

HALA!



[HALA! RESEARCH NETWORK: D.2.1. PHD MANAGEMENT PLAN]

Version 3.0

SESAR WP E
Theme 2: Toward Higher Levels of
Automation in ATM

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1 HALA!'S VISION

The main objective of HALA! is to build an efficient tool able to encourage the innovation and knowledge generation. Universities research conditions combine both a wide theoretical knowledge and a large research experience.

HALA! places PhD research at the core of its activities as a vital component in the achievement of its goals. Every two years HALA! shall ask participants to propose PhD projects on any topic in the area of 'Automation in Air Traffic Management' that will be funded by the Research Network.

HALA's vision in PhD. management is based on five basic initiatives:

1. Selection of the Best Research Topics in Automation, the most suitable PhD. supervisors and candidates
2. Guarantee of full involvement of PhDs in HALA! Network
3. Encouragement of innovation and knowledge generation.
4. Facilitation of mobility of PhD. students between universities belonging to HALA! Research Network and also between academia and companies.
5. Improvement of the results, avoiding:
 - PhD. taking longer than required
 - Less results than expected



Figure 1-1. Lisbon Strategy

HALA! will gather research and innovation in automation in ATM under a common research network to better exploit the European research potential. By offering better framework conditions for European ATM research, the plan is to create closer integration and organisation of the research and technology arenas. Through increased collaboration, the goal is to promote the best research.



2 RESEARCH TOPICS

The main research teams of HALA! will be described in the Review Paper document of the Research Network. The following sections summarize the initial research areas of HALA!:

2.1 OBJECTIVE 1: 4D TRAJECTORY MANAGEMENT

This objective consists of defining, prototyping and validating a common Trajectory Management and Prediction framework that covers the entire Business/Mission Trajectory lifecycle and takes into account all stakeholders involved (FOC, aircraft, ATM service providers, airports). This common Trajectory Management framework would need to be defined in close coordination with at least the SESAR Work Packages and should cover the transition path from the requirements imposed by SESAR to a full automated ATM system. Under this umbrella the following research topics are included:

- Trajectory modelling, description and computation
- Trajectory optimization
- Trajectory deconfliction
- Trajectory exchange and synchronization
- Aircraft performance modelling
- Intent generation algorithms, intent inferring, intent modelling
- Atmosphere modelling

2.2 OBJECTIVE 2: ADVANCED DSTS

This objective consists of defining, prototyping and validating advanced Decision Support Tools (DST) for airborne and ground systems that could support all the levels of automation envisaged in SESAR WP-E. These Advanced DSTs will need to rely in sophisticated trajectory-based applications that will make intensive use of the research done in Trajectory Prediction and Management within the Research Network. The following research topics can be included under this objective:

- Flight operations (mission planning)
- Advanced Arrival managers (AMAN), Departure Management (DMAN), Conflict Detection and Resolution (CD&R)
- Human Factors in ATM automation

2.3 OBJECTIVE 3: NETWORK CENTRIC ATM SERVICES

This objective consists of defining, prototyping and validating a new operational concept in where different ATM services are centralized. This approach would permit a high level of maintainability and reliability of the different ATM services that the different ATM users would



require. This operational concept will require the integration and intensive use of Advanced DSTs for the deployment of the appropriate ATM services. The following research topics can be included under this objective:

- Interaction protocols, information exchange formats
- Airborne and ground SWIM
- Integrated services for trajectory prediction, aircraft performances, weather acquisition, airlines preferences)
Systems

2.4 OBJECTIVE 4: UAS IN CONTROLLED AIRSPACE

This objective consists of defining, prototyping and validating a futuristic operational concept that considers the integration of UAS in a managed airspace under TBO. Operating within such airspace will most likely imply certain surveillance, communications and trajectory synchronization requirements to be fulfilled by the aircraft (both manned and unmanned), as well as certain required ATC automation capabilities (for example, to conduct centralized deconfliction). The UASs would be equipped with simulated Sense and Avoid capabilities that may or may not be based on the surveillance and trajectory exchange mechanisms required for operating within TBO airspace. The research in this field will take in consideration the research done in Advanced DSTs and ATM services conducted before. The following research topics can be included under this objective:

- UASs for civil applications (e.g., cargo applications, surveillance)
- Automated airborne systems (e.g., sense and avoid, automated separation assurance, UAS mission design)
- UAS Command and Control algorithms
- UASs for testing new operational concepts



3 ROLE OF THE PHDS IN THE HALA! NETWORK

As Innovation is a main objective of HALA!, Doctoral (PhD) level research, involving the participation of leading universities in collaboration with each other, and the ATM industry, are the heart of HALA!.

The PhD research projects will be focused in the research issues identified in the Review Paper produced by the HALA! Network.

In order to guarantee that the selected PhD topics are relevant for the Review Paper and that the HALA! PhD program offers the highest quality, the following management structure has been established within the Network (as it is described in the Network Management Plan):

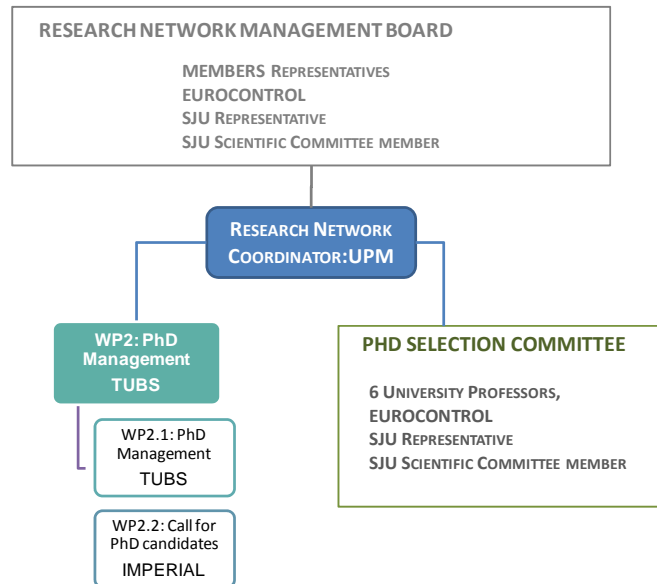


Figure 3-1 PhD Management Structure

- Work package 2.2. will prepare and launch the call for PhDs and will guide the PhD selection process.
- PhD Selection Committee will guarantee that the best PhD proposals are selected and that these proposals are consistent with the issues identified by the Review Paper of the HALA! Network.
- Work package 2.1. will ensure a high qualified and consistent management of all PhD thesis funded by the HALA! research network.
- Research Network Coordinator will coordinate the activities of WP 2 and of the PhD selection Committee. The coordinator will also be involved in the dissemination of the PhD results and will foster collaborative activities in order to involve other stakeholders in the PhD activities.



- Research Network Management Board (RNMB) is responsible for the definition of the strategy of the call for PhDs and other high level decisions (i.e. if the call is open or restricted to participants of HALA!).

Research and innovation from PhD activities are extremely important for getting a strong structure of the Network and crucial for boosting research activities and creating new knowledge in Automation Field.

PhD research activities are expected to lead to the elaboration of knowledge for workshops, to contribute to the improvement of the HALA Review Paper and to other activities performed within the Research Network. The PhD results may also become into inputs feeding other PhD researches. This way, knowledge and expertise relevant to ATM Automation will be progressively built.

In exchange, PhDs within HALA can expect:

- A high quality research experience and enhanced arrangements for supervision and mentorship.
- In addition to the traditional university supervision, PhD researchers will be guided by organizations who represent the ATM industry in order that the knowledge that is developed can be most efficiently translated into effective tools.
- Regular monitoring and support of the PhD progress.
- Yearly HALA conferences to enable to understand the projects of the other PhDs in the HALA network. These meeting will promote fruitful discussions and new ideas.
- Yearly joint conference with all the networks of WP-E, which will offer a new perspective on problems due to the different backgrounds.
- 1-week Summer school at the most prestigious European universities focus on a variety of automation topics ranging from the technical to the human as well as the integration between both and tailored towards the SESAR 2020 vision.

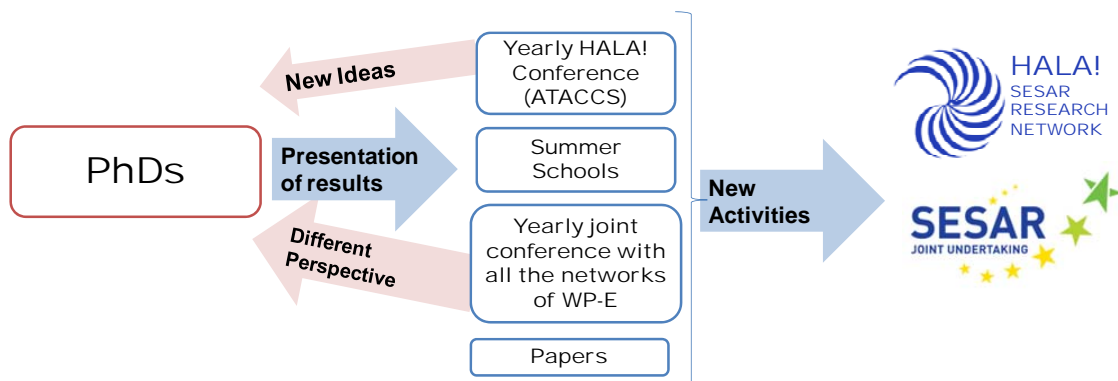


Figure 3-2. PhDs Activities



4 PHD SELECTION PROCESS

One of the main objectives of HALA! is to facilitate innovation, knowledge generation and application to address the challenges of future ATM. This is to be accomplished by the training of high quality research personnel through PhD programmes at leading European Universities with a proven track record of excellence in delivering high quality innovative research in the fields of automation and ATM. Universities have, over the years, engaged in cutting edge research and gained significant experience that are critical to the objectives of HALA! Furthermore, knowledge transfer has become an intrinsic part of University research involving direct links/interfacing with industry in order to facilitate uptake. This is recognised by HALA! by the involvement of the ATM industry. Therefore, the research programmes will be greatly enhanced in terms of relevance, technical innovation and application, by the close collaboration between the University and industry partners.

In order contribute to the creation of a critical mass, in Europe, of Doctoral level researchers and developers in ATM, the HALA! Network, will:

- issue three “calls for PhD proposals”. Therefore, Post-graduate students with an interest in automation in ATM will have the opportunity to join HALA! in either the First, Third or Fifth year of the 6-year period of HALA!. Clearly, in the case of the latter, the PhD students will complete their research beyond the lifetime of the Network (see the Section on Funding Principles below).
- The first call for PhD had been launched in September 2010, with a selection of 6 PhD topics started in spring 2011.
- The second was opened in June 2011, and PhD’s started in the first quarter of 2012.
- Third call will be opened in April 10th with an intended start of the PhD’s at the end of the summer of 2014.

4.1 HALA! PHD SELECTION COMMITTEE

As it is described in the D.1.0 Network Management Plan of HALA!, WP 2 PhD Management will support HALA! coordinator in the management of the PhD selection process.

In order to ensure that the PhD selection process is robust and fair, a PhD Selection Committee has been established for the evaluation of applications for HALA! PhD scholarships.

The HALA! PhD Selection Committee is comprised of nine members:



- 6 Professors, one each from the University members of the HALA! network;
- 1 representative from EUROCONTROL WP-E programme Management team;
- 1 representative from the SESAR Joint Undertaking (SJU) and
- 1 representative from the SJU Scientific Committee.

The Selection of the individuals to the Selection Committee will be on the basis of the alignment of their expertise and experience to the Calls. Members will be required to declare any conflict of interest in advance of any of the assessment panel meetings to ensure that the process is robust and fair.

4.2 FUNDING PRINCIPLES

In the first two calls, the contribution to financing a PhD student was limited to 35.000€ per year, and for a maximum of 2 years of the PhD programme. In this third call, the funding is limited to a total amount of 34,560€. The rest of the funding required should be sought from other sources including the Universities responding to the Calls, industry (including those in HALA!), Non-Governmental Organizations (NGOs) and other entities.

It is a mandatory requirement that funding is guaranteed for the whole duration of the PhD. Therefore, evidence of co-funding must be included in the proposal submitted by any University wishing to host a PhD student.

4.3 CALL PROCEDURE

Each call will implement a two-stage process to award the funds to support PhD research (See Figure 3-1).

Step 1.

1. The call for PhDs is announced on the HALA! website and mailshots sent to those registered on the site. The requirements, process and closing date are outlined. The First call was "limited" to the Members and Participants of HALA!, while the second was "open" for all interested universities within Europe and the third is open to any university, research centre or company that wants to contribute to the objectives of HALA! .
2. Interested Universities, Research Centers or Companies submit PhD proposals (max. 4 pages) to the HALA! PhD Selection Committee. A maximum of three pages should be used for the Technical Case for Support and one for justification of resources, including co-funding arrangements. The Technical



Case should clearly articulate the objectives/goals, novel/innovative aspects of the proposal, relevance/alignment to the aims and objectives of HALA!, in relation to automation in ATM, and potential impact. It should also contain a brief description of the characteristics of the ideal PhD student to undertake the research. Proposals may involve co-applicants from more than one entity.

3. The PhD Selection Committee selects the projects based on a number of criteria, including:
 - Overall scientific merit of the proposal, including level of risk and potential impact.
 - Alignment of the proposal to the aims and objectives of HALA! (HALA! Review Paper will be available soon, meanwhile a short version can be found in Annex B).
 - Availability of the relevant facilities at the University.
 - The profile and track record of the Supervisor(s), including any co-supervisors from non-University members.
 - Exploitation of the relevant varied expertise within HALA!, both in academia and industry.
 - The requirements for mobility, if any, for the chosen PhD candidate.
 - Co-funding (see below).
 - Co-supervision arrangements, including with non-University members and participants.

All Members of HALA! will conduct a survey to assess the technical value of the proposals. This survey will be used to create a ranking.

This ranking will be provided to the PhD Selection Committee to support decision making.

Table 4-1 shows the survey items and the weights of each mark. The sums of the weighted marks generate a relative ranking of the PhD proposals under examination.

	MARK (0-10)	WEIGHT (100%)
Supervisor		10%
Institution (Host university)		10%
Aims and objectives of the Research		20%
Relevance to HALA! Network (Review Paper)		20%
Validity and innovation of methodology		15%
Funding Conditions		20%
Mobility		5%

Table 4-1 Survey items



4. Once the PhD. Selection Committee has selected the proposal(s), the successful Universities are informed. The search and selection process for the PhD student (Step 2 below) is then be invoked.

Step 2.

The successful hosts Universities are responsible for recruiting their PhD student(s).

The HALA! PhD Selection Committee will review the CVs of the selected PhD candidates in order to ensure that they fulfill the requirements described in section 4.4.

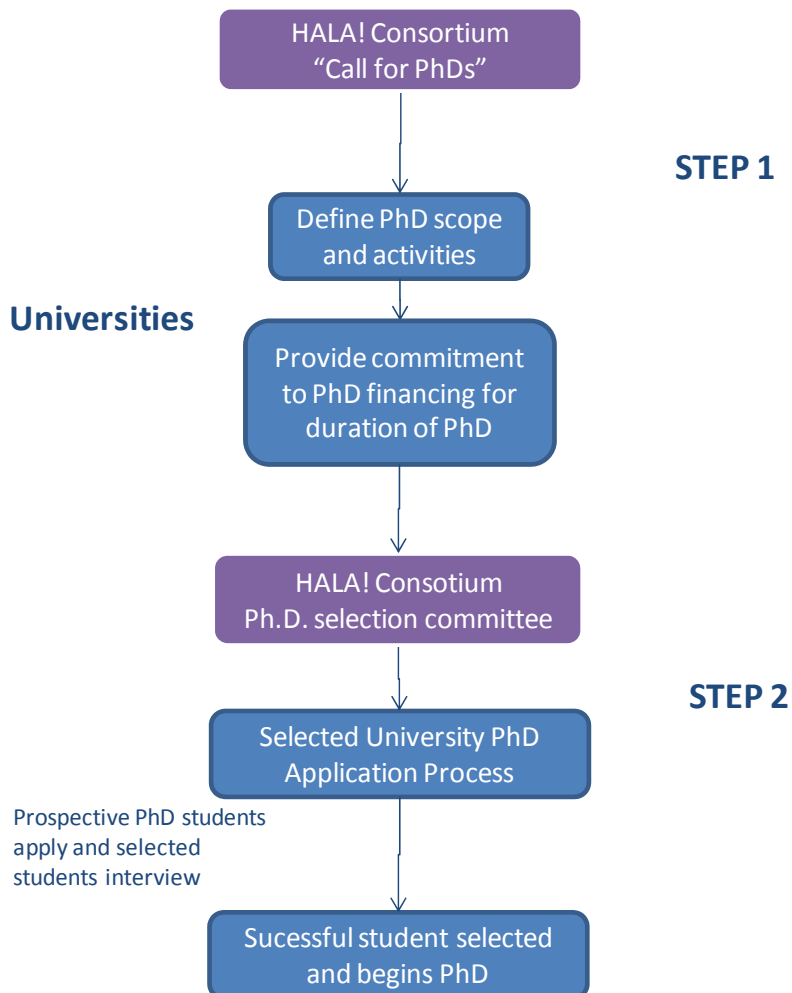


Figure 4-1. The Two-Step PhD Selection Process

4.3.1 IMPORTANT DATES OF THE FIRST CALL FOR PHDS

The first call for PhDs had been launched in 2010, with the work of the selected PhD's started in spring 2011. More details about the



work of the PhD students can be found on the HALA! website (see www.hala-sesar.net).

4.3.2 IMPORTANT DATES OF THE SECOND CALL FOR PHDS

The second call for PhDs was open to any university, research centre or company that wants to contribute to the objectives of HALA!. Research organizations in all relevant fields of research will not have to be participants of HALA! to submit their proposals.

Second Call for PhD proposals

- Opening date: 15th of June 2011.
- Closing date: 5th of September 2011.

Announcement of the results of the Second Call for PhD proposals.

- 7th of October 2011.

Announcement of the results of the Candidate selection process.

- January 2012

Start date for the second cohort of PhD programme.

- 1st Quarter 2012.

4.3.3 IMPORTANT DATES OF THE THIRD CALL FOR PHDS

The third call for PhDs will be open to any university, research centre or company that wants to contribute to the objectives of HALA!. Research organizations in all relevant fields of research will not have to be participants of HALA! to submit their proposals.

- Opening date: 10th of April 2014
- Closing date: 9th of May 2014.

Announcement of the results of the Third Call for PhD proposals.

- 23 of May 2014.

Announcement of the results of the Candidate selection process.

- Summer 2014. Before end of August 2014

Start date for the third cohort of PhD programme.

- September 2014.

4.4 PHD PROFILE



The hosting university will be in charge of the selection of the PhD candidate. However, there are some common requirements that have to be accomplished by all the PhDs candidates:

- Strong educational background and outstanding intellectual capabilities
- Has a working oral & written knowledge of English
- Possesses the ability to engage in high quality research
- Clear motivation to become a scholar in automation in ATM
- Possesses personal characteristics required of an international academic career.
- Active participation in the International Summer Schools

Students interested in joining a HALA! will have the possibility of sending their CVs online using the web page. The members and participants of HALA! will have full access to this CV database in order to find a best candidate for their PhD proposal.

4.5 RESEARCH INSTITUTION PROFILE

The PhD supervisor should have advanced scientific credentials, and the knowledge and experience to supervise the proposed research. There should be specialists on the research team, or collaborative agreements with others entities participating in the HALA! consortium to ensure that all aspects of the research will be completed.

The proposing research institution should have a proven record of organizing and managing scientific research programs. The place of the research in the institution's organizational structure should be described also.



5 THE PHD MANAGEMENT

The principles of the PhD monitoring within HALA! will be put together in a “HALA! mentoring code”. This mentoring code will adhere the definitions of the participants (i.e. PhD candidate, PhD manager, HALA! research network) as well as their respective responsibilities. The HALA! mentoring code will finally define the way how the progress of each PhD theses will be monitored.

An essential basic understanding must be developed between the HALA! research network and the University where the PhD candidate is conducting his or her work. The funding of a PhD thesis by the HALA! network will be limited to a period of 2 years maximum. During this funding period the PhD supervisor should be prepared to work in close cooperation with the HALA! research network to allow the best results.

Figure 5-1 is displaying the PhD management and controlling process.

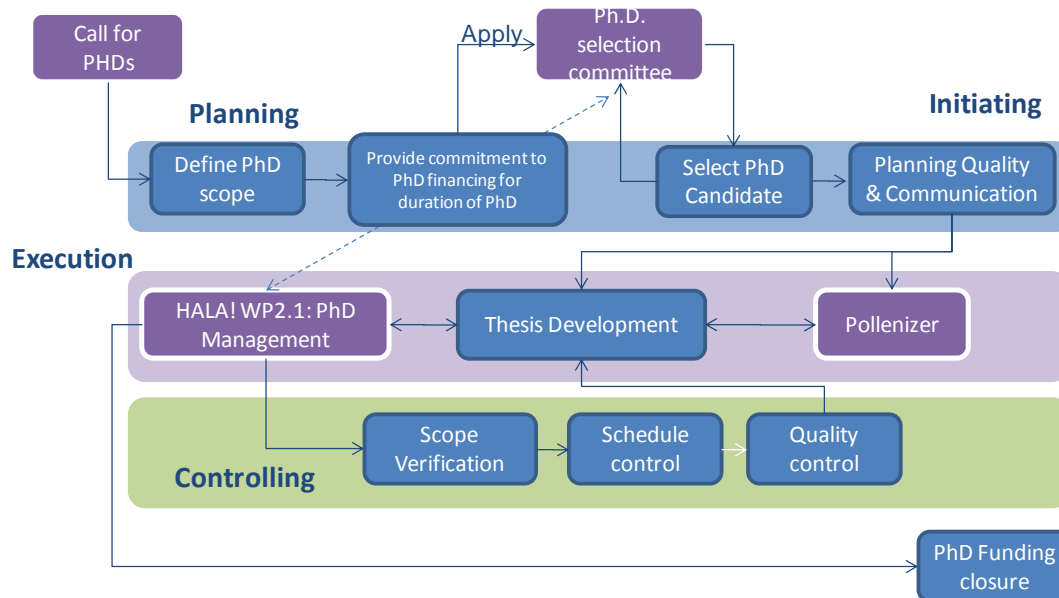


Figure 5-1 PhD. management and controlling

The following chapters will describe the controlling process and the contents of the HALA! mentoring code in more detail.

5.1 THE HALA! MENTORING CODE

The HALA! mentoring code ensures a high qualified and consistent management of all PhD thesis funded by the HALA! research network. It gives a guideline for the PhD candidate, the PhD. supervisor as well as the HALA! management team.



5.1.1 THE PHD MANAGEMENT ROLES

There are different levels of responsibilities and duties. These can be subdivided into the PhD team, located at the university or doctoral school the PhD will take place, the PhD management and the PhD sponsors.

The duties and responsibilities of each party will be described in the following chapters.

5.1.1.1 PHD TEAM

The PhD team consists of the PhD candidate and the PhD supervisor (e.g. a professor of the hosting university).

The PhD thesis will be defined by the hosting university. The PhD selection process has already been specified before. When a PhD thesis has been selected by the HALA! research network to be funded, a detailed work plan including the scope of the thesis, a timeline for the two-year-period and required milestones have to be prepared by the PhD candidate and the PhD supervisor.

5.1.1.2 PHD MANAGEMENT TEAM

The PhD management team consists of the PhD supervisor and one expert of the HALA! research network. The management team will be named at the kick-off of the respecting PhD. thesis.

The HALA! research network will ensure that one person will be responsible for a dedicated PhD thesis. A deputy will be named to act as a substitute in urgent cases.

The PhD management team has to review the progress reports to assure the quality of the work. The publications shall be reviewed by at least one of the members of the PhD management team.

The PhD management team will acknowledge the work plan of the PhD team and is responsible for delivering the progress reports and publications in accordance to the timeline described in section 4.1.2.

5.1.1.3 HALA! WP 2

WP 2 will monitor the progress of the PhD thesis in order to identify any drift from the directions the PhD Management team has set out. WP 2, in coordination with the Network coordinator, will also assess the contribution of each of the PhDs to the network and decide if any corrective action is required.

HALA! WP 2 will be assisted by the PhD selection Committee when it is required.

HALA! WP 2.1 is responsible for the internal approval process and for consultation with the PhD Program Committee if required. WP 2 and



the HALA! coordinator are also responsible for the final submission to EUROCONTROL and SJU.

5.1.1.4 PHD SPONSORS

In the first two calls, the PhDs were co-financed during the 2-year-funding period by the hosting university and the HALA! research network. As stated in chapter 4, a mandatory requirement was that the financing of the thesis be ensured by the hosting university for the whole duration of the thesis beyond the 2-year funding period of the HALA! research network.

A similar process will occur for this third call.

5.1.2 HOW HALA! WILL MONITOR THE PROCESS

An essential part of the HALA! research network is to ensure the quality of each funded PhD thesis in a consistent way. Therefore the following principles of monitoring the process shall be used by the PhD management team.

5.1.2.1 RESEARCH INDICATORS AND MEASURES

The progress will be monitored with key elements progress reports and publications.

- Draft Research Draft (T0+3 months)
- Internal progress reports

The PhD candidate has to deliver a short progress report every 6 month, covering the achievements of the last reporting period, the work to be performed in the upcoming 6 month and any major milestone that has been reached. In addition a literature review will be provided after 9 months.

- 1st Progress report (T0+6 months)
- Literature Review (30 pages) (T0+9 months)
- 2^ot Progress report (T0+12 months)
- 3^{er} Progress report (T0+18 months)
- 4th Progress report (T0+24 months)

For the first call for PhD proposals the progress reports should be delivered even beyond the termination of the funding. This is to ensure the continuation of the thesis in terms of HALA's vision on higher automation levels in ATM. For the second call the progress reports should be continued at least until the termination of the HALA! network.



- Publications
The PhD candidate shall participate at the yearly HALA! conference (ATACCS) with a presentation of the work.

PhD student shall submit a presentation/Paper to the annual joint network event.
- Peer-review publication (T0+24 months)
The PhD candidate shall publish at least one peer-reviewed publication during the funding period. This can be either a journal publication or a presentation with proceedings at an acknowledged scientific conference. Whilst in this third call the funding is for a total amount, rather than 2-years of funding, the same requirement for publication remains.
- Thesis (T0+48 months)

In addition the PhD supervisor will produce a management report every year:

- 1st Progress report by supervisor (management report) (T0+12 months)
- 2^o Progress report by supervisor (management report) (T0+24 months)

The following table summarizes all the PhD deliverables:

<i>ID</i>	<i>Deliverable</i>	<i>Due date</i>
D1	Draft research plan	T0+3
D2	1 st Progress report by student (technical report)	T0+6
D3	Research plan	T0+9
D4	Literature Review (30 pages)	T0+9
D5	1 st Progress report by supervisor (management report)	T0+12
D6	2 nd Progress report by student (technical report)	T0+12
D7	3 rd Progress report by student (technical report)	T0+18
D8	Article in peer-reviewed journal or conference	T0+24
D9	4 th Progress report by student (technical report)	T0+24
D10	2 nd Progress report by supervisor (management report)	T0+24
D11	Thesis	T0+48



Whilst in this third call the funding is for partial period of a PhD only relevant deliverables will be selected to be funded.

5.1.2.2 BOARD OF INDEPENDENT EXPERTS

The PhD selection committee will provide guidance to find independent experts which can be approached for assistance.



6 INTERNATIONAL SUMMER SCHOOLS

The HALA! Network will organise a 1-week Summer school orientated towards PhD. candidates and researchers around a variety of automation topics ranging from the technical to the human as well as the integration between both and tailored towards the SESAR 2020 vision. The Invitations will be sent to members, participants and the broader ATM/industrial/academic community.

The courses will be a unique opportunity to learn and share experiences and knowledge with experts of recognised prestige in their area of activity.

These courses are organized by UPM¹ as part of their summer courses that are held every July in La Granja de San Ildefonso (Segovia). The accommodation and meals of the PhD. candidates will be supported by the Organization of the Summer Courses of UPM.

¹ <http://www.upm.es/institucional/Estudiantes/CursosVerano>



7 TYPOLOGY AND FORMAT OF THE THESIS

The full report of the PhD. thesis must be written in English.

If the thesis is not finish within the funding period then a short version of the thesis should be in a format ready for submission to an international journal.



8 AWARD OF TITLES AND DEGREES

The title and degree will be the one the candidate will get from their university / doctoral school.

However, HALA! will negotiate with SESAR SJU to create a SESAR-PhD certificate.

The SESAR-PhD certificate would be complementary to the local PhD degree obtained from the student's home university, and would be in no way in collision with national regulations and would represent an added-value to a national PhD degree.

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