Abstract: In the field of fictional and literary geography, the spatial information is conveyed through the power of words by one person: the author of the novel or, in the case of Dream Cartography, by the dreamer. Every story takes place somewhere. However, the acquisition of geographic information differs conceptually from the geography of the real, physical world. This represents a novel opportunity for engaging in the production of volunteered geoinformation. With the right tools available, the collaborative spatialization of dreams gives birth to a new category of Volunteered Geographical Information (VGI), namely a fictional VGI. We argue that not only the dreamer, but also a third party may contribute to fictional geography by making a visual interpretation of the original content published by the dreamer. The social aspect of volunteering is discussed in both VGI and F-VGI. Additional possible sources of information, which may be used for retrieving geoinformation from dreams, are also mentioned. Our judgements are supported by data from an experimental study on dream locations. The participants rated their awareness of the dream setting, stated which elements are helping them to recognize places in their dreams and estimated the frequency of their dreams happening in personally relevant places.

Keywords: Fictional VGI (F-VGI), Dream Cartography, Fictional Geography

1. Introduction

Referencing to geographic information is deeply embedded in everyday tasks, applied, for example, when people talk about their leisure activities such as a trip to the countryside, when searching for a restaurant to have dinner, or when giving directions. Drawing a schema to explain to the spouse where the new grocery shop is located is also a way of creating and sharing geographic information. However, this is not usually perceived as such. The same happens when people recount a dream: the dream takes place somewhere; and sometimes it would be nice to be able to better describe this
place, to remember it or to “visit” it another time. Dream Cartography proposes to do just that, using specially developed tools.

The goal of Dream Cartography is to create dream maps, with the focus on the locations where the dreams take place and proposing the visualization of other dream elements as well (Iosifescu Enescu, Montangero, & Hurni, 2015). Although usually not a central element in a dream, the dream setting is important. It is an anchor, which helps people to build a story out of the dream, to make sense. If the dream setting is remembered, people tend to begin a dream report by giving information about it first (e.g., on dreams reports saved by (Domhoff & Schneider, 2013).

We speak about fictional places, such as in literature or dreams. However, one could argue that the dream settings are not fictional, or at least not consciously intended to be fictional. Yet one must differentiate here between fiction and fantasy (which is a subset of fiction). Moreover, we take into consideration the Reality Assumption: “everything that is (really) true is also fictionally the case, unless excluded by the work” (Friend, 2017, p. 29). This renders dream reports to be fictional works, as they relate about a dream world, where people also “have arms and legs” (Friend, 2017, p. 32), if not otherwise mentioned. Returning to places, by implication, a setting in a fictional work can be called fictional.

The aim of the current work is to show how a new form of volunteered geographic information (VGI) is about to arise, namely a fictional-VGI (F-VGI), where people compose maps of fictional worlds, such as exist in dreams or in novels. The particularities of the F-VGI compared to the VGI are addressed, focusing on aspects such as volunteers or sources of data. Our judgements are supported by the results from an experimental study on dream settings.

2. State of the art

Goodchild (2007, p. 211) designated Volunteered Geographic Information (VGI) as the harnessing of Web tools “to create, assemble, and disseminate geographic information provided voluntarily by individuals”. Few would assess fictional work as a carrier of geoinformation. However, every story needs a place, where the events “take place”, and therefore “it’s impossible to even think literature without any spatial context” (Piatti, Bär, Reuschel, Hurni, & Cartwright, 2009, p. 178). This space and its composition is the subject of literary geography, one of the fictional geographies. A fictional text such as a novel or a dream report is indeed a source of geoinformation. While the literary geography deals with settings in literature, there are some important differences when trying to transfer their findings to Dream Cartography; the main ones are the length of the original text (the dream report) and the fading memory of the dream (Iosifescu Enescu et al., 2015).

Although VGI is fundamentally based on the assumption that contributions come to a convergence and, thus, over time, the differences between multiple versions of reality
smooth over (Elwood, Goodchild, & Sui, 2012), this is not necessarily the case in F-VGI. Multiple versions, multiple visual interpretations of the same fictional text are allowed.

Due to the length of a dream report compared to the length of a literary text, but also due to the particularities of the dream space, it is almost impossible to apply automatic methods for GIR to dreams. Although different methods have been developed for automatic retrieval of a place name or description from an unstructured text (Jones & Purves, 2008; Jones, Purves, Clough, & Joho, 2008; Schockaert, De Cock, Cornelis, & Kerre, 2008), these are using additional information in the studied text, which are rarely available in a dream report. Moreover, GIR could hardly account for sudden transitions from a place to another, which are very far away in real world; in dreams, the distance between these may be very different from the real one. As a dream-blogger writes about his dream of going by car from the USA to Japan: “Please, don’t ask me how we made it through deep blue sea by car. I don’t know neither.” (Tougaw, 2009, p. 253). Rather, and because we are talking about volunteers, the geoinformation retrieval must still be manually performed by the dreamer herself or by a third party. As Haklay, Singleton and Parker (2008, p. 2026) put it: “Crowdsourcing is how large groups of users can perform functions which are difficult to automate or expensive to implement”.

A literary text is a complete work; on the contrary, a dream report is “only” a description of the dream. Although the dream reports are a good measure for dreams (Nir & Tononi, 2010) and are almost exclusively the means used by the dream research community, they are far from being complete. Previous work on Dream Cartography (Iosifescu Enescu et al., 2015) shows how to best get the written report of a dream and its possible sources listed by the dreamer herself.

Another issue in fictional geography is the scale of space, in which the story is happening, and which resemble to the psychological spaces. Montello (1993) classifies the psychological spaces into four classes: figural, vista, environmental and geographical. Figural space is smaller than the human body and is the space of pictures, maps, objects, or distant landmarks. Vista spaces can be visually apprehended from a single point of view, such as a single room, a town square, the horizon, or even the surface of the earth viewed from above. Environmental space is larger than the human body and surrounds it, its apprehension requires “the integration of information over significant periods of time” (Montello, 1993, p. 315) and is a constructive process. Examples of environmental places are buildings, neighborhoods and cities. Geographical space (states, countries) is so large that it cannot be apprehended directly, but learned through symbolic representation, such as maps or models.

2.1. Volunteers
Volunteers in GI “are highly likely to be living in an advanced economy and to be a member of the middle class, thus to have the education, technical skills, access to resources and infrastructure that facilitates participation in these activities.” (Haklay, 2013, p. 112). Making a parallel to our study on dream locations (see section 3) we
notice how good the gathered convenience sample resemble in the age and education structure to the volunteers presumed to be the most active in the VGI.

Many people show a strong interest in their dreams. In spite of an assumed difficulty in collecting data for the Dream Cartography project (especially because of privacy issues), many sources of dream data were found. Openly available dream reports are found in published books and dream journals (e.g., von Uslar, 2003; Adaman-Tremblay, 2015), on dream forums (klartraum.de, dreamviews.com, dreamscloud.com) or on scientific online dream databases (dreambank.net). This happens although dreams are very personal experiences and they reveal much of the current concerns and activities of the dreamer, as the continuity hypothesis of dreaming and its experimental basis sustain (Strauch & Meier, 1996; Domhoff, 1996; Erlacher & Schredl, 2004).

As Goodchild (2007) does for VGI, we must also wonder what drives the people to be accurate. And the same answers are valid for dream data: self-promotion, audience, but what may add to these is the wish to have an ‘interpretation’ of their dream. This is highly plausible, given the fact that there are platforms just for dream interpretation on the Internet (dreamcloud.com, or even the Facebook page of the International Associations of Dreams). There are also many people, more or less ‘expert’, willing to give their interpretation to a dream. Interesting discussions develop, to which the dreamer is fully participating, by giving new information, confirming or not the interpretations. For example, the motto of dreamscloud is “We make dreams social” (dreamscloud.com, 2015). In this regard, revealing dreams can be compared to the use of social platforms such as Facebook, where the desire of self-revealing and self-disclosure reaches its apogee (Hollenbaugh & Ferris, 2014).

Just as in VGI, where local activities and changes in local infrastructure or names are best known and fast documented by local people (Goodchild, 2007), the F-VGI is best documented by the dreamers themselves and in a short time after the dream. The dreamers themselves, psychologists, artists: everyone can participate, be an F-VGI volunteer, and create a dream map. The volunteers extract the geographical information from the dream / dream report and, using available tools (e.g. on a Dream Cartography platform), they assemble, visualize and disseminate it. Third parties contributing to a dream visualization may be commissioned by the dreamer or might be acting from their own initiative on open dream data. In the latter case, a direct interaction with the dreamer is not given. Therefore, other sources could help to complete the lack of data.

2.2. Data and information sources
In the case of F-VGI, the possibility to go in the field and measure physical proportions is not provided, since the original source is a description of the setting in a dream report (or, in the case of literary geography, in a fictional text). Luckily, it handles about the same, written, text. To the information extracted from the original text, one may add other sources. This situation has some similarities with traditional VGI, where it is possible to vectorize sources of secondary information, but also major differences.
Fictional settings are not measurable because they vary in their relationship to the real geography. They can be extremely realistic and have a real world counterpart, but can also be a crossfading of more real spaces or even partially or totally invented (Iosifescu Enescu et al., 2015). Reuschel and Hurni (2011, p. 294) suggest that “the spatial dimension in fiction [...] has to be completed and developed through the imagination of the reader”. Generic world knowledge on history or geography helps to further develop the “imagination”, but an important source of information is the author’s biography, especially in the case of dreams.

A key variable in investigating the memory sources of dreams is the temporal delay to which an element from the waking life is incorporated into a dream. The most elements in dreams are from the day (already Freud (1942) introduced the concept of “day-residue”) or the week (recency effect) prior to the dream (Grenier et al., 2005). It is therefore important that, besides a dream report, the dreamer writes down also what she has been doing the day before, and lists possible sources of her dream. Here an example, on how the day-residue can affect the dream content:

*Back in the eighties, I was allowed to watch together with my parents the American prime time television soap opera “Dallas”. An episode was broadcasted each Sunday evening and I, as a child, used to go to bed just after the show. The action was catchy and it happened to me quite a few times that, when the film started next Sunday, I was surprised to see where it begins: I used to dream my personal continuation of the series. In my dreams, I was either one or the other of the main characters and experienced everything from that perspective. My continuation had, of course, little in common with the real following episode and I've never been in Texas in my real life. [personal experience of the first author]*

Identifying the dreamer’s biography as an additional information source, we are interested in the weight of the temporal extent of biography elements occurring in dreams. Grenier and colleagues (2005) found in dreams references to autobiographical memories from the whole life span. The participants to their experimental study (30 older women, >60 years, from 217 dreams) identified temporal references in the own dreams and, separately, produced a sample of autobiographical memories. The authors found a linear decrease in temporal references identified in dreams and autobiographical memories with increased remoteness for the last 30 years (Grenier et al., 2005). For older participants, they could also show the occurrence of a reminiscence bump (here the age from 10 to 19, known from the research on autobiographical memory as important for identity formation, see also (Conway & Haque, 1999)). Fig. 1 illustrates these results, with the mention that, for a clearer visualization, the authors excluded from the graphic the last category of “more than 60”, which reflects the recency effect and contains 65% of the memory and 85% of the dream data.
The results of Grenier and colleagues (2005) show that features of past memories (e.g., old residence sites, personally relevant geolocations) may be incorporated for a longer period of time into dreams. This is also what showed our experimental study (Iosifescu Enescu, 2016) on dream locations (see section 3).

2.3. From VGI to F-VGI
Maps and information available on open platforms, which originate form VGI, are used in many domains. Even for Dream Cartography, geographical information may be downloaded from one or the other of these platforms and combined or morphed in such a way (Fig. 2) that it best fits the space description in a dream (for the resulting dream visualization, see (Iosifescu Enescu et al., 2015).

A good example of F-VGI are maps of the territories from certain books or TV-series, which enjoy a lot of attention from the community. One of the best (Fig. 3) is made by fans for the book series “A song of ice and fire” or TV series “Game of Thrones”, and presents a very detailed, interactive map with character plots and trajectories structured by book chapters or TV-series episodes; it is licensed under the Creative Common license (theMountainGoat & Tear, 2012). The mapmakers combined elements from different drawings and from different parts of the Earth in satellite view from Google Maps. Moreover, we learn that a Web forum, “The Cartographers’ Guild”, is ready to take any commissions for maps for fictional realms, as used both in novels and computer, tabletop or role-playing games and we may admire various creations of these authors on their site (http://www.cartographersguild.com).
Fig. 2. The schema, on how a morphed city was composed from two city plans, of Zurich (top) and Göttingen (bottom); Original source data: OpenStreetMaps contributors

Remembering the discussion about world knowledge as data source, as we may notice in Fig. 3, the map of Westeros resembles the geography of Ireland, with the North to South (see “the Fingers” compared to region Cork – Tralee in Ireland). Moreover, the author G. RR Martin seems to have followed the relief and historic sites of Ireland (this time not turned to 90 degrees, as the map itself) in building his cities, castles and story course on the map. Let us consider for example Dublin, which in Gaelic means “black pool”. Dublin influenced the “Blackwater Bay” from King’s Landing, the capital of Westeros, which is, similarly, situated in the Middle East of the country (shakeyspears, 2014).
There are many resources available for inspiration when creating fictional maps. These and other personal experiences may become part of a dream, as we have discussed. In the following, we show how people perceive their dream settings based on a self-conducted experimental study on dream location.

3. A study on dream locations

We studied the dream location and different dream characteristics using a mainly self-developed questionnaire. The questionnaire was available for six months (July 2015 – January 2016) and was completed by 255 people (172 females, 83 men), the most with a high education and aged between 20 and 45. The questionnaire was online on an external server (soscisurvey.de) and was offered in four languages: English, German, French and Romanian. Active publicity was made for the questionnaire through personal E-Mails, posts on dream-research communities Web pages and Facebook posts. It resulted a convenience sample (for details on methods for selecting research participants, see (Gravetter & Forzano, 2003). The questionnaire asked people, among others, to estimate the frequency of their remembered dreams in the last couple of months and, on this base, to answer some questions about dream location and sleep and dream patterns. Part of a larger project (Iosifescu Enescu, 2016), the target group of this study consisted of people with international migration background. The
questionnaire addressed also the question of dream location related to real locations. The participants were instructed to think about their dreams, recall where the dreams were happening and answer if they recognized the dream setting. Due to its length, complexity and specific questions related to international migration, many people did not finish the questionnaire. However, for general questions about dream location (see Fig. 4), we could analyze 309 answers.

Regarding the interesting point of how people recognize a place in their dreams (Fig. 4), only 16% recognize the place due to landmarks, 31% due to environmental elements (a river, a forest, building styles, etc.), 64% just have the feeling to be there and 13% do not recognize a place at all. Moreover, the results show a correlation between the reported visual memory and the remembering of the dream setting: People, who try to remember details of the landscape when they are in a new place, are more aware of the location in their dreams.

In the case of the international migration and how this influences the dream settings, the Dream Location Questionnaire focused on the smallest scale: at the country level. People were asked, in how many percent of their dreams appeared specific countries, which were of interest to them. All of the interviewed people stated they do dream about countries, which were current, past or future residences, holiday countries or heritage culture. However, when asked about the percent, they gave values, which rarely added up to 100%, being both more or less than that. We account for this fact with the explanation that this is specific to dreams: People may dream in one dream about both their childhood country and their current residence country (leading to mixed or condensed places) or, on the contrary, their dream location may have less with the real world in common, but consisting of imaginary places.

![Dream Location Questionnaire]

**Fig. 4.** Dream Location Questionnaire, page with general questions on dream location.
Analyzing the results from a cross-sectional perspective, we found that the age at the time of the last migration significantly influences the amount of dreams about the current residence country. People who moved before they turned 19 years old to the current country of residence dreamed more about this country than people who were older when they moved to their current residence country. The interpretation of this result (Iosifescu Enescu, 2016, p. 42), is that the current residence country (although different from the one they were born in) might represent for these people a second “childhood country”. This is because enough memories point to this country, also from a time where the identity formation takes place. This period is shown to occupy a relatively big amount of memories also in the autobiographical memory, being called the reminiscence bump (Rubin, Wetzler, & Nebes, 1986), as previously discussed.

### Table 1. Examples of dream locations given by people in the dream location survey

<table>
<thead>
<tr>
<th>Places with a real-world counterpart</th>
<th>Mixed places or unclear</th>
<th>Fantasy places</th>
</tr>
</thead>
<tbody>
<tr>
<td>Childhood and current home</td>
<td>A semi-familiar garden; an unknown balcony</td>
<td>In a cafeteria, which doesn’t exist</td>
</tr>
<tr>
<td>University, school</td>
<td>In or around water</td>
<td>A class room in an apartment</td>
</tr>
<tr>
<td>Workplace, office</td>
<td>A tree-house</td>
<td>in a city center of a city</td>
</tr>
<tr>
<td>In a hotel room I’ve lived in</td>
<td>Random houses</td>
<td>unknown to me</td>
</tr>
<tr>
<td>At people’s houses - people</td>
<td>My high-school, only</td>
<td>School (but not a school I have ever been to in real life</td>
</tr>
<tr>
<td>important to me</td>
<td>darker, more sinister,</td>
<td></td>
</tr>
<tr>
<td>The summerhouse of my parents</td>
<td>bigger</td>
<td>Underground tunnels filled</td>
</tr>
<tr>
<td>At a theatre I’ve been to</td>
<td>Woods; meadow</td>
<td>with water in an unknown</td>
</tr>
<tr>
<td>Holidays resort I’ve been to</td>
<td>As a pedestrian on a road</td>
<td>location on the world map.</td>
</tr>
<tr>
<td>Outside, at a nice place where I’ve</td>
<td>In a train</td>
<td>A kind of technological vortex</td>
</tr>
<tr>
<td>been to</td>
<td>Pubs similar to those I know, streets similar to those I know but not really any exact place. More of a similar impression of the place.</td>
<td>Beach / holidays resort, where I’ve never been</td>
</tr>
<tr>
<td>Places to which I just was in</td>
<td>An overlap between two disparate city suburbs; Random mashed-up locations of a city</td>
<td>A strange small airport</td>
</tr>
<tr>
<td>excursion</td>
<td>I know I dream about the city I live in, but it looks different in my dreams, a fantasy town, which is much more densely built and is darker.</td>
<td>In the Wild West (after I played a computer game about it)</td>
</tr>
<tr>
<td>Childhood neighborhood</td>
<td>Europe, shrunk into a land I could walk about and visit different cities.</td>
<td>The topic / setting of a book I read or of a film I’ve seen</td>
</tr>
<tr>
<td>Town center of the town where I now</td>
<td></td>
<td>Fictional city</td>
</tr>
<tr>
<td>live</td>
<td></td>
<td>My dream world, from which I write fiction</td>
</tr>
</tbody>
</table>
Table 1 shows a few examples of places people named as their dream settings in the last couple of months, categorized by their relationship to a real place and ordered by the scale of the space. People mentioned mostly well-known spaces such as at work or at home. These were experienced usually in large scales which, translated to the psychological spaces of Montello (1993) as introduced in chapter 2, correspond mostly to vista or environmental scale, rather than to geographical or figural scale.

4. Conclusions and outlook

The new concept of fictional VGI was described considering important aspects such as the sources of data and who are the volunteers. We mentioned also some differences between F-VGI for Literary Geography and F-VGI for Dream Cartography. The social aspect was touched, where the volunteers are the dreamers themselves, engaged in a quest of self-discovery and, at the same time, of self-revealing. However, a third party can perform as well a dream visualization based only on a dream report and using additional sources of information. Dream sources are shown to be highly connected to the dreamer’s experiences from the previous day (day-residue) or to the dreamer’s biography. Therefore, personally relevant geolocations are a good starting point for visualizing dreams, where the dream setting is too vague. Dream locations are experienced mostly from a psychological scale of space called vista, and this aspect was illustrated with examples from the Dream Location Questionnaire. Our study shows that people, which moved to another country, rated their dreams to be happening more often in that residence country, where they lived at the age of identity formation, at the beginning of adulthood. Compared to a dream report, a literary text is usually longer and therefore presents a bigger probability to contain enough data for geoinformation extraction. VGI and F-VGI resemble in the aspects of having a main data source to which additional sources of information may be added; however, these are conceptually different: measurable versus non-measurable, just as the spaces themselves can be: linear versus nonlinear.

In conclusion, volunteering is a good way to approach the acquisition of geoinformation from an unstructured text. F-VGI is well suited for Dream Cartography, especially when the volunteers are the dreamers themselves. With the right tools available, individuals will be able to represent their dream worlds or allow others to do it for them and vote for the quality and accuracy of interpretation or for the artistic depiction of their dreamscape. Regarding the tools for Dream Cartography, more research is needed to reveal the form these should take and how exactly the scale and the context of space can be taken into account, in order to map the dream settings in an expressive manner.
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Notes on contributors

Cristina M. Iosifescu Enescu is a PhD candidate at the Institute of Cartography and Geoinformation of ETH Zurich, Switzerland. She graduated with a Diploma in Geodesy at the Technical University of Civil Engineering Bucharest in 2003 and an MSc in Psychology at the University of Zurich in 2016. Her research interests focus on Dream Cartography, graphical user interfaces for Web Cartography and the Cognitive Theory of Dreams.

Lorenz Hurni is professor of Cartography at the Institute of Cartography and Geoinformation, ETH Zurich, since 1996. He graduated in Geodesy at ETH Zurich in 1988 and completed his PhD in Cartography at ETH Zurich in 1995. He is managing editor-in-chief of the ‘Atlas of Switzerland’, the Swiss national atlas. His current research focus is on cartographic data models, tools for the production of printed and multimedia maps, as well as interactive, multidimensional multimedia map representations.

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