Project Overview And Exploitable Results

The core product of the PONTE project is the PONTE platform which can support researchers in the generation and testing of hypotheses for drug repositioning trials, evaluation of their scientific validity, guidance and decision support during the preparation of the Clinical Trial Protocol and selection of patients for recruitment. The PONTE platform comprises an integrated product combining several components, which can be exploited each on their own merit.

The exploitable by-products of the PONTE platform are:

- **PONTE Integrated Tools**
  - Semantic search tool – by applying semantic representations of clinical research knowledge onto heterogeneous data sources and supplementing retrieved results through direct Linked Data querying Clinical Trial Protocol authoring tool with advanced decision support for drug repositioning studies and direct linking to literature
  - Query tool linking to healthcare entities’ patient data complemented by mechanisms for data protection

- **PONTE models and mechanisms**
  These are the components, such as software solutions, models, and others, that could be integrated with other systems, e.g.:
  - Semantic Data Models for the test of hypothesis development and design of clinical trials as well as the formulation of the eligibility criteria and their representation into patient healthcare parameters
  - Customised editing tools for enriching the models
  - The individual mechanisms forming the integrated tools mentioned above.

- **Other PONTE outputs**
  These include non-technical outcomes of the project such as legal solutions and others.
# PONTE Platform Components and Licensing

<table>
<thead>
<tr>
<th>Components</th>
<th>Function</th>
<th>Responsible Partner</th>
<th>Availability to Researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tools</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GoPONTE</td>
<td>Intelligent data search tool</td>
<td>TUD</td>
<td>The search engine development during the PONTE project is based on a pre-existing, proprietary license protected framework, provided to PONTE by Transinsight GmbH.</td>
</tr>
<tr>
<td>PAT</td>
<td>Clinical Trial Protocol authoring tool</td>
<td>ICCS/NTUA</td>
<td>Will be available open source</td>
</tr>
<tr>
<td>EHR - CS</td>
<td>Set of mechanisms and models linking to healthcare patient data sources for clinical research querying</td>
<td>ICCS/NTUA</td>
<td>Will be available open source</td>
</tr>
<tr>
<td>DS</td>
<td>Decision Support during study design and patient selection</td>
<td>ICCS/NTUA</td>
<td>Will be available open source</td>
</tr>
<tr>
<td>Security</td>
<td>Access and data protection</td>
<td>CETIC</td>
<td>Will be available open source</td>
</tr>
<tr>
<td>CTP Repository</td>
<td>Stores the clinical trial protocol in a semantic form</td>
<td>CETIC</td>
<td>Will be available open source</td>
</tr>
<tr>
<td>Semantic Mapper</td>
<td>Performs inter-vocabulary translation</td>
<td>CETIC</td>
<td>Will be available open source</td>
</tr>
<tr>
<td>Linked Data Application</td>
<td>A web application that dynamically aggregates information from the Linked Data Cloud based on an ontology</td>
<td>CETIC</td>
<td>Will be available open source</td>
</tr>
<tr>
<td>Ontology Editor</td>
<td>An ontology generation plug-in</td>
<td>TUD</td>
<td>Already available Open Source, distributed with OBO Edit and Protégé.</td>
</tr>
<tr>
<td>OWL2OBO</td>
<td>Transforms ontologies from OWL format into OBO format</td>
<td>CETIC</td>
<td>Will be available open source</td>
</tr>
<tr>
<td><strong>Models</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRO</td>
<td>Hypothesis Research Ontology</td>
<td>CETIC</td>
<td>Will be available open source</td>
</tr>
<tr>
<td>CTP</td>
<td>Clinical Trial Protocol</td>
<td>Model by ICCS/NTUA Ontology version by CETIC</td>
<td>Will be available open source</td>
</tr>
<tr>
<td>Eligibility Criteria</td>
<td>Ontology Model for Eligibility Criteria</td>
<td>ICCS/NTUA</td>
<td>Will be available open source</td>
</tr>
<tr>
<td>Global EHR</td>
<td>Ontology Model for EHR parameters of clinical research interest</td>
<td>ICCS/NTUA</td>
<td>Will be available open source</td>
</tr>
</tbody>
</table>
Roadmaps To Exploitation Of PONTE Results

A) The Intelligent Data Search Tool
The tool performs advanced searches across published findings all over the web (including linked data) through the application of semantic representations of clinical research. The tool is a combination of the GoPONTE search engine with the HRO and the Linked Data Application. Currently it allows searches to be performed across the web via the Yahoo API. Potential stakeholders are able to test-use the tool via the PONTE website registration and discuss it with the partners. For exploitation the tool will be available as a web-based service, that can be accessed from anywhere by registered users. The GoPONTE framework is licensed by Transinsight GmbH and number of retrieved results via the Yahoo API is subject to subscription.

Potential applications:
- In the Drug repositioning industry as a data mining platform
- As a literature search tool in any field of medical research
- Other projects in the field that build on the tool framework

B) The Clinical Trial Protocol Authoring Tool
It features a Clinical Trial Protocol Authoring Tool with advanced decision support for drug repositioning studies. The PONTE Clinical Trial Protocol Authoring Tool is:
- Flexible, allows multiple authors and good tracking of versions
- Linked with the Keeps records of the results of all data base searches and allows to trace back reasons for specific decisions during protocol writing
- Enriched with decision support mechanisms covering automatic questions generation for literature searches and eligibility criteria suggestions
- Setup for ongoing testing and improvements
For test-use the tool can be accessed via the PONTE website after registration. It is provided through a web interface and includes the PAT, DS and the CTP repository, combined with GoPONTE’s web-based service that can be accessed by registered users. The GoPONTE framework is licensed by Transinsight GmbH and number of retrieved results via the Yahoo API is subject to subscription.

Potential applications:
- In the Clinical Trials industry as an intelligent authoring tool
- Other project consortia in the field that would like to build on the results
C) The Healthcare Patient Data Query Tool

This tool encapsulates a series of novel mechanisms and models for translating eligibility criteria of clinical trials into patient data parameters which can be found in healthcare databases is complemented by mechanisms for data protection. The tool has a threefold application in the trial design and recruitment process – a) for the sample estimates as well as for evaluating study site recruitment potential – through the estimation of number of eligible patients per center, b) for the actual selection of eligible patients for recruitment and c) for an automatic, intelligent pre-screening of the selected eligible patients – based on the available data- on the basis of patient safety and study efficacy.

PONTE’s tool facilitates automated search in databases with patient data: hospital data base*, cancer registries*, volunteer registries etc.

* to comply with data protection regulations

Search in databases for recruitment purposes should only be done if the patients have consented to data search of their medical files for research purposes.

It includes the EHR-CS, the DS, the Global EHR ontology, the Eligibility Criteria ontology and the Security. There are no user fees.

Potential applications:

- In the Clinical Trials industry as a recruitment tool
- In the EHR vendor industry as an added functionality to their products
- In health care (management, government, funding authorities) as a heterogeneous data mining tool for statistics and other purposes
- In health research for epidemiological data mining, research, planning
- Other project consortia in the field that would like to build on the results

D) THIRST – the pilot study

This study has the potential to bring groundbreaking evidence for novel treatment of heart failure and to open the doors for further research on the effects of thyroid hormone in a wide range of clinical scenarios

The preliminary results are:

1) treatment with synthetic thyroid hormone replacement therapy with a triiodothyronine analogue (liothyronine, Liotir) is safe and feasible in patients with STEMI both in the acute (in hospital period) and chronic phase (till 6 month after hospital discharge);
2) thyroid hormone therapy appears to reduce infarct size, regional wall motion abnormalities, systolic and diastolic myocardial dysfunction; also neuroendocrine imbalance (in particular noradrenaline pathway) is improved as well as quality of life, cognitive and behavioural status.

These preliminary, but promising results suggest that studies on the role of thyroid hormone treatment in preventing progression of cardiac dysfunction after an acute ischemic cardiac event should be expanded. This would have significant implications for the health care industry and society.