid cell fall).
ItemOpenHearing47	Elementary / generalComment Spold ID 492	suggest new field: this field became (mostly) a repository for the Pedigree codes, e.g. [1,5,3,2,4] for uncertainty calculations (if those were applied). If the Pedigree approach is to be continued, maybe these entries could receive a dedicated (optional) field (5 fields?)	[1] The pedigree matrix topic was also raised by another feedback submitter (see ItemOpenHearing01) and has been responded to by a restructuring of the uncertainty topic in EcoSpold v2. New fields 1869 through 1880 allow for inclusion of a qualitative assessment of data quality indicators based on a pedigree matrix.
ItemOpenHearing48	Process / General Comment temporal resolution	suggest new field: if a more resolved time axis is to be inventoried than presently (= short-term and	[1] Temporal aspects only on the process level. The current use of sub-compartments ("sub-categories" in

long-term distinguished in emissions subcategories) it might be advisable to have an additional field to each exchange pertaining to temporal aspects (instead of expanding the emissions subcat)

EcoSpold v1) to indicate the temporal location of an emission is only one way to handle this issue, and it may not be the most elegant. Another option would be to assign a different time period to the emitting activities, e.g. by subdividing a landfill activity into several consecutive periods. In both cases, this is not a format issue, but more an issue of how the format is used. Theecoinvent Centre will consider how this can best be handled in the future.