AI-driven SaaS platform for clinical trials modeling & prognosis

Jun 2023

PROBLEM

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- **New drug development** poses significant challenges and is a resource-intensive undertaking.
- The **clinical trials** stage carries a considerable risk of failure, with failure rates reaching up to 90%.
- **AI** technology has emerged as a transformative solution capable of expediting the drug development process.
- However, successful implementation of AI requires a **specialized team** of highly qualified professionals, including AI engineers, data scientists, big data analysts, and IT developers.
- The scarcity of highly skilled AI professionals makes it **challenging to assemble** and manage the necessary expertise.
- Hiring and retaining these specialists demands **careful consideration** of recruitment strategies and effective administration.

SOLUTION

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- **OncoUnite**: A game-changing SaaS AI-driven platform for simulating clinical trials
- Harnessing the power of digital twins of patients for precise testing

by

ABOUT THE PRODUCT

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Key Features:

- Gold-standard datasets and state-of-the-art algorithms
- Cutting-edge techniques and proprietary know-how
- Instant generation of digital patients with specific diagnoses
- Testing therapeutic effects of molecules on digital patients

User-Friendly Interface:

- OncoUnite is designed for end-users
- No IT background required to operate the system
- Intuitive interface for seamless user experience

Maximizing Success:

- Utilizing computer experiments to adjust clinical trial protocols
- Optimization of trial protocols for increased success rates

OUR CUSTOMERS

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Venture capital funds

- **Clinical trials virtual modeling**: portfolio success estimation, due diligence of incoming molecules
- **Search for perspective unmet medical needs:** subgroups discovery

BD departments in pharma

- **Market launch modeling**: priority, comparison, revenue forecast
- **RWE/RWD research**: opportunities, competitors analysis, unmet medical needs

R&D facilities in pharma

- **Lab experiments emulation**: PoC, in vitro, in vivo, clinical
- **Biomarkers development**: clarification and correction of the clinical trials protocol

Clinics, CRO, physicians

- **Patient therapy selection**: genomic profiling, biomarkers, targeted and immune drugs,
- **Patient relevance for clinical trials**: outcome forecast

THE ONCOUNITE PRODUCT MODULES

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1. **In-vivo experiment**: digital twins of animals and patients, clinical trials modeling comparative analysis, KM curves, therapy selection
2. **OMICS data processing tool:** interpretation of NGS, transcriptomic, proteomic data – for scientific and clinical purposes
3. **NLP search**: RWE/RWD data from open databases (Pubmed, forums, etc), health records, clinical studies – for proprietary databases creation
4. **Launch forecast**: revenue prognosis, market share prediction, competition analysis

TOP TASKS OF OUR CUSTOMERS

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We offer pre-combined tools from our modules for most popular cases:

1. **Repurposing / retargeting**: patient share, efficacy comparison, biomarker identification
2. **Clinical trials protocol optimization**: virtual CT
3. **Determination of the conditions for the use of the created drug**: search for combinations in which it is optimal to use the developed drug
4. **Patient therapy selection**: targeted and immune drugs, relevance for clinical trials with forecasting
5. **Market launch estimation**: priority, comparison, revenue forecast
6. **RWE/RWD research**: opportunities for new drugs development and sales, analogues and competitors analysis, unmet medical needs

CONTINIOUS COLAB WORK – FOR SUCCESSFUL ITERATIONS

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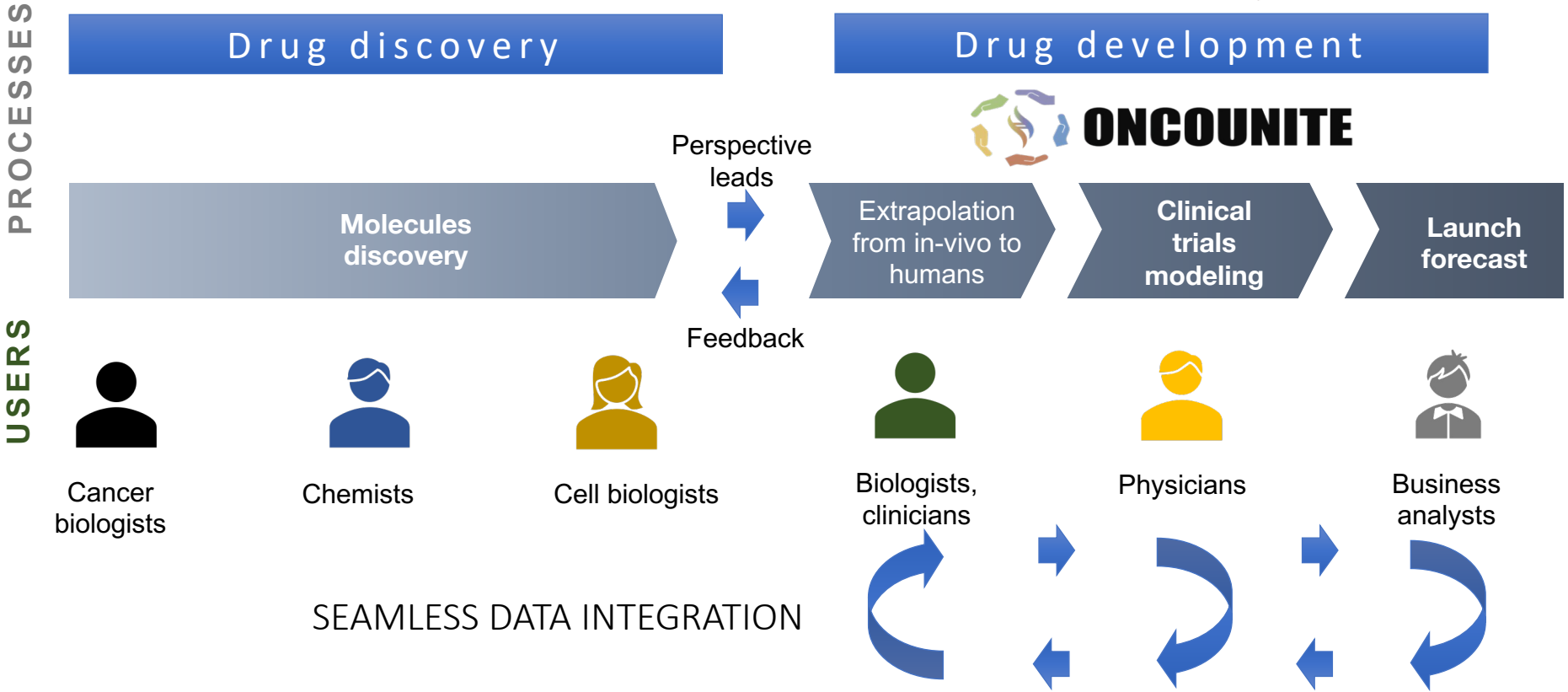

Users are different at each stage, there can be many iterations, and their presence in one process is convenient
OncoUnite unites everyone and realizes the interests of each of them, without the need for integration

SEAMLESS DATA INTEGRATION

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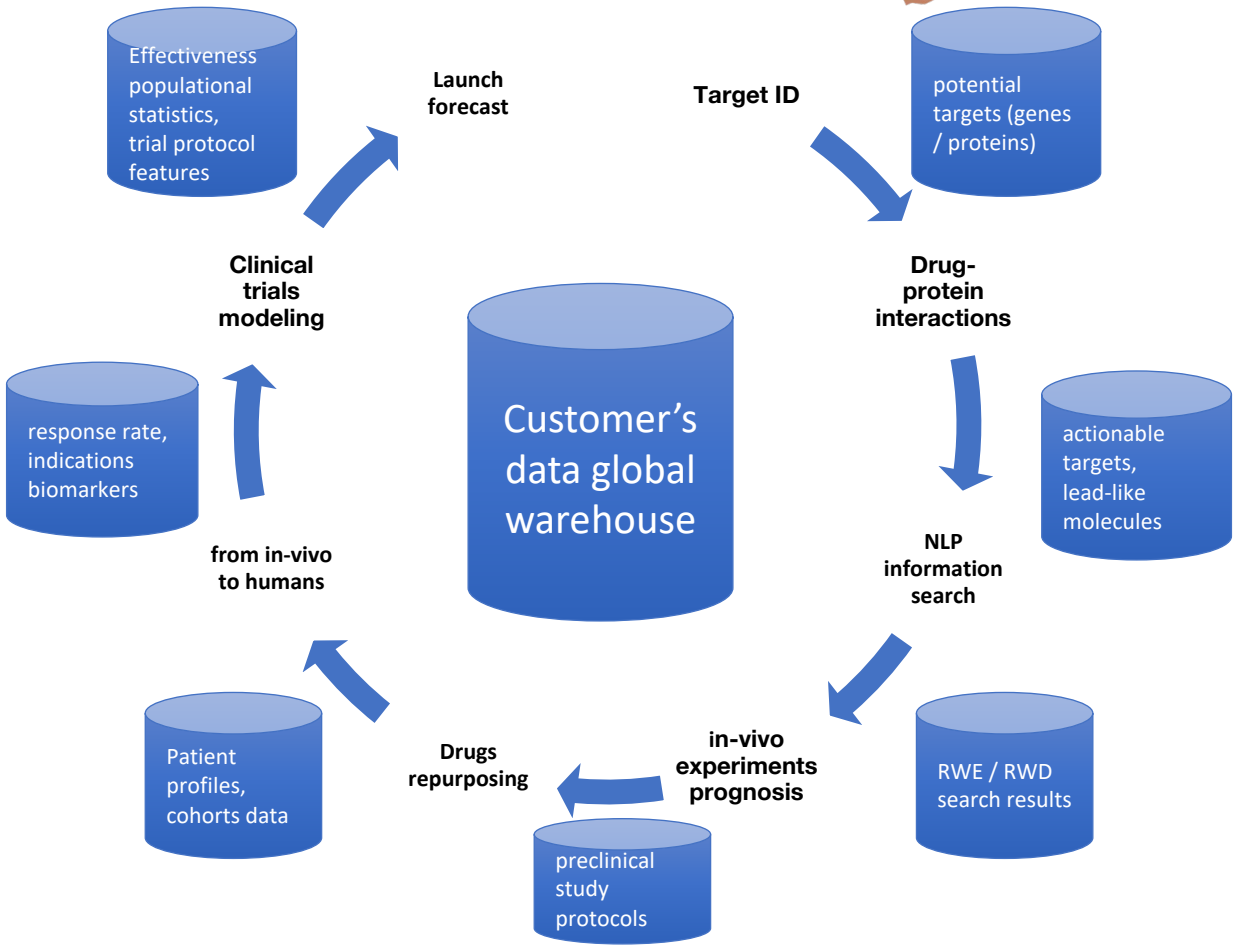
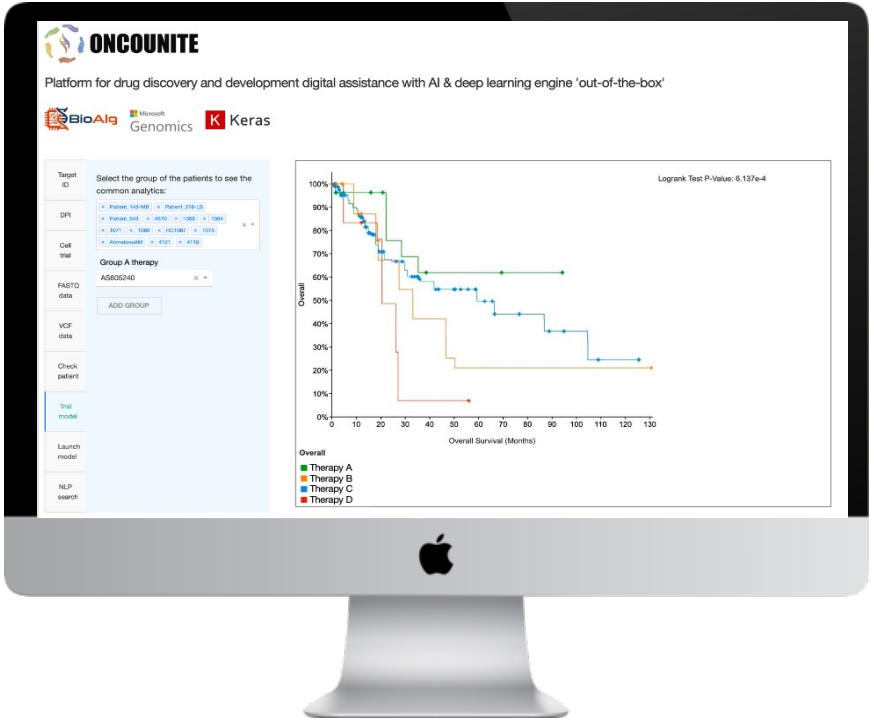
Advantages:

- safe and complete data increases value at acquisition
- no need to integrate different software solutions
- easy transfer of data from stage to stage: data from already conducted digital experiments
- convenient teamwork



CLINICAL TRIALS AI SIMULATION MODULE - VIEW

- Kaplan-Meier curves for given arms
- Response types and rates
- Iterative process
- Automated search for optimal conditions



NOVELTY

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- **"End user platform"**: Designed directly for pharmaceutical industry professionals - No IT or bioinformatical experience required.

- **Seamless SaaS solution**: Eliminating technical issues and complexities.

- **"Turn-key" approach**: Save time and resources with pre-configured modules, no installation required.

- **Enhancing predictive capabilities**: Empowering users to incorporate additional user-owned data for improved accuracy and quality of predictions.

TRACTION

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- Contracts for drug development AI support with big pharma:
- Contract for patients modeling with clinical cancer center
- B2C solution for patients for cancer therapy selection: over 4000 sales
- Microsoft Technology Partner status

ULTIMATE ADVANTAGES: WHY CHOOSE OUR PRODUCT?

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Time advantage:

- we have already tested a large number of hypotheses, choosing only working ones
- proprietary knowledge base: all the necessary databases are already collected in one place and formatted properly
- tested usability was successfully used by numerous clients

Expenses advantages:

- no need to create a department of AI engineers and developers, for a development and R&D process lasting at least a year

Complexity of creation “in-house” alternative:

- many different ways of implementation: data representation and fine tuning input parameters
- well-coordinated pipeline: algorithms that fits to each other

USAGE

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Use **OncoUnite** for:

- **Populational analysis:** perspective niches, unmet medical need
- **Clinical trials planning:** prediction of success rate, discovery of weak points in protocol
- **Relevance** of the patient to the trial
- **Trial protocol optimization** after "in-silico" tests
- **Drugs repurposing** based on historical and fundamental data

WHAT'S INSIDE

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Data bases of drugs registered for particular disease

Case studies based on publicly available data bases (TCGA)

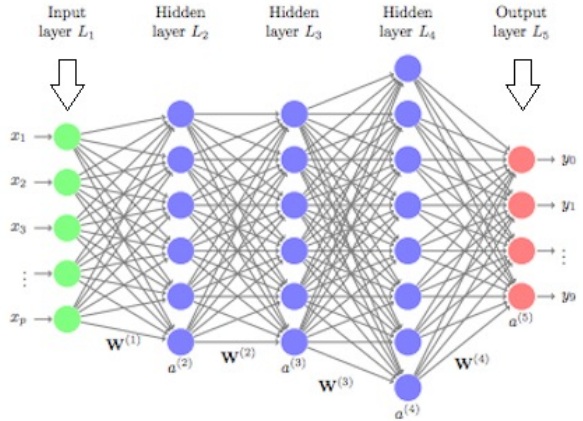
Cell lines with genomic profiles (CCLE, GDSC)

Biological mechanisms of the cell (NLP & NER search)

Sources

FDA COSMIC Catalogue Of Somatic Mutations In Cancer PubMed ClinVar VeP Functional Analysis Through Hidden Markov Models

Models: deep learning neural networks



THE CORE TEAM

ONCOUNITE

Dima, PhD in Tech

CEO

- Bio-mathematician
- Entrepreneur in innovations
- 15 yrs in data science
- 17 papers on AI & cancer genomics

Seva, PhD in Bio

CSO

- Biochemistry scientist
- 12 yrs in cell & molecular biology
- 50+ papers on cancer biology and drug discovery

PUBLICATIONS

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Hematological ONCOLOGY

SUPPLEMENT ABSTRACT | Free Access

DEEP LEARNING TO PREDICT THE EFFECT OF DRUGS IN PATIENTS WITH LYMPHOMA BASED ON CELL LINE DATA

D. K. Chebanov, I. N. Mikhaylova, N. S. Tatevosova

First published: 17 June 2021 | https://doi.org/10.1002/hon.82_2881

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Poster Presentations - Proffered Abstracts

Abstract PO086: Method for predicting the effectiveness of the developed immune dendritic cell vaccine in melanoma patients based on cell surface antigens and machin learning with non-classical logic

Dmitrii K. Chebanov, Irina N. Mikhaylova, and Nadezhda S. Tatevosova

DOI: 10.1158/2326-6074.TUMMM20-PO086 Published February 2021

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Abstract A32: Identifying actionable pathway malfunction scores with ML algorithm for omics data

Dmitrii Chebanov, Nadezhda Tatevosova, and Irina Mikhaylova

DOI: 10.1158/1538-7445.MVC2020-A32 Published April 2020

ISSN 0005-1055, Automatic Documentation and Mathematical Linguistics, 2020, Vol. 54, No. 5, pp. 255–259. © Allerton Press, Inc., 2020.
Russian Text © The Author(s), 2020, published in Nauchno-Tekhnicheskaya Informatsiya, Seriya 2: Informatsionnye Protsessy i Sistemy, 2020, No. 9, pp. 00000–00000.

INTELLIGENT SYSTEMS

On the Methods of Artificial Intelligence for Analysis of Oncological Data

D. K. Chebanov[a, *] and I. N. Mikhaylova[b, **]

Oncotarget

Online ISSN: 1949-2553

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Oncotarget. 2018; 9:24381-24390. https://doi.org/10.18632/oncotarget.25274

Metrics: HTML 45 views

Irina N. Mikhaylova[1], Irina Zh. Shubina[1], George Z. Chkadua[1], Natalia N. Petenko[1], Lidia F. Morozova[1], Olga S. Burova[1], Robert Sh. Beabealashvili[2], Kermen A. Parsunkova[3], Natalia V. Balatskaya[4], Dmitrii K. Chebanov[5], Vadim I. Pospelov[6], Valeria V. Nazarova[1], Anastasia S. Vinova[1], Evgeny A. Cheremushkin[1], Alvina A. Molodyk[1], Mikhail V. Kiselevsky[1] and Lev V. Demidov[1]

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[4]Department of Immunology and Virology, Moscow Helmholtz Research Institute of Eye Diseases, Moscow, Russia
[5]RUDN University, Moscow, Russia

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Abstract PO-045: Machine learning for predicting overall survival using whole exome DNA and gene expression data and analyzing the significance of features

Dmitrii K. Chebanov, Nadezhda S. Tatevosova, and Irina N. Mikhaylova

DOI: 10.1158/1557-3265.ADI21-PO-045 Published March 2021

ISSN 0005-1055, Automatic Documentation and Mathematical Linguistics, 2019, Vol. 53, No. 5, pp. 283–287. © Allerton Press, Inc., 2019.
Russian Text © The Author(s), 2019, published in Nauchno-Tekhnicheskaya Informatsiya, Seriya 2: Informatsionnye Protsessy i Sistemy, 2019, No. 10, pp. 00000–00000.

THE JSM METHOD OF AUTOMATED RESEARCH SUPPORT AND ITS APPLICATION IN INTELLIGENT SYSTEMS FOR MEDICINE

Intellectual Mining of Patient Data with Melanoma for Identification of Disease Markers and Critical Genes

D. K. Chebanov[a, *] and I. N. Mikhaylova[b, **]

Springer Link

Published: 20 October 2021

Detection of the PRAME Protein on the Surface of Melanoma Cells Using a Fluorescently Labeled Monoclonal Antibody

K. A. Sapozhnikova, A. V. Misyurin, N. B. Pestov, E. G. Meleshkina, S. D. Oreshkov, E. P. Ganzhula, A. S. Mikhailova, V. A. Korshun, V. A. Misyurin & V. A. Brylev

Russian Journal of Bioorganic Chemistry **47**, 1077–1085 (2021) | Cite this article

75 Accesses | 1 Citations | 1 Altmetric | Metrics

International Journal of *Molecular Sciences*

MDPI

Article

Sensitive Immunofluorescent Detection of the PRAME Antigen Using a Practical Antibody Conjugation Approach

Ksenia A. Sapozhnikova [1], Vsevolod A. Misyurin [2], Dmitry Y. Ryazantsev [1], Egor A. Kokin [1], Yulia P. Finashutina [2], Anastasiya V. Alexeeva [3], Igor A. Ivanov [1], Milita V. Kocharovskaya [1,4], Nataliya A. Tikhonova [5], Galina P. Popova [1], Vera A. Alferova [1,6], Alexey V. Ustinov [1], Vladimir A. Korshun [1,*] and Vladimir A. Brylev [1,*]

ELSEVIER

Pathology - Research and Practice

Volume 217, January 2021, 153214

Biological features of tissue and bone sarcomas investigated using an *in vitro* model of clonal selection

N.A. Avdonkina (Avdonkina.Natalia) [a], A.B. Danilova [a], V.A. Misyurin [b], E.A. Prosekina [a], D.V. Girdyuk [a], N.V. Emelyanova [a], T.L. Nekhaeva [a], G.I. Gafton [a], I.A. Baldueva [a]

…AND OTHER

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THANKS FOR YOUR ATTENTION!

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