Third Call
Guide for Applicants

Grant Agreement No.	873087
Project Name	Smart Human Oriented Platform for Connected Factories (SHOP4CF)

Project web address:	https://www.shop4cf.eu/
Call title:	SHOP4CF 3° CALL
Call publication date:	1 September 2022, 08:00 CET
Proposal submission deadline:	31 October 2022, 23:59 CET
Proposal submission platform:	https://opencalls.shop4cf.eu/call/shop4cf-third-call
Target groups:	Single or a team of established entities (i.e., formally registered with local authorities) at the time of the application. At least one of the partners needs to be an SME.
Duration of participation:	8 months, 1 Feb 2023 – 30 Sep 2023
Total Call budget:	1.200.000€, target: ~12 proposals selected
Maximum budget per experiment:	100.000€ per experiment (Lump sum, equity-free, max 60.000€ per partner or single applicant)
Funding rate:	100% (non-profit), 70% (for-profit)
Keywords:	Modular automation solutions, Lean System Integration, Robotics, Augmented Reality, Visual Quality Checks, Human-Centered Production
More information:	www.shop4cf.eu

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1. Introduction to SHOP4CF

SHOP4CF (**S**mart **H**uman **O**riented **P**latform for **C**onnected **F**actories) is an EU-funded project within the eighth framework program Horizon 2020 that aims to create a unique infrastructure for the convenient deployment of human-centric industrial applications.

SHOP4CF believes that people should not be replaced by automated process but can gain new relevance through usage of their individual abilities within the factory. Therefore, new technologies need to be human-centric.

In the project, 20 partners develop a comprehensive software platform that already hosts a wide range of different software modules (referred to as components) that cover a broad spectrum of industrial requirements and functionalities in the context of modern, flexible, and data-rich manufacturing. Apart from the core consortium that submitted the original SHOP4CF proposal, the project is looking for additional members during the project runtime through several open calls.

Another outcome of SHOP4CF is the development of a new set of rules, which will address novel aspects of human-robot collaboration such as privacy, security, protection, legal aspects, or data ownership.

SHOP4CF aims to build a holistic ecosystem that fosters communication, collaboration, knowledge, and technology transfer in a community that includes SMEs, large corporates, universities, research institutes and system integrators.

The intended non-classical approach of SHOP4CF involves the human as an essential part.

The consortium of SHOP4CF is united by the vision of a platform that significantly increases the level of automation to maintain the competitive edge of the European manufacturing sector. Open calls are the best chance for interested organisations to join the SHOP4CF community and to become part of this vision.

The SHOP4CF consortium creates a platform providing human-centric modular components for the manufacturing industry that can be deployed with minimal effort for the end-user. In this context, the prevailing terminology in SHOP4CF is as follows:

- **Marketplace**: Hosting modular components and providing information regarding use-cases, license models (there are free and commercial components).
- **Architecture**: Ensuring coherence and interoperability of the SHOP4CF components. The architecture provides a common template for concrete systems designed for use-cases, open-call projects, etc.
- **Components**: Components can be seen as sub solutions to confined tasks. For instance, a use-case comprising a work cell usually consists of several components, each providing specific functionality. The general interfaces of the components targeted in SHOP4CF are supposed to ensure convenient integration and cross-industry usability.
- **use-cases**: pilots that comprise a set of components.

2. Scope of SHOP4CF Third Call

The Third Call of SHOP4CF's scope is to establish use-cases that solve real challenges in a manufacturing environment and improve human safety and well-being at work.

These challenges should be focused on supporting humans in their work and improving working conditions by:

- Automating monotonous laborious work and/or
- Increasing human productivity and safety with a focus on well-being at work

Proposed use-cases based on a set of modular software components (with optional hardware) **should have a clear positive impact on human work on a shop floor** by considering the following viewpoints:

- What is the main relevant human-related issue to be solved or improved?
- What kind of human-technology interaction does the use-case introduce?
- Which are the most relevant workers or workers groups that are affected by the use-case implementation?
- How will the use-case improve the competitive position of the organisation?

Experiences from operations in industrial environments are intended to lead to valuable feedback for the SHOP4CF consortium. Moreover, the call is expected to expand the ecosystem of industrial corporates that will contribute to promoting the SHOP4CF vision by adding new technologies and appealing use-cases.

So far, a first set of pre-existing components developed by the initial project consortium exists. Note that new components and components extensions developed during the Third call must be uploaded to the SHOP4CF Marketplace (RAMP[i]).

A complete list of components and a short video of each of them can be found on the SHOP4CF website ([link](#)).

2.1   Main call details

- Total Call budget: €1.200.000
- Projects to fund: ~12 projects
- Duration of the projects: eight months, Feb 2023 - Sep 2023
- Target group: Integrators, manufacturing companies, developers. Application can be submitted by single applicants or teams (at least one must be a SME).
- Up to 100.000€ budget per experiment (Lump sum, equity-free, max 60.000€ per partner or single applicant) for covering the personnel expenses, costs of travel (including accommodation) and consumables.
- Funding rate:
  - 100% of their direct costs for-non profit institutions
  - 70% of their direct costs for-profit institutions
- Proposals must test their use cases in a manufacturing environment and show a high degree of feasibility, i.e. it should be possible to implement the solution within eight months fully.

Note that the industrial relevance of the use-case, the targeted technical maturity, and the proper consideration of human factors will be important criteria for the selection of the final proposals. For more details about the evaluation process, please check Section 6.

Financial support will not be awarded to individual legal entities that have already received €100.000 via open calls (Financial Support to Third Parties = FSTP = cascade funding) from H2020 I4MS (https://i4ms.eu/) and SAE (https://smartanythingeverywhere.eu/) projects.

3. General Conditions

3.1   General requirements for applicants

- A single organisation or a team of organisations can submit a proposal.
- All involved organisations need to be established entities (i.e., formally registered with local authorities) at the time of the application.
- At least one of the partners needs to be an SME[ii]

3.2   Technical requirements for applicants

The proposed solution can be based on newly proposed components, existing SHOP4CF components, or a mixture of them.

If the proposed solution is based on new components:

    a.   The components must implement the SHOP4CF architecture and the related data models.

    b.   The component must communicate through the FIWARE Context Broker (link).

    c.   The component must run in a Docker container, which must be uploaded later to RAMP as a Docker image (link).

    d.   The component is expected to be mainly a software solution, but optionally it can be coupled with hardware.

If the proposed solution is based on existing components:

    a.   The existing SHOP4CF components already comply with the technical requirements of SHOP4CF. The wrappers or extensions to the SHOP4CF components must not conflict and must comply with the requirements listed in point 1.

Applicants must comply with all the technical requirements listed above, according to the type of the proposed solution.

4. Benefits for Selected Projects

Selected projects will be supported by SHOP4CF with funding and mentoring during the eight months of development and implementation of their solutions.

4.1   Support & Monitoring

Two mentors from the core consortium will be assigned to each of the funded projects, including regular consulting of the experiments, continuously evaluating the results, and immediately introducing corrective actions if needed.

Moreover, a range of supporting activities will be offered:

- **Technology training and mentoring** to support the efficient deployment of use-cases and the development of the new components. This will include workshops focusing on the deployment of the framework and the integration of new components as well as component-specific training (e.g., in the form of webinars). Each funded experiment will be supported by a technical mentor during the 8 months of implementation.
- **Business coaching** to provide guidance on how to best present/advertise the new components/use-cases that are deployed on the SHOP4CF marketplace. Moreover, the individualised coaching will focus on supporting the companies in their expansion to new, previously unreachable markets.
- **Funding mentoring** to support the involved companies, especially the developers of new components, in acquiring follow-up funding and ensuring their long-term success. This will include the linking with corporates that may become the next big customers and thus the launch pads to further expansion.

The call will also reach out to a wider group of corporate users or solution providers with interest to support and "sponsor" the expansion of the SHOP4CF innovation ecosystem.

4.2   Funding

The total call budget is €1.200.000, 12 use-case projects are expected to be selected. Each use-case project will last for eight months (1 Feb 2023 – 30 Sep 2023).

A lump sum of max €100.000 will be granted to each use-case project for covering the personnel expenses, costs of travel (including accommodation) and consumables. Durable hardware can be made available as an "in-kind" contribution by the partners or by large corporate sponsors that wish to contribute to the use-case. Other types of expenses are not eligible for funding. The maximum amount may not exceed €60.000 for each partner or single applicant.

For non-profit organisations, 100% of their eligible costs will be refunded; for-profit organisations will be funded at a rate of 70%.

It is encouraged to include large corporate industries that support ("sponsor") the SME driven use-cases with (in-kind) contributions, e.g. through concrete technology (e.g., software components, robotics, augmented reality devices etc.), by making available test environments, interest in promoting the SHOP4CF digital market place and its components with their brand name, evaluating the impact of human-machine interaction of novel solutions or otherwise.

4.3   Payment Structure

- **M1 Start of the project**: pre-payment of 40% of the estimated costs

Successful applicants will receive 40% of the estimated costs as pre-payment after signing and submitting the Funding Agreement. The Funding Agreement template can be found in the SHOP4CF open call platform.

Further payments will be made upon reporting development, analysis and reporting of results, milestones, and deliverables, as specified in the respective Funding agreement with the coordinator of SHOP4CF. These accomplishments will be measured using Key Performance Indicators (KPIs, see sub-chapter 5.1) and the overall work status that are individually defined for each use-case project as a basis for the monitoring of the use-case experiment.

- **M4 Midterm**: interim payment of 40% of the estimated costs

The interim payment of 40% of the estimated costs will be made after the fourth month upon development, analysis and reporting of specific KPIs and overall work status, and approval of them on the M4 bi-monthly monitoring report.

- **M8 End of the project**: final instalment of 20% of the estimated costs

Thus, applicants can receive a maximum of 80% of the costs during the runtime of the project, while the final instalment will be paid at the end of the project, after evaluation and the approval of the project results by SHOP4CF consortium.

5. Proposal Submission

The proposal will be submitted via the SHOP4CF open call platform ([link](#)), where all supporting documentation will be available.

The applicants are required to:

- Enter the proposal information and partner data
- Complete the proposal application form
- Enter the requested budget information
- Submit the complete proposal

SHOP4CF partners will be available for one-on-one sparring sessions with potential applicants during the open call upon request. Requests will be collected through the "Contact us" form on SHOP4CF website ([link](#)).

The applicants can edit their proposal before the deadline; only the last version submitted will be considered for evaluation. It is the responsibility of the applicants to ensure timely submission.

Failure of timely submission of the proposal for any reason, including communication delays, will automatically lead to rejection of the proposal.

The time of receipt of the submission, as recorded by the submission system, will be authoritative.

Shortly after the submission of the proposal, an acknowledgement of receipt will be sent to the email address of the proposal's primary contact person registered on the platform. Sending an acknowledgement of receipt does not indicate that a proposal has been accepted as eligible for evaluation.

For any given proposal, the proposal primary contact person will act as the primary point of contact between the proposal partners and the SHOP4CF consortium. Upon receipt by SHOP4CF, proposals will be registered, and their contents entered a database to support the evaluation process. The proposals will be checked whether they fulfil the H2020 admissibility and eligibility criteria (link) in order to be retained for evaluation.

A proposal is admissible if:

- it was submitted via the official online submission system before the call deadline;
- it is written in English;
- it is complete, i.e. all the requested fields and attachments within the application have been completed;
- it is readable, accessible and printable;
- all the administrative forms were filled, including the requested budget.

A proposal is eligible if:

- its contents are in line with the topic of the call;
- it is submitted by eligible proposers (see general requirements)
- the proposing Partner Organisations are established in EU Member States or Horizon 2020 associated countries (link);
- the proposing Partners have the operational capacity to carry out the activities related to the main objective of the call;
- its project duration is in line with the 8 months' time frame defined in the call, 1 Feb 2023 – 30 Sep 2023.

In addition, the proposals must strictly adhere to the application form provided via the SHOP4CF open call platform, which defines sections and the overall length. Experts will be instructed to not consider extra material in the evaluation.

The SHOP4CF offers an email-based helpdesk system for applicants through the "Contact us" form on the project website (link). Applicants are encouraged to use this facility for any queries concerning the call and the submission.

With the proposal submission and the completion of the contact information, the applicants agree that partner(s) names, affiliations, and proposal titles of the successful proposals (only) will be announced on the SHOP4CF website.

5.1   Key Performance Indicators

All proposals are required to suggest a set of at least 5 technical KPIs to reach at M8 with a midterm expected status at M4. These KPIs will track the progress during the technology development or integration of the components in the use-case.

Furthermore, it is required that applicants declare an initial status of the KPIs at the beginning of M1, to compare them with the results at the end of the M4, in which the interim payment will be made, and at M8 for the final evaluation and final payment.

Relevance and appropriateness of proposed KPIs will be assessed during the evaluation of proposals by independent experts who will be asked to also evaluate the feasibility of the project in terms of time, scope, and ambition.

Dissemination and business KPIs will be set by SHOP4CF. Final KPIs will be negotiated during contract preparation and may be subject to fine-tuning.

For contract details, please read the SHOP4CF Third Call Funding agreement available on the open call platform.

6. Proposal Evaluation

All submitted proposals, fulfilling admissibility and eligibility criteria, will be assigned remotely via the open call platform to external evaluators, independent of the SHOP4CF consortium and without any conflict of interest with applicants. All evaluators will sign a declaration of confidentiality concerning the content of the proposals and the entire evaluation process. A declaration of absence of any conflicts of interest will be signed by evaluators as well.

Each proposal will be evaluated by at least two assigned evaluators with different expertise in the relevant technology field or the application area(s) and business development. In the case of substantial deviation between the individual evaluations, a third independent evaluator will evaluate the proposal.

6.1 SHOP4CF Third Call Evaluation process

Open call deadline	Evaluators' assignment and contracting	Kick-off meeting for Evaluators	Remote evaluation	Panel meeting	Communication of the selected use-cases
31 Oct 2022	01–11 Nov 2022	14-18 Nov 2022	21 Nov – 09 Dec 2022	12-16 Dec 2022	Within 30 days
Open call platform: https://opencalls.shop4cf.eu/call/shop4cf-third-call Helpdesk available: Contact us form on www.shop4cf.eu	Two evaluators assigned to each proposal. In case of substantial deviation in evaluators, a third evaluator will be assigned	Virtual meetings with the SHOP4CF consortium members and evaluators. Explanation of the evaluation procedure and the scope of the call.	21 Nov – 02 Dec: Individual evaluation of the assigned proposals via the open call platform. 05-09 Dec: Reaching consensus	Evaluators meet to calibrate the evaluations and reach the final ranking of the proposals. SHOP4CF Steering Committee will have the final decision on the selected use-cases.	SHOP4CF consortium will contact the selected use-cases to start the funding contracting discussions.

Table 1 SHOP4CF Third Call Evaluation Process

The proposal evaluation will be performed in two steps:

1. In the first step
   - Remotely via the open call platform, two evaluators will individually review each proposal according to the evaluation criteria (Table 2).
   - The evaluators will score each criterion below and give explanatory comments. Scores for each evaluation criterion are in the range of 1 to 5 (details are given in Table 3).
   - After individual evaluations, the evaluators will discuss the proposal via a consensus blog available in the open call platform and explicitly agree on the scores and comments for the remote evaluation, reaching the consensus.

- The outcome of the first evaluation step is a so-called consensus report for each proposal and a ranked list of proposals.
2. Second step
  - The consensus report will be the base for the panel meeting that is the second phase of the evaluation. In the panel meeting, evaluators will discuss each application and agree on a final ranking. SHOP4CF Steering Committee will have the final decision on the selected use-cases.
  - Within 30 days after the selection procedure, applicants will be informed whether their proposal was successful or not and receive the evaluation summary report.

Applicants are asked to carefully review the evaluation criteria to directly address the aspects that will be evaluated by the reviewers. The timeline may vary according to the call's needs.

Table 2: Proposal evaluation criteria

1. Technical Aspects	Reviewer comments	Score
Evaluate the **level of detail that the technical description** features. Please consider both the use-case description and the description of the new components. A high score implies that both parts are described in sufficient detail. *Please lower the score if the applicant did not answer this question in sufficient detail. Provide a brief comment on the score.*		__/5
Rate your **confidence that the described undertaking will be successful** in the given time frame and with the given funding. A high score reflects that the reviewer has no doubt that the desired project will be successful. *Please lower the score if the applicant did not answer this question in sufficient detail. Provide a brief comment on the score.*		__/5 (min. 3)
Do you expect **high-quality components** that have a good chance of being seamlessly reused as part of the SHOP4CF marketplace? A high score would indicate that the component is likely to be well implemented and can conveniently be reused/modified/extended. *Please lower the score if the applicant did not answer this question in sufficient detail. Provide a brief comment on the score.*		__/5 (min. 3)
Are the **available resources** in the form of experts and hardware appropriate for the execution of the planned project? *Please lower the score if the applicant did not answer this question in sufficient detail. Provide a brief comment on the score.*		__/5 (min. 3)
Are **human factors** sufficiently taken into account? Does the use-case lead to an improvement of working conditions for the worker? E.g., the substitution of human labour should reduce this score tremendously. *Please lower the score if the applicant did not answer this question in sufficient detail. Provide a brief comment on the score.*		__/5 (min. 3)
2. Expected Impact		
Rate the **overall level of innovation**. A high score indicates a challenge that cannot be solved by conventional solutions and demonstrates the unique features of the SHOP4CF platform: Human factors, advanced methodologies, and the modular concept. *Please lower the score if the applicant did not answer this question in sufficient detail. Provide a -brief comment on the score.*		__/5 (min. 3)
Assess the **relevance of the components** to be developed or extended within the proposed use-case. Are components envisioned that are sufficiently general to be reused? Are the components highly relevant for the community? A high score indicates a valuable addition to the SHOP4CF marketplace.		__/5 (min. 3)

Please lower the score if the applicant did not answer this question in sufficient detail. Provide a brief comment on the score.		
Are the **KPIs defined by the applicants appropriate**? Do the KPIs have a good balance between challenge and achievability? A high score would imply that the applicant sets the KPIs neither too low nor too high. *Please lower the score if the applicant did not answer this question in sufficient detail. Provide a brief comment on the score.*		__/5 (min. 3)
Rate the **impact of the solution on the manufacturing industry**. A high score refers to a high probability that both the use-case and the components have a good chance of attracting new companies to SHOP4CF. *Please lower the score if the applicant did not answer this question in sufficient detail. Provide a brief comment on the score.*		__/5 (min. 3)
Evaluate the potential for **commercial exploitation** of the use-case as well as the components. A high score indicates a high degree of sustainability beyond this open call. *Please lower the score if the applicant did not answer this question in sufficient detail. Provide a brief comment on the score.*		__/5
3. Work Plan Description		
Is the **implementation clearly described** with a respective work plan and schedule? A high score means that the applicant was able to provide the complete picture of the planned project. *Please lower the score if the applicant did not answer this question in sufficient detail. Provide a brief comment on the score.*		__/5
Have the **risks been adequately considered**? Are measures defined to circumvent these risks? A high score would indicate that the reviewer is confident that potential risks have been minimised or eliminated. *Please lower the score if the applicant did not answer this question in sufficient detail. Provide a brief comment on the score.*		__/5 (min. 3)
Are the **milestones and tasks defined by the applicants reasonable**? Do the milestones and tasks show a good balance between ambition and feasibility? A high score would imply that the applicant is neither setting the KPIs too low nor too high. *Please lower the score if the applicant did not answer this question in sufficient detail. Provide a brief comment on the score.*		__/5 (min. 3)
Evaluate the respective **competencies of the partner/s**. Are the specific role/s of the partner/s clearly defined? Do the experience/s of these partner/s cover most elements of the work plan? *Please lower the score if the applicant did not answer this question in sufficient detail. Provide a brief comment on the score.*		__/5 (min. 3)
Remarks		
Ethical implications and compliance with applicable international, EU and national law.		Essential

Scores	1. Technical Aspects Score:	___ /25 (min. 15, 60%)
	2. Expected Impact	___ /25 (min. 15, 60%)
	3. Work Plan Description	___ /20 (min. 12, 60%)
	Overall score:	___ /70 (min. 49, 70%)

Table 3: Proposal evaluation scores

0	Fails	The proposal fails to address the criterion or cannot be assessed due to missing or incomplete information.
1	Poor	The criterion is inadequately addressed, or there are serious inherent weaknesses.
2	Fair	The proposal broadly addresses the criterion, but there are significant weaknesses.
3	Good	The proposal addresses the criterion well, but a number of shortcomings are present.
4	Very good	The proposal addresses the criterion very well, but a small number of shortcomings are present.
5	Excellent	The proposal successfully addresses all relevant aspects of the criterion. Any shortcomings are minor.

7. SHOP4CF Third Call Timeline

	2022				2023								
Sept	**Oct**	**Nov**	**Dec**	**Jan**	M1	M2	M3	M4	M5	M6	M7	M8	M9
					Feb	**Mar**	**Apr**	**May**	**Jun**	**July**	**Aug**	**Sep**	**Oct**
Open Call		Evaluation, Selection and Contracting			**Implementation**								
Payments					40%				40% after approval of M4 KPIs and work status				20% after approval of M8 KPIs, work results and final report
Support					SHOP4CF mentors will regularly consult the experiments and evaluate the results every two months								
Evaluation						Bimonthly Evaluation		Bimonthly Evaluation		Bimonthly Evaluation		Final Evaluation	

Table 4 SHOP4CF Third Call Timeline

8. Redress procedure

Upon receiving the evaluation results, the applicants have two weeks to start the redress procedure by sending a complaint via the proposal submission platform (link). The request for redress can only be related to the evaluation process, admissibility, or eligibility checks.

Please note that the Redress Committee will not call into question the judgements made by qualified expert evaluators, nor will it take into consideration any new information or explanations not included in the original proposal. All requests for redress will be treated confidentially. An internal Redress Committee will examine requests for redress and recommend an appropriate course of action to the SHOP4CF Consortium.

9. How to Address Human Factors

The applicants are asked to address the effects on human work in the proposal.

- The use-case description should consider the following viewpoints:
  - What is the main relevant human-related issue to be solved or improved?
  - What kind of human-technology interaction does the use-case introduce?
  - Which are the most relevant workers or working groups that are affected by the use-case implementation?

- The proposal may also include initial descriptions on possible new work tasks and/or changes in work tasks after use-case implementation and what kind of new knowledge and competencies will possibly be needed.

The current SHOP4CF use-cases are expected to create an impact on specific human aspects such as communication, problem-solving, decision-making, physical/mental workload, learning/guidance, task adaptivity and human error.

These aspects can be utilised in the proposals, but they are not exclusive; the applicants are also encouraged to propose human-related matters to be improved based on their own relevant production and industrial needs.

The SHOP4CF project provides a design and evaluation framework with the human-centred design approach. This framework guides solution development so that specified topics related to human factors are considered throughout the project, from design to evaluation. The framework emphasises the human workers' personal experiences and evaluations on the new solutions and focuses especially on user experience, user acceptance, usefulness, usability, ergonomics, safety, and ethics. The chosen applicants will have access to the framework documents and related materials, such as questionnaires and guidance for user studies.

Please note that the consideration of effects on human work is a specific measure in the overall evaluation of applicants' proposals (see Section 6 for more details).

10. SHOP4CF Architectural Aspects

The SHOP4CF architecture is a framework architecture (reference architecture), i.e., a common template for concrete systems designed for use-cases, open-call projects, etc. An excerpt from the SHOP4CF architecture is provided in this section, and the full version is available on the open call platform (link).

In SHOP4CF, different aspects of the architectural design are considered:

- **Logical software architecture** – describes the functionality and the organisation of the software modules under design, i.e., SHOP4CF core components and, in the future, new components proposed by the applicants.

- **Logical platform architecture** – describes, from the functional perspective, the organisation of the underlying software and hardware, i.e., the technology assumed to be present to use the aforementioned software modules.

- **Data architecture** – describes the organisation of data, in the form of data models, exchanged among the software modules.

A concrete system implementing the SHOP4CF architecture is expected, respectively, to provide functionality organised in a specific way (software architecture), to use specific underlying technology (platform architecture), and to model information exchanged among software modules with specific data models (data architecture). Defining a usage scenario (or scenarios) for such a system is also highly encouraged.

The SHOP4CF architecture is not fixed and will be subject to further adjustments. If applicants find it necessary, they could propose their own extensions.

10.1 Logical software architecture

Manufacturing processes can be supported in their different phases: at the design of the processes, at their execution (i.e. actual product manufacturing), and at the further analysis of the execution. Moreover, processes can be supported at different manufacturing levels: at specific work cells (local level) and across work cells (global level).

The high-level logical view of the software in SHOP4CF is designed as a set of six subsystems supporting manufacturing processes in the three phases (design, execute, analyse) and at the two levels (global, local), as presented in Figure *1*. Each subsystem consists of a set of concrete software components.
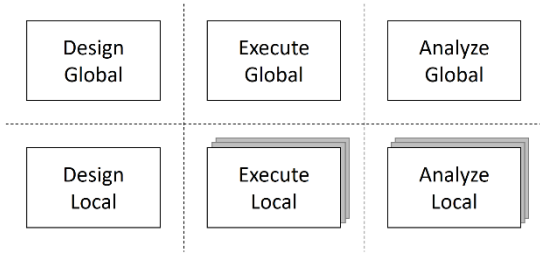

Figure 1: Top-level logical software architecture

A concrete system implementing the SHOP4CF architecture provides functionality that can be categorised into those phases and levels and uses a subset of existing software components.

The applicants are encouraged to design how the proposed functionalities map onto the logical software architecture to ensure their alignment with the SHOP4CF framework.

10.2 Logical platform architecture

The top-level organisation, from the functional perspective, of the underlying technology, is presented in Figure 2. The software modules under design (i.e. SHOP4CF components and, in the future, new components proposed by the applicants) use middleware for communication, may communicate with 3rd-party systems and IoT (preferably via the middleware), and run in containers (i.e. OS-level virtualisation).
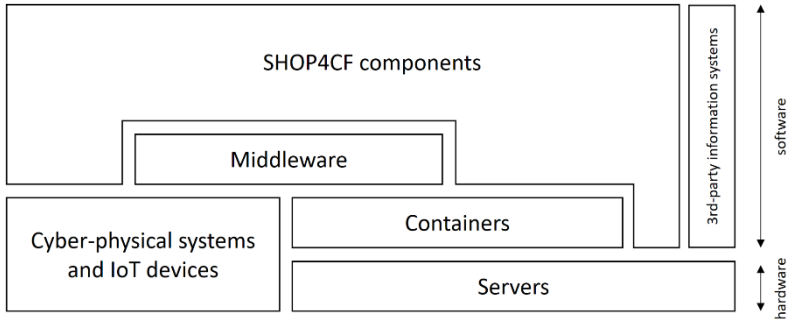

Figure 2: Top-level logical platform architecture

The adopted middleware is FIWARE. Orion-LD is the chosen implementation of the FIWARE Context Broker. All communication between software modules (components) should be realised via the FIWARE middleware. Only in case of hard real-time constraints for communication, two relevant components might have a direct communication channel (without FIWARE). Please note that not using FIWARE needs to be well justified.

The applicants are encouraged to design how the communication among components in their proposal would be realised (e.g., via the Context Broker or other approaches).

The chosen implementation of containers is Docker. Software modules should be provided as Docker images and run as containers (unless an alternative approach is justified, as for instance for mobile applications).

10.3   Data architecture

Usage of the uniform SHOP4CF data models increases the composability and interoperability of the software components, making the SHOP4CF framework easily adaptable to new scenarios. Thus, whenever software components exchange information, it should be modelled using the SHOP4CF data models.

Figure *3* presents the top-level overview defining the basic data models for factory locations, tangible resources (equipment, materials, human workers, etc.), alerts (exceptional situations), and tasks under execution together with their definitions. Please note this overview does not include all SHOP4CF data models.
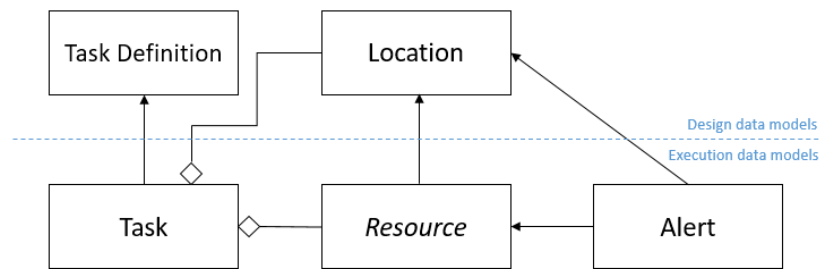

Figure 3: Top-level concept data models

In addition to those concept data models (definitions of entities and their interrelations), SHOP4CF defined example technical representation of some data entities in the FIWARE NGSI-LD format that is the adopted technical data format in SHOP4CF. The preliminary examples are available here.

The applicants are encouraged to identify which data models could represent the information to be communicated within their proposed systems.

11. Selection of Pre-Existing Components

As mentioned before, applicants can integrate pre-existing components into their use-cases. Every pre-existing component is implemented on the basis of the architectural requirements of the previous section and is tested either in lab conditions or in a real use-case.

A full list of components and a short video of each of them can be found on the SHOP4CF website (link)

12. Ethical issues

Research activities in Horizon 2020, and particularly in SHOP4CF, should respect fundamental ethical principles, particularly those outlined in "The European Code of Conduct for Research Integrity" (link). Therefore, questions about ethical issues are to be addressed in the proposal text, if ethical issues apply to an application experiment, before and during the runtime of the research activities within SHOP4CF, including the approval by the relevant committees and the compliance with the recent General Data Protection Regulation (GDPR, link).

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technologies to improve efficiency and productivity, and as a Technology Solution Provider you reach customers faster and enjoy access to a far larger market. Link to RAMP here.

[ii] At least one of the partners needs to be an SME (definition can be found here). Note that partners of the SHOP4CF consortium cannot apply to the calls. The European Commission's (EC) eligibility and financial rules apply to all sub-projects to be funded under this call and should be considered already at the proposal submission stage (details can be found here). In particular, the members of the applying teams must therefore be established in the EU Member States or Horizon 2020 Associated Countries (details can be found here). Successful applicants must possess a validated Participant Identification Code (PIC) (details can be found here). However, at the moment of submission, the entity can apply by using a provisional PIC.