

# Cite My Data M2M Service Technical Description

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## 1 Introduction

The Cite My Data Machine to Machine (M2M) service is a set of RESTful (*Representational State Transfer*) web services that allow registered clients to mint, update & retrieve ANDS Digital Object Identifiers (DOIs) that identify research data. By embedding the service within data management workflows, clients are able to treat datasets as citeable unique objects in the same way as DOI identified publications. The service ensures that a standard level of metadata is always associated with ANDS DOIs through the use of a mandatory metadata schema, while also allowing clients to further enrich descriptions through the use of non-mandatory metadata schema elements.

## 2 How Does it Work?

### 2.1 Integration with the Global DOI System

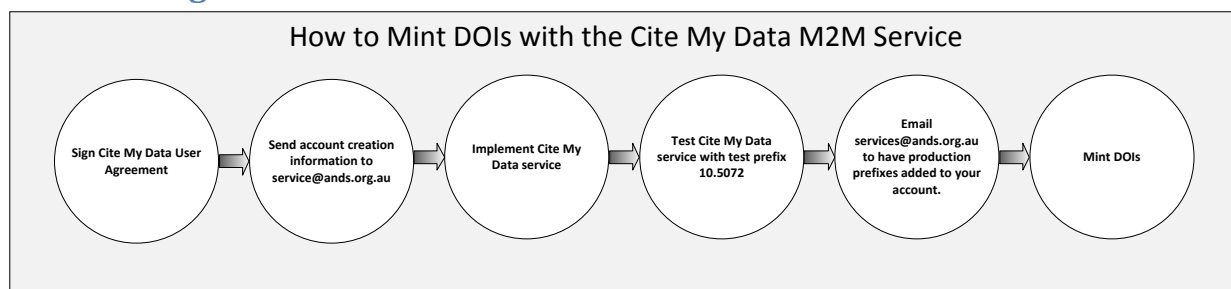
The [Digital Object Identifier \(DOI\) System](#) provides a framework for persistent identification, managing intellectual content, managing metadata, linking customers with content suppliers, facilitating electronic commerce, and enabling automated management of media. DOI names can be used for any form of management of any data, whether commercial or non-commercial. The DOI System is an ISO International Standard which is based on the [Handle System](#).

In order to provide DOI minting services that integrate with the global DOI System an organisation must be registered as an authorised Registration Agency (RA). ANDS is a member of an established International Registration Agency called [DataCite](#). DataCite has developed an infrastructure that supports simple and effective methods of data citation, discovery, and access. Through this DataCite membership, ANDS has become part of the Registration Agency and can offer DataCite DOI services.

The ANDS Cite My Data M2M service utilises the DOI services offered through our membership with DataCite while also adding a layer of administration and business logic. DataCite addresses the issue of data accessibility by requiring that all data identified by a DataCite DOIs is publicly available (published) via a URL. This means that all DOIs minted through ANDS must resolve to a public landing page that contains information about the associated dataset and a direct link to the dataset itself.

ANDS aims to integrate the Cite My Data service with the ANDS registry allowing clients to register collections and mint DOIs in a single step.

### 2.2 Minting DOIs



The ANDS Cite My Data M2M service is implemented as a set of secure PHP RESTful web services backed by a Postgres database. Clients are required to register with ANDS before access to the

administrative services is granted (*see section 3.1 [How Do I Get Access?](#)*). Once registered, clients can programmatically call the Cite My Data M2M Service to mint and manage DOIs (*see section 3.9 [Service Points](#)*). All connections with the service should be made via Hypertext Transfer Protocol Secure (*HTTPS*).

When minting a DOI, the Cite My Data M2M service requires that metadata about the data being identified is included in an XML document that conforms to the DataCite Metadata Schema (*ANDS currently supports version 2.1 of the schema. See section 3.6 [DataCite Metadata Schema](#)*). Clients are not required to pass through identifiers when minting DOIs as these are generated by the Cite My Data service.

The mandatory set of information that needs to be passed through to mint a DOI is

- **URL** - The URL for the landing page of the dataset. (*Passed as a parameter and not part of the XML metadata*)
- **Title** - A name or title by which a resource is known.
- **Creators** - The main researchers involved in producing the data, or the authors of the publication, in priority order.
- **Publisher** - The holder of the data (including archives as appropriate) or institution that submitted the work.
- **Publication Year** - The year when the data was or will be made publicly available.

*An XML example of DataCite metadata can be found in section 3.11 [DataCite Schema XML Example](#).*

Once a DOI has been minted the ANDS Cite My Data Service will give public access to the XML metadata associated with the DOI via a publically accessible service point.

*Note: ANDS does not update the information stored with DOIs which have been minted using the Cite My Data service. This is the responsibility of the client that minted the DOI.*

## 2.3 DOI Resolution

All ANDS DOIs must be associated with a resolvable URL pointing to a landing page for the data being identified. This means that resolving ANDS DOIs is as simple as prefixing the DOI with the DOI System's resolution service address (<http://dx.doi.org/>) in a browser address bar e.g. <http://dx.doi.org/10.1594/PANGAEA.726855>.

It is important to understand that the Handle System (the technical infrastructure for DOIs) is a distributed network system. The consequence of this is inherent latency. DOIs have TTL (time to live) defaulted to 24 hours, so any changes will be visible to the resolution infrastructure only when the TTL expires.

## 3 Cite My Data M2M Service Technical Details

### 3.1 How Do I Get Access?

Before your software can use the Cite My Data M2M service it needs to be registered as a trusted client in the ANDS database. Once this registration process is complete, HTTP requests will be serviced.

There are 2 steps involved in gaining access to the Cite My Data M2M service.

#### Step 1

The first step in gaining access to the service is to submit a signed Cite My Data Service Agreement to ANDS. The agreement details the responsibilities of ANDS and ANDS clients in the provision and use of the Cite My Data service. The agreement can be downloaded [here](#) and should be signed by someone entitled to enter into agreements on behalf of your organisation and sent to your ANDS liaison officer.

#### Step 2

Once you have submitted a signed Cite My Data Service Agreement you will need to email [services@ands.org.au](mailto:services@ands.org.au) with the following account creation information:

- **DOI Account Name** – *(A name for the Cite My Data account. Usually an organisation)*
- **IP Address or Range** – *(This must be the IP address of the machine that will be calling the service. Ranges can be submitted by entering the start and end of the range separated by a comma)*
- **Account Contact Full Name** – *(The name of a contact at your site ANDS should contact to discuss DOI related issues)*
- **Account Contact Email Address** – *(Email address for the primary contact. Group mailboxes are preferred over personal email addresses as they ensure ANDS has an ongoing contact point if a client's staff member changes role or leaves.)*
- **Top Level Domains** – *(Comma separated list of top level domains that DOI URLs will be resolved under. Remember DOI URLs must resolve to a public landing page that contains information about the associated dataset and a direct link to the dataset itself)*

#### Example

**DOI Account Name:** ANDS Canberra

**IP Address:** 101.101.101.101

**Datacentre Contact Full Name:** Joe Smith

**Datacentre Contact Email Address:** [DataCentreDOIperson@ands.org.au](mailto:DataCentreDOIperson@ands.org.au)

**Top Level Domains:** <http://ands.org.au> , <http://services.ands.org.au>

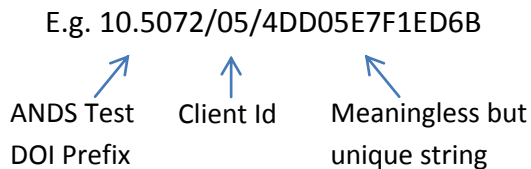
### 3.2 Authentication

After ANDS has set up your Cite My Data account you will be issued with an Application Identifier (App Id). The App Id will be used along with your registered IP address for authentication with the ANDS Cite My Data service. The App Id must be passed as a parameter with all administrative service calls (mint & update). Administrative requests that do not contain correct credentials will fail with a response code of 415 : Authentication Error.

App Id example : 9b310b815997d2d3438ead565f253b0e75e970f7

### 3.3 Client Identifiers

Upon account creation your account will be given a unique Client Identifier (Client Id). The Client Id will be used in the creation of your DOIs and will allow you to identify your DOIs and obtain accurate reporting statistics.



### 3.4 Testing the Cite My Data M2M Service

While a client is integrating and testing the Cite My Data service, the only DOI prefix that will be allocated to the client's account will be the ANDS test DOI prefix (10.5072). DOIs minted using this prefix are not visible in the global DOI infrastructure and therefore do not resolve. These test DOIs are routinely deleted from the DOI database.

Once the client and ANDS are satisfied that the service has been successfully implemented and tested, the client will need to email [services@ands.org.au](mailto:services@ands.org.au) to have the production prefixes added to their account.

### 3.5 Adding Domains to Your Account

Additional domains can be added to your Cite My Data account by sending a request to [services@ands.org.au](mailto:services@ands.org.au). The email subject should be 'Add Domains to My Cite My Data Account' and the body should contain your Account Name and a comma separated list of the domains you wish to add.

### 3.6 DataCite Metadata Schema

DataCite has published an XML schema that defines the valid format for any metadata submissions to the dataset DOI registration system. As ANDS integrates with the DOI system via DataCite, all metadata that is passed as a parameter to one of the Cite My Data web services must adhere to this schema. ANDS currently supports version 2.1 of the schema. More information about the schema can be found at [DataCite schema](#).

#### 3.6.1.1 Tips for building XML metadata documents.

1. The schema must be declared in the root element as follows:

```
<resource xmlns="http://datacite.org/schema/kernel-2.1"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://datacite.org/schema/kernel-2.1
  http://schema.datacite.org/meta/kernel-2.1/metadata.xsd">
```

2. Note that above uses [schema.datacite.org](http://schema.datacite.org) not [www.datacite.org](http://www.datacite.org). You can use only schemas located at <http://schema.datacite.org> in order to get your XML documents accepted by the Cite

My Data service. You should NOT use schemas hosted on [www.datacite.org](http://www.datacite.org) even if both seem to be version 2.1.

3. If you have problems uploading your XML documents, 3<sup>rd</sup> party tools can be used to diagnose and validate your XML. One of many tools is <http://www.validome.org/xml> - just paste your XML document into the 'source code' area and press Validate. The tool highlights a location of the error.

### 3.7 Cite My Data M2M Service Responses

The possible responses to Cite My Data M2M service requests are shown in the below table.

Responses are in text HTML format.

Response Code	Response Text	Response Reason
200	OK : DOI <identifier> was successfully minted.	DOI minting request successful
200	OK : DOI <identifier> was successfully updated.	DOI update request successful
200	OK : DOI <identifier> was successfully deactivated.	DOI deactivation request successful
200	OK : DOI <identifier> was successfully activated.	DOI activation request successful
200	DOI <doi_identifier> does not exist in the ANDS Cite My Data service	The DOI you have requested metadata for does not exist in the Cite My Data service.
200	No metadata exists in the Cite My Data service for DOI <identifier>.	No metadata exists in the Cite My Data service for the requested DOI.
415	Authentication Error : You are not authorised to use this service. For more information or to request access to the service please contact <a href="mailto:services@ands.org.au">services@ands.org.au</a> .	Client's credentials (App Id, & IP) passed through in a service call do not match what's held in the Cite My Data service.  <i>See section 3.1 <a href="#">How Do I Get Access?</a> and 3.2 <a href="#">Authentication</a> for more information.</i>
415	Authentication Error : You do not appear to be the owner of DOI <identifier>. If you believe this to be incorrect please contact <a href="mailto:services@ands.org.au">services@ands.org.au</a> .	Client attempts to change a DOI which doesn't belong to them.
500	Internal Server Error : Document Load Error	Syntactical error in XML document passed through in a service request.
500	Internal Server Error : Document Validation Error  The metadata you have provided to mint a new DOI has failed the schema validation. Metadata is validated against the DataCite Metadata Schema. For information about the schema and the latest version supported, please visit the ANDS website <a href="http://ands.org.au">http://ands.org.au</a> . Detailed information about the validation errors can be found below.	DOI metadata in XML document passed through in service request has failed the DataCite schema validation  <i>See section 3.6 <a href="#">DataCite Metadata Schema</a> for more information.</i>
500	Internal Server Error : Document Validation Error	DOI metadata in XML document passed through in service request

Response Code	Response Text	Response Reason
	The metadata you have provided to update DOI <identifier> has failed the schema validation. Metadata is validated against the DataCite Metadata Schema. For information about the schema and the latest version supported, please visit the ANDS website <a href="http://ands.org.au">http://ands.org.au</a> . Detailed information about the validation errors can be found below.	has failed the DataCite schema validation  <i>See section 3.6 <a href="#">DataCite Metadata Schema</a> for more information.</i>
500	Internal Server Error : URL is a mandatory value to mint a DOI	URL parameter has been omitted when requesting a new DOI.  <i>See section 3.9 <a href="#">Service Points</a> for more information.</i>
500	Internal Server Error: There has been an unexpected error processing your DOI request. For more information please contact <a href="mailto:services@ands.org.au">services@ands.org.au</a>	The Cite My Data service has encountered an unexpected error due to external dependencies.
500	Internal Server Error : The ANDS Cite My Data service is currently unavailable. Please try again at a later time. If you continue to experience problems please contact <a href="mailto:services@ands.org.au">services@ands.org.au</a> .	Cite My Data Service is unavailable

### 3.8 Service Availability

Although ANDS attempts to ensure that the Cite My Data M2M service is always available, planned and unexpected outages will occur. Notice of all planned outages will be distributed via email prior to the event. For this reason it is important to keep your account contact information as up to date as possible.

As ANDS is dependent on a number of external services the risk of unexpected outages are increased. It is strongly recommended that application developers ensure service outages can be catered for in their applications.

### 3.9 Service Points

#### 3.9.1 Mint a DOI

<b>Description</b>	Mints a new DOI with associated metadata. <i>Note: Identifiers for DOIs are automatically generated by the Cite My Data service and do not need to be passed as parameters in the 'Identifier' metadata element when minting a DOI. Any text passed through in the 'Identifier' element within the metadata will be overwritten.</i>
<b>Service Point</b>	<a href="https://services.ands.org.au/home/does/doi_mint.php?app_id=\$app_id&amp;url=\$url">https://services.ands.org.au/home/does/doi_mint.php?app_id=\$app_id&amp;url=\$url</a>
<b>Method</b>	POST
<b>Parameters</b>	<ul style="list-style-type: none"> <li>• Application Id</li> <li>• URL</li> <li>• XML Metadata (conforming to DataCite Metadata Schema)</li> </ul>
<b>Response</b>	Text HTML format. <i>See Cite My Data M2M Service Responses table above.</i>

<b>Data</b>	
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### 3.9.2 Update a DOI

<b>Description</b>	Updates a DOI. DOI being updated must belong to the client requesting the update. The update service point allows clients to update their DOIs in 3 ways. Clients can update the URL only, metadata only, or both the URL and metadata.
<b>Service Point</b>	<a href="https://services.andis.org.au/home/does/doi_update.php?app_id=\$app_id&amp;DOI=\$DOI_id">https://services.andis.org.au/home/does/doi_update.php?app_id=\$app_id&amp;DOI=\$DOI_id</a>
<b>Method</b>	POST
<b>Parameters</b>	<ul style="list-style-type: none"> <li>• Application Id</li> <li>• DOI</li> <li>• URL (<i>only required if updating the URL</i>)</li> <li>• XML Metadata. Must contain the DOI being updated (<i>only required if updating the metadata</i>)</li> </ul>
<b>Response Data</b>	Text HTML format. <i>See Cite My Data M2M Service Responses table above.</i>

### 3.9.3 Deactivate a DOI

<b>Description</b>	Deactivates metadata associated with a DOI. A DOI's metadata is active by default. Deactivating a DOI's metadata prevents the metadata from being returned by the public 'Request Metadata Associated with DOI' service endpoint.
<b>Service Point</b>	<a href="https://services.andis.org.au/home/does/doi_deactivate.php?app_id=\$app_id&amp;DOI=\$DOI_id">https://services.andis.org.au/home/does/doi_deactivate.php?app_id=\$app_id&amp;DOI=\$DOI_id</a>
<b>Method</b>	GET
<b>Parameters</b>	<ul style="list-style-type: none"> <li>• Application Id</li> <li>• DOI</li> </ul>
<b>Response Data</b>	Text HTML format. <i>See Cite My Data M2M Service Responses table above.</i>

### 3.9.4 Activate a DOI

<b>Description</b>	Activates deactivated metadata associated with a given DOI. A DOI's metadata is active by default, and can only be activated if it has previously been deactivated. Activating a DOI's metadata allows the metadata to be returned by the public 'Request Metadata Associated with DOI' service endpoint.
<b>Service Point</b>	<a href="https://services.andis.org.au/home/does/doi_activate.php?app_id=\$app_id&amp;DOI=\$DOI_id">https://services.andis.org.au/home/does/doi_activate.php?app_id=\$app_id&amp;DOI=\$DOI_id</a>
<b>Method</b>	GET
<b>Parameters</b>	<ul style="list-style-type: none"> <li>• Application Id</li> <li>• DOI</li> </ul>
<b>Response Data</b>	Text HTML format. <i>See Cite My Data M2M Service Responses table above.</i>

### 3.9.5 Request Metadata Associated with a DOI

<b>Description</b>	Publically accessible service point which returns the metadata associated with a given DOI.
<b>Service Point</b>	<a href="https://services.andis.org.au/home/does/doi_xml.php?DOI=\$DOI_id">https://services.andis.org.au/home/does/doi_xml.php?DOI=\$DOI_id</a>
<b>Method</b>	GET

<b>Parameters</b>	DOI
<b>Response Data</b>	Text HTML format. <i>See Cite My Data M2M Service Responses table above.</i>

### 3.10 PHP Minting Example

The following example requests a new DOI using PHP and CURL. A request to update a DOI would basically be the same except the update service end point would be called.

```
<?php
    // set up the following parameters to have the appropriate values
    $app_id= "your_privded_application_id";
    $url = "the_url_of_the_data";

    // set up the xml post field to contain the valid Datacite schema xml

    $xml = 'xml=<?xml version="1.0" encoding="UTF-8"?>.....valid DataCite xml for this

    // define the call to the service
    $requestURI = "http://test.ands.org.au/home/does/doi_mint.php?app_id=".$app_id."&url=".$url;
    // use curl to connect and run the service and receive the response

    $newch = curl_init();
    curl_setopt($newch, CURLOPT_URL, $requestURI);
    curl_setopt($newch, CURLOPT_RETURNTRANSFER, true);
    curl_setopt($newch, CURLOPT_CUSTOMREQUEST, "POST");
    curl_setopt($newch, CURLOPT_POSTFIELDS,$xml);

    $result = curl_exec($newch);

    $curlinfo = curl_getinfo($newch);

    curl_close($newch);

    if( $result )
    {
        $resultXML = $result;
    }
    echo $resultXML;
?>
```

### 3.11 DataCite Schema XML Example

```
<resource xmlns="http://datacite.org/schema/kernel-2.1"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://datacite.org/schema/kernel-2.1
http://schema.datacite.org/meta/kernel-2.1/metadata.xsd">
    <identifier
identifierType="DOI">10.1594/WDCC/CCSRNIES_SRES_B2</identifier>
    <creators>
```

```

        <creator>
            <creatorName>Toru, Nozawa</creatorName>
        </creator>
        <creator>
            <creatorName>Utor, Awazon</creatorName>
            <nameIdentifier nameIdentifierScheme="ISNI">1422
4586 3573 0476</nameIdentifier>
        </creator>
    </creators>
    <titles>
        <title>National Institute for Environmental Studies and
Center for Climate System Research Japan</title>
        <title titleType="Subtitle">A survey</title>
    </titles>
    <publisher>World Data Center for Climate (WDCC)</publisher>
    <publicationYear>2004</publicationYear>
    <subjects>
        <subject>Earth sciences and geology</subject>
        <subject subjectScheme="DDC">551 Geology, hydrology,
meteorology</subject>
    </subjects>
    <contributors>
        <contributor contributorType="DataManager">
            <contributorName>PANGAEA</contributorName>
        </contributor>
        <contributor contributorType="ContactPerson">
            <contributorName>Doe, John</contributorName>
            <nameIdentifier
nameIdentifierScheme="ORCID">xyz789</nameIdentifier>
        </contributor>
    </contributors>
    <dates>
        <date dateType="Valid">2005-04-05</date>
        <date dateType="Accepted">2005-01-01</date>
    </dates>
    <language>eng</language>
    <resourceType resourceTypeGeneral="Image">Animation</resourceType>
    <alternateIdentifiers>
        <alternateIdentifier alternateIdentifierType="ISBN">937-0-
1234-56789-X</alternateIdentifier>
    </alternateIdentifiers>
    <relatedIdentifiers>
        <relatedIdentifier relatedIdentifierType="DOI"
relationType="IsCitedBy">10.1234/testpub</relatedIdentifier>
        <relatedIdentifier relatedIdentifierType="URN"
relationType="Cites">http://testing.ts/testpub</relatedIdentifier>
    </relatedIdentifiers>
    <sizes>
        <size>285 kb</size>
        <size>100 pages</size>
    </sizes>
    <formats>
        <format>text/plain</format>
    </formats>
    <version>1.0</version>
    <rights>Open Database License [ODbL]</rights>
    <descriptions>
        <description descriptionType="Other">
            The current xml-example for a DataCite record is the
official example from the documentation.

```

```
        <br/>Please look on datacite.org to find the newest
versions of sample data and schemas.
    </description>
</descriptions>
</resource>
```