

KTH International RAE 2008

Report Panel 12: Architecture, Built Environment and Management

General Assessment of the Research Field

Five of the six Units of Assessment (UoA) in this Research Field come from the School of Architecture and Built Environment, one, Industrial Management, from the School of Industrial Technology and Management. Together, these UoAs have a particular and essential role within KTH as an interface between technology and built environment, between industry and society in Sweden. This role is vital and paramount for the University and for Sweden, and to a certain extent, even to the whole Nordic Community.

It is widely recognized internationally that research into the built environment plays a crucial role in securing economic competitiveness and quality of life. This field therefore has a crucial and necessary role to play in a portfolio of activities of a leading technical university in Europe.

In the past, the importance of these Schools has clearly been in forming highly qualified manpower (architects, engineers, surveyors and economists) for the country. Consequently the task of educating young professionals to high international standards has received highest priority. Together with higher education, applied research played a big role in linking KTH to the national economy and society. This was mainly done to provide up-to-date knowledge to political and legislative arenas, to the labour market and to civil society of the country. Knowledge development was based on applied research and on importing advanced international knowledge, adapting it to national or Nordic conditions. Many prominent researchers of the Schools are continuously linking research and practice, providing their knowledge to the country, thus contributing continuously to the national visibility of KTH.

In times of globalization, with the growing internationalization of higher education and academic research, this role has to be reviewed. While focussing on national agendas remains an important task of a technical university, responding to international challenges has become an equally important task. The new vision of KTH will have to balance these two functions of a modern university. Thereby national tasks should not be sacrificed to indispensable internationalization. And internationalization does not necessarily mean an exclusive orientation to the Anglo-American world, as there are other scientific environments in the world which deserve equal attention. One more aspect should be mentioned at this point: the internationally renowned success of Sweden (and other Nordic countries) as a social model is also rooted in the success of its system of higher education and research. Globalization is not a reason why this model should be given-up. To the contrary, it is one mission of a high-class university in the Nordic Community to communicate such experiences and achievements to international academic arenas.

Given the nature of education and research in the five (six) sub-units, the School as a whole is very heterogeneous. The different UoAs are clearly affected by the considerable transition challenge to advance from a national to an international institution. While some of the sub-units are still affected by recent institutional re-organization and ongoing generation change of professorial leadership, it is apparent that an unclear overall mission of KTH is affecting

their medium and longer-term strategies. Past re-organizations have not always been beneficial to strengthen future oriented research profiles.

Obviously, it would be unfair to evaluate the Research Field as a whole. Given different traditions and conditions, as well as the immense load of educational functions, the research evaluations for individual UoAs range between world-leading and of national standard. There are excellent research groups of international reputation, and there are units, which seem to be in decline, even if the research area as such could play a key role in the advancement of science. The following individual assessment of the UoA will provide detailed evaluations of achievements and shortcomings of the various research groups. However, a number of general observations can be made. They reflect among others some of the difficulties, the UoAs are facing, when internationalizing their research.

The relationship of education and research is unbalanced. The dependency of the Research Field on student numbers, including PhD students, is a serious impediment to advance in international basic research.

This may in part reflect the effect of the financial model for the allocation of resources that operates within KTH (this is not an issue that is unique to these UoAs). We are concerned that this model is poorly understood internally and embodies inefficiencies such as a poorly designed incentive structures that militates against high quality research. For example, the practice of paying according to the number of completing PhDs is fraught with moral hazard and, other factors being equal, could reduce the quality of the work. We recommend that KTH considers critically reviewing its current financial models, including undertaking a comparison with those used in other comparable international technical institutions.

The relationship of basic and applied research is blurred. Too much time is needed and sacrificed to “hunt” for basic and research contracts, though the success rates for external contracts are usually high. The ongoing generation change is still an impediment for new research initiatives.

The number of foreign researchers and visiting scholars is far too low for a university which aims to be one of the best technical universities in Europe.

There is impressive emerging young talent in the UoAs; which is an excellent base for developing new strategies and profiles. Unfortunately there is no clear system of incentives for younger faculties to engage in international research. This could result in a loss of talent!

The Swedish potentials of research are not efficiently used by the UoAs when developing and profiling international research strategies. World leading research could very well have a “Swedish” dimension.

The view beyond the Anglo-American world of international research is limited. Very little research is published in refereed journals beyond the Anglo-American sphere. In general, international scientific orientation lacks a wider perspective, beyond the Anglo-American scientific hemisphere.

There is little strategic co-ordination between the UoAs, though it is acknowledged that such co-ordination beyond routine meetings is not easy to maintain. There are few established mechanisms and incentives for internal strategic debates. However, unintentional coordination

by means of joint coffee meetings, newsletters, research workshops, or external speaker's afternoon events may encourage greater creative interaction between members of the Research Field.

Academic "marketing" of the UoAs is insufficient, in particular if such marketing requires qualified support staff permanently communicating with individual research groups. In general, there seems to be lack of qualified and committed non-academic technical staff at the Schools.

The overall international visibility of the Research Field and the research output of the different UoAs (with some noteworthy exceptions) is weak. In the past, language has clearly been a constraint, though this is no longer a fact. The visibility of the profiles, of competences and strengths, beyond the Nordic Community has to be improved to contribute to KTH's mission to become one of the leading technical universities in Europe and to compete successfully with such institutions in Milan, Barcelona, London, Zurich, Aachen, Munich, Karlsruhe, Delft or Helsinki.

UoA: Architecture

Foreword

Research in the field of architectural is a difficult concept, one that is both familiar (*but not in the common understanding of "scholarship"*) and unfamiliar for the discipline. It is familiar in the sense that every time one creates an object or explores a design solution, new outcomes are being researched and architects have always done this; it is unfamiliar because "research" in the common sense of producing a publishable paper is not something central to a professional discipline geared towards making/designing (*unless one is doing architecture history criticism or theory*). Therefore, when one measures "research", one can measure the quality of design output by professors and their students; or one can measure the scholarly articles that writing produces.

In addition, "research" in architecture - particularly in the first sense of design exploration - is something that cannot be separated from education. As a profession that is driven by service-based commissions, one rarely gets to explore innovative approaches in professional work. Rather, teaching offers the outlet to explore riskier ideas and new approaches - technical, aesthetic, programmatic - to problem solving.

In connection with this it has to be stated, too, that the criteria for measuring the "quality" of research in this area are highly amorphous, not only because it isn't clear whether design or scholarly output is being referred to, but also because in *each* of these, standards are not black and white. For design, one can measure whether the work of the staff - either on their own or with their students - has been published or exposed at conferences or lectures, but there is no agreed upon measure of the "buzz" that new work generates. For scholarly publications of architects, there are very few refereed journals in which one can publish and they are not the most respected in the field; hence this standard for success is not really reliable. In the end, like design itself, the measure of research quality is more subjective than in other fields, although this "subjective" nature does not imply that one cannot recognize a true contribution to the field; quality is recognizable, just not quantifiable.

General Assessment

To the credit of the architecture faculty at KTH, there are continuous attempts to bridge the distance between the two forms of research and to promote the embeddedness of “research” in teaching. The manner in which the Department of Architecture is attempting to do this is consistent with international trends - that is to say, by i) insisting that design incorporate intellectual ideas based on cultural/social research; that ii) design also incorporate investigations of new technical - digital and material - innovations; and that iii) design teaching is itself a research forum.

There is the additional difficulty that the Department of Architecture of KTH is in enormous transition. The output of the last 4 years does not reflect the potential for what will happen in the future, which seems poised to be innovative and ambitious in its research output.

Performance Against Evaluation Criteria

Scientific Quality (basic research)

When assessing the Department of Architecture, design and written scholarly output are treated separately

“Scientific” is not a category that applies to the output in architecture and therefore the Panel decided not to evaluate architectural research along this criteria. The evaluation of research for both design and written scholarly output is, rather, assessed under applied research.

Applied Research Quality

When assessing applied research, student and faculty are being treated separately.

Design: parts of the UoA currently perform at an internationally high standard with the main part performing at a nationally high and internationally recognised standard.

Students: The work of the design studios at the Department of Architecture is of high quality, though does not break new grounds or make innovative contributions. This is true for both the quality of thought and also for the use of innovative technology.

Digital fabrication: One professor is focused on digital fabrication. Others will soon join; but this still may not be enough to be internationally competitive in this emerging arena. Nor is this work seen in the theoretical light pertinent to a social or more particularly Swedish context, which has a long and excellent tradition in prefabrication, which digital fabrication partakes in.

Theoretical underpinnings: This aspect of the design work seemed strong; original thought was evident in many of the projects. It is comparable to international work.

Faculty: Little design work produced by faculty members was shown to the Panel making it difficult for the Panel to assess. The lack of design evidence, the Panel thinks, is due to an understanding of design not being seen as research; but again, this type of dichotomy is unhelpful.

While it is the part-time, unrepresented faculty that primarily practice, (not the full-time that represented the unit) it is important to recognize that the faculty as a whole will further its

international reputation by showing quality, research-led design work. In future research assessments, faculty should be encouraged to show their design work.

Written scholarly output: parts of the UoA currently perform at an internationally high standard with the main part performing at a nationally high and internationally recognised standard.

The written scholar output is visible in three fields: social science texts, and architectural history texts; and architectural /cultural theory texts

Social science texts: While making positive connections with industry, work produced in this area pursues a dated approach and should be reinvigorated in line with new developments.

Architecture history texts: These are serious, scholarly, and well researched but being largely in Swedish, widely inaccessible to readers outside Scandinavia.

Architecture/cultural theory texts: All the books written in English, on gender, fashion, and authorship, are most innovative. They serve a significant cultural purpose in Sweden/Scandinavia and indicate a willingness and ability to participate in an international contemporary theoretical context; they certainly contribute to but do not yet lead international trends; but those that lead in this area, it must be realized, are for the most part not primarily architects.

Scholarship

Design: emerging across the majority of the UoA

Student Work: There was willingness to do work of experimental nature; and there was an atmosphere in the studio design work of engagement with complex issues. This is true of technical, visual and conceptual experimentation.

Faculty Work: While there was virtually no design work shown by the faculty on this occasion, it was clear that the themes that the students pursued were encouraged and fuelled by the professors who are clearly intellectually engaged, well read and culturally current in their interest.

Written Scholarly output: emerging in some parts/individuals of the UoA
There was willingness to take risk and a good atmosphere for exploration, although it was largely the younger staff that participated in this form of scholarly research. The commitment of *Katja Grillner* in particular should be mentioned here.

Vitality and Potential

Design: excellent in some parts of the UoA, good in the remainder

New liveliness and imagination is seen in the school as it is now formulated, both as scholarly work enters the design work and also as the new technology of digital fabrication gets embraced. This is true for both student design work and younger faculty who are connecting with international architects exploring new digital fabrication techniques.

Written Scholarly output: excellent in some parts of the UoA, good in the remainder

In this area in particular, there is evidence of the younger generations' enthusiasm for pushing the boundaries beyond standard historical scholarship and forming connections in Sweden and internationally with other scholars and journal publishers to develop a consistent high-level intellectual community

Strategy

The strategy of the UoA was considered good, with real potential to be achieved. The balance of full-time academics to part-time practitioners is right. The focus on research as education and research as practice is strong and vital.

The proposed emphasis on PhD funding is appropriate, though it reflects the dependency of the Department on the PhD funding mechanism of KTH, which seems to be inappropriate to promote basic research in the UoAs. Whilst PhDs' are certainly essential to raise the research profile of the school, the singular emphasis that the unit is placing on this will be short-sighted if it is not matched by a sustained effort to establish a clear identity for the programme and match this with a strong marketing program. PhD support will mean nothing if it is not combined with a coherent vision for the pro-gramme. The work of the PhD students will need to be recycled into the undergraduate and masters programme for their contribution to lift the profile of the unit as a whole. Therefore, other things that were not identified by the UoA need to be in place as well. These are identified below in "actions for development"

Suggested Actions for Development

The following suggestions are made to strengthen the international visibility and reputation of the Department of Architecture

Profiling and marketing the Department of Architecture: Lecture series with international figures should be funded and developed. International guest critics and studio teachers should be funded and folded into the curriculum.

Support for new digital equipment: Access to current digital fabrication hardware - CNC mills, laser cutters, rapid proto-typing, water jet cutters - and advanced software - rhino, solidworks - is a MUST for any school to attract top international visitors and top students. Most international architectural leaders will want to work with students who have access to sophisticated hardware and to digital fabrication machines; and students should know how to apply sophisti-cated software. In a technical university with international ambition, such as KTH, such support should be unquestioned.

Putting new technologies to original use: This could be by taking advantage of the other strength in the panel of UoAs unit, namely the socio-theoretical scholarship and the units that explore the built environment at a larger scale, namely planning and transport.

Developing a coherent and unique vision for contemporary architectural education in Sweden: Obviously there are too many scattered points of view in the current or outgoing faculty. A stronger coordinated vision needs to be developed, if the Department wants to be better seen internationally. There are, however, indications that the school is aware of this deficit and has already taken first steps to remedy this. The next five years will be important to both nurture and watch.

Structural/administrative help to guide in research applications and industry connections. In this current era in which architecture explores the potential for new digital technology and participates in scholarly experimental output in the form of PhD education, comprehensive support is fundamental.

UoA: Real Estate and Construction Management

General Assessment

Real Estate and Construction Management (RECM) is a much renowned national institution. It has well developed and tight relationships with the Swedish administration. The UoA consists of three independent research groups: (1) *Real Estate Planning and Land Law* (2) *Centre for Banking and Finance* (CEFIN); and, (3) *Building and Real Estate Economics*. In the opinion of the Panel, construction management is missing in this profile.

The UoA concentrates primarily on good teaching. It offers five master programmes and one bachelor programme. Seven full professors and four associate professors are assigned to the whole Unit. The teaching load of the academic staff does not leave much space for research, and there are few tenured positions for post-doc researchers.

Apart from teaching nationally and internationally, providing legal and real estate expertise to the politico-administrative environment in Sweden has been the main function of the UoA. Continuous social interaction with political and professional stakeholders in the country has been an essential activity for the key academic leaders of the unit.

Over the years, despite the different thematic specialization, the whole UoA seems to have developed a very cooperative spirit internally. Group loyalty was highly visible.

Performance Against Evaluation Criteria

Scientific Quality (basic research)

Research at the UoA is largely carried out in form of PhD-studies. Only the Centre for Finance seems to be able to concentrate primarily on research. Most PhD students, who graduated from the UoA, have got positions outside KTH. This proves that the degree is well accepted in professional circles. Overall, basic research was considered of a high international standard throughout the majority of the UoA, with the remainder performing at a nationally high and internationally recognised standard.

Real Estate Planning and Land Law

Real Estate Planning and Land Law is disadvantaged by the fact that the institutional – (Swedish) – framework limits extensive global orientation. As a rule, research results have to be published in Swedish to reach the national politico-administrative environment. However, there have been some comparative international studies, which meet international standards. The valuation of a real estate (index) is an outstanding achievement of the unit. In addition, the unit is carrying out a well-known English programme for countries in transition, a programme, which adds to the international profile of KTH.

Centre for Banking and Finance

The Centre for Banking and Finance (CEFIN) with its orientation on both empirical relevance (represented by industry cooperation) and theoretical excellence (represented by publications in refereed journals) ranks highest in the department. In the field of comparative retail banking the Centre has shown remarkable leadership in research and transfer of research. This is mainly the result of impressive leadership of *Kent Eriksson*.

Building and Real Estate Economics

The Valuation of Real Estate Index is an outstanding achievement of the unit. In the past, research in this unit has been much too local in its aspirations. It seems, however, that initiatives have been taken recently to further open up the unit to international arenas. One indicator for such change is the decision to host the International Conference of the European Real Estate Society (ERES) in Stockholm 2009. Another one is the proposed establishment of new Real Estate Centre at KTH, an initiative which, given similar developments all over Europe, is coming comparably late.

Scientific research output of all three groups is produced mainly in the form of doctoral theses, which are, as a rule, and for good reasons, written in Swedish. Swedish texts, however, can be read and used in teaching and research all over academic and professional arenas in the Nordic Countries. When disseminating research results, RECM is able to use its long tradition in international education in the field of real estate and land management, which is another strength of the UoA.

In general, international contacts of the UoA are frequent, though they seem neither to lead to high-level scientific co-projects nor to more articles in refereed international journals. Only few researchers in the whole unit seem to publish actively in international publications.

The number of publications as a whole is rather low compared to the number of research staff. Only ten candidates successfully finished their PhDs research during 2003-2007 (though in the coming year 2009 ten new intakes are being expected). Two graduates from the unit have got a position at RECM, four at foreign universities (Tanzania and Ukraine) and four in the Swedish industry and administration.

Applied Research Quality

The income of the UoA has increased heavily in 2006 mainly because of the Centre of banking and finance although the external finance is still under the KTH average. The plans about the proposed new Centre of Real Estate will further improve the financial base of the UoA. Overall, applied research quality was considered of a high international standard throughout the majority of the UoA, with the remainder performing at a nationally high and internationally recognised standard.

Real Estate Planning and Land Law

The group has developed with respect to its local “Swedish” relevance. The local impact is strong and clear. At an international level the focus is on comparative studies. The results are presented mainly in international joint publications, conferences, in teaching (international master program) and when carrying out EU-projects for developing education in countries in transition. In addition the results are used in legislative work with the Swedish administration.

Centre for Banking and Finance

The presentations and the materials provided show an internationally oriented group that exploits local opportunities to gather data and information. *Samuel Azasu* gave an impressive overview how scientific content and education may interact through good pedagogic efforts. This type of work should be further supported.

Building and Real Estate Economics

In presentations given to the Panel, it was not yet clear how the group could go beyond local aspirations. However, there is active research in real estate valuation where the results are applied directly in industry and administration. This extends beyond the Swedish scope.

Scholarship

Scholarship was considered as emerging across the majority of the UoA. Many researchers of all three sub-units have an active and important role with the national administration. All units are also strong internationally. The national visibility of the UoA seems to be clearly strongest at KTH. All PhD students seem to have got good positions after graduation, and the increasing number of PhD's proves the attractiveness of the research areas in the three sub-units.

Vitality and Personnel

Vitality and potential was considered good across the majority of the UoA. There is a clear strive to find new openings to strengthen the research. The number of PhD students is increasing. After graduation they can be placed well outside the university. Gender balance among young researchers and doctoral students is satisfying. On the professor level there is still an unbalanced gender situation.

Strategy

The strategy of the units was considered good with real potential to achieve. The department is coherent and there are clear synergies between the different research groups. However, the strategic plan of RECM is not very clear. The aim to become one of the three leading units of its kind within Europe is not convincing without elaborating a clear concept of how to achieve this ambitious target. Careful benchmarking with other comparative research centres in Europe has not yet been done.

Suggested Actions for Development

The proposed new Centre of Excellence for Real Estate as a joint centre in the UoA is a timely project. It further opens up the Unit to the international world. The realization of such a Centre requires considerable engagement from the real estate and construction industry in Sweden. If a sound and sustainable financial framework can be secured, the centre could have a promising future. This project, however, will only succeed if KTH can attract and recruit highly qualified researchers from international banks, developers and international real estate centres, and with endowments to create new chairs in the field.

The focus on education, as on national research and commitment, should remain a stronghold of the UoA. In the future, good – theory based– teaching is important to attract brilliant graduate students to KTH and to continue their studies in PhD programmes, a more significant orientation towards international academic circles would be beneficial for the reputation of the UoA and KTH. Thereby Swedish experience in land management and real estate policies can certainly be used to raise the profile and the international visibility of the UoA.

The UoA should explore the fields in which key chairs are missing to complement the existing environment. Such fields could be “applied financial economics” (in CEFIN), real estate law, operation research (OR), econometrics, special fields of statistics, and complementing social research fields of engineering (e.g. logistics...). To this respect, possible co-operation with other departments at KTH and other universities in the Greater Stockholm region should be investigated.

UoA: Philosophy and History of Technology

General Assessment

The groups of *Philosophy* and *History of Technology* are two very good groups with strong international track records beyond Scandinavia and Europe. They both belong to the top research groups in Europe in their respective fields. The members of both groups are very successful ‘academic entrepreneurs’. They benefit from a very high level of external funding. Their success in attracting external funding, however, may become a weakness, as there appears to be an imbalance between internal and external funding. In addition the high level of external funding has the danger of affecting the internal coherence (scattered projects depending on external funding) and leaves insufficient room for more basic research. The kind of research and teaching performed by the philosophy and history groups is very different from the work done by their counterparts at the University of Stockholm because of its focus on technology and engineering practice. The close cooperation of the philosophy group with engineers and empirical scientists is notable and is rather unique in the field. Here KTH shows a remarkable strength.

At the request of the groups, History and Philosophy are evaluated separately.

Performance Against Evaluation Criteria

Scientific Quality (basic research)

Philosophy

The majority of the UoA currently performs at a world leading level. This group has an excellent publication record, in quantity as well as quality. The members of the group publish in the top international journals in the field of philosophy. They are setting standards for the philosophy of technology. Their publications cover fundamental as well as applied issues. Their collaboration with empirical scientists and engineers as well as their strategy to encourage PhD students to publish in international journals work well. Comparable groups in the field are based in Cambridge, Eindhoven, Twente, Delft.

History

Parts of the UoA currently perform at a world leading level with the main part performing at an internationally high standard. This group is well entrenched in international networks in the field and has a high international visibility. It is involved in/part of important European initiatives in the history of technology and plays a prominent role in the most important society in the field (SHOT). Publishing more in top international journals in the field may strengthen its publication record. Comparable leading groups in Europe are to be found in Eindhoven, Cambridge, Berlin (Max Planck Institute) and Munich.

Applied Research

For philosophy as well as for history of technology the notion of applied research is rather problematic. Thus applied research quality is interpreted as societal relevance and relevance for research customers.

Philosophy

The majority of the UoA currently performs at a world leading level. The mission of the group is to do philosophical research that is relevant to engineers. The high level of external funding and the close collaboration with empirical scientists/engineers indicates that they succeed very well. For a philosophical group this is exceptional.

History

The majority of the UoA currently performs at a world leading level. The high level of external funding indicates a high level of relevance. Its societal relevance is apparent from the group's involvement in questions about how to deal with Swedish industrial heritage. The high level of external funding is exceptional for a history group.

Scholarship

There is a potential tension between the high level of external funding and scholarship as defined for this assessment. External funding may endanger academic independence. This potential tension was explicitly addressed during the interviews. However the groups indicated that none of them has experienced any problems in this regard.

Philosophy

Scholarship was considered excellent in parts/individuals of the UoA. Single members of the Philosophy group regularly participate in governmental committees, thus contributing to the future-oriented profile of KTH.

History

Scholarship was considered excellent in parts/individuals of the UoA. Single members of the History of Technology philosophy group regularly participate in governmental committees, thus contributing to the future-oriented profile of KTH.

Vitality and Potential

Philosophy

Vitality and potential was considered excellent in some parts of the UoA and good in the remainder. The remarkable growth of the philosophy group since it had been established in 2000 shows that it is an unusually thriving group. In spite of its limited internal funding it has succeeded in attracting funding for many PhD students. The group as a whole has built up an excellent publication record in a short time. Here *Sven Ove Hansson* has certainly played a crucial and leading role.

History

Vitality and potential was considered excellent in some parts of the UoA and good in the remainder. The group has a multi-nuclei set-up (history of technology, history of science, environmental history and industrial heritage). The group has proven that is able to handle such a broad set up in a fruitful way. This underscores their claim that their biggest asset is very congenial young faculty. With such a faculty, a multi nuclei set-up brings vitality

(instead of fragmentation). Given that the group is able to maintain this momentum, it has great potential.

Strategy

Philosophy

The strategy of the unit was considered excellent but challenging to achieve. In the past, the philosophy group has been active mainly in the fields of the philosophy of risk, (the logic of) belief revision and regulatory toxicology. The group has a clear view on its future research agenda; apart from continuing research in these fields it intends to set up new research projects in behavioural science and risk research, ethics of medical technology and philosophical issues related to technical education. Its funding and publication strategies have proven to be very successful. The limited amount of internal funding, however, may turn out to be the main obstacle for implementing this promising strategy, which would make KTH one of the leading academic centres of technical philosophy in Europe.

History

The strategy of the unit was considered excellent but challenging to achieve. The group has a clear view on its future research strategy. This strategy is to aim for large research programmes that cut right across the various nuclei within the group and to play an active and leading role in international research programmes. Given the fact that they have been successful in this in the past, this strategy appears sound and feasible but the high level of external funding is a factor of uncertainty, which may be mitigated by rising their internal funding within KTH.

Suggested Actions for Development

The following suggestions are made to mainly strengthen the international visibility and reputation of the two groups:

For the future of these groups within KTH, and for the humanities and social sciences in general, it is important that the Board of KTH develops a strong vision of the role and place of research and teaching in these fields at the KTH.

So far, the two groups operate separately. The above vision may help in stimulating cooperation between the two groups. Simply putting them in one organizational unit will not work. However, the groups would certainly benefit from internal debates on a common vision of the role of the humanities within a Technical University. A common physical location on the campus would certainly facilitate and enhance internal communication.

More internal funding by the KTH appears desirable and certainly worthwhile in order to ensure the long-term position of these groups at the KTH. This extra internal funding should not be used for broadening the research topics addressed, but for strengthening basic research themes, which benefit from and cut across the various externally funded research projects.

UoA: Urban Planning and the Built Environment

General Assessment

The Department of Urban Planning and the Built Environment, newly established in 2003/4, consists of four divisions, each representing a selected field of studies and research interests. These four sub-units are, *Urban Studies and Planning*, *Regional Studies and Planning*, *Environmental Strategic Analysis* and *Geoinformatics*. For two reasons, the focus of this assessment is mainly on the first and the third divisions. *Regional Studies and Planning* has not been particularly active during the last five years (due to the principle professor being seconded to the university leadership). Further, the Panel did not consider that it was competent to judge the scientific quality of the impressive activities recently carried out in the *Geoinformatics* division.

The UoA is young, and the transition period to the present organizational form has obviously been cumbersome. In recent years the UoA has grown considerably mainly due to the enormous dynamism and commitment of their leading faculty and young (female) researchers. Sustainable urban development is the overriding theme, under which a plethora of mainly applied research projects and strategic studies for local and regional clients are being carried out. As a consequence, sustainable urban development is only defined vaguely in academic terms. The mission statement and the focus mentioned are not yet convincing, as they cover many areas of the whole discipline. The socio-political dimensions of spatial development and planning seem to have a certain priority in research.

Given the constantly low support from KTH for basic research, the UoA is continuously forced to attract funds from outside the University for its research activities. This has significant impact on the selection of research themes, on the timing of research projects, and it usually obliges the researchers to deliver output which can be immediately processed by the clients to local, regional and national political arenas. Thus, freedom of research is limited, and longer-term basic research is neglected to satisfy the needs and expectations of contracting clients. This explains why most applied research projects have clearly a Swedish bias, at the expense of more international and more theoretical dimensions. This, in turn, limits the scope for publications in international referred journals. Moreover, it seems that the UoA considers itself primarily as a policy advisor to Swedish policies.

The UoA has made a considerable commitment to education, offering five educational programmes, three of which are taught in English. This fact clearly limits the research capacity of the faculty to carry out more basic research. These programmes, however, seem to be attractive to international students, and make KTH internationally visible. In addition, the UoA runs a national Town Planning Academy, which strengthens the links with planning practise in the country.

International links have been established by the UoA to many academic research groups at universities in the UK, in the Netherlands, and in China. Particularly in the fields of housing, social exclusion and integration, and in the wider field of regional science the UoA is well known internationally. The division of Geoinformatics has good links to China.

Performance Against Evaluation Criteria

Scientific Quality (basic research)

The quality of basic research was considered of a high international standard overall, with parts of the UoA producing work at a world leading standard. The leading scholars of the UoA are publishing internationally. In recent years the group has become a much after-sought reference point for Sweden. Contributions on Swedish experiences in urban planning and local development have become a particular strength of the group in the international academic community. Particularly in the fields of social integration and of methodological advancement (e.g in spatial forecasting) the senior researchers have an international reputation. A stronger involvement in international comparative projects (particularly with research groups in France, Switzerland and Germany) would increase their international profile. However, the international visibility of the group is still limited. The quantitative and qualitative information base, accumulated in the course of numerous local and regional studies, is still untapped for the advancement of theory building. The number of articles in international refereed journals is below the intellectual and knowledge potential of the group.

Applied Research Quality

The quality of applied research was considered world-leading in parts with the remainder of the UoA performing at a high international standard. The majority of research of the UoA is applied research in urban and regional studies, mainly financed by contracts of public institutions in Sweden. Without such funding the group could not have developed so impressively and grown so fast. The dependency on outside funding is additionally nurtured by the interest to have access to local and regional case studies. Cities and regions with their socio-political environment are the laboratories of researchers in urban and regional studies. This enables the UoA to undertake action-based research and remain linked with the reality of the society.

Scholarship

Scholarship was considered as excellent in some parts/individuals of the UoA. The UoA is widely known in Sweden. Local, regional and national bodies seek frequently ad-hoc political advice and strategic guidance in local and regional development and planning matters. The qualitative outcome of these activities could not be assessed, as respective documents were neither mentioned, nor available during the assessment visit. The senior researchers at the UoA are frequently invited by local and regional governments, and to national, Nordic and wider international conferences. The forthcoming involvement of the Unit in the World Urban Forum in Nanjing/China, illustrates its growing international reputation.

Vitality and Potential

The vitality and potential of the UoA was considered good overall. The experience gained by the UoA in carrying out numerous studies and applied research for Swedish institutions in a broad field of urban and regional planning could be a good base for selecting a limited number of areas of competence, where a Swedish research centre, such as this UoA, could become the leader of European research in this field. In the past, in the context of numerous local and regional studies in Sweden, the group has compiled considerable competence on local development and political concerns. The number of senior researchers, who are free from educational and administrative and external project promotion work, is limited. However, there seem to be many young researchers who have the potential to implement the manifold research ambitions of the department.

Strategy

The strategy of the UoA was good with real potential to be achieved. Efforts were described to better integrate the various fields of research and groups of researchers across the four divisions of the UoA. It remains to be seen, whether the written strategy could be turned into a clear concept of selecting future-oriented priority areas for research, and for gradually implementing the concept. Clearly, sustainable urban development is far too broad as a shared research theme, and it is not yet clear what the UoAs specificity (*the USP*) in this field could be. The department should carefully narrow down its research ambitions and deepen the competence in a field which reflects long-standing Swedish or Nordic experiences. (*e.g. in which field, a Europe in transition, could benefit and learn from Nordic experience*). This would certainly require intensive internal debates and more funding from KTH to become less dependent on outside funding. And it would require some international benchmarking to identify the particular international research potentials of the UoA in contrast to other institutions doing research on sustainable urban development in Europe and beyond. Co-operating with Nordregio, the research arm of the Nordic States in Stockholm, could strengthen the UoA. It would also make sense to look for co-operation beyond the UoAs' boundaries within KTH, once the internal process of narrowing down the spectrum of research areas has resulted in a joint research concept.

Suggested Actions for Development

The following suggestions are made to strengthen the international visibility and reputation of the UoA.

Obviously the focus of research has to be narrowed down. This should be done in view to the future overall academic mission of KTH in Europe. The UoA could have a significant advisory role in defining and shaping this mission, and in streamlining the related future international profile of the University. The “*Energy-and-Environment*” theme, enriched with a clear social and spatial dimension, could be a promising future field of competence of the UoA.

It could make sense to start one or two catalytic projects to better integrate competence and talent represented in the UoA. Such projects, financed out of KTH funds, would have to cut across the many past and ongoing research projects in order to identify a research field where the UoA could develop a particular research profile. The application for a VINNEX Centre of Excellence may be one such possibility and opportunity.

The number of visiting scholars, post-docs, visiting professors or guest lecturers should be increased to open up the UoA to international dialogues. KTH can support such activities by providing funds for such invitations, or by financing applications to international institutions, which finance such international scholarships for senior researchers. (Fulbright, Gulbenkian, EU/Marie Curie etc.)

In order to create synergies and economize on human resources, research and educational profiles of the English language programmes in the Department should be synchronized and tailored to the available potentials of the UoA.

Appropriate tools for sustainable internal communication should be developed and used (*e.g. journal fix, luncheon meetings, newsletters*) to intensify internal exchange, and to encourage and motivate younger staff to go international and publish in refereed journals.

Substantial documentation of the research outcomes of the whole group is not available beyond scattered and very general communications on the website. Consolidated information in English (and French?) would raise international attention and help to increase the international profile of the group. The UoA could also explore initiating a publication series of urban and regional studies based on the Swedish experience with an international publisher specializing in this field (e.g. Blackwell, Routhledge). KTH should consider supporting such a project for reasons of international marketing.

UoA: Transport and Economics

General Assessment

This UoA consists of three subunit; **Transportation** (ToL, Division of Transport and Location Analysis; CTR, Centre for Transport Research; CTS, Division of Safety Research), **Economics** (Division of Economics and CESIS), and **Geodesy**.

Due to the lack of a specialist geodesist on the panel we did not feel competent to undertake an assessment of the research quality and international standing of this subunit. We note, however, that several internationally leading academic transport research groups are investing significantly in the development of geomatics research, as a complement to existing strengths in transportation. This may be some that KTH will wish to consider in the future. Economics and Transportation are assessed separately, since these two subunits are very different from each other, both in what they study and also in their programmatic stages within the UoA.

The Transportation group has been well established for some time and has recently made an internationally visible recruitment from the USA (*Haris Koutsopoulos*) that has greatly increased the group's visibility and breadth, though *Lars-Göran Mattson and Anders Karlström* are equally visible internationally.

The Economics group has recently recruited a Swedish scholar (*Marcus Asplund*) who has taught both in the US and in the UK. Through him and his colleagues the selected future path of research and scholarship is very promising.

Performance Against Evaluation Criteria

Scientific Quality (basic research)

Economics

The scientific quality of this subgroup in basic research is hard to judge because the group is embarking on a new project under the leadership of *Marcus Asplund*. It is not clear whether this new empirical research project will also stimulate theoretical work and whether the work will be internationally recognized. This project is supported by the Centre of Excellence for Science and Innovation Studies. Thus, it appears that from the vantage point of scientific quality there are synergies between the ongoing activities of CESIS and that these synergies have been identified and are being exploited. Publication rates and the quality of publications in the unit were considered healthy. Future research plans revolve around the development of a highly detailed firm-level longitudinal dataset of R&D activity and interactions and their impact on productivity. This is an important, timely and welcome strategic initiative. It has the potential to underpin significant new basic research outputs in the future including new knowledge, new empirically documented facts, new models of the firm and new hypotheses about R&D that are interesting to test.

Transportation

The transportation subgroup does little basic research as it is strongly and successfully involved in many applied projects. In the case of traffic modelling the research programme is long standing and the basic research has occurred long time ago having since moved to applications. Although describing this work as applied, it is also potentially capable of producing highly relevant basic research outcomes (i.e., new knowledge about traffic

dynamics) provided senior researchers can find sufficient time to develop the more theoretical aspects of the model.

The scholars publish well in internationally read journals. Although their rate of publication is not high in comparison to leading international competitors, we believe that this does not reflect a lack of capability. The need to increase output is well understood by the group and arrangements are in place to encourage this. Notably, Lars-Göran Mattson and Jonas Eliasson are jointly editing an important issue of *Transportation Research* which will publish papers on Stockholm's congestion pricing experiment. This is the kind of activity that contributes positively to the visibility of the group by extending the reach of their applied research to an international context.

Senior researchers in the unit have demonstrated that they have the interest and the skills for doing basic research. However, their duties within the subgroup and the need for externally funded applied projects have apparently limited the opportunities for them to achieve their full potential as basic researchers.

Applied Research Quality

Economics

The quality of applied research was considered of a high international standard overall. CESIS reported a budget of 13-14 million SKE of which only 20% is from internal sources. In June 2008 it reported as involving 15 senior researchers and 15 Ph.D. students with high level skills in statistics/econometrics and microeconomics which are skills well-suited to the goals of CESIS to study idea generation and productivity /innovation at the level of the firm.

Applied research activities outside of CESIS were not that strongly presented and it was difficult to establish their scope. The point was made that the group is too small to have seminars and that there are not yet enough foundations upon which to apply for external funding. The group's research focus is best described as a "niche market" with little competition from elsewhere in Sweden. It is not clear, however, what this means in terms of funding opportunities. On the one hand, the division may be able to increase its funding because there is no competition within the niche, but on the other hand, it may find this a disadvantage in its efforts to increase funding because the importance niche may not be well-recognized by relevant funding agencies.

Transportation

The quality of applied research was considered world-leading in parts of the UoA and of an international high standard in the remainder. The activities of Transportation were very well rationalized and presented. The Division of Safety Research was not however presented since that division specializes in the risk analysis of technical systems which includes also non-transportation infrastructure. The strategy revealed an extremely capable organizational structure called the Centre for Transport Studies. It is well equipped to study all aspects of transportation planning and modelling, from traffic analysis at the micro level to forecasting and modelling trip generation and location demands.

The one relatively unclear aspect of Transportation at KTH is the relationship with VTI. Although VTI appeared within the chart, its role and the degree of synergy and the nature of the collaborations between VTI and the rest of transportation are not clear.

Scholarship

Economics and Transportation

The overall level of scholarship in both Economics and Transport was considered excellent. Recent papers by Economics show successful basic and applied scholarship in the economics of innovation, the theory of the firm and competition. It is desirable that papers continue to be published in the leading economics journals though this will depend in large measure on how the proposed research evolves with the unique data set on Swedish firms.

Haris Koutsopoulos is widely and internationally known as a leader in the micro-simulation of traffic as well as for applied studies in other areas of transportation. He has published a large number of articles in well known international journals. The transport group also benefits from the reputation of Lars Lunqvist (now retired) as he was a well-known scholar in the transportation and urban systems literature and has produced significant review articles in recent years with international collaboration.

Vitality and potential

Economics and Transportation

Vitality and potential were considered excellent across both the groups. Both Economics and Transportation show a great deal of vitality and potential for continuing success and growth. The vitality is attested by their ability to make the international recruitments. As mentioned above, there are significant opportunities for translating this vitality into more international recognition by publishing more papers in better journals and by more international collaboration with well-known scholars.

Strategy

Economics and Transportation

The strategies of both Economics and Transportation are well rationalized, as explained above, and they are set to bring in continuing successes in applied research and with some effort could also contribute to basic research. They were considered both excellent and achievable by the Panel. The execution of the strategy is promising and a though clearer in the case of Transportation, potentially very promising in the case of Economics.

Suggestions actions for development

One of the main issues for this group is to increase its international visibility and the international impact of its work. There are a number of steps that the institution may wish to consider to promote this.

More publications in the leading international journals, as elaborated above.

More collaboration with US and other leading European scholars, perhaps by creating short term visiting positions that could result in joint papers.

Sustained participation in international conferences that are suitable to the fields. For example, in the case of Transportation and Locational Analysis, papers can be submitted to the urban economics sessions that are part of the Annual North American regional Science Meetings (held each November in a different USA city) and the European counterpart. The world's leading urban economists participate in these sessions each year. Likewise, it would

be desirable to see a more consistent level of participation in the activities of the International Association for Travel Behaviour Research, the International Symposium on Transportation and Traffic Flow Theory and also in the annual meeting of the Transportation Research Board.

Collaboration between Transportation and Logistics and Transportation and Location Analysis could lead to interesting scholarly output. The same can be said about collaboration between CESIS and the research agenda of Markus Asplund, to the extent that this agenda is not already included within CESIS.

Finally, collaboration between the Division of Economics and the Division of Transport and Location Analysis is also potentially fertile because transportation plays a vital role in how interactions among firms might lead to innovation. The transportation group is knowledgeable in the areas of agglomeration economies and they could benefit from the results of Markus Asplund's planned research and, in time, create joint projects that bridge their interests.

Transportation is an area that also has considerable scope for fruitful collaborations with academic groups outside Architecture, Built Environment and Management, particularly with groups in Computing, Electrical Engineering, Medicine, and in the field of Sensor Technologies. Many of the most important future developments may take place on these disciplinary interfaces. The prevailing culture of individualism KTH may make such collaborations more difficult to achieve than in the US or some other European countries. It would seem desirable for the institution as a whole to address this issue, since it may prove to be an impediment to valuable initiatives in this and other areas.

UoA: Industrial Management

General Assessment

Industrial Management is a Unit of the Department Industrial Technology and Management and is divided into nine sections covering different and heterogeneous areas of teaching and research.

The core competence and major field of joint activities of the unit is education and teaching (The I-Programme and other teaching services). The teaching activities of the unit are very successful. Besides architecture, the education offered by the unit is the most attractive educational programme at KTH . It contributes considerably to the profile of KTH in Sweden.

(International) Research is not a priority of the unit. In the past it has mainly been an "add-on" activity rather than focus. Corresponding activities vary significantly within the unit. Nevertheless some parts of the unit are attracting considerable outside funds for applied research. Thereby the fields of industrial dynamics, industrial work science, and gender and organization are relatively strong in terms of international funding, publication and visibility.

Performance Against Evaluation Criteria

Scientific Quality (basic *and* applied research)

Given the considerable (and successful) teaching load in the unit, basic research is not seriously addressed within the unit. Applied research, which has a strong Swedish focus, serves the educational task of the unit primarily. For these reasons the research quality of the unit (both basic and applied) was considered as of a high national standard throughout and of an internationally high standard in parts.

The (applied) research environment at the UoA reflects a free and open organizational culture that makes room for a broad spectrum of themes in the fields of industrial management, organization and dynamics, many of which are interesting and unconventional.

The (applied) research output focuses strongly on monographs and conference papers, and has a strong bias towards Swedish as the publishing language. Therefore, larger parts of the research output are not visible for the international scientific community. Only a few senior researchers at the UoA have published results of applied research work in renowned refereed journals and are internationally visible.

Research collaboration within the Unit (within the different sections as well as between the sections) remains sporadic and is not systematically developed.

Only few individual researchers/scientists collaborate with other research institutions and scientists in Sweden and abroad – e.g. in the context of European Union supported research. Thus, European leadership in this field of research cannot yet be identified. With promising younger faculty this may change in the future.

Scholarship

Scholarship was considered as emerging in some parts/individuals of the UoA. The most visible and recognized joint activity of the unit is in teaching, especially within the context of the I-Program. It is the single most important and dominating bond that generates a common basis of the UoA.

Originality and (international) visibility of scientific production/ output is highly dependent on the advanced activities of a handful of UoA researchers from industrial dynamics, industrial work science, and gender and organization who participate in international scientific debates and contribute Swedish experiences to international debates. Many members of the unit are traditionally contributing to public debates on Industrial Management in the country

The international visibility of the research outputs of the UoA as a whole is weak. This is mainly due to the heavy teaching load and the lack of English publications, but also as a result of a striking ‘non-marketing’ attitude, which seems to be characteristic for the unit as a whole.

Vitality and Potential

Vitality and potential were considered good in some parts of the UoA, though needs to be improved in the remainder. The UoA is coming into a period of transition with retirements and new recruitments. Currently, this sets boundaries to major strategic reorientations.

The unit provides a vital and productive environment for PhD students leading to an impressive research output (unfortunately mainly in Swedish).

The unit is marked by a lack of internationality in the scientific staff as well as in the PhD environment. There are very few foreign researchers, visiting scientists and professors.

The gender balance within the Unit is sound – 40% of the staff is female (in 2007). The same is true for age – 54% of the staff is under 40 years old.

Strategy

The Panel did not consider that a concise and visible research strategy for the future development of the UoA as a whole was presented. The strategic abilities of the UoA were therefore evaluated as weak. In the place of a coherent strategy, the Panel noted a tentative and very incremental patchwork of possible future research activities, mainly as follow-up research on previous projects. Visions and strategic orientations seem to be centred on a few individuals within the UoA and there is a clear need to increase the scope of strategic activities.

The strong dependence of research activities on external funding along with the heavy teaching load necessarily promotes ‘incremental’ and ‘random’ research profiles.

The overall vision of “improving conditions by studying managerial activity and technology” is very unspecific in terms of research aims and questions, methodology and industrial sector. In addition the international dimension of such research remains unclear.

Suggested Actions for Development

The suggestions made aim to strengthen the international visibility and reputation of the unit.

Efforts should be undertaken, and incentives offered, to encourage younger researchers to publish in international refereed monographs and journal articles. Swedish experience in the field of industrial management is certainly a field where the members of the group could excel internationally.

An annual (or bi-annual) report on the research and teaching activities of the UoA would increase visibility and trigger internal debates on future research priorities. Similarly, a series of English language Discussion Papers could be launched to create an environment of broader international communication and to promote international research on Swedish Industrial Management.

Sustainable mechanisms to promote regular strategic debates (and related decisions) within the Unit (particularly during the forthcoming transition period) should be explored to enhance internal communication and cooperation.

Internet presence of the UOA should be improved: the INDEK website could present research projects and new publications / monographs.

Visiting scholars should be invited from non-Swedish speaking countries, in order to internationalize education and promote international comparative research on Swedish Industrial Management. An international lecture series on annually changing themes could stimulate academic debate and exchange, and increase visibility.

The possibility to establish an international Graduate School, in co-operation with other Swedish institutions, should be explored.