USPTO Cancer Moonshot Challenge – Our Visualization Story

The best visualizations transfer knowledge not just to individuals but to groups, building consensus. We demonstrate a recent Melanoma Landscape in Intellar,™ a friendly horizon scanning tool. Intellar builds a more complete picture for users having varied levels of expertise. It enables collaboration by linking big data visualizations from "high level pictures" to "deep dives" so users reach funding and policy decisions together.

Melanoma Focus

According to cancerresearch.org, melanoma is the most aggressive and deadliest form of skin cancer. In 2016 in the U.S. ~76,380 new melanomas will be diagnosed, and ~10,130 people will die. A substantial unmet need still remains for new therapies.

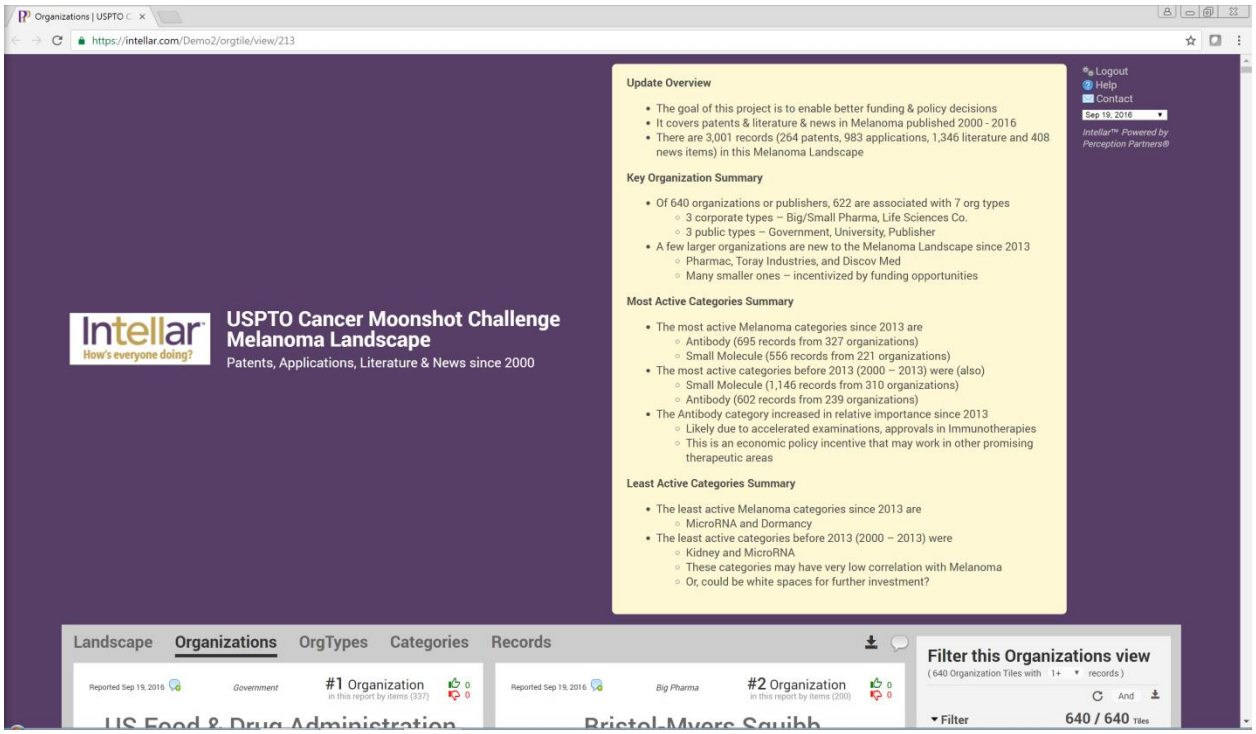
According to the Orange Book/Purple Book, 8 new melanoma drugs/therapies are FDA approved since 2011. There are 4 immunotherapies: Ipilimumab (Yervoy®); Pembrolizumab (Keytruda®); Nivolumab (Opdivo®); Talimogene laherparepvec (T-VEC, Imlygic™). The first three are checkpoint inhibitors that "take the brakes off" the immune system; the last is an oncolytic virus therapy. There are also 4 targeted therapies: Vemurafenib (Zelboraf®); Dabrafenib (Tafinlar®); Trametinib (Mekinist®); Cobimetinib (Cotellic®). These target common genetic mutations, e.g., BRAFV600 mutation.

The Dataset

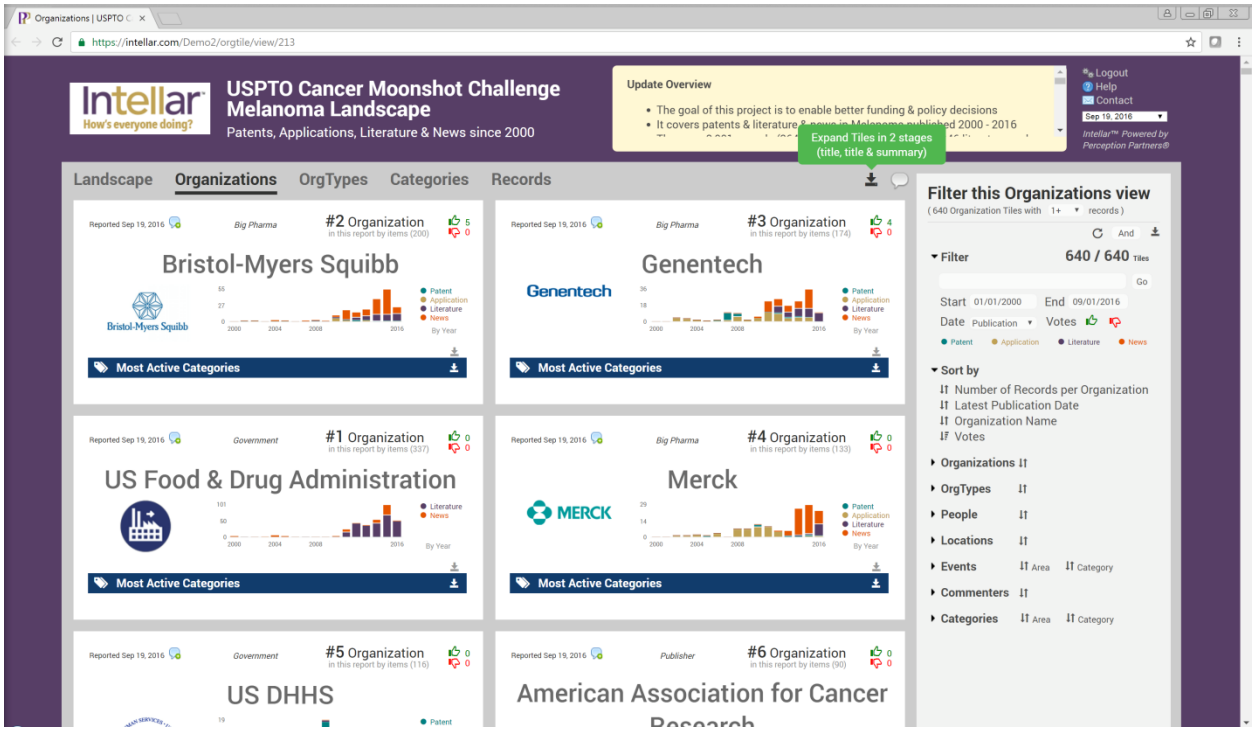
This landscape covers publishing since 2000 in melanoma to demonstrate insights in one commercial therapeutic area.

- 264 US patents and 983 applications (from USPTO Developer data accessed on Thomson Innovation; de-duped to latest non-expired member of DWPI family) related to melanoma, and/or breakthrough therapy terms
- 1,346 Literature items covering actual research (journals, clinical trials, studies; not editorial/opinion) from ISSN's with 10+ relevant hits in EBSCO Medline
- 408 News items from EBSCO Business Source Corporate Plus, Newswires and Web News
- Technology thesaurus to categorize records into a taxonomy of 6 areas and 46 therapeutic categories
- Events thesaurus to categorize records in 10 areas and 91 commercial categories
- Data organized in Vantage Point 9.0 from Search Technology before import to Intellar

Organizations Active in Melanoma

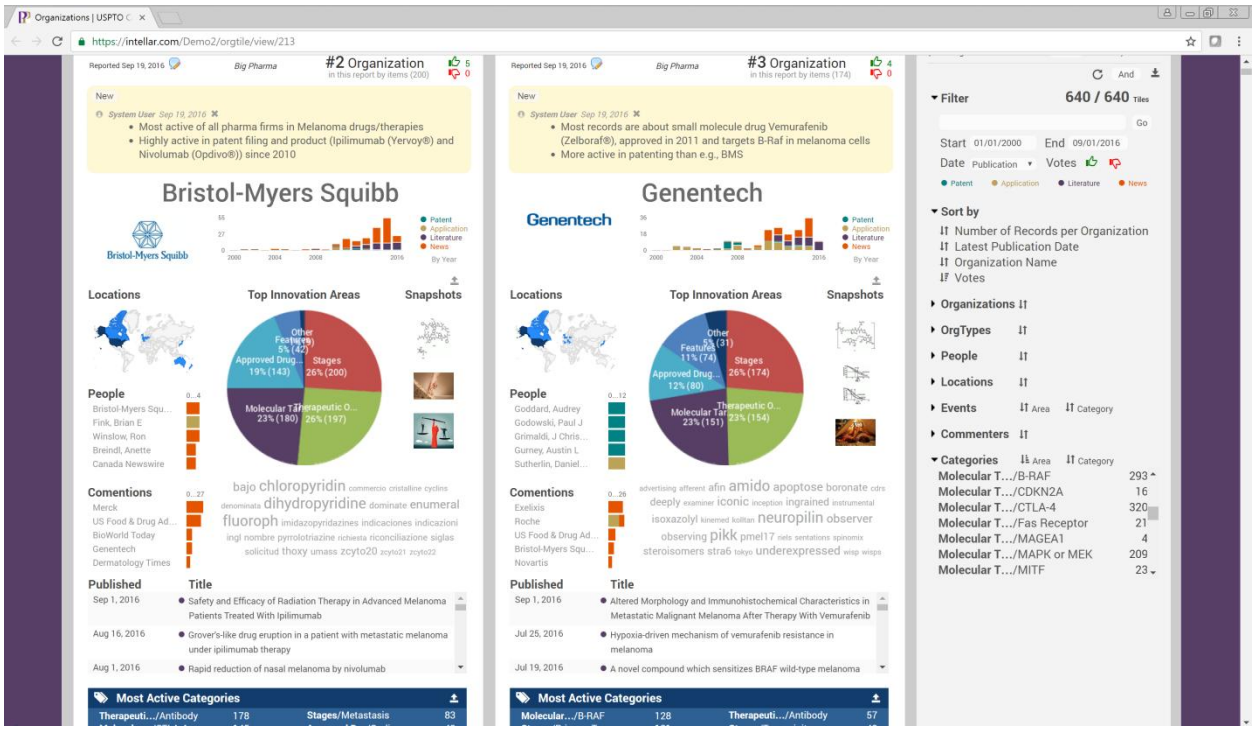


Roll over the executive summary block at the top of the Organizations View (or any other View) to see the full landscape summary.



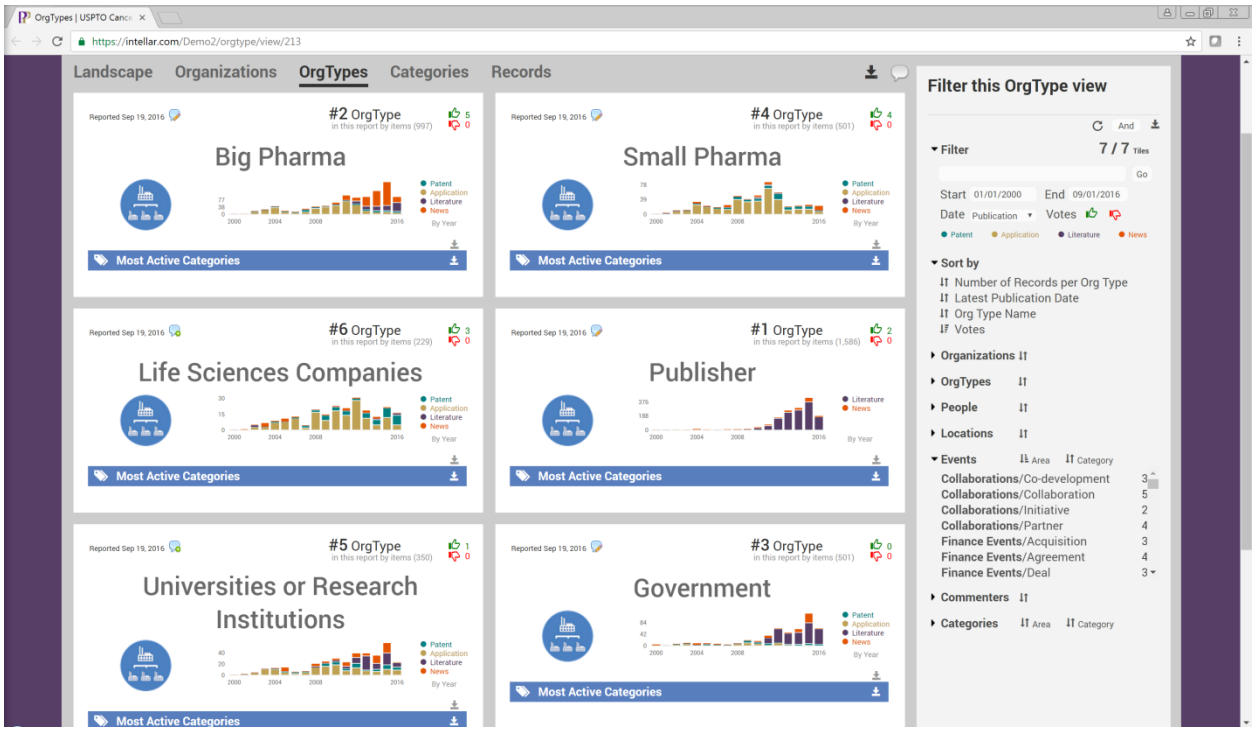
In this landscape there are 640 unique organizations/publishers. Organizations are displayed in tiles (un/collapsed by arrow icons) and are filterable/sortable by attributes in the collapsing right pane. Bar charts depict publishing by Document Type by Organization by Year. It is evident for

firms that most of the time, patenting (green and gold data series) precedes other publications (violet & orange). This reinforces the value of patents (and USPTO) as an early indicator in Melanoma research.



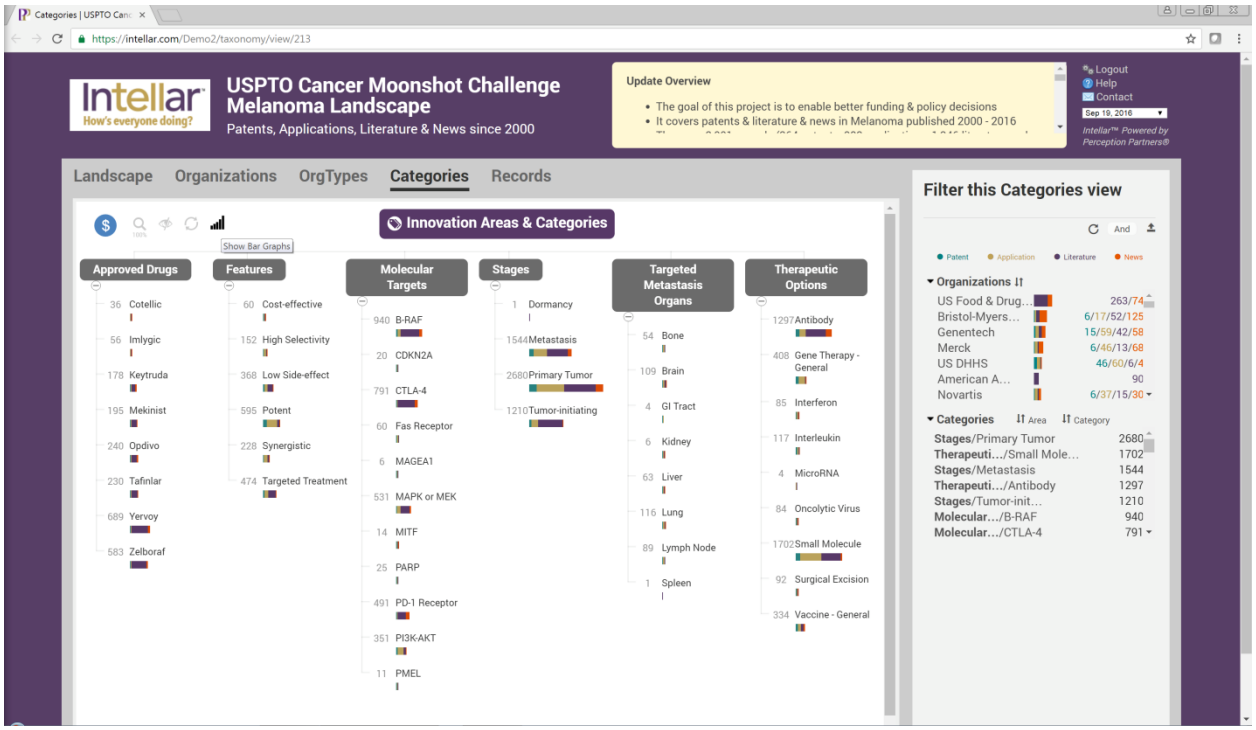
By expanding Organization tiles one can compare details between firms. Above, we see (across the innovation area pie charts; top category bottom boxes; categories in right pane and TFIDF extracted concepts) the research differences between BMS – with more US research efforts directed more to antibodies – compared to Genentech with more small molecule approaches targeted to B-RAF. User comments in context can hide/show at top of tiles (balloon icons). Voted tiles sort in right pane to make this comparison.

Organization Types

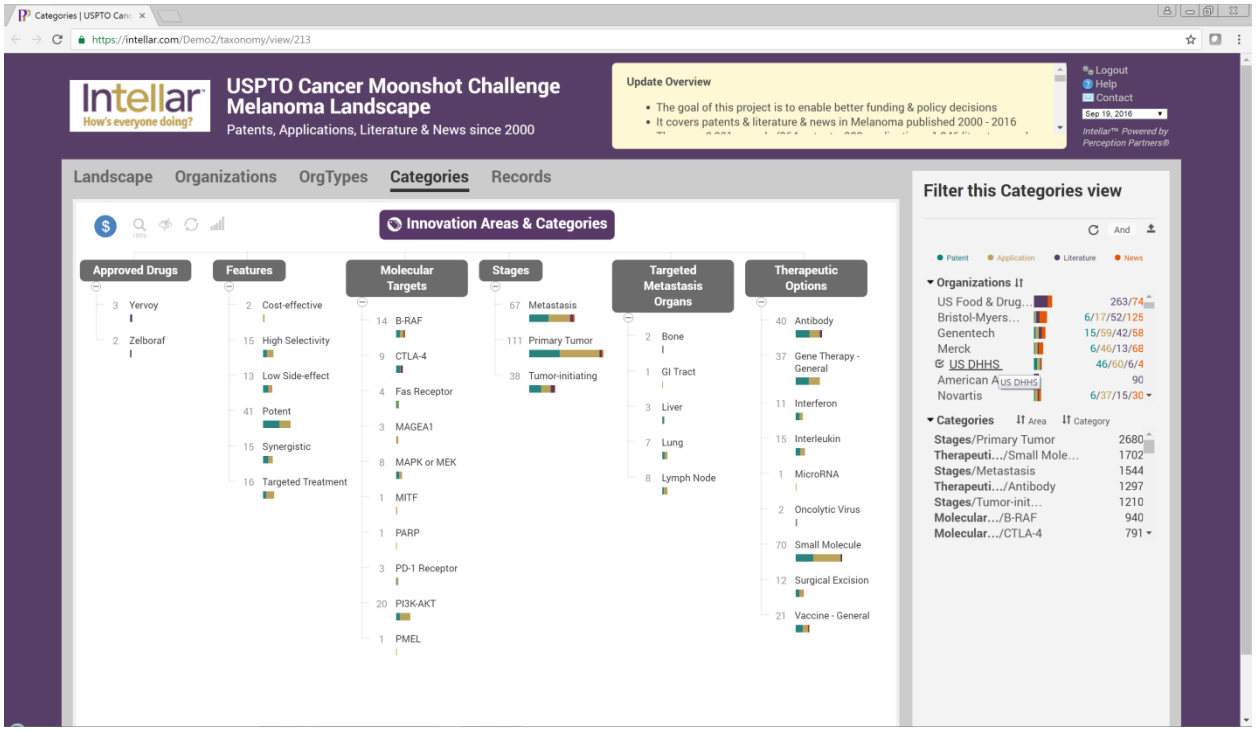


This collapsed Organization Types View reveals meaningful publishing trends. Looking carefully one sees the earliest publishing is in USPTO patents/applications (green/gold), demonstrating incentives to patent first in almost every Organization Type. To improve early investment, one would need to monitor Government publications (purple) or hone in on news (orange) about e.g., business events involving Life Sciences Companies. As Publisher output picks up in the Landscape, earlier studies are often not reported by highest-impact journals until approved by the FDA. This indicates a need for smarter library subscription policies to obtain lower-impact journals that may not be in "popular" collections, but which could provide more bang for the buck, if focused on Melanoma.

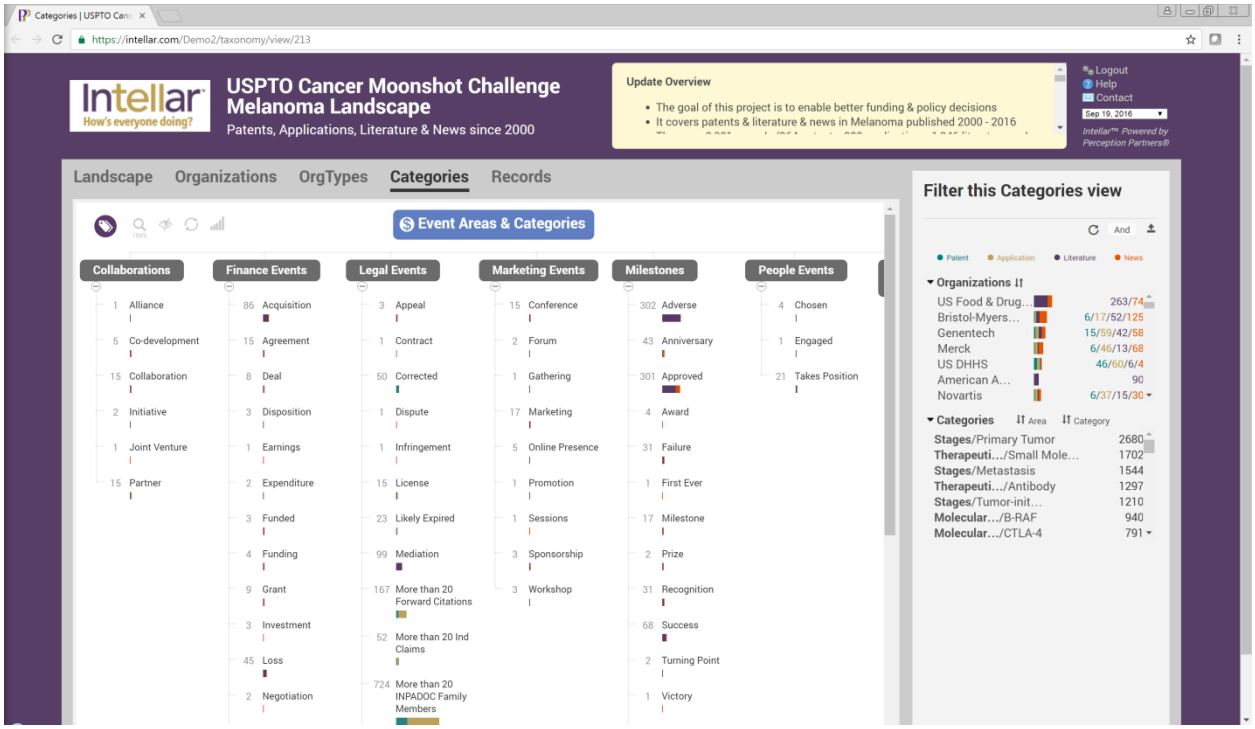
Melanoma Taxonomies



The Categories View shows a technology taxonomy emphasizing activity by Document Type. Important areas are Approved Drugs, Molecular Targets and Therapeutic Options. B-RAF, and CTLA-4 Receptors are the most popular targets in the literature. PI3K-AKT is the most patented to date for Melanoma.

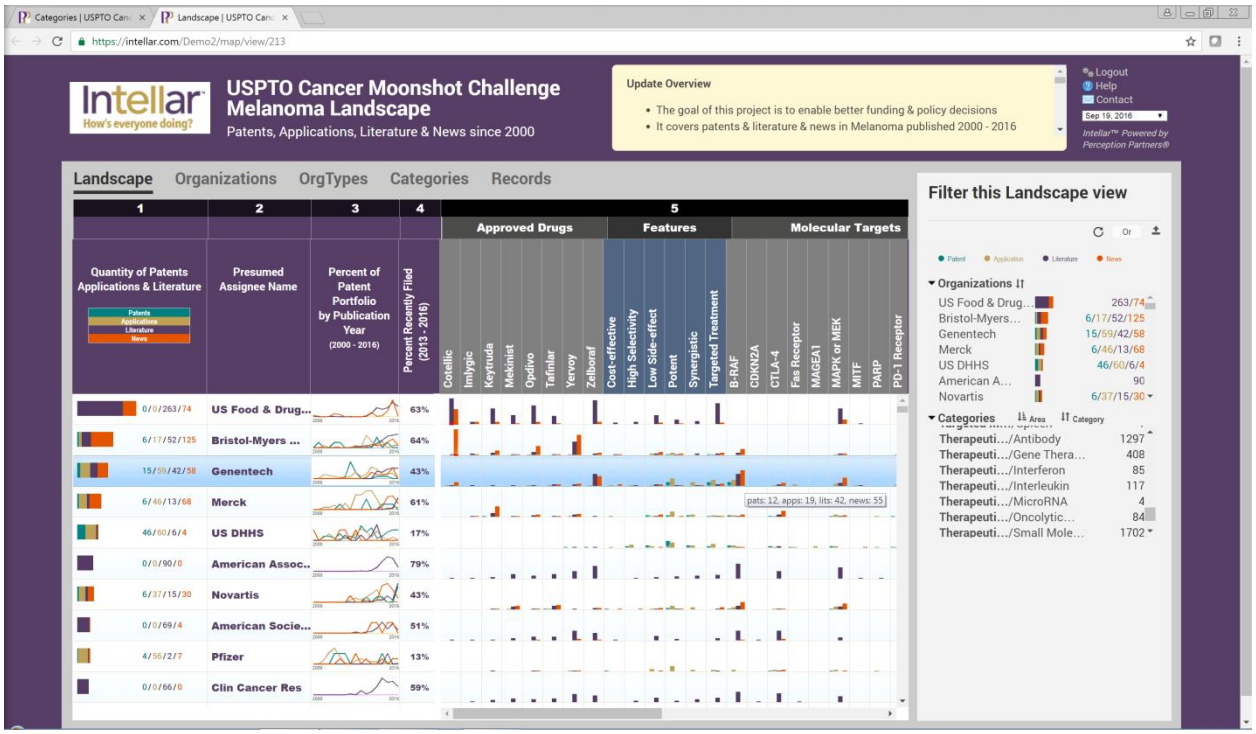


Filtering on the right pane shows taxonomy co-occurrence by any number of Organizations or Categories. Here we see the "weight" of Melanoma patents and literature funded by US DHHS.

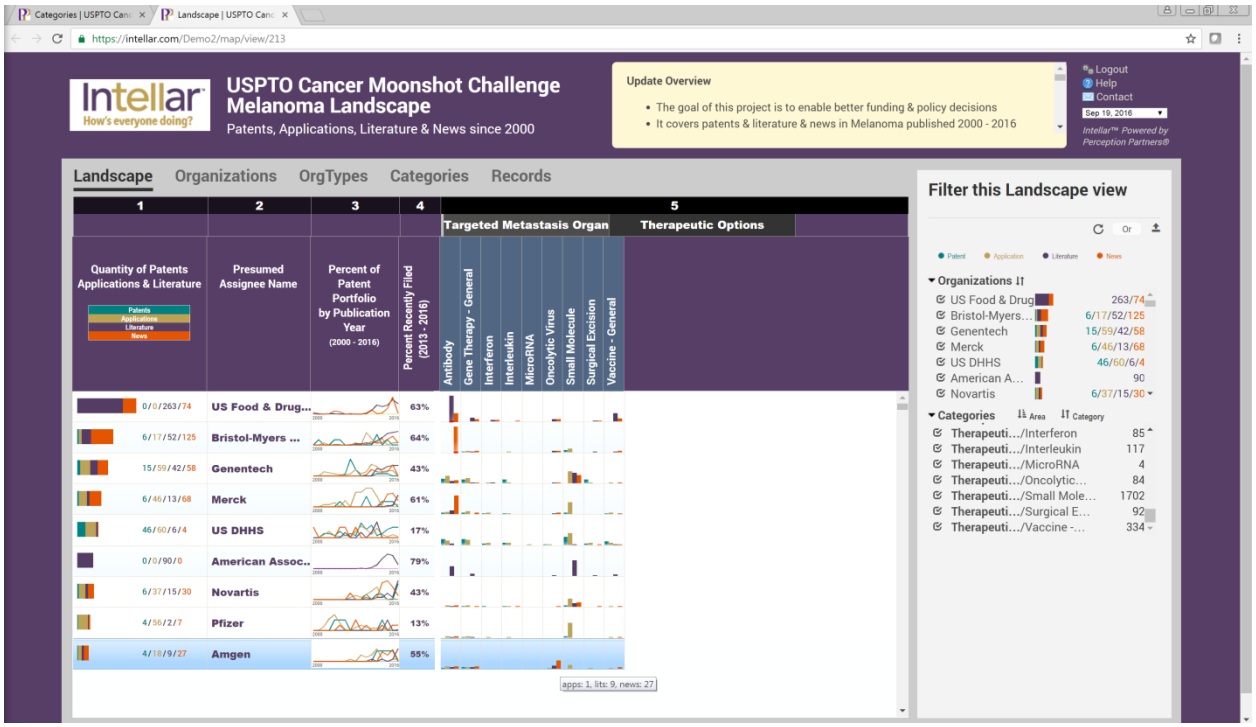


Selecting the blue dollar sign in the upper left corner reveals the Events taxonomy. Here we can see the intensity of commercial activity and indicators for opportunities & risks.

Melanoma Landscape



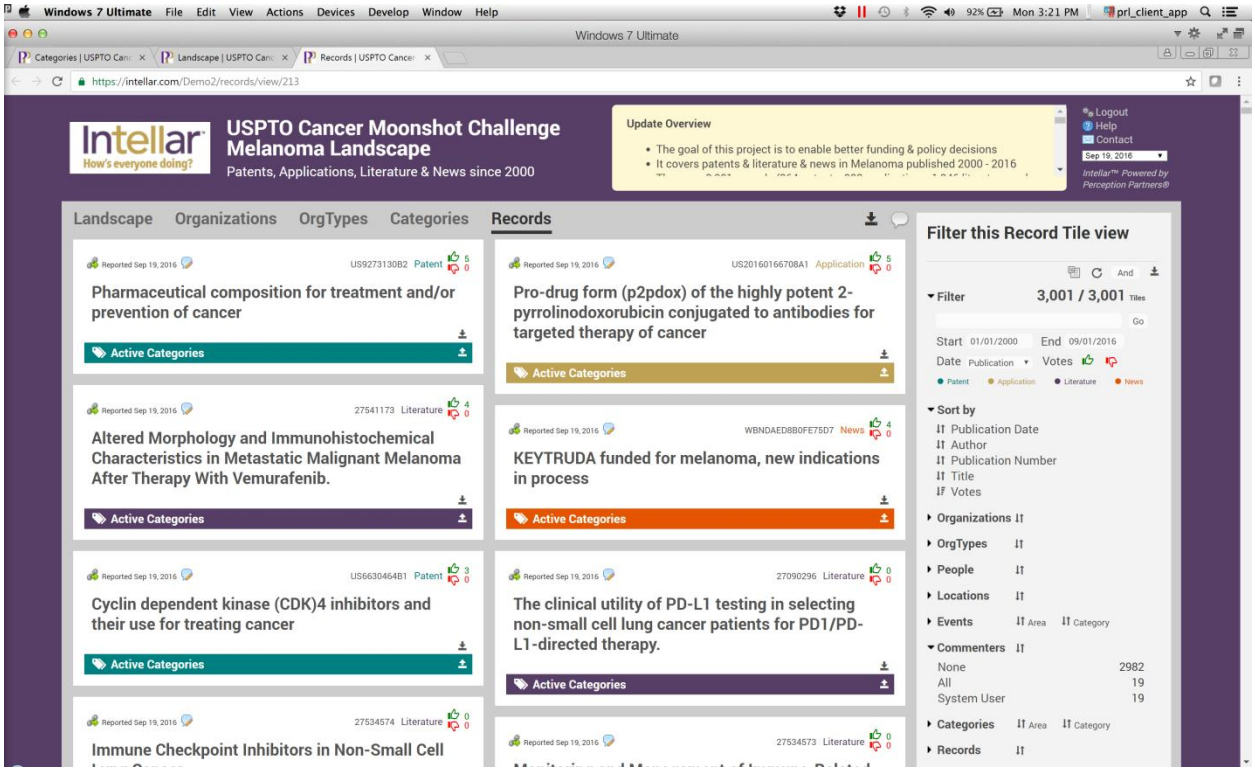
The Landscape map shows all Organizations (rows) by all technology Categories (columns) by all Document Types (cells).



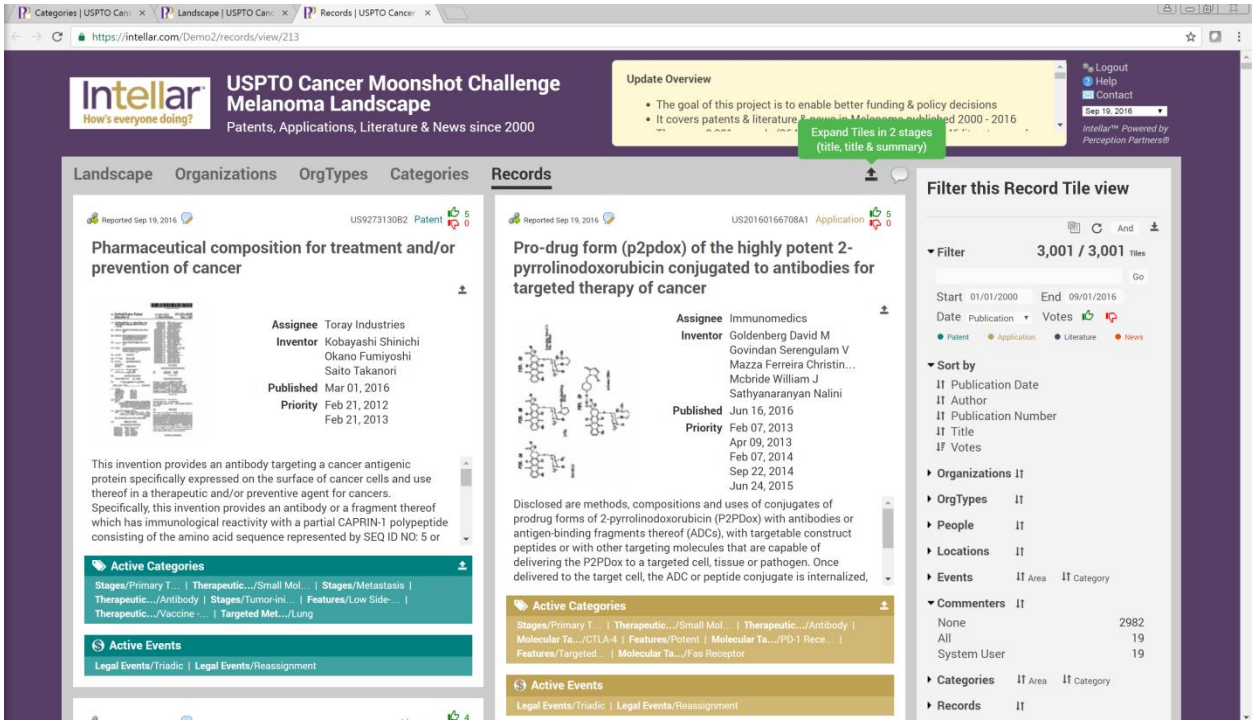
Right pane filters customize the map. Publishing trends reveal organizational strategies. Most focus on Antibodies, while e.g., Amgen is focused on Oncolytic Virus. More Government

investment may be necessary here. Note that FDA, DHHS, and American Assc. for Cancer Research appear to have invested primarily outside of Oncolytic therapies to date.

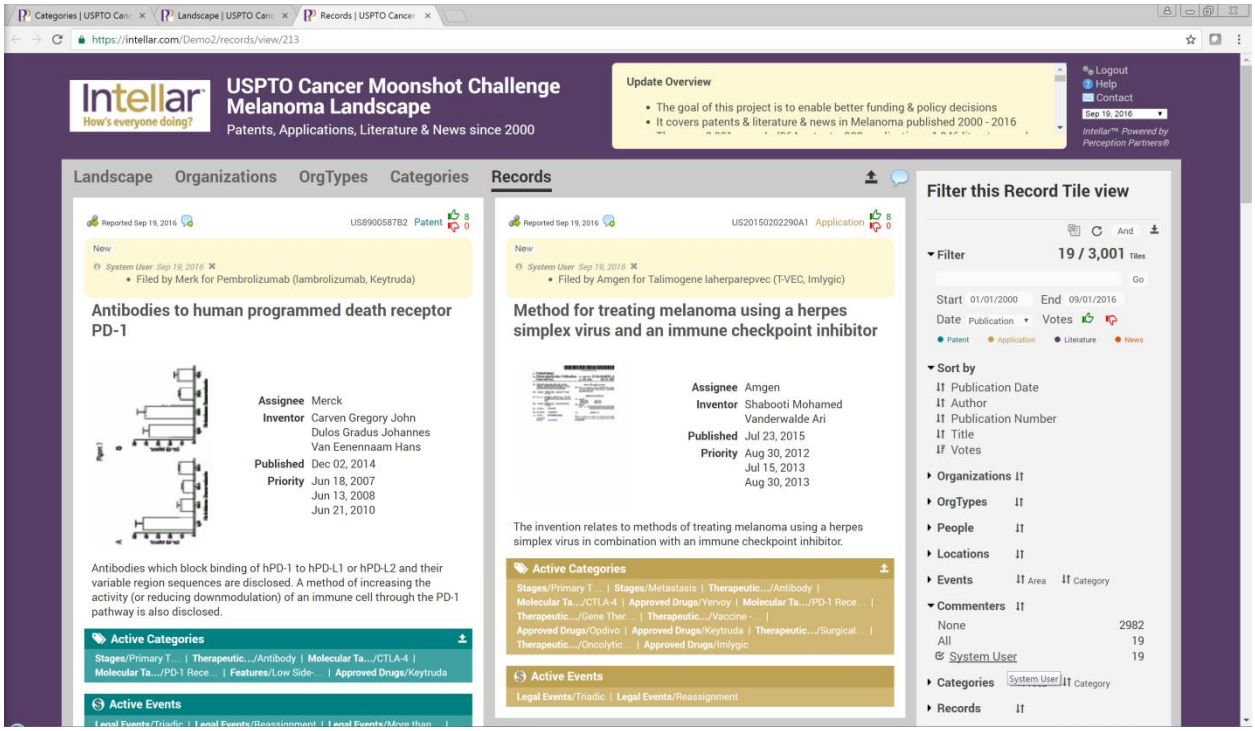
Record Observations



Right-clicking on any Landscape intersection (or Records View in menu) will drill down into documents for key Organizations and Categories. Titles link to open source record versions; publication numbers link to deep web versions. The Excel icon in the top right pane downloads visible records and metadata.



Records may be expanded from the top nav bar and filtered by any category or attribute in the right pane.



Filtering by commenter highlights patents with expert (or algorithmic) conversations in context.

Conclusion

Intellar's linked visualizations reveal new opportunities for Melanoma funding and policy. Government and researcher users learn how to better direct/request funding to less-active but promising technologies (e.g., Oncolytics). Policy makers can identify journals more likely to publish early research in Melanoma, optimizing subscriptions in research libraries. Finally, as patents remain the earliest indicators in Melanoma, scientists and patent examiners can set up periodic monitoring to systematically discover emergent art and debate the significance in context.

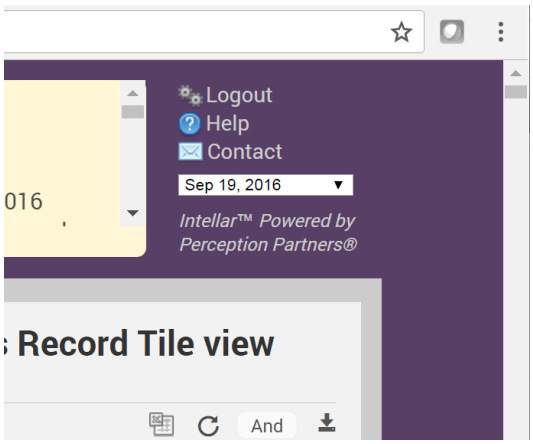
In the near future Intellar will import social and financial data as well.

USPTO Cancer Moonshot Challenge – Testing Instructions

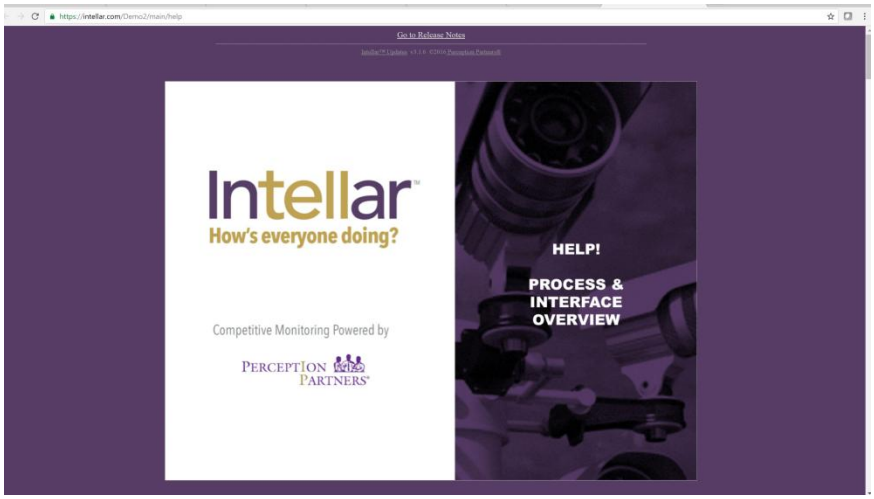
Accessing this information online requires the following login:

Login:	https://intellar.com/Demo2/welcome
User ID:	demo2intellar@perceptionpartners.com
PW:	intellarwins1

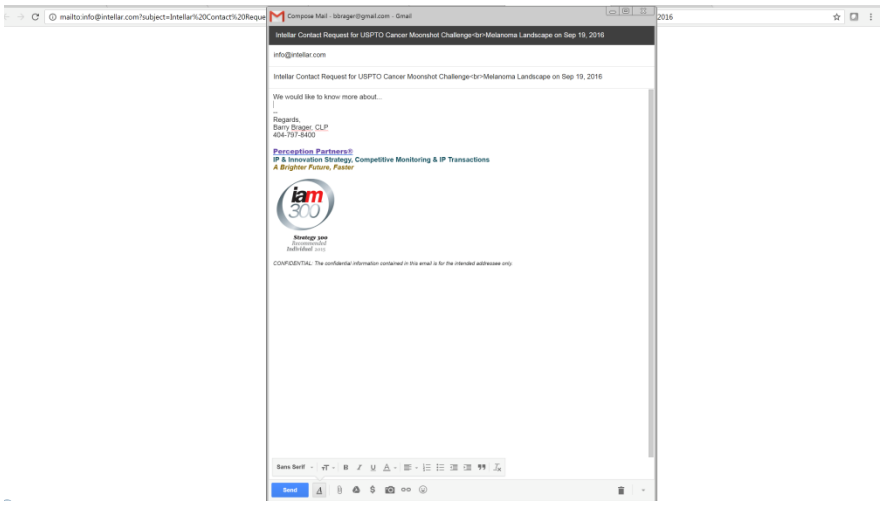
Chrome or Firefox is strongly recommended to review this submission.
Please bookmark this submission to return to it.



There is a help link in the upper right after login.



The Help link contains marked up screenshots and release notes.



We can also be reached for rapid support by clicking the Contact link, also in the upper right.