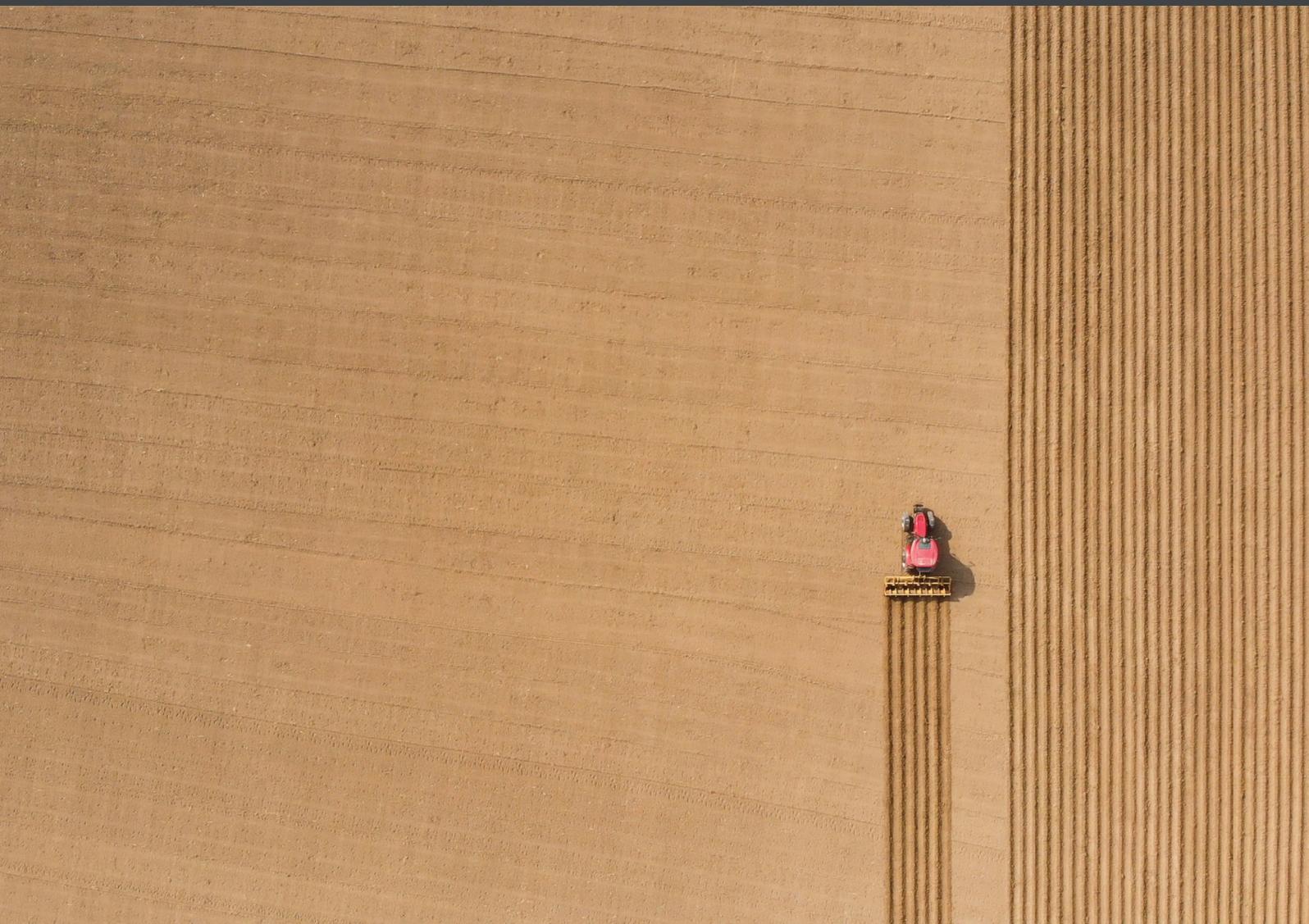


Use case

Analysing RWE forums: Extracting actionable information from patient forums



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Pharmaceutical companies need to keep up-to-date to remain competitive and maintain awareness of the effects of their drugs. A potentially valuable but underutilized resource is the real-world evidence reported by patients themselves. Recently, health forums such as [PatientsLikeMe](#) and social media platforms like Twitter have gained popularity as a destination for patients to share unsolicited information about their experiences with medicinal products. In fact, a recent study found that patients reported more potential adverse events on Twitter than physicians reported to the FDA's Adverse Event Reporting System (FAERS) during the same six-month period¹. Recognising the explosion of available information, the EMA now recommends screening the internet or digital media for reports of possible adverse events^{2,3}. Despite the growing importance of patient-reported outcomes, mining actionable information from uncontrolled, unstructured social media reports remains a challenge.

Many current computational approaches struggle to deal with the inherent ambiguity of the terms people use – multiple terms can be used to describe the same thing, so an investigator searching a patient forum for 'myocardial infarction' would miss references to 'heart attack' or 'serious heart event'. SciBite enables pharmaceutical companies to utilise patient-reported information more effectively by transforming free text into unambiguous, machine-readable data.

SciBite: unlocking the value of patient data

The foundation of the SciBite platform are the vocabularies and ontologies which apply an explicit, unique meaning and description to a term. SciBite contextualises the unstructured text found in patient forums so that it can be understood and used as high quality, actionable data. Comprising tens of millions of synonyms across many scientific 'topics', SciBite's manually curated ontologies have unrivalled depth and breadth, providing a comprehensive coverage of relevant terminology and a robust foundation necessary for an effective and impactful search strategy.

SciBite's ontologies can be augmented with bespoke terms, such as those relating to a specific disease or terms that cover the range of different ways people refer to the same symptom. This enables SciBite to cope with the informal language used in patient forums and other social media.

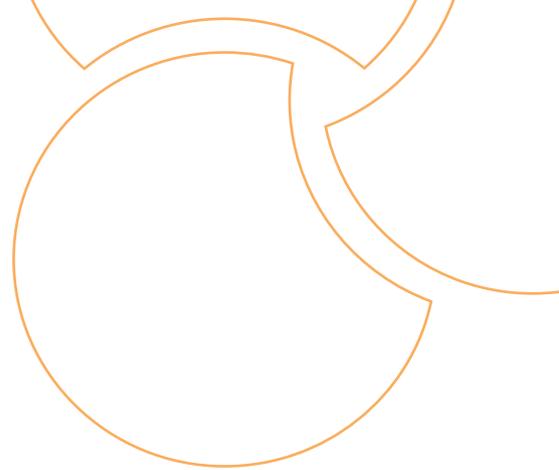
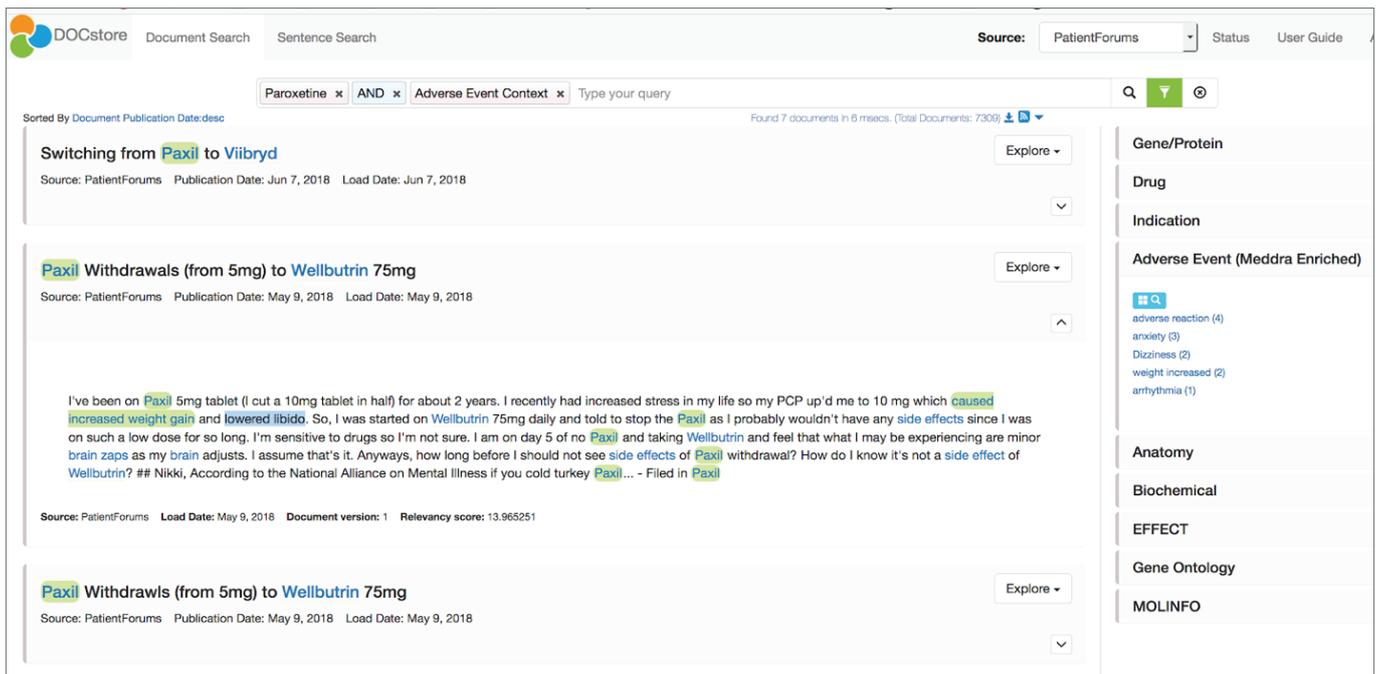
SciBite's semantic platform is able to integrate multiple data sources, eliminating the need to for users to log into multiple websites and replicate their query. Users can search for single terms as well as patterns in text, such as a drug and an adverse event mentioned in the same sentence. With the flexibility to create, adapt and refine search patterns over time, these approaches can accommodate the evolving language used for a particular topic and fit different use cases and search strategies.

Text of a forum or blog post can be instantly scanned, highlighting key topics so that reviewers can easily understand the context. This enables them to derive more value from the reading experience and focus on understanding interesting findings rather than searching for them. For example, in the post illustrated below, lower libido is highlighted as a potential side effect of the antidepressant Paxil.

1 Freifeld CC1, Brownstein JS, Menone CM, Bao W, Filice R, Kass-Hout T, Dasgupta N.. Digital Drug Surveillance: Monitoring Pharmaceutical Products in Twitter. *Drug Saf.* 2014 May; **37**(5):343-50.

2 European Commission. eHealth for safety: impact of ICT on patient safety and risk management. 2007. Available at http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=3150 Accessed 20th March 2017

3 HMA: Guideline on good pharmacovigilance practices (GVP) Module VI – Management and reporting of adverse reactions to medicinal products (Rev 1). http://www.ema.europa.eu/docs/en_GB/document_library/Scientific_guideline/2014/09/WC500172402.pdf

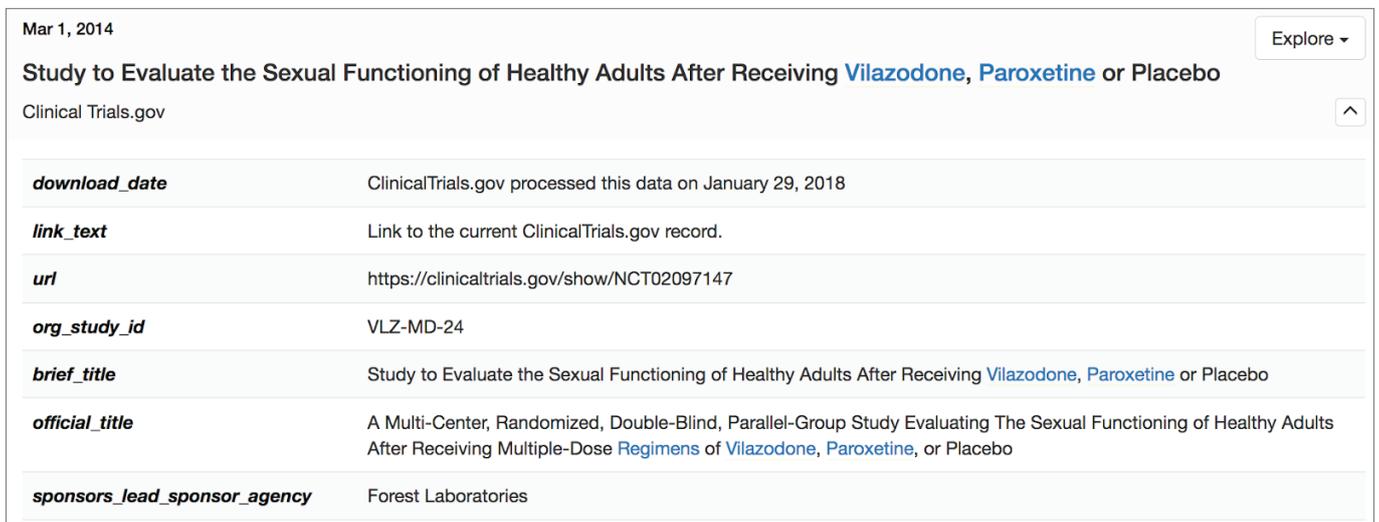



The screenshot shows the DOCstore search interface. At the top, there are navigation tabs for 'Document Search' and 'Sentence Search', and a 'Source' dropdown set to 'PatientForums'. A search bar contains the query 'Paroxetine x AND x Adverse Event Context x'. Below the search bar, three search results are displayed. The first result is 'Switching from Paxil to Viibryd'. The second result is 'Paxil Withdrawals (from 5mg) to Wellbutrin 75mg', which includes a text snippet: 'I've been on Paxil 5mg tablet (I cut a 10mg tablet in half) for about 2 years. I recently had increased stress in my life so my PCP up'd me to 10 mg which caused increased weight gain and lowered libido. So, I was started on Wellbutrin 75mg daily and told to stop the Paxil as I probably wouldn't have any side effects since I was on such a low dose for so long. I'm sensitive to drugs so I'm not sure. I am on day 5 of no Paxil and taking Wellbutrin and feel that what I may be experiencing are minor brain zaps as my brain adjusts. I assume that's it. Anyways, how long before I should not see side effects of Paxil withdrawal? How do I know it's not a side effect of Wellbutrin? ## Nikki, According to the National Alliance on Mental Illness if you cold turkey Paxil... - Filed in Paxil'. The third result is also 'Paxil Withdrawals (from 5mg) to Wellbutrin 75mg'. On the right side, there is a sidebar with various ontologies: Gene/Protein, Drug, Indication, Adverse Event (Meddra Enriched) (listing adverse reaction (4), anxiety (3), Dizziness (2), weight increased (2), arrhythmia (1)), Anatomy, Biochemical, EFFECT, Gene Ontology, and MOLINFO.

Figure 1: Identifying interesting posts amongst the noise present in a patient forum

Similarity searching helps users identify peer-reviewed scientific articles or clinical trials that are related to a forum post and help explain the science behind it. For example, a

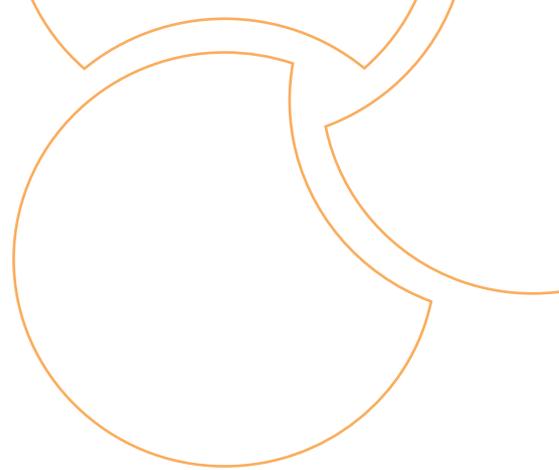
search for articles similar to the aforementioned post about Paxil leads us to a clinical trial exploring the link between sexual function and Paroxetine, the generic name for Paxil.



The screenshot shows a clinical trial record. At the top left, the date 'Mar 1, 2014' is displayed. The title of the study is 'Study to Evaluate the Sexual Functioning of Healthy Adults After Receiving Vilazodone, Paroxetine or Placebo'. Below the title, the source is 'ClinicalTrials.gov'. An 'Explore' button is visible in the top right. Below the title, there is a table with the following data:

download_date	ClinicalTrials.gov processed this data on January 29, 2018
link_text	Link to the current ClinicalTrials.gov record.
url	https://clinicaltrials.gov/show/NCT02097147
org_study_id	VLZ-MD-24
brief_title	Study to Evaluate the Sexual Functioning of Healthy Adults After Receiving Vilazodone, Paroxetine or Placebo
official_title	A Multi-Center, Randomized, Double-Blind, Parallel-Group Study Evaluating The Sexual Functioning of Healthy Adults After Receiving Multiple-Dose Regimens of Vilazodone, Paroxetine, or Placebo
sponsors_lead_sponsor_agency	Forest Laboratories

Figure 2: Finding Clinical Trials related to a patient blog post



Applications of semantically-enriched patient data

In addition to providing a rich source of searchable information, the real-time nature of semantically enriched patient-reported data offers pharmaceutical companies the opportunity to transform a wide range of business processes.

For example, pharmaceutical companies are obliged to scan the scientific literature for ‘safety signals’ – potential causal relationships between their drug(s) and adverse events. However, patents and publications are often preceded by months or years of research, limiting their ability to react in a timely manner. Since patient-reported data has no lag phase, it can be used by Pharmacovigilance teams as an early warning system to react to safety signals faster and ultimately protect patient safety⁴.

Similarly, post marketing surveillance of patient data can uncover instances of poor adherence to a dosing regimen and identify the need for improved patient support. Common side effects mentioned by patients can also reveal potential drug-indication relationships, providing insight for drug repositioning initiatives⁵. If demographic information is available, patient-reported data can be used as the basis of epidemiological studies, to explore the efficacy of a drug in different population.

Analysing patient-reported data can also help identify which drugs and diseases people are most vocal about. This can deliver valuable business insight to inform R&D investments and ensure time is not wasted developing on drugs from a class that has associated safety issues or that would ultimately be entering an unattractive, prohibitively competitive marketplace.

Summary

SciBite delivers an integrated, cost-effective solution to enable pharmaceutical companies to unlock the value of patient-reported data and make faster, more informed decisions.

SciBite’s award-winning platform⁶ is the culmination of tens of years of experience applying Semantic Analytics to scientific data. Global pharmaceutical companies and emerging biotechs have partnered with SciBite and are leveraging our unparalleled know-how to unlock the potential of the wealth of unstructured, publicly available information that is now at their disposal.

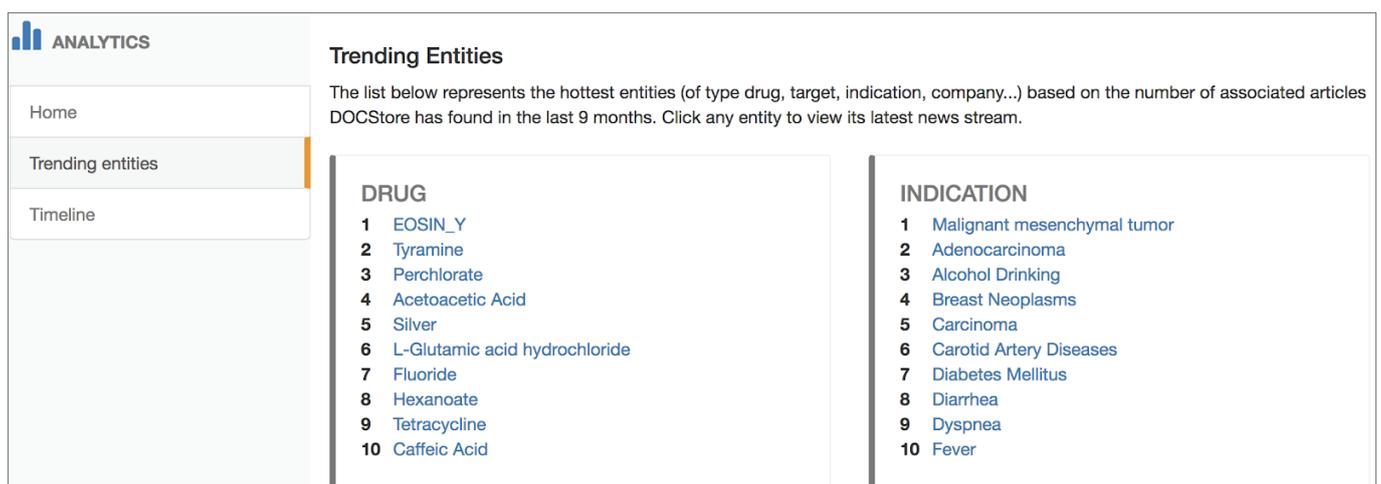


Figure 3: Highlighting trending topics in patient-reported sources

4 For example, see our publication: ‘Semantic Analytics: An Integrated Approach for Pharmacovigilance Teams to Achieve Total Awareness’, available from the [SciBite Library](#)

5 For example, see our publication: ‘Semantic Analytics: A Systematic, Data-Driven Approach to Drug Repositioning’, available from the [SciBite Library](#)

6 SciBite has been recognised with a series of awards, including Bio-IT World’s Best of Show 2017 and the British Chamber of Commerce in Japan’s 2017 British Business Award for Innovation. The latter is in recognition of our transformation of data management in the life sciences, and the opportunity this has brought for Japan to gain a global advantage in the sphere.

SciBite's data-first, semantic analytics software is for those who want to innovate and get more from their data. At SciBite we believe data fuels discovery and we are leading the way with our pioneering infrastructure that combines the latest in machine learning with an ontology-led approach to unlock the value of scientific content. Supporting the world's leading scientific organisations with use-cases from discovery through to development, SciBite's suite of fast, flexible, deployable API technologies empower our customers, making it a critical component in scientific, data-led strategies. Contact us to find out how we can help you get more from your data.

To learn how SciBite can unlock the value of your data, speak to one of our experts today or email us at contact@scibite.com

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