



TOPAZIUM's Medical Research Model

TOPAZIUM has created a unique platform able to simultaneously analyze and process a combination of chemical, genetic, pre-clinical, clinical and social/environmental data in the context of anomalies and pattern classification. This way, TOPAZIUM expects to help overcome the shortcomings of the current medical research model and give rise to a new one with the following characteristics:

- *An exponential R&D approach.* When a process becomes digitized and powered by information flow, its pace of development jumps onto an exponential growth path, doubling every two years (the Moore's Law). In these non-linear systems, AI tools outperform traditional regression and statistical tools, leading to an exponential increase in the quality of the results obtained in medical research, and ultimately, the improvement of human health.
- *Generous and altruistic treatment of the data.* In an information-based environment, access and sharing of data is more important than ownership. Participation and exchange amongst different networks and communities generate exponential growth and value. Pharmaceutical companies, biotech companies, scientists and physicians will be able to share their skills and results in TOPAZIUM's platform, promoting medical research.
- *Based on a wealth of information and shared assets.* A wealth of information encourages data sharing and facilitates innovation. TOPAZIUM's system is based on algorithms that are capable of processing encoded



and anonymized data obtained from pharmaceutical companies, biotech companies, academic institutions and patient associations through collaboration agreements. Once the data is processed by the platform, the system learns and improves its knowledge. The data is not even “disclosed” in the sense of the old R&D model, since it is encoded and embedded into the platform’s engine. Therefore, all users will benefit from this shared, enhanced knowledge, extracting their own value from it.

- *Lower research costs.* The use of artificial intelligence (AI) reduces exponentially the costs associated to medical research, tending to zero, whereas the output dramatically increases, as all wasteful processes and expenditure on purposes other than the creation of value are eliminated. All in all, the system promotes a culture of continuous *in silico* experimentation that reduces research costs and increases innovation, resulting in a wealth of information and a subsequent cost reduction, therefore generating a positive feedback loop.
- *A global and continuous learning process.* One of the main advantages of AI tools is their ability to progressively learn with and from the data without being explicitly programmed for this. TOPAZIUM’s platform learns from all data provided by stakeholders: researchers, clients, patients, industry (even competitor companies).
- *A disruptive approach.* An information-based environment promotes learning, research and the discovery of innovative solutions. In this system, the most benefited stakeholders are those who experience more and learn faster.

Adding a global approach to the medical research flow while incorporating the appropriate AI tools will ultimately



result in better disease prevention and earlier diagnosis, as well as improved, cost-effective drug development. AI analytical tools will enable to simultaneously extract valuable information from large databases generated by all stakeholders in healthcare from all areas: researchers in chemistry, biology, preclinical development, ADME/toxicology, or clinical trials, practicing physicians and patients. Therefore, insights and decisions will be data-driven, and will be combined with the work of healthcare professionals, which will improve patient care standards through a truly personalized and holistic approach.

In this new paradigm, patients and citizens become very important players in the advancement of healthcare, and health policies favor prevention over treatment, thanks to the new wealth of information that will become available through this collective intelligence platform. This paradigm should also encourage and promote the democratization of diagnosis, with health concerns being identified much earlier and therefore, treated at much lower costs with more effective, targeted medicines. This will not only improve clinical outcomes, but it will also reduce the overall financial burden on healthcare systems. The benefits could be greater in peripheral areas or in developing countries without access to medium/high complexity care centers, as primary care doctors will be able to establish difficult diagnoses earlier, and determine which patients need to be referred to other centers to receive specialized treatment. In summary, this colossal common effort based on a new collective intelligence platform will exponentially improve the quality of medical research, resulting in a radical shift from the current healthcare model.