

Knowledge Graphs at Scale
Innovative Training Network (ITN)

Project Number: 860801

Start Date of Project: 2019/10/01

Duration: 48 months

Deliverable 6.1 Website

Dissemination Level	Public
Due Date of Deliverable	Month 3, 31/12/2019
Actual Submission Date	Month 3, 31/12/2019
Work Package	WP6 - Dissemination and Impact
Task	T6.1
Type	Report
Approval Status	Final
Version	1.0
Number of Pages	11

Abstract: This deliverable presents the planning, design and implementation of the project website for KnowGraphs, explaining and clarifying the intermediate steps that have led to the completion of Task 6.1. The main goal of the KnowGraphs website is to disseminate the information on project activities, events and partners (external); serve as registration portal for events (external); disseminate the project deliverables (external); facilitate the engagement of stakeholders (external); serve as communication platform for Fellows (internal); serve as communication platform for beneficiaries and partners (internal). Towards the end of the project, the website will also support the exploitation activities of the project. After the closing of the project, the website will remain online and will be accessible to users for a period of at least five years.

The KnowGraphs website uses a polymorphic knowledge graph completed by static content in the backend. The website itself is static but is regenerated dynamically after updates in the corresponding Git repository. Therewith, we ensure that versioning, rollbacks and distributed editing are easily possible. Automatic checks ensure that the website is only deployed if it meets predefined quality criteria.

The first chapter of this deliverable illustrates the approach followed in the development of the project website. The following chapter covers the process of delivery of the website, how it will be articulated and how it will be managed over the course of the project.

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This project has received funding from the European Commission's H2020 Marie Skłodowska-Curie work programme under grant agreement No 860801.

History

Version	Date	Reason	Revised by
0.0	02/12/2019	First draft created	Ida VaroÅanec
0.1	10/12/2019	Draft revised	Bettina Zijlstra
0.2	12/12/2019	Second draft	Bettina Zijlstra
0.3	23/12/2019	Peer review	Axel Ngonga
0.4	30/12/2019	Third draft	Tim Ermilov
0.4	31/12/2019	Peer review	Axel Ngonga
0.4	31/12/2019	Final version submitted	Nadine Jochimsen

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Executive Summary

D6.1 gives an overview of the KnowGraphs website. The site was designed to reflect the work to be carried out in the project and uses a polymorphic knowledge graph completed by static content in the backend. While the website as rendered by browsers is static, the content of the site is regenerated dynamically after updates in the corresponding Git repository. Therewith, we ensure that versioning, rollbacks and distributed editing are easily possible. Automatic checks ensure that the website is only deployed if it meets predefined quality criteria.

This deliverable presents the planning, design and implementation of the project website for Know-Graphs, explaining and clarifying the intermediate steps that have led to the completion of Task 6.1. The main goal of the KnowGraphs website is to disseminate the information on project activities, events and partners (external); serve as registration portal for events (external); disseminate the project deliverables (external); facilitate the engagement of stakeholders (external); serve as communication platform for Fellows (internal); serve as communication platform for beneficiaries and partners (internal). Towards the end of the project, the website will also support the exploitation activities of the project. After the closing of the project, the website will remain online and will be accessible to users for a period of at least five years.

Section 1 of this deliverable illustrates the approach followed in the development of the project website. In Section 2, we give a brief technical overview of the site create, generation and deployment. Finally, Section 3 gives an overview of the current structure of the website and details how the website will be managed over the course of the project.

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1 Introduction

1.1 Aim of the deliverable

This deliverable explains the development and launch of the KnowGraphs website via the URL <https://knowgraphs.eu>. The website went live on December 2nd, 2019.

1.2 Goal of the Website

The website of the project serves as a communication and dissemination tool and is a vital part of the project, being a resource for information, collaboration and multi-spectral dissemination of results to all stakeholders of the KnowGraphs project. For this purpose, the website is divided into separate sections. Currently, the section “Home” will be devoted to general information about the project’s goals and approach, to its objectives, its achievements and research areas. Moreover, it features a section on “latest tweets” which will thus display the latest mentions of the project on Twitter, as well as “News” which will lead the user to articles related to the project. Finally, the Home section provides contact information of primary contacts of the project. Other sections include “Team” – where an overview of individual project mentors is displayed, and a concomitant section “Partner” lists the beneficiaries and associated members of the project. More details on the current structure of the site can be found in Section 3.

The ownership of the website domain, <https://knowgraphs.eu>, was secured by the WP6 leader at the start of the project and remains propriety of the consortium. The URL was chosen to replicate the project’s name, which is already quite symbolic, and to simplify the search for information by any possible user.

1.3 Hosting Services

The website is hosted by Hetzner Online, which is based on the strict security and performance standards reinforced by partnering with prominent hardware and software manufacturers (i.e., Intel and Dell).

1. *Data centers* - The Hetzner Online has everything covered at hardware level to overcome any problem. It features high-performance web hosting, managed servers, cloud servers, dedicated root servers, collocation services which form a state-of-the-art and environmentally-friendly infrastructure spanning over three data center parks.
2. *Power supply* - The infrastructure features redundant UPS facilities which support the power supply in the case of a power supply failure.
3. *Climate control* - Climate control is achieved via energy efficient direct free cooling N+2 redundancy, cold aisle containment, under-floor air conditioning, higher than average raised floor system, and monitoring of air temperature and server/distribution cabinets, thereby protecting the physical hosting system.

Data centers are designed to withstand any form of intrusion or hazard, because of an innovative design technology. Security infrastructure encompasses video-monitored high-security perimeter fencing around the entire data center park, entry via electronic access control terminals with a transponder

key or admission card, and 24/7 surveillance cameras for monitoring access routes and other facilities. Technical features of Hetzner Online data center are based on:

- Firewalls
- IDS: intrusion detection system
- Antivirus
- Protection against DDoS attacks
- HTTPS Protocol

2 Technical Overview

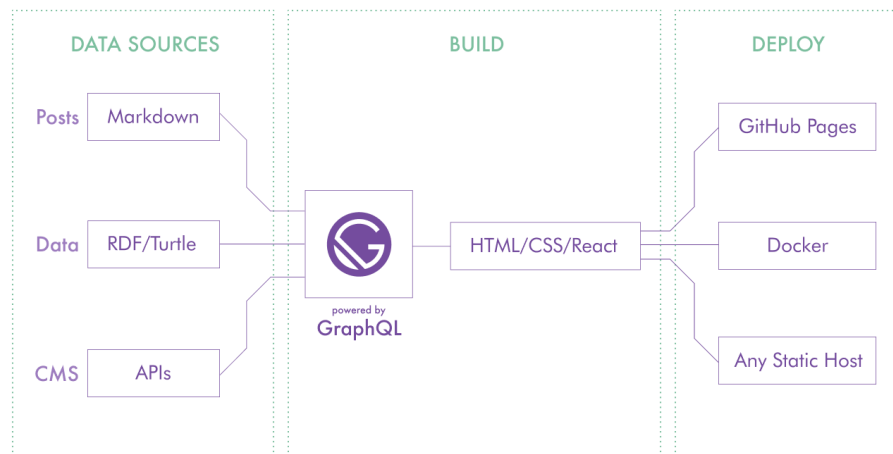


Figure 1: Overview of the technical deployment

An overview of the deployment of the KnowGraphs website is shown in Figure 1. The KnowGraphs website is based on the popular, free and open-source framework Gatsby.¹ This framework is a fast, modern site generator for React² that is extensible via a flexible plugin system. The first step of the Gatsby workflow is consuming data from the data sources. While Gatsby does come with a wide variety of data source plugins (e.g., we are using Markdown plugin for simple text pages on the website), it does not support knowledge graphs directly. Hence, we have developed a Gatsby transformer plugin capable of ingesting local knowledge graphs (in turtle format) and transforming them into Gatsby data nodes. Additionally, we implemented a script that converts publications (queried by specific project tag) from the Bibsonomy³ API to a set of local knowledge graphs that are also provided to Gatsby. The current version of the website uses knowledge graph representations for people, partners and related publications. The internal data nodes generated by Gatsby for all data sources are exposed via a GraphQL⁴ endpoint. Therewith, the website ingests RDF and exposes a custom knowledge graph representation.

The next step in the Gatsby application lifecycle is the build process. During this step, our custom React templates are used along with queries to the data from the aforementioned GraphQL endpoint to

¹ <https://www.gatsbyjs.org/>

² <https://reactjs.org/>

³ <https://www.bibsonomy.org/>

⁴ <https://graphql.org/>

generate visual representations of the resulting data (i.e., pages for people, partners and publications). In addition to React for templating, we utilize the PostCSS⁵ plugin along with the Tailwind.css⁶ framework to style pages according to the design defined in the project. PostCSS plugin additionally uses Autoprefixer⁷ to make sure all our styles are compatible with all browsers that currently have significant usage percentage across the Web. Finally, we utilize the PurgeCSS⁸ plugin to remove unused styles to keep the resulting website as lean as possible. Aside from building data from knowledge graphs into pages, we also use simple markdown to generate basic text pages (e.g. contact, news). The work of converting markdown into styled web pages is also carried out during the build step. Additionally, we utilize specialized Gatsby plugins to pre-process and optimize any images that need to be included into the website. The result of the build step is the folder containing static version of the complete website that can be deployed by serving via web server.

The final step in building the project website is the deployment step. We have opted to use Docker⁹ as our core technology. After Gatsby finishes the build, the Docker image is assembled according to the specification defined in the Dockerfile. The Docker image is then deployed to one of our servers using Exoframe.¹⁰ Exoframe automatically handles the configuration of the reverse proxy Traefik,¹¹ the setup of SSL certificates (provided by letsencrypt)¹² and rolling updates for the website updates. We have also configured a continuous delivery process using Github Actions¹³ so that the website content can be easily edited and deployed directly from the Github web user interface.

3 Design, Structure and Maintenance

3.1 Approach

The steps for the creation of the website were as follows:

- Definition of a structure
- Collocation of the contents in the relevant sections
- Proposition of contents
- Design of the graphic layout in accordance with the logo and the graphic identity of the project
- Implementation of sections and web pages with the agreed layout
- Testing phase
- Website online and sharing with the consortium

All the above steps have been agreed with the project coordinator. The coordinator and many of the partners were involved in the phases of the planning, the design and the testing during the whole process.

⁵ <https://postcss.org/>
⁶ <https://tailwindcss.com/>
⁷ <https://github.com/postcss/autoprefixer>
⁸ <https://github.com/FullHuman/purgecss>
⁹ <https://www.docker.com/>
¹⁰ <https://github.com/exoframejs/exoframe>
¹¹ <https://containo.us/traefik/>
¹² <https://letsencrypt.org/>
¹³ <https://github.com/features/actions>

3.2 Structure

The website structure was designed to ease the access to information about the KnowGraphs Project. It was hence designed to have a simple navigation that makes the access to content possible in a small number of clicks. The structure is summarized in Figure 2.

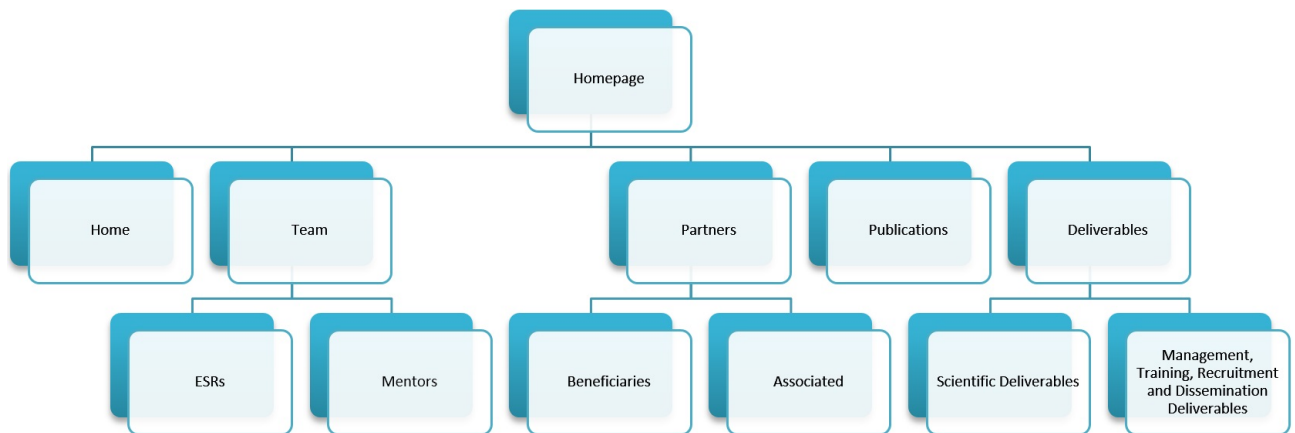


Figure 2: Structure of the KnowGraphs website. Note that ESRs will be added after the recruiting of the first ESRs. Moreover, the structure will be extended with corresponding achievements in the project, e.g., the creation of multimedia content.

The current sections are instantiated as follows:

1. Home: contains general information about the project. This information aims to provide context to the website and the project in general.
 - Welcome to KnowGraphs: This sub-section depicts the concrete objectives of the project and therefore defines what the final output is foreseen to be. Once the development of the project progresses, this section will be updated with new information that the consortium deems appropriate for public communication.
 - Research areas: This sub-section describes the relevant research areas of the project.
 - Latest tweets: This sub-section provides information on latest 'tweets' that are mentioning and of relevance of the project.
 - News: This sub-section leads the user to relevant news that will be published accordingly with the project's progress.
 - Contact us: This sub-section lists two primary contact points of the project and connects to more contact information.
2. Team: this section presents the composition of the consortium, highlighting the variety of nationalities and expertise that it comprises. In this section, a page is dedicated to each individual mentor. Each of them is presented by standardized information: title, name and portrait picture. The ESRs will be added as first item in this section once they have been hired.
3. Partners: This section comprises a list of beneficiaries and associated members of the project. They are represented by their name and logo, which subsequently lead to their respective websites where more specific information can be obtained.
4. Publications: This section features publications of the project. Users can search by article or author's name, as well as filter the results by authors, years or type of publication.

5. Deliverables: This section provides a list of deliverables. It is segregated in two sub-sections - Scientific Deliverables, and Management, Training, Recruitment and Dissemination Deliverables. This contributes to the project's transparency for the broader public and consortium members.
6. Contact: In this section, visitors will find the contact details of the KnowGraphs project coordinators and the email addresses.

The website will be extended with corresponding sections as relevant content (e.g., multimedia) is generated.

3.3 Website Design Explanation

The starting point for the website layout design was the graphic identity that was developed for the project's logo (see Figure 3). The concept features the name of the project and a 3D model abstracting a tesseract, which stands for a multidimensional structured object, a symbol of what knowledge graphs should capture.

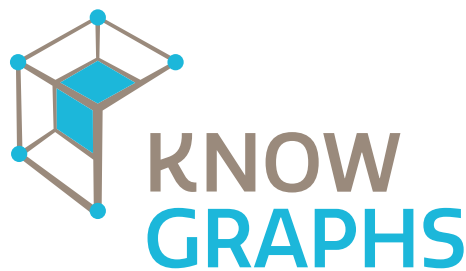


Figure 3: Logo of the KnowGraphs project

From this design and from the other elements of the brand identity, such as the colour palette and the fonts, the website layout was designed and developed (see Figures 4 and 5). The main elements that are featured are:

- A graphic header that will also be used to host banners for specific initiatives
- A space for an infographic or for other graphic materials that will guide the users through the website and the project (a sample in the image below)
- A list of the latest news published on the website
- Project highlights

In addition to the KnowGraphs website, the KnowGraphs GitHub repository has been set up for the sharing of code and to support the collaboration on the website within the consortium as shown in Figure 6.

3.4 Website Dissemination

Each partner in the KnowGraphs consortium will contribute, where appropriate, to give visibility to the website, for example by linking it to their company/organization institutional websites, disseminating it among their networks and by referring to it in any communication concerning the project.

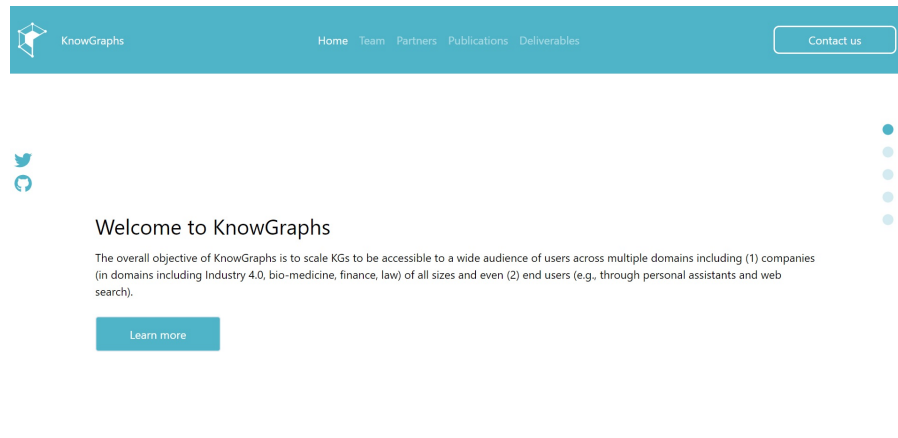


Figure 4: Top frame of the KnowGraphs home

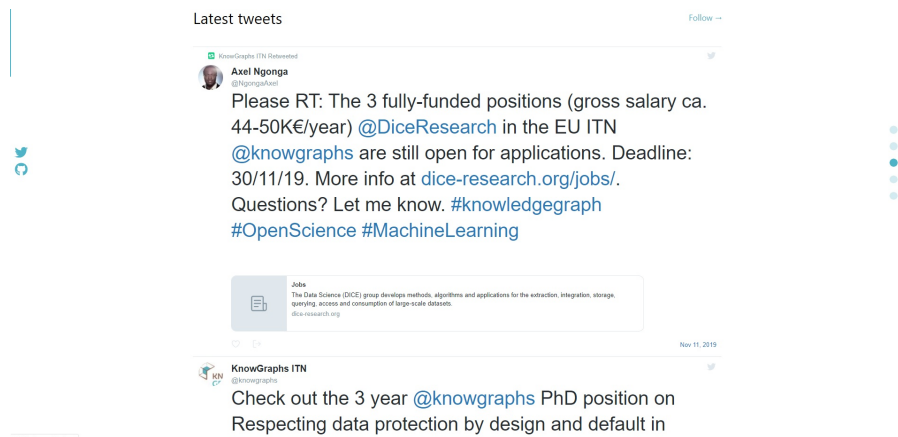


Figure 5: Tweets integrated into the KnowGraphs home

Additionally, a referencing and Search Engine optimization will be devised in order to make the KnowGraphs website easy to reach by web search engines with relevant keywords that will be identified by the consortium. Another tool that is used to disseminate information about the KnowGraphs project is Twitter. KnowGraphs' twitter account¹⁴ was set up in September 2019 and has already attracted 172 followers (December 31st, 2019) and quite some traffic in particular related to the posting of the KnowGraphs ESR job offers by the different institutions.

3.5 Website Maintenance and Long-Term Perspective

The website is updated regularly with the help of information received from partners. The ESRs will play a key role in generating content to be added to the website, e.g., a multimedia overview of what KnowGraphs is about. The structure of the website will evolve with the content generated by the project. Given the versioning and automatic checks in the backend, we expect the website to have reliable up times and serve as a constant portal for persons interested in KnowGraphs and its results. The website domain name is licensed for five years and can be further extended as may be necessary to support the future development of the KnowGraphs systems.

¹⁴ <https://twitter.com/knowgraphs>

KnowGraphs / knowgraphs-website

Unwatch 15 Star 1 Fork 1

Code Issues 0 Pull requests 0 Actions Projects 0 Wiki Security Insights

KnowGraphs website

knowgraphs-website gatsby rdf

67 commits 2 branches 0 packages 0 releases 3 contributors

Branch: develop New pull request Create new file Upload files Find file Clone or download

yamalight Update NadineJochimsen.ttl Latest commit d6314fb yesterday

.github/workflows	Update github actions to fit new structure	2 months ago
data	Update NadineJochimsen.ttl	yesterday
images	Migrate to use new gatsby-theme-rdfsite	2 months ago
pages	Migrate to use new gatsby-theme-rdfsite	2 months ago
src/gatsby-theme-rdfsite	Migrate to use new gatsby-theme-rdfsite	2 months ago
.dockerignore	Cleanup repo from unused files	2 months ago
.exoframeignore	Cleanup repo from unused files	2 months ago
.gitignore	Migrate to use new gatsby-theme-rdfsite	2 months ago
Dockerfile	Migrate to use new gatsby-theme-rdfsite	2 months ago
README.md	Update readme to reflect theme change	2 months ago
exoframe.json	Cleanup repo from unused files	2 months ago
gatsby-config.js	Migrate to use new gatsby-theme-rdfsite	2 months ago
package.json	Use rdfsite theme v1.0	2 months ago
yarn.lock	Use rdfsite theme v1.0	2 months ago

Figure 6: The KnowGraphs website on GitHub



Figure 7: KnowGraphs' twitter account