



Call for Proposals for the Fifth Tender of *PROGRESS*

PROGRESS, the successful Dutch research programme on Embedded Systems & Software, which is supported by EZ, NWO and STW, hereby calls upon academic researchers in the Netherlands to submit new project proposals.

Aiming at a direct link between public research centres and the industrial world, PROGRESS projects should have at least one industrial partner that participates substantially in the research, both financially and technically.

From the fourth call onwards, PROGRESS research is "theme-oriented". The themes are based on the PROGRESS Embedded Systems Roadmap 2002-2011, published in 2002. The themes of the present call are:

- *Architecture, design and construction of Dependable Systems*
- *Methods and constructs to support design for dependability*

Information on the tender (such as submission dates, etc.) can be found in the accompanying memo and on the PROGRESS website <http://www.stw.nl/progress>.

PROGRESS Office,

Utrecht, July 20, 2004





Call for Proposals for the Fifth Tender of **PROGRESS**

Summary

The PROGRESS research programme calls upon academic researchers in the Netherlands to submit project proposals in the field of embedded systems. In this document the requirements for the proposals can be found. For general information on the PROGRESS programme and the embedded systems research in the Netherlands we also refer to the PROGRESS website or the PROGRESS office.

According to the PROGRESS formula each project must have at least one industrial partner that participates significantly in the research, both technically and financially. In this and subsequent tenders the subjects of PROGRESS research are "theme-oriented". This orientation is based on the PROGRESS Embedded Systems Roadmap 2002-2011, originally published in 2002. Every call has two themes: a system oriented one and a design-methodological one. As several respected research institutes, like UC Berkeley, CMU, and IBM York Town, have already done, PROGRESS likes to start a research tender on "dependable system design" (note the ambiguity!).

Therefore, we have chosen the following two themes for our fifth tender

- *Architecture, design and construction of Dependable Systems*
- *Methods and constructs to support design for dependability*

The remainder of this document (including annexes) contains general and specific information concerning the fifth tender.

Introduction

The first phase of PROGRESS can be described as one in which the Dutch research field of Embedded Systems was tested for its spirit and capacity to take part in an ambitious academic-industrial research programme. The second phase will be characterised by an increased technical-scientific ambition and a diligence to close the indicated gaps in the research field. Both ambitions originate from the Embedded Systems Roadmap. This document is available from the website <http://www.stw.nl/progress/ESroadmap/index.html>. The Roadmap clearly indicates that the current technical-scientific ambitions provide solutions up to the year 2005 - 2006. The ambitions of the fifth tender should definitely reach until 2010 - 2012 and anticipate concepts such as 0.06 micron VLSI technology, system intelligence, ubiquitous systems availability, heterogeneous networks (both with regard to components and to communication), service-level protocols, etc. PROGRESS will take a clear step towards systems and methods that offer solutions for the time frame 2009 - 2010.

Apart from research grants, PROGRESS will provide additional facilities, in particular an embedded systems based research ambience with sufficient and diverse communication between the research groups (the PROGRESS embedded systems network), the annual PROGRESS symposium, support for further use of research results within education and research (outreach), etc.



Who can apply for a grant?

Project proposals can be submitted by professors (full, associate or assistant) with a permanent position at one of the Dutch universities. The research must be pre-competitive and the point of gravity therefore lies within the university. If the applicant has a part-time appointment, the daily supervisor of the project employees must be indicated in the proposal. Proposals can also be submitted by permanent scientific staff of research institutes that are mainly financed by the Ministry of Science (OC&W).

These institutes are:

- ◆ *CWI* *Centrum voor Wiskunde en Informatica*
- ◆ *Amolf* *FOM Instituut voor Atoom- en Molecuulfysica*
- ◆ *FOM Instituut voor Plasmafysica Rijnhuizen*
- ◆ *KVI* *Kernfysisch Versneller Instituut*
- ◆ *NIKHEF* *Nationaal Instituut voor Kernfysica en Hoge Energiefysica*
- ◆ *ASTRON* *Stichting Astronomisch Onderzoek in Nederland*
- ◆ *SRON* *Stichting Ruimte Onderzoek in Nederland.*

What can be requested?

PROGRESS accepts the following cost categories for a project:

- ◆ *temporary assignments to a maximum of four years full-time employment*
- ◆ *goods, small instruments and appliances, domestic travel*
- ◆ *foreign travel*
- ◆ *investments in equipment.*

What is excluded from requesting?

- ◆ *costs of general courses and PhD-education*
- ◆ *costs concerning the infrastructure such as workplace, office articles, secretary support, depreciation*
- ◆ *workshop costs, unless a project draws disproportionately on the capacity of the workshop*
- ◆ *costs of publications or books, page charges*
- ◆ *computing costs; these can be requested if necessary at the NWO foundation national computer facilities (NCF) in The Hague*
- ◆ *advertisement costs; for this separate facilities are available.*

The institution(s) of the applicant(s) ensure(s) the required infrastructure, the supervision and fitting into the research programme of the research institute. PROGRESS may verify this with the Dean or the Executive Board of the institute.

The expertise required for the research must be available at the requesting institute(s), so that external consultants will not be necessary. If one co-operates with institutes that cannot apply for PROGRESS funds, for example TNO or a foreign university, these parties take care of their own funding.

How to apply for a grant

PROGRESS has a two-phase approach to project selection: a project outline and a full project proposal.



The project outline

The project outline serves two purposes: small initial effort and short response time. Based on this project outline researchers are either invited by the programme committee (PC) to submit a full project proposal, or not. Further information can be found in Annex 1.

The project outlines must be submitted to the PROGRESS office, preferably by e-mail.

Proposals that do not fit the rules or the programme are rejected or referred to another financier (e.g. the STW Open Technology Programme).

The full project proposal

Full project proposals will be presented to a number of expert referees for comments. Referees are members of the scientific field of the applicants as well as proposed users of the intended results. Their comments will be sent to the applicants for response. Together with the proposal, the comments and responses form the protocol that serves the prioritisation of the proposals. The PROGRESS Programme Committee will perform this prioritisation.

Tender period and treatment duration

The submission of PROGRESS research proposals is a two-step procedure: the project outline and the full project proposal. For this tender, the following time schedule is used:

July 2004	Publication Call for Proposals (PROGRESS)
August 31, 2004	Deadline for submission of project outlines (applicants)
September 23, 2004	Decision of PROGRESS PC on project outlines (PROGRESS)
November 23, 2004	Deadline for submission of full project proposals (applicants)
January 23, 2005	Referees' comments sent to applicants for response (PROGRESS)
February 6, 2005	Deadline for submission of response to the referees' comments (applicants)
February 13, 2005	Full project proposals plus protocols sent to PC for judgement (PROGRESS)
March 24, 2005	Deadline for returning marks on FPPs (PC)
March 31, 2005	PC meeting with discussion on the marks and order of the FPPs and formulation of the decision advice for granting
April 15, 2005	SG meeting with decision on granting of full project proposals

For further information you can contact:

PROGRESS Office
Technology Foundation STW
Dr.ir. F.A. Karelse
Phone 030 – 6001 268,
Email: progress@stw.nl
WWW: <http://www.stw.nl/progress>

Appendices

- Annex 1: The project outline
- Annex 2: The project proposal step by step



- Annex 3: Assessment and selection criteria
- Annex 4: Assessment and selection procedure
- Annex 5: Utilisation
- Annex 6: Procedure after granting
- Annex 7: Themes for the fifth tender of PROGRESS



Annex 1. The project outline

The project outline couples small initial effort to short response time. Based on the project outline the programme committee (PC) may invite researchers to submit a full project proposal. Proposals that do not fit the programme are either rejected or referred to another financier (e.g. the STW Open Technology Programme). A Full Project Proposal (FPP) can only be sent in if a pre-proposal has been submitted with corresponding title, applicant(s) and outline, or if requested explicitly by the PC. The submission of an FPP based on a pre-proposal that was rejected or redirected to another programme is not allowed.

The project outline - which must not exceed 3 pages – should be written in English. The structure must be as follows:

1. Title or work title
2. Name and address of the applicant(s)
3. Fit within the themes of the fifth tender
4. Spearheads of the project: divided by percentage between theory, methodology, prototyping and utilisation activities
5. Expertise of the applying group and the objectives to increase their expertise
6. Name and address of the industrial partner(s) of the project, if possible the name of the contact within the company
7. Preliminary budget requirement (temporary staff and required financial resources)
8. Support and involvement of the industrial project partners to this research project (qualitatively and quantitatively)
9. Concise description of the planned research. At least a description should be given of the expected results and the implementation thereof in industry
10. References.

Upon receiving a project outline the PROGRESS office will review it on completeness. Complementary data may be asked for. Next the PROGRESS daily board (DB) will assess the outline on the following three criteria:

- i. How does the proposal fit within the themes of the fifth call of the PROGRESS research programme? (1-9)
- ii. To what extent are the project partners the suitable parties for this research? (1-9)
- iii. Is the industrial participation sufficient? To what extent is the suggested utilization of the expected research results realistic? (1-9)

Each DB member will give marks between 1 and 9 for these criteria to all proposals. The DB formulates a proposal for acceptance or refusal to the programme committee (PC). Unsatisfactory marks will be stipulated. The PC discusses all project outlines and marks. The PC will shortlist successful applicants and invite them to submit a full project proposal.

Directives on the industrial participation in projects can be found in the PROGRESS programme in section 5.1 on page 43 (<http://www.stw.nl/progress/programma/index.html>)



Annex 2. The full project proposal

A Full Project Proposal (FPP) can only be sent in if a pre-proposal has been submitted with corresponding title, applicant(s) and outline, or if requested explicitly by the Programme Committee (PC). The submission of an FPP based on a pre-proposal that was rejected or redirected to another programme is not allowed.

Format of the full proposal

The PROGRESS office receives your proposal preferably by e-mail in doc, pdf, or ps format.

- ◆ *Mention on the front page 'PROGRESS' in the upper left corner*
- ◆ *The maximum length is 12 (twelve) pages of A4*
- ◆ *The proposal is written in English.*

Administrative data

On maximally half a page you should provide:

- ◆ *Title. The title of the project has a maximum of 225 characters . For publicity purposes, a short, non-technical title is required as well.*
- ◆ *Name, address, phone number, fax number and e-mail address of the applicants and possible co-applicants and the telephone number of the secretary.*
- ◆ *Version number and revision date.*
- ◆ *PROGRESS sends the official correspondence to the main applicant. This is the first applicant mentioned. PROGRESS assumes the main applicant will have the supervision on the project. He or she becomes the project leader and bears the final responsibility for the execution of the research and the utilisation plan.*
- ◆ *Applications elsewhere. If support has been applied for elsewhere, you should give the status of this application at the time of submission to PROGRESS.*

The project description

1. Summaries

The summaries of your project should be clear to the general embedded systems community. At least the following subjects should be included:

Research

Summarise in half a page the context, problem statement, research method and expected results.

Utilisation

Summarise also in half a page the utilisation of the expected results. Provide everything the review committee must know about the utilisation: the chosen approach, the chosen partners and the way results will be brought into practice.

2. Composition of the group

The current group

Describe in half a page the composition of the team (academic and industrial) that will perform the research as well as the reason this team is fit for this research. Indicate the supervisors of the project, the proposed staff, and how the tasks will be divided. A bibliography should be given in section 7.



Available infrastructure

This information includes available laboratory room and equipment.

Candidate researchers

In case candidates for the proposed staff positions are already known, you mention them here. Give a short explanation of their suitability.

3. Scientific description

In this section of maximally four pages an expert in the field should find all information to assess the quality of the proposed research. Treat the following subjects:

Contents of the research

Provide the scientific objectives, the starting-points and the substance of the project. Describe the methods and techniques you will apply, the available knowledge in the team, the knowledge to be developed, and the instruments and models you will use for this.

Required personnel and equipment

Provide motivations for staff and equipment and possible other requirements for the research.

Time schedule and allocation of tasks

Describe the proposed course of the research over the years and how the different parts must interact. You give decision points (milestones) and moments research results are expected (deliverables). Further, you indicate which partner will perform which tasks.

After acceptance of a FPP the PROGRESS office will ask for a more detailed so called "project plan" which will complement the project contract with STW.

Connections with other research

Mention here similar research that is performed elsewhere, either in the Netherlands or in the rest of the world. Describe the relation with your own research and the contacts with these groups (or the plans to establish them).

Outreach plan

In the outreach plan you describe the transfer of knowledge resulting from the project to other target groups than the scientific community (partners and users). The outreach plan addresses e.g. students, scholars, technology-oriented people in industry, technology press, et cetera. The outreach is seen as an essential aspect of publicly-paid research and must be planned right from the start of the project. The PROGRESS public outreach officer Wim Hendriksen (ppoo@stw.nl) can assist in formulating and establishing the outreach plan.

4. Utilisation plan

The utilisation plan you give must be clear to people with only general knowledge of the application area. The plan does not exceed three pages. Address the following issues:

The challenge from the practice and the proposed solution

Your research will address concrete problems with not-yet-existing solutions. Indicate the industrial relevance of this problem and the impulse this research gives towards the solution. Indicate which steps you will take to bring the research results into actual practice. Provide details for assessment of the feasibility and the conditions for successful application.

The users committee

All PROGRESS projects have a "users committee". For further information on this you are referred to Annex 5 and to the PROGRESS website. Mention the contact persons from companies and organisations that already accepted invitations to join the users committee, or that are willing to co-operate in another relevant way to realise utilisation of results.



Past performance on utilisation

Indicate the past successes that the academic team achieved in bringing academic research results into industrial practice, in relation with PROGRESS or otherwise.

5. Contracts and patents

If there are any contracts relevant to the proposed research project, these should be mentioned here. Also provide patent search results, or the reason why such a search is not necessary for your proposal. Indicate if you have patents or running patent applications in the field of the research. This section takes maximally half a page.

6. Budget

In the main document you find a general explanation on which costs are considered for financing by PROGRESS and which are not. All amounts are without BTW (VAT). The length of this section is at maximum one page.

- ◆ **Personnel**
You can apply for temporary staff: PhD-students, post-docs or technicians. PROGRESS reimburses salary expenses and social charges. As a guideline the standard rates of STW for 2005 will be used (not known yet). Staff is appointed by the executive institution. The actual appointment is subject to prior written permission of the PROGRESS office. PROGRESS may withdraw a grant if vacancies are not filled within a year after granting.
- ◆ **Materials**
The costs of office and laboratory goods, small instruments and appliances must be specified here. Internal travel expenses of the project are also part of this budget.
- ◆ **External travel expenses**
These are costs for travel and subsistence for congress visits abroad for the project.
- ◆ **Investments**
These are costs for necessary equipment and other investments for the project.
- ◆ **Contributions of partners**
Provide financial and technical (staff and material) contributions that the partners bring to the project. After granting PROGRESS will invoice the financial contributions and add them to the corresponding credit of the project.
- ◆ **Overview of the total project costs**
Present a table with the planning of the staff appointments and the budgets per project year. Use the above mentioned headers. The partner contributions must be specified separately. The total project costs are the costs for PROGRESS as well as the contributions of the partners.

7. Literature

In maximally two pages list all relevant and publicly available publications of the participating parties of the proposal, as well as relevant publications of others.

8 Letters confirming the contributions by the partners of the project

Refer to enclosed confirmation letters of the competent partner authorities, officially stating their technical and financial contributions.

9. Key words, abbreviations and acronyms

Appendix. Potential referees

List four (inter-) nationally renowned referees that could review your proposal.

Appendix. Confirmation letters, see item 8.



Annex 3. Assessment and selection criteria

The following questions will be posed to people who will assess the mentioned quality aspects of a proposal.

1. Scientific quality & innovative power

- 1.1 How competent is the team to carry out this research successfully?
- 1.2 To what extent is the proposal original and/or innovative?
- 1.3 What is your opinion on the scientific research method proposed?
- 1.4 What is your opinion on the research time schedule?
- 1.5 What is your opinion on the available infrastructure?
- 1.6 What are your comments on the size and category competences of the requested staff?
- 1.7 What is your opinion on the budget requested for materials, investments and foreign travel?

2. Economic relevance, utilisation and participation

- 2.1 What is your opinion on the economic relevance of the problems at hand
- 2.2 What do you think of the application of results of the research team in the past?
- 2.2 How effective and realistic is the utilization plan, presupposing the research project is scientifically successful?
- 2.3 What aspects of the intended results may be turned into a patent? Do you expect that the research team will encounter existing patents that may obstruct the utilization?
- 2.4 Does the contribution of the partners and users to the research project meet their commercial or economical interest? If not, please motivate your answer.
- 2.5 Do you see applications in industry, society, technology or science that have not been described in the proposal?

3. Suitability within the PROGRESS programme

- 3.1 Does the proposed project fit the ambitions of the fifth tender of the PROGRESS programme. Do the project results comply with industrial needs of the period 2009 – 2011?
- 3.2 To which extent does the proposal fit each of the themes of the fifth tender of the PROGRESS program?
- 3.3 How does the proposal extend the embedded systems expertise in the Netherlands in general and in the partner and user groups in particular?
- 3.4 Indicate the main technical / scientific gaps to be filled by this proposal? Does the proposal address subjects and refer to gaps mentioned in the PROGRESS Embedded Systems Roadmap?



Annex 4. Assessment and selection procedure

Check of the project proposal by the PROGRESS office

The PROGRESS office confirms the receipt of every proposal. A general check is performed whether or not the proposal satisfies all requirements as mentioned in this document. In case of doubt the office will contact the applicant.

Review by referees

PROGRESS presents the proposal to a number of experts in the field of the proposal. These referees are from the scientific community, knowledge institutes and relevant industry. They will review the proposal on the basis of criteria for scientific quality, utilisation and fit within the programme and themes of the tender. These criteria are stated in Annex 3. Per project at least four referees will be asked for comments.

PROGRESS will combine the comments of the referees in a protocol. In the protocol it is not identifiable who made the individual comments. The applicant can make a substantiated request to exclude particular referees from the review procedure.

Reply by the applicants

The PROGRESS office will send the protocol to the main applicant requesting to react to the comments of the referees. The applicants should react to the protocol in a way it is clear to which comments they are referring. Moreover, they add possible project changes to the protocol in such a way that it is clear which comments have resulted in which changes in the proposal.

Assessment by the PROGRESS programme committee

The procedure consists of two rounds. In the first one the PC will give four marks for every project proposal: one for scientific quality, one for utilisation and two for the fit (one for both themes of the fifth tender). PC members may add clarifying comments to their marks. The PROGRESS office will list the averages, variances and comments per criterion for every proposal. The PC will discuss the outcome of the first round in a plenary session. After this discussion, the members of the PC may adjust their original scores individually in a second round. Based on the resulting order, the PC will formulate an advice for granting to the PROGRESS steering group (SG). The SG will make the final and official decision on the honouring of the projects. A more elaborate description of the assessment procedure is available at the PROGRESS office.

PROGRESS wants to grant the best proposals for both themes. Further, it leaves the possibility to grant an outstanding proposal, which does not fall within the themes of the tender. The granted project must fit the PROGRESS portfolio.

Possibility of appeal

The applicant can appeal against a decision of the steering group by sending an objection letter to the General Board of NWO within six weeks after the date of the granting or the rejection letter.



Annex 5. Utilisation

A very important aspect of the PROGRESS formula is the utilisation of the project results in industrial practice. Two mechanisms exist here: partners and users.

Partners

Partners are companies that participate actively in the project execution by means of financial or technical (material and/or staff) support. The contributions of the project partners are an integral part of the project and are stated explicitly in the project proposal. Confirmation letters of the partners are attached to the project proposal. Partner contributions are the main indication for the importance of the research to the partners and for their intention to utilise the results. Therefore partners are seen as users by definition.

Users

Users are interested persons or parties who are allowed to take knowledge of the progress and results of the research performed. They can be companies, authorities, research institutes, but also consumers or end-users. Users help to make sure that the research is performed as should be and to justify grants from the public sector. For protection of the intellectual properties of the partners it may be necessary for the users to sign a non-disclosure agreement.

The project proposal should mention potential users.

The users committee

PROGRESS research is funded partly from public resources. Therefore the granting organisations want a proper inspection of the progress and the effectiveness of the research. Moreover they demand that the knowledge from the research is transferred optimally to the embedded systems community. Therefore, PROGRESS demands for all research projects a Users Committee. Apart from partner representatives, this committee will consist of the users mentioned before and one representative of the programme committee. The users committee is composed in consultation with the project leader. Exclusion of users from the users committee is only possible on explicit, substantiated request of an (industrial) partner that delivers a significant contribution to the project.

The users committee will meet every half a year. The 'Taak en werkwijze van PROGRESS gebruikerscommissies' is downloadable and available from the PROGRESS office (presently only in Dutch).

Knowledge management

Knowledge management is the regulation of the property, the protection and the exploitation of knowledge. Starting point is that the partners share the property of the knowledge. Members of the users committee are first in line for gaining knowledge from the results of the research, but they have no rights to exploit or commercialise this knowledge. To gain such rights a "reasonable compensation" has to be provided.

A well-known and generally accepted measure for knowledge protection is the request for a temporary ban on the publication of particular results. This may be required for e.g. the submission of a patent.



Annex 6. Procedure after granting

During the course of a project the following procedures apply. Extensive information is available in the 'Aanwijzingen voor de projectleider'. This document will be enclosed in the letter awarding the grant. It is also available from the PROGRESS office.

Granting

The main applicant becomes the project leader, unless otherwise indicated in the project proposal. After granting, the project leader obtains a number of documents in which the legal and financial conditions are stated. The grant is available only after these documents have been signed and returned to the PROGRESS office.

Initially, the credits for materials, travel and investments are granted only for the first two years and the staff is granted only for the first three years. PROGRESS reserves the remaining budget for the "Request for project continuation" after two years.

Project plan and contract

After granting the project leader should write a project plan as an appendix to the proposal, containing a more elaborate planning and task scheduling. The project plan is a rolling forecast: At least once a year and whenever necessary the project plan is adapted to the situation. The next year is planned with most detail. The project plan is written together with the partners and is presented to PROGRESS as well as the users committee. Guidelines for the project plan are given in the 'Aanwijzingen voor de projectleider'.

The commitments of the project partners to the execution of the project as put forward in the project plan form a project contract between the partners and PROGRESS.

Start of the project

The credits are available from the moment that the abovementioned documents are received by PROGRESS. The start date of the project is the date of the appointment of the first staff member. Usually, this is not the date of granting.

Users committee en reporting

Approximately six months after the start of the project the users committee will meet for the first time. Hereafter, the committee will meet twice a year to discuss the progress. The users committee will receive all scientific publications for approval prior to publication. They will also receive all progress reports.

The project leader reports semi-annually on the progress of the research to the PROGRESS office. The representative of the programme committee reports to the programme committee on the progress of the project in terms of issues and recommendations.

Continuation of projects

For projects that last for three years or longer, the project leader must submit a continuation request one year and a half after the start of the project. To decide on the continuation PROGRESS will be advised by the PC representative in the users committee.

Termination

Termination of projects before the official final date is possible if the commitments are not fulfilled (anymore) or if the scientific quality of the research or utilisation is below the required level. In this case the PC representative in the users committee will propose the PC to withdraw the funds from the project.



Annex 7. Themes for the fifth tender of PROGRESS

In our professional and personal lives, we depend already heavily on (networked) embedded in-product hard-, soft- and other-ware. We expect these products to work, with little or no hassle, immediately, always and properly. Whenever we step into a car or undergo a medical examination, we depend on complex hardware / software systems and we expect them to be fully trustworthy.

These complex *Embedded Information Processing Systems* are co-operatively designed by experts, among which are domain specialists and engineers with several disciplines, like electrical, mechanical and software engineering. The embedded systems are multi-disciplinary by their very nature. Multi-disciplinarity, however, is not the only source of design problems. All kinds of strong and weak interactions between design objectives may lead to ill functioning systems. This is commonly referred to as the *dependability* aspect in embedded systems design. Dealing with dependability requires many innovations, new expertise, and quite some intelligence in people and systems. Evolving system complexity, for instance, is facing end-users with ever more questions about systems functionality and quality.

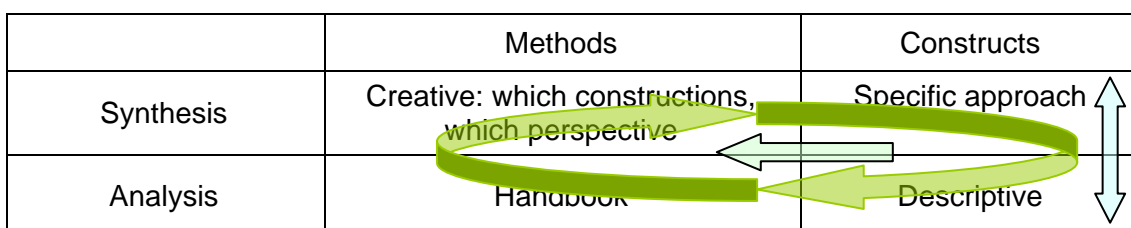
Interesting articles on dependability can be found e.g. on Philip Koopman's web site at <http://www.ece.cmu.edu/~koopman/index.html>.

As several respected research institutes, like UC Berkeley, CMU, and IBM York Town, have already done, PROGRESS likes to start a research tender on "dependable system design" (note the ambiguity!).

Therefore, we have chosen the following two themes for our fifth tender

- *Architecture, design and construction of Dependable Systems*
- *Methods and constructs to support design for dependability*

These themes are obviously related, like the two sides of the same coin. The first theme is rather in the synthesis / creative part of product engineering, taking an integral multi-disciplinary systems view, while the second theme covers more the analytical part, supporting design and validation of aspects of dependability. They should clearly be approached in parallel. In the following diagram we indicate the various concepts. The green arrows follow today's design practice where typically an



"artful" route is taken along the circular curve. Only availability of constructs leads to methods that help to select and use them. Academic approaches typically deal with problems and solutions in the rightmost column of the diagram, indicated by the blue arrow. By their very nature, universities remain rather typical and small sized in number of system aspects. One of the intentions of this tender is therefore to advocate industrial and academic co-operation towards a better understanding of the dependabilities, towards better quantitative models, and ways to turn available constructs into more generic methods (follow the horizontal blue arrow).



Dependable systems have to satisfy a number of distinct – mostly *conflicting* – (non-functional) properties that prevent them from working properly. Examples are availability, reliability, robustness, safety, usability and security. This set is domain specific, and may even change over time. Traditionally these properties have been dealt with in isolation. In cases where multiple properties are important, the system designer is left with the burden of combining constructs and aspects that were not developed for integration into one *coherent* design. It is often unclear to what extent the different properties interfere and which tradeoffs have to or can be made to achieve appropriate solutions.

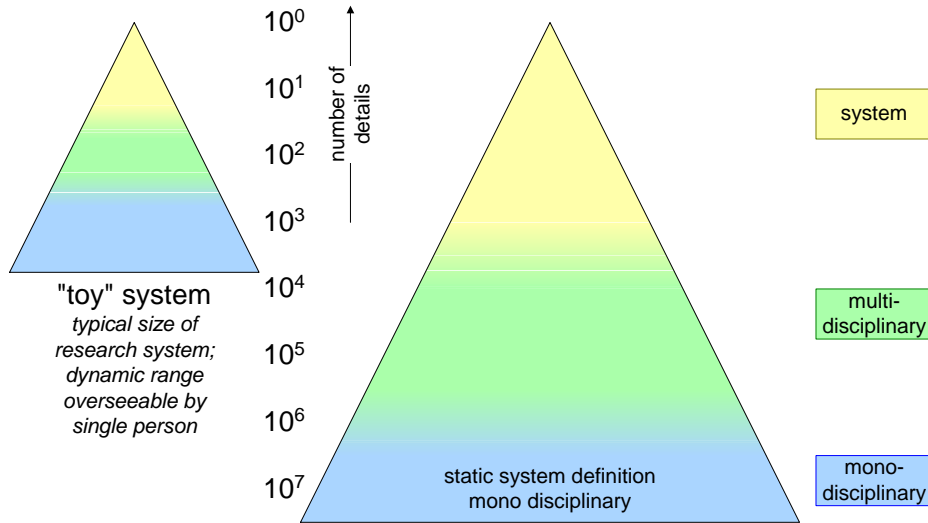
Here follow aspects of research that will be taken very seriously by the Program Committee during the selection procedure of this tender. Clarity in these aspects is therefore important. The figures at the end of this annex may help to understand our ideas.

1. Dependability problems are an industrial threat (to come). Universities can very well investigate the fundamentals of these problems in an industrial context (i.e. in a PROGRESS context), but not on university scale systems.
2. Dependability research should clarify two main aspects: an *application carrier* (which may be smaller than a complete application domain) and a *complex of tensions* (the actual research challenges, given the carrier).
3. Tensions and trade-offs can be of different nature. We have encountered tensions between requirements within an application domain, tensions between the design and implementation disciplines, and tensions between application requirements and implementation constructs.
4. The industrial partner(s) will indicate both the carrier and the tensions as a threat for their products' futures. They will provide, moreover, the necessary information for a fundamental research approach on these products.
5. The proposal will identify a *main tension field* as well at least one other (*secondary tension field*) that underlies the industrial dependability problem. Most of these tensions will be outside the range of almost-functional tensions like speed and power (that may be boundary conditions, however).
6. To safeguard a fundamental and more generic approach to this mostly industrial problem, the research has to elaborate on the expected impact of the application (from hypothesis to evaluation) on the system itself and on the user community.
7. The proposal will have at least two university partners with established expertises in the identified tension fields. They are sufficiently different to provide a truly multidisciplinary team.

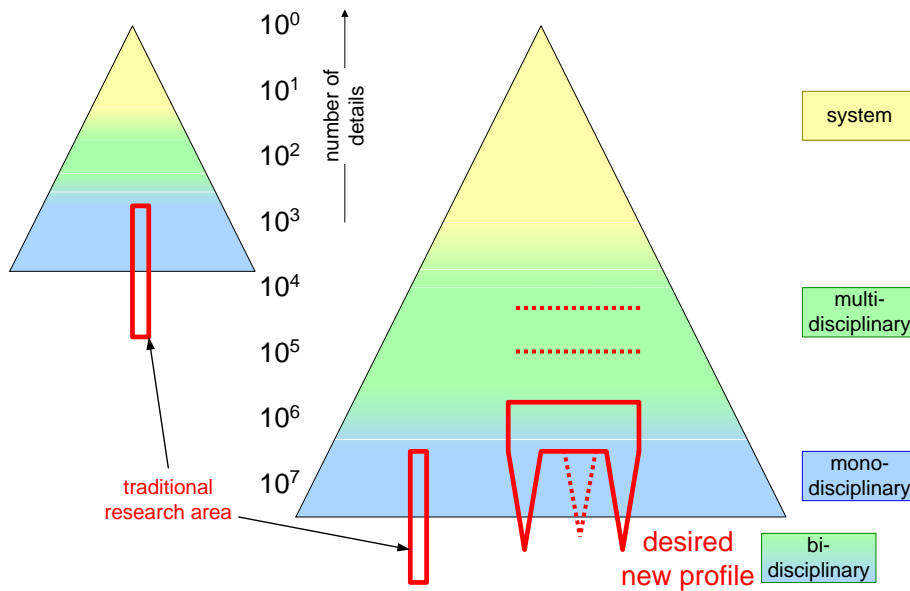
In this context, the following questions are very challenging:

- Can we use part of the transistors of the next generations of chips to solve the dependability problems, instead of merely increasing the system's functionality or processing speed?
- Can this be done without increasing the system's complexity for the end-user?
- How can low-level, medium-level, and high-level layers in a typical system set-up co-operate to sustain dependability issues?

In case of doubt or for a short discussion one should contact the PROGRESS Bureau, Ed Deprettere (Chairman Themes Working Group), or Eric van Utteren (Chairman PROGRESS).



University vs. Industry scale systems.
The order of 10⁷ (even 10⁹) holds for many disciplines



Multi-aspect research over disciplines and layers in industrial context