Design for IGA-type discretization workflows

D2.1 GECKO Website

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Deliverable Information sheet

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1.0	08/03/2023	Alberto Tena	Document ready for submission to the European Commission

Executive summary

This document provides a general overview of the structure and contents of the GECKO project website. It reflects, at the time of writing this report, the current status and the planned content and features evolution that will be developed along with the project progress during the 4 years lifespan.

Possible modifications and improvements might happen in the future to address any needs not identified at this stage of the project. The website provides the main point of initial contact and information to the public, and to other researchers and it is the centralised tool to communicate the job openings information for Doctoral Candidates. The website has been designed to be professional and responsive and it is planned to be regularly maintained using different formats (e.g. webinars, video clips, power points, etc.). It is intended to publish both general contents on the project but also links to the technical nonconfidential deliverables (when these become available). The website also provides the consortium members with a private area. Besides the website, a Google Drive Folder is created as the space to facilitate collaborative work and enhance the activity of the consortium.

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List of abbreviations

CMS	*Content Management System*
DCs	*Doctoral Candidates*
SB	*Supervisory Board*
KoM	*Kick-off Meeting*

Introduction

The GECKO website is structured and designed as the tool for communication and dissemination of the work to the general public, the potential Doctoral Candidates (DCs), and also to the experts in the field. The website contains a section to include all the training materials and information produced during the project.

The website will provide detailed information about the scope and objectives of GECKO. The intended use is for both internal Consortium communication and public dissemination but is especially focused on attracting talented and motivated candidates. The website will also serve as the tool to disseminate the meaningful research breakthroughs achieved and for helping the DCs to communicate and disseminate their individual project experiences, research scope, objectives, and results.

The website will be constantly updated with material such as upcoming meetings, participation in events, dissemination actions, conferences, publications, DCs training information, newsletters, news, photos, etc. It will be a key enabler for communications between project partners, DCs, stakeholders, and the wider public to share project outcomes.

The website is the public part: it will be open to the general public and will be available by anyone with access to the Internet. The intranet is the private part: it will be regularly updated to provide the latest private deliverables and will be accessible only to consortium members. It represents the project area restricted to the Consortium.

The Project Coordinator CIMNE-CERCA has registered the following domain name:

https://gecko.cimne.com

This domain will host the website of the GECKO project.

The project partner in charge (CIMNE-CERCA) has designed the layout, based on WordPress as Content Management System (CMS), and will maintain the website content during the project's lifetime and at least 3 years after the end of the project. CIMNE-CERCA provisioned the hosting service.

The content updates will be produced mainly as part of WP2 – Dissemination, training and exploitation in charge of project partner KU Leuven which is responsible to communicate and disseminate GECKO research results to a wide community of experts and non-experts in the field and to exploit results within the GECKO consortium.

KU Leuven will also create GECKO accounts in populated social media channels associated with the website. GECKO will be connected to social media creating Facebook pages, Linkedin and Twitter accounts. Links to these will be found on the GECKO website.

The GECKO website has a Password protected intranet, which is accessible only by the registered users from the consortium members through the "private area link" present on the GECKO website main menu.

The project will also have a collaborative environment provided by the project partner in charge (CIMNE-CERCA) consisting of an online file repository based on a Google Drive Folder accessible via a "direct URL link" only accessible for the consortium members serving as the basis for the online collaboration platform for providing access to project management information within the consortium (including information for meetings, minutes, project participants, important events, etc.).

1. THE PROJECT WEBSITE

At this early stage in the project, the website has 7 sections (namely GECKO Project, About Us, Research, Training, Communication & Dissemination, Job Openings and Contact) which describe the scope and objectives of the project, the consortium overview, research objectives, work packages and the individual research projects expected to be conducted by the DCs during the project, information about the secondments, the job openings and the information about the main contact points of the project. Additional information about the training and dissemination materials, activities and events, and non-confidential deliverables will be added. The website will be updated regularly based on the communication and dissemination plan driven by WP2. The website has been built using WordPress, which facilitates updating by the project management team over the duration of the project.

1.1 HOME PAGE

The home page of the portal represents the front-end message of the GECKO project to communicate the project objectives, a summary of the latest project activity, and indications on where to find on the website the project results containing all the essential information concerning the project activity that can be published on the public Internet.

The home page is organised according to the following design model:

Top of the page (Figure 1):

- Graphical identity of GECKO (logo).

- Menu items: GECKO Project, About Us, Research, Training, Communication & Dissemination, Job Openings, Contact.

- Search button.

Central part of the page (Figure 2 and 3):

- Project background, GECKO Scope and Objectives.

Bottom of the page (Figure 4):

- Horizon Europe message disclaimer

Here below in Figure 1, Figure 2, Figure 3 and Figure 4 a representation of the home page in terms of header and main menu, menu details, and home page main content.

Figure 1: Header and Menu

Welcome to Gecko

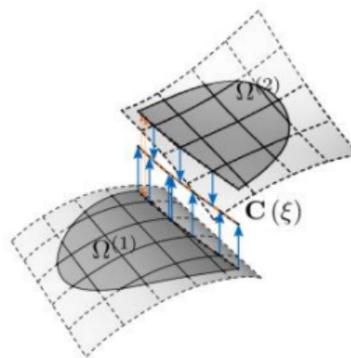### Design for IGA-type discretization workflows

Figure 2: Top-Central part of the page

Scope and Objectives

The main objective of the GECKO project is to bridge the existing gap between the CAD and the computational models (CAE) and integrate them within the industrial workflow. This will imply collaborating with industries in enhancing the adoption of the technology within commercial solvers and adapting existing open source frameworks so that they can hook into the industrial practice and thus remain relevant in the foreseeable future.

In the practice, this implies ensuring that open-source solvers, developed in the academia for both solid and fluid dynamics, are able to use as an input domain any CAD geometry, even in cases in which the geometrical definition is not optimal, i.e. poorly defined or "dirty" geometries with no additional operations nor user intervention.

An efficient and robust solver design must be implemented to be capable of performing seamless "Design-through-analysis" workflows. Achieving such a goal will inherently imply collaborating with the pre/post processing industry to ensure that a smooth path is defined at software level.
The overall project outcome will be to enhance the open source tools and operational workflow so that it can effectively complement commercial based approaches. This in turn will allow addressing relevant bottlenecks, as identified by the industrial partners and addressing them using the IBRA technology so that the solution can be eventually backported into commercial solutions.

Another important objective in the GECKO project is to empower and generalize the capabilities of the IBRA methodology when using complex non-linear models (Solvers) in Computational Fluid Dynamics (CFD), Computational Solid Mechanics (CSM), acoustics, vibro-acoustics, Reduced Order Models (RoM) and surface mapping.

Figure 3: Bottom-Central part of the page

Figure 4: Bottom of the page

1.2 ABOUT US

The intended use of the "*About Us*" page is to give a high-level overview of the GECKO project. This is a page with static data, i.e. should not change during the project unless any amendment formally agreed with the EC.

This page is split into the following subsections:

- Consortium composition. Beneficiaries & Associated Partners.

- Doctoral Candidates (DCs).

- Supervisors.

Figure 5 gives a representation of the "About Us" which includes Consortium composition and soon it will also include a page with information about the DCs and the Supervisory Board members.

The Doctoral Candidates (DCs) page will be created once the DCs are recruited for the project. DCs will be encouraged to create official GECKO pages within social networks and websites in which they will provide information about the project's achievements, possible grants and fellowships, scientific news and breakthroughs and their personal view of the research life within GECKO. These actions will promote the dissemination of the project within the consortium but also to external parties and students. Links to the personal DCs web pages will be created on this page.

Once the Supervisory Board (SB) has been created after the Kick-off Meeting (KoM), The content of the Supervisors webpage will be created with the information of the representatives of each Partner involved in this governance board.
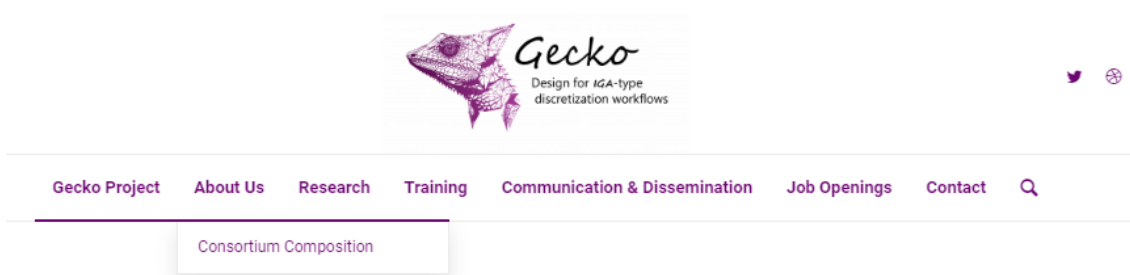
Figure 5: About Us page

1.3   RESEARCH

The Research page contains information about the scientific research to be conducted during the project to communicate the scientific aim of the project and the main scientific objectives.

The Research page is divided into three pages:

The main Research Page (Figure 6):

- It contains information about the scientific aim of the project and the main scientific objectives.

The Work packages Page (Figure 7):

- It contains information about the five work packages of the project, including the main objective and the WP-leader of each one.

Individual Research Projects (Figure 8):

- It contains information about the Individual Research Projects of each DC. This information will be linked with the specific sections of The Doctoral Candidates (DCs) pages which will provide information about the progress of the individual Research Projects.

After more than a decade of research, IsoGeometric approaches are starting to make inroads into commercial solvers, and thus starting to be relevant in the industrial practice. Outstanding challenges still exist in the use of the underlying CAD technologies, and in particular in the use of "trimming". The GECKO project wants to help solving the outstanding difficulties by improving the current state of the art and by integrating academic research within the industrial workflow. With this purpose, GECKO pursuit the following objectives:

- Ensure that open-source solvers, developed in the academia for both solid and fluid dynamics, are able to use as an input domain any CAD geometry, even in cases in which the geometrical definition is not optimal, i.e. poorly defined or "dirty" geometries. In this regard, an efficient and robust solver design must be implemented to be capable of performing seamless "Design-through-analysis" workflows.

- Collaborate with the pre/post processing industry represented in the proposal by the company BETA-CAE), with solver vendors (DYNAMORE) and end users (IDIADA) to ensure that a smooth path is defined to allow such convergence.

- Enhance the open source tools and operational workflow so that they can effectively complement commercial based approaches. This in turn will allow addressing relevant bottlenecks, as identified by the industrial partners, so that the solution can be eventually backported into commercial solutions.

- Empower and generalize the currently available solutions when dealing with complex non-linear models (Solvers) in Computational Fluid Dynamics (CFD), Computational Solid Mechanics (CSM), acoustics, vibroacoustics, Reduced Order Models (RoM) and surface mapping.

Figure 6: Research section main page

- **WP1 Technical Coordination**

  Objectives: This WP will be devoted to the technical planning of the project. This includes the establishment of initiatives, interaction and information exchange procedures between the different beneficiaries and associated partners.

  WP-leader: CIMNE – CERCA

- **WP2 Dissemination, training and exploitation**

  Objectives: The overall objectives of this WP are to communicate and disseminate GECKO research results to a wide community of experts and non-experts in the field and to exploit results within the GECKO consortium and to manage the data resulting from the project.

  WP-leader: KU Leuven

Figure 7: Work packages information page of the Research section

- **DC1 CFD techniques for IBRA-type discretizations -WP3:**

  Explore the use of IBRA-type discretizations in the context of CFD.

- **DC2 IBRA-type discretizations in computational solid mechanics – WP3:**

  Explore the applicability of IBRA-type discretization to problems in solid mechanics.

- **DC3 Application of IBRA-type discretizations in implicit contact mechanics – WP3:**

  Use of smooth CAD discretizations in contact mechanics is known to be beneficial.

- **DC4 Co-simulation strategies involving IBRA for solution of multi-field problems – WP3:**

  Complex technical systems often require a partitioned approach to enable disciplinary modelling and simulation with bestsuited solution approaches and discretization techniques in each domain.

- **DC5 Large deformation structural elements (beams and shells) modeled with IBRA, including trimming and multiple coupled patches- WP3:**

  Development and systematic assessment of high-accuracy and robust structural mechanics elements for large deformation isogeometric B-Rep analysis.

Figure 8: Individual Research Projects page of the Research section

1.4   TRAINING

The Training page will contain information about the Training Activities and Events of the project and the secondment that will be carried out by the DCs.

The Training page is divided into two pages (Figure 9):

The Training Activities & Events Page:

- It will contain information about the training activities conducted by the DCs and the training events conducted by the project or those where the DCs will attend. The content will be created once the first training activities will be designed and performed. Whenever possible, the activities and events provided by the project will be available online via webinars, recorded files, and online teaching materials which will be accessible from this page.

The Secondment Page (Figure 10):

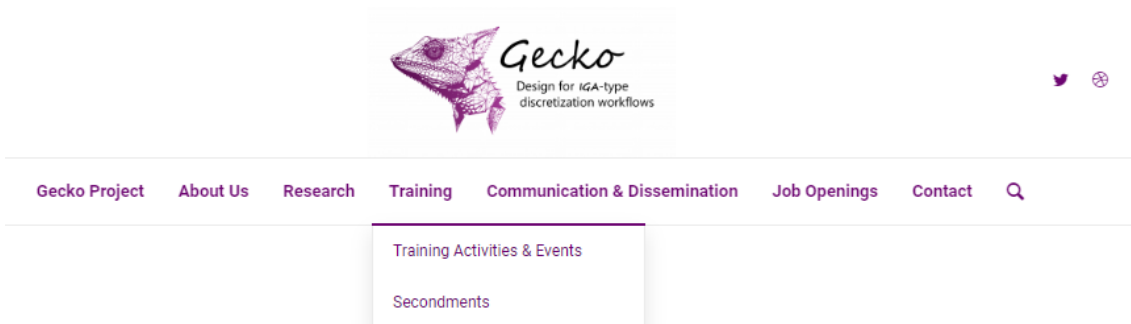- It contains information about the Secondment plan for the DCs envisaged.
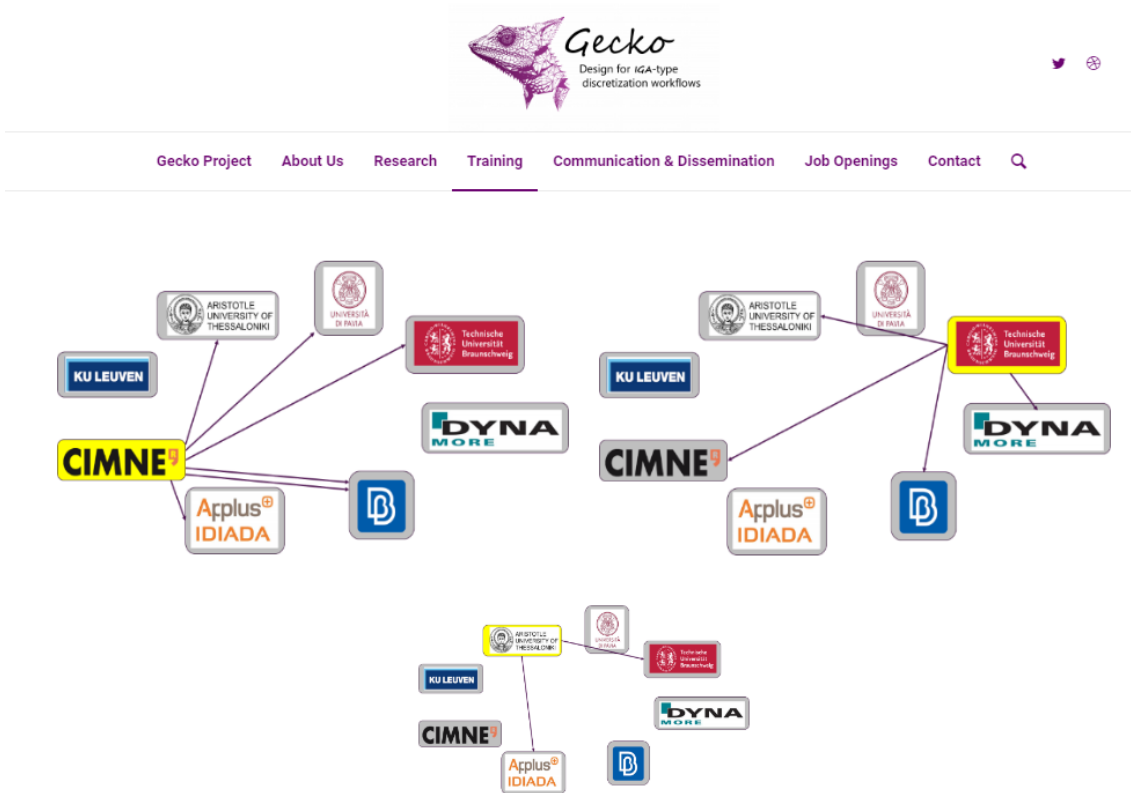
Figure 9: Training Page sub-menus

Figure 10: Secondment Plan Page

1.5 COMMUNICATION & DISSEMINATION

The Communication & Dissemination page will contain information about the current status and advances of the project and the public dissemination and engagement events that will be organised during the project where the DCs and other interested participants will present their achievements in an informative, easy-to-follow manner.

The structure of this page (Figure 11) will consist of two sub-pages (News & Events and Dissemination) that will be created when the first news of the project will be created.

Figure 11: Dissemination Page structure

1.6 JOB OPENINGS

The Job Openings page will contain information about the eligibility criteria of the DCs and information about the selection process. A summary of the vacancies information will be included on this page with a link to the institution which is promoting each position.

1.7 CONTACT

The Contact page contains the contact details of the Scientific Coordinator of the project and the project management board (Figure 12).
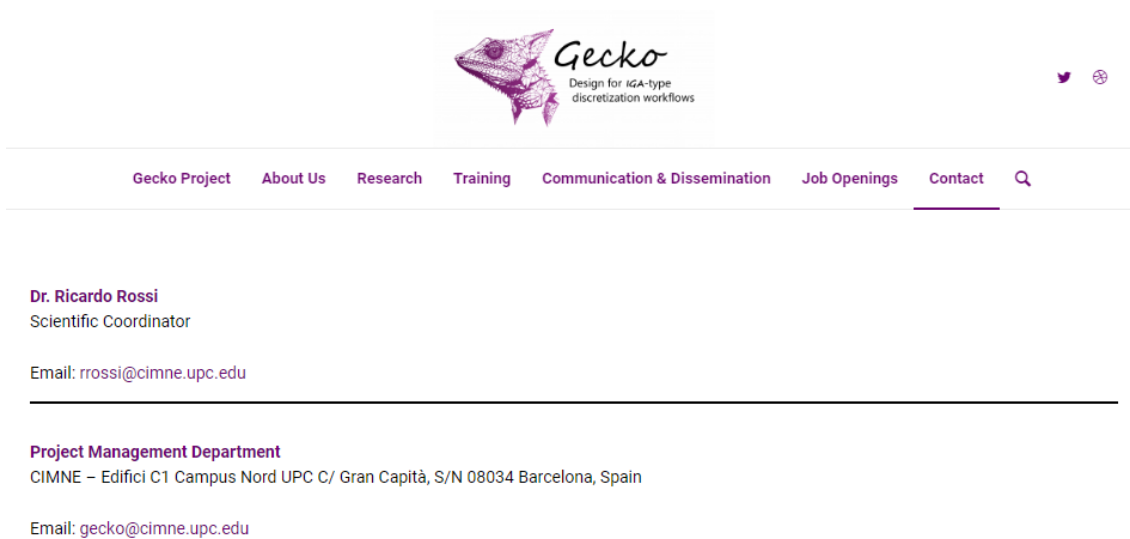
Figure 12: Contact details page

1.8 INTRANET

Through the Intranet, project partners with editing rights can modify the content and structure of the website. Besides, in this Intranet authorised project partners users can consult and download the sensitive approved project deliverables. The access is reserved for pre-registered users that are authorised persons working in the project and are designated by the partner that owns their identity. Access to the reserved area is controlled through the login procedure.

User account and privileges management are managed by CIMNE-CERCA.

2. THE COLLABORATIVE ENVIRONMENT

The project internal workspace and collaboration area consist of a Google Drive Folder. The access is reserved for the authorised persons working on the project and is designated by the partner that owns their identity.

User authorization and privileges management are managed by CIMNE-CERCA.

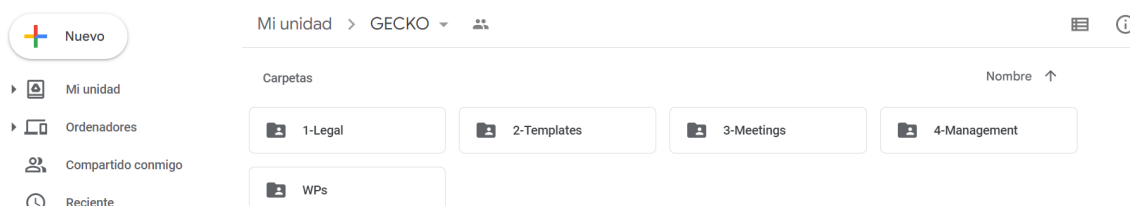Figure 13 gives a representation of the collaborative project area.

Figure 13: Google Drive Folder as the GECKO's collaborative project area