

**Report on assessment of
Centre for Research “Sustainable Transportation”
LAMIH and TEMPO Laboratories
University of Valenciennes and Hainaut-Cambrésis
FRANCE**

Period: 2008–2009

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1. The International Scientific Committee and the assessment procedure

1.1 The International Scientific Committee

An International Scientific Committee was established in the Spring 2010 to assess the Centre for Research “Sustainable Transportation” LAMIH and TEMPO Labs. The committee members and their personal expertise are listed below:

Name and affiliation	Expertise	Participant in visit
Prof. Robert Babuska Delft Center for Systems and Control Delft University of Technology, The Netherlands	Automation axis Identification and control	Yes
Prof. Niels Bay chairman of the committee Dept. of Mechanical Engineering Technical University of Denmark, Denmark	Mechanics axis Metal forming Manufacturing tribology	Yes
Prof. Jeff Crandall Center for Applied Biomechanics University of Virginia, Charlottesville, USA	Mechanics axis Biomechanics of impact and Human trauma	No
Prof. Mohamed Gad-El-Hak Dept. of Mechanical Engineering Virginia Commonwealth University Richmond, USA	Mechanics axis Fluid mechanics, turbulence and fluid-structure interaction	(Yes) by video conference
Prof. Michel Gendreau Centre de recherche sur les transports CIRRELT Université de Montréal Montreal, Canada	Computer Science axis Operational research, e- commerce	No
Res. Dir. Jean-Michel Hoc IRCCyN - Institut de Recherche en Communications et Cybernétique de Nantes UMR CNRS et Université de Nantes Nantes, France	Human and Life Science axis Cognitive psychology and ergonomics	Yes
Prof. Toshiyuki Inagaki Dept. of Risk Engineering University of Tsukuba Tsukuba, Japan	Automation axis Human-Machine systems	No

<p>Prof. Magnus Langseth Structural Impact Laboratory (SIMLab) Centre for Research-based Innovation Norwegian University of Science and Technology (NTNU) Trondheim, Norway</p>	<p>Mechanics axis Materials and structures, crash and impact</p>	<p>Yes</p>
<p>Prof. Gérard Morel CRAN Faculté des sciences Vandoeuvre les Nancy France</p>	<p>Automation axis Production systems</p>	<p>Yes</p>
<p>Prof. Ahmed Seffah Ecole Hôtelière de Lausanne Le Chalet-à-Gobet, Lausanne 25, Switzerland</p>	<p>Computer Science axis Customer experiences engineering, design pattern and design theory, software cost benefit studies</p>	<p>Yes</p>
<p>Prof. Khellil Sefiane School of Engineering & Electronics, University of Edinburgh, Edinburgh, UK</p>	<p>Mechanics axis Heat transfer</p>	<p>Yes</p>

1.2 Scope of the assessment

The International Scientific Committee (in the following abbreviated ISC) was requested to assess the quality and scientific relevance of the research in the LAMIH and TEMPO laboratories related to the Centre for Research “Sustainable Transportations” and to provide possible advice on how the quality might be improved. The assessment covers the research performed in the period 2008–2009.

1.3 Data provided to the ISC

A detailed documentation in form of a 141 pages report: Centre for Research “Sustainable Transportations”, 2008–2009 Activity Report was made available to the ISC by downloading from the internet on May 25, 2010.

The report describes the historical background of the laboratories involved in the centre, i.e. LAMIH and TEMPO, and the establishment of the centre followed by a description of the scientific organisation of the centre. National and international scientific cooperation by centre staff members is listed together with industrial cooperation.

The centre is organised in four main areas and seven research groups as indicated below:

1. Automation

- 1.1 LAMIH/ASHM—Automatic Control and Human–Machine Systems
- 1.2 TEMPO/PSI—Production, Services, Information

2. Mechanics

- 2.1 LAMIH/C2S—Crash, Comfort, Safety
- 2.2 TEMPO/MSM—Materials, Surfaces & Forming
- 2.3 TEMPO/DF2T—Fluid Dynamics and Heat Transfer

3. Computer Sciences

- 3.1 LAMIH/DIM—Decision, Interaction and Mobility

4. Human and Life Sciences

- 4.1 LAMIH/SHV—Human and Life Sciences

The last part of chapter 1 in the activity report lists the number of staff in the individual research groups and gives an overview of the scientific production of publications in each group. Finally data are given regarding budget and financing of the centre.

Chapter 2 includes the description of the individual research group activities listing staff members of the group, national and international scientific and industrial collaboration and projects, summarizing the research and listing publications. Description of the individual group activities is finalized by a section on perspectives regarding future work.

The report gives generally a valuable description of the center activities although it could be better organized and more concise. It is somewhat marked by inhomogeneity in the description of the different research groups. This ought to be improved in the next report.

1.4 Procedure followed by the ISC

The assessment and recommendations are based on the Activity Report provided by the centre prior to the visit and presentations by and discussions with the leaders of the research groups and the centre management. Presentations and discussions took place during the well organized visit on June 3–4, 2010 on location at the UVHC.

Assessment forms were provided by the centre for giving marks as well as comments and recommendations. The forms filled out by the individual ISC members are presented in the following chapter. In some cases two members have coordinated their evaluation, in other cases several individual comments on the same topic have been submitted to the chairman of the ISC, after which they in some cases have been coordinated into a single assessment in other cases they are presented as individual assessments on the same topic.

Concluding the two days visit to UVHC the ISC had a meeting with the centre management:

- Professor Eric Markiewicz, Head of centre
- Professor Thierry-Marie Guerra, Head of LAMIH
- Professor Laurent Dubar, Head of TEMPO

At this meeting general comments and recommendations were presented. In the following, chapter 2 presents these general remarks, after which the detailed assessment is given in chapters 4–7. Chapter 3 concerns the grading scale.

2. General comments and recommendations

2.1 General comments

The Center for research "Sustainable Transportation" located in UVHC is strategically placed in the heart of the French transport industry, which is situated in the northern part of France. With a total of 235 employees including 44 professor and 60 associate/assistant professors, the center has an impressive working capacity covering the fields of automation, mechanics, computer sciences and human and life sciences. The latter area is acknowledged as a special characteristic of the center.

For most of the research groups of the centre, the academic reputation varies from good to excellent. In general the panel was impressed by the quality and quantity of the research at the centre. The research that is carried out makes significant contributions to the field in cutting-edge research as well as in innovative applications of new concepts and methodologies. The presentations of the seven research groups including laboratory visits revealed that the Center has remarkable experimental facilities in range of good to excellent quality.

In some research groups attention should be paid to improve the scientific output in form of more international publications in peer reviewed journals, an increased international cooperation with common publications, broader field of research and improved cooperation with other research groups in the centre.

It is surprising to notice the lack of research on design and materials engineering in the centre. The ISC understands that main reasons for this are lack of teaching and therefore also research in design engineering at UVHC, and rather narrow research with focus on ceramics in the materials research group. Considerations about how to remedy this problem as regards the centre research should be considered.

2.2 General recommendations

1. The vision and objectives of the centre are not very clearly outspoken in the Activity Report. This should be improved in the next report.
2. Coherence of the research and description of the relationship between the various research groups should be improved.
3. Improved balance in quality of the participating groups and their scientific impact is requested.
4. Clear relevance of the research to the overarching theme of Sustainable Transportation should be ensured.
5. A description of the success criteria is requested as well as quantitative goals.

6. The centre management should establish a working committee with the objective of encouraging and promoting stronger, real links between the various research groups and avoiding artificial, structure driven links.
7. The centre management should pay special attention to the weaker research groups with the objective of strengthening these.
8. The relevance of some of the research in the groups should be considered. Sustainability which is a common denominator of the centre does not appear to be in focus in all research groups.
9. It is recommended to strengthen discussions with industry as regards future challenges requesting industry about their expectations and needs.
10. The centre could be more visible nationally as well as internationally.
11. The interdisciplinary research cooperation planned in the centre makes membership of CIRP—The Academy for Production Engineering a good forum for international collaboration. Leading researchers from several of the research groups are encouraged to seek membership.
12. An external PhD opponent from a leading laboratory abroad is recommended for each PhD defence.
13. Seminars to attract MSc students are proposed.
14. As regards PhD theses, which the ISC understands must be written in French except when the student is a foreigner, it is proposed to include an extended summary in English and a PhD project should result in (at least) two international journal publications by the PhD student in order to ensure international visibility.
15. 1 page CV including the research profile of each permanent staff member of the centre is requested in subsequent reports.
16. A list of selected key publications in each research group is requested.
17. The ISC is proposed supplemented by an extra reviewer with expertise in Movement Science.
18. The Activity Report on the center were sent somewhat late leaving little time to study the document. At least two weeks before the assessment meeting is requested.
19. Description of the relationship between the various research groups is lacking.
20. It is recommended to limit the assessment meetings to every second year rather than the suggested annual meetings. An intermediate report may be submitted to the ISC in the years without meeting.
21. The list of ISC members, addresses, and expertise should be sent out to the ISC prior to the assessment meeting.

3. Assessment grading details

The assessments of each of the seven research groups are given in chapters 4- 7 based on the forms provided by the centre. Each research group is given a global evaluation with on of four different levels:

- Excellent
- Very good
- Good
- Intermediate or poor

In the detailed assessment is subsequently evaluated:

2008–2009 Results evaluation

1. Scientific quality and production
 - Scientific bottlenecks relevancy
 - Scientific topics relevancy considering knowledge increase
 - Scientific production (papers, conferences, ...)
2. External visibility and attractiveness
 - International partnership
 - National and European projects
 - Organization of seminars, workshops and conferences
 - Editorial activities
 - Networking and international collaborative research
3. Industrial cooperation

2010–2013 Perspectives evaluation

4. Scientific relevancy
 - Strategic vision
 - Impact in terms of potential for increasing knowledge or for expected results value
5. Industrial and societal needs
 - Scientific objectives relevancy and impact in society as regards industrial needs
 - Potential for industrial cooperation
 - Potential integration of results by scientific or industrial community
6. Expected results
 - Innovative and ambitious character of the expected results as regards the objectives of the Centre “Sustainable Transportations”
 - Clear and measurable targets

Each of the six subjects is evaluated on a scale from 1 to 10:

- Excellent 10
- Very good 8–9
- Good 6–7
- Intermediate 4–5
- Limited 1–3

4. Assessment of research activities on Automation

4.1 LAMIH/ASHM—Automatic Control and Human-Machine Systems

Automatic control

Assessor: Robert Babuska,

Global estimation

- Very good

2008–2009 Results evaluation

1. Scientific quality and production

1 2 3 4 5 6 **7** **8** 9 10

The overall scientific quality can be rated between good (7) and very good (8). A small part of the research output has a significant impact at international level, while the majority has quite a small impact. This can be seen, among other indicators, in the citation analysis of the individual professors. Two of the full professors have adequate scores and play a significant role in their community (several tens of publications and an H-index of 8 and 13, respectively), while the other professors have few publications (between 10 and 30 and an H-index of about 2 to 4).

Recommendations:

- develop a clear mission statement for the group and the related strategy. At the moment there seems to be no clear strategy in terms of the focus on specific topics within the field, relationship to other groups in the center, effective use of the facilities (the car simulator is a world-class facility – make use of it!).
- increase the number of PhD students

2. External visibility and attractiveness

1 2 3 4 5 6 **7** 8 9 10

Some members of the group are internationally visible. However, this does not hold for the other members.

Recommendations:

- participate in or lead EU programmes

- assess staff regularly, including full professors, based on their scientific output, visibility and impact

3. Industrial cooperation

1 2 3 4 5 6 7 **8** 9 10

Industrial collaboration seems to be adequate, although there might be room for more initiatives, for instance, in connection with the car simulation facility, etc.

2010-2013 Perspectives evaluation

4. Scientific relevancy

1 2 3 4 5 6 7 **8** 9 10

Strategic vision and mission in relation to the Center's mission should be developed and embedded in the operation of the group.

There is a potential for more impact than the group currently has.

5. Industrial and societal needs

1 2 3 4 5 6 7 **8** **9** 10

There is definitely enough potential and perspective for this group. A clear strategic vision should be developed.

6. Expected results

1 2 3 4 5 6 **7** 8 9 10

This item is hard to judge as no clear targets have been presented.

Human-Machine systems

Assessor: Toshiyuki Inagaki

Global estimation

- Excellent

2008–2009 Results evaluation

1. Scientific quality and production

1 2 3 4 5 6 7 8 **9** 10

Series of research works at Valenciennes on human-machine systems, especially on dynamic function allocation between humans and machines have been well recognized in academia world-wide already from early 90s. The current LAMIH/ASHM inherits the good tradition and reputation.

In the Theme “Human-machine systems,” the following two important topics are investigated regarding human based automation: (1) human-machine cooperative control and (2) diagnosis of states and errors. Both of these topics are not only extremely important and challenging research aims but also essential for realizing resilience of

transport systems. The topics are studied very nicely based on the accumulation of profound achievements done so far at the LAMIH/ASHM.

2. External visibility and attractiveness

1 2 3 4 5 6 7 **8** 9 10

Investigations of human-machine systems are sometimes domain-dependent as well as context-dependent. Especially, transport related studies require deep understanding of similarities and dissimilarities among characteristics of transportation modes (such as aviation, automobile, trains), which is done very successfully at the LAMIH/ASHM. One of obvious reasons for that is that the LAMIH/ASHM has excellent faculty members whose research fields cover a wide variety of transportation modes. It is a very strong characteristic of the LAMIH/ASHM that comparisons among transportation modes can be made easily within a single organization (institution), which is not usually possible in other universities or research institutions other than the LAMIH/ASHM. Actually, the LAMIH/ASHM is clearly visible from abroad and attracts keen attention from researchers in the world.

3. Industrial cooperation

1 2 3 4 5 6 7 **8** 9 10

Various types of cooperation with industries are going on. It is obvious why research activities at the LAMIH/ASHM attract much attention from industry.

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4. Scientific relevancy

1 2 3 4 5 6 7 8 **9** 10

The strategy of the Theme “Human-machine systems” trying to allocate efforts to the research field of *resilience engineering* is very sensible and appropriate. Some years have past already, since the need of “resilience engineering” had been suggested in international meetings. However, no quantitative theory or model has been established yet. The strategic decision of LAMIH/ASHM is sound, and will most likely bring many contributions to the establishment of the resilience engineering based on the LAMIH/ASHM’s past achievements and competences on theoretical framework construction as well as mathematical modelling.

5. Industrial and societal needs

1 2 3 4 5 6 7 8 **9** 10

The strength of LAMIH/ASHM lies in the fact that the institution covers from models (or theories) to applications, as well as from machines to humans (with their combinations), for all the important transportation modes. When the LAMIH/ASHM provides the industries big pictures or complete stories with methods for (1) realization of smart machines (or functions to assist humans), (2) monitoring and estimation of human characteristics, and (3) design of human-machine interactions so that humans and machines collaborate in a situation-adaptive manner, then the impacts and contributions that the LAMIH/ASHM can give to the industries and society would be very high.

6. Expected results

1 2 3 4 5 6 7 8 9 **10**

It will be interesting to follow how quantitative theories and models for resilience engineering can be applied to human-machine systems in the real-world. The proof of the applicability of the theories and models to real-world problems would invite many researchers to the field of resilience engineering for further development and generalization of theories and models. The LAMIH/ASHM would then become a global Centre of Excellence in the world in the research of resilience engineering, especially for transportation systems.

It is expected that clear answers may be provided to the following important questions: (1) to what extent the resilience engineering needs to be transportation mode dependent? (2) what is the interrelation of “resilience” with some already established concepts, such as robustness, fault-tolerance, and graceful degradation? (3) How should resilience be measured or evaluated? (5) How can human workload be related to resilience of human-machine systems? (6) Is there anything that the machine can do to attain resilience of the human-machine system when it determined that the human’s action is not compatible with a given situation? The answers to the above questions would contribute much to make the resilience engineering attractive as well as useful.

Human–Machine systems

Assessor: Jean-Michel Hoc

The above mentioned assessor is not an expert in automation, but has written some comments on Human-Machine system studies.

2008–2009 Results evaluation

1. Scientific quality and production

As regards Human-Machine systems the report is not clear enough on the originality of the LAMIH studies as compared to other laboratories in France, in Europe, and in the world. It does not present any result. It should go beyond the presentation of research domains, reaching knowledge acquisition.

There is no mentioning of collaboration with experts in psychology or ergonomics, although there are some common keywords.

Rather few publications are noticed in multidisciplinary journals. More publications would for instance be expected in IEEE SMC or IJHCS.

2010–2013 Perspectives evaluation

4. Scientific relevancy

As regards Human-Machine systems the prospects do not mention very original targets: workload assessment, learning strategies, etc. From a scientific point of view one would

like to be convinced that LAMIH is oriented towards original goals. It is surprising to note projects on HMS without any experts in psychology or ergonomics.

4.2 TEMPO/PSI—Production, Services, Information

Assessors: Morel Gerard and Seffah Ahmed

Global estimation

- Good

2008–2009 Results evaluation

1. Scientific quality and production

1 2 3 4 **5** 6 7 8 9 10

This team was the ‘Production Systems’ team a component of LAMIH before the last evaluation by the national assessment agency for research and higher education (www.aeresevaluation.fr) as well as by the national centre for scientific research (CNRS). The global ranking by AERES led to the dissociation from CNRS and LAMIH, although the scientific results of a few members were very good.

Main remaining concerns to solve are:

- PhD thesis (6): the spectrum of topics is too large and the strategy to publish doctoral results must be strongly improved. Supervision is not well balanced between the 5 potential supervisors.
- Articles (10): A part of these articles is not of higher impact and an effort should be made to better classify them against each other (for example, Insight Journal is a publication of a technical society).
- Conferences (22): The ranking must be strongly improved (international is not enough to rank the level of a conference).
- Relevant Topics: They must not be driven by the various opportunities of projects, collaborations, PhD Thesis ...
- Not publishing members: Publication in journals is not well balanced between researchers. About 50% of the members have not published at a good level, so that the risk remains of a low evaluation.

2. External visibility and attractiveness

1 2 3 4 5 **6** 7 8 9 10

The visibility of the team is good at the national and regional levels. The exploration of the domain of services for healthcare and transportation systems is a positive point in the continuity of the manufacturing domain previously studied by the team.

Efforts have been made to network researchers and to organize events. Nevertheless, the attractiveness of the team remains weak at the international level and a new strategy must be defined.

3. Industrial cooperation

1 2 3 4 5 6 **7** 8 9 10

A positive point of the team is its active involvement at the regional level. A concern is the relevance of the topics to the overall scientific objectives. Another concern is the lack of involvement in European projects.

2010–2013 Perspectives evaluation

4. Scientific relevancy

1 2 3 4 5 6 **7** 8 9 10

TEMPO / PSI is a team component of the research unit EA 4542 labelled by the French Ministry of Higher Education and Research. The core objective of PSI is to be re-integrated in LAMIH as a team component of a research unit labelled by the CNRS and the Ministry of Research. The above comments aim to improve this research program ranked positively by AERES.

The key scientific domain of the team is still the historical core activity of the team related to the *management of performances both in the design and the exploitation stages of complex systems*. There may be a concern to separate these two complementary aspects of a system into two themes especially if one takes into account the fact that complex system engineering aims to consider these two issues in a concurrent and collaborative way. ‘*Management of performances*’ may also be too general to ensure the scientific relevance of the results between the two themes in order to effectively contribute to complex systems modelling. This concern may be increased since these two themes address four other specific sub-themes.

For example, why not qualify and quantify the performance assessment of the attractive 'open control' paradigm based on active infotonics entities into a same theme in order to study in an integrative way various aspects related to control design, control robustness, data modelling, dependability issues as well as any others required properties according to the application domains?

Another concern is complexity to overcome the scale of the benchmarking demonstrators in order to address realistic complexity issues (several thousands of cooperating entities). Solving these concerns could allow to really open up this promising research area by cooperating with the LAMIH-DIM team to get beyond the national level to a more ambitious international level within the IMS-HMS community in order to participate to European and worldwide research programs.

5. Industrial and societal needs

1 2 3 4 5 6 7 **8** 9 10

Due to limitations in terms of researcher resources (about fifteen members), another topic could be dedicated to applications in order to maintain this important and excellent activity at the regional level related to transportation, healthcare and manufacturing systems. This can provide real case-studies on complexity issues related to the first topic. This could allow federating the team to work on applied R&D issues around a common

paradigm which is more efficient compared to simply initiating a SURFER project.

6. Expected results

1 2 3 4 5 6 **7** 8 9 10

Sustainability assessment should be addressed as a core issue and could be a key contribution of this team to the overall objective of the centre.

Human aspects should be also addressed by this team while collaborating at least with the Human-Machine Systems team. This could be a concern to meet the objective of re-integrating LAMIH.

The team must move a step further from its past history. The team must focus its scientific potential around a common research shared by all team members in order to improve its record of publication. Applying various modelling techniques should be considered for applications within industrial or dedicated communities.

An important concern remains the strategy to get at the international level beyond the existing partnerships. This can be achieved by taking more effective responsibilities (working group, editorial board, etc.) within relevant academic bodies (IFAC, IEEE, IFIP, CIRP, etc.). A special attention should be paid to invited lectures and sessions as well as publications of survey articles (for example, the ‘open-loop paradigm’).

5. Assessment of research activities on Mechanics

5.1 LAMIH/C2S—Crash, Comfort, Safety

Assessor: Magnus Langseth

Global estimation

- Very good

2008–2009 Results evaluation

1. Scientific quality and production

1 2 3 4 5 6 7 **8** 9 **10**

(Scientific quality 10, production 8)

The research carried out is quite broad as it covers topics such as the behaviour, damage and fracture of materials and structural joints, uncertainty and robust design as well as biomechanics of impact and human trauma. The research is scientifically relevant and is based on a research methodology accepted by the international research community, i.e. materials modelling, materials testing and validation of the proposed models. Thus the reviewer does not see any bottlenecks to meet the defined objectives, i.e. to develop numerical tools that can be used by the industry in their process and product development to improve safety. It is worth mentioning the impressive testing facilities available in the laboratories for material, component and structural testing.

With respect to scientific production, the research team has published 23 papers in peer reviewed journals which gives on average 0.7 publications per year for each faculty member. This ratio is somewhat low and should be increased. The following actions may increase the publication rate: 1) A PhD thesis should result in minimum two international journal papers. 2) The number of PhD candidates should be increased – each faculty member should at least have two candidates simultaneously. 3) All kind of research cooperation (national and international) should end up in common publications. 4) The research group should encourage their industrial partners that the results from contract projects should be published.

2. External visibility and attractiveness

1 2 3 4 5 6 7 8 9 **10**

The research group has an excellent national network and thus visibility with extensive national cooperation. However, the international partnership/cooperation and especially the visibility could be strengthened by increasing the number of international publications as mentioned above. In this way the research work carried out by the group would be much more accessible to the international research community and thus attract more international cooperation.

3. Industrial cooperation

1 2 3 4 5 6 7 8 9 **10**

The research group has been running several industrial projects where the research competence has been utilized. In this way the group transfers its developed technology through commercial contracts with the industry.

2010–2013 Perspectives evaluation

4. Scientific relevancy

1 2 3 4 5 6 7 8 9 **10**

The defined research program is a continuation of the previous research carried out. However, the vision and objective for the research program should be better defined as well as the industrial link (has the research content been discussed with the industrial partners). This is mandatory with respect to the annual work-plan to be defined, and thus may make it easier for the program head and also for the centre director to monitor the progress of the work carried out. However, the strength of the research is the coupling between testing in the laboratory using excellent laboratory facilities, modelling and analyses in order to develop engineering models.

The group is encouraged to be a member of European Automotive Research Partner Association (EARPA - <http://www.earpa.eu/>) to increase their visibility and their impact on automotive research in Europe.

5. Industrial and societal needs

1 2 3 4 5 6 7 8 9 **10**

The research topics are generic in nature and will attract several industrial partners also outside the transportation sector such as the aircraft industry, offshore industry, aerospace industry etc. Focus in the proposed program is among other things placed on tools to be used in lightweight design coupled with occupant safety research as well as robust design issues. This is mandatory to fulfill environmental requirements as well as to reduce fuel consumption and still maintain sufficient safety. The establishment of a Technological innovation program will definitely strengthen the implementation of the results into industrial innovation.

6. Expected results

1 2 3 4 5 6 7 8 **9** 10

Based on the previous work carried out by the research group the obtained results will definitely be used in innovation and value creation by the industrial partners. Based on the available documentation, it is hard get a clear understanding of how the results in the program will meet the general objectives of the whole Centre. This has to be better defined as well as how the research in the present program is linked to the other research programs in the Centre. Furthermore, the reviewer proposes that quantitative goals are defined for the program in order to monitor the progress.

5.2 TEMPO/MSM – Materials, Surfaces & Forming

Assessors: Mohamed Gad-el-Hak and Niels Bay

Global estimation

- Good

2008-2009 Results evaluation

1. Scientific quality and production

1 2 3 4 5 6 **7** 8 9 10

Activities in the TEMPO/MSM research group are focussed on metal working processes including forming, cutting and continuous casting and glass processing including forming and tempering. The research is organised in two thematic approaches, namely: (1) Multiphysics approach; and (2) Rheological and tribological behaviour of surfaces at high temperature.

Great emphasis is put on research in metal forming tribology (friction, lubrication and wear), where the laboratory has possessed an international level for many years. The subject has presently large attention and industrial relevance.

The output from the group is good but considering the manpower available it can be improved by widening its field of research to other important areas within metal forming R&D, (see point 4 below).

The present assessors are not qualified to evaluate the glass processing activities, but activities on this subject seems to be good. For both metal and glass processing research

it can be stated that a good mixture between theoretical/numerical and experimental analysis on custom built equipment is ensured, a vital condition to obtain industrial applicable results.

The number of PhD students per permanent scientific staff member is rather low and could be improved.

The number of international journal publications is very good, among the highest rate per permanent scientific staff, whereas number of international conference publications is low.

2. External visibility and attractiveness

1 2 3 4 5 **6** 7 8 9 10

The group has some collaboration with foreign (European) research centres, but this collaboration is rather limited in number. An increase inside (as well as outside) Europe in form of joint research projects, and MSc and PhD students staying at foreign research centres for a period of their study is strongly recommended.

Participation in European projects is low and should be sought improved, although the ISC realizes, that this may be difficult due to the present EU research policy with little focus on production technology.

The collaboration with national research centres is good and the amount national funding is good especially due to a single, large grant, CISIT, International Campus of Safety and Intermodality in Transport.

Editorial activity including reviewing of international journal and conference papers is satisfactory.

The group is encouraged to seek membership of CIRP (The International Academy for Production Engineering) and ICFG (The International Cold Forging Group) and to increase its involvement in collaborative research on metal forming in Europe and elsewhere.

The group members should join more international conferences with paper presentations in order to establish a broader network.

3. Industrial cooperation

1 2 3 4 5 6 7 **8** 9 10

The industrial collaboration is good.

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4. Scientific relevancy

1 2 3 4 5 6 **7** 8 9 10

The activities on metal forming tribology and surface engineering are very relevant as an area with major international focus regarding R&D, and the group has expertise to achieve significant results.

It is suggested to widen the field of research incorporating other areas within metal forming R&D which at present are in focus, e.g. sheet forming of advanced high strength steels (AHSS) and light metals and bulk forming of Al- and Mg-alloys. The group's expertise in surface engineering could be applied in sheet metal forming of AHSS.

5. Industrial and societal needs

1 2 3 4 5 6 **7** **8** 9 10

The growing awareness of environmental issues and the requirements to establish solutions diminishing the impact on working environment as well as external environment implies great relevance of the group's research on metal forming tribology and surface engineering. Potential for industrial cooperation is already proven by the group.

6. Expected results

1 2 3 4 5 6 **7** 8 9 10

The ambitions regarding metal forming tribology and surface engineering are high and justified. They could be widened to sheet metal forming and other focus areas of research within metal forming in such a way as to include new materials (AHSS and light metal alloys).

5.3 TEMPO/DF2T—Fluid Dynamics and Heat Transfer

Heat Transfer

Assessor: Khellil Sefiane

Global estimation

- Good

2008-2009 Results evaluation

1. Scientific quality and production

1 2 3 4 5 6 **7** 8 9 10

This group has clearly identified the cutting edge research topics in their area. They have also built a very elaborate infrastructure and laboratory facilities. Over the last years the group has been very successful in securing research funding. They have respectable scientific papers in good journals; some of them have taken leading roles in their research community.

In the light of the success on the funding and infrastructure building, there is definitely a scope in improving the scientific output both in terms of quantity and quality.

The group seems to have two focus areas (sub-groups), as it stands now. One sub-group is focusing on fluid mechanics and the other on heat transfer. These two topics are very tightly linked in most top universities departments. This merger is fairly recent, however more interaction between individuals doing fluid mechanics and thermal heat transfer should be encouraged and followed. Some concrete outputs (objectives) can be set to measure, quantify and assess this interaction (this could be under the form of joint publications).

The output from this group is certainly good but considering the resources available the group can certainly do much better in quantity and quality. The group has a healthy number of research students although on the lower side.

Most of the research projects tackled by this group have direct relevance to industry in one way or another. Introducing some very fundamental problems related to these applications (but keeping it in small proportion) can give some depth to the work that the group is undertaking.

The group can pay more attention to the impact of the research it is doing. Making people aware of the impact is one way of doing it, e.g. make individuals aware of impact factors of journals where they publish, citation indexes, patents ect.

In summary, the overall rating of the group as it stands is rather good tending to very good.

2. External visibility and attractiveness

1 2 3 4 5 6 **7** 8 9 10

Some members of the group have definitely national and international visibility however other members of the group should be encouraged to do the same as this is not enough for the group as it stands now. The group needs more people with national and international visibility.

The group interaction with international partners is fairly recent and this should be encouraged and reinforced. Members of the group could be encouraged to undertake more visits to other national and overseas laboratories to present their work and initiate collaboration.

3. Industrial cooperation

1 2 3 4 5 6 7 8 **9** 10

The industrial collaboration is very good indeed; there is an efficient and productive interaction between the group and its industrial partners.

2010–2013 Perspectives evaluation

4. Scientific relevancy

1 2 3 4 5 6 7 **8** 9 10

The present state of the group is very good, however it has the potential for excellence. Recent steps taken in terms of organisation and merging the groups on fluid mechanics and heat transfer is a good move.

The group also has all it needs in terms of infrastructure and it is possible to develop new research ideas making use of existing facilities. This gives the opportunity to reinforce the fundamental approach that this group lacks.

5. Industrial and societal needs

1 2 3 4 5 6 7 **8** 9 10

The number of industrial partnerships that this group has built over the years is impressive. Most of the topics tackled within this group have direct links to industry. It seems that the group is getting substantial support from the industrial partners. This aspect of the group activity should be maintained and reinforced in the future.

6. Expected results

1 2 3 4 5 6 7 **8** **9** 10

The expected results from this group hover between very good and excellent. It all depends on the direction the group will take, if the group reinforces its weaknesses by the following initiatives:

- Increase both in quantity and quality its scientific output
- Widen the national and international visibility to more members of the group
- Continue its partnership and support its gaining from industry
- Widen the number of funding grants to more members of the group

If the above are attended to, the group will definitely tend to excellence.

Fluid Dynamics

Assessor: Mohamed Gad-el-Hak

Global estimation

- Good

2008–2009 Results evaluation

1. Scientific quality and production

1 2 3 4 5 6 **7** 8 9 10

They have a respectable number of publications in international journals, which number probably indicates relevance and awareness of prior work.

2. External visibility and attractiveness

1 2 3 4 5 6 **7** 8 9 10

3. Industrial cooperation

1 2 3 4 5 6 **7** 8 9 10

2010–2013 Perspectives evaluation

4. *Scientific relevancy*

1 2 3 4 5 6 **7** 8 9 10

5. *Industrial and societal needs*

1 2 3 4 5 6 **7** 8 9 10

6. *Expected results*

1 2 3 4 5 6 **7** 8 9 10

6. Assessment of research activities on Computer Sciences

6.1 LAMIH/DIM—*Decision, Interaction and Mobility*

Assessors: Seffah Ahmed and Morel Gerard

Global estimation

- Good

2008–2009 Results evaluation

1. *Scientific quality and production*

1 2 3 4 5 6 **7** 8 9 10

The newly established team DIM is the result of the merging of two teams RAIHM and SIADE, both components of LAMIH. These two teams have been evaluated positively by the national assessment agency for research and higher education (www.aeres-evaluation.fr) as well as by the national centre for scientific research (CNRS). RAIHM (*Automated Reasoning and Human-Computer Interaction*) and SIADE (*Information, Decision-Making and Embedded Systems*) become the ‘Computer Science’ part of LAMIH labelled as FRE (meaning a research unit in evolution) by CNRS.

Results are presented in relation with the new organisation which has been defined according to three themes related to RAIHM, ROAD (*Operational Research and Decision Support Systems*) and SyME (*Mobile and Embedded Systems*). The scientific quality and production is globally good.

The objective is to highlight the studies of three complementary aspects related to interactional, decisional and mobility aspects of digital systems.

The group has a very good research agenda, but has to align it with the long term goals of the whole centre. The topics addressed are very accurate and the proposed framework to

tackle the proposed research agenda has some originality. Some papers have been published in journal with a very high impact factor.

One major and serious drawback is the lack of explicit interaction between the three subgroups. They seem to be like silos with limited interaction.

We do suggest re-defining and presenting the group in terms of project/group based on the expertise of each member, rather than three different and isolated topics.

2. External visibility and attractiveness

1 2 3 4 **5** 6 7 8 9 10

The group is highly involved in the local area (region) and national community. One major weakness is the lack of involvement in European projects. The group has also to develop a strategy to attract stronger PhD candidates. Also, recognition at international level is not consistent in terms of publication in highly ranked journals. A more ambitious strategy in terms of visibility has to be defined.

3. Industrial cooperation

1 2 3 4 5 6 7 **8** 9 10

The group is involved in funded, applied and competitive research projects mainly from strong (ANR and FUI) at the national and from regional levels.

The group has to improve visibility of its achievements to industry (software tools methods, etc.). This can be done via technical reports, videos showing tools, tutorials. Such publications do not appear to be listed in the report.

The group lacks involvement in European and worldwide research networks related to the topics addressed by the group such as Ambient Intelligence.

2010–2013 Perspectives evaluation

4. Scientific relevancy

1 2 3 4 5 6 7 **8** 9 10

LAMIH / DIM is a team recognized as FRE unit by CNRS and the Ministry of Research. The goal is to meet the criteria of scientific excellence required by CNRS to be recognized at the higher level UMR (meaning Joint Research Unit).

The research agenda is accurate. The group has to develop projects bridging the three different topics addressed by group members, for example between distributed information systems and adaptive context-aware interfaces.

One possible strategy consists to continue the ongoing projects while identifying a new, common research niche.

5. Industrial and societal needs

1 2 3 4 5 6 **7** 8 9 10

The group has the capacity to provide solutions to numerous problems inferred by applied research. A concern is the lack of strategy for an international leadership on a technology.

The group should try to attract more industry partners while proposing bigger and long-term projects (integrative with different team members or federative projects with the other groups of the centre).

6. Expected results

1 2 3 4 5 6 7 **8** 9 10

This aspect is not very clear from the report. The group should highlight their fundamental contributions and shows how it is different from the research done by other groups.

There is no explicit management strategy defined at the team level. A concern may be the expected results remain to rely on individuals.

This current organization of DIM reinforces the scientific relevancy for ROAD and RAIHM according to the results gained with the previous organisation. A concern for increasing the impacts of the group and its visibility may be collaboration with SyME on transportation applications.

Sustainability is not addressed by the team and the core objective of the centre is not explicitly addressed by the group.

Collaborations with others teams within the centre should be developed, such as with TEMPO / PSI about the ‘implicit control paradigm’ based on infotronics technologies which could be a federating concept.

Assessor: Jean-Michel Hoc

The above mentioned assessor is not an expert in computer sciences, but has the following comments to this research group.

ROAD: Where is “support”? I only see automated decision systems.

RAIHM: Human-Machine interaction does not seem to be a core issue of this group’s research topics. Apparently, there is no collaboration with psychology or ergonomics, although there is such a team in the laboratory.

There is no publication in Human-Machine Interaction journals (e.g., IJHCS, BIT, etc.).

7. Assessment of research activities on Human and Life Sciences

7.1 LAMIH/SHV—Human and Life Sciences

Assessor: Jean-Michel Hoc

Global estimation

- Good

2008–2009 Results evaluation

1. Scientific quality and production

1 2 3 4 5 6 7 **8** 9 10

This new research team groups together very heterogeneous fields – cognitive ergonomics, biomechanics, sensorimotor control, and clinical neurophysiology. It is impossible for a single reviewer to be fully competent in so different fields. Certainly three reviewers are too much, but the reality is too difficult!

There are a reasonable number of doctoral students (10 for 7 Prof. or Ass. Prof.) in the group and a good publication rate (18 international articles).

Collaboration with other groups within the laboratory are not visible, so it is difficult to understand why these research domains are covered in this particular laboratory. Apparently, this team's quality and competency are neglected by the other teams.

PERCOTEC

Research on cooperation produces original results and should be more widely published. The combination of cognitive and emotional approach is valuable and original, but apparently not yet published. The group should put its approach and results in perspective with the current state of the art. Its productions are up to date, but they lose some of their strength due to lack of perspective. The sub-group should try to publish more in one of the best international journals in ergonomics (e.g., Human Factors, Ergonomics, Applied Ergonomics, etc.). The paper in IJHCS was a good initiative to pursue.

Future recruitments would be absolutely necessary to develop this little team. Apparently, a full-time researcher is needed. The other teams should take more benefit of this one in their research projects.

EM2SE

The present assessor is not an expert in the field of EM2SE and cannot provide a satisfactory evaluation. In the next assessment it is proposed to invite an expert from “Institut des Sciences du Mouvement” (Université de la Méditerranée Marseille), Jean-Louis Vercher for example.

Regarding perspectives the same comment as that given for PERCOTEC is valid: the value and originality of the researchs is not put into an international perspective. The results are published in good journals.

2. External visibility and attractiveness

1 2 3 4 5 6 **7** 8 9 10

Good activity regarding visiting professors, responsibilities in scientific societies and networks, national research collaborations, and Editorial Board memberships is noticed. Probably the development of formal collaboration at the international level could be expected.

3. Industrial cooperation

1 2 3 4 5 6 7 **8** 9 10

Several research projects (among them 2 ANR projects) and industrial contracts are noticed.

2010-2013 Perspectives evaluation

4. Scientific relevancy

1 2 **3** 4 5 6 7 8 9 10

For the moment, the perspectives are not clear enough to formulate a definitive judgement. The two sub-groups were recently associated. Apparently, the elaboration of the research program is in progress. It will be interesting to follow the outcome of these very different research topics. Possibly a meta-reflection on the projects going on could be positive for everybody and something original could emerge.

5. Industrial and societal needs

1 2 3 4 5 6 7 8 **9** 10

If the two sub-groups continue the development of their research topics, there is no doubt about their societal and industrial relevance.

6. Expected results

1 2 **3** 4 5 6 7 8 9 10

Expected results should be defined.