

# The Story of Syrian Refugee Crisis Across Europe Through the Lens of Cartography

By Students in the Multimedia Cartography course at Faculty of Geodesy, University of Zagreb in Academic year 2015/16

A compelling multimedia narrative story of the Syrian refugee crisis across Europe ([www.geof.unizg.hr/~akuvezdic/MultimediaCartography-Course2016.html](http://www.geof.unizg.hr/~akuvezdic/MultimediaCartography-Course2016.html)) was envisioned by a group of graduate students enrolled in Multimedia Cartography, a course offered through the Faculty of Geodesy at University of Zagreb ([eucenje.geof.unizg.hr](http://eucenje.geof.unizg.hr)). This multimedia visualization was created as an assignment for the course exercises during the summer 2016 academic term, in which students had to choose arbitrarily a subject to be visualized in a multimedia environment to explore the effects and components of a multimedia map.

After ten weeks of learning how to make an interactive and animated web maps using the d3 (Data Driven Documents) web mapping library ([d3js.org](http://d3js.org)) and acquiring literacy in JavaScript, HTML, and CSS programming for the web, students collaborated in team for creating the final multimedia application, but each student was responsible for the design of one map. The theme of the refugee crisis came naturally, since it was (and still is) a very current topic which makes it very well documented by the means of availability of relevant and easily accessible data and statistics on the internet.

The story is narrated through the sections that can be simply scrolled through. Each section combines authoritative maps with narrative text, images, or multimedia content to tell the story of the Syrian refugee crisis across Europe. Since the crisis is epic in size, spilling over into every country in Europe, perhaps the best way to attempt to comprehend it is to look at it through the maps.

## Getting out

First map *The Population of concern in year 2014*, designed by student Đurđica Šparavec, shows the extent to which Syrians have been displaced from their homes – 22.4 million persons in year 2014 come from top seven countries of origin (Syria, Afghanistan, Iraq, Iran, Albania, Pakistan and Nigeria). On this map, graduated bubble symbols represent the numerical data of UNHCR's populations of concern. It is a statistic interactive map and visitors are allowed to explore several groups of persons of concern (refugees, asylum-seekers and internally displaced persons – IDPs). By moving the mouse cursor over the bubbles the information about number of persons in concern in selected country is shown.

## The flow towards Europe

The *Flow of Refugees* is an animated map made by student Barbara Telebec, which shows the main refugee paths from the Middle East, or rather their countries of origin and their destinations. An animated map was specifically chosen because it is an effective visualization method for this particular set of information. Migrants are represented as paper planes flying out from their home country and into their host country. Of course, in real life, the journeys of these refugees have hardly been that smooth.

This map is dynamic and interactive. As the countries of origin, the top five countries based on the number of refugees were chosen (Syria, Afghanistan, Iran, Iraq and Pakistan). The data used for this map are from 2014, because it is the last year where refugees were specifically mentioned,

and afterwards the focus shifts on asylum seekers. The data that was taken was reduced significantly because of the sheer volume of it, so as not to overcrowd the map. In the end, as the destination countries, only those that have taken in over 1000 refugees have been taken into account.

## A way in

Data from Frontex, an agency of the European Union which monitors the movement of people in Europe, shows that there are eight main migratory routes used by migrants to enter the continent. However, the two routes seeing more use are the Eastern Mediterranean route, heading through Turkey, and the West Balkan route.

Animated routes presented on map made by student Kristina Bedrica show refugees and migrants making their journey to the European Union to seek asylum, traveling across the Mediterranean Sea or through Southeast Europe. Bubbles on map indicate the number of refugees who came to Europe by sea during the year 2016. Tiny boats show the path, or usual routes which refugees use. In the news section some shocking facts are displayed, such as total number of migrants in 2016 or dead/missing migrants.

The map made by student Dijana Burazer shows the estimated monthly arrivals of refugees in the first three months of the 2016 through the countries on the Western Balkan migration route.

On this static interactive map the temporal navigation is implemented in the form of tabs for each month and on the homepage tab some general

# Priča o izbjegličkoj krizi u Europi kroz objektiv kartografije

Studentski radovi iz predmeta Multimedijaska kartografija na Geodetskom fakultetu Sveučilišta u Zagrebu u ak. god. 2015./2016.

Studenti diplomskog studija na predmetu Multimedijaska kartografija koji se predaje na Geodetskom fakultetu Sveučilišta u Zagrebu (e-učenje. [geof.unizg.hr](http://geof.unizg.hr)) osmislili su zanimljivu multimedijisku priču o sirijskoj izbjegličkoj krizi u Europi ([www.geof.unizg.hr/~akuvezdic/MultimediaCartographyCourse2016.html](http://www.geof.unizg.hr/~akuvezdic/MultimediaCartographyCourse2016.html)). Multimedijiski prikaz izrađen je u ljetnom semestru u ak. god. 2015/16 kao zadatak na vježbama u sklopu kojeg su studenti trebali proizvoljno izabrati temu koju će vizualizirati u multimedijском okruženju s ciljem istraživanja mogućnosti i sastavnih dijelova multimedijске karte.

Prvih deset tjedana semestra studenti su proveli učeći kako izraditi interaktivnu i animiranu web-kartu pomoću kartografske biblioteke D3 (Data Driven Documents) na webu ([d3js.org](http://d3js.org)) kako bi stekli osnovne vještine programiranja u JavaScriptu, HTML-u i CSS-u u web-okruženju. Nakon toga studenti su surađivali u timu kako bi izradili konačnu multimedijisku vizualizaciju, s time da je svaki student bio zadužen za izradu jedne karte. Tematika izbjegličke krize nametnula se kao prirodan izbor, s obzirom na to da je to bila (i još uvijek je) u medijima vrlo aktualna tema, što znači da je i dobro dokumentirana u smislu pronalaženja značajnih i lako dostupnih statističkih i numeričkih podataka na internetu.

Priča je pripovijedana u tematskim cjelinama kroz koje se prolazi pomicanjem miša. Svaka tematska cjelina kombinira kartografski prikaz s narativnim tekstom, slikama ili multimedijским sadržajem kako bi se ispričala priča o sirijskoj izbjegličkoj krizi u Europi. S obzirom na goleme razmjere koje kriza poprima šireći se na sve europske zemlje, možda je zaista najbolji način pokušati shvatiti njezin domet sagledavši ju kroz karte.

## Izlaz iz zemlje

Prva karta *Populacije od interesa u 2014. godini*, koju je izradila studentica Đurđica Šparavec, pokazuje u kojoj su mjeri Sijerijci bili primorani napustiti svoje domove – 22,4 milijuna osoba u 2014. godini dolazi iz sedam zemalja (Sirija, Afganistan, Irak, Iran, Albanija, Pakistan i Nigerija). Na toj karti, promjenjivim veličinama kružića iskazani su numerički podaci o osobama od interesa UNHCR-a. Radi se o statičnoj interaktivnoj karti koja korisnicima pruža mogućnost istraživanja podataka o nekoliko skupina (izbjeglicama, tražiteljima azila i interno raseljenih osoba). Pomicanjem miša preko kružića prikazuje se informacija o broju osoba od interesa u odabranoj zemlji.

## Protok u Europu

*Protok izbjeglica* je animirana karta koju je izradila studentica Barbara Telebec, a koja prikazuje glavne putanje kretanja izbjeglica s Bliskog istoka, ili preciznije, zemlje iz kojih dolaze te zemlje koje izabiru kao svoja glavna odredišta. Animacija je namjerno izabrana kao upečatljiva metoda vizualizacije takvog skupa podataka. Migranti su prikazani kao papirnati avioni koji putuju iz svoje domovine u zemlju domaćina. Naravno, u stvarnom svijetu, njihovo putovanje rijetko prolazi glatko, kao što je to prikazuje animacija na karti.

Karta je dinamična i interaktivna. Za zemlje porijekla izabrano je pet glavnih zemalja iz kojih dolazi najveći broj izbjeglica (Sirija, Afganistan, Iran, Irak i Pakistan). Podaci prikazani na karti datiraju iz 2014. godine budući da je to posljednja godina u kojoj je zabilježen broj izbjeglica, kasnije je pažnja usmjerena na prikupljanje podataka o tražiteljima azila. Obim izvornih podataka namjerno je značajno smanjen kako ne bi došlo do preopterećenosti karte podacima. Osim toga, kao odredišne

zemlje, na karti su prikazane samo one zemlje koju se prihvatile više od 1000 izbjeglica.

## Ulazak u zemlju

Podaci Frontexa, agencije Europske unije koja se bavi nadzorom kretanja ljudi na vanjskim granicama država članica Europske unije, pokazuju da postoji osam glavnih migracijskih ruta za ulazak u Europu. Međutim, dvije rute koje se značajnije koriste od ostalih su Istočnomediterranska ruta, preko Turske do grčkih otoka, te Zapadnobalkanska migracijska ruta.

Animirane rute prikazane na karti koju je izradila studentica Kristina Bedrica prikazuju izbjeglice koje putuju ka Europskoj uniji u potrazi za azilom, putujući preko Sredozemnog mora ili jugoistokom Europe. Veličine kružića prikazanih na karti ukazuju na broj izbjeglica koje su u Europu pristigle morskim putem u 2016. godini. Maleni brodovi prikazuju uobičajene rute koje koriste na svom putovanju. U posebnom dijelu karte iznesene su neke od uznemirujućih činjenica, poput ukupnog broja izbjeglica u 2016. godini, te broja mrtvih/nestalih osoba.

Karta koju je izradila studentica Dijana Burazer prikazuje procijenjene brojeve mjesečnih dolazaka izbjeglica tijekom prva tri mjeseca 2016. godine kroz zemlje na Zapadnobalkanskoj migracijskoj ruti. Na toj statičnoj interaktivnoj karti ugrađena je vremenska navigacija u obliku kartica, a u svakoj kartici prikazana je karta s podacima za jedan mjesec, dok su u početnoj kartici dani općeniti podaci o karti. Zemlje na Zapadnobalkanskoj ruti obojane su svijetlo narančastom bojom, a ostale su zemlje prikazane bijelom bojom. Narančasti kružići ukazuju na procijenjeni broj mjesečnih dolazaka u svakoj zemlji. Ti su dolasci prikazani samo za prva tri mjeseca u godini, jer je u

information about the map is written. The countries through which the Western Balkan route passes are coloured with a light orange and the other countries are white. The orange bubbles on map indicate the number of the estimated monthly arrivals in each country. The estimated monthly arrivals are shown only for the first three months of the year, because in March 2016, Macedonia closed the border with Greece, so the Western Balkan route was blocked.

**Welcome or not?**

And finally, since the influx of refugees is not good news in many European countries, by viewing the series of choropleth maps, made by student Valentina Čudina, which show the number of asylum applications lodged in 38 European countries and how that number changed on monthly basis during the year 2015, you can make your own impression whether the refugees are welcome to Europe.

**Changing attitudes**

Welcome or not, the fact is that due to a few specific photos that have been published showing the suffering of refugees there is more sympathy towards migrants than there has been in recent years. The story of the Syrian refugee crisis ends with the gallery of the photographs awarded with *Pulitzer Prize In Breaking News Photography* for coverage of Europe’s refugee crisis.

**How were the students’ maps made?**

When designing their maps, students were asked to think about the map concept considering following questions: *What type of map do I want to implement (dynamic, static, etc.)?, What is the structure of my map (sequential or non-sequential)?, Does my map need any navigation elements?, What are the interactive elements of my map?, etc.* and to choose the complexity level that they felt they could complete most independently (regarding the implementation of basic or advanced interactive features or animations on your map). They were also asked to

## The Syrian refugee crisis across Europe

Through the Lens of Cartography

By Students in the Multimedia Cartography course at Faculty of Geodesy, Academic year 2015/16

**The Syrian Refugee Crisis in Maps** was envisioned by a group of graduate students enrolled in Multimedia Cartography, a course offered through the Faculty of Geodesy at University of Zagreb. The students jointly produced the multimedia cartography application during the summer 2016 academic term.

This multimedia application combines authoritative maps with narrative text, images, and multimedia content to tell the story of Syrian refugee crisis through the lens of cartography.

Each student created one map, and also participated in providing additional multimedia content for the multimedia application (images, videos, text, infographics.). Students collaborated in team for creating the final multimedia application, but each student was responsible for the design of one map.

59.5 million Turkey displaced people worldwide | 19.5 million Refugees | 10 million Stateless people

*“We are now witnessing the highest levels of displacement on record.”*

**Getting out**

First map, made by student Đurdica Šparavec, shows the extent to which Syrians have been displaced from their homes. 22.4 million persons of concern in year 2014 come from 7 countries of origin. While 7.6 million are considered internally displaced, many have crossed over into bordering countries, with more than 1 million seeking refuge in Lebanon and almost 2 million in Turkey.

**The World in Numbers - Populations of Concern in Year 2014**

Populations of Concern   Refugees   Asylum seekers   IDPs

Click to see this map in full size

**Refugees**

Includes individuals recognised under the 1951 Convention relating to the Status of Refugees, individuals granted complementary forms of protection, or those enjoying temporary protection. Since 2007, the refugee population also includes people in a refugee-like situation.

Click to see this map in full size

## The Syrian refugee crisis across Europe

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### The flow towards Europe

The map made by student Barbara Telebec shows the flow of migrants into Europe from the top five origin countries of the asylum seekers, to their most significant destinations. Migrants are represented as planes flying out from their home country and into their host country. Of course, in real life, the journeys of these refugees have hardly been that smooth.



### A way in

Data from Frontex, which monitors the movement of people in Europe, shows that there are eight main migratory routes used by migrants to enter the continent.

*"The two routes seeing more use are the Eastern Mediterranean route, heading through Turkey, and the West Balkan route."*

Animated routes presented on Kristina Bedrica's map show refugees and migrants making their journey to the European Union to seek asylum, traveling across the Mediterranean Sea or through Southeast Europe.



On her map, student Dijana Burazer, showed estimated monthly arrivals in year 2016 through the Western Balkan migratory route.

### Monthly Estimated Arrivals per Country - Flows through Western Balkans Route, 2016



ožujku 2016. Makedonija zatvorila granicu s Grčkom, te time blokirala Zapadnobalkansku rutu.

### Dobrodošli ili ne?

I na kraju, budući da priljev izbjeglica nije nužno uvijek dobro prihvaćena vijest u mnogim europskim zemljama, pregledavanjem niza koropletnih karata, koje je izradila studentica Valentina Čudina, a koje prikazuju broj tražitelja azila podnesenih u 38 europskih zemalja na mjesečnoj razini tijekom 2015. godine, lako se može donijeti sud o tome jesu li izbjeglice dobrodošle u Europu.

### Promjena stava

Dobrodošli ili ne, činjenica je da je zbog objave nekoliko dojmljivih fotografija na kojima su zabilježene patnje kroz koje izbjeglice prolaze na svom putovanju, povećana razina suosjećanja s njihovim sudbinama u odnosu na protekle godine. Priča o izbjegličkoj krizi završava galerijom fotografija koje su nagrađene Pulitzerovom nagradom za udarne vijesti za izvještavanje o europskoj izbjegličkoj krizi.

### Kako su nastale studentske karte?

Pri oblikovanju karata, od studenata se tražilo da razmišljaju o konceptu karte razmatrajući sljedeća pitanja: *Koji tip karte želim izraditi (dinamičnu, statičnu, itd.)? Koja je struktura moje karte (sekvencijalna ili nesekvencijalna)? Treba li moja karta navigacijske elemente? Koji su interaktivni dijelovi na mojoj karti?, i sl., te da odaberu onaj stupanj složenosti u izradi karte za koji smatraju da mogu što samostalnije provesti (s obzirom na primjenu osnovnih ili naprednih interaktivnih elemenata ili animiranih elemenata na karti). Njihov je zadatak također bio da ukupan izgled karte zadrže što jednostavnijim, jasnijim, da kartu u što većoj mogućoj mjeri prilagode korisniku, te da upotrijebe kartografiku koja će se uklopiti u cjelokupni projekt. Studenti su nastojali kritički uređivati svoje karte kako bi uklonili nepotrebne detalje, ukazalo im se na važnost izbora odgovarajuće temeljne karte, te poticalo na razmišljanje o skočnim prozorima i kartografskim znakovima koje će upotrijebiti na karti kako bi uspješno poslali željenu poruku.*

retain the overall map design as simple, clear, and user-friendly as possible while incorporating cartography that matches this project. They tried to edit their maps to eliminate unnecessary detail and were guided to choose an appropriate base map as well as to think about what custom pop-ups and symbology they wanted to provide to deliver the map's message.

The students' maps were rewritten from scratch using D3 (d3js.org), a JavaScript library for visualizing data with HTML, SVG, and CSS. D3 library handles everything from parsing the TopoJSON geography (for drawing the base map) and the CSV attribute data (for depicting various thematic information about refugee crisis), to handling the animation and interactivity of the elements displayed on the map.

The geography datasets used to create these maps were prepared using two shapefiles downloaded from the Natural Earth website (www.naturalearthdata.com): one with the small scale data suitable for schematic maps of the world, and one with the medium scale data suitable for making zoomed-out maps of countries and regions. All numerical and operational data about refugee crisis depicted on the maps were taken from official UNHCR (The UN Refugee Agency) sources, such as UNHCR Open Data for Refugee Response (data.unhcr.org), and UNHCR Population Statistics Database (popstats.unhcr.org)

Data were loaded from a comma-separated values (CSV) file and plotted on the maps drawn either with D3's convenient Winkel Tripel Projection or Lambert conformal conic projection. Then some basic transitions and timers were used to create interaction and animation.

Considering that presented maps are the result of the one semester student work, this was a very straightforward project, and we like it as an example of proportional symbol and choropleth mapping using the D3 library (d3js.org).

Ana Kuveždić Divjak ■

## The Syrian refugee crisis across Europe

Through the Lens of Cartography

By Students in the Multimedia Cartography course at Faculty of Geodesy, Academic year 2015/16

### Welcome or not?

The influx of refugees is not good news in many European countries - the Washington Post has put together a map showing which countries are building fences to keep people out. The following map, made by student Valentina Čudina, shows the number of asylum applications lodged in 38 European countries and how that number changed on monthly basis during the year 2015.

### Asylum Seekers in 2015 - Monthly Arrivals per European Country

Home January February March April May June July August September

October November December Total 2015

#### Asylum seekers in Europe, January 2015

This map presents information about asylum applications lodged in 38 European countries. Due to retroactive adjustments implemented by States, totals in this dataset may differ from annual totals published by the competent national authorities.

[Click to see this map in full size.](#)

Home January February March April May June July August September

October November December Total 2015

#### Asylum seekers in Europe 2015

This map presents information about asylum applications lodged in 38 European countries. Due to retroactive adjustments implemented by States, totals in this dataset may differ from annual totals published by the competent national authorities.

[Click to see this map in full size.](#)

## The Syrian refugee crisis across Europe

Through the Lens of Cartography

By Students in the Multimedia Cartography course at Faculty of Geodesy, Academic year 2015/16

### Changing attitudes

Immigration has long been one of the most contentious issues, but the recent surge in Syrian refugees fleeing to Europe has caused a shift in attitudes. In part due to a few specific photos that have been published showing the suffering of refugees there is more sympathy towards migrants than there has been in recent years.

*"Traditionally, refugees are the subject of pity. The Reuters images, used in newspapers and on websites around the globe, conveyed the people's courage, dignity, hope and determination."*

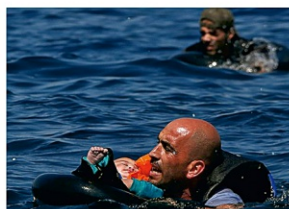
In one image, the sun rises over a boat crossing the waters off Turkey. Its outboard engine has just failed. In another, the group's dinghy has deflated about 100 yards from the shore, ditching the father of a small child, who balances the baby on a life tube as he flounders to safety. In a third, a father stumbles in the water, struggling to keep his drenched baby's head from going under.

### Photography Pulitzer for Coverage of Refugee Crisis

The New York Times and Thomson Reuters shared The Pulitzer Prize for breaking news photography for coverage of Europe's refugee crisis.



A overcrowded inflatable boat with Syrian refugees drifts in the Aegean sea between Turkey and Greece after its motor broke down off the Greek island of Kos (Yannis Behrakis, Thomson Reuters - August 11, 2015).



A Syrian refugee holding a baby in a life tube swims towards the shore after their dinghy deflated some 100m away before reaching the Greek island of Lesbos (Alkis Konstantinidis, Thomson Reuters - September 13, 2015).



The body of an unidentified migrant is seen on a beach after being washed ashore, on the Greek island of Lesbos (Alkis Konstantinidis, Thomson Reuters - November 7, 2015).



An Afghan migrant jumps off an overcrowded raft onto a beach at the Greek island of Lesbos (Yannis Behrakis, Thomson Reuters - October 19, 2015).



A Syrian refugee holds onto his children as he struggles to walk off a dinghy on the Greek island of Lesbos after crossing a part of the Aegean Sea from Turkey to Lesbos (Yannis Behrakis, Thomson Reuters - September 24, 2015).



Amoun, 70, a blind Palestinian refugee who lived in the town of Aleppo in Syria, rests on a beach moments after arriving along with another forty on a dinghy in the Greek island of Kos, crossing a part of the Aegean Sea from Turkey to Greece (Yannis Behrakis, Thomson Reuters - August 12, 2015).

The Story of Syrian refugee crisis across Europe  
Through the Lens of Cartography

By Students in alphabetical order:  
Krisina Bedrica, Djana Bursac, Valentina Čušina, Dunica Šparavec and Barbara Telebec  
in the Multimedia Cartography course at Faculty of Geodesy, Academic year 2015/16

Kôd koji stoji u pozadini karata studenti su samostalno napisali koristeći D3 ([d3js.org](http://d3js.org)), JavaScript biblioteku za vizualizaciju podataka s pomoću HTML-a, SVG-a i CSS-a. Biblioteka D3 odrađuje sve, od parsiranja podataka u formatu TopoJSON (za iscrtavanje temeljne karte) i atributnih podataka u formatu CSV (za prikaz različitih tematskih informacija o izbjegličkoj krizi), do rukovanja animacijama i interaktivnostima elemenata prikazanih na karti.

Skup geografskih podataka koji je upotrijebljen za izradu prikazanih karata pripremljen je s pomoću dvije datoteke u formatu .shp preuzete s internetskih stranica Natural Earth ([www.naturalearthdata.com](http://www.naturalearthdata.com)). Jedna od datoteka sadrži geometrijske podatke o granicama država prilagođene za prikaz na kartama u sitnom mjerilu, dok druga datoteka sadrži te iste podatke prilagođene prikazu na razini skupina zemalja, odnosno regija. Svi numerički i statistički podaci o izbjegličkoj krizi prikazani na studentskim kartama preuzeti su sa službenih stranica UNHCR-a (UN-ove Agencije za izbjeglice), poput UNHCR-ovih slobodnih podataka za odgovor na izbjegličku krizu (Open Data for Refugee Response, [data.unhcr.org](http://data.unhcr.org)), te UNHCR-ove baze podataka sa statističkim podacima o populacijama (UNHCR Population Statistics Database, [popstats.unhcr.org](http://popstats.unhcr.org))

Ti su podaci učitani su iz unaprijed pripremljenih datoteka u formatu CSV, datoteka koje sadrže tabularne podatke u obliku teksta te su iscrtani na kartama u Winkelovoj trostrukoj ili u Lambertovoj konformnoj konusnoj projekciji s pomoću funkcija ugrađenih u biblioteku D3. Zatim su pozivane funkcije prijelaza (transitions) za izradu interaktivnih i animiranih elemenata na kartama.

S obzirom na to da su prikazane karte rezultat studentskog rada tek tijekom jednog semestra, radi se o jednostavnijem projektu, koji je zgodan primjer primjene biblioteke D3 u izradi tematskih karata na kojima se variranjem boja ili veličine znaka prikazuju tematski podaci unutar raznih teritorijalnih, najčešće administrativnih, jedinica u relativnom odnosu.

Ana Kuveždić Divjak ■