

White Paper

Combating drug diversion and counterfeiting with big data



Digital Supply Chain Security

Data science assisted human intelligence to enhance the safety of the drug supply chain, brand protection, and IP enforcement

Digital Drug Diversion Response

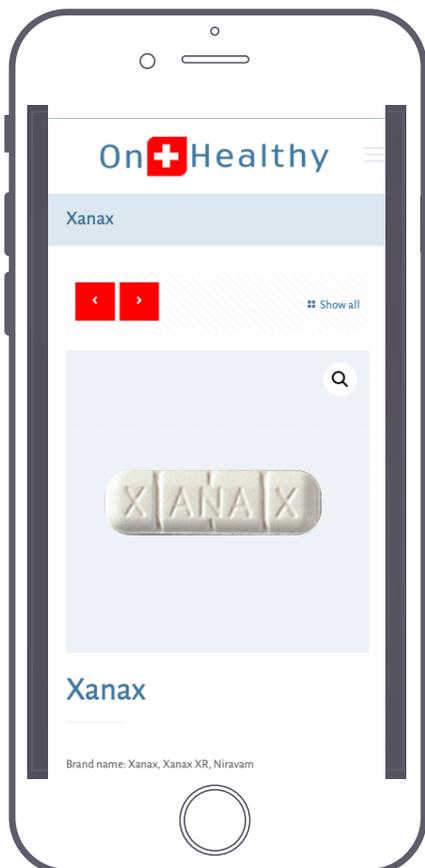
Advanced approaches using big data, machine learning, and data visualization to combat and respond to drug diversion online

Illegal Online Diversion of Pharmaceuticals

The illegal sale of branded and generic pharmaceuticals online is a *billion dollar* global challenge that is fueling a public health crisis of counterfeit and falsified medicines. Unauthorized sales of pharmaceuticals occurs across the whole of the Internet, from rogue online pharmacies to social media drug dealers and also on the criminal dark web. **S-3 Research has solutions to combat this threat.**

Why address illegal online sales?

There is a clear and present public health danger due to the illegal sale of pharmaceuticals online. Virtually all types of drugs are available online, with published studies detecting drugs in critical shortage, life-saving and essential drugs, controlled substances, recalled drugs, cancer therapy, and even vaccines being sold illegally online. If you are a brand holder or manufacturer, this “digital grey market” represents a serious risk to **brand integrity**, your **intellectual property rights**, **loss of revenue**, and compromises the **safety** of your patient communities.



Selling drugs to consumers one click away

Online drug sellers often operate across multiple platforms and aggressively market counterfeits direct-to-consumers using false and misleading tactics. Without visibility to what is happening across all internet platforms, brand holders and manufacturers are constantly playing a game of “whack-a-mole” and may be one step behind changes in these selling networks

Example of illegal online pharmaceutical selling website that is also optimized for mobile devices

Digital Diversion Threat Detection

*Cutting-edge Digital Threat
Detection Specific to Drug
Diversion*

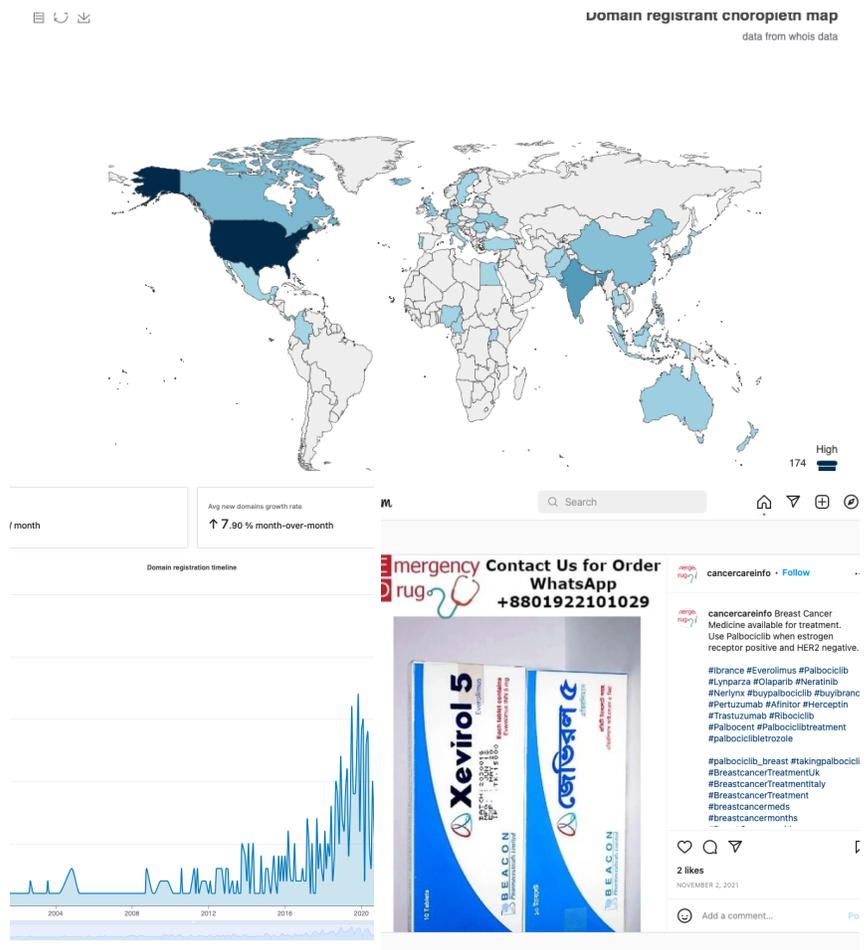
At S-3 Research, we believe in the power of *human intelligence* combined with *big data* and *machine learning*. Our services and technology are backed by decades of academic research and our team includes experts in public health, computer science, and specific SMEs in online drug diversion.

Humans + Big Data + Machine Learning = Dynamic Threat Detection

The first layer of our service consists of human analysts who are experts in understanding online drug markets and who first establish an initial assessment of the online landscape of illegal diversion of your products. From there, this human intelligence is transferred to our S-3 engine, a proprietary data collection, analysis, and visualization suite in a single service.

We are **Interdisciplinary**

To fully understand illegal online drug markets, employing different tools and techniques is a must. We utilize various interdisciplinary methods to give you a clear picture of online threats. Whether it be the network structure of sellers, location, or clues they leave about themselves detected by web forensics, we aim to clearly identify threats and how to deal with them



CUSTOMIZED DATA SCIENCE APPROACHES

Short List of Methods

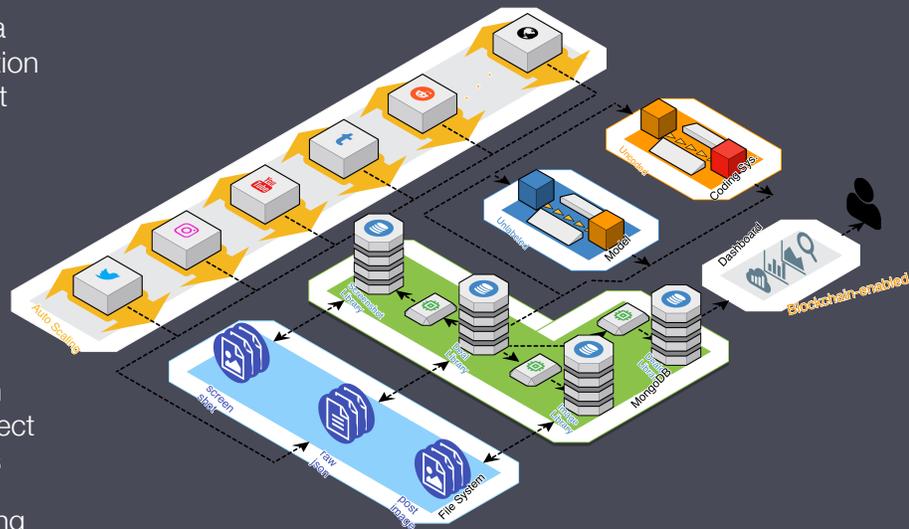
- Natural Language Processing/Topic Modeling
- Supervised Machine Learning
- Quantitative and Statistical Analysis
- Social Network Analysis
- Geospatial Analysis
- Website Traffic and Forensic Analysis
- Policy and Legal Analysis

Innovation

Technology and Solution Features

The S-3 Engine is our comprehensive online data surveillance suite of tools, analysis, and visualization solutions used to detect, characterize, and report illegal drug diversion and online pharmaceutical sales. It has the following world-class features:

- Detection capabilities across multiple social media platforms, internet search results, e-commerce sites, and dark web marketplaces
- Custom machine learning algorithms with high accuracy (+80-90%) specifically trained to detect illicit drug selling on different Internet platforms
- Cross-platform detection and activity monitoring to specifically classify low to high risk threats to your products



What is the S-3 Engine?

The S-3 Engine consist of three core services that operate seamlessly to provide a comprehensive online drug diversion detection system. The cores include robust data collection of custom keyword generation, in-depth analysis using machine learning and other methods, and custom visualization to deliver the intelligence you need to take action or help S-3 enable enforcement



DATA COLLECTION

Generate, update, and assess performance of keywords, slangs, codewords for specific therapeutic classes



IN-DEPTH ANALYSIS

Use of unsupervised and supervised machine learning models, web forensics, and other web traffic analysis



VISUALIZATION

Custom data dashboards for different Internet platforms, reporting functions, and translating data to action through partnerships

S-3 Research

To learn more about how companies can use the S-3 Engine to improve patient safety and public health visit our website [here](http://www.s-3.io) or contact us for a demo of our drug diversion solution services.

www.s-3.io

About S-3 Research

S-3 Research is a technology company originally created from a startup award from the National Institutes of Health and which was subsequently awarded an SBIR contract from the National Institute on Drug Abuse to develop and commercialize technology to combat illicit online opioid diversion.

The company's team is comprised of academic researchers who are experts in online drug diversion, with its activities and expertise widely covered in the media, and now with clients across technology companies and government agencies.

As featured in the following media outlets:



The Washington Post



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