Innovative and Inclusive Democratic Spaces for Deliberation and Participation

HE-101132431

D3.8 iDEM Integrated Platform, API Specification and Design

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Summary

This describes a fast prototype of an open-API cloud-based web-services platform to deliver the iDEM services and text-simplification app. The iDEM services are applicable to a range of different audiences, languages, and domains, and are being implemented as a free open source library for easy integration into internet-based deliberative and participatory democratic spaces. The project will have two formal operational baseline releases, one in March 2025 and one in June 2026.

Easy Language Summary

This is the first prototype of a service that will make it easier for people to understand complex text.
It will be available in many languages and can be used in many different settings.
The service will be released in two stages, one in 2025 and one in 2026

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0.2	09/02/2024	Updates based on discussion, and inputs from all Partners at project meeting on 29-30/01/24.	MAC
0.3	08/05/2024	Updates based on inputs from all Partners based on the first version of the Fast Prototype.	MAC
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1.0	18/06/2024	Final version prepared	MAC
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Acronyms	
AI	Artificial Intelligence
API	Application Programme Interface
CEFR	Common European System of Reference for Languages
CoE	Council of Europe
DL	Deep Learning
DoA	Description of the Action
EAA	European Accessibility Act
ECCroN	European Consortium on Cross-Cultural Neuropsychology
EL	Easy-Language
ER	Easy-Read
ET	Easy-Text
EUL	Easy-to-Understand Language (what iDEM gives every user)
FP	Fast Prototype
GA	Grant Agreement
GenAI	Generative AI
GDPR	General Data Protection Regulation
GPT	Generative Pre-Trained Transformer AI technology
HTML	Hypertext Markup Language
HTTPS	HyperText Transfer Protocol Secure
ICT	Information and Communication Technologies
iDEM	Both the service and this project (GA 101132431)
IP	Intellectual Property
IPR	Intellectual Property Rights
KPI	Key Performance Indicator
LRC	Language & Reading Comprehensibility

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MCI	Mild Cognitive Impairment
MoCA	Montreal Cognitive Assessment
MT	Machine Translation
NLP	Natural Language Processing
OCR	Optical Character Recognition
OS	Operating System
OSS	Open Source Software
POC	Proof of Concept
TGA	Text Generation Assistant
UI	User Interface
UCD	User Centred Design
URL	Uniform Resource Locator
UX	User Experience
UXD	User Experience Design
WAD	Web Accessibility Directive
WP	Work Package
WWW	World Wide Web

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Executive Summary

This report describes the software packages and libraries' resources of the iDEM Integrated Platform, API Specification and Design, as an initial fast prototype and first output of task T3.5 "iDEM Service Implementation" of WP3 "Advanced Human Language Technology for non-discriminatory and accessible Democratic Spaces". Task T3.5 is researching, developing, and implementing the open-API cloud-based iDEM web-services platform to deliver the iDEM services and text simplification app, integrating the various components and solutions from WP3, including investigating mechanisms to identify complex linguistic phenomena and to implement a Text Generation Assistant (TGA) in the content of deliberative democracy. WP3 is applying Deep Learning techniques to make the methods applicable to a range of different audiences, languages, and domains. The solutions (algorithms and language resources) will be implemented as a freely available library for easy integration into Internet-based deliberative and participatory democratic spaces, starting with the Barcelona Decidim platform.

This D3.8 initial iDEM fast prototype enables users to become actively involved in the co-creation process of the service's functional specification and its co-development from early in the project, resulting in its formal operational releases in two stages (D3.9 "Prototype iDEM Integrated Platform and API" and D3.10 "Final iDEM Platform, API and Services") in March 2025 and June 2026, respectively.

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1. Introduction

Deliberative and participatory processes currently lack full legitimacy due to the exclusion and marginalisation of several vulnerable communities from democratic spaces. iDEM is addressing this issue in the context of marginalisation and exclusion of people who need support to fully be able to read, write and comprehend language (around 6 million individuals in the EU and over 90 million people globally). iDEM is developing the theoretical foundations for the analysis of current marginalisation from deliberative processes of diverse under-represented groups due to language skills and will propose, implement, and evaluate inclusive deliberative and participatory spaces. The project is using a user-centred approach for making participatory processes more accessible and inclusive, by developing advanced natural language processing technologies and artificial intelligence to empower under-represented groups with tools to facilitate communication and dialog in democratic spaces.

The iDEM project aims to co-create the next-generation multilingual models that will:

(1) detect possible sources of problems in understanding messages and biases for several European languages and audiences,
(2) automatically adapt texts in those languages to be accessible and unbiased for these audiences,
(3) provide AI tools for enhancing the controllable generation of messages and discourses.

Thus, iDEM will innovate democratic spaces with customised, user-centric technology enhancing the participation and representation of marginalised groups by providing unbiased and inclusive technology. To do so, iDEM is also building on the results of relevant past projects, and seeking collaboration with related projects and relevant centres for democracy in Europe.

This report describes the software components and libraries' resources of the iDEM Integrated Platform, API Specification and Design, implemented as an initial fast prototype and first output of task T3.5 "iDEM Service Implementation" of WP3 "Advanced Human Language Technology for non-discriminatory and accessible Democratic Spaces". Task T3.5 is researching, developing, and implementing the open-API cloud-based iDEM web-services platform to deliver the iDEM services and Text-simplification App, integrating the various components and solutions from WP3 to implement the iDEM Text Generation Assistant (TGA) in the content of deliberative democracy. WP3 is applying Deep Learning techniques to make the methods applicable to a range of different audiences, languages, and domains. The solutions (algorithms and language resources) are being implemented as a freely available library for easy integration into Internet-based deliberative and participatory democratic spaces.

The iDEM service is being developed using an Agile iterative DevOps approach[1], with this initial fast prototype to enable users to become actively involved in the co-creation process of its functional specification and its co-development from early in the project, resulting in its formal operational release in two stages (D3.9 "Prototype iDEM Integrated Platform and API" and D3.10 "Final iDEM Platform, API and Services" in months 15 and 30 of the project).

[1] Agile vs DevOps | Atlassian

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The iDEM service platform resides on CAPITO's federated cloud distributed microservice infrastructure which was co-funded by the EU Innovation Council as the basis for services such as iDEM. The system is using adaptive technologies to personalise and adjust the complexity of the text or use different modalities based on the needs of individual users. All services are designed in line with "Privacy and Security by design and Default" (as per article 25 of the GDPR (General Data Protection Regulation)[2]), in their specification, development, and validation, driven by its user-centred co-creation methodology.

The impact of iDEM is expected to be profound. By 2029 the iDEM service will be available to 1.2 million citizens with reading difficulties enabling them, for the very first time, to participate in their local, national and EU democratic process with 80 participatory democracy bodies in the EU[3]. This impact will be achieved through the iDEM cloud-based web-services platform and mobile application being free and open source, integrated and operationally delivering Easy-to-Understand Language (EUL) texts for use with any democratic deliberative or participatory online space, government website, and EU site. The project will also develop an open API to enable any future additional and third-party services to be integrated into the iDEM System and extend its impact.

1.1 iDEM Text Users

iDEM is addressing the needs of all individuals and entities that interact with text in any way, regardless of whether they are reading, writing, editing, translating, or generating text.

iDEM's services will provide specific tools for text consumers (i.e. end users) and text providers (i.e. deliberative democratic and participation spaces. However, iDEM's text community, or ecosystem, includes all stakeholders and participants, to ensure that the iDEM services are all-inclusive, accessible, and unbiased. More than just "consumers" and "providers", as they acknowledge that everyone who interacts with text plays an important role in the text communication process.

Throughout this report, which term is most appropriate to use will depend on the specific context. For example, if we are talking about the relationship between readers and writers, we might use the term "text participants". If we are talking about the people and organisations that produce and distribute text, we might use the term "text stakeholders".

[2] https://www.privacy-regulation.eu/en/article-25-data-protection-by-design-and-by-default-GDPR.htm
[3] As estimated in D5.8 "iDEM Initial Sustainable Exploitation, Innovation and IPR Plans"

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1.2 Task T3.5 Implementation Methodology

To ensure a focus on its objectives, the effective contribution of all iDEM Partners and total transparency, task T3.5 is being implemented in an open collaborative iterative way as follows

1. At the start of the task and after delivery of a deliverable, the format and outline contents of its next deliverable are drafted on a shared space and agreed by all Partners.
2. A “fast draft” initial version of the deliverable is generated.
3. The fast draft is then collaboratively iteratively completed by the ongoing continuous inputs, reviews and contributions of all Partners, as each undertakes their research and task work.
4. Regular WP3 meetings discuss and review progress, and agree work to be done.

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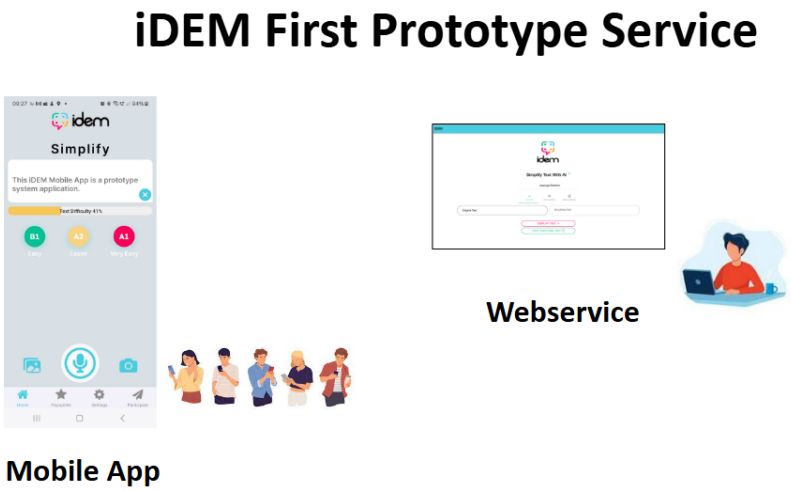
2. iDEM Service

As a first step to implement the iDEM application and open API that will integrate and operationally deliver all of the iDEM services, for use with any democratic/participatory spaces, a Fast Prototype (FP) of the iDEM service was developed. User personas' requirements analysis (see section 4) indicated that most users will access the iDEM services using mobile devices (phones and tablets). So the initial FP of the iDEM services was developed as a mobile app, using CAPITO's existing simplification services and accessing the Decidim.Barcelona deliberative democratic participation platform[4].
By demonstrating and validating iDEM with the Decidim platform, the goal is to enhance accessibility, inclusivity, and participation in citizen deliberations and decision-making processes. The tailored iDEM architecture aims to provide an integrated and user-friendly experience within the context of the Decidim digital platform for citizen participation in Barcelona. The web service version for desktop PC access will be then straightforward to develop (see section 2.3).



Using the FP the work can now focus on the development and formative evaluation by users of the innovative iDEM tools and services.

2.1 iDEM Services and Users

The iDEM system will provide the following services, as defined in the DoA:

1. iDEM Difficulty Assessment
2. iDEM Simplifier
   a. Lexical Simplification
   b. Sentence Simplification
3. iDEM Text Generations Assistant (TGA)

iDEM services will simplify texts to *Easy*, *Easier* or *Very Easy*, equivalent to *Plain Language*, *Easy Language* or *Easy Read*, or level B1, A2 or A1 on the Common European System of Reference for Languages (CEFR)[5] scale (see section 3)

[4] decidim.barcelona
[5] The CEFR Levels - Common European Framework of Reference for Languages (CEFR) (coe.int)

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The simplified texts are focused on supporting and enabling users to engage in the deliberation and participation democratic spaces for:

A. Official documents from democratic and policy-making institutions at all levels from local, national, and international (EU).
B. interactions with democratic and policy-making institutions at all levels from local, national, and international (EU) on their platforms.

The iDEM services are targeting the following 5 User groups:

1. People with Language and Reading Comprehensibility (LRC) difficulties (Primary)
2. Democratic & Policy-making institutions (Primary)
3. Local & regional participatory democratic bodies & civic platforms (Primary)
4. All Citizens (Secondary)
5. Technical developers of Deliberative eDemocracy/eParticipation platforms and Scientific Community (Secondary)

The primary targeted LRC users include citizens with reading, writing and language comprehension difficulties, such as elderly, migrants, people with Mild Cognitive Impairment (MCI)[6] [~ Montreal Cognitive Assessment (MoCA) score 18-25][7], and other vulnerable, marginalised and hard to reach groups, to be identified in WP4. (see section 4).

The iDEM mobile app and web service, will be a platform by which all user groups can contribute to public discussions. So for instance, expanding access to the Decidim.Barcelona API for mobile platforms, the iDEM User Interface (UI) and services empower all user groups to engage with and contribute to participatory processes.

2.2 iDEM First Prototype Service

The iDEM V0.1 FP system is implemented using the CAPITO platform[8] to work initially with the Decidim digital platform for citizen participation[9], as used by the Barcelona City Council[10], which will be one of the iDEM pilot sites in WP4. The CAPITO platform and the Decidim platform provide a number of features and services that are beneficial for the iDEM V0.1 fast prototype. They are also widely used, scalable, secure, and reliable, and they provide a variety of services that can be used to implement the core functionality of the iDEM system.

The App is published and available as a beta test App to iDEM partners' Approved Users for both Android and IoS, on the Google and Apple App stores[11]. Thus enabling those users to become proactively involved in the co-creation process of the service's functional specification and its co-development from early in the project. Once refined by users feedback, the app will be readily redeveloped as a webservice that incorporates the same functionality and User Interface (UI) features.

[6] Aging Dementia - Pickup Family Neuroscience Institute (hoag.org)
[7] Montreal Cognitive Assessment - an overview | ScienceDirect Topics
[8] https://www.CAPITO.eu/en/
[9] https://decidim.org/,
[10] https://www.decidim.barcelona/?locale=es
[11] To join the iDEM Approved Users Group, email john@mac.ie

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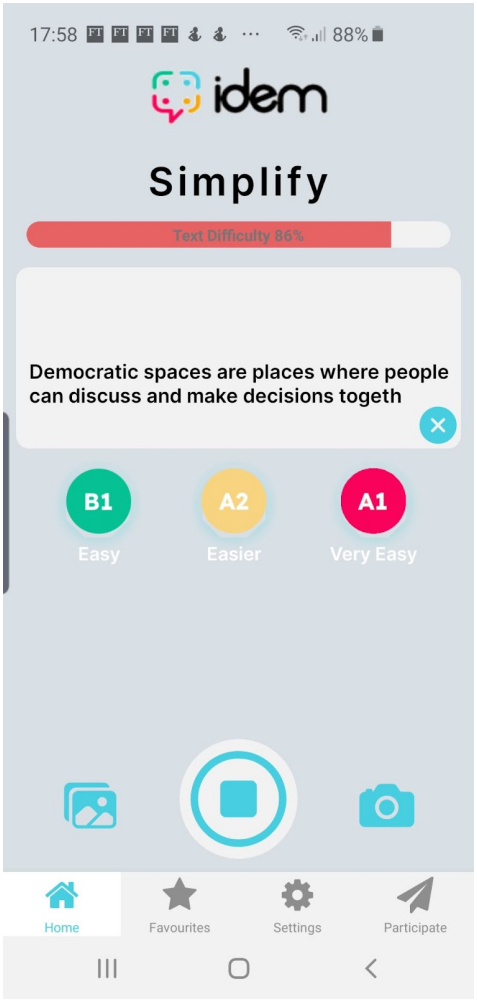
The Fast Prototype (FP) is a first step to give users a "feel" for using the service on a phone. It is also the first step in the subsequent Incremental development through many cycles of formative users' feedback and improvements.

2.3 iDEM Phone App Text Generation Assistant

The iDEM App's very simple UI provides a very extensive set of powerful functions that are required to run the iDEM service on both Android and Apple phones.



iDEM Home Input Screen
Difficulty Assessment (Green, Blue, Red)[12]
Text input **Window**
Simplification to *Easy*/B1/Plain, *Easier*/A2 or *Very Easy*/A1/Easy Read
inputs/edits by Text/keyboard, Paste, File/OCR images, Voice, Camera/OCR
4 major iDEM **functions**, starting with Home Page

[12] Indicating approximately Green - A1/Very Easy/Easy Read (everybody understands).
Blue - B1/Easy/Plain Language, Red - B2+(could be difficult to understand). See discussion in section 3.

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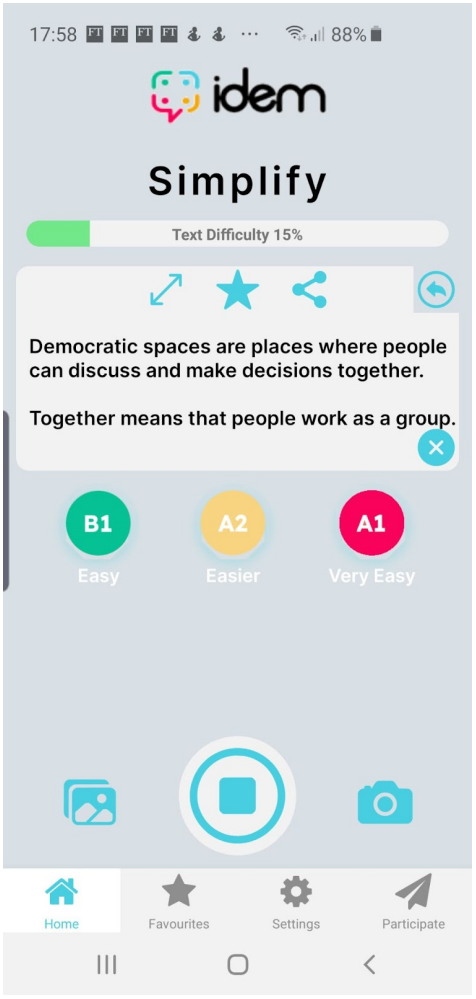
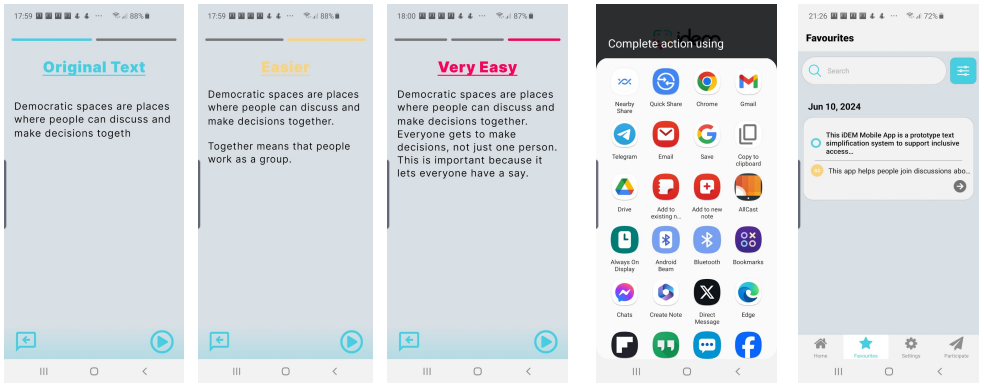


iDEM Home Output Screen
Difficulty Assessment (Green, Blue, Red)[13]
Full Screen (a,b,c below), Save to **Favourites** (d), **Share** on social media (e), **Voice**, readout **highlighting** words for clarity. **Output** – Text, window.
Simplification to *Easy*/B1/Plain, *Easier*/A2 or *Very Easy*/A1/Easy Read
inputs/edits by Text/keyboard, Paste, File/OCR images, Voice, Camera/OCR
4 major iDEM **functions**, starting with Home Page



iDEM Homes Screen Outputs (a), (b), (c), (d), (e)

[13] Indicating approximately Green - A1/Very Easy/Easy Read (everybody understands).
Blue - B1/Easy/Plain Language, Red - B2+(could be difficult to understand). See discussion in section 3.

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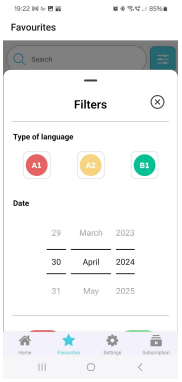
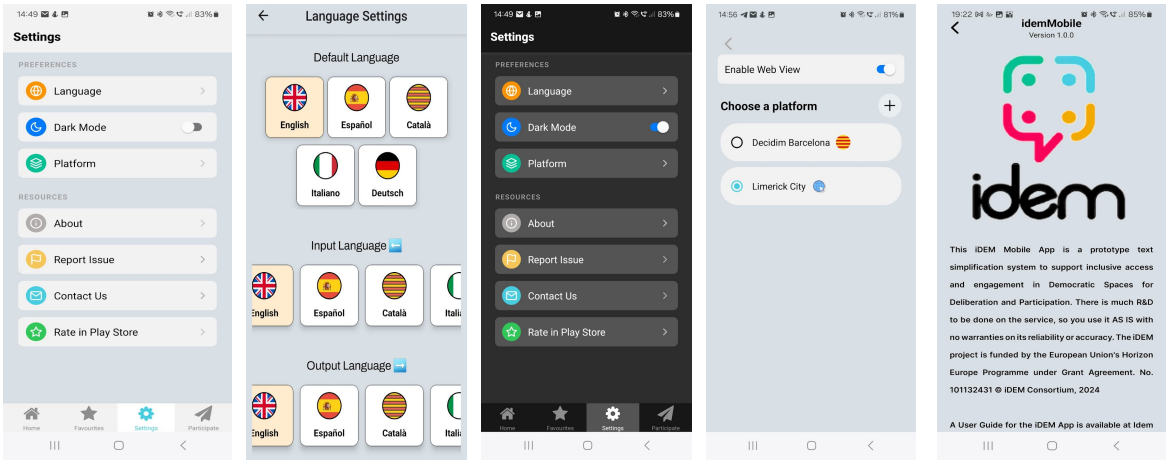
Favourites – repository of user's stored text simplifications



Settings – Participation Platform, Language, Personalise, Accessibility



(a) Settings Screen, (b) Languages, (c) Dark Mode, (d) Participation Platforms, (e) Usage Message

Participate – to an online Space, e.g. on Decidim Barcelona or others, as user chooses in Settings, and described in next subsection.

The iDEM FP User Interface provides the following functions to allow public posts as well as assessing the text difficulty of the text to be submitted

- Full Text Generation Assistant (TGA) functionality
- Text Simplification and Difficulty Assessment using the CAPITO API [de,en]
- Text to speech output using native voice on the user's device [ca,de,en,es,it]
- Voice Recognition using native recognition on the user's device [ca,de,en,es,it]
- Seamless Optical Character Recognition (OCR) for images using Google's open source Firebase Machine Learning (ML) Kit[14] [ca,de,en,es,it]
- Users choose the democratic platform they wish to participate in. The FP provides the Barcelona.Decidim as one of the project pilot sites, and the Limerick Council site which is in English as an example of a space external to the project.
- Webview access to any deliberative democratic participatory space on the web.

[14] ML Kit for Firebase (google.com)

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- Integration into the Barcelona.Decidim platform using its GraphQL API[15] to provide an extremely simple UI to enhance accessibility for all users.
- Publishing the simplified texts on social media allows the user to share the simplified texts with their other contacts using any of their social media apps.
- Local storage on the user's device to enable persistence for any text simplification using native asynchronous storage, and avoiding GDPR issues.
- The FP UI uses mainly graphical icons that are not language specific.. However it does require textual prompts. For the FP UI these prompts are in English. They will be extended for multilingual operation in [ca,de,en,es,it] for D3.9, based on the user's device default or choice of language.

The performance of each function will be now assessed and characterised in the D3.9 formal release of V1.0 of the App.

2.4 iDEM Phone App Participation in Democratic Spaces

The App's "Participate" button, with its powerful functionality and very simple UI is how the iDEM services enable inclusive participation by users in democratic deliberation spaces.

The user chooses the democratic platform in which they wish to participate in their Settings screen, as shown in the last subsection.

The FP Participate functionality provides 3 stages of participation:

a. **ENGAGE** - to take the user to the Consultation or Survey Space in which they wish to engage.

b. **READ -** they can read short summaries or full descriptions of the Space and previous comments/inputs.
   - Using all iDEM services - simplify, translate, voice read out, share etc

c. **INPUT -** their own views/comments to actively Participate
   - Using all iDEM services - difficulty assess, simplify, translate, Image file/camera OCR in, voice I/O, share etc
   - HOWEVER, in the FP this stage just publishes to the user's own phone to allow unhindered private WP4 testing with no security, privacy, GDPR or Space-junk issues for the live Democratic Spaces.

[15] GraphQL | A query language for your API

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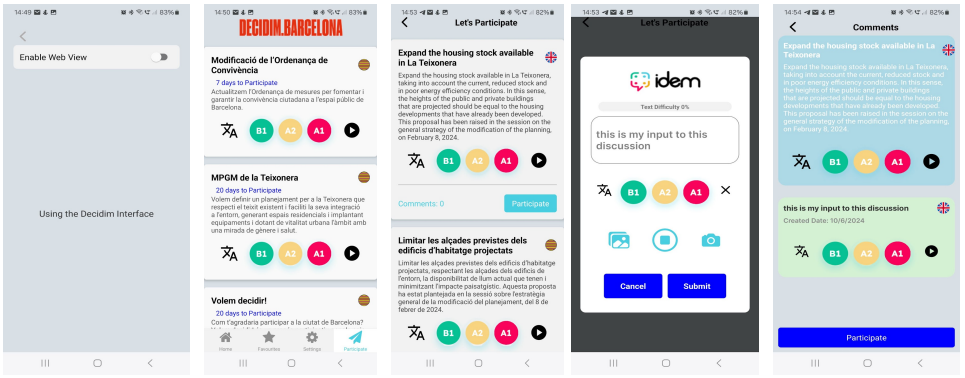
The FP offers 2 choices of participation (in the "Settings" see above) to prove the concept and explore users' feedback.:

1. **iDEM Integrated API view to participate in the Barcelona.Decidim platform**
   Excellent UX with very few and easy programmed buttons - but specific to **Barcelona.Decidim** in the FP, and the many other Decidim Spaces later. Implements the first WP4 pilot site, and the others will be included in D3.9.
   a. In the **Settings** screen, choose **Platform.** Set **Enable Web View** slider to **Off.** Confirmed by a message.
   b. In the **Participate** screen, see the **Decidim.Barcelona** list of active deliberative democracy discussions (Title, days left to participate and short description. Number of user **comments**, which are viewed by clicking it.



Integrated Barcelona.Decidim iDEM screens (a), (b), (c), (d), (e)

   c. For each Space iDEM provides the following functions: i. Touch the text for a **full Description**, ii.Translate to English (indicated by flag), iii Simplify the text to B1,A2 or A1, iv. Read out the text.v. Participate.
   d. This gives the **iDEM input page** with the full multi-modal inputs, translation, simplification and output options available to the user, with a **submit** or **cancel** options.
   HOWEVER, in the FP this stage just publishes to the **user's own phone** to allow unhindered private WP4 testing with no security, privacy, GDPR or Space-junk issues for the live Democratic Spaces.
   e. See that the number of comments has increased. Touch **Comments** and see your input is included with the Space's other (real) users' inputs.

2. **iDEM virtual browser web view to participate in any Deliberative Democratic Space**

   a. In the **Settings** screen, choose **Platform**
   b. In the **Choose a platform** screen **Enable Web View** slider to to **On**
   c. If you wish to add a new Democratic Space click the "+" button for the **Create a new platform**
   d. The new platform appears on you list, with the language of the site as indicated

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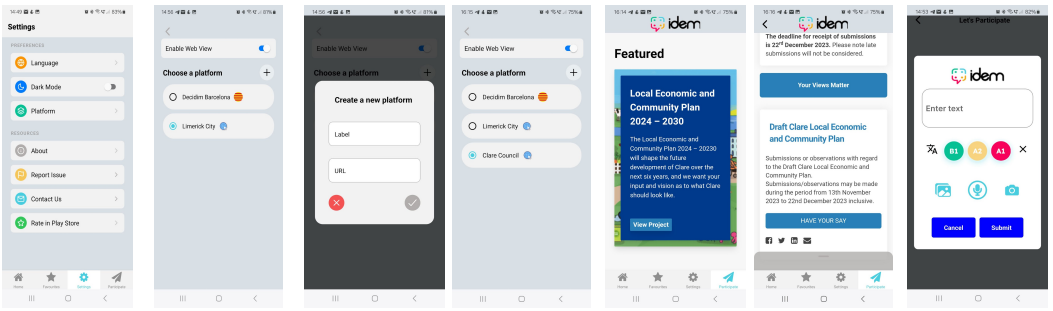


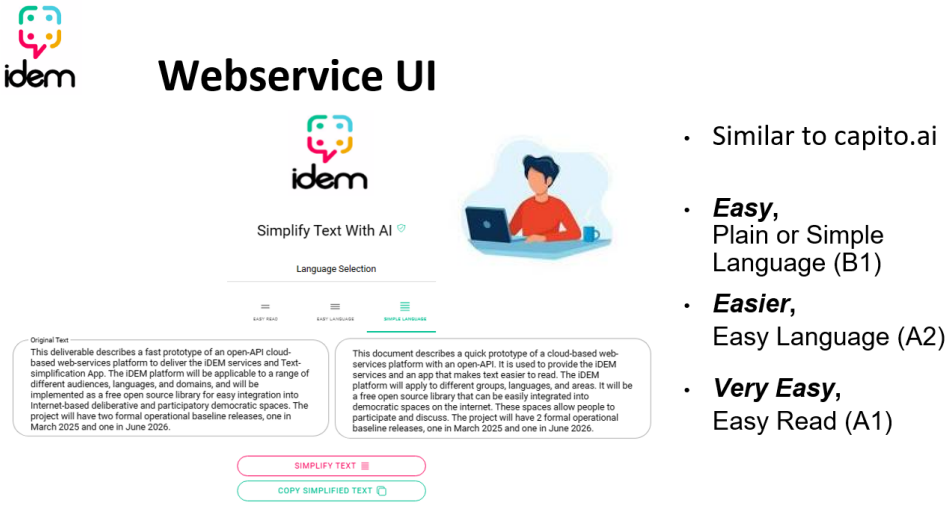
Webview screens (a),(b),(c),(d),(e),(f)

e. Using the **Clare** Council "**Have your say**" as a typical external English text participation site. In the **Participate** screen, follow the web site's instructions to its Participate or **submit** . The web navigation & UX depends on the Web site design.
f. The **iDEM input page** with the full multi-modal inputs, translation, simplification and output options available to the user, with a **submit** or **cancel** options. **HOWEVER**, in the FP this stage just publishes to the **user's own phone** to allow unhindered private WP4 testing with no security, privacy, GDPR or Space-junk issues for the live Democratic Spaces.
g. The Barcelona.Decidim site may also be accessed using the iDEM web view virtual browser approach.

These two approaches will be explored with users to determine which is most useful for them. The first formal release (D3.9) will then incorporate the results of that feedback, and both approaches to allow integrated easy access to the iDEM project's 3 pilot sites in WP4, and virtual web view access to any deliberative democratic space.

2.5 iDEM Webservice Text Generation Assistant

Once the technically challenging Android and IoS proof-of-concept (POC) mobile apps are refined by users' feedback and formative evaluation, the iDEM client will be redeveloped as a web service that incorporates the same functionality and UI features, but is less technically challenging to achieve.



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2.6 Backend and APIs

The iDEM services backend platform resides on CAPITO's federated cloud distributed microservice infrastructure which was co-funded by the EU Innovation Council as the basis for services such as iDEM. The system is using adaptive technologies to personalise and adjust the complexity of the text or use different modalities based on the needs of individual users. All services are designed to be compliant with the GDPR and are being assessed by the ethical team as specified in WP6.

CAPITO has a significant development and natural language processing team as well as 30 research-partners in 7 countries. This organisation works with various deep learning and simplification techniques. CAPITO expects iDEM to become a high level platform for the exchange of know-how in computer-linguistics and text simplification.

The iDEM backend platform is a suite of services that implement the core functionality of the iDEM system. These include language detection, text adaptation, and message generation. These services could be implemented using a variety of technologies, such as natural language processing, machine learning, and artificial intelligence.

The iDEM backend is responsible for performing tasks such as:

- Assessing the difficulty of text
- Identifying complex sentences in text
- Simplifying text for easy-read
- Generating text tailored to specific audiences
- Generating unbiased and inclusive text

The iDEM backend platform will also host the iDEM API to provide the iDEM system functionality to clients, both its own and third party users. The iDEM API will potentially be used by a variety of clients, such as web applications, mobile applications, and command-line tools. Thus the iDEM backend is designed to be scalable, reliable and easy to use and maintain (see section 6.2).

2.6.1 CAPITO API

app.capito.ai allows users to write everywhere in an easy-to-understand way using Artificial Intelligence (AI) for Easy to Understand Language (EUL). With the CAPITO API, users get the functions and advantages of CAPITO digital directly into their system. With an on-premises installation, users can host CAPITO digitally on their own servers.

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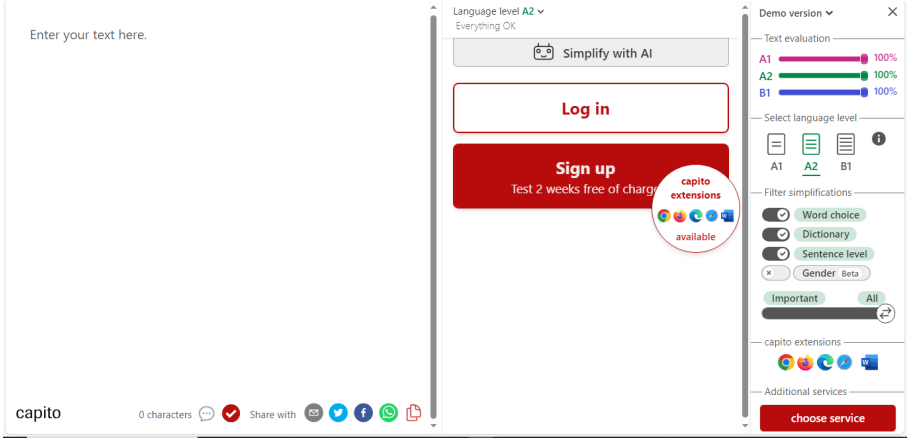

[16]

The CAPITO API is described at capitoAI - Docs

2.6.2 Decidim API

Decidim is an open-source participatory democracy platform that enables citizens to co-create policies and make collective decisions. It provides tools for deliberation, voting, and proposal creation.

The Decidim API is described at www.decidim.barcelona/api/docs. The API is a GraphQL API[17], which means it uses a query language to request data. The data is returned in JSON format. The API can be used to access information about participatory spaces, components, and other entities within a Decidim installation.

2.7 iDEM Service System Architecture

Using CAPITO's existing federated cloud distributed microservice infrastructure, the following architecture has been developed and evolved for the iDEM backend system. The FP has been implemented to initially work with the Decidim digital platform API for citizen participation, as used in Barcelona[18]:

[16] https://digital.CAPITO.eu/en

[17] GraphQL is an open-source data query and manipulation language for APIs and a query runtime engine. GraphQL enables declarative data fetching where a client can specify exactly what data it needs from an API, GraphQL | A query language for your API

[18] This addresses one of the iDEM pilot sites in WP4. It also allows the FP to explore the UI value for users of integrating the API rather than using the webview approach that can be used with any participatory online platform. The formal release of the iDEM service (D3.9) will address all 3 pilot site platforms for tasks T4.5.3.1-3.

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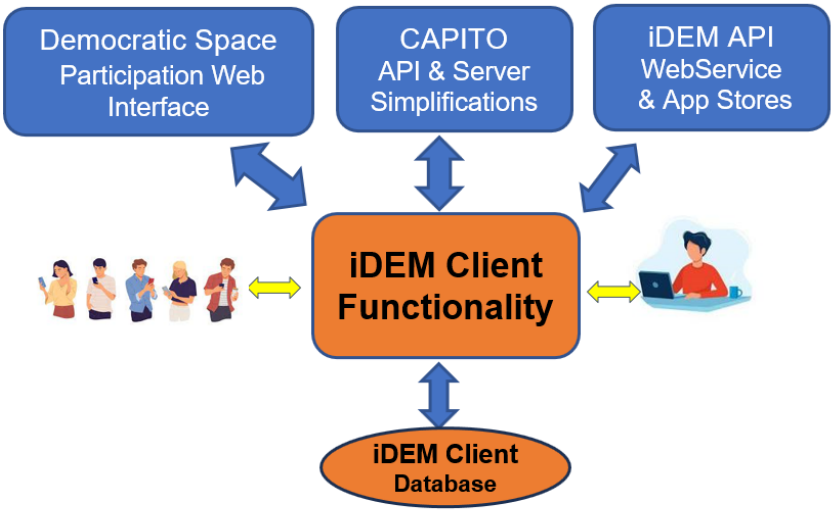

This provides:

iDEM Client Functionality

- Android, IoS, web service
- Input – Text/keyboard, Speech, Camera/OCR, File, OCR stored images
- Favourites – repository of stored texts
- Settings – Language, Personalise, Accessibility
- Participate – Programmed API to Decidim.Barcelona and Webview to any online web-based participation space.
- Output – Text, Speech, Text Difficulty Assessment, Share, Window or Full-screen,

iDEM Client Database

- Stored locally in each User's own Device
- Text Favourites & Image Files
- Personalisation options

iDEM API Web Service & App Stores

- Google Android Play Store and Apple IoS App Store
- Regular published Iterative client updates, e.g. Version V1.0.0 Build 4
- Approved iDEM Users only - for now, until the service is formally released.
- Open API for 3rd party use

Backend:

- iDEM backend system resides on CAPITO's existing federated cloud distributed microservice infrastructure, which provides a variety of services for natural language processing, machine learning, and artificial intelligence.
- Thus enabling iDEM services that scale in real time so that they can respond to demand that can change instantly by orders of magnitude. Delivering a consumption-based platform of "unlimited" resources provided by the cloud. With intelligent scaling up/down policies the cloud ensures that any volume of requests is handled on time. Constant monitoring and regular updates will ensure high Quality of Service (QoS), even for these early prototypes.

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2.8 Fast Prototype User Scenarios

The following Scenarios based on the primary users' personas and their stories described in Annex A, are being used to ensure that the iDEM Fast Prototype's functionality begins to provide a credible basis for the user testing in WP4 and throughout the project.

Scenario 1: Overcoming Language Barriers for Participation

- User: **Sarah**, an elderly person with MCI affecting her reading and writing abilities.
- Problem: Sarah struggles to grasp complex texts related to political issues, news events, and policy proposals
- iDEM Solution:
  - Sarah uses the iDEM mobile app to access the "Information Phase" on Decidim.Barcelona.
  - The app's text simplification feature transforms complex text into easy-to-understand language.
  - Maria can participate and create recommendations, and feel included in community initiatives.

Scenario 2: Inclusive Policy Drafting

- User: **Sandra**, a Barcelona City Council official.
- Problem: Sandra wants to create a policy document that's accessible to a wide audience, ensuring diverse voices are heard in the consultation process.
- iDEM Solution:
  - Sandra uses the iDEM web service text generation assistant on her laptop.

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- She selects "Easy Language" for her target audience.
- Using the difficulty assessment tool, she iteratively refines the text until it meets her desired readability level.
- She publishes the inclusive policy document on Decidim.Barcelona along with a multilingual survey for feedback.

Scenario 2 Publishing a policy document

Sandra, is drafting a new Barcelona City Council policy document on affordable housing, to be published on the Decidim.Barcelona deliberative democratic space

- Using the prototype iDEM webservice which is designed to integrate with assistive technologies, to create accessible &inclusive content
  - She chooses "Easier" Language as the language competence of the communities she wishes to engage
  - She iteratively refines her text with an iDEM Difficulty Assessment of each successive draft
  - Until her intended Easy Language rating is achieved.
- She publishes her final text on Decidim.Barcelona along with a survey for community feedback & suggestions.

Scenario 3: Empowering a Community and Facilitating Direct Engagement

- Users: **Rosa**, leader of an association for adults with reading difficulties, and **Sarah**, a member with MCI.
- Problem: Both Rosa and her members want to participate in Decidim.Barcelona consultations, but complex policy language is a barrier. Sarah's MCI adds a further layer of difficulty.
- iDEM Solution:
  - Rosa uses the iDEM web service text simplification tool on her laptop to create EUL versions of Sandra's policy document and survey instructions.
  - She emails the simplified text to her members, including Sarah.
  - Sarah uses the iDEM app's text-to-speech feature on her phone to listen to Rosa's EUl version, aiding her understanding.
  - To submit her feedback, Sarah utilises the iDEM App's Text Generation Assistant with speech input, confidently articulating her thoughts without the anxiety of writing.

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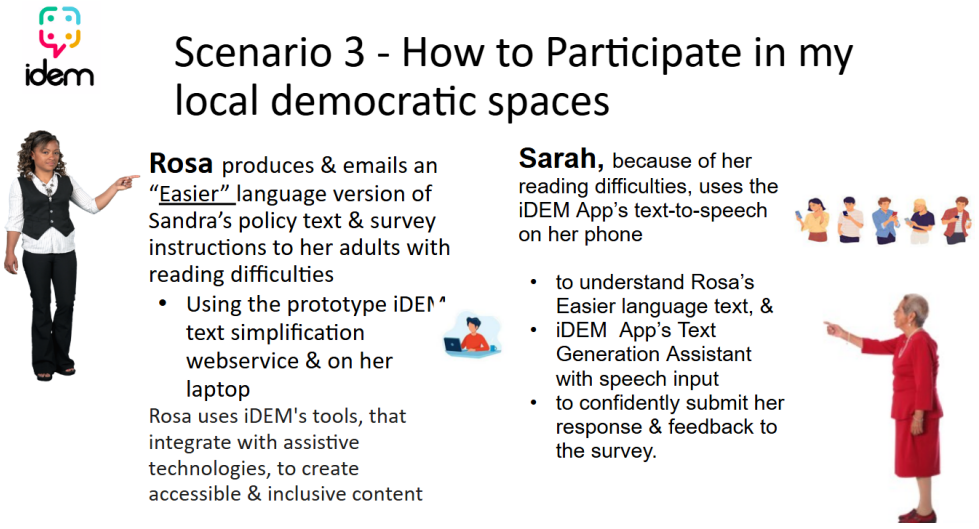

The personas' stories for these scenarios are provided in Annex A.2 from the perspectives of Maria, Sandra, and Sarah, highlighting the following personal benefits the iDEM FP service will begin to bring to their lives:

- **Accessibility**: iDEM breaks down language barriers, enabling individuals like Maria, Miguel, and Sarah to understand complex information and share their voices.
- **Inclusion**: iDEM empowers marginalised communities to actively participate in policy making and decision-making processes, making democracy more representative.
- **Empowerment**: Users like Miguel and Rosa find their sense of agency amplified, leading to greater participation and meaningful contributions to their communities.

2.9 iDEM GPT - iDEM service interactive expert support

To provide easy expert support on the iDEM service, both to users and researchers (particularly in WP4), the knowledge embodied in all of this deliverable is available as the custom iDEM GPT.

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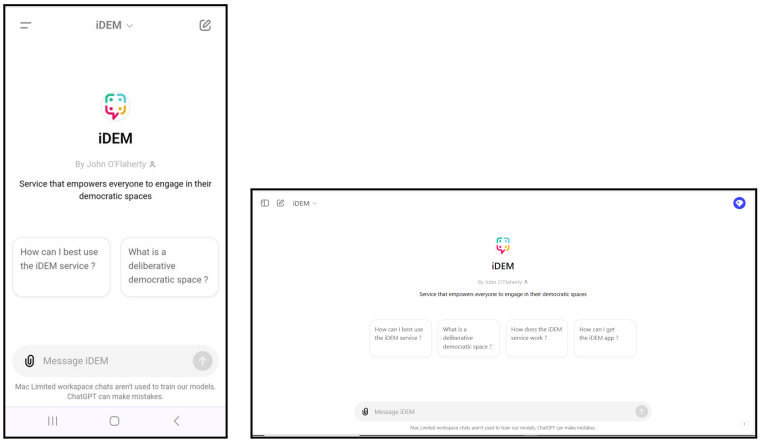

This public custom GPT uses the private Knowledge Space of D3.8 and the intelligence of ChatGPT[19]. Thus, providing user-friendly interactive access to all the expertise of this D3.8 Knowledge Space, without having to read it all ! Just ask anything about the iDEM service.

While publicly available to any user or researcher with the link, to explore the contents of this Knowledge Space (i.e. D3.8), the iDEM GPT's contents are retained within the MAC Team workspace and are not accessed nor used by ChatGPT to train its wider models. Though still we have been careful to avoid any private content in the Knowledge Space[20]. The iDEM GPT Knowledge Space will be expanded as the iDEM services are evolved and developed.

[19] Explore GPTs (chatgpt.com)
[20] Tutorial: How To Make and Share Custom GPTs - Unite.AI

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3. Language Competency

Everyone should have access to information and be able to understand it. However, many people have difficulty understanding information. Texts in Easy to Understand Language (EUL) help to make complex information understandable for everyone.

3.1 Standard Definitions[21]

The relevant definitions that appear in the ISO/IEC 23859 Information technology - User interfaces[22] - Requirements and recommendations on making written text easy to read and understand

3.1.1 ***Easy-to-Understand language (EUL)***
Any language variety which enhances comprehensibility.
Note to entry: Easy-to-understand language includes plain language, easy language and any intermediate variety. These varieties share many recommendations, but the extent of comprehensibility is different as they address different user needs.

3.1.2 ***Plain language***
Language variety whose wording, structure, and design are so clear that the intended readers can easily find what they need, understand what they find, and use that information.
Note to entry: ISO-WD24495-1:2020(E) defines plain language as a communication in which wording, structure, and design are so clear that the intended readers can easily find what they need, understand what they find, and use that information. In this standard we define plain language as a language variety for the reasons expressed in Note to entry 3.1.1.

3.1.3 ***Easy language***
Language variety in which a set of recommendations regarding wording, structure, design and evaluation are applied to make information accessible to persons with reading comprehension difficulties for any reason.
Note to entry: Easy language is often referred to as "easy-to-read" but in this document the term "easy language" is preferred as it can be applied not only to written content which is read but also to oral or multimodal content.

From discussions at the project kick off meeting[23] it was decided that iDEM would use the ISO/IEC 23859 standard definitions as follows:

[21] iDEM seminar, "Plain Language Workshop: How to write for everybody to understand", Almudena Rascón Alcaina, Plena Inclusion Madrid, Seminar_05_06_24 - Google Drive, and the following references from that: ISO 24495-1:2023 Plain Language, https://www.iso.org/standard/78907.html, ISO/IEC 23859:2023. Information technology — User interfaces — Requirements and recommendations on making written text easy to read and understand, https://www.iso.org/standard/77178.html, UNE 153101:2018 EX Lectura Fácil. Pautas y recomendaciones para la elaboración de documentos, https://www.une.org/encuentra-tu-norma/busca-tu-norma/norma?c=N0060036, International Plain Language Federation, https://www.iplfederation.org/, Red Panhispánica de Lenguaje Claro y Accesible, https://www.rae.es/la-institucion/red-panhispanica-de-lenguaje-claro-y-accesible, Prodigioso Volcán. ¿Habla claro la Administración a los públicos vulnerables? II Radiografía del lenguaje administrativo en España, https://comunicacionclara.com/docs/prodigioso-volcan-habla-claro-la-administracion-publicos-vulnerables.pdf

[22] ISO/IEC 23859:2023 - Information technology — User interfaces — Requirements and recommendations on making written text easy to read and understand

[23] 29-30 January 2024.

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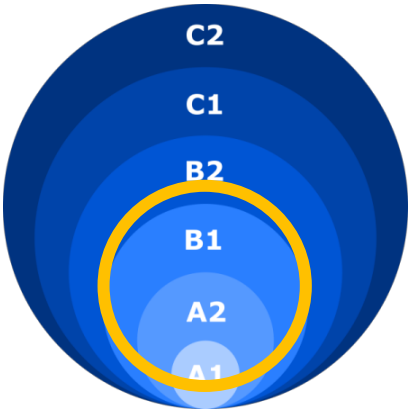
- Easy-to-understand language (EUL) – includes…
  - plain language – which is a communication in which wording, structure, and design are so clear that the intended readers can easily find what they need, understand what they find, and use that information.
  - easy language = "easy-to-read"
    - Easy English = easy-to-read = or Easy Read
      - is a writing style that helps people who find it hard to read and understand English
    - is simpler and has a lower reading level than Plain English.
    - Easy to read is a method of presenting written information to make it easier to understand for people with difficulty reading. Easy read advocates sentences of no more than ten to fifteen words, with each sentence having just one idea and one verb. Active sentences are used instead of passive sentences. Easy to read is closely edited, to express ideas in a small number of simple words.
    - any intermediate variety

CAPITO have recently updated their naming to *Easy, Easier* and *Very Easy*. As this is much more user friendly it was agreed at a WP3 meeting that these will also be used in the iDEM services. These terms are defined as follows:

Proficiency	CEFR	Description		Term
PROFICIENT USER - competent use of language	C2 / C1			
INDEPENDENT USER - independent use of language	B2			
	B1	understandable to most people. Simple colloquial language. Technical terms & foreign words are explained	Plain Language	***Easy***
BASIC USER - elementary language use	**A2**	explains a specific topic in such a way that readers can understand the most important information & act accordingly. More detailed than A1 & explains many important terms in an easy-to-understand way.	Easy Language	***Easier***
	A1	**M**ost easily understandable level. Only simple, well-known words & short sentences are used. The contents are summarized & reduced to the essentials.	Easy Read	***Very Easy***

3.2 Common European System of Reference for Languages (CEFR)

The Common European System of Reference for Languages (CEFR) is considered the European standard for the evaluation of language competence[24].



The CEFR organises language proficiency in six levels, A1 to C2, which can be regrouped into three broad levels: Basic User, Independent User and Proficient User, and that can be further subdivided according to the needs of the local context. The levels are defined through 'can-do' descriptors. These descriptors were created without reference to any specific language, which guarantees their relevance and

[24] The CEFR Levels - Common European Framework of Reference for Languages (CEFR) (coe.int)

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across-the-board applicability. The descriptors specify progressive mastery of each skill, which is graded on a six-level scale (A1, A2, B1, B2, C1, C2).

Level A refers to an elementary language use, Level B an independent and Level C a competent use of language. Each level is additionally divided into two levels. iDEM focuses on language levels A1, A2 and B1:

- **Easy Reading Level** A1 - A1 stands for the most easily understandable level. Only simple, well-known words and short sentences are used. The contents are summarised and reduced to the essentials.
- **Easy Reading Level A2** Information in A2 explains a specific topic in such a way that readers can understand the most important information and act accordingly. A2 is more detailed than A1 and explains many important terms in an easy-to-understand way.
- **Easy Reading Level B1** Information in B1 is understandable to most people. B1 corresponds to a simple colloquial language. Technical terms and foreign words are avoided so that even people who are not experts in a particular field understand everything.

These levels are described in **Reference Level Descriptions** (RLD) for national and regional languages, which provide detailed content specifications for different CEFR levels, are as follows:

PROFICIENT USER	C2	Can understand with ease virtually everything heard or read. Can summarise information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation. Can express him/herself spontaneously, very fluently and precisely, differentiating finer shades of meaning even in more complex situations.
	C1	Can understand a wide range of demanding, longer texts, and recognise implicit meaning. Can express him/herself fluently and spontaneously without much obvious searching for expressions. Can use language flexibly and effectively for social, academic and professional purposes. Can produce clear, well-structured, detailed text on complex subjects, showing controlled use of organisational patterns, connectors and cohesive devices.
INDEPENDENT USER	B2	Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.
	B1	Can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Can deal with most situations likely to arise whilst travelling in an area where the language is spoken. Can produce simple connected text on topics which are familiar or of personal interest. Can describe experiences and events, dreams, hopes & ambitions and briefly give reasons and explanations for opinions and plans.
BASIC USER	**A2**	Can understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment). Can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. Can describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need.
	A1	Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. Can interact in a simple way provided the other person talks slowly and clearly and is prepared to help.

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To summarise these Common Reference Levels in a holistic way, a simple 'global' representation is provided at Official translations of the CEFR Global scale. An assessment orientation tool to profile a user's main language skills, and decide at which level they might look at a checklist of more detailed descriptors to assess their level of proficiency, is provided at Table 2 (CECR 3.3): Common Reference levels - ***Self-assessment grid.***

The following table[25] indicates the qualitative spoken performance aspects of the different categories of language use

	RANGE	ACCURACY	FLUENCY	INTERACTION	COHERENCE
C2	Shows great flexibility reformulating ideas in differing linguistic forms to convey finer shades of meaning precisely, to give emphasis, to differentiate and to eliminate ambiguity. Also has a good command of idiomatic expressions and colloquialisms	Maintains consistent grammatical control of complex language, even while attention is otherwise engaged (e.g. in forward planning, in monitoring others' reactions).	Can express him/herself spontaneously at length with a natural colloquial flow, avoiding or backtracking around any difficulty so smoothly that the interlocutor is hardly aware of it.	Can interact with ease and skill, picking up and using non-verbal and intonational cues apparently effortlessly. Can interweave his/her contribution into the joint discourse with fully natural turn taking, referencing, allusion making etc.	Can create coherent and cohesive discourse making full and appropriate use of a variety of organisational patterns and a wide range of connectors and other cohesive devices.
C1	Has a good command of a broad range of language allowing him/her to select a formulation to express him/ herself clearly in an appropriate style on a wide range of general, academic, professional or leisure topics without having to restrict what he/she wants to say.	Consistently maintains a high degree of grammatical accuracy; errors are rare, difficult to spot and generally corrected when they do occur.	Can express him/herself fluently and spontaneously, almost effortlessly. Only a conceptually difficult subject can hinder a natural, smooth flow of language.	Can select a suitable phrase from a readily available range of discourse functions to preface his remarks in order to get or to keep the floor and to relate his/her own contributions skilfully to those of other speakers.	Can produce clear, smoothly-flowing, well-structured speech, showing controlled use of organisational patterns, connectors and cohesive devices.
B2	Has a sufficient range of language to be able to give clear descriptions, express viewpoints on most general topics, without much conspicuous searching for words, using some complex sentence forms to do so.	Shows a relatively high degree of grammatical control. Does not make errors which cause misunderstanding, and can correct most of his/her mistakes.	Can produce stretches of language with a fairly even tempo; although he/she can be hesitant as he or she searches for patterns and expressions, there are few noticeably long pauses.	Can initiate discourse, take his/her turn when appropriate and end conversation when he / she needs to, though he /she may not always do this elegantly. Can help the discussion along on familiar ground confirming comprehension, inviting others in, etc.	Can use a limited number of cohesive devices to link his/her utterances into clear, coherent discourse, though there may be some "jumpiness" in a long contribution.

[25] Table 3 (CECR 3.3): Common Reference levels - ***Qualitative aspects of spoken language use***

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B1	Has enough language to get by, with sufficient vocabulary to express him/herself with some hesitation and circum-locutions on topics such as family, hobbies and interests, work, travel, & current events.	Uses reasonably accurately a repertoire of frequently used "routines" and patterns associated with more predictable situations.	Can keep comprehensibility, even though pausing for grammatical and lexical planning and repair is very evident, especially in longer stretches of free production.	Can initiate, maintain and close simple face-to-face conversation on topics that are familiar or of personal interest. Can repeat back part of what someone has said to confirm mutual understanding.	Can link a series of shorter, discrete simple elements into a connected, linear sequence of points.
A2	Uses basic sentence patterns with memorised phrases, groups of a few words and formulae in order to communicate limited information in simple everyday situations.	Uses some simple structures correctly, but still systematically makes basic mistakes.	Can make him/herself understood in very short utterances, even though pauses, false starts and reformulation are very evident.	Can answer questions and respond to simple statements. Can indicate when he/she is following but is rarely able to understand enough to keep conversation going of his/her own accord.	Can link groups of words with simple connectors like "and, "but" and "because".
A1	Has a very basic repertoire of words and simple phrases related to personal details and particular concrete situations.	Shows only limited control of a few simple grammatical structures and sentence patterns in a memorised repertoire.	Can manage very short, isolated, mainly pre-packaged utterances, with much pausing to search for expressions, to articulate less familiar words, and to repair communication.	Can ask and answer questions about personal details. Can interact in a simple way but communication is totally dependent on repetition, rephrasing and repair.	Can link words or groups of words with very basic linear connectors like "and" or "then".

3.3 Matching with linguistic abilities

Reading and understanding texts are an essential prerequisite for an independent life. Thus understandable texts benefit the majority of people. It's not just about simplifying texts. It's about formulating a text in such a way that as many people as possible can understand it
For instance, in German-speaking countries, 89.8% of people understand the language levels A1, A2, B1 and B2. Only 8.4% of people understand the C1 and C2 language levels. However, a large part of the information issued by companies and authorities is written in the language levels C1 and C2. This means that a large part of the information is not understood.
52.5% of people depend on texts that are written in the language levels A1, A2 and B1, i.e. easy-to-understand texts. However, the target group for EUL texts is not only people with learning difficulties or people with a non-mother tongue. Reading difficulties run through the entire population.

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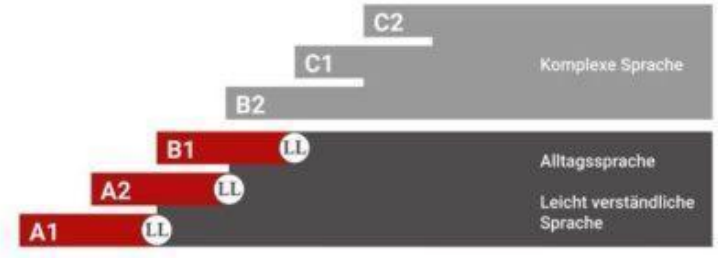

Figure Distribution of language performance levels

So only those who understand information can make truly well-founded and self-determined decisions.

3.4 Easy to Understand Language (EUL)

Easy to Understand (EUL) is a simple version of the standard language. The goal is to make information more understandable. Simple words, short sentences and a clear structure are deliberately used.[26]. EUL serves as an umbrella term for simple language, easy reading and easy language. The EUL is the umbrella term for texts written in easy language, simple language or easy reading. The texts dispense with complicated words or sentences and aim to be as clear and simple as possible.

EUL enables understanding, promotes participation and is therefore an important step towards more inclusion in our society. That is why it is also important for companies and public institutions to pay attention to barrier-free communication. Because iDEM believes that everyone should have access to information and be able to understand it.

EUL research projects funded by the European Commission include CAPITO Automatisiert[27], CAPITO-Making information understandable for everyone[28], Able to include[29], Easy Access for Social Inclusion Training[30], and the ongoing project Train2Validate[31] which will deliver a curriculum for facilitators and validators across Europe. At EU level, 2 regulations drive the sector to growth and create high unmet demand for EUL, easy-to-read and plain language, which will eventually take place in every EU-country.

1. Directive (EU) 2016/2102 on the accessibility of the websites and mobile applications of public sector bodies[32]
2. Directive (EU) 2019/882 The European Accessibility Act[33]

3.4.1 Right Language Levels – Capito Method

The right language level depends not only on reading skills, but also on previous knowledge and experience. The CAPITO method makes it possible for people to choose for themselves

[26] Easy language - CAPITO ✅ What is Easy-to-understand language?
[27] https://projekte.ffg.at/projekt/4238646
[28] https://sme.easme-web.eu/?p=190167125
[29] http://able2include.taln.upf.edu/,
[30] EASIT: https://pagines.uab.cat/easit/en
[31] T2V: https://plenainclusionmadrid.org/train2validate
[32] Accessibility of public sector websites and mobile apps | EUR-Lex (europa.eu)
[33] Directive - 2019/882 - EN - EUR-Lex (europa.eu)

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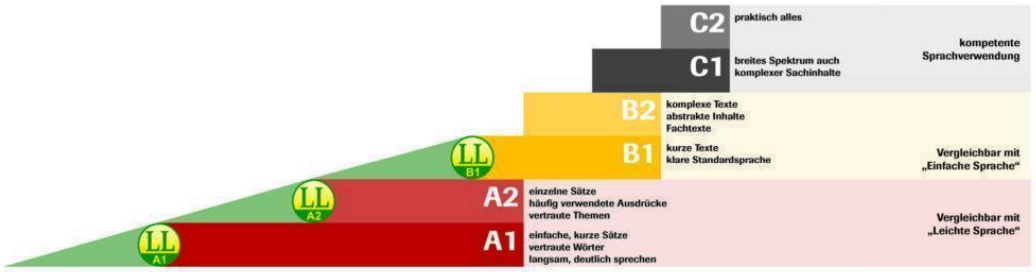
which language level is right for them. The method is currently based on 90 criteria, which are defined in a catalogue of criteria[34] and vary depending on the language level.



(Courtesy of CAPITO)

In the language levels A2 and A1 the rules for EL/*Easier* are covered. Language level B1 covers everything that should be considered for texts in PL/*Easy*.

In the CAPITO method, each text is checked for comprehensibility by representatives of the target group. Texts that have been created according to the CAPITO method and checked by a test group receive the seal of approval for ER/*Very Easy*.

[34] https://www.CAPITO.eu/kriterienkatalog/

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4. iDEM Users' Requirements

A core commitment of the project is to develop the iDEM services in a way that meets the needs of all stakeholders. This will ensure that the iDEM services have the potential to make a real difference in the world by helping to improve communication and understanding for everyone.

4.1 User Experience (UX)

To understand the challenges of deliberative and participatory democratic practices, in the context of marginalised and underrepresented people, and identify the limitations and opportunities of enhancing democratic spaces, a theoretical and intersectional approach is being applied. Literature review, expert interview and focus groups will be applied. This theoretical approach identifies limitations and opportunities for enhancing democratic spaces that enable people with cognitive impairments to be included in the democratic conversation.

From a social sciences perspective, a user-centred participatory approach will be adopted. User centred design (UCD) or user experience (UX) design is a concept of "product development and design" that focuses the user's needs and capabilities in the entire development and design process.[35] It was developed to support effectiveness and improve accessibility, sustainability, and human well-being. Its characteristics are:

(i) focus on solving users' problems
(ii) it is iterative,
(iii) it analyses the specific target group,
(iv) involves users from the very beginning to the end,
(v) it uses of multiple feedback loops, additionally
(vi) considering the fundamentals of good design brings different perspectives.

It is composed of four phases:

1. Analyse (Who is the target group and what are their needs?),
    a. Analysis was carried out in the first months of the project and the following tools were applied: literature review, expert interviews, online focus groups, and online semi-structured interviews.
2. Define (Which potential solutions can be created?),
    a. The potential solutions will be defined in M6-M18 in face-to-face participatory workshops.
3. Design (How could it look?),
    a. The design will be carried out in M15-M30 applying card sorting methods, journey maps, and prototyping workshops
4. Evaluate (Does it work?).

[35] "Design for Usability Methods & Tools A practitioner's guide", Jasper van Kuijk, Contributions by Stella Boess Mieke van der Bijl-Brouwer Steven Dorrestijn Daan van Eijk Christelle Harkema Frederik Hoolhorst Cha Joong Kim Jasper van Kuijk Mascha van der Voort Tristan Weevers, Delft University of Technology Faculty of Industrial Design Engineering TU/Eindhoven Department of Industrial Design University of Twente Faculty of Engineering Technology and Department of Philosophy, 2012, ISBN 978-94-6186-077-4

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a. The evaluation in M6-M35 will be prepared and carried out with expert interviews, observations, and on-line surveys iDEM will consider the following participants when designing:
    i. persons with limited skills in reading, writing or understanding a fairly complex language: the core target group whose level of participation in democratic processes should be improved by our solution,
    ii. the facilitators of participatory and deliberative processes that are confronted with the inclusion of such groups and may rely on our solution to increase their inclusivity, and
    iii. citizens that do not belong to the target group, but are engaged in participatory and deliberative processes as they should not be negatively affected by its implementation and will therefore also be involved in its evaluation.

4.2 UX Design (UXD)

In general, user experience is simply how people feel when they use a product or service. In most cases, that product will be a website or an application such as iDEM. Every instance of human-object interaction has an associated user experience, but, in general, UX practice is interested in the relationship between human users and computers and computer-based products, such as websites, applications and systems[36].

We can add all the features and functionality that we like to a site or application, but the success of the project rides on a single factor: how the users feel about it. In particular:

- Does the application give the user value?
- Does the user find the application simple to use and navigate?
- Does the user actually enjoy using the application?

Focusing on UX enables design to focus on the user. It increases the chances of a project's success when it finally comes to market, not least because it doesn't gamble on the faith of users taking into a product just because it's a brand name or resulting from an EU project !

The main methodology used to guarantee the user experience in most projects is user-centred design. Simply put, user-centred design is all about designing with the users' needs and expected behaviours in mind. It's important to remember that user-centred design is a means of achieving good UX—and *not* the *only* methodology or tool that one can use to ensure optimal UX in a project.

UX design is all about guiding product development to shape how users feel when using our products. It's not a perfect method; sometimes, even with all the UX design know-how in the world behind it, a product will still fail. However, the appropriate use of UX design does offer a much higher chance that a product will be successful for our users than products developed without the application of UX design principles.

User Experience (UX) is critical to the success or failure of a product in the market, but what do we mean by UX? All too often, UX is confused with usability, which describes *how easy* a

[36] What is user experience (UX) design? | Lyssna

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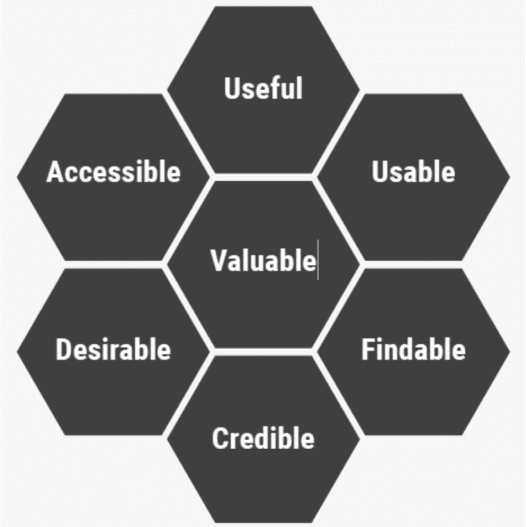
product is to use. While it is true that UX as a discipline begun with usability, UX has grown to accommodate much more than usability, and paying attention to *all* facets of UX in order to deliver a successful iDEM App and Service to market is vital.

There are seven factors that describe user experience, arranged into the 'User Experience Honeycomb', which is used to understand UX design[37],. The 7 factors are:



1. Useful
   - If a product is not useful to someone, why would you want to bring it to market? If it has no purpose, it is unlikely to be able to compete for attention alongside a market full of purposeful and useful products. It's worth noting that 'useful' is in the eye of the beholder, and things can be deemed 'useful' if they deliver non-practical benefits such as fun or aesthetic appeal.
2. Usable
   - Usability is concerned with enabling users to achieve their end objective with a product effectively and efficiently. A computer game which requires three sets of control pads is unlikely to be usable as people only have two hands.
3. Findable
   - the product must be easy to find, and in the instance of digital and information products, the content within them must be easy to find, too. The reason is quite simple: if you cannot find the content you want on a website, you're going to stop browsing it.
4. Credible
   - Credibility relates to the ability of the user to trust in the product—not just that it does the job it is supposed to do, but also that it will last for a reasonable amount of time and that the information provided with it is accurate and fit-for-purpose. There are plenty of alternatives in nearly every field for them to choose a credible product provider. They can and will leave in a matter of seconds and clicks unless you give them reason to stay.
5. Desirable
   - Desirability is conveyed in design through branding, image, identity, aesthetics, and emotional design. The more desirable a product is, the more likely it is that the user who has it will brag about it and create desire in other users.
6. Accessible
   - Accessibility is about providing an experience which can be accessed by users with a full range of abilities—this includes those who are disabled in some respect, such as the hearing, vision, motion, or learning impaired.
7. Valuable

[37] https://www.usability.gov/what-and-why/user-experience.html

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- The product must deliver value to the business which creates it and to the user who buys or uses it. Without value, it is likely that any initial success of a product will eventually corrode as the realities of natural economics start to undermine it.

The success of iDEM or any product/service depends on more than utility and usability alone. Products which are usable, useful, findable, accessible, credible, valuable, and desirable are much more likely to succeed with users.

4.2 iDEM Targeted Users

iDEM will mainly provide: (a) Text Difficulty Assessment, (b) Text Simplification and (c) Appropriate Text Generation, used with the deliberation and participation democratic spaces for:

A. Official documents from Democratic and Policy-making institutions at all levels from local, national, and international (EU).
B. interactions with Democratic and Policy-making institutions at all levels from local, national, and international (EU) on their platforms.

To the following users[38]:

iDEM's Targeted users	Mainly Read Text	Mainly Write Text	Priority
1. People with LRC difficulties	☑		Primary
2. Democratic & Policy-making institutions		☑	
3. Local & regional participatory democratic bodies & civic platforms	☑		
4. All Citizens	☑		Secondary
5. Technical developers of Deliberative eDemocracy/eParticipation platforms & Scientific Community.		☑	

The people with LRC difficulties include citizens with reading, writing and comprehension difficulties, such as elderly, migrants and people with intellectual/cognitive impairments, and other vulnerable, marginalised and hard to reach groups, who will be clarified and identified in WP4.
Based on recommendations and insights from the European Consortium on Cross-Cultural Neuropsychology (ECCroN)[39] which aims to improve the assessment of culturally, educationally, and linguistically diverse individuals across Europe, iDEMs targeted people with LRC difficulties are categorised into 3 levels as follows:

[38] As specified in the DoA and agreed at the Kickoff Meeting on 29th January 2024
[39] Full article: Cross-cultural neuropsychological assessment in Europe: Position statement of the European Consortium on Cross-Cultural Neuropsychology (ECCroN) (tandfonline.com)

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Category	LRC Factors	Cognitive Ability	ECCroN Factors	iDEM Support Features
People with Low LRC difficulties	• Users with strong reading & language skills in their primary language. • May face challenges with complex vocabulary or unfamiliar topics.	No Cognitive Impairment (**NCI**) MoCA 26+	• High educational attainment, native or fluent language proficiency.	* Standard text format * Optional text simplification for complex topics * Multilingual support
People with Medium LRC difficulties	• Users with some reading & language difficulties. • May struggle with complex sentence structures, unfamiliar vocabulary, or lengthy texts.	No Cognitive Impairment (**NCI**) MoCA 26+ May have Subjective Cognitive Impairment (**SCI**)	• Moderate educational attainment, • May have a second language but with some limitations.	* Simplifyy text with clear language & shorter sentences. * Text-to-speech functionality for audio access. * Visual elements like infographics or bullet points.
People with High LRC difficulties	• Users with big reading & language challenges. • May have limited literacy skills, learning disabilities, or difficulties with their 1st language or the language used on the platform. • May have MCI. • Users who are not native local language speakers & have limited proficiency in the local language	Mild Cognitive Impairment (**MCI**) experiencing language & reading difficulties alongside memory or processing limitations. MoCA 18-25	• May have high literacy skills in their native language but struggle with understanding the local language. • May have low educational attainment, limited literacy skills in any language. • May vary depending on specific cognitive strengths & weaknesses of the user.	* "Very Easy" with minimal text & strong visuals * Option for voice input & speech recognition. * Integration with assistive techs. * Multilingual support -options for preferred language. * Glossary of key terms with translations. * Culturally appropriate visuals & examples.

For iDEM's elderly users with LRC difficulties, this categorisation recognises the following 4 standard stages of cognitive impairment severity[40]:

1. No Cognitive Impairment (NCI) - Montreal Cognitive Assessment (MoCA) score of 26+[41]:
    - Individuals perceive no decline in cognition & no decline in complex skills that rely on their cognitive abilities. NCI characterises normal ageing individuals, plus those with a cognitively impairing disorder that is not severe enough to produce any change in these abilities.

2. Subjective Cognitive Impairment (SCI) - MoCA score of 26+:
    - A perceived or subjective decline in cognitive or functional abilities that does not keep an individual from performing any of their usual or most complex activities. Individuals are aware that there has been a decline in some ability but that they can still compensate to perform it. SCI characterises normal ageing individuals as well as those who are progressively becoming more impaired due to a cognitive disorder.
3. Mild Cognitive Impairment (MCI) - MoCA score of 18-25:
    - A decline in cognitive abilities such as language, memory reasoning, judgement, or perception that is not due to normal ageing. Individuals in the MCI stage of severity can independently drive, shop, cook, pay bills, manage finances, do household chores & other well-learned skills that do not place significant demands upon learning new information. The MCI stage is not seen in normal ageing individuals, & is due to one or more cognitive disorders.

4. Dementia - MoCA score of 17 & below:
    - Individuals with dementia have declined in ability to perform instrumental activities of daily living, which include well learned skills such as cooking,

[40] Aging Dementia - Pickup Family Neuroscience Institute (hoag.org)
[41] Montreal Cognitive Assessment - an overview | ScienceDirect Topics

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shopping for groceries, driving to familiar locations, paying bills, doing housework or home repairs, performing well learned hobbies or pastimes. Dementia progresses to affect even more well learned skills, called basic activities of daily living, including bathing, dressing, operating a toilet, planning to urinate or defecate so that they get to the toilet on time. Dementia finally progresses to affect walking speech, swallowing & control of the trunk, neck & face.

While group 4 may benefit from iDEM's accessibility features, it is currently beyond the scope of the current project until the service is proven, and is not now a target audience. It will require tailored personal care, assistive technology and medical expertise to determine how the proven service might be made navigable & understandable for each individual user.

Groups 1,2 and 3 are a primary target audience for iDEM's tools, for whom iDEM has the potential to be an empowering service, particularly for users in the MCI stage of cognitive decline. By providing tailored support & simplifying access to democratic processes, iDEM can counter marginalisation and promote inclusivity for a broader range of citizens.

WP4 will address the ECCroN recommendations for the assessment of people with further High LRC difficulties culturally, educationally, and linguistically diverse migrants and other vulnerable, marginalised and hard to reach groups across Europe.

4.3 User Personas Design Approach and their Implications for iDEM services

In keeping with the iDEM user-centric approach, the methodology to design the iDEM services, is based on creating fictional stories of its primary users' typical personas, with their main use and usage scenarios of the iDEM services. The methodology and process is described in Annex A.

In addition to defining the UI functionality required of the iDEM services, the main finding from the user personas is that most iDEM users will access the services from their phone and require multi-modal access, so the mobile App and its UX will be critical for them.

The following table has more nuanced implications for the iDEM service from the personas' analysis, particularly for its mobile app.

Persona	Impairment/ Challenge	Implications for iDEM Services	Most Beneficial Text Level
Miguel	Cognitive Impairment (SCI)	* Clear, concise language. * Visual/multimedia support. * Intuitive navigation. * Potential for personalization.	Easy Language (*Easier*/A2) or Easy Read (*Very Easy*/A1), depending on the severity of the impairment.
Sarah	Elderly + MCI	* Supportive writing tools. * Memory support. * Patience and error tolerance.	Plain Language (*Easy*/B1) or Easy Language (*Easier*/A2), with focus shifting to A2 as the dementia progresses.
Maria	Migrant with limited Italian proficiency	* Accurate automatic translation. * Text simplification (focus on idioms, cultural terms). * Potential for glossaries/definitions.	Easy Language (*Easier*/A2) initially, then progressing to Plain Language (*Easy*/B1) as proficiency improves.

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Sandra	Council Official	* Tools for gauging document difficulty. * AI-assisted simplification suggestions. * Multi-language surveys/forms. * Engagement metrics.	Focus on tools to analyze existing text & offer simplified alternatives at multiple CEFR levels to reach the widest audience.
Rosa	Represents adults with reading difficulties	* Focus on common challenges (MCI, etc.). * Clear iDEM instructions. * Ability to share simplified text.	Easy Language (*Easier*/A2) & Easy Read (*Very Easy*/A1) resources, as reading impairments vary widely in type and severity.

Key Considerations:

- **Prioritisation:** Features *most crucial* to iDEM fulfilling its mission depends on target population & available resources. This table helps spark those discussions.
- **Text Purpose:** For policy documents (Sandra), simplified language while maintaining meaning is crucial. For personal expression (Sarah, Maria), maintaining meaning and voice is important.
- **Individual Variation:** individuals benefit from different levels of simplification. Ideally, iDEM should allow users to choose or tailor the level.
- **Iterative Progress:** Maria may *start* with *Easier* (A2) to understand basics & progress to *Easy* (B1). iDEM should facilitate this journey.
- **Intersectionality:** People experience multiple challenges simultaneously (e.g.: elderly person both vision & cognitive decline). iDEM's design anticipates this.

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5. iDEM Design & Consolidation

To ensure that the iDEM services have the potential to make a real difference in the world by helping to improve communication and understanding for everyone, the iDEM services are being designed and consolidated in a way that is efficient, effective, and user-friendly, by staring with an initial iDEM v0.1 fast prototype (FP), using the following steps:

- Design the iDEM service architecture: defines the components of the iDEM services and how they will interact with each other. The architecture also defines how the iDEM services will be deployed and scaled.
- Design the iDEM service user interface: provides users with a way to interact with the iDEM services and to access the functionality that they need. The user interface is being designed to be easy to use and accessible to its intended wide range of users.
- Consolidate the iDEM services: into a single platform. This will make it easier for users to access and use the services, and it will also make it easier for the iDEM team to maintain and update the services.

Specific questions that we consider when designing and consolidating the iDEM services:

- How will the iDEM services be made accessible to a wide range of users, including people with low literacy skills and people who speak different languages?
- How will the iDEM services be integrated with other systems and applications?
- How will the iDEM services be secure and scalable?
- How will the iDEM services be maintained and updated?

We also consider the following when designing and consolidating the iDEM services:

- The needs of people with low literacy skills.
- The needs of people who speak different languages.
- The needs of government agencies, healthcare organisations, educators, journalists, and other stakeholders.
- The latest research and best practices in natural language processing, machine learning, and artificial intelligence.

In addition to the steps listed above, we are also involving the iDEM stakeholders in the design and consolidation process. We gather feedback from the stakeholders to ensure that the iDEM services meet their needs and requirements. We also provide the stakeholders with opportunities to test and evaluate the iDEM services as they are being developed.

We believe that it is important to involve the stakeholders in the design and consolidation process from the start because they are the ones who will be using the iDEM services. By involving the stakeholders, we can ensure that the iDEM services are designed and consolidated in a way that meets their needs and requirements.

5.1 User Experience Design Thinking

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iDEM is being developed using User Experience Design (UXD) Thinking, which is about *designing* the ideal *experience* of *using* a service or product[42]. As such, it can involve all types of products and services. However, in the main, the term *user experience design* is used in relation to websites, web applications and other software applications such as iDEM.

5.1.1 Design Thinking

Design thinking is an iterative process in which we seek to understand the user, challenge assumptions, and redefine problems to identify alternative strategies and solutions that might not be instantly apparent with our initial level of understanding. At the same time, design thinking provides a solution-based approach to solving problems. It is a way of thinking and working as well as a collection of hands-on methods[43].

Design thinking revolves around a deep interest in developing an understanding of the people for whom we're designing the iDEM service. It helps us observe and develop *empathy* with the target user. Design thinking helps us in the process of questioning: questioning the problem, questioning the assumptions, and questioning the implications. Design thinking is extremely useful in tackling problems that are ill defined or unknown, by re-framing the problem in human-centric ways, creating many *ideas* in brainstorming sessions, and adopting a hands-on approach in *prototyping* and *testing*. Design thinking also involves ongoing experimentation: sketching, *prototyping*, *testing*, and trying out concepts and ideas.

The five phases of design thinking, according to the Hasso-Plattner Institute of Design at Stanford (aka 'd.school'), are as follows[44]:

1. **Empathise** – with your users (as in Annex A and WP1)
2. **Define** – your users' needs, their problem, and your insights (as in section Annex A and WP4)
3. **Ideate** – by challenging assumptions and creating ideas for innovative solutions (as in section 3, 4 and 5, Annex A, and WP3)
4. **Prototype** – to start creating solutions (as in section 2)
5. **Test** – solutions (as in section 6 and WP4)

The five phases, stages, or modes are not always sequential. They do not have to follow any specific order. What's more, they can often occur in parallel and repeat iteratively. As such, the phases are not a hierarchical or step-by-step process.

Design thinking is an iterative and non-linear process, in which our design team continuously uses their results to review, question, and improve their initial assumptions, understandings and results. Results from the final stage of the initial work process inform our understanding of the problem, help us determine the parameters of the problem, enable us to redefine the problem, and, perhaps most importantly, provide us with new insights so we can see any alternative solutions that might not have been available with our previous level of understanding.

[42] https://www.interaction-design.org/ebook
[43] https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process
[44] https://dschool.stanford.edu/resources/getting-started-with-design-thinking

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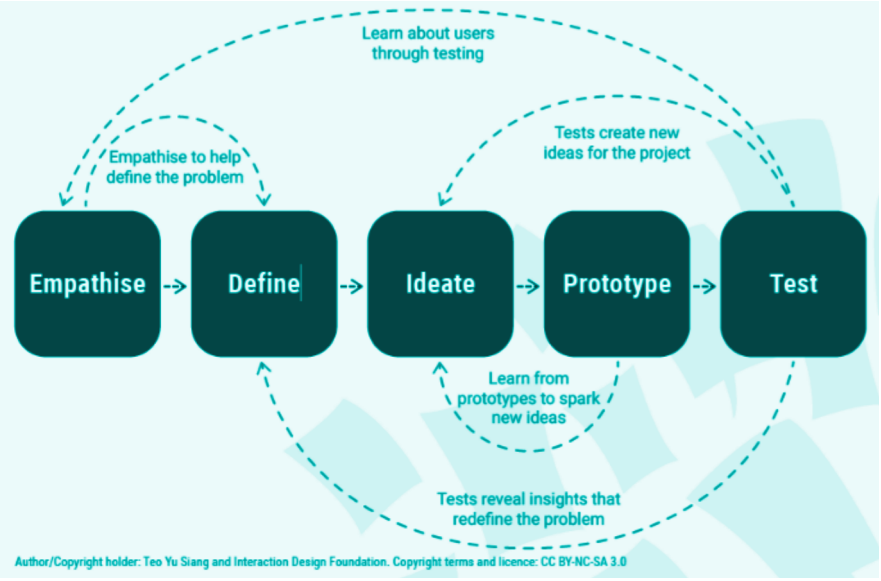

Figure Five phases of Design Thinking

At the heart of design thinking is the intention to improve iDEM and its App by analysing how users interact with it and investigating the conditions in which they operate. Design thinking offers us a means of digging that bit deeper to uncover ways of improving user experiences.

5.2 Fast Prototyping to Fail Fast & Often

The "Design Thinking" process is biassed towards action. Our ultimate goal is to prototype fast, prototype often, and test it on real users. Rapid prototyping frees practitioners to embrace failure as a means of learning–learning about the shortcomings of the mock product and making changes. We don't get things right the first time, innovative breakthroughs arise from failure[45].

Fail fast and often, then go back to the drawing board and make improvements where we failed. Prototypes go through multiple iterations where feedback from users is incorporated and changes are made to come up with an effective final solution.

In short, during prototyping we want to test the feasibility of our ideas and see if they can become *the* solution. We want to create an experience, get feedback, use the feedback to constantly make changes that improve on the prototype until we arrive at a better solution. We are building for the end user. We want to create a scenario where the user will handle the prototype and experience it by themselves. In this stage, complete involvement of the end user is crucial to success.

The aim is to build a prototype and get it into the hands of users to ensure early and regular feedback. The team observes, measures, records and judges how the users interact with the prototype. The users voice how they feel and think about it, their likes and dislikes of the design, functionality and usability, tell the team what is working and what is not, point out the hidden issues.

[45] Prototyping in Design Thinking: Fail Fast, Fail Often, Prototyping in Design Thinking: Fail Fast, Fail Often | Envato Tuts+ (tutsplus.com)

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Prototyping helps the team to ask more questions, redefine the problem, make choices that improve the product and, as a result, improve the user experience. It also allows the team to pursue different ideas without committing to a direction early. Fail quickly and cheaply by committing less time and money up front.

So, our guiding principles are:

- Don't wait or delay. Start building right away.
- Build fast. Don't spend too much time on a single prototype. Don't get emotionally attached to a prototype by spending too much time building it.
- Build with the end user in mind.
- Engage the user. Build to create an experience. Build something they can see and touch and feel.
- While building, imagine yourself as the user. Think about questions the user will ask. Identify what is being tested. You want to get meaningful feedback.
- Break the whole prototype down into different components. These help to prepare questions to ask the end users after they experience the prototype.

Once we have built the Prototype, we bring in the end users and have them experience it. Make them speak about their moment-by-moment experience so we can capture every small detail of how they are experiencing it. Actively observe and enthusiastically engage the user throughout their experience.

When the experience is over, we follow up with the user who had the experience with a set of questions. The questions should be prepared beforehand.

From a *usability* perspective, the prototypes can be categorised into:

A. Throwaway Prototypes - are models which are eventually discarded. They only show what an actual product can do. Throwaway prototypes are also called "close ended prototypes".
B. Evolutionary Prototypes - involves building a basic prototype that can further be improved and built upon to form an actual saleable product. This avoids wastage of resources. This is iDEM v0.1, as described in section 2.

5.3 iDEM DevOps Approach

However, design thinking is not enough ! To meet its core objectives, the iDEM service must be first and foremost, be useful, practical and operational. So building on the design thinking action-driven approach, the iDEM service is being developed using an Agile iterative DevOps approach, with an initial fast prototype to enable users to become actively involved in the co-creation process of its functional specification and its co-development from early in the project, resulting in its first formal operational release in two stages (D3.8 and D3.10).

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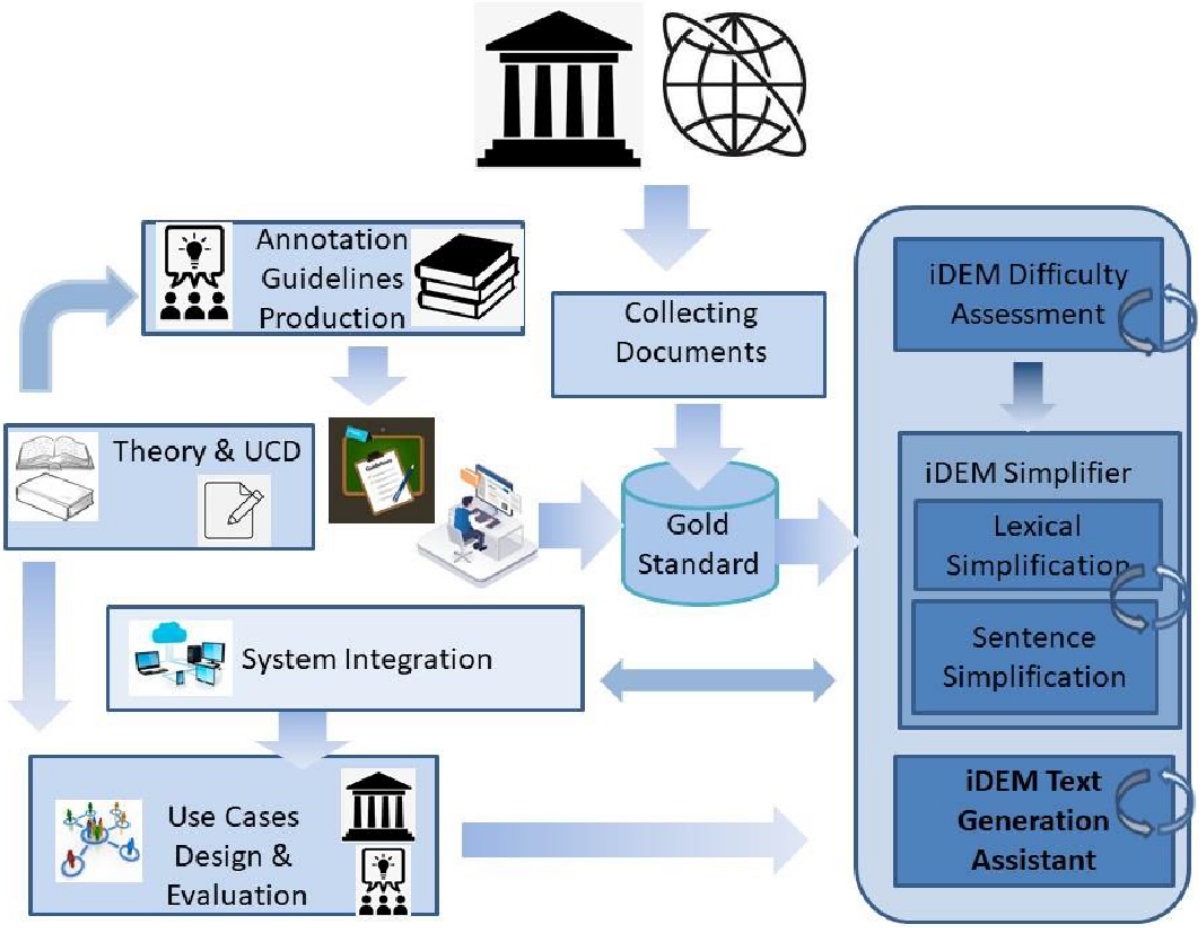
In line with UXD and Design Thinking, iDEM is using an Agile DevOps approach[46], with an initial fast prototype to enable users to become actively involved in the co-creation process of its functional specification and its co-development (through formative evaluation in WP4) from early in the project. This evolving prototype enables WP4 summative evaluation pilot trials to take place, and subsequently iteratively progressing it to its final release at the end of the project. The co-creation approach ensures wide uptake, improved EUL detection and multilingual speech processing on mobile devices for everyone. The process as illustrated from the DoA.

This co-creation approach ensures wide uptake, improved ET detection and multilingual speech processing on mobile devices for everyone.



[46] https://devops.com/how-to-combine-devops-and-agile/

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5.4 Technical Status of the iDEM Service

The required technical performance of the iDEM service and what has been achieved to date is as follows:

iDEM App Features	User Technical Requirements	Current status
A. User's Mobile Device	1. The iDEM App must be easy & intuitive to use. Simple but powerful. To run on standard modern phones & tablets with data Internet access for the App to operate using the iDEM cloud-based services. It will support both text and voice inputs & outputs, as well OCRed image inputs.	☑
	2. The iDEM Mobile App will be free & easily downloadable by users from the Google Play Store for Android phones & tablets, & from the Apple App Store for iPhones & iPads.	☑
	3. All the iDEM Mobile App's user's inputs & outputs will be on the users' mobile device – no personal data will be stored on the iDEM server.	☑
	4. The App works with any messaging app (such as WhatsApp) on the same user device, to facilitate communication with people who are not present at the time.	☑
B. User's Desktop PC	1. The iDEM web service must be easy & intuitive to use. Simple but powerful. To run with all standard modern web browsers.	In progress
	2. All the iDEM webservice's user's inputs & outputs will be on the users' computer – no personal data will be stored on the iDEM server.	☑
C. iDEM server System Performance	1. Simplification, translation, assessment, text generation & user login/authorisations should: a. Respond within 2 seconds – with a maximum of 5 seconds, to enable effective user communications.	☑
	b. Provide user-acceptable accuracy for 75% of users	Not yet evaluated
	2. Users should have at least 75% average satisfaction rating with the overall operation of the iDEM service.	Not yet evaluated
	3. The iDEM server will automatically & securely login & authorise the user to the iDEM services, after a one-time short & simple manual user setup & authorisation	In progress
D. Accessibility	1. iDEM's mobile app & web services work seamlessly with Assistive Technologies, including (a) Text-to-speech software	☑
	(b) Screen Readers	Not yet tested
	(c) Magnification tools	Not yet tested
	(d) Alternative input devices	Not yet tested

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	2. iDEM adheres to WCAG 2.1 AA accessibility standards to ensure compatibility with a wide range of assistive technologies, with its design & development addressed: a. Semantic HTML: Uses proper HTML tags to give assistive technologies context to understand content	Part done.
	b. ARIA attributes: enhance existing HTML to provide extra information for screen readers.	Part done.
	c. Keyboard Navigation: all functionality is accessible with just a keyboard, not relying on a mouse.	Part done.
	d. High Contrast: options for colour schemes that aid users with visual impairments.	Part done.
E. User Preferences	1. iDEM App & web service will provide one-tap/click user-selectable translation & conversion between any combination of: a. English, Spanish, Italian, Catalan, text	In progress.
	b. English, Spanish, Italian, Catalan, spoken	☑
	2. The App will provide, & retain, user selectable a. default personalised options for the User Interface, App text languages & favourite settings.	Part done.
	b. UI display, audio & text options, including contrast.	Part done.

So overall, the current iDEM App and web service addresses much of its initial UI, text simplification and language requirements.

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6. iDEM V1.0 Plans

Starting from the current iDEM v0.1 FP, as described in the previous sections, we will now iteratively develop towards the iDEM V1.0 first formal operational release as D3.9 "Prototype iDEM Integrated Platform and API" in March 2025, based on formative evaluation, continuous user feedback and iterative system improvements, that will be described in D3.9. In addition to the Barcelona pilot, the formal release of the iDEM service (D3.9) will address all 3 pilot site platforms for tasks T4.5.3.1-3.

The formal version 1.0 of the open iDEM application and web services API will automatically detect possible sources of problems in understanding the messages for a number of languages and for a number of audiences, and improving their output automatically to make it more suitable to these audiences by the end of the project:

1. to a level of 90% "Easy-to-Read" translation,
2. a User satisfaction of 75%,
3. for at least 4 languages (English, Spanish, Italian, Catalan),
4. operating with at least one democracy or participatory platform (such as Decidim), one government websites (such as https://web.gencat.cat) and EU site (such as the European Climate Pact, https://climate-pact.europa.eu, and the Conference on the Future of Europe, https://futureu.europa.eu**).**

6.1 iDEM Services Platform evolution

The free and open-source iDEM EUL text mobile application (building on task T3.4) and open-API cloud-based web-services platform (integrating all of the service functions developed in T3.1/2/3) to deliver the suite of iDEM services, for use with any deliberative democracy or participatory space, will continue to be iteratively specified, designed and developed in task T3.5 "iDEM Service Implementation" during M6-M36 led by MAC, working with the iDEM teams in CAPITO, UOL and UPF.

The iDEM App, component services and platform API will continue to be iteratively developed and published free and open-source, while the iDEM platform will continue to be provided by CAPITO. This will promote the involvement of an R&D community. Furthermore, the exploitation leader (MAC) will provide a business strategy for the viability of the iDEM services & application beyond the project life-span.

The iDEM project's results with commercial potential are likely to include:

- The free and open-source iDEM mobile App, component services and open API, as discussed above.

- The automatic detection of possible sources of problems in understanding the messages for a number of languages and for a number of audiences and improving their output automatically to make it more suitable to many more audiences, and the outputs can be applied to other applications such as broadcast and online multimedia services.

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- Individual AI and machine learning algorithms that provide the various multilingual and difficult-language detection and conversion to EUL can be used in other applications such as training and education.

- The adaptation of writing errors, be it lexical, syntactic, or semantic ones, can also be applied in other applications. for example, for migrants

The iDEM services platform will continue to reside on CAPITO's federated cloud distributed microservice infrastructure. The iDEM platform will continue to be developed using an Agile iterative DevOps approach, building on the firm foundation of this initial fast prototype that enables users to be involved in the co-creation process of its functional specification and its co-development from early in the project, resulting in its first formal operational release in two stages (D3.8 and D3.10). All services will be compliant with the GDPR and will be assessed by the ethical team as specified in WP6. "Privacy and Security by design and Default" (as per article 25 of the GDPR (General Data Protection Regulation)[47]), will continue to be core to the specification, development, and validation of the iDEM services and platform, driven by its user-centred co-creation methodology. Best-practice mobile applications security and GDPR testing (such as those defined by NIST[48] and GDPR.EU[49]), are used to ensure adherence to all relevant privacy and security standards.

6.2 iDEM Services APIs

Once the iDEM services and clients, both App and web service, evolve to a stable platform, the iDEM Services API will be specified and developed as a suite of APIs that will provide users with access to iDEM's services. The iDEM API will be able to be used to perform a variety of tasks, such as:

- Assessing the difficulty of text
- Identifying complex sentences in text
- Simplifying text for easy-read
- Generating text tailored to specific audiences
- Generating unbiased and inclusive text

The iDEM API will be a powerful tool that can be used to improve communication and understanding for everyone. The iDEM API provides users with access to a variety of services that can be used to perform a variety of tasks, such as assessing the difficulty of text, identifying complex sentences. The iDEM API will enable future additional and third party services to integrate the iDEM services ensuring effectively and meaningfully participate in deliberative democratic and participative spaces, through (a) text simplification, (b) multi-language availability, (c) cultural sensitivity, (d) personalization and (e) engagement.

The iDEM services will be free, open-source and comprehensive, while the open iDEM API will provide a standardised common medium for communication and an architecture for the dedicated components developed in T3.1/2/3. Based on those information flows, the iDEM API will provide the detailed specification of each module, data structure, protocol, and system component.

[47] https://www.privacy-regulation.eu/en/article-25-data-protection-by-design-and-by-default-GDPR.htm
[48] NIST (National Institute of Standards and Technology), "Vetting the Security of Clientlications", https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-163r1.pdf
[49] "Complete guide to GDPR compliance", https://gdpr.eu

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6.2.1 API—First Approach

To ensure that iDEM users can count on a solid interface and developers have the freedom they need to build robust services, with a clear path to every service, the iDEM architecture is being defined based on the API First Approach[50] and principles[51] so that all teams can innovate in their own time. Also, to ensure that iDEM is an open ecosystem of services. By defining generic and versatile APIs, including the service they perform, the inputs they take, and the outputs they produce, before writing any other code, ensures that iDEM takes full advantage of its microservices architecture, a variant of service-oriented architecture (SOA), in which applications are structured as collections of loosely coupled services.

To ensure loose coupling and high coherence among software components developed by the consortium's different and distributed teams—both internal and external—our common iDEM API policy is defined as:

1. Each iDEM API will be backed by a microservice to ensure the effectiveness and versatility of the iDEM architecture.
2. All iDEM APIs will be independently callable, stateless, and idempotent[52]. This means that an application can use an API without having to call another first, and that values internal to the service are not changed in a way that causes it to produce a different result each time it's called.
3. There is no distinction between internal-only APIs and external APIs.
4. Some services are performed centrally by the iDEM backend, even as most API work is implemented independently by a variety of development teams. For example, to ensure consistency, access control iDEM's backend will be centrally managed, with one identification and authentication scheme to be used by all APIs.
5. The iDEM data format is backend centrally managed to ensure uniformity.
6. IDEM service level agreements (SLAs) are defined and controlled. For example, you might say that for anything customer facing, the APIs should respond within 50 milliseconds.

All of the iDEM APIs will be defined, documented and shared in iDEM Google WP3 directory and will evolve as the iDEM system is developed. The catalogue will be centrally maintained by MAC (as task leader) in that shared directory.

While the responsibility for implementation will be left with the individual iDEM teams or external vendors, those who develop the iDEM services are bound by what's defined in the iDEM Catalog of APIs.

So while the teams implementing the APIs will be able to pick their database, and a lot of other things, if they mess up it can be very quickly and easily determined if a team is managing it correctly. If the APIs are going down, then we will know that we have a problem.

---

[50] As described in section 7.2.

[51] 3 commandments that should drive every API strategy | CIO

[52] Idempotency means that sending the same request multiple times will produce the same result, without changing the state of the server or the resource. Safety means that sending a request will not change the state of the server or the resource at all, only retrieve information. How do you test and monitor idempotency and safety in REST APIs for event-driven architecture? (linkedin.com)

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The iDEM APIs will offer a number of benefits to developers of applications that wish to interact with the iDEM platform, including:

- They are easy to use and integrate into existing applications.
- They are scalable and can be used to support large numbers of users.
- They are reliable and secure.
- They are constantly being updated and improved.

6.2.2 Initial iDEM Catalogue of APIs

The following table provides an overview of each potential API's purpose, technical capabilities, and how developers can integrate them into the iDEM system to achieve the project's objectives. Developers can refer to detailed API documentation for implementation specifics and best practices.

The iDEM APIs are still under development (and will continue to evolve throughout the project), but they have the potential to revolutionise the way that people participate in democracy. By making it easier for developers to create new features and functionality, the iDEM APIs can help to create a more inclusive and participatory democracy.

The iDEM APIs provide a way to interact with the iDEM platform and its services. The following is a tabulated reference catalogue of the possible iDEM APIs:

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API	Purpose	Technical Description
1. **Authentication**	API allows you to authenticate users and obtain access tokens.	The Authentication API allows developers to authenticate users and obtain access tokens. This API can be used to implement a variety of authentication mechanisms, such as OAuth 2.0 and OpenID Connect.
2. **User Management**	API allows you to manage users, including creating, updating, and deleting user accounts.	The User Management API allows developers to manage users, including creating, updating, and deleting user accounts. This API can be used to implement a variety of user management features, such as user registration, login, and profile management.
3. **Content**	API allows you to manage content on the iDEM platform, including creating, updating, and deleting content items.	The Content API allows developers to manage content on the iDEM platform, including creating, updating, and deleting content items. This API can be used to implement a variety of content management features, such as creating and editing blog posts, news articles, and forum threads.
4. **Translation**	API allows you to translate content into different languages.	The Translation API allows developers to translate content into different languages. This API can be used to implement a variety of translation features, such as translating user-generated content, website content, and documentation.
5. **Easy-to-Read**	API allows you to convert content into an easy-to-read format.	The Easy-to-Read API allows developers to convert content into an easy-to-read format. This API can be used to implement a variety of accessibility features, such as making content more readable for people with low literacy levels and cognitive impairments..
6. **Discourse Analysis**	API allows you to analyse discourse for potential sources of problems in understanding the messages.	The Discourse Analysis API allows developers to analyse discourse for potential sources of problems in understanding the messages. This API can be used to implement a variety of features, such as identifying and correcting errors in user-generated content, and detecting and preventing hate speech.
7. **Adaptation**	API allows you to adapt content to different audiences and needs.	The Adaptation API allows developers to adapt content to different audiences and needs. This API can be used to implement a variety of features, such as personalising content recommendations, and adapting content for different devices and screen sizes.
8. **Search**	API allows you to search for content on the iDEM platform.	The Search API allows developers to search for content on the iDEM platform. This API can be used to implement a variety of search features, such as enabling users to search for blog posts, news articles, and forum threads.
9. **Notifications**	API allows you to receive notifications about events on the iDEM platform.	The Notifications API allows developers to receive notifications about events on the iDEM platform. This API can be used to implement a variety of notification features, such as notifying users when they receive a new message, or when a new blog post is published.
10. **Statistics**	API allows you to retrieve statistics about the iDEM platform and its users.	The Statistics API allows developers to retrieve statistics about the iDEM platform and its users. This API can be used to implement a variety of features, such as generating reports on user activity and content engagement.
11. **Administration**	API allows you to manage the iDEM platform, including configuring settings and creating new users.	The Administration API allows developers to manage the iDEM platform, including configuring settings and creating new users. This API can be used to implement a variety of administrative features, such as managing user roles and permissions, and configuring the platform's appearance and functionality.

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6.2.3 Implementation

GraphQL[53] is a standard query language for APIs, and is not tied to any specific database or storage engine. Instead it would be backed by iDEM's existing code and data. So the iDEM API functions will probably be eventually provided in GraphQL, because:

- GraphQL allows for requesting specific data fields, reducing over-fetching compared to traditional REST APIs.
- The nested structure of GraphQL queries aligns well with the hierarchical nature of text analysis and generation tasks.
- Variables can be used in GraphQL queries to make them more dynamic and reusable.

Potential GraphQL Queries for iDEM API Functions

The following are illustrative examples of using such API functions. However the actual implementation of the iDEM API in GraphQL may require a detailed schema definition and resolver functions to handle the specific requests and responses.

1. **Difficulty Assessment:**

```
GraphQL

query {
 assessDifficulty(text: "This is a complex policy document.") {
  difficulty
  explanation
 }
}
```

2. **Text Simplification:**

```
GraphQL

query {
  simplifyText(text: "This sentence is convoluted and hard to understand.", targetAudience: "lowLiteracy") {
  simplifiedText
 }
}
```

3. **Content Adaptation:**

```
GraphQL

query {
   adaptContent(text: "This news article needs to be culturally sensitive.", targetCulture: "spanish") {
  adaptedText
```

[53] GraphQL | A query language for your API

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```
  }
}
```

4. **Message Generation:**

```
GraphQL

query {
 generateMessage(topic: "climate change", tone: "informative") {
   message
 }
}
```

6.2.4 Examples of iDEM API potential Use Cases

- A developer could use the Content API to create a mobile app that allows people with language difficulties to access and participate in deliberative democratic spaces.
- A government agency could use the Translation API to translate its website and other communication materials into multiple languages, making them accessible to a wider audience.
- A non-profit organisation could use the Easy-to-Read API to create educational materials that are accessible to people with low literacy levels.
- A researcher could use the Discourse Analysis API to study how people with language difficulties communicate in online forums.
- A journalist could use the Adaptation API to adapt their articles to make them more accessible to people with different reading abilities.
- An election commission could use the Voting API to create an online voting system that is accessible to people with language difficulties.
- Developer: Create a mobile app for people with language difficulties to access deliberative democratic spaces.
- Government agency: Translate website and communication materials into multiple languages.
- Non-profit organisation: Create educational materials accessible to people with low literacy levels.
- Researcher: Study how people with language difficulties communicate in online forums.
- Journalist: Adapt articles to make them more accessible to people with different reading abilities.
- Election commission: Create an online voting system accessible to people with language difficulties.

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7. Conclusions and Recommendations

This D3.8 initial iDEM fast prototype (FP) has been developed, published and is available as a beta test App to iDEM partners' Approved Users for both Android and IoS, on the Google and Apple App stores[54]. This FP is a first step to give users a "feel" for using the service on a phone. Thus enabling users to become proactively involved in the co-creation process of the service's functional specification and co-development from early in the project. It is also the first step in the subsequent Incremental development through many cycles of formative users' feedback and improvement. Once refined by users feedback, the iDEM app client will be readily redeveloped as a webservice client that incorporates the same functionality and User Interface (UI) features.

From this proof-of-concept foundation, the iDEM mobile app, web service and API will now be iteratively developed and improved to result in the first formal release of the service as D3.9"Prototype iDEM Integrated Platform and API" in March 2025, and its final operational release as D3.10"Final iDEM Platform, API and Services" in June 2026, as specified in the DoA.

The conclusions so far are:

- The initial fast prototype of the iDEM app has been developed and is currently being used by approved users to gather feedback and improve the app before its formal release.
- The iDEM system is being developed using an Agile iterative DevOps approach, which allows for continuous user feedback and iterative system improvements.
- The iDEM platform will continue to reside on CAPITO's federated cloud distributed microservice infrastructure.
- The iDEM project's results with commercial potential are likely to include the free and open-source iDEM mobile app, component services, and open API.
- The iDEM API will be a powerful tool that can be used to improve communication and understanding for everyone.
- The custom iDEM GPT is a very useful expert support on the iDEM service, both to users and researchers.

Thus the recommendations for the remainder of the iDEM project are as follows:

- Continue iterative development and refinement of the iDEM Fast Prototype (FP) system based on user testing and feedback. The FP has shown promising results in improving understandability and readability at CEFR B1 and A2 levels. Further development will focus on tailoring simplifications to the specific needs of targeted people with LRC difficulties, particularly those who need Easy Read (*Easier*/A1) level simplification.
- Conduct user testing with individuals who have diverse reading abilities to get accurate feedback. This will be especially important for Easy Language (*Very Easy*/A2) level simplification, as it needs to be carefully evaluated to ensure it meets the needs of some individuals without being too simple for others.

[54] To join the iDEM Approved Users Group, email john@mac.ie

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- Refine the iDEM backend services to tailor simplifications to specific user needs based on the other WPs' R&D results. This will allow the iDEM clients to provide more personalised and effective text simplification for people with LRC difficulties.
- Continue to provide the custom iDEM GPT expert support on the iDEM service, both to users and researchers (particularly in WP4). Expanding its Knowledge Space as the iDEM services are evolved and developed to their formal releases, and further iDEM public deliverables become available. While ensuring that no private content is included.
- Use real-world user feedback to determine the effectiveness of iDEM's simplification services. The feedback from WP4 and pilot user testing will be essential in assessing the true impact of iDEM's simplification services and identifying areas for further improvement.
- Specify and develop the iDEM Services API as a suite of APIs that will provide users with access to iDEM's services. The API will allow developers to perform various tasks, such as assessing text difficulty, simplifying text, and generating tailored content.
- Define, document, and share all iDEM APIs in a centralised catalogue. This will ensure that all teams can innovate and develop services independently while adhering to a common API policy.
- Ensure that the iDEM APIs are easy to use, scalable, reliable, secure, and constantly updated. This will encourage developers to create new features and functionality, leading to a more inclusive and participatory democracy.

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Annex A: iDEM Primary User Personas' Design Methodology

In keeping with the iDEM user-centric approach, the methodology to design the iDEM services, is based on creating fictional stories of its primary users' typical personas, with their main use of the iDEM services' highlighted in Yellow as follows:

iDEM Target Users Service - 1. Language Challenged Communities - User Persona

Miguel, with SCI felt excluded from community discussions. iDEM transformed his life & inclusive democracy.

- **Before iDEM** - he had trouble accessing information due to complex jargon & inaccessible formats.
- **After iDEM** - Miguel accessed inclusive spaces, connected with neighbours & shared his concerns, freely expressing his views.
  - The App assessed text difficulty to ensured he understood discussions.
  - Miguel participated in an intersectional deliberative space launched by the Ombudsman office, where he shared his insights & perspectives, bringing his voice to the community.
  - Using iDEM's Text Generation Assistant, Miguel compiled conclusions & recommendations - informing city policies.
- Benefits from iDEM's seamless integration with assistive technologies (screen readers, text-to-speech, etc.).

Sarah - an elderly person with MCI, struggled to understand complex texts.

- **Before iDEM -** Sarah felt excluded from important conversations & decision-making processes.
- **After iDEM** App simplified complex texts, made it easier for Sarah to understand political websites, news articles, & policy documents.
  - iDEM - helped Sarah to navigate online forums & discussions, contributing her thoughts & ideas without fear of being misunderstood.
  - made voting accessible & empowering for Sarah.
  - enabled Sarah to connect with her elected Representatives.
  - Empowered her to participate fully in the democratic process.

Maria - a migrant with limited Italian language skills.

- **Before iDEM,** Maria felt excluded from community discussions.
- **After iDEM** facilitated accessible spaces for Maria to engage in dialogue.
  - AI-powered text assessment ensured Maria could understand discussions & participate in a deliberative space.
  - Her voice was heard & valued. She helped create recommendations for community-based initiatives.
  - iDEM empowered Maria to engage more actively in her community, sharing her experience, inspiring others to participate

iDEM Service – 2. Democratic & Policy-making institutions User Persona.

Maria, a Barcelona City Council public official, was leading the public consultation process for a new policy document She wanted to ensure that the policy reflected the diverse needs & perspectives of the city's residents.

- **Before iDEM,** Maria faced challenges in gathering meaningful input from everyone.
  - Traditional methods excluded those with limited language skills or mobility challenges.
  - Complex language in policy documents made it difficult for many residents to understand & participate.
- **After iDEM** - Maria embraced iDEM as a powerful tool for fostering inclusive public engagement, by using:
  - the AI-powered text **assessment** & Text Generation Assistant webservice tools Maria could
    - choose the language competence of the communities she wished engage, &
    - appropriately **simplified language in** all drafts of the policy as it evolved for each Participatory Space (Dropdown: *Participatory Processes, Assemblies, Consultations, Conferences & Initiatives*) & its **Component** (Dropdown: *Proposals, Page, Meetings, Budgets, Surveys, Accountability, Debates, Sortitions or Blog*).
  - iDEM to access online forums in multiple languages on the Decidim Barcelona platform
  - iDEM's tools, designed to integrate with assistive technologies, to create accessible & inclusive content.
  - Residents from traditionally marginalized communities had their voices heard using the iDEM App interactive text simplification on their phones
- iDEM has transformed Maria's approach to public consultation, empowered her to create more inclusive policies & broaden Barcelona's democracy.

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iDEM Service – 3. Local & regional participatory democratic bodies & civic platforms User Persona.

Rosa is the director of an association for adults with reading difficulties. Her members want to participate in Barcelona's democratic processes on the Decidim platform.

- **Before iDEM:**
  - Complex policy language makes understanding & responding difficult.
  - Rosa feels overwhelmed summarizing documents for her members.
- **After iDEM:**
  - iDEM text simplification services are integrated into Decidim.
  - Rosa uses her laptop to demonstrate iDEM to her members at a meeting.
  - iDEM transforms policy documents into easy-language formats.
  - iDEM's tools integrate with assistive technologies, to create accessible & inclusive content.
  - Members understand the policy directly for the first time.
  - One member, Juan, confidently uses iDEM to submit feedback.

- iDEM removes the barrier of complex language.
  - Members' understanding & confidence increase,
    - leading to direct participation in the policy process."
  - Policies become more inclusive, reflecting the needs of the entire community.

The stories of these Personas and the impact of the highlighted iDEM services are as follows:

1. People with LRC difficulties

Maria, Miguel, & Sarah: *In the heart of Barcelona, a transformative initiative called iDEM was taking shape, empowering citizens like Miguel, Maria, and Sarah to actively participate in shaping the city's policies and decisions.*
Miguel, - *a person with Medium LRC difficulties due to SCI, had long felt excluded from community discussions. The complex jargon and inaccessible formats left him struggling to comprehend the information. iDEM's text simplification feature was a game-changer, seamlessly simplifying text and allowing Miguel to connect with neighbours, share his concerns openly, and contribute meaningfully to community dialogues.*
Maria, *a person with High LRC difficulties due to being a migrant with limited Italian language skills, initially felt intimidated by the language barriers that prevented her from engaging effectively in community discussions. iDEM's AI-powered text assessment tool transformed her experience. It automatically simplified the language, making it easier for Maria to comprehend and participate actively.*
Sarah, *an elderly person with High LRC difficulties due to MCI affecting her reading and writing abilities, struggled to grasp complex texts related to political issues, news events, and policy proposals. iDEM's text simplification capabilities were invaluable, simplifying texts and enabling Sarah to navigate online forums and discussions.*
As Maria, Miguel, and Sarah actively engaged in the iDEM-facilitated discussions, their insights and perspectives were gathered and analysed by the project. This data-driven approach allowed the city council to craft policy documents that were not only informed by the collective wisdom of its citizens but also tailored to their specific needs and concerns.

In the end, iDEM's impact was profound and far-reaching. It transformed the way Barcelona's government interacted with its citizens, fostering a truly inclusive and participatory democracy. Miguel, Maria, and Sarah, once marginalised voices, found their voices amplified, their concerns heard, and their contributions valued. iDEM had become a beacon of hope, demonstrating how technology could empower individuals and strengthen communities.

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2. Democratic & Policy-making institutions.

Sandra, *a seasoned Barcelona City Council official, was tasked with leading the public consultation process for a new policy document on the city's Decidim deliberative democratic and participatory platform. Sandra was passionate about ensuring that the policy reflected the diverse needs and perspectives of the city's residents.*
Before the iDEM service became operational, Sandra faced several challenges in gathering meaningful public input. Traditional methods, such as in-person meetings and public hearings, often excluded individuals with limited language skills or mobility challenges. Additionally, the complex language used in policy documents made it difficult for many residents to understand and provide informed feedback.
Sandra's efforts to overcome these barriers were often met with limited success. She recognized the need for a more inclusive and accessible approach to public consultation. When iDEM was introduced, Sandra saw it as a potential game-changer.
iDEM's text simplification feature was a revelation for Sandra. It enabled her to create online surveys and forums in multiple languages, ensuring that all residents had access to the information and resources they needed to participate. iDEM's AI-powered text assessment tools also proved invaluable, automatically simplifying the language of policy documents, making them more accessible to a wider audience.
Sandra quickly embraced iDEM as a powerful tool for fostering inclusive public engagement. She utilised the platform to create an online survey on the proposed policy, reaching residents from all corners of the city. The survey was translated into multiple languages, ensuring that everyone had the opportunity to provide their input.
The results of the survey were overwhelmingly positive. Residents appreciated the ability to participate online and in their own language. They also found the policy documents to be more understandable, enabling them to provide more informed feedback.
Sandra used the feedback gathered through iDEM to refine the policy proposals. She was particularly impressed by the insights and perspectives of residents from traditionally marginalised communities. Their voices had been heard and valued, ensuring that the final policy document reflected the needs and concerns of all Barcelona residents.

The iDEM service had transformed Sandra's approach to public consultation. She no longer felt constrained by the limitations of traditional methods. With iDEM as her partner, she could engage with a broader and more diverse range of residents, ensuring that the city's policies were truly representative of the community.
iDEM had not only empowered Sandra to create more inclusive policies but also inspired her to continue pushing the boundaries of citizen engagement. She saw the potential for iDEM to transform not just public consultation but also the very fabric of Barcelona's democracy, fostering a truly participatory and inclusive city government.

3. Participatory democratic bodies & civic platforms

Rosa *is the executive director of an association representing (people with Medium to High LRC difficulties due to MCI and other reading difficulties. Her members care deeply about their community and wish to be involved in public consultations on the Barcelona City Council's Decidim platform. However, navigating complex policy documents is nearly impossible for them. Often, the language is too dense, the sentences too long. Most members become discouraged and feel their voices can't be heard. Rosa works tirelessly to summarise the documents and advocate on their behalf, but she cannot help everyone, and she knows her own summaries cannot fully replace her members' direct participation.*

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The iDEM text difficulty assessment and simplification services are now available on Decidim. Rosa excitedly shows her members how to use the iDEM app on their phones. "Look!" she exclaims, "The new policy document is here. Tap this button, and the iDEM app makes it so much easier to understand!"
Several members try it out, amazed. For the first time, they are reading Barcelona City Council policy drafts directly; seeing their own interests reflected in the simplified language. One member, Juan, has an idea for a change he feels would benefit their community. Using the iDEM services, he carefully but confidently articulates his input in the "responses" section. In that moment, he knows his voice matters.
Through the iDEM project, technology is no longer a barrier for Rosa's members. Their understanding of Barcelona's democratic process grows as they confidently participate. Rosa observes that her summaries and guidance are still needed, but her members feel empowered to engage more directly with decision-makers. With a greater share of their voices heard, policies truly reflect the diverse needs of their community**.**

Through the iDEM project, technology is no longer a barrier for Rosa's members. Their understanding of Barcelona's democratic process grows as they confidently participate. Rosa observes that her summaries and guidance are still needed, but her members feel empowered to engage more directly with decision-makers. With a greater share of their voices heard, policies truly reflect the diverse needs of their community.

A.1 Stories of personas with LRC difficulties

These are fictional stories to explore the functionality and design of the iDEM services, by illustrating the use of the services and their potential impact on the lives of typical end-users targeted by iDEM.

Sarah

In the heart of a bustling city, Sarah, an elderly woman with MCI due to the onset of Alzheimer's disease affecting her reading and writing abilities, navigated the world with a sense of isolation and frustration. Complex texts, from news articles to political speeches, often seemed like indecipherable puzzles, leaving her feeling excluded from important conversations and decision-making processes.

In the pre-iDEM era, Sarah's engagement with the democratic process was limited. She would skim through political pamphlets, hoping to grasp a few key points, but often felt overwhelmed by the jargon and lengthy sentences. The thought of participating in online discussions or writing to her elected representatives filled her with anxiety.

The introduction of iDEM, a revolutionary tool designed to assist individuals with reading difficulties, transformed Sarah's life. The iDEM app seamlessly simplified complex texts, providing her with easy-to-understand summaries and explanations. With the app's help, Sarah delved into political websites, news articles, and policy documents, gaining a deeper understanding of the issues affecting her community.

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The app's ability to assess the difficulty of text proved invaluable. Sarah could now confidently navigate online forums and discussions, contributing her thoughts and ideas without fear of being misunderstood. The app's unbiased and inclusive language further empowered her, ensuring that her voice was heard and respected.

When it came to voting, Sarah's confidence soared. The iDEM app translated complex ballot papers into clear, concise instructions, making the voting process accessible and empowering. She could now make informed decisions without feeling intimidated or excluded.

iDEM also enabled Sarah to connect with her elected representatives. The app's text generation feature allowed her to compose clear and concise emails, expressing her concerns and opinions effectively. She felt a newfound sense of agency, knowing that her voice could be heard by those who held decision-making power.

iDEM's impact extended beyond Sarah's personal life. She became an active member of her local community, volunteering for political campaigns and attending town hall meetings. Her ability to understand and engage with complex information made her a valuable asset to her community, fostering a deeper sense of belonging.

Sarah's story is a testament to the transformative power of accessible technology. iDEM has empowered individuals like Sarah to participate fully in the democratic process, bridging the gap between literacy barriers and civic engagement. It is a reminder that technology can be a force for inclusion, ensuring that every voice is heard and every vote counts.

Miguel

In the bustling heart of Barcelona, Miguel, a man with SCI due a brain injury in a car accident many years ago, often felt excluded from discussions about his neighbourhood's needs. Complex jargon and inaccessible information created barriers, preventing him from fully participating in community initiatives.

The introduction of iDEM, a transformative tool designed to bridge the gap between citizens and decision-makers, revolutionised Miguel's experience. iDEM's accessible and inclusive spaces, equipped with text accessibility and text production tools, provided a platform for Miguel to connect with his neighbours and share his concerns.

With iDEM's support, Miguel joined online discussions and forums, freely expressing his views and contributing valuable insights into the issues affecting his community. The app's ability to assess the difficulty of text ensured that Miguel could fully understand the discussions, fostering informed and inclusive dialogue.

When the Ombudsman office launched a deliberative space to address the identified community needs, Miguel was among the first to participate. The space, powered by iDEM's intersectional approach, brought together a diverse group of citizens, including people with impairments, the elderly, migrants, and representatives of the general population.

In this inclusive setting, Miguel's voice resonated with the wider community. His perspectives, often overlooked due to accessibility barriers, gained recognition and respect. Together, the citizens deliberated on the identified issues, pooling their knowledge and expertise.

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Through iDEM's text generation feature, Miguel actively participated in the compilation of conclusions and recommendations. His contributions, carefully crafted and easy to understand, helped shape the recommendations that would inform city policies.

The impact of iDEM extended beyond the deliberation space. Miguel's newfound confidence and sense of inclusion empowered him to actively engage in his neighbourhood. He volunteered for community initiatives, attended town hall meetings, and shared his experiences with others, inspiring them to embrace their voices and contribute to their community.

Miguel's story exemplifies the transformative power of iDEM in fostering inclusive and participatory democracy. It demonstrates how technology can bridge accessibility gaps, empower marginalised voices, and lead to informed decision-making that truly reflects the needs of the community.

Maria

Before the iDEM project was implemented, Maria, a migrant with limited Italian language skills, often felt excluded from civic engagement initiatives in her community. Complex texts and inaccessible information presented significant barriers to her participation in deliberative processes such as mini-publics or Civic assemblies.

The introduction of iDEM, a transformative tool designed to bridge the gap between citizens and decision-makers, revolutionised Maria's experience. iDEM's accessible and inclusive spaces, equipped with text accessibility and text production tools, provided a platform for Maria to engage in meaningful dialogue with her neighbours and fellow citizens.

With iDEM's support, Maria joined online discussions and forums, freely expressing her views and contributing valuable insights into the issues affecting her community. The app's ability to assess the difficulty of text ensured that Maria could fully understand the discussions, fostering informed and inclusive dialogue.

When a parallel bottom-up (from the people to representatives) deliberative democratic space was piloted, powered by iDEM's intersectional approach, Maria was among the first to participate. The space, designed to enhance the participation of less representative groups, welcomed people with reading/writing impairments and migrants, ensuring that the voices of all community members were heard.

In this inclusive setting, Maria's voice resonated with the wider community. Her perspectives, often overlooked due to language barriers, gained recognition and respect. Together, the citizens deliberated on the identified issues, pooling their knowledge and expertise.

Through iDEM's text generation feature, Maria actively participated in the compilation of conclusions and recommendations. Her contributions, carefully crafted and easy to understand, helped shape the recommendations that would inform community-based initiatives.

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The impact of iDEM extended beyond the deliberation space. Maria's newfound confidence and sense of inclusion empowered her to actively engage in her community. She volunteered for local initiatives, attended town hall meetings, and shared her experiences with others, inspiring them to embrace their voices and contribute to their community.

Maria's story exemplifies the transformative power of iDEM in fostering inclusive and participatory democracy. It demonstrates how technology can bridge accessibility gaps, empower marginalised voices, and lead to informed decision-making that truly reflects the needs of the community.

A.2 Users' Scenarios

Scenarios from the perspectives of Maria, Sandra, and Rosa, to make real the personal benefits that the iDEM Fast Prototype will aim to begin to brings to their lives:

Maria - A Voice Amplified

The heart of Barcelona pulsed with energy, but for Maria, it only echoed her isolation. A migrant from Italy, she longed to be a part of her new community, to contribute to the vibrant discussions shaping her neighbourhood. Yet, the official notices, the online forums, all seemed like a foreign language. The words were a blur, the meaning lost behind complex sentences.
Then, a friend whispered about iDEM. An app that could make the words understandable. Hesitantly, she downloaded it. The first time she opened Decidim.Barcelona and tapped the iDEM button, something extraordinary happened. The text transformed, becoming clear and simple. She could read about an upcoming community project, about spaces for children to play, and it made sense.
A feeling flickered within her – not just understanding, but possibility. Her finger moved to the reply button, a hesitant tap. With iDEM's help, she typed her thoughts about the park, the need for shade, and her ideas as a mother. She pressed 'send', a tremor in her hand. Her voice, too long silenced, was out in the world, a part of the conversation shaping her home.

Sandra - Crafting Inclusive Policies

Sandra stared at the policy draft on her screen. As a Barcelona City Council official, she knew the words on this document held power – affecting lives, shaping communities. But the technical terms, the legal jargon – she sighed. This wouldn't be understood by most of the very people it impacted. In the past, they'd tried simplifying things, but it always felt insufficient.
Then came iDEM. Not just a simplification tool, she realised, but something smarter. On her laptop, the webservice assessed the text's difficulty. Red highlighted the problem areas. Beside it, the text generation assistant offered alternatives, clearer phrases. Sandra edited, the red fading with each change. A new version ready, she selected "Easy Language" and smiled.
This was what she wanted – a policy the whole city could understand. She uploaded it to Decidim, added the multilingual survey. It was far more than fulfilling an obligation to make information accessible. This was a door flung open, an invitation to Barcelona's diverse voices to shape their own future.

Rosa - Empowering her Community

Rosa looked at the faces around the table, her heart full. Her association, adults with reading difficulties, had always been passionate about their city. But when it came to the online

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consultations, the fancy policy documents, most felt defeated from the start. She did her best, summarising, advocating, but it wasn't the same.
Her excitement had been infectious when she'd told them about iDEM. Now, they were seeing it for themselves. On their phones, the iDEM app simplified the newest Decidim proposal. Eyes that often skimmed in frustration were focused. Juan, normally quiet, raised his hand. "I have an idea," he said, and iDEM helped him write his response directly into the forum.
Rosa beamed. This was more than just understanding the policies. This was ownership, participation. Her members weren't reliant on her summaries anymore. Technology wasn't the enemy, but their ally. She looked around the room, at the faces glowing with a newfound sense of agency. iDEM was giving them back their voices, loud and clear, to make sure their community reflected all of them.

Sarah - Finding Her Voice

Sarah winced at the email on her phone. Another policy document from Decidim. In the past, it would have filled her with dread. The words swam on the screen when she tried to read, the meaning a tangled mess. MCI was a constant battle, making her feel excluded from important discussions.

But this time, there was a note from Rosa – something about an app called iDEM. She installed it, curiosity winning over scepticism. It had a button that said "Listen". Sarah tapped it, and Rosa's clear voice filled her earbuds, explaining the policy in simple terms she could grasp. A spark of hope ignited.

The survey still felt daunting. Sarah wasn't great at writing, the jumble of letters in her head never quite making it to the page the way she intended. But iDEM... it had another option. "Speak your response," the app suggested. Suddenly, Sarah wasn't worried about spelling or grammar. Her thoughts flowed out, the app turning them into text. She edited, making sure her ideas were clear.

Hitting 'send' felt like a triumph. iDEM had been her bridge. It helped her understand the world of policies, and more importantly, gave her the tools to make her own voice heard in the conversations that mattered.

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