

Wooden construction

Innovative Eco-Construction System Based on Interlocking Modular
Insulation Wood & Cork-Based Panels
IMIP experience in the Sudoe region

Environmental assessment:
ICT integration and climate change mitigation evaluation

Melchor Monleón Domenech

Interreg SUDOE IMIP
(SOE3/P3/E0963)

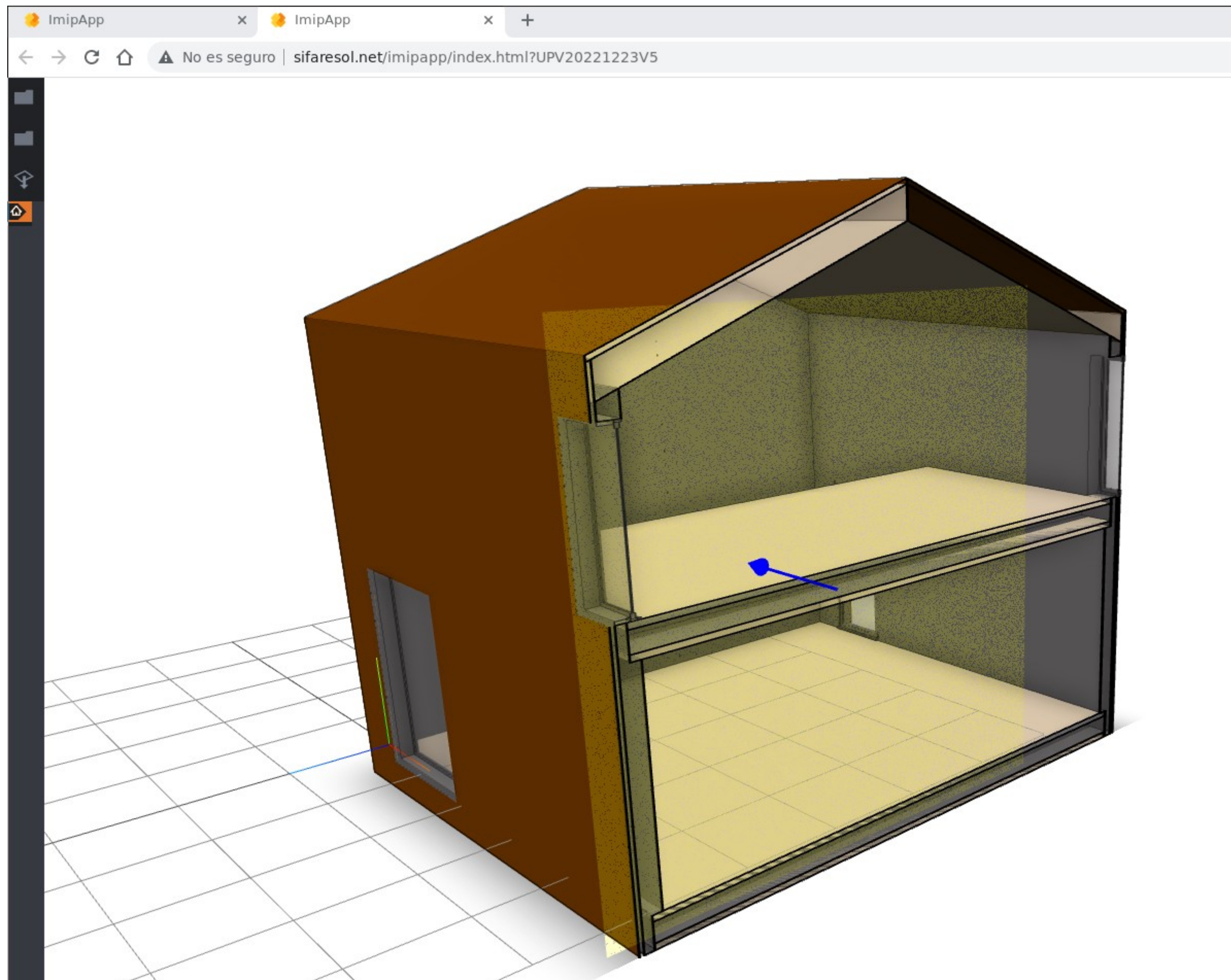
Polytechnic University of Valencia



The IMIP project works on the evolution and improvement of wooden and natural cork construction systems, with one of its objectives being the increase in energy efficiency and the reduction of environmental footprint in building,



including the use of resources as close as possible to the location where they will be used, in order to reduce the carbon footprint and promote the local economy. This promotes the use of wood and natural cork in building, making their use more viable technically and economically.



As part of the project, a web application is being developed using a BIM methodology, which allows for energy and environmental analysis of the elements and buildings to be developed.

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Why a new tool?

- Open environment.
- Pedagogical Approach.
- Increase the understandability.
- Focus on highly efficient buildings.
- Integrate with BIM-IFC tools



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Although there are several recognized tools in Spain for calculating energy ratings, we aim to take a step further towards achieving increased efficiency and decreased environmental footprint through calculation tools, based on the following premises:



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Promote an open environment and the use of open-source code, taking advantage of the universality of web tools to encourage knowledge dissemination and collaboration, and thus reduce dependence on proprietary tools.



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Add a pedagogical component to the tool to make the processes involved in achieving energy efficiency and environmental footprint reduction more understandable.



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Increase the understandability of the results of different choices aimed at improving energy efficiency and environmental footprint, to facilitate design decisions, as well as to expose and clarify the functioning of hygrometric comfort and its impact on health.



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Existing calculation programs are designed for conventional buildings, which can lead to problems when evaluating highly efficient buildings. For example, these buildings do not require active climate control systems, but calculation programs do not allow for the option of a building without such systems, which penalizes the result if these installations are omitted.

The impact of exact orientation is important, but existing calculation programs make simplifications that, while acceptable for conventional buildings, are not for highly efficient buildings.

The implementation of intelligent efficiency improvement systems, such as the automation of sun protection elements or intelligent forced natural ventilation systems, is complicated because their calculation is not foreseen and they are closed programs where their application is difficult.

Regarding the calculation of thermal bridges, they are generally calculated approximately. In highly efficient buildings, transmission through thermal bridges has been minimized, but it is complicated to calculate them in existing programs. This is one of the points where integration with a BIM-IFC environment would allow for improved calculation, considering interactions in two and three dimensions.



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The current operation of recognized programs requires modeling the building, either numerically (CERMA, CX3, ...) or in their own proprietary modeling environments (HULC, CypeTherm, ...)

There are converters from proprietary BIM environments to Hulc, but these require licenses for both the BIM program and the converter.

Our application uses BIM models created on any platform compatible with export to IFC. From these models, the resources necessary for certification and energy efficiency calculations are generated, without the need to create a new model of the building. In this way, we aim to achieve greater compatibility with the rest of the BIM processes in building and avoid errors caused by duplication of modeling.



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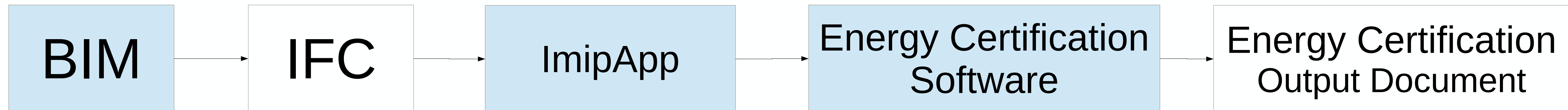
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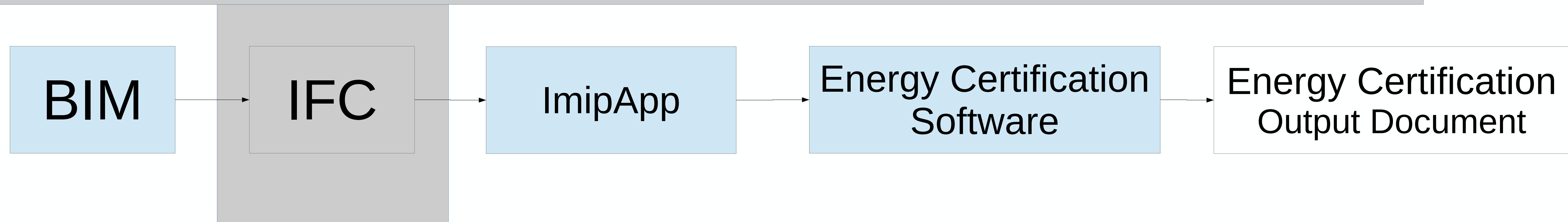
Stages and Operation Diagram





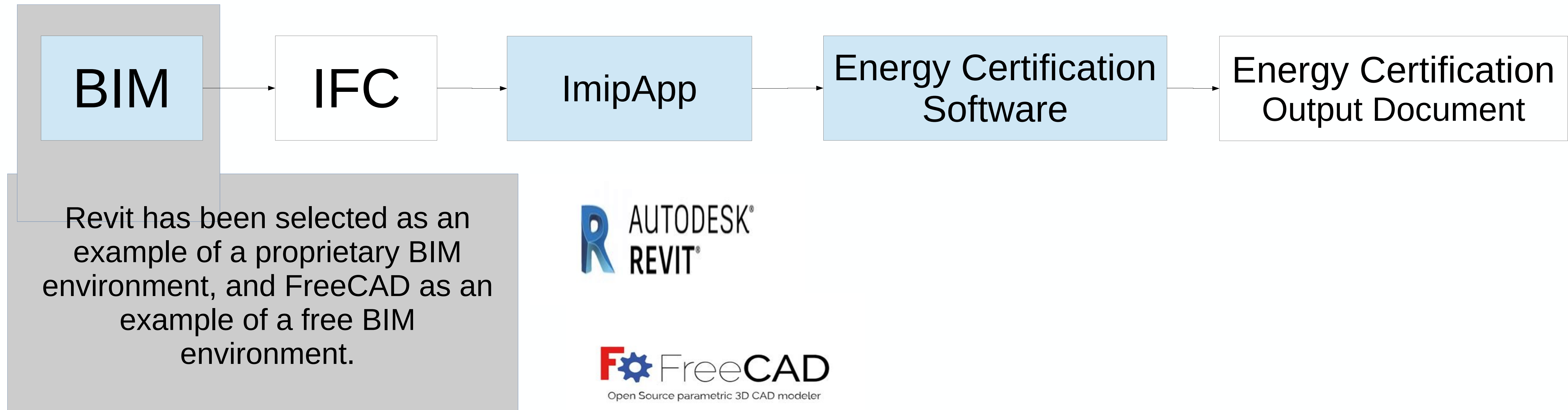
Stages and Operation Diagram

Integration with BIM through IFC files: Since IFC is an open and standard data model defined by ISO 16739, the program can acquire data from any BIM platform that exports to IFC.



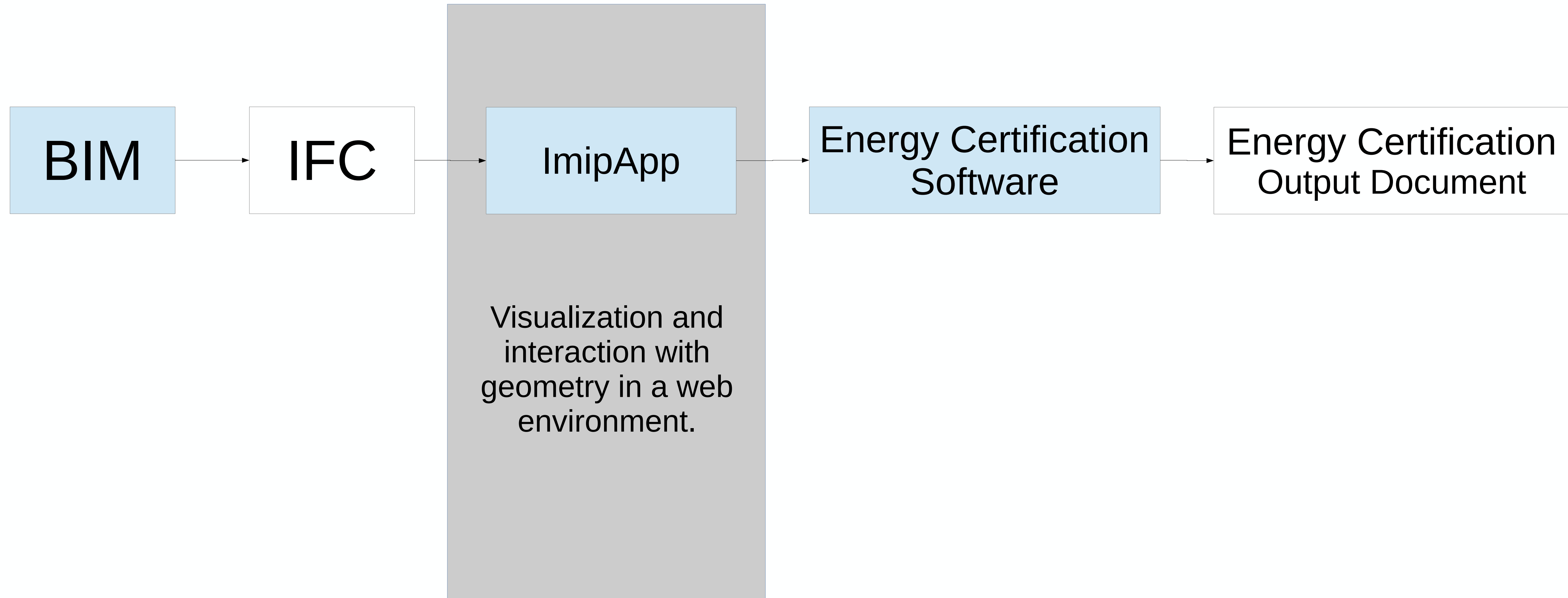


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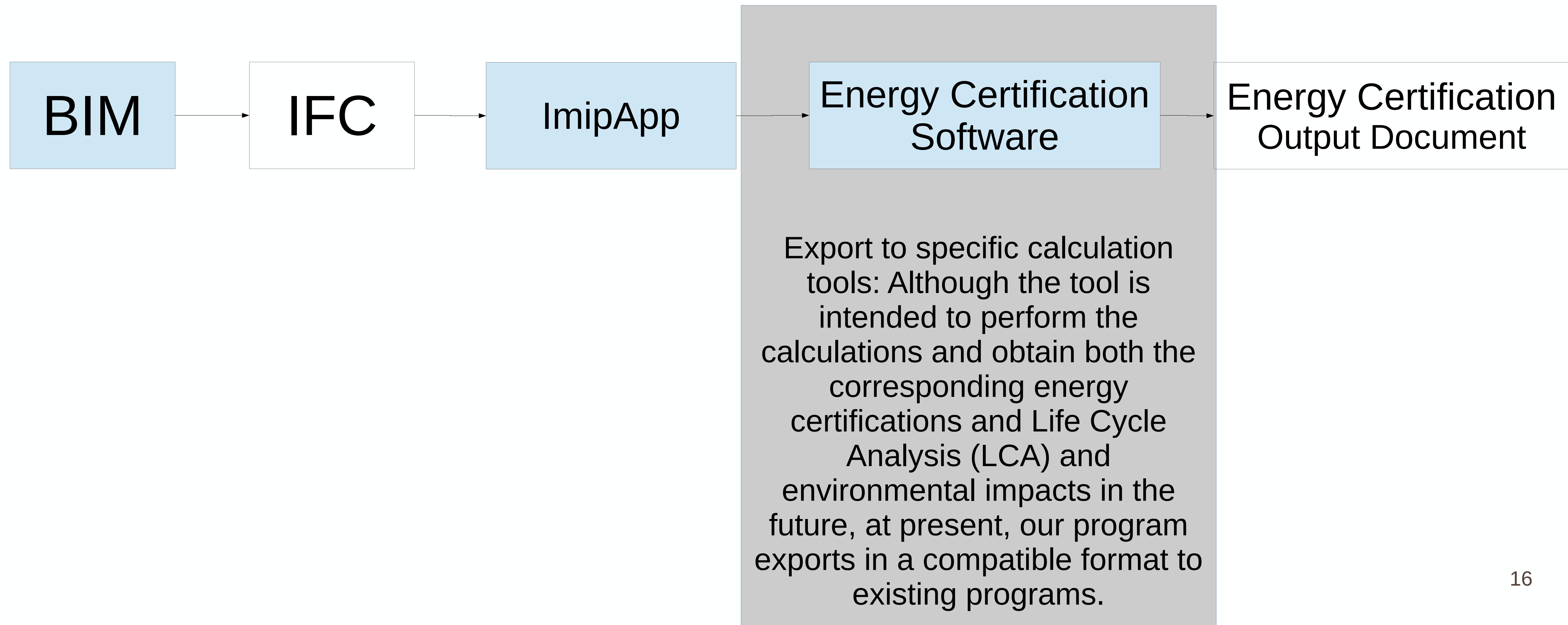


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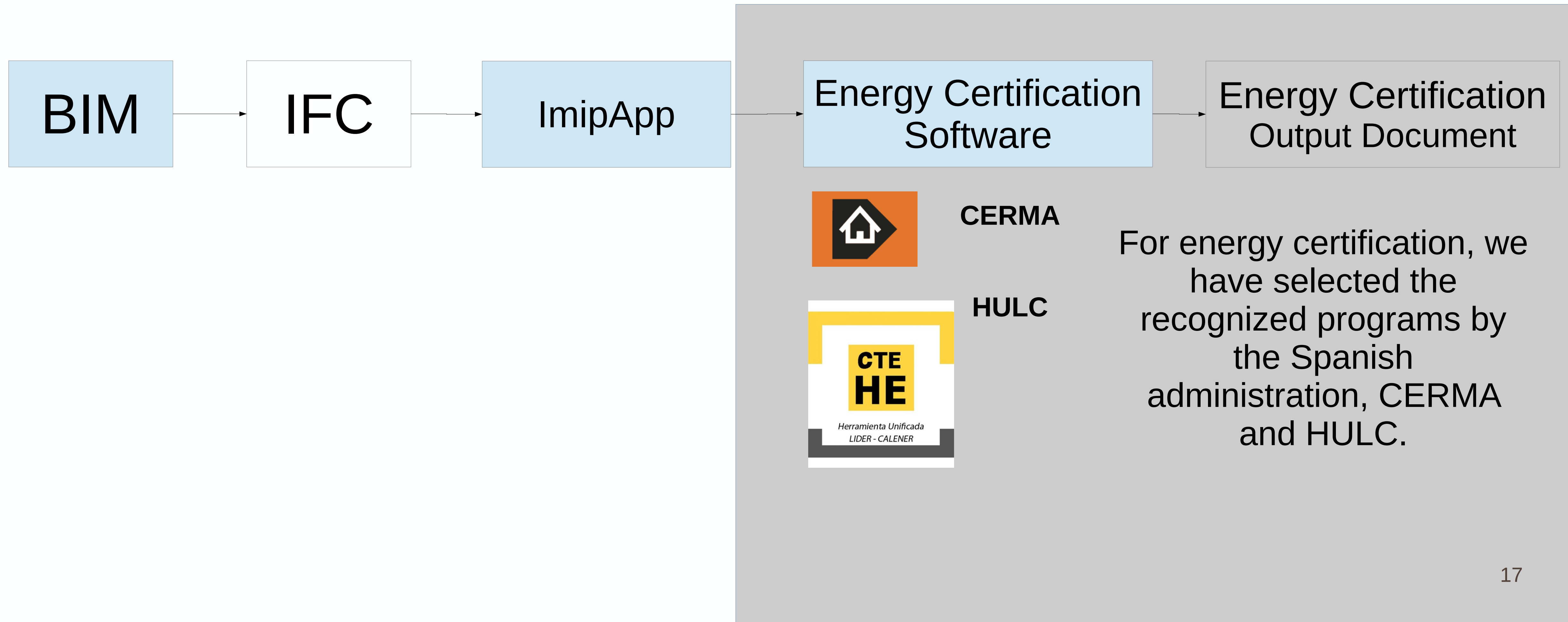


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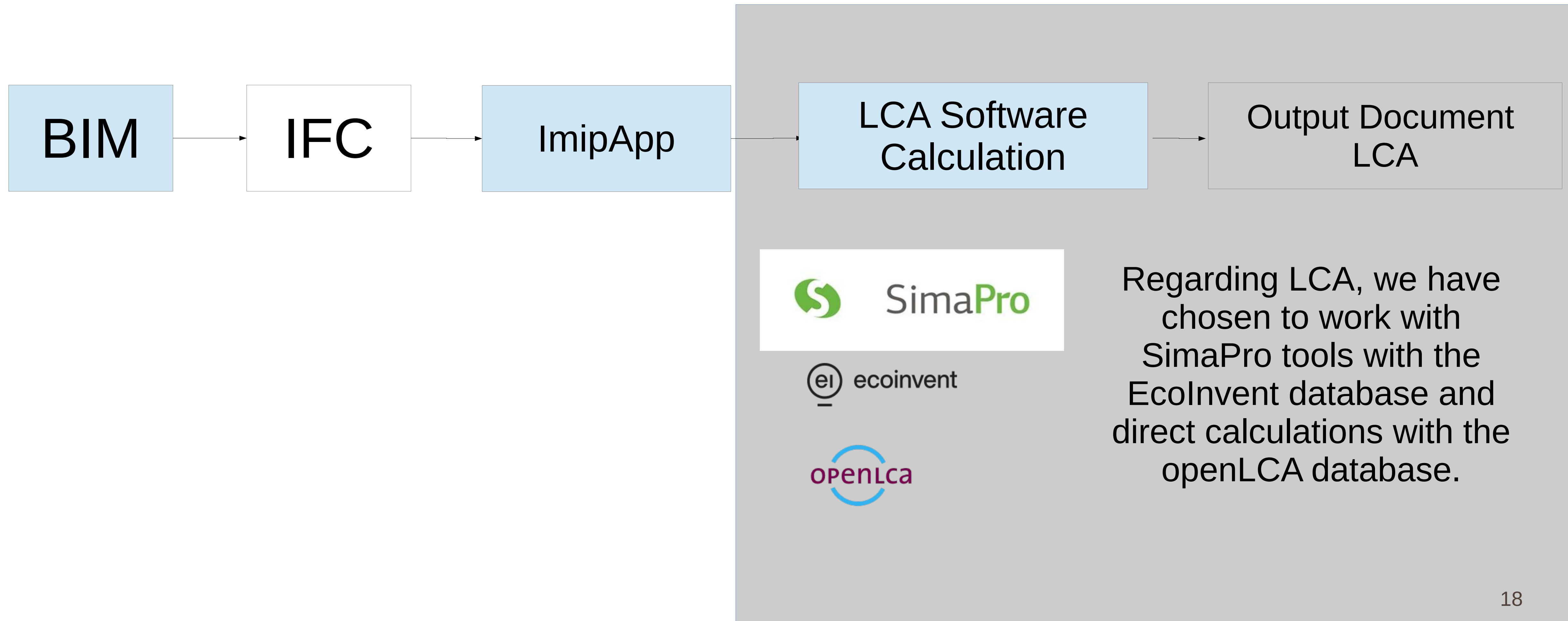


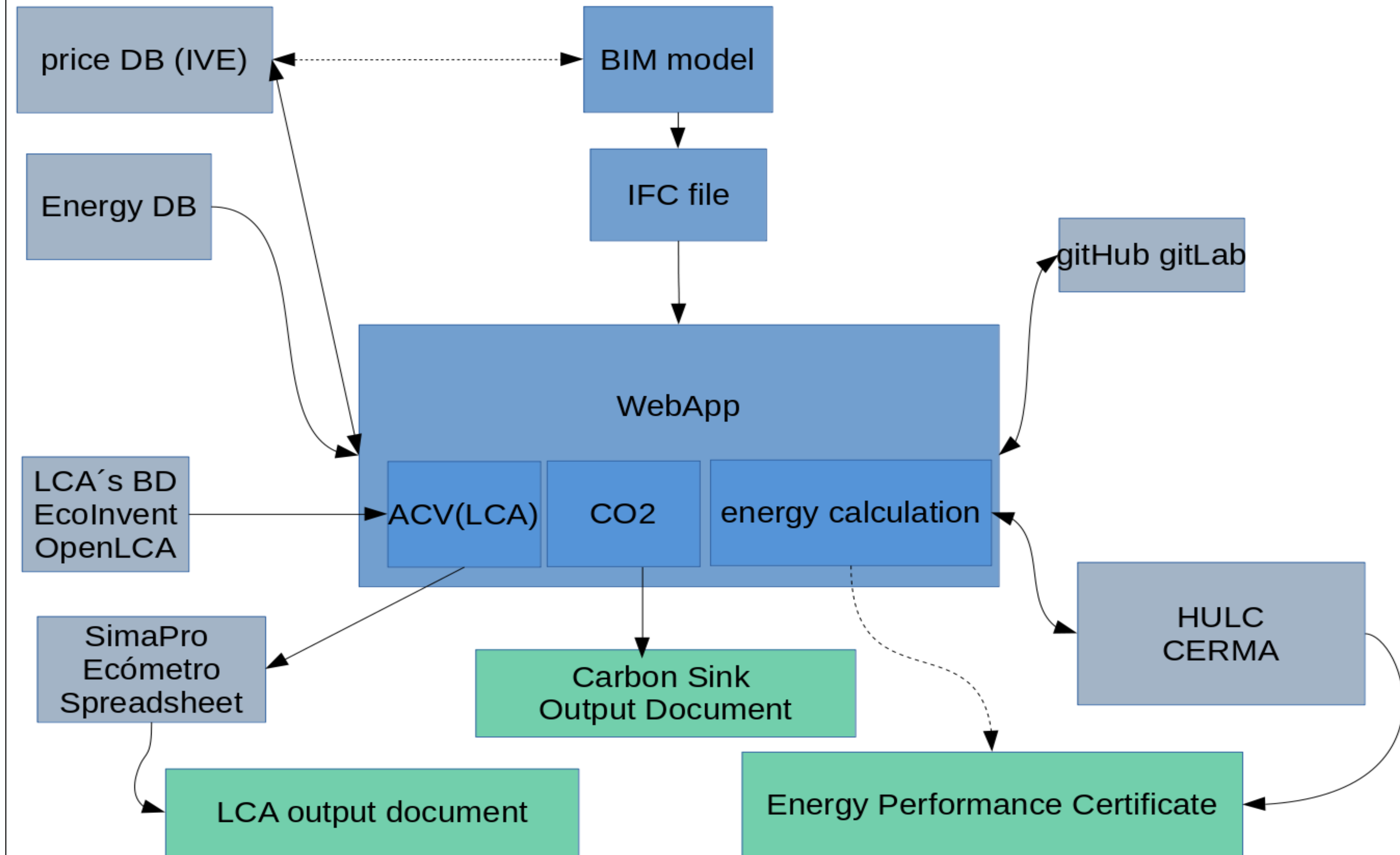


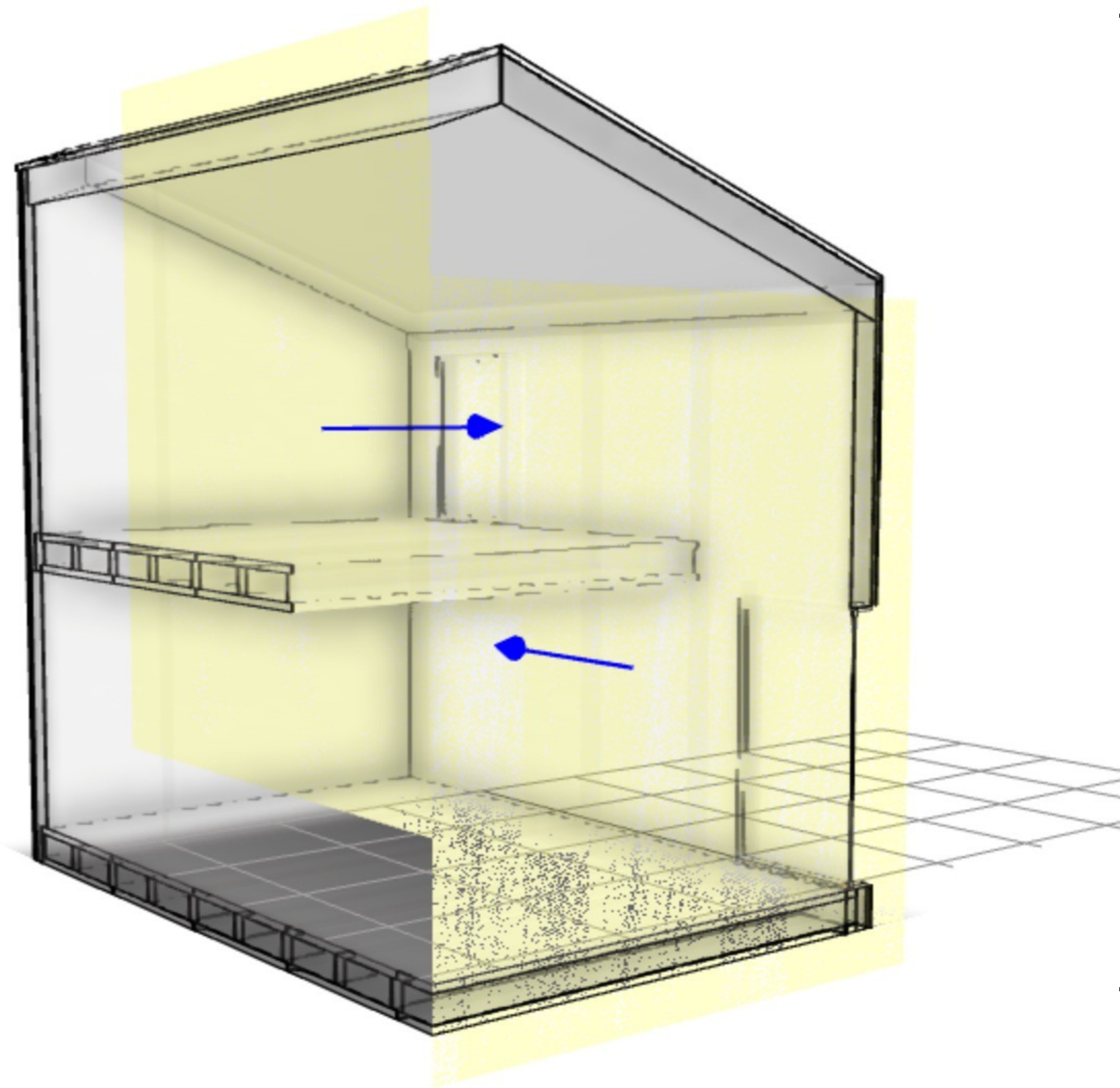
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Rather than the creation of a fully finished and usable function, the main focus of this section of the IMIP project is to establish a solid foundation for the development of a future universal, accessible, pedagogical, and integrated project with BIM tools, that can help professionals improve the energy efficiency and reduce the environmental impact of buildings with very high energy efficiency and minimum impact. With the additional purpose of obtaining support from both the administration and the university, providing an alternative to proprietary solutions.



imipApp. Development version 2023.04.16 <http://sifaresol.net/imipapp/>

imipApp. (stable versión) 2022.12.05 <https://imipapp.five.es/>

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Thank you