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P. Kewisch
Mozilla

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jCard: The JSON format for vCard
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Abstract

This specification defines "jCard", a JSON format for vCard data.

Status of This Memo

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1. Introduction

The vCard data format [RFC6350] has gone through multiple revisions, most recently vCard 4. The goal followed by this format is the capture and exchange of information normally stored within an address book or directory application. As certain similarities to the iCalendar data format [RFC5545] exist it makes sense to define a JSON-based data format for vCards that is similar to the jCal format defined in [I-D.ietf-jcardcal-jcal].

The purpose of this specification is to define "jCard", a JSON format for vCard data. One main advantage to using a JSON-based format as defined in [RFC4627] over the classic vCard format is easier processing for JavaScript based widgets and libraries, especially in the scope of web-based applications.

The key design considerations are essentially the same as those for [I-D.ietf-jcardcal-jcal] and [RFC6321], that is:

> Round-tripping (converting a vCard instance to jCard and back) will give the same semantic result as the starting point. For example, all components, properties and property parameters are guaranteed to be preserved, with the exception of those which have default values.
>
> Ordering of elements will not necessarily be preserved.
>
> Preserve the semantics of the vCard data. While a simple consumer can easily browse the data in jCard, a full understanding of vCard is still required in order to modify and/or fully comprehend the directory data.
>
> Ability to handle many extensions to the underlying vCard specification without requiring an update to this document.

2. Conventions Used in This Document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

The underlying format used for jCard is JSON. Consequently, the terms "object" and "array" as well as the four primitive types are to be interpreted as described in Section 1 of [RFC4627].

Some examples in this document contain "partial" JSON documents used for illustrative purposes. In these examples, three periods "..." are used to indicate a portion of the document that has been removed

for compactness.

3. Converting from vCard to jCard

This section describes how vCard data is converted to jCard using a simple mapping between the vCard data model and JSON elements.

3.1. Pre-processing

vCard uses a line folding mechanism to limit lines of data to a maximum line length (typically 72 characters) to ensure maximum likelihood of preserving data integrity as it is transported via various means (e.g., email) - see Section 3.2 of [RFC6350]. Prior to converting vCard data into jCard all folded lines MUST be unfolded.

vCard data uses an "escape" character sequence for text values and property parameter values. When such text elements are converted into jCard the escaping MUST be removed. See Section 3.4 of [RFC6350].

One key difference in the formatting of values used in vCard and jCard is that in jCard the specification uses date/time values aligned with the complete representation, extended format of [ISO.8601.2004].

3.2. vCard Stream

In certain cases it makes sense to group a sequence of vcard objects into a stream of objects. While the vCard 4 standard doesn't define a stream of vcard objects, having one makes it easier to identify multiple jCard objects and also ensures compatibility to jCal. A jCard stream is identified by an array, where the first element is the string "vcardstream". Subsequent elements are vCard objects represented as described in this document.

In the typical case where there is only one vCard object, encapsulation inside a "vcardstream" array MAY be omitted.

A vCard stream can contain one or more vCard objects. Each vCard object, delimited by "BEGIN:VCARD" and "END:VCARD", is represented in JSON as a fixed length array with two elements:

1. The string "vcard"

2. An array of jCard properties

The representation of a vCard object in JSON will be named "vcard component" throughout this document.

Example:

```
["vcardstream",
  ["vcard",
    [ /* properties */ ]
  ],
  ["vcard",
    [ /* properties */ ]
  ],
  ...
]
```

vCard objects are comprised of a set of "properties", "parameters" and "values". The top level of a vCard object contains "properties". A "property" has a "value" and a set of zero or more "parameters". vCard objects are delimited by the general properties "BEGIN" and "END" with the fixed value "VCARD" as defined in Section 6.1.1 and 6.1.2 of [RFC6350]. In addition, the vCard format is versioned, therefore the "version" property is mandatory. To comply with Section 6.7.9 of [RFC6350], the value of the version property MUST be "4.0".

3.3. Properties (RFC6350 section 6)

Each individual vCard property is represented in jCard by an array with three fixed elements, followed by one or more additional elements, depending on if the property is a multi-value property as described in Section 3.3 of [RFC6350].

The array consists of the following fixed elements:

1. The name of the property as a string, but in lowercase.

2. An object containing the parameters as described in Section 3.4.

3. The type identifier string of the value, in lowercase.

The remaining elements of the array are used for the value of the property. For single-value properties, the array MUST have exactly four elements, for multi-valued properties as described in Section 3.3.1.1 there can be any number of additional elements.

The array describing the property can then be inserted into the array designated for properties in the "vcard" component.

Example:

```
["vcard",
  [
    ["version", {}, "text", "4.0"],
    ["fn", {}, "text", "John Doe"],
    ["gender", {}, "text", "M"],
    ...
  ],
]
```

The property parameters in the second element of the property array associate a set of parameter names with their respective value. Parameters are further described in Section 3.4.

To allow for a cleaner implementation, the parameter object MUST be present even if there are no parameters. In this case, an empty object MUST be used.

3.3.1. Special Cases for Properties

This section describes some properties that have special handling when converting to jCard.

3.3.1.1. Multi-valued Properties

Various vCard properties defined in [RFC6350], for example the "CATEGORIES" property, are defined as multi-valued properties. In jCal these properties are added as further members of the array describing the property.

Note that additional multi-valued properties may be added in extensions to the iCalendar format.

Example:

```
["vcard",
  [
    ["categories", {}, "text", "computers", "cameras"],
    ...
  ],
  ...
]
```

3.3.1.2. Grouping of Properties

[RFC6350] Section 3.3 defines a grouping construct that is used to group related properties together. In jCard, each grouped property appears as a separate property containing the group name and property name, separated by a "." character. This was done to maintain compatibilty of array elements with [I-D.ietf-jcardcal-jcal].

Example:

```
["vcard",
  [
    ["groupname.email", {}, "text", "johndoe@example.org"],
    ...
  ],
  ...
]
```

3.4. Parameters (RFC6350 section 5)

Property parameters are represented as a JSON object where each key-value pair represents the vCard parameter name and its value. The name of the parameter MUST be in lowercase, the original case of the parameter value MUST be preserved. For example, the "LANG" property parameter is represented in jCard by the "lang" key. Any new vCard parameters added in the future will be converted in the same way.

Example:

```
["vcard",
  [
    ["role", { "lang": "tr" }, "text", "roca"],
    ...
  ],
  ...
]
```

3.4.1. VALUE parameter

vCard defines a "VALUE" property parameter (Section 5.2 of [RFC6350]). This property parameter MUST NOT be added to the parameters object. Instead, the value type is always explicitly mentioned in the third element of the array describing the property. Thus, when converting from vCard to jCard, any "VALUE" property parameters are skipped. When converting from jCard into vCard, the appropriate "VALUE" property parameter MUST be included in the vCard property if the value type is not the default value type for that property.

3.4.2. Multi-value Parameters

In [RFC6350], some parameters allow using a COMMA-separated list of values. To ease processing in jCard, the value to such parameters MUST be represented in an array containing the separated values. The array elements MUST be string values. Single-value parameters SHOULD be represented using a single string value, but an array with one element MAY also be used. An example for a such parameter is the vCard "SORT-AS" parameter, more such parameters may be added in extensions.

DQUOTE characters used to encapsulate the separated values MUST NOT be added to the jCard parameter value.

Example 1:

```
["vcard",
  [
    ["n",
     { "sort-as": ["Harten", "Rene"] },
     "text",
     "van der Harten;Rene,J.;Sir;R.D.O.N."
    ],
    ["fn", {}, "text", "Rene van der Harten"]
    ...
  ],
  ...
]
```

3.5. Values (RFC6350 section 4)

The type of a vCard value is explicitly mentioned in the third element of the array describing a jCard property. The actual values of the property can be found in the fourth and following elements of the array.

3.5.1. Text (RFC6350 section 4.1)

Description: vCard "TEXT" property values are represented by a property with the type identifier "text". The value elements are JSON strings.

Example:

```
...
["kind", {}, "text", "group"],
...
```

3.5.2. URI (RFC6350 section 4.2)

Description: vCard "URI" property values are represented by a property with the type identifier "uri". The value elements are JSON strings.

Example:

```
...
["source", {}, "uri", "ldap://ldap.example.com/cn=babs%20jensen"],
...
```

3.5.3. Date (RFC6350 section 4.3.1)

Description: vCard "DATE" property values are represented by a property with the type identifier "date". The value elements are JSON strings with the same date value specified by [RFC6350], but formatted using the [ISO.8601.2004] complete representation, extended format. The same date format restrictions regarding reduced accuracy, truncated representation and expanded representation noted in [RFC6350] Section 4.1.2.3 apply. Whenever the extended format is not applicable, the basic format is to be used.

ABNF Schema:

```
date-complete = year "-" month "-" day ;YYYY-MM-DD

date-noreduc  = date-complete
             / "--" month "-" day; --MM-DD
          /  "---" day; ---DDD

date =  date-noreduc
    / year; YYYY
 / year "-" month ; YYYY-MM
 / "--" month; --MM
```

Examples:

```
...
["bday", {}, "date", "1985-04-12"],
["bday", {}, "date", "1985-04"],
["bday", {}, "date", "1985"],
["bday", {}, "date", "--0412"],
["bday", {}, "date", "---12"],
...
```

3.5.4. Time (RFC6350 section 4.3.2)

Description: vCard "TIME" property values are represented by a property with the type identifier "time". The value elements are JSON strings with the same time value specified by [RFC6350], but formatted using the [ISO.8601.2004] complete representation, extended format. The same date format restrictions regarding reduced accuracy, decimal fraction and truncated representation noted in [RFC6350] Section 4.3.2 apply. Whenever the extended format is not applicable, the basic format is to be used. The seconds value of 60 MUST only be used to account for positive "leap" seconds and the midnight hour is always represented by 00, never 24. Fractions of a second are not supported by this format. Contrary to [I-D.ietf-jcardcal-jcal], UTC offsets are permitted within a time value.

ABNF Schema:

```
time-notrunc =  hour [":" minute [":" second]] [zone]

time = time-notrunc
    / "-" minute  ":" second [zone]; -mm:ss
    / "-" minute [zone]; -mm
    / "--" second [zone]; --ss
```

Examples:

```
...
["x-time-local", {}, "time", "12:30:00"],
["x-time-utc", {}, "time", "12:30:00Z"],
["x-time-offset", "time", "12:30:00-0800"],
["x-time-reduced", "time", "23"],
["x-time-truncated", "time", "-30"],
...
```

3.5.5. Date-Time (RFC6350 section 4.3.3)

Description: vCard "DATE-TIME" property values are represented by a property with the type identifier "date-time". The value elements are JSON strings with the same date value specified by [RFC6350], but formatted using the [ISO.8601.2004] complete representation, extended format. The same restrictions with respect to leap seconds, fractions of a second and UTC offsets as in Section 3.5.4 apply. Just as in [RFC6350], truncation of the date part is permitted.

Example:

```
...
["anniversary", {}, "date-time", "2013-02-14T12:30:00"],
["anniversary", {}, "date-time", "2013-01-10T19:00:00Z"],
["anniversary", {}, "date-time", "2013-08-15T09:45:00+0100"],
["anniversary", {}, "date-time", "---15T09:45:00+0100"],
...
```

3.5.6. Date and/or Time (RFC6350 section 4.3.4)

Description: jCard has no direct equivalent to vCard's "DATE-AND-OR-TIME" property value data type. Instead, the specified date, date-time or time format MUST be detected and the property MUST be represented by a property with the detected type identifier. See Section 6 for more information on how conversion between jCard and vCard should be handled.

3.5.7. Timestamp (RFC6350 section 4.3.5)

Description: jCard has no direct equivalent to vCard's "TIMESTAMP" property value data type. Instead, the specified complete date and time of day combination MUST be represented by a property with the "date-time" identifier. See Section 6 for more information on how conversion between jCard and vCard should be handled.

3.5.8. Boolean (RFC6350 section 4.4)

Description: vCard "BOOLEAN" property values are represented by a property with the type identifier "boolean". The value element is a JSON boolean value.

Example:

```
...
["x-non-smoking", {}, "boolean", true],
...
```

3.5.9. Integer (RFC6350 section 4.5)

Description: vCard "INTEGER" property values are represented by a property with the type identifier "integer". The value elements are JSON primitive number values.

Examples:

```
...
["x-karma-points", {}, "integer", 42],
```

```
...
```

3.5.10. Float (RFC6350 section 4.6)

Description: vCard "FLOAT" property values are represented by a property with the type identifier "float". The value elements are JSON primitive number values.

Example:

```
...
["x-grade", {}, "float", 1.3],
...
```

3.5.11. UTC Offset (RFC6350 section 4.7)

Description: vCard "UTC-OFFSET" property values are represented by a property with the type identifier "utc-offset". The value elements are JSON strings with the same UTC offset value specified by [RFC6350], with the exception that the hour and minute components are separated by a ":" character, for consistency with the [ISO.8601.2004] timezone offset, extended format.

Example:

```
...
// Note: [RFC6350] mentions use of utc-offset
// for the TZ property as NOT RECOMMENDED
["tz", {}, "utc-offset", "-05:00"],
..
```

3.5.12. Language Tag (RFC6350 section 4.8)

Description: vCard "LANGUAGE-TAG" property values are represented by a property with the type identifier "language-tag". The value elements are JSON strings containing a single language-tag, as defined in [RFC5646].

Example:

```
...
["lang", {}, "language-tag", "de"],
..
```

3.6. Extensions (RFC6350 section 6.10)

vCard extension properties and property parameters (those with an "X-" prefix in their name) are handled in the same way as other properties and property parameters: the property is represented by an array, the property parameter represented by an object. The property or parameter name uses the same name as for the vCard extension, but in lowercase. For example, the "X-FOO" property in vCard turns into the "x-foo" jCard property. See Section 5 for how to deal with default values for unrecognized extension properties or property parameters.

4. Converting from jCard into vCard

When converting property and property parameter values, the names SHOULD be converted to uppercase. Although vCard names are case insensitive, common practice is to keep them all uppercase following the actual definitions in [RFC6350].

Backslash escaping and line folding MUST be applied to the resulting vCard data as required by [RFC6350].

When converting to vCard, the VALUE parameter MUST be added to properties whose default value type is unknown. The VALUE parameter SHOULD NOT be added to properties using the default value type.

5. Handling Unrecognized Properties or Parameters

In vCard, properties have a default value type specified by their definition, e.g. "BDAY"'s value type is "date-and-or-time", but it can also be reset to a single "text" value. When a property uses its default value type, the "VALUE" property parameter does not need to be specified on the property.

When new properties are defined or "X-" properties used, a vCard to jCard converter might not recognize them, and not know what the appropriate default value types are, yet they need to be able to preserve the values. A similar issue arises for unrecognized property parameters. As a result, the following rules are applied when dealing with unrecognized properties and property parameters:

- When converting vCard into jCard:
  - Any property that does not include a "VALUE" property parameter and whose default value type is not known, MUST be converted to a string object. The content of that string is the unprocessed value text.

    * Any unrecognized property parameter MUST be converted to a string value, with its content set to the property parameter value text, treated as if it were a "TEXT" value.

- When converting jCard into vCard:

    * Since jCard always explicitly specifies the value type, it can always be converted to vCard using the VALUE parameter.

    * If the value type specified in jCard matches the default value type in vCard, the VALUE parameter SHOULD be omitted.

Example: The following is an example of an unrecognized vCard property (that uses an "URI" value as its default), and the equivalent jCard representation of that property.

vCard:

```
X-COMPLAINT-URI:mailto:abuse@example.org
```

jCard:

```
...
["x-complaint-uri", {}, "text", "mailto:abuse@example.org"],
...
```

Example: The following is an example of a jCard property (where the corresponding vCard property uses a "INTEGER" value as its default), and the equivalent vCard representation of that property. It is assumed that the parser has knowledge of the default data type for the "x-karma-points" property.

jCard:

```
...
["x-karma-points", {}, "integer", 95],
...
```

vCard:

```
X-KARMA-POINTS:95
```

Example: The following is an example of an unrecognized vCard property parameter (that uses a "FLOAT" value as its default) specified on a recognized vCard property, and the equivalent jCard representation of that property and property parameter.

vCard:

```
GENDER;X-PROBABILITY=0.8:M
```

jCard:

```
...
["gender", { "x-probability": "0.8" }, "text", "M"],
...
```

6. Conversion of Date and Time Related Data Types

[RFC6350] defines the data types DATE, DATE-TIME, TIME, DATE-AND-OR-TIME and TIMESTAMP, covering various aspects of dates and times. As jCard is more "strongly typed", some of these types have been consolidated. This section aims to aid conversion between jCard and vCard and vice versa.

Regardless of the date/time related property converted, jCard and vCard use different representations of the [ISO.8601.2004] format. The date format MUST be adjusted during conversion.

6.1. Conversion from jCard to vCard

- If the property type of the jCard property matches the property's default type, the VALUE parameter MUST NOT be added to the vCard property.

- For property types "date-and-or-time" or "timestamp", the property value MUST be converted to a permitted date and/or time format as specified in [RFC6350] Section 4.3.4 and 4.3.5 and the VALUE parameter MUST NOT be added to the vCard property. If a permitted conversion cannot be done, the VALUE parameter must be added with the closest available date/time format identifier.

- If the default type is unknown or the jCal property type does not match the default type, the VALUE parameter MUST be specified.

6.2. Conversion from vCard to jCard

- If the parser knows the default type of the property and it is one of "DATE", "DATE-TIME" or "TIME", the properties can be directly converted following the guidelines of the respective format type in this document.

- For the property type "date-and-or-time", the parser SHOULD detect if it is handling either a date, a time, or a date-time and use the respective format identifier in jCard.

- For the property type "timestamp", the parser MUST use the format type identifier "date-time" in the jCard property.

- If the (default) property type is unknown, the property value MUST be treated as opaque text and the "text" format type identifier MUST be used.

7. Security Considerations

For security considerations specific to calendar data, see Section 9 of [RFC6350]. Since this specification is a mapping from vCard, no new security concerns are introduced related to calendar data.

The use of JSON as a format does have security risks. Section 7 of [RFC4627] discusses these risks.

8. IANA Considerations

This document defines a MIME media type for use with vCard in JSON data. This media type SHOULD be used for the transfer of calendaring data in JSON.

Type name: application

Subtype name: vcard+json

Required parameters: none

Optional parameters: version as defined for the text/vcard media type in [RFC6350].

Encoding considerations: Same as encoding considerations of application/json as specified in [RFC4627].

Security considerations: See Section 7.

Interoperability considerations: This media type provides an alternative format for vCard data based on JSON.

Published specification: This specification.

Applications which use this media type: Applications that currently make use of the text/vcard media type can use this as an alternative. Similarly, Applications that use the application/json media type to transfer directory data can use this to further specify the content.

Person & email address to contact for further information:
vcarddav@ietf.org

Intended usage: COMMON

Restrictions on usage: There are no restrictions on where this media type can be used.

Author: See the "Author's Address" section of this document.

Change controller: IETF

9. Acknowledgments

The author would like to thank the following for their valuable contributions: Cyrus Daboo, Mike Douglass, William Gill, Erwin Rehme, and Dave Thewlis. This specification originated from the work of the XML-JSON technical committee of the Calendaring and Scheduling Consortium.

10. References

10.1. Normative References

[I-D.ietf-jcardcal-jcal] Kewisch, P., Daboo, C., and M. Douglass, "jCal: The JSON format for iCalendar", draft-ietf-jcardcal-jcal-00 (work in progress), March 2013.

[ISO.8601.2004] International Organization for Standardization, ""Data elements and interchange formats -- Information interchange -- Representation of dates and times"", ISO 8601, 12 2004.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC5234] Crocker, D. and P. Overell, "Augmented BNF for Syntax Specifications: ABNF", STD 68, RFC 5234, January 2008.

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[RFC5646] Phillips, A. and M. Davis, "Tags for

Identifying Languages", BCP 47, RFC 5646, September 2009.

[RFC6321] Daboo, C., Douglass, M., and S. Lees, "xCal: The XML Format for iCalendar", RFC 6321, August 2011.

[RFC6350] Perreault, S., "vCard Format Specification", RFC 6350, August 2011.

10.2. Informative References

[RFC4627] Crockford, D., "The application/json Media Type for JavaScript Object Notation (JSON)", RFC 4627, July 2006.

[calconnect-artifacts] The Calendaring and Scheduling Consortium, "Code Artifacts and Schemas", <http://www.calconnect.org/artifacts.shtml>.

Appendix A. ABNF Schema

Below is an ABNF schema as per [RFC5234] for vCard in JSON. ABNF Symbols not described here are taken from [RFC4627]. The schema is non-normative and given for reference only.

The numeric section numbers given in the comments refer to section in [RFC6350]. Additional semantic restrictions apply, especially regarding the allowed properties and sub-components per component. Details on these restrictions can be found in this document and [RFC6350].

Additional schemas may be available on the internet at [calconnect-artifacts].

```
; A vCard Stream is an array with the first element being the
; string "vcardstream". All remaining elements are jcardobjects.
jcardstream = begin-array
              DQUOTE "vcardstream" DQUOTE
              *(value-separator jcardobject)
              end-array

jcardobject = component

; A jCard object consists of the name string "vcard" and a properties
; array. Restrictions to which properties and may be specified are to
; be taken from RFC6350.
```

```
   jcardobject = begin-array
                 DQUOTE component-name DQUOTE value-separator
                 properties-array
                 end-array

   ; A jCard property consists of the name string, parameters object,
   ; type string and one or more values as specified in this document.
   property = begin-array
              DQUOTE property-name DQUOTE value-separator
              params-object value-separator
              DQUOTE type-name DQUOTE
              propery-value *(value-separator property-value)
              end-array
   properties-array = begin-array
                      [ property *(value-separator property) ]
                      end-array

   ; Property values depend on the type-name. Aside from the value types
   ; mentioned here, extensions may make use of other JSON value types.
   property-value = string / number / boolean

   ; The jCard params-object is a JSON object which follows the semantic
   ; guidelines described in this document.
   params-object = begin-object
                   [ params-member *(value-separator params-member) ]
                   end-object
   params-member = DQUOTE param-name DQUOTE name-separator param-value
   param-value = string

   ; The type MUST be a valid type as described by this document. New
   ; value types can be added by extensions.
   type-name = "text" / "uri" / "date" / "time" / "date-time" /
               "boolean" / "integer" / "float" / "utc-offset" /
               "language-tag" / x-type


   ; Property, parameter and type names MUST be lowercase. Additional
   ; semantic restrictions apply as described by this document and
   ; RFC6350.
   component-name = lowercase-name
   property-name = lowercase-name
   param-name = lowercase-name
   x-type = lowercase-name
   lowercase-name = 1*(%x61-7A / DIGIT / "-")
```

Appendix B. Examples

This section contains an example of a vCard object with its jCard representation.

B.1. Example: vCard of the author of RFC6350

B.1.1. vCard Data

```
BEGIN:VCARD
VERSION:4.0
FN:Simon Perreault
N:Perreault;Simon;;;ing. jr,M.Sc.
BDAY:--0203
ANNIVERSARY:20090808T1430-0500
GENDER:M
LANG;PREF=1:fr
LANG;PREF=2:en
ORG;TYPE=work:Viagenie
ADR;TYPE=work:;Suite D2-630;2875 Laurier;
 Quebec;QC;G1V 2M2;Canada
TEL;VALUE=uri;TYPE="work,voice";PREF=1:tel:+1-418-656-9254;ext=102
TEL;VALUE=uri;TYPE="work,cell,voice,video,text":tel:+1-418-262-6501
EMAIL;TYPE=work:simon.perreault@viagenie.ca
GEO;TYPE=work:geo:46.772673,-71.282945
KEY;TYPE=work;VALUE=uri:
 http://www.viagenie.ca/simon.perreault/simon.asc
TZ:-0500
URL;TYPE=home:http://nomis80.org
END:VCARD
```

B.1.2. jCard Data

```
["vcard",
  [
    ["version", {}, "text", "4.0"],
    ["fn", {}, "text", "Simon Perreault"],
    ["n", {}, "text", "Perreault;Simon;;;ing. jr,M.Sc."],
    ["bday", {}, "date", "--02-03"],
    ["anniversary", {}, "date-time", "2009-08-08T14:30:00-0500"],
    ["gender", {}, "text", "M"],
    ["lang", { "pref": "1" }, "language-tag", "fr"],
    ["lang", { "pref": "2" }, "language-tag", "en"],
    ["org", { "type": "work" }, "text", "Viagenie"],
    ["adr",
       { "type": "work" },
       "text",
       ";Suite D2-630;2875 Laurier;Quebec;QC;G1V 2M2;Canada"
    ],
    ["tel",
      { "type": ["work", "voice"], "pref": "1" },
      "uri",
      "tel:+1-418-656-9254;ext=102"
    ],
    ["tel",
      { "type": ["work", "cell", "voice", "video", "text"] },
      "uri",
      "tel:+1-418-262-6501"
    ],
    ["email",
      { "type": "work" },
      "text",
      "simon.perreault@viagenie.ca"
    ],
    ["geo", { "type": "work" }, "uri", "geo:46.772673,-71.282945"],
    ["key",
      { "type": "work" },
      "uri",
      "http://www.viagenie.ca/simon.perreault/simon.asc"
    ],
    ["tz", {}, "utc-offset", "-05:00"],
    ["url", { "type": "home" }, "uri", "http://nomis80.org"]
  ]
]
```

Appendix C. Open Issues (to be removed prior to publication as an RFC)

- [RFC6350] doesn't define any kind of stream for multiple vcard elements. For similarity with the jCal draft, I have added a "vcardstream". Is this wanted and does the name fit? (Maybe rather "jcardstream" ?)

- During conversion to jCard, I have dropped "date-and-or-time" and "timestamp" formats, since they can equally be represented by the formats "date", "time" and "date-time". I have added guidelines to Section 6, but there may be some situations I am unaware of that make dropping these formats impossible.

- This document defines in Section 3.3.1.2, that grouped properties are not to be handled differently than normal properties. This was done for compatibility with the jCal draft to make it easier for a parser to support both jCal and jCard. Another option would be to add a pseudo-property with the special type "group", the property name being the group name and the property value being an array of properties. Downside is that there is room for an extra set of parameters in the group container that does not serialize back to vCard.

- There is some open discussion on the vcarddav and calsify lists about structured property and parameter values. The origin of this format comes from jCal, where structured values are very rare and processing the remaining ones requires a processing library anyway. Therefore neither structured property values nor parameter values were added. For jCard on the other hand, structured values appear quite often. I have come up with three possible options for structured property values:

  1. Use an array as the value, possibly with a null value for any empty structured property: foo;;bar becomes ["foo", null, "bar"]

  2. Use an object for key-value combinations. Downside is that the key may not always be known, and needs to be defined at least for standard properties. (i.e for N: "surnames", "given", "additional", "honor-prefix", "honor-suffix"). Object values themselves could also be array values, i.e multiple honorific prefixes. Upside is that it makes it very easy to access the values even without using a dedicated client library.

  3. Keep the property value as an opaque text and leave any splitting to client libraries. This makes it very simple to parse both iCalendar and vCard data into a similar format, but

puts the burden of parsing the structured value on the client or client library.

Also, there should be a mention of how multi-values inside a structured value should be handled. With the second approach, these could themselves be an array, similar to how this document currently defines multi-value parameters.

Appendix D. Change History (to be removed prior to publication as an RFC)

draft-kewisch-vcard-in-json-01

* Added ABNF and improved references in date/time related sections
* Changes to wording in "vCard Stream" section
* Changes to wording about VALUE parameter when converting to vCard
* Corrected missing "type" parameter and separator in example
* Minor wording corrections

draft-ietf-jcardcal-jcard-00

* Pubication as a WG draft

Author's Address

Philipp Kewisch
Mozilla Corporation
650 Castro Street, Suite 300
Mountain View, CA 94041
USA

EMail: mozilla@kewis.ch
URI: http://www.mozilla.org/