ART-Plan™ Annotate:
AI-powered contours for experts.
Less contouring from experts.

ART-Plan™ has experienced a very high level of acceptance in the different teams of our department, as it saves a lot of valuable time that can be used for complex treatment planning tasks and interdisciplinary discussions.

Prof. Daniela Thorwarth

Head of Biomedical Physics Research at the University of Tübingen, Germany

Thanks to Annotate we were able to standardize the contours across different dosimetrists/radiation oncologists as well as to free up a significant amount of their time that can be dedicated to the planning of patient treatment.

Prof. Vincent Gregoire

Chair of the Radiation Oncology Department at the Centre Léon Bérard, France

ART-Plan™ offers a 5-to 6-fold reduction of the time required for the delineation of organs at risk without any disruption of our usual clinical workflow. Additionally, it guarantees the standardization of annotations, which is crucial for treatment planning, workflow optimization and improvement in patient safety.

Prof. Eric Deutsch

Chair of the Radiation Oncology Department at Gustave Roussy, France

THERAPANACEA
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White paper

Art-Plan™'s Annotate: AI-powered, accurate and fast delineations of more than 100 organs at risk by TheraPanacea

Cancer remains leading cause of mortality and morbidity globally. Radiation therapy is a fundamental component of effective cancer treatment around the world. At least half of cancer patients would undergo radiotherapy at some point over the course of their cancer care.

A vital aspect of the quality of radiation therapy planning is to accurately delineate all organs at risk (OARs) to minimize adverse effects to healthy surrounding tissue and organs. This is a tedious, time-consuming, costly (in terms of both related resources and expertise) task that suffers from inter- and intra-practitioner variability hampering the global effectiveness of the treatment.

Anatomically Preserving Deep learning segmentation with ART-Plan™'s Annotate

With the cutting-edge, AI-powered, automatic tools of ART-Plan™*, users can now greatly optimize and standardize their OAR segmentation process. As such, Annotate, performs fully automatic annotation of CT, CBCT and MR image sets. With the plug-and-play, web-based Annotate software, the user receives a fully, pre-trained machine learning technique that can be utilized to identify more than 100 organs at risk and structures, including lymph-nodes from day one.

Our patent-pending unique technology harnesses a powerful combination of the latest advances in artificial intelligence – bottom-up data-driven deep learning and top-down physician's cognitive perception models - leading to solutions that are robust, generalize well on unseen data, follow international guidelines, and perform equally well to human expert annotators.

ART-Plan™'s usability & performance in clinical practice

Several studies performed on different body sites have shown that our solution can radically speed up (up to a factor of 20) the treatment planning phase while providing accurate delineations that, respecting current guidelines, can be used in most cases for planning without additional modifications [1,2,3,4,5]. A few examples of the clinical acceptability of selected organs covered by Annotate are listed in the table below. For most organs, Annotate was found to produce contours (AI) that are close to (and sometimes even better than) contours performed manually by clinical experts (CE).

	Clinical acceptability (%)	
	AI	**CE**
Eyes	96	98
Optic nerve	98	99
Parotids	96	96
Breast	92	96
Lungs	96	91
Spinal cord	94	76
Thyroid	97	99
Larynx	100	94
Oral cavity	99	94
Mandible	99	97
Brainstem	98	89

In addition to organs at risk, the delineation of lymph nodes at risk of cancer spread is a time-consuming manual task. In Annotate, users can delineate most lymph-nodes for the head-and-neck, breast, and pelvic anatomies. Studies with clinical experts have shown up to 100% acceptability of these contours, further underlining how Annotate can contribute to accelerate and standardize the radiotherapy workflow.

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Frequently Asked Questions:

Q: How will Annotate be integrated to our clinical workflow? Is Annotate a stand-alone product or can it be directly integrated into our current treatment planning system?

A: Annotate can be seamlessly integrated to your existing treatment planning solution (Dicom exchange) – no apparent change of the current practices or additional training needed - or used as a standalone product supporting validation and modifications of the automatically generated contours by our AI-based editing tools.

Q: Do we need to provide data from our center to benefit from Annotate?

A: ART-Plan™ is a «Plug and Play» software. As such, you will receive a fully trained operational solution allowing you to benefit from the speed and efficiency of AI-powered OAR annotation from day one after installation. Zero need of data for our solution, and no exploitation of your data.

Q: Does Annotate support all organs at risk and imaging modalities?

A: Annotate encompasses models corresponding to various body sites including head and neck, breast, abdomen, male and female pelvis, and the brain both for computed tomography and magnetic resonance imaging. Annotate is always improving, and we are always adding new structures. At the moment, Annotate is able to provide AI-powered annotations of more than 100 organs at risk, including lymph nodes.

Q: What is the typical time needed to produce annotation for a single scan?

A: Annotate's running time is approximately 5 seconds per anatomical structure. The exact time for a single scan will depend on the users hardware and the number of structures to be delineated but ranges between 90 and 180 seconds.
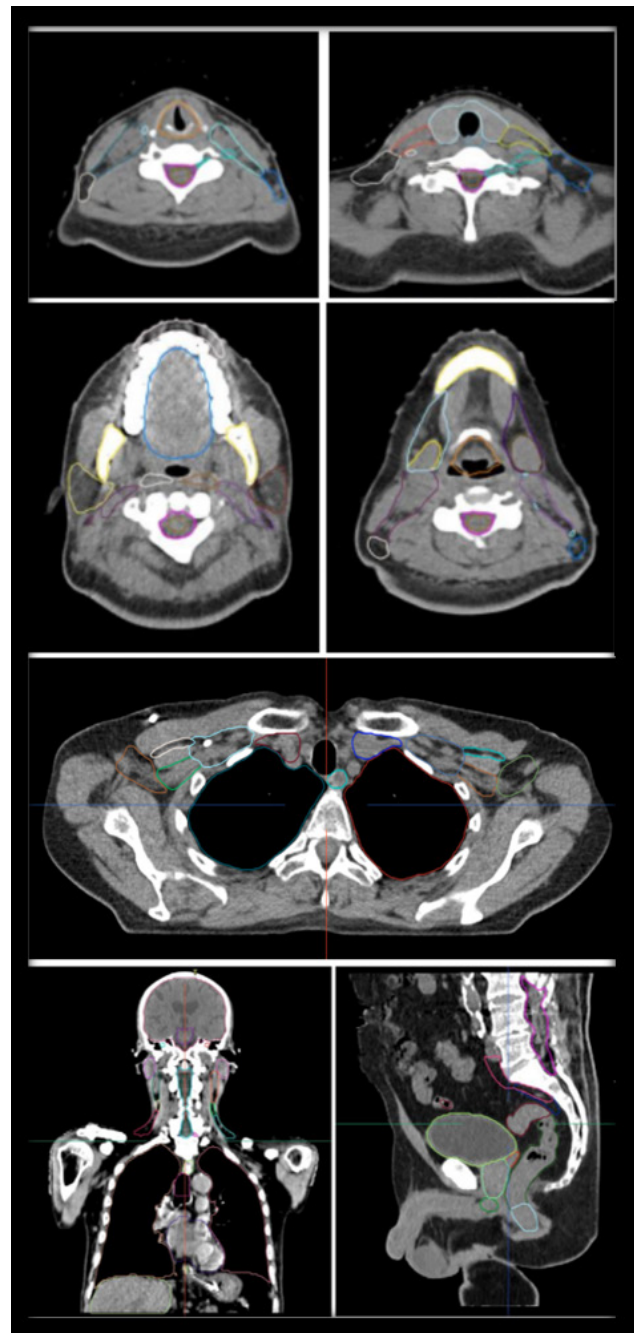
Figure 1 - *Examples of automatic delineation of OARs, lymph nodes and target volumes with Annotate for the head-and-neck, breast, and pelvis anatomies without editing.*

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Q: What is the typical effort behind the corrections of organs at risk annotations?

A: Most users report minimal corrections needed for a handful number of OARs. For instance, a recent head and neck study led by Prof. Vincent Gregoire has found that 98% of Annotate's automatic contours with Annotate were classified as clinically relevant. In comparison, only 96% of the manual contours were judged as clinically acceptable [2].

Q: Is any additional hardware infrastructure needed to deploy Annotate?

A: Currently, you will receive a server to be installed within your internal clinic network. ART-Plan™ is a web-based software with computing resources running on the server. As such, it is accessible from any computer connected to the network of your clinic from day one and results can be pushed to any TPS or PACS system within your hospital network. The only thing you will need is a computer and a web browser. No extra hardware needed. Soon, Annotate will be available over the cloud, further optimizing and streamlining your radiotherapy workflow.

Q: How often are Annotate's models updated and new organs added, and how do we get access to them?

A: Thanks to our especial relationship with our customers and clinical partners, who provide invaluable feedback on the performance of Annotate for the many anatomies it supports, Annotate keeps improving. With every new release (every three to six months), users get access to new models and functionalities.

Q: Can Annotate be used to delineate target volumes?

A: Annotate provides all necessary tools and operators for computer assistant annotation of target volumes. On top of that, we progressively develop target volume delineation models. Currently, our solution supports automatic annotation of brain tumors.

Q: Can Annotate be customized to our own clinical practices? Can new structures be added to Annotate's models using our own data?

A: Annotate is trained internally by TheraPanacea, with the anonymized and GDPR protected data from collaborations with several international cancer centers. The models will not learn from your own data. Of course, if you would like to have it customized to your own needs, we would be happy to discuss this option with you.

* subject to regulatory clearance in some markets

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