

Evaluation of research and professional activity of research-oriented institutes of the Czech Academy of Sciences for the period 2015–2019

Final Report

Name of the Institute:

Institute of Theoretical and Applied Mechanics of the CAS, v. v. i.

Evaluated teams and their leaders:

1. Theoretical and Applied Mechanics (Martin Šperl)
2. Material Science (Daniel Kytýř)
3. Applied Sciences for Cultural Heritage (Miloš Drdácý)

Part A: Evaluation of the institute

Strengths:

Well established national position in Civil Engineering, Structural Mechanics, Materials Testing, and safeguarding of Cultural Heritage structures. Active young as well as experienced senior researchers capable of carrying out comprehensive and multidisciplinary research projects in these fields with societal relevance. Self-assessment procedure of employees.

Weaknesses:

Rather wide portfolio of activities with engineering service for society, which makes it difficult to focus on specific problems at internationally competitive level. The infrastructure support of the detached Centre Telč is important, but the distance between the laboratories in Prague and Telč is an issue and may lead to duplication of lab equipment. With some exceptions, rather standard equipment and instrumentation (may be also be seen as a long-term threat).

Opportunities:

The Institute has a very stable basis on which a strong international cooperation in Civil Engineering can be built. The research fields of the Team 1 and Team 2 can diversify in new research directions and address fundamental problems. The importance of Cultural Heritage conservation, restoration and reconstruction is likely to increase in the future, offering new international cooperation opportunities. Integration of the joint project “The City as a Laboratory of Change” in the AV21 strategy will also offer new opportunities for cooperation.

Threats:

Lack of basic research may slowly contribute to a transformation of the Institute from a research institution to a service institution. Demand of industrial partners for the applied research in the current research directions may decrease, specifically for Teams 1 and 2.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
In general, the quality of outputs evaluated in Phase I for the whole Institute is excellent, but there is a high diversity of the quality among the individual teams.	
H1.2	Contribution of workers on the outputs reached
The total contribution of the workers in all outputs from Phase I evaluation is above average, which is appreciated.	
H1.3	Quality of all outputs and results
It is very difficult to comment on the quality of all outputs. Considering the massive publication activities of the Institute, there is a balanced diversity of the outputs including higher and lower quality outputs in adequate proportions. Appreciated are the number of applied results mostly in form of utility models, but there are no licensed patents which would have been expected among 151 applied outputs.	
H1.4	The most valuable discoveries and findings in the fields, their importance for the field
There are no identifiable general discoveries of the Institute. To avoid duplications, the particular discoveries will be discussed for each Team separately.	

H1.5	Contribution of the participation of the authors in large collaborations
Not relevant.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The research outputs and engineering services provided by the Institute have significant relevance to the society in the fields of Civil Engineering safety and security as well as safeguarding of cultural heritage. These activities are consistent with CAS mission and the Institute's strategy plan.	
H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the institute's activity on proper practice in society in the area of social sciences and humanities
The substantial amount of research outputs and services with application in practise shows the usefulness for society.	
H2.3	Relation to practice
The high number of small contracts with industrial partners indicates an adequate relation of Institute's activities to practise.	
H2.4	Participation in AV21 strategy
In the evaluated period, the Institute was not part of the Strategy AV21 program. However, it initiated a program that reflects the Institute's mission and with partners from other CAS institutes prepared a new project entitled "The City as a Laboratory of Change: Buildings, Cultural Heritage and Environment for a Safe and Valuable Life". It is intended to integrate this project in the AV21 strategy.	
H2.5	Cooperation with regions of the Czech Republic
There is substantial cooperation with regional institutions in all areas of Civil Engineering and Cultural Heritage covered by the Institute.	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the teams and the institute with similar international and national institutes
There are not many institutes of comparable size to be found, and most of them are in the Russian Federation. The research topics covered by ITAM are internationally in many cases represented by the Theoretical and Applied Mechanics groups of larger institutes, such as e.g. BAM, Germany, or INSA Lyon, France.	
D1.2	Scope and quality of international and national cooperation and the role of the institute in such cooperation; engagement in broad international cooperation

The activities towards international and national cooperation are strong including common projects, cooperation on specified topics, exchange of researchers, educational activities, and national and international personal contacts.	
D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
The participation of the workers of the Institute in scientific community activities is quite extensive.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
The strategy plan for the next evaluation period partially follows the predetermined directions from the last period and addresses some new perspective directions which assure the consistency and sustainability of the research activities.	
D2.2	Assessment of the previous research objectives and their achievement
In line with its mission, the Institute has successfully implemented the recommendations of the last evaluation period and strengthened its national and international cooperation. The research infrastructure in Telč is now fully integrated in the Institute including institutional funding.	
D2.3	Assessment of implementation of recommendations from past evaluation
See D2.2.	
D2.4	Success in receiving grants
The funding of the Institute through grants represents approximately half of the budget and the success rate of receiving grants is claimed to be around 60%, which is very satisfactory.	
D2.5	Adequacy of instrumental equipment
From the documentation and presentations, the laboratory spaces and the equipment are adequate for the research topics of the Institute. Most equipment seems to be rather standard, but there are several specialities such as a climatic wind tunnel with an atmospheric boundary layer, and a radiographic laboratory with X-ray micro-tomography and neutron tomography.	
D2.6	Effectiveness of management
Considering the wide range of research and service activities, the effectiveness of the Institute's management can be considered as successful.	
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
The HR strategy of the Institute is well designed, and the self-evaluation process run for each worker every five years identifies the best scientists. The continuous education strategy very well addresses the career and qualification growth of workers.	
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
The work-life balance conditions seem to be standard, and the ratio of man to woman workers with 2.5:1 does not indicate specific gender issues at present.	

D2.9	Relation of the institute with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
Not relevant.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
The cooperation with universities at the national and international level can be considered as adequate.	
D3.2	Effectiveness of joint research centres
The joint research centre with Masaryk University's Central European Centre for Cultural Heritage in Telč creates a well-balanced platform for scientist and educators to perform common activities profitable for both sides. From the point of view of the Institute, the centre provides access to a larger group of students working in this research field and thus extending the choice options for recruiting research staff for new common project proposals.	
D3.3	Success rate in supervision of PhD students
Within the evaluation period, only one PhD defence is reported. However, the success in recruiting new PhD students and post-docs seems to be adequate, and this category represents approximately one third of the research staff of the Institute.	
D3.4	Participation of PhD students in the outputs
No comment possible.	
D3.5	Participation of the institute in master or bachelor studies
Active participation of the Institute in master studies. Participation in bachelor studies has room for improvement.	
D3.6	Assessment of cooperation intensity with universities in the form of teaching
Cooperation in form of joint projects, research centres and education activities is quite extensive.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
The research popularisation activities of the Institute workers can be considered as generally adequate. Popularization activities using modern media, such as YouTube, TV or radio could be used in order to increase the awareness of the general public to the research activities of the Institute and their relevance to society.	
D4.2	Publishing activities and its quality

Quite a number of outreach publishing activities have been reported in the evaluation period, but their quality is not directly assessable.	
D4.3	Participation in professional organisations in the area of research and development
A number of members of each team participate in professional organizations, and therefore participation of the Institute in professional organisations may be considered as satisfactory.	

Other comments of the commission:

The Institute might consider establishing a strategy encouraging new fields of research in line with the mission of the Institute, e.g. by setting aside (institutional) start-up funds for new research topics.

Due to the expected continuing limitations of institutional funding, the Institute might consider professionalizing project administration, e.g. by establishing a project initiation and administration office as well as an Intellectual Property (IP) policy.

PhD students are very important in generating research results and they participate actively in publications. Therefore, intensifying the cooperation with universities in joint or shared supervision of PhD students should be considered.

Concerning characterization of materials of heritage buildings, cooperation with the Institute of Geonics, Team 1 “Laboratory Research on Geomaterials”, is encouraged.

Concluding Remark: The Commission is aware of the fact that virtual site visits cannot replace person-to-person meetings. Nevertheless, based on the documentation provided and the virtual site visits, the Commission has made every effort to arrive at an objective and comprehensive Evaluation of the Institute.

Part B: Evaluation of teams

1. Theoretical and Applied Mechanics

Strengths:

Very consistent team with good academic and professional background in Civil Engineering, clear strategy and strong links to industrial as well as academic partners in the field. Well-equipped experimental facilities including special equipment guarantees demand of specific experimental investigations by existing and new cooperation partners.

Weaknesses:

Rather wide portfolio of activities with engineering service for society, which makes it difficult to focus on fundamental research problems of Applied Mechanics; and this may not allow to fully exploit the Team's potential of highly experienced scientists.

Opportunities:

Active membership in the AV21 strategy ("City as a Laboratory of Change") in the next evaluation period can open up new opportunities of national and international cooperation.

Threats:

Declining number of (PhD) students in Civil Engineering may be a long-term threat to maintain the professional quality of the Team. Renewal and necessary upgrading of large-scale equipment will require significant investment.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
The results of Phase I evaluation indicate excellent overall quality of the outputs which is very satisfactory.	
H1.2	Contribution of workers on the outputs reached
The results of Phase I indicate a high contribution of workers as well as good collaboration with national and international colleagues which is highly appreciated.	
H1.3	Quality of all outputs and results
Taking the publications in journals, books, conference papers, and the applied outputs together, a high overall quality of the outputs is evident.	
H1.4	The most valuable discoveries and findings in the fields, their importance for the field
Contributions of the Team to safety research in Civil Engineering are of great importance for the field and are even more significant for society. The most valuable discoveries appreciated by the scientific community are related to analyses of physical properties of construction elements and systems. The standard for the determination of a technical seismicity load and for the response of civil and engineering structures in areas with the occurrence of seismic shocks in the Czech Republic is also an important result.	
H1.5	Contribution of the participation of the authors in large collaborations
Not relevant.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
<p>The largest impact on society may be attributed to the area of safety research of the Team, but other activities regarding the impact of wind and seismic shocks on building structures, as well as forensic and general Civil Engineering services play their part in the societal relevance of the results. These activities are consistent with CAS mission and the Institute's strategy plan.</p>	
H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities
<p>Considering the large number of applied results, the knowledge transfer towards practical application is documented as well as its usefulness for society.</p>	
H2.3	Relation to practice
<p>A large number of small contracts with industrial partners indicates a good relation of the Team's research to practice.</p>	
H2.4	Participation in AV21 strategy
<p>Active membership in the AV21 strategy ("City as a Laboratory of Change") is expected in the next evaluation period and can open up new opportunities of national and international cooperation.</p>	
H2.5	Cooperation with regions of the Czech Republic
<p>There is substantial cooperation with regional institutions in all areas of Civil Engineering. Also, collaboration of the team members with national universities is documented.</p>	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
<p>The Team is part the Institute. See D1.1 of Institute Evaluation.</p>	
D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
<p>Strong cooperation at the national level with universities and industrial partners. International cooperation on specific research topics is documented.</p>	
D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
<p>Scientific community activities of team members are satisfying and very much appreciated.</p>	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
The activity plan for the next evaluation period continues partially in the same directions as in the last period and is building on the results achieved, but also recognizes some new perspective directions. The planned research directions will ensure the continuity and sustainability of the research activities.	
D2.2	Assessment of the previous research objectives and their achievement
Judging from the achieved results it may be concluded that the previous research objectives were mostly achieved.	
D2.3	Assessment of implementation of recommendations from past evaluation
The recommendations from previous evaluation were largely followed and have been implemented.	
D2.4	Success in receiving grants
The success of the Team in receiving grants is lower than in the case of the other teams of the Institute even when the number of experienced researchers in the Team is the most favourable. With such potential, grants with higher funding (by national and international projects) would have been expected.	
D2.5	Adequacy of instrumental equipment
Not enough information has been found in the documentation to comment on the specific equipment of the Team. See general comment D2.5 on the institutional level.	
D2.6	Effectiveness of management
The management efficiency seems to be on a very good level considering the achieved results, publications and the service activities of the Team.	
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
The HR strategy of the Team follows the strategy set on the institutional level.	
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
Work-life balance conditions are managed on institutional level. Team 1 has the lowest ratio of female to male researchers and may encounter gender issues in the future. However, pushing the gender balance issues (if the number of university female graduates is low) on the Institute or Team level can generate another misbalance in terms of the quality and equality of job opportunities.	
D2.9	Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
Not relevant.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
Scope of the cooperation with national and international universities is satisfactory and includes common projects, educational activities, study stays as well as individual personal cooperation.	
D3.2	Effectiveness of joint research centres
Not applicable.	
D3.3	Success rate in supervision of PhD students
Within the evaluation period, only one PhD defence is reported. However, the success in recruiting PhD students and post-docs for participation in Institute's research activities seems to be adequate but needs to be extended in the future.	
D3.4	Participation of PhD students in the outputs
The involvement of PhD students into the research activities is satisfactory with their adequate participation in the outputs.	
D3.5	Participation of the team in master or bachelor studies
The educational activities in master and bachelor studies are adequate and are highly appreciated.	
D3.6	Assessment of cooperation intensity with universities in the form of teaching
From the numbers provided, the cooperation intensity with universities is adequate and the number of students addressed by the team members is quite high. Therefore, a solid basis exists for recruiting more (PhD) students for the research of the Team.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Several outreach activities towards area of research popularisation are well addressed to a wide spectrum of public including scholars in secondary schools, which indicates a good media strategy of the Team.	
D4.2	Publishing activities and its quality
The publishing activity is adequate and uses a wide range of media potentials including videos, newspapers, courses, and expositions. Based on the satisfying research publications of the team members, the publishing activities are expected to be of the same quality level.	
D4.3	Participation in professional organisations in the area of research and development
The team members adequately participate in professional organizations, mainly as members of advisory boards or reviewers in organisations such as journals, conferences, and universities.	

Other comments of the commission:

The Team is conducting research according to the Institute's mission, and it forms a compact research unit with clearly defined strategy and research directions.

2. Material Science

Strengths:

Team of young enthusiastic researchers, not strongly adhered to any specific research directions. Broad and strong experimental expertise addressing new challenges, from neutron scattering to 4D microCT and techniques for in-situ testing of materials. Very good international contacts and collaborations. Successful in getting grants and attracting students.

Weaknesses:

Not much collaboration with other institutes of CAS, e.g. ISI or internationally.

Opportunities:

Large potential for cooperation with industry in various sectors, such as building materials, glass and ceramics.

Threats:

The team might not be able to establish itself as a leader in the above research activities due to a high competitiveness and lack of fundamental research expertise. International and national cooperation is important to provide a peer review of research activities, which could be marginalised in a longer term.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
The quality of selected results (excellent output 1+2) is above the national average in this field (Materials Engineering).	
H1.2	Contribution of workers on the outputs reached
Members of the group contributed to the output; however, the productivity per FTE and FC is below average.	
H1.3	Quality of all outputs and results
The team covers a wide range of expertise, from experimental techniques to modelling, focusing on two areas: (1) the mechanical characteristics of biological materials and artificial biocompatible structures (Department of Biomechanics) and (2) building materials (Department of Materials Research); the main output is publications: 79 articles in journals with impact factor (some of excellent quality), 2 books and 19 chapters in books, 94 conference proceedings, one national and one European patent (two patent applications pending), and 46 other applied results.	
H1.4	The most valuable discoveries and findings in the fields, their importance for the field
The team operates several labs, including X-ray radiography, with a focus on 4D micro-CT (including custom-made parts). The team reports the following results to be the most important: (1) the multiscale modelling of cementitious materials, linking microstructure to mechanical properties, e.g. study of reaction kinetics in acid-base cements, (2) the determination of mechanical and microstructural properties of artificial biocompatible structures used in regenerative medicine, e.g. deformation analysis of bone scaffolds, and (3) the development of hardware and software tools for 4D microCT. The results are relevant for the field.	
H1.5	Contribution of the participation of the authors in large collaborations

Not applicable.

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The research of biological materials and artificial biocompatible structures and of building materials, both traditional (e.g. regarding the conservation of historic materials) and modern, are highly relevant for society.	
H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities
Contribution to the general knowledge about materials.	
H2.3	Relation to practice
Limited collaboration with industry, some contacts to clinical research partners and hospitals.	
H2.4	Participation in AV21 strategy
Not explicitly addressed	
H2.5	Cooperation with regions of the Czech Republic
Collaborations with local universities	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
Because of the quality of their publications, the list of ongoing projects and the collaborating partners, the team has a high standing in the community.	
D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
The team is embedded in several active national and international networks where team members play a crucial role (e.g. Competence Center for High-Resolution 3D X-ray Imaging, The International Union of Laboratories and Experts in Construction Materials, Systems and Structures).	
D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
Members of the team serve on numerous scientific committees, organized one symposium and co-organized two; they gave three invited talks.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
The major research direction is the multiscale modelling of cementitious materials, the determination of their mechanical and microstructural properties (including artificial biocompatible structures) and the development of hardware and software tools for 4D microCT. The planned future activities follow this direction; extending the material studies to soft tissue and cells.	
D2.2	Assessment of the previous research objectives and their achievement
The previous research objectives were well focused, following the major research direction, and good, even excellent results were achieved. Excellent use of European research facilities (synchrotron light and neutron sources).	
D2.3	Assessment of implementation of recommendations from past evaluation
The team has addressed the assessments or the previous evaluation and has tried to increase the number of team members and has filed several patent applications.	
D2.4	Success in receiving grants
The team seems to be very successful in attracting national grants from MEYS, TACR, CSF and the Ministry of Culture of the Czech Republic, as well as the European JPI on Cultural Heritage and Global Change. Nearly 2/3 of the budget is covered by projects.	
D2.5	Adequacy of instrumental equipment
The equipment is adequate, mainly XCT and microCT systems; X-ray diffraction, SEM, Micro Raman and Infrared spectroscopy, various chemical analysis tools.	
D2.6	Effectiveness of management
Good and efficient teamwork	
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
The team seems to be well structured, consisting of two departments with well-defined responsibilities. The age structure is good, several experienced and many young team members. There are 3 females among 11 researchers.	
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
See D2.7	
D2.9	Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
Not explicitly addressed.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
Intensive collaboration with universities on national (2) and international (14) level	
D3.2	Effectiveness of joint research centres
Membership in RILEM (The International Union of Laboratories and Experts in Construction Materials, Systems and Structures), member of the Competence Center for High-Resolution 3D X-ray Imaging, participation in the European Research Infrastructure Consortium in the fields of materials, biomaterials and nanotechnology, including the Institute Laue-Langevin, the European neutron facility (France) and the Elettra Synchrotron facility (Italy); collaboration with research centres (Hungarian Academy of Sciences, Budapest Neutron Centre, National Academy of Sciences of Belarus, Bundesanstalt für Materialforschung und –prüfung (Germany)).	
D3.3	Success rate in supervision of PhD students
Several (about 8) PhD students, one has defended her thesis during the evaluation period This may indicate a low completion rate.	
D3.4	Participation of PhD students in the outputs
All PhD students contributed significantly to publications.	
D3.5	Participation of the team in master or bachelor studies
Supervision of four bachelor and two master students.	
D3.6	Assessment of cooperation intensity with universities in the form of teaching
Members of the team taught 5 courses at bachelor and master level at CTU.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
Activities include publishing in popular magazines, using social networks and YouTube channels, participating in “open science” programs and monitoring short-term internships.	
D4.2	Publishing activities and its quality
Two publications for the general public	
D4.3	Participation in professional organisations in the area of research and development
Team members serve on various technical, research and science foundation committees and boards, as evaluators for ministries and are (guest) editors for scientific journals.	

Other comments of the commission:

The Team has a clear plan for future activities, both in terms of improving the experimental techniques and in addressing interesting novel research topics; extending the microstructure studies to soft tissue and cell imaging will require some effort to become competitive.

3. Applied Sciences for Cultural Heritage

Strengths:

Multidisciplinary team, unique expertise, extensive international research cooperation, unique experimental facilities, good grant success rate.

Weaknesses:

Relatively low publication rate and lowly rated quality of research articles.

Opportunities:

The importance of Cultural Heritage conservation, restoration and reconstruction is likely to increase in the future, offering interesting international cooperation opportunities.

Threats:

No threats have been identified.

Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
The quality of outputs is quite low and below the average national level. This could be related to the nature of the research activities, which are largely focusing on the solution of very applied or practical problems (e.g. diagnostics and conservation).	
H1.2	Contribution of workers on the outputs reached
No comment.	
H1.3	Quality of all outputs and results
The overall quality of research is good despite the low quality of the selected outputs (as evaluated in Phase I). The latter can be partially explained by the lack of the avenues for publication of heritage science papers in highly ranked journals, especially journals with high IF.	
H1.4	The most valuable discoveries and findings in the fields, their importance for the field
The Team claims that a new method of direct determination of the mechanical characteristics of degraded wood is “a breakthrough in the diagnostics of timber structures”. This might be an exaggeration. The method is similar to other developments and cannot be considered as highly original. It is more an adaptation of known experimental techniques/principles.	
H1.5	Contribution of the participation of the authors in large collaborations
Not relevant.	

Main criterion: 2. Societal relevance (H2.1-H2.5)

H2.1	Societal relevance of outputs and results pursuant to CAS and institute mission
The research has a high societal relevance and it is in line with the Institute mission.	

H2.2	System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team’s activity on proper practice in society in the area of social sciences and humanities
The Team is very successful in transferring knowledge into practice. The research has a significant impact on social sciences and humanities.	
H2.3	Relation to practice
The Team develops methods for safeguarding of cultural heritage assets and historical buildings as well as methods for diagnostics and risk mitigation, all of which have a direct relevance to practice and are very important for conservation of cultural heritage. The latter has also a direct impact on the Czech economy, part of which depends on tourism.	
H2.4	Participation in AV21 strategy
Active membership in the AV21 strategy (“City as a Laboratory of Change”) is expected in the next evaluation period and can open up new opportunities of national and international cooperation.	
H2.5	Cooperation with regions of the Czech Republic
The field of research addresses many historical sites of the Czech Republic as well as across Central Europe (e.g. Italy, Austria, etc.).	

Further criterion: 1. Position in international and national context (D1.1-D1.3)

D1.1	Comparison of the team with similar international and national institutes
The Team is competitive with similar international institutes. The team is recognised for its research both nationally and internationally.	
D1.2	Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation
<p>Very wide national and international collaboration including ČVUT in Prague, UK Prague, Mendel University Brno, UP FR Litomyšl, VUT Brno and around 50 international universities/research centres.</p> <p>For example, in the EC Horizon 2020 E-RIHS PP (European Research Infrastructure of Heritage Science) project, the Team is cooperating with the leading institutions in the field. Close collaboration with CNR Italy, the Royal Institute for Cultural Heritage (KIK-IRPA) Belgium, the Cyprus Institute, CSIC Madrid Spain, CNRS Paris France, the Israel Antiquities Authority, the German Archaeological Institute, LNEC Portugal, UCL UK, the Institute of the Protection of Cultural Heritage in Slovenia, CERIC ERIC, the Foundation for Research and Technology Hellas and RCE in the Netherlands is noted.</p>	
D1.3	Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)
During the assessed period, the Team participated in the organization of several conferences and workshops. Team members presented several invited lectures and received several prestigious awards.	

Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

D2.1	Direction in line with the perspective of the planned research directions
Directions are well aligned with the planned research activities of the Institute.	
D2.2	Assessment of the previous research objectives and their achievement
All objectives set for 2015-2019 have been achieved including the development of new methods and techniques, long monitoring campaigns, grants, financial support, etc.	
D2.3	Assessment of implementation of recommendations from past evaluation
Only a few specific recommendations concerning the TASCH team were provided during the previous evaluation. The quality of publications was one of the main comments, which was apparently difficult to address, see H1.1 and H1.3. Another main recommendation (to gain financial support) has been well achieved.	
D2.4	Success in receiving grants
The Team was very successful in acquiring national and international competitive grants. The Team reports 9 national and 7 international grants with funding of over 4M EUR.	
D2.5	Adequacy of instrumental equipment
The Team has a very good experimental infrastructure, including a unique X-ray computer tomography facility. The Team operates several specialized labs with good and direct access to a variety of experimental tools/instruments.	
D2.6	Effectiveness of management
The management seems to be quite effective in many aspects, including international collaborations, grants, developments, and projects. A significant growth in these areas is documented over the evaluation period, which is very encouraging.	
D2.7	Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth
It is difficult to evaluate the professional structure as the research fields are very diverse. The age structure of the Team is good. It seems that the Team is inspired by the work. However, the Team experiences difficulties in “finding the right skilful candidates”. The management developed “a career plan and a motivational wage system based on annual evaluation results (to) encourage staff to upgrade their skills”. TASCH also encourages its staff to teach at national and foreign universities, to attend workshop/courses, etc.	
D2.8	Creating work-life balance conditions, assessment of approach towards possible gender issues
There are no issues found during the present evaluation.	
D2.9	Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.
Not applicable.	

Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

D3.1	Scope of cooperation with universities on national and international level
The scope includes joint grants, commercial projects, and research publications, as demonstrated in the documents submitted for the evaluation.	
D3.2	Effectiveness of joint research centres
TASCH is involved in joint research with the Masaryk University in the “Central European Centre for Cultural Heritage in Telč”. The team is also involved in joint educational activities. However, there is not much information regarding the effectiveness of the joint research centres and there are no benchmarks to compare with.	
D3.3	Success rate in supervision of PhD students
Despite a good involvement into publishing (more than one third of all TASCH’s outputs), only one PhD completion is reported in the evaluation period. This issue needs to be addressed in the future.	
D3.4	Participation of PhD students in the outputs
PhD students actively participate in research projects, for example, “Telč and Jesuits: The order and its sponsors” (2016–2020) and “Origins and attributes of heritage values of the cities of the Czech Republic” (2016–2020). PhD students participated in of 35 journal articles, 49 international conference papers, 2 national conference papers, 2 chapters of books, 3 books, 5 patents, 4 utility patterns, 9 functioning samples, 1 map, 2 certified methodologies, and development of 1 software product. This represents more than one third of all TASCH’s outputs.	
D3.5	Participation of the team in master or bachelor studies
The participation is well documented and may be limited by the absence of corresponding university degrees and specialisations.	
D3.6	Assessment of cooperation intensity with universities in the form of teaching
Team members actively participate in teaching activities at undergraduate and graduate levels.	

Further criterion: 4. Outreach activities (D4.1-D4.3)

D4.1	Sufficiency of media strategy and activities in the area of research popularisation
The team have presented 20 lectures for the public, 12 books, 3 teaching videos on wood working and diagnostics procedures, on rescue activities in the case of disasters and on medieval triangulation. It has launched a research programme for youth (PATRIMONIA) and prepared 6 temporary or permanent expositions.	
D4.2	Publishing activities and its quality
See comments to D4.1.	

D4.3	Participation in professional organisations in the area of research and development
Very broad participation in professional organisations in the research and development area is documented.	

Other comments of the commission:

The Team has the potential to acquire more funding from national and international grants as well as from collaborative projects with government agencies.

Final report was elaborated by:

Commission 7.2 - Engineering and technology

Evaluated teams No.: 1, 2, 3

Commission Chair: Prof. Dr.-Ing. Manfred H. Wagner

Commission Deputy Chair: Jaroslav Kováč

Commission Members:

Andrei Kotousov

Andrés Fabián Lasagni

Axel Loewe

Jožef Predan

Dieter Roehrich