# **REF 2021 Import/Export documentation**

Version: 2.6, December

## **Updates**

Minor updates have been made following the publication of the submission system validation rules document. These changes are highlighted in blue.

New updates have been made to the documentation to take into account the changes to the submission system resulting to the changed timescale as a result of the COVID-19 pandemic. These changes are highlighted in green.

1. The import/export file formats have been updated bring them in-line with the submission system. Most of the changes involved the renaming of fields or values. Some new fields have been added when the implementation of the part of the system required them to be. The postal address details have been removed from the case study contacts as they are no longer required. The impact case study grants section has been redesigned due to better understanding of the requirements for this section.

The import engine will support any files using the previous format *except* for the format of the impact case studies. The changes are highlighted through the document..

## **Introduction**

1. This document provides details of the structure of the import/export file formats, including the names of the tables and fields and details of the expected data types and field lengths. It should be read in conjunction with the ‘Guidance on submissions’ (REF 2019/01), hereafter ‘Guidance on submissions’, and ‘Panel criteria and working methods’ (REF 2019/02), hereafter ‘Panel criteria. These are available at [www.ref.ac.uk](http://www.ref.ac.uk).
2. The data requirements listed show all possible data requirements, whether mandatory or optional, for the purpose of developing REF import files. Existence of a data requirement in this document does not indicate that it is a mandatory requirement for the REF.
3. The case sensitivity of table and field names will follow the convention of the file format. If the file format is case sensitive then the names will follow the camel case convention which is how they appear in this document.

## **Free text fields**

1. All free text fields included in the import/export files should not contain any formatting, and in nearly all cases there is a word limit applied to the field during validation. The submission system will allow the text to be imported in full if it does not exceed the stated character length limits.

## **Import/export tables**

1. The import/export file formats will break down the submission data into the following tables. Some of the details of how these tables are structured depends partly on the file format.

|  |  |  |
| --- | --- | --- |
| **REF form** | **Table** | **Name** |
|  | Research groups | researchGroup |
| REF1a | Current staff | currentStaff |
| REF1b | Former staff | formerStaff |
| Former staff contracts | formerStaffContract |
| REF2 | Outputs | Outputs |
| Link between staff and outputs | staffOutputLink |
| REF3 | Impact case studies | impactCaseStudy |
| Impact case study grants | impactCaseStudyGrants |
| Impact case study contacts | impactCaseStudyContact |
| REF4a | Research doctoral degrees awarded | researchDoctoralDegrees |
| REF4b | Research income | researchIncome |
| REF4c | Research income in-kind | researchIncomeInKind |
| REF5a | Institutional level environment statement | institutionEnvironmentStatement |
| REF5b | Environment statement | environmentStatement |
| REF6a | Requests to remove the minimum of one requirement | removeMinimumOfOneRequests |
| REF6b | Output reduction requests | outputReductionRequests |
| Unit rationale statement | unitRationaleStatement |

### **Common fields**

1. In some file formats these fields will appear in every table. In the hierarchical file formats like XML and JSON these may appear only once in the hierarchy.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| Ukprn | String | Must be 8 characters long | The UKPRN for the institution importing the records |
| unitOfAssessment | Number | Between 1 and 34 | The number of the unit of assessment the records will be imported into |
| multipleSubmission | Character | A letter between A – Z | Only required if the institution is making more than one submission to a unit of assessment |

### **Research groups**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| Code | Character | An alpha or numeric character |  |
| Name | String | Maximum length 128 characters |  |

### **Current staff**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| hesaStaffIdentifier | String | Must be 13 characters long |  |
| staffIdentifier | String | Maximum length 24 characters | Only required if there is no HESA staff identifier. |
| Surname | String | Maximum length 64 characters |  |
| Initials | String | Maximum length 12 characters |  |
| dateOfBirth | Date |  |  |
| Orcid | String | Must be 37 characters | The ORCID should not begin with [**https://orcid.org/**](https://orcid.org/), as the submission system will add the prefix. |
| contractedFTE | Decimal | 2 decimal places |  |
| researchConnection | String | Maximum length 7,500 characters | See Guidance on Submissions paragraphs 123 to 127. |
| reasonsForNoConnectionStatement | String | One or more of CaringResponsibilities, PersonalCircumstances, ApproachingRetirement, DisciplinePractice | See Guidance on Submissions paragraphs 123 to 127. |
| isEarlyCareerResearcher | Boolean |  | Only required for staff members without a HESA staff identifier |
| isOnFixedTermContract | Boolean |  |  |
| contractStartDate | Date |  |  |
| contractEndDate | Date |  |  |
| isOnSecondment | Boolean |  |  |
| secondmentStartDate | Date |  |  |
| secondmentEndDate | Date |  |  |
| isOnUnpaidLeave | Boolean |  |  |
| unpaidLeaveStartDate | Date |  |  |
| unpaidLeaveEndDate | Date |  |  |
| researchGroups | Character | An alpha or numeric character | [[1]](#endnote-1)Can be repeated up to 4 times. |

### **Former staff**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| staffIdentifier | String | Maximum length 24 characters |  |
| Surname | String | Maximum length 64 characters |  |
| Initials | String | Maximum length 12 characters |  |
| dateOfBirth | Date |  |  |
| Orcid | String | Must be 37 characters | The ORCID should not begin with [**https://orcid.org/**](https://orcid.org/), as the submission system will add the prefix. |
| excludeFromSubmission | Boolean |  | Indicates the staff should not be included in the submission. No records with this flag set should remain in the submission when submitting it to the REF 2021. |

### **Former staff contract**

1. For each former staff member this information may be repeated for each contract. For the non-hierarchical file formats the staff identifier fields from the **Former staff** table will be included on the table as well.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| hesaStaffIdentifier | String | Must be 13 characters long |  |
| contracedtFTE | Decimal | 2 decimal places |  |
| researchConnection | String | Maximum length 7,500 characters | See Guidance on Submissions paragraphs 123 to 127. |
| reasonsForNoConnectionStatement | String | One or more of CaringResponsibilities, PersonalCircumstances, ReducedHours, NormalDisciplinePractice | See Guidance on Submissions paragraphs 123 to 127. |
| startDate | Date |  |  |
| endDate | Date |  |  |
| isOnSecondment | Boolean |  |  |
| secondmentStartDate | Date |  |  |
| secondmentEndDate | Date |  |  |
| isOnUnpaidLeave | Boolean |  |  |
| unpaidLeaveStartDate | Date |  |  |
| unpaidLeaveEndDate | Date |  |  |
| researchGroups | Character | An alpha or numeric character | 1Can be repeated up to 4 times. |

### **Research outputs**

1. More information for the requirements for outputs can be found in Annex K of the Guidance on Submissions on in the Output Information Requirements spreadsheet available from the REF website.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| outputIdentifier | String | Maximum length 24 characters |  |
| webOfScienceIdentifier | String | Maximum length 20 characters | More guidance on the use of this field will be provided when the integration with the citation API has been worked out further. |
| outputType | Character | A letter between A – V |  |
| Title | String | Maximum length 7,500 characters | If the output has no title, a description is required.  |
| Place | String | Maximum length 256 characters |  |
| Publisher | String | Maximum length 256 characters |  |
| volumeTitle | String | Maximum length 256 characters |  |
| Volume | String | Maximum length 16 characters |  |
| Issue | String | Maximum length 16 characters |  |
| firstPage | String | Maximum length 8 characters |  |
| articleNumber | String | Maximum length 32 characters |  |
| Isbn | String | Maximum length 24 characters |  |
| Issn | String | Maximum length 24 characters |  |
| Doi | String | Maximum length 1024 characters |  |
| patentNumber | String | Maximum length 24 characters |  |
| Month | String | One of 1 – 12 or January – December or Jan – Dec | Only required for outputs linked to former staff members. See Guidance on Submissions paragraph 264b. |
| Year | String | One of 2014, 2015, 2016, 2017, 2018, 2019, 2020 |  |
| url | String | Maximum length 1024 characters |  |
| isPhysicalOutput | Boolean |  | An indication that the output will be provided in physical form. |
| supplementaryInformation | String | Maximum length 1024 characters | See Guidance on Submissions paragraph 264l. |
| numberOfAdditionalAuthors | Number | A possible integer | See Guidance on Submissions paragraphs 268 to 272. |
| isPendingPublication [deprecated] | Boolean |  | <https://ref.ac.uk/media/1417/guidance-on-revisions-to-ref-2021-final.pdf> paras 44-45). |
| pendingPublicationReserve [deprecated] | String | Maximum length 24 characters | <https://ref.ac.uk/media/1417/guidance-on-revisions-to-ref-2021-final.pdf> paras 44-45). |
| isForensicScienceOutput | Boolean |  | See Guidance on Submissions paragraphs 275 and 276. |
| isCriminologyOutput | Boolean |  | See Guidance on Submissions paragraphs 277 and 278. |
| isNonEnglishLanguage | Boolean |  | See Guidance on Submissions paragraphs 285 to 287.  |
| englishAbstract | String | Maximum length 7,500 characters |
| isInterdisciplinary | Boolean |  | See Guidance on Submissions paragraphs 273 and 274. |
| proposeDoubleWeighting | Boolean |  | See Guidance on Submissions paragraphs 279 to 283. |
| doubleWeightingStatement | String | Maximum length 7,500 characters |
| doubleWeightingReserve | String | Maximum length 24 characters | The output identifier for the reserve for the pending publication. See Guidance on Submissions paragraphs 279 to 283. |
| conflictedPanelMembers | String | Maximum length 512 characters | See Guidance on Submissions paragraphs 261 to 263. |
| crossReferToUoa | Number | Between 1 and 34 | See Panel criteria paragraphs 399 to 404. |
| additionalInformation | String | Maximum length 7,500 characters | See Guidance on Submissions paragraphs 284. |
| isDelayedByCovid19 | Boolean |  | <https://ref.ac.uk/media/1417/guidance-on-revisions-to-ref-2021-final.pdf> paras 28-40  |
| covid19Statement | String | Maximum length 7,500 characters | <https://ref.ac.uk/media/1417/guidance-on-revisions-to-ref-2021-final.pdf> paras 28-40  |
| doesIncludeSignificantMaterialBefore2014 | boolean |  | Indicates the additional information statement includes a statement about significant material in common with an output submitted to REF 2014. |
| doesIncludeResearchProcess | boolean |  | Indicates the additional information statement includes information about the research process and/or content.  |
| doesIncludeFactualInformationAboutSignificance | boolean |  | Indicates the additional information statement includes factual information about the significance of the research. |
| researchGroups | Character | An alpha or numeric character |  |
| openAccessStatus | String | One ofCompliant,NotCompliant,DepositException,AccessException,TechnicalException,OtherException,OutOfScope,ExceptionWithin3MonthsOfPublication | See Guidance on Submission paragraphs 223 to 255. |
| outputAllocation1 | String | Maximum length 128 characters | This is required for UOAs 7, 10,11, 12, 26, 27, 28, 29, 33 and 34. See output allocation guidance at <http://www.ref.ac.uk/guidance/additional-guidance/>for more information.  |
| outputAllocation2 | String | Maximum length 128 characters | This is required for UOA 26 and optional for UOA10. As above see output allocation guidance at <http://www.ref.ac.uk/guidance/additional-guidance/> for more information. |
| outputAllocation3 | String | Maximum length 128 characters | This is required for UOA 12. As above see output allocation guidance at <http://www.ref.ac.uk/guidance/additional-guidance/> for more information. |
| outputSubProfileCategory | String | Maximum length 128 characters | Specifies the output sub-profile category for UOAs 3 and 12. See panel criteria and working methods paragraphs 181 and 183. |
| requiresAuthorContributionStatement | Boolean |  | This flag is to enable the submission system to track the author contribution statements to aid institutions in developing their submissions. |
| isSensitive | Boolean |  | Indicates the output record contains sensitive information and should be excluded from publication. |
| excludeFromSubmission | Boolean |  | Indicates that the output record should be excluded from submission. No records with this flag set should remain in the submission when submitting it to the REF 2021. |
| outputPdfRequired | Boolean | Export only | Will identify journal articles which the REF team have not been able to retrieve from publishers |
| outputPdf | 2Binary |  | The PDF of the full text of the output when submitting the output electronically. See Guidance on Submission Annex K. |
| mediaOfOutput | Boolean | Must not exceed 264 characters in length | Must be used to describe the version of electronic output being returned where not possible to submit the final version in electronic form. E.g. “Proof”, “Author Accepted Manuscript”.See updated invitiation to submit to REF 2021 as PDF at: https://ref.ac.uk/publications/updatedinvitation-tosubmit-to-ref2021/ for more information. |

### **Link between staff and outputs**

1. This table links staff to outputs, so the submission system can check the numbers of output submitted per staff member.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| hesaStaffIdentifier | String | Must be 13 characters long |  |
| staffIdentifer | String | Maximum length 24 characters |  |
| outputIdentifier | String | Maximum length 24 characters |  |
| authorContributionStatement | String | Maximum length 7,500 characters |  |
| isAdditionalAttributedStaffMember | Boolean |  | A value indicating whether this staff member is an additional attributed staff member for a double weighted output or an output submitted to main panel D. |

### **Impact case studies**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| caseStudyIdentifier | String | Maximum length 24 characters | An identifier provided by the institution for the case study. The identifier must be unique within a submission to a unit of assessment. |
| Title | String | Maximum length 256 characters |  |
| redactionStatus | String | One of NotRedacted, RequiresRedaction, NotForPublication |  |
| conflictedPanelMembers | String | Maximum length 512 characters | The name(s) of the panel member(s) who may have conflicts of interest for commercial reasons. |
| caseStudyPdf | [[2]](#endnote-2)Binary |  |  |
| redactedCaseStudyPdf | 2Binary |  |  |
| caseStudyDocument | 2Binary |  |  |
| crossReferToUoa | Number | Between 1 and 34 |  |
| corroboratingEvidence | 2Binary |  |  |
| IsCovid19StatementNotForPublication  | Boolean |  | <https://ref.ac.uk/media/1417/guidance-on-revisions-to-ref-2021-final.pdf>paras 53-62  |
| covid19Statement  | String | Maximum length 7,500 characters | <https://ref.ac.uk/media/1417/guidance-on-revisions-to-ref-2021-final.pdf>paras 53-62  |

### **Impact case study grants**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| grantsFunding | number | String | Maximum length 256 characters | In non-hierarchical files repeat these columns at the end of the file. See the Excel template for an example. |
| amount | Number | Positive integer |
| nameOfFunders | String | Maximum length 256 characters | 1Should be repeated for multiple funders |
| globalResearchIdentifiers | String | Maximum length 256 characters | 1Should be repeated for multiple identifiers |
| fundingProgrammes | String | Maximum length 256 characters | 1Should be repeated for multiple funding programmes |
| researcherOrcids | String | Must be 37 characters | The ORCID should not begin with **https://orcid.org**/.1Should be repeated for multiple researchers |
| formalPartners | String | Maximum length 256 characters | 1Should be repeated for multiple partners |
| Countries | String | Maximum length 256 characters | 1Should be repeated for multiple countries |

### **Impact case study contacts**

1. For each impact case study this information may be repeated for each contact. For the non-hierarchical file formats the case study identifier field from the **Impact case study** table will be included on the table as well.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| Number | Number | Between 1 and 5 |  |
| Name | String | Maximum length 64 characters |  |
| jobTitle | String | Maximum length 64 characters |  |
| emailAddress | String | Maximum length 128 characters |  |
| alternateEmailAddress | String | Maximum length 128 characters |  |
| Phone | String | Maximum length 24 characters |  |
| Organisation | String | Maximum length 128 characters |  |

### **Research doctoral degrees awarded**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| Year | String | One of 2013, 2014, 2015, 2016, 2017, 2018, 2019 |  |
| degreesAwarded | Decimal | 2 decimal places |  |

### **Research income**

A list of the income sources and how they map to the HESA sources by year can be found in Annex A.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| Source | Number | Between 1 and 15 |  |
| income2013 | Integer |  |  |
| income2014 | Integer |  |  |
| income2015 | Integer |  |  |
| income2016 | Integer |  |  |
| income2017 | Integer |  |  |
| income2018 | Integer |  |  |
| income2019 | Integer |  |  |

### **Research income in kind**

A list of the income sources can be found in Annex A.

|  |  |  |  |
| --- | --- | --- | --- |
| Field name | Type | Restrictions | Comments |
| Source | Number | 16 and 17. |  |
| income2013 | Integer |  |  |
| income2014 | Integer |  |  |
| income2015 | Integer |  |  |
| income2016 | Integer |  |  |
| income2017 | Integer |  |  |
| income2018 | Integer |  |  |
| income2019 | Integer |  |  |

### **Institution environment statement**

1. Unlike all the other tables listed the institution environment statement will not include the **unitOfAssessment** or **multipleSubmission** fields.

### **Environment statement**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| requiresRedaction | Boolean |  |  |
| Statement | 2Binary |  |  |
| statementDocument | Binary |  |  |
| redactedStatement | 2Binary |  |  |
| covid19Statement | String |  |  |
| redactedCovid19Statement | String |  |  |

### **Requests to remove the minimum of one requirement**

1. See Guidance on Submissions paragraphs 178 to 183.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| hesaStaffIdentifier | String | Must be 13 characters long |  |
| staffIdentifier | String | Maximum length 24 characters | Only required if there is no HESA staff identifier. |
| Circumstances | String | One ofECR,SecondmentsOrCareerBreaks,FamilyRelatedLeave,JuniorClinicalAcademic,RequiringJudgement | 1Should be repeated for each circumstance which applies. See Guidance on Submissions paragraphs 179 and 180. |
| supportingInformation | String | Maximum length 7,500 characters | See Guidance on Submissions paragraphs 182. |

### **Output reduction requests**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| hesaStaffIdentifier | String | Must be 13 characters long |  |
| staffIdentifier | String | Maximum length 24 characters | Only required if there is no HESA staff identifier. |
| typeOfCircumstance | String | One ofECR,SecondmentsOrCareerBreaks,FamilyRelatedLeave,JuniorClinicalAcademic,RequiringJudgement | See Guidance on Submissions paragraphs 160 to 162. |
| tariffBand | Number | Between 0 and 3 | Should map to the rows of Table 1 or Table 2 in the annex L of the Guidance on Submissions for the circumstance being claimed.  |
| supportingInformation | String | Maximum length 7,500 characters | See Guidance on Submissions paragraph 193. |

### **Unit rationale statement**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field name** | **Type** | **Restrictions** | **Comments** |
| unitRationaleStatement | String | Maximum length 7,500 characters | See Guidance on Submissions paragraph 177. |

**Annex A – Income sources**

|  |  |
| --- | --- |
| Source | Column numbers by year as in HESA templates |
| 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 |
| 1 | BEIS Research Councils, The Royal Society, British Academy and The Royal Society of Edinburgh | C1 | C1 | C1i | C1i | C1i | C1i |
| 2 | UK-based charities (open competitive process) | C2 | C2 | C2 | C2 | C2 | C2 |
| 3 | UK-based charities (other) | C3 | C3 | C3 | C3 | C3 | C3 |
| 4 | UK central government bodies/local authorities, health and hospital authorities | C4 | C4 | C4 | C4 | C4 | C4 |
| 5 | UK central government tax credits for research and development expenditure |  | C5 | C5 | C5 | C5 | C5 |
| 6 | UK industry, commerce and public corporations | C5 | C6 | C6 | C6 | C6 | C6 |
| 7 | UK other sources | C13 | C14 | C7 | C7 | C7 | C7 |
| 8 | EU government bodies | C6 | C7 | C8 | C8 | C8 | C8 |
| 9 | EU-based charities (open competitive process) | C7 | C8 | C9 | C9 | C9 | C9 |
| 10 | EU industry, commerce and public corporations | C8 | C9 | C10 | C10 | C10 | C10 |
| 11 | EU (excluding UK) other | C9 | C10 | C11 | C11 | C11 | C11 |
| 12 | Non-EU-based charities (open competitive process) | C10 | C11 | C12 | C12 | C12 | C12 |
| 13 | Non-EU industry commerce and public corporations | C11 | C12 | C13 | C13 | C13 | C13 |
| 14 | Non-EU other | C12 | C13 | C14 | C14 | C14 | C14 |
| 15 | Health research funding bodies |  |  |  |  |  |  |
| 16 | Research councils income-in-kind |  |  |  |  |  |  |
| 17 | Health research funding bodies income-in-kind |  |  |  |  |  |  |

**Annex B – Summary of changes to the file formats**

The import engine will support the importing of the original names along side the updated names, and any field the import engine does not recognise is ignored. Therefore with the exception of the changes to the impact case study grants section all changes are backwardly compatible.

|  |  |  |
| --- | --- | --- |
| **Form** | **Field** | **Summary of changes** |
| Research group | name | Increased the maximum length from 64 characters to 128 characters. |
| Outputs (REF2) | supplementaryInformation | Renamed the field from supplementaryInformationDOI. |
|  | doesIncludeSignificantMaterialBefore2014 | Field added, to enable the system to work out the word count for additional information. |
|  | doesIncludeResearchProcess | Field added, to enable the system to work out the word count for additional information. |
|  | doesIncludeFactualInformationAboutSignificance | Field added, to enable the system to work out the word count for additional information. |
|  | openAccessStatus | The OtherFurtherException status has been renamed OtherException and the ExceptionWith3MonthsOfPublication has been renamed ExceptionWithin3MonthsOfPublication. |
|  | outputAllocation1 | Renamed the field from outputAllocation |
|  | outputAllocation2 | Field added. |
| Staff/Output links (REF2) | isAdditionalAttributedStaffMember | Field added, to record whether this staff member is an additional attributed staff member for a double weighted output or an output submitted to main panel D. |
| Impact case studies (REF3) | redactedCaseStudyPdf | Field added. |
|  | corroboratingEvidence | Field added. |
| Impact case studies grants (REF3) |  | This section of the import file has been reworked completely due to a better understanding of the requirements. NOTE: Old versions of this section are not supported by the import engine. |
| Impact case studies contacts (REF3) | contactType, addressLine1, addressLine2, addressLine3, addressLine4, addressLine5, postcode, country, corroborateText | These fields have been removed as they are no longer required. |
| Requests to remove the minimum of one (REF6a) | circumstances | Renamed the RequiresJudgement circumstance to RequiringJudgement. |
|  | supportingInformation | Renamed the field from supportingStatement |
| Output reduction requests (REF6b) |  | Section renamed from unitCircumstancesStaffList |
|  | typeOfCircumstance | Renamed the RequiresJudgment circumstance to RequiringJudgement. |
|  | supportingInformation | Renamed the field from supportingStatement. |
| Unit rationale statement (REF6b) | unitRationaleStatement | Renamed the field from supportingStatement. |

1. In hierarchical file formats these items can just be repeated in the file, for other formats a semi-colon delimited list should be provided in the single field. [↑](#endnote-ref-1)
2. Fields of type binary will only be supported in some of the file formats. Text based file formats (XML and JSON) for example will require the binary data to be BASE64 encoded. [↑](#endnote-ref-2)