

# Request for Proposal RFP\_2019\_0172: Seeking Experts in Organic 3D Shape Recognition and Artificial Intelligence

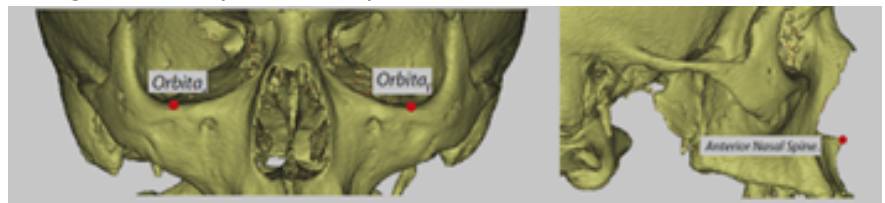
<b>RFP Title</b>	Seeking Experts in Organic 3D Shape Recognition and Artificial Intelligence
<b>Due Date</b>	10/04/2019
<b>Opportunity</b>	Consulting, Contract R&D, supplier agreement, joint development
<b>Timeline</b>	Phase 1 – Candidate interest evaluation (1-2 months) Phase 2 – Expert selection (by end of 2019 early 2020) Phase 3 – Project work (starting early to mid 2020)
<b>Financials</b>	All funding is to be negotiated
<b>RFP Description</b>	NineSigma, representing <b>Ortho Baltic</b> , invites proposals from qualified candidates in the fields of organic 3D shape recognition and the fields of artificial intelligence & machine learning suitable for dealing with organic 3D shapes. Selected candidates will participate in compensated consulting activities, with the potential for additional, long-term partnership opportunities in the future.
<b>Background</b>	<p>Ortho Baltic produces more than 10,000 patient-specific medical devices per year. The company has in-house state-of-the art research and manufacturing infrastructures. One of Ortho Baltic's innovations is their 'Medical Implants Customization Engine' (MICE): a patient-specific implants pre-surgery planning system based on 3D models. The system supports the physician in making the right choice for their patient. The physician also updates the database with patient data and their treatment results so that the database continues to grow offering more support for later treatments.</p> <p>Ortho Baltic wants to introduce new functionalities like full automatization of 3D anatomical model segmentation (reconstruction) from computed tomography (CT) images and automated marking of anatomical reference points used for per-surgery planning in respect to a treatment plan. They also plan to include intellectual capabilities like machine learning that make use of the accumulated clinical data to provide extra support to physicians in their pre-surgery planning process.</p> <p>Ortho Baltic is therefore looking for experts in <b>one or more</b> of the 5 following areas:</p> <ol style="list-style-type: none"><li>1. Experts to that can make a review of the state-of-the-art achievements in <u>organic 3D shapes models comparison and recognition</u></li><li>2. Experts that can make <u>a review of existing software</u>, adapt it or develop new software for automated 3D segmentation (reconstruction) based on the computed tomography (CT) images.</li><li>3. Experts that can make a <u>review of existing algorithms, develop new algorithms (or adapt existing) for automatic 3D identification of anatomical reference points</u> for individual components of the human skeleton.</li><li>4. Experts that can help identify those <u>Artificial Intelligence based technologies that are used (or could be used) for recognition of organic 3D shape objects based on biometric data measurements in a combination of structured data describing the medical case (symptoms, diagnosis, treatment, etc.)</u>.</li><li>5. Experts capable to <u>develop a Machine Learning based software module that makes use of the MICE database (consisting of different types of data, e.g.: parameterized clinical data, 3D models, radiological images and other types of data sets) to train itself</u> such that the module</li></ol>

automatically provides rules, concepts and forecast models to the physicians

## Key Success Criteria

## Brief Summary of Expected Tasks

1. Review of state-of-the-art achievements in 3D organic shape recognition to include:
  1. among possible other technologies, fingerprint, iris, 3D facial recognition, CAD systems for radiological imaging diagnostics.
  2. existing projects and products from research institutions and companies, e.g.:
    - 3D face recognition is still an active research field and the review should include leading vendors and comparative analysis of the commercial solutions they are offering, including an analysis of the technologies they apply;
    - CAD systems for radiological imaging diagnostics, the technologies applied like only 2D based or combinations of 2D and 3D, what challenges they meet, what technologies apply, their SWOT analysis;
    - Similarities and fundamental differences between face recognition, radiological imaging diagnostics. Prepare the SWOT analysis for comparison of 2D, 3D and multimodal 2D-3D organic shapes 3D object recognition technologies;
    - list of most relevant research publications, patents & patent applications.
1. Review of existing software applications for automated 3D segmentation (reconstruction) based on the patient CT scan images. The analysis should include:
  1. Evaluation of software automatic reconstruction accuracy for bone reconstruction from CT images in DICOM format
  2. Evaluation of integration options into the MICE system, technologies review, analysis of their strength and weaknesses
1. Review of existing algorithms or developing new algorithms for automatic 3D identification of anatomical reference points designated for measurement or key difference identification between two or more models:
  1. Of interest are identification methods applicable on skull and bones (including intervertebral joints and discs). The anatomical reference points are located on different sides of the bone and in the case of a skull, not only on the outer but also on the inner sides - for example see the figure with 'cephalometric points' on a skull 3D model;



2. Any other 3D object identification algorithm that is possible to adapt to anatomical objects;
3. Review to include the analysis of strength and weaknesses of the identified methods.
4. Able to overcome challenges arising from human skeleton defects like bone voids, fractures, dislocations, tumors and congenital defects
1. Identify AI technologies for recognition of 3D organic shape objects based on biometric data measurements
1. Review in what ways algorithms for identification of biometric data can be integrated with machine learning functionality e.g. by use of artificial neural networks.
2. What challenges are met using such technologies
3. Include strength and weakness analysis

1. Develop a Machine Learning based software module that makes use of the MICE database to train itself such that the module automatically provides rules, concepts and forecast models to the physicians
1. Formalize basic medical knowledge by creating a knowledge database that can be used for initial training of the machine learning module
2. Able to automatically identify anatomical reference point on 3D shapes
3. Capable of auto-generating rules and concepts based on good clinical practice on real patient cases
4. When a patient case cannot be defined by the existing rules provide automated forecast models to guide the physician towards a possible treatment plan
5. Module to become an integral part of the MICE system

**Area of Interest**

Computer Sciences-Applied > Artificial Intelligence  
 Computer Sciences-Theoretical > Algorithms and Data Structures  
 Computer Sciences-Applied > Artificial Intelligence > Machine Learning

**Possible Approaches**

The successful candidate will have demonstrated expertise in one or more of the following:

- 3D shape/object recognition
- Algorithms
- Artificial intelligence
- Machine learning
- Decision support system

**Approaches not of Interest**

Ortho Baltic will consider all approaches provided they respond to the scope and the criteria listed above

**Preferred Collaboration Types**

Consulting  
 Contract Research  
 Joint Development  
 Supply Agreement  
 To Be Negotiated

**Items to be Submitted**

You must respond to at least one of the five areas listed in the background section of this expert search. Please indicate which of these areas you are submitting for. You may respond to more than one area of interest. Your response should not contain any confidential information. Briefly explain the approach to the chosen task and why you feel qualified for it. Include a short overview of the individual or team behind the proposal and expertise in the fields or related fields of interest. Ortho Baltic will evaluate all responses and choose those of greatest interest for direct discussions that could lead to contractual engagement or other commercial arrangements with selected respondent, to develop or adapt promising technologies or approaches. Review tasks will be set-up with stage gate decision points. Development tasks will include a 'proof of concept' phase with the aim to verify that the proposed method has practical potential.

**Award Amount**

**Attachments**

No Files Selected

**Request Number**

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**Picture**

