Ontologies & Data Fusion Advanced Tools for the Information Specialist

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CEO & Founder
Omnisol Information Systems



Example: Finding Investors



Consider an Israeli startup developing a new medical diagnostic method and looking for funding.

Which Angel / VC should it approach?

Example: Finding Investors



Consider an Israeli startup developing a new medical diagnostic method and looking for funding.

Which Angel / VC should it approach?

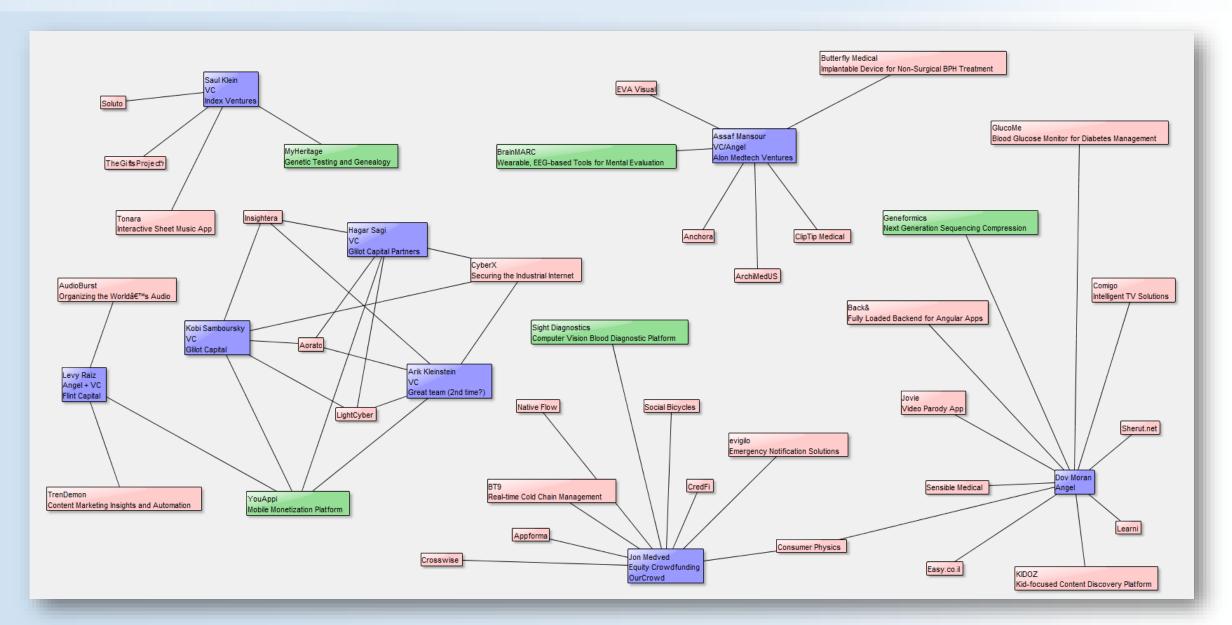
Interesting approach:

Find similar companies that managed to raise money and see who invested in them

Similar by: product, market, team, development stage, funding stage...

What we are after

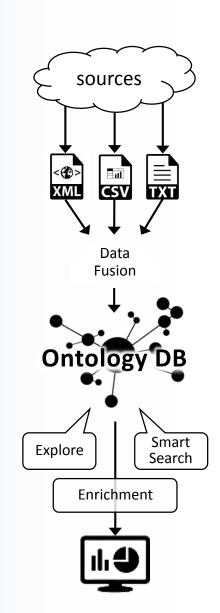




Suggested Methodology



- Identify sources
- Extract relevant data
- Build a model (ontology)
- Load the data into the model
- Explore the data
- Process and Enrich
- Generate infographics

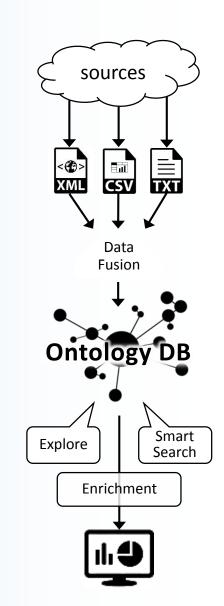


Suggested Methodology



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Now within reach of the information specialist!

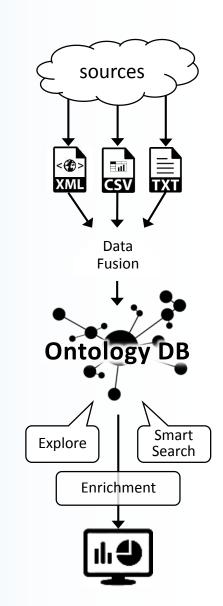


Suggested Methodology



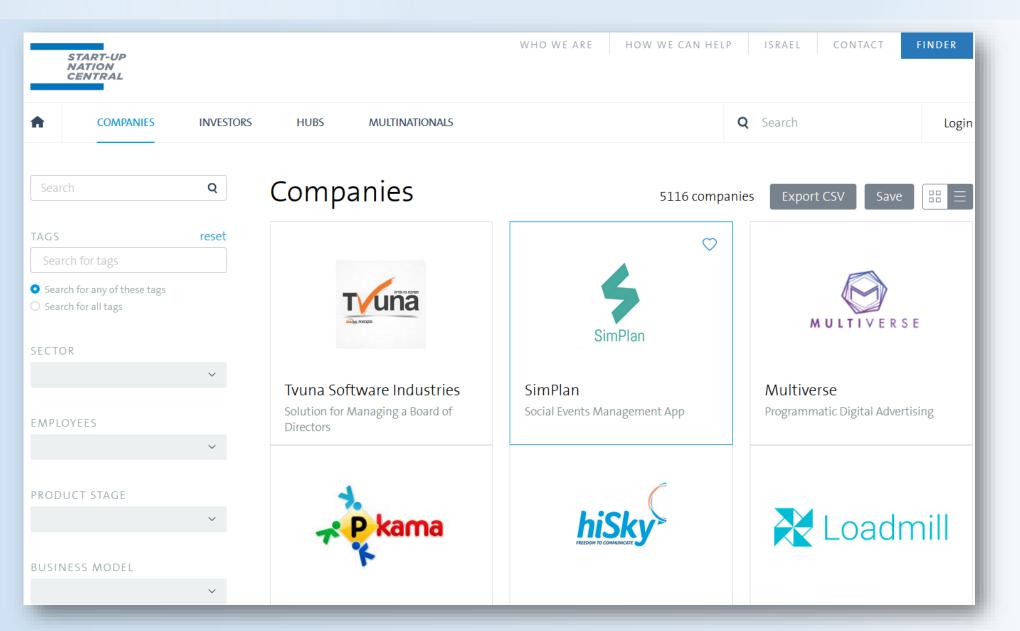
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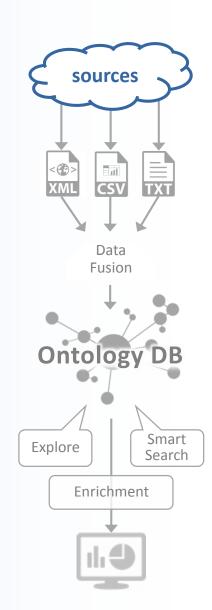
Now within reach of the information specialist!



Start-Up Nation Central

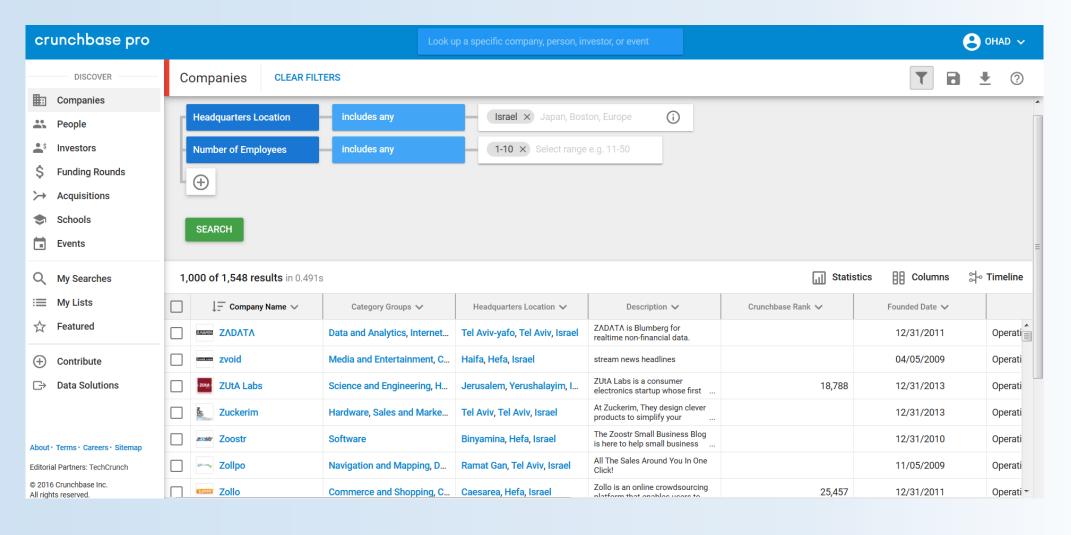


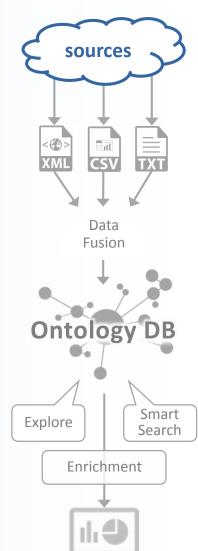




Crunchbase



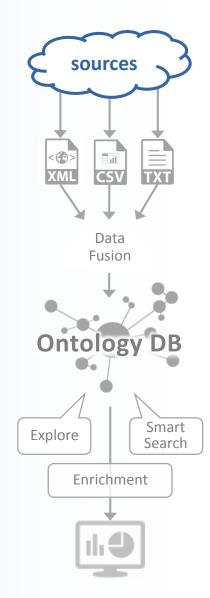




The Angels file



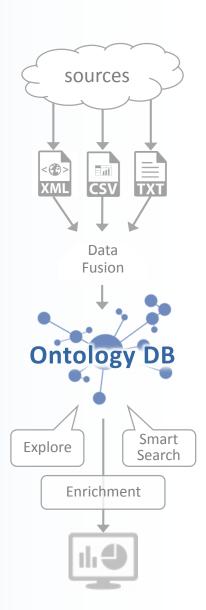
Name	Past year investments (otherwise "?")	When to Approach	Entity	Kind	Primary Interest	Other Interests [Free form]	Min Investment	Max Investment	Activity Level In Israel
Abrahami Avishai				Angel	Mobile & So		\$50,000	\$200,000	2. Medium
Adam Finkel	Sookasa, Crossbar, Augury, CloudHelix, Swell (Aq'd by Apple)		<u>OrfinVentures</u>		Enterprise	Deep Tech g	\$50,000		1. High
Adi Pundak-Mintz	chi			Angel	Finance				1. High
Adi Vagman			WIT	Micro VC	Agritech		\$50,000		4. Non-Existent
AfterDox	IDTS. mainly invests in israel, and not really our sector		afterdox.com	Angels fund	t	х	\$50,000	\$750,000	1. High
Alex Kaplun	, Momemt.me, FeedVisor, Any.do, Imonomy, Roojoom, Cloudyn, 365Scores, Aitype, BrightInfo, Mentad, MantisVision, MUV Interactive, Cimagine, NanoRep	Strong revenue gro	Titanium	VC	SaaS	E-commerce, Adtech	\$500,000	\$5,000,000	1. High
Alina Libova	Whatweorder, Nodeprime, AnswerBook	Initial customers	Tamares Capital	VC	Enterprise	computer vision, mob	\$50,000	\$1,000,000	1. High
Ami Isakov	BriefCam, AgentVi, VocalZoom	Technology proof	Motorola Solutions V	Corp VC		Command & Intellige	\$1,000,000	\$5,000,000	2. Medium
Amir Farhi					SaaS	Enterprise, SaaS, Ma	\$20,000	\$100,000	3. Low
Amit Bohensky	Zoomd			Angel			\$50,000	\$500,000	3. Low
Amit Gatenyo		Great team (2nd tin		Angel	Cyber	Enterprise, SaaS, Storage	\$200,000	\$2,000,000	1. High
Amit Gilon				Angel					
Amnon Rapoport	Planium	Technology proof		Angel	SaaS	а	\$25,000	\$100,000	3. Low
Amos Talmor				Angel					



Our Simple Ontology

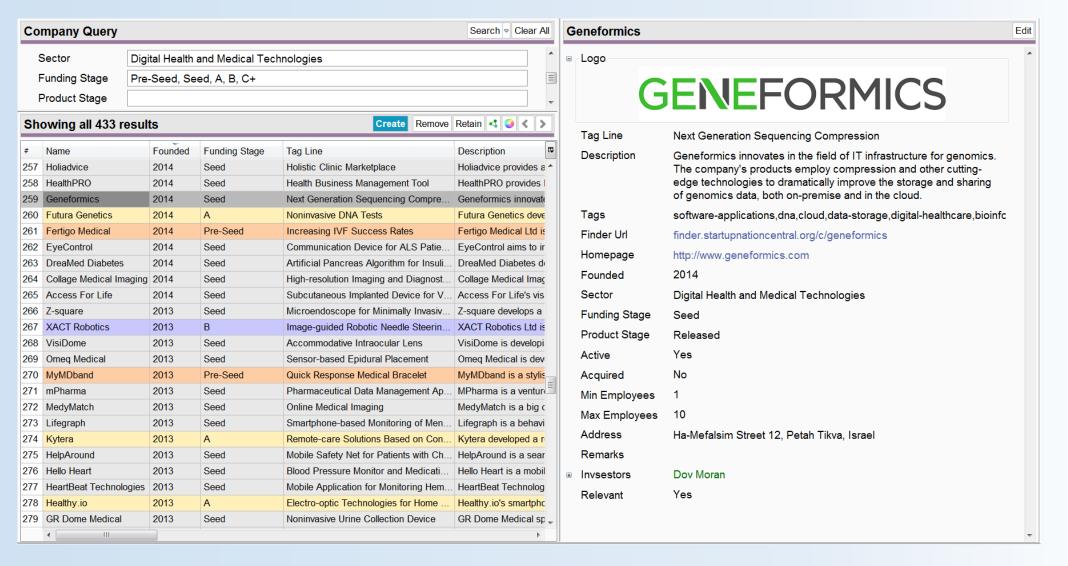


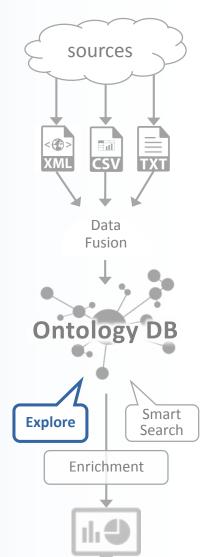
			Company		
			String	name	
	Investor		String	tag_line	
String	name		String	description	
String	when_to_approach		String	tags	
String	entity		String	finder_url	
String	kind		String	homepage	
String	primary_interest		String	address	
String	other_interests		String	city	
Integer	min_investment	invested_in	String	sector	
Integer	max_investment		String	funding_stage	
String	activity_level_in_israel		String	product_stage	
String	contact		String	em ploy ees	
Boolean	follow_on		Boolean	acquired	
String	location		Boolean		
String	guidelines_from_investor		Integer	year_founded	
Company[]	invested_in		Integer	min_employees	
			Integer	max_employees	
			String	label	
			Integer	funding_amount	



Explore by searching

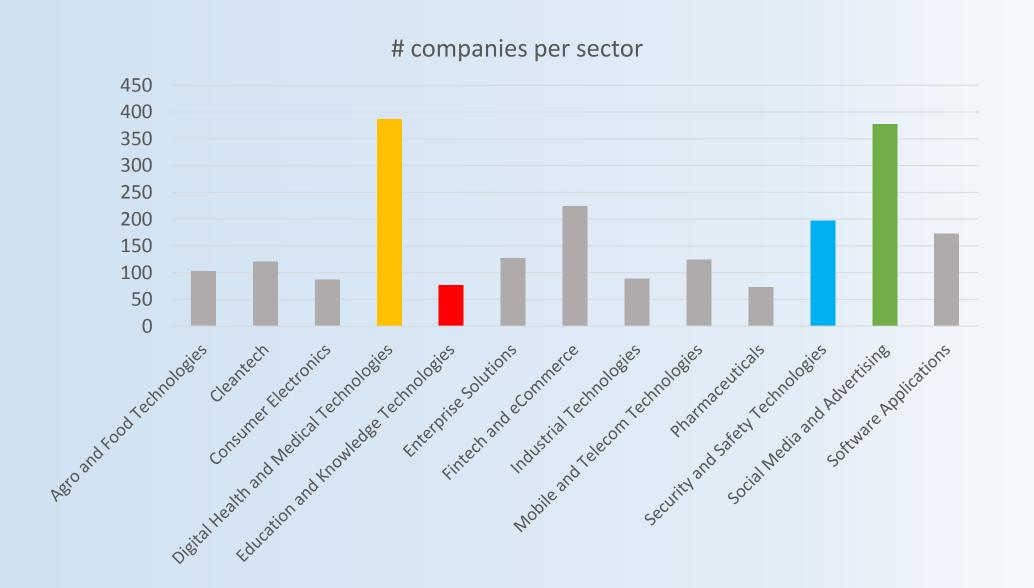


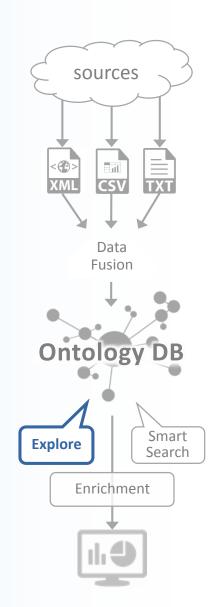




Explore by charting



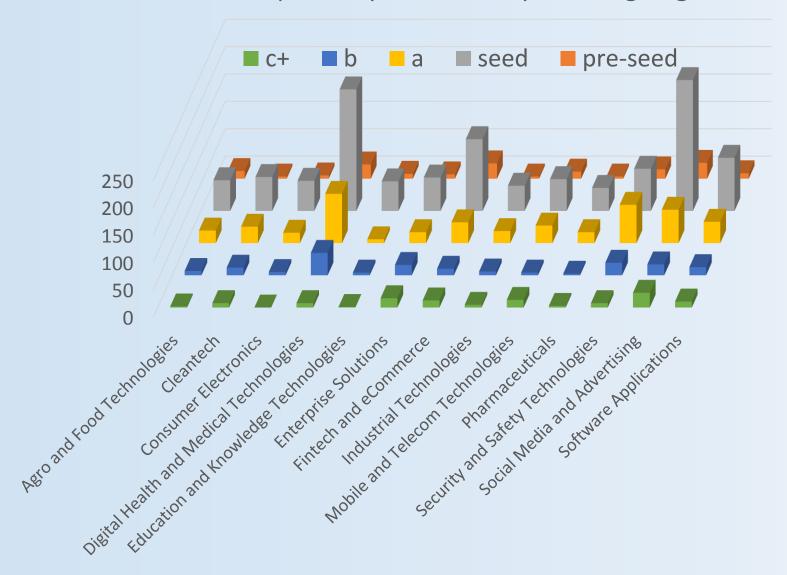


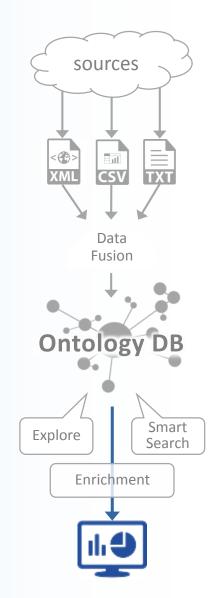


Generate insights from infographics



companies by sector and by founding stage





Mapping to the Ontology



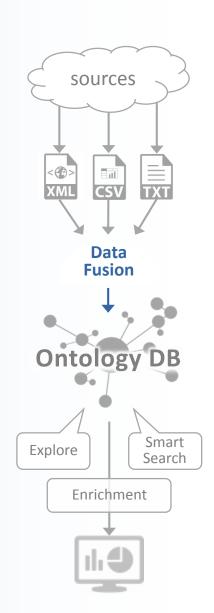
Crunchbase

4	Α -	В	C	D	E
1	Company Name	ompany Name Number of Employees Last Funding		Total Funding Amount	Founded Date
2	zvoid	1-10			04-05-09
3	ZUtA Labs	1-10	Product Crowdfunding	\$500,000	12/31/2013
4	Zuckerim	1-10			12/31/2013
5	Zoostr	1-10			12/31/2010
6	Zollpo	1-10			11-05-09
7	Zollo	1-10	Series Unknown	\$3,100,000	12/31/2011

Startup Nation

	Α	В	С	D -	E	
1	name	employees	funding_stage	founded	active	sector
2	Cloud of Things	"1-10"	Seed	2014	TRUE	Consumer Electror
3	Loom Systems	"11-50"	Bootstrapped	2015	TRUE	Software Applicati
4	Tipulog	"1-10"	Revenue Financed	2009	TRUE	Digital Health and
5	RenalSense	"11-50"	В	2009	TRUE	Digital Health and
6	OrCam Technologies	"51-200"	В	2010	TRUE	Digital Health and

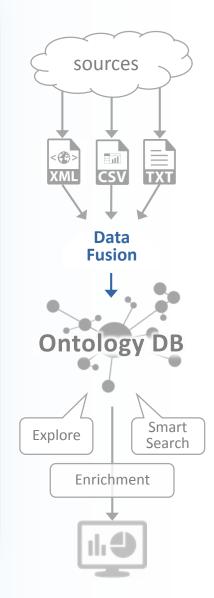
_		
		Company
	String	name
	String	tag_line
	String	description
	String	tags
	String	finder_url
	String	homepage
	String	address
	String	city
	String	sector
	String	funding_stage
	String	product_stage
	String	employees
	Boolean	acquired
	Boolean	active
	Integer	year_founded
	Integer	min_employees
	Integer	max_employees
	String	label
	Integer	funding_amount



Data Fusion – Mapping



Source		→ Anchor Class		∀ Hide Success	sful	Show All Export to Excel	Unreso	olved: 5104 Total: 5104	1 / 11
# name «<	founded <	tag_line	4	funding_stage <	hon	mepage	4	sector	<
1 Cloud of Things	2014	Custom-branded IoT Solutions		Seed	http	o://www.cloudofthings.com		Consumer Electronics	
2 Loom Systems	2015	Al Data Analysis Solution for IT Environments		Bootstrapped	http	o://www.loomsystems.com		Software Applications	
3 Tipulog	2009	Online Not			X	www.tipulog.co.il		Digital Health and Medical Techno	ologies
4 RenalSense	2009	Real-time I				/www.renalsense.com		Digital Health and Medical Techno	ologies
5 OrCam Technologies	2010	Assistive T Column Mapping for 'n	ame'			/www.orcam.com		Digital Health and Medical Techno	ologies
6 Nuvo Group	2007	Multi-moda Path * info2017.Compar	nv.name		~	/www.nuvo-group.com		Digital Health and Medical Techno	ologies
7 Well-Beat	2015	Improving	•					Digital Health and Medical Techno	ologies
8 CureFacts	2015	Online Evic				/www.curefacts.com		Digital Health and Medical Techno	ologies
9 ReWalk Robotics	2001	Battery-po				/rewalk.com		Digital Health and Medical Techno	ologies
10 Nucleix	2008	Urine-base				/www.nucleix.com		Digital Health and Medical Techno	ologies
11 ATLASense Biomed	2015	Real-time (Merge Policy				/www.atlasensebiomed.co	m	Digital Health and Medical Techno	ologies
12 Zerto	2009	Disaster R Missing value in SiGraph	Update SiGra	aph	-	/www.zerto.com		Enterprise Solutions	
13 Datos Health	2015	Health Date Missing value in staging ar	rea Do Nothing	,	-	/datos-health.com/		Digital Health and Medical Techno	ologies
14 Keheala	2014	Digital Hea			-	/keheala.com/		Digital Health and Medical Techno	ologies
15 PlantArcBio	2014	Gene Disc Mismatching values	Resolve Man	ually	▼			Agro and Food Technologies	
16 Post Harvest Solutions	2003	Packaging				/zoepac.com		Agro and Food Technologies	
17 Mobilicom	2006	4G Mobile				/www.mobilicom.com/		Mobile and Telecom Technologies	;
18 Growee Technologies Ltd	2016	Smartphon	Rem	nove Save Canc	ام	/www.getgrowee.com		Agro and Food Technologies	
19 Reali Technologies	2008	Real-time F	Item	oave oanc	.01	/www.realiteq.com/		Cleantech	
20 Taranis	2014	Mitigating Weather-related Risks for Farmers		Seed	http	o://www.taranis.ag		Agro and Food Technologies	
21 SMART! Fertilizer Management	2008	Software for Optimizing Fertilizers		В	http	o://www.smart-fertilizer.com/		Agro and Food Technologies	
22 AgriTask	2005	Precision Agronomy and Agricultural Intelligen	nce Platform	Α	http	o://www.agritask.com/		Agro and Food Technologies	
23 Atomation	2014	End-to-end IoT Platform		Α	http	o://atomation.net		Consumer Electronics	
24 ATP Labs	2016	Farm-to-market Intelligence		Seed	http	o://www.atp-labs.com/		Agro and Food Technologies	
25 I-Dripper	2016	On-demand Irrigation System		Seed	http	o://www.i-dripper.com/		Agro and Food Technologies	
26 CommonSensor	2001	Sensors for Efficient Plant Watering		Revenue Financed	http	o://www.common-sensor.com	n	Agro and Food Technologies	
27 Sensilize	2013	Analyzing Vegetation with UAS Technology		Seed	http	o://sensilize.com/		Agro and Food Technologies	
28 Tvuna Software Industries	1984	Solution for Managing a Board of Directors		Established	http	os://www.boardirector.co.il/e	n/	Enterprise Solutions	
29 Tecto	1977	Grading Machines		Established	http	os://www.tectoltd.com/		Agro and Food Technologies	



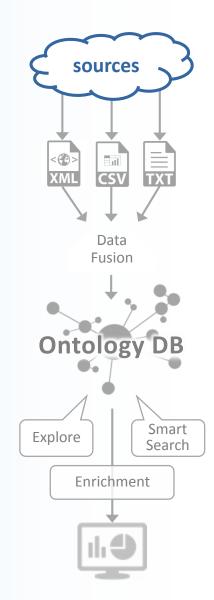
Data Fusion Operations



- Alignment
 - 'Series A' vs. 'A'
- Cleansing
 http://zollo.co.il/ → http://zollo.co.il
- Transformations

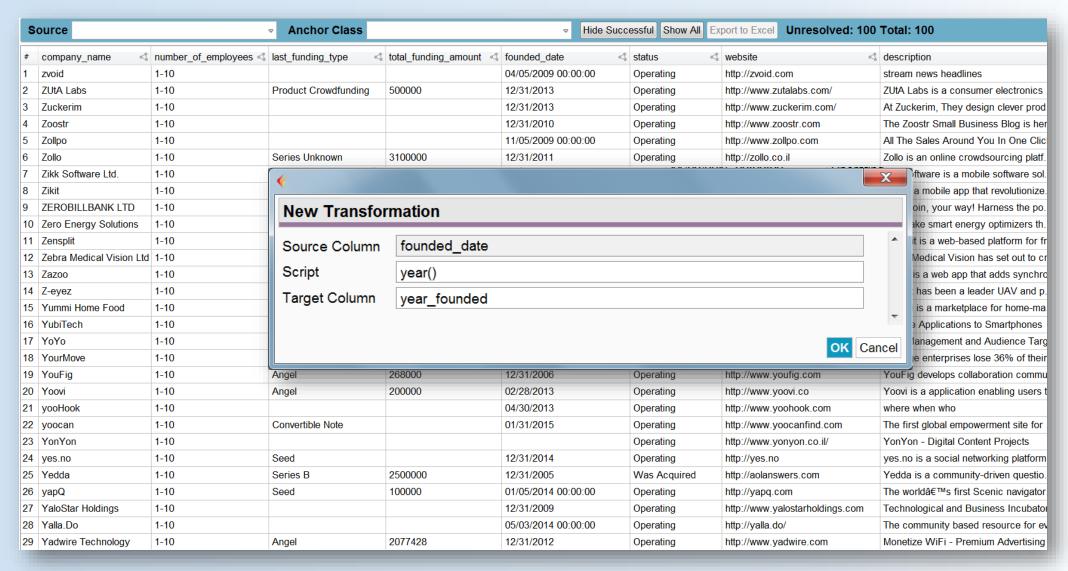
$$5/11/2013 \rightarrow 2013$$
"11-50" \rightarrow 11
"11-50" \rightarrow 50

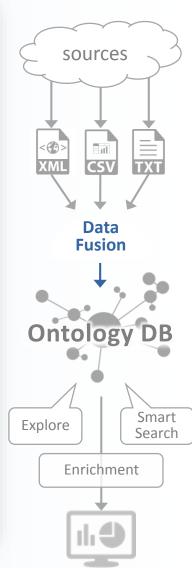
Conflict Resolution
 Manual, by policy



Data Fusion – Alignment



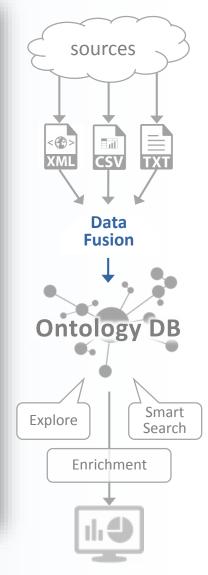




Data Fusion – Cleansing



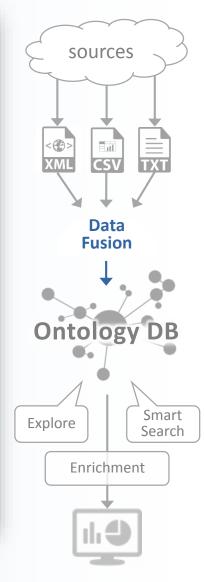
Source				Hide Succe Hide Succe	essful Show All	Export to Excel	Jnresolved: 100 Total: 100	
# company_name <	number_of_employees <	last_funding_type <	total_funding_amount <	founded_date <	year_founded <	status	✓ website	description
1 zvoid	1-10			04/05/2009 00:00:00	2009	Operating	http://zvoid.com	stream news headline
2 ZUtA Labs	1-10	Product Crowdfunding	500000	12/31/2013	2013	Operating	http://www.zutalabs.com/	ZUtA Labs is a consu
3 Zuckerim	1-10			12/31/2013	2013	Operating	http://www.zuckerim.com/	At Zuckerim, They de
4 Zoostr	1-10			12/31/2010	2010	Operating	http://www.zoostr.com	The Zoostr Small Busi
5 Zollpo	1-10			11/05/2009 00:00:00	2009	Operating	http://www.zollpo.com	All The Sales Around
6 Zollo	1-10	Series Unknown	3100000	12/31/2011	2011	Operating	http://zollo.co.il	Zollo is an online crov
7 Zikk Software Ltd.	1-10	Seed		12/31/2012	2012	Operating	http://www.zikksoftware.com	Zikk software is a mol
8 Zikit	1-10			05/31/2014	2014	Operating	http://www.zik-it.com	Zikit is a mobile app th
9 ZEROBILLBANK LTD	1-10			02/09/2015 00:00:00	2015	Operating	http://www.zerobillbank.com/	Your coin, your way!
10 Zero Energy Solutions	1-10			11/09/2015 00:00:00	2015	Operating	http://www.zero.energy/	We make smart energ
11 Zensplit	1-10			03/31/2013	2013	Operating	http://zensplit.com	Zensplit is a web-base
12 Zebra Medical Vision Ltd	1-10	Series Unknown	2.0E7	12/31/2013	2013	Operating	http://www.zebra-med.com	Zebra Medical Vision
13 Zazoo	1-10	Series A	3100000	12/31/2010	2010	Operating	http://www.zazoo.it	Zazoo is a web app th
14 Z-eyez	1-10			12/31/2011	2011	Was Acquired	http://www.z-eyez.com/	Z-eyez has been a lea
15 Yummi Home Food	1-10			12/31/2011	2011	Operating	http://www.yummi.co.il/	Yummi is a marketpla
16 YubiTech	1-10			10/31/2008	2008	Operating	http://www.yubitech.com	Migrate Applications t
17 YoYo	1-10			12/31/2011	2011	Operating	http://www.yoyo-il.com/	Data Management an
18 YourMove	1-10			12/31/2008	2008	Operating	http://www.yourmovetp.com	Average enterprises le
19 YouFig	1-10	Angel	268000	12/31/2006	2006	Operating	http://www.youfig.com	YouFig develops colla
20 Yoovi	1-10	Angel	200000	02/28/2013	2013	Operating	http://www.yoovi.co	Yoovi is a application
21 yooHook	1-10			04/30/2013	2013	Operating	http://www.yoohook.com	where when who
22 yoocan	1-10	Convertible Note		01/31/2015	2015	Operating	http://www.yoocanfind.com	The first global empov
23 YonYon	1-10					Operating	http://www.yonyon.co.il/	YonYon - Digital Conf
24 yes.no	1-10	Seed		12/31/2014	2014	Operating	http://yes.no	yes.no is a social net
25 Yedda	1-10	Series B	2500000	12/31/2005	2005	Was Acquired	http://aolanswers.com	Yedda is a community
26 yapQ	1-10	Seed	100000	01/05/2014 00:00:00	2014	Operating	http://yapq.com	The world's first S
27 YaloStar Holdings	1-10			12/31/2009	2009	Operating	http://www.yalostarholdings.com	Technological and Bu
28 Yalla.Do	1-10			05/03/2014 00:00:00	2014	Operating	http://yalla.do/	The community based
29 Yadwire Technology	1-10	Angel	2077428	12/31/2012	2012	Operating	http://www.yadwire.com	Monetize WiFi - Prem



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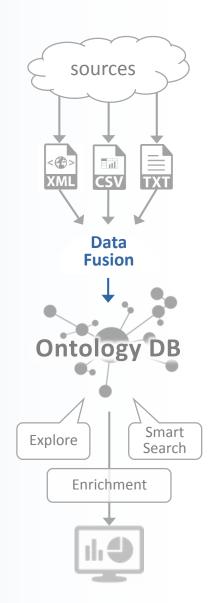
S	ource Crunchbase co	ompanies 🔻	Anchor Class info2017.	Company	e Successful Show All Export to Excel Unresolved: 73 T	otal: 100
#	ompany_name <	company_ref	year_founded •	last_funding_type	website <	description
1	zvoid	• zvoid	• 2009	No value>	http://zvoid.com	stream news headlines
2	ZUtA Labs	ZUtA Labs	2013 ≠ 2014	■ Product Crowdfunding ≠ Seed	http://www.zutalabs.com	ZUtA Labs is a consumer electronics
3	Zuckerim	Zuckerim	• 2013	 Revenue Financed 	• http://www.zuckerim.com ≠ http:// www.zbamdesign.com	At Zuckerim, They design clever prod
4	Zoostr	Zoostr	• 2010	No value>	http://www.zoostr.com	The Zoostr Small Business Blog is her
5	Zollpo	Zollpo	2009	No value>	http://www.zollpo.com	All The Sales Around You In One Click!
6	Zollo	Zollo	• 2011	Series Unknown	http://zollo.co.il	Zollo is an online crowdsourcing platf
7	Zikk Software Ltd.	Zikk Software Ltd.	• 2012	Seed	http://www.zikksoftware.com	Zikk software is a mobile software sol
8	Zikit	Zikit	2014 ≠ 2015	Pre-Seed	http://www.zik-it.com	Zikit is a mobile app that revolutionize
9	ZEROBILLBANK LTD	 ZEROBILLBANK LTD 	2015	No value>	http://www.zerobillbank.com	Your coin, your way! Harness the po
10	Zero Energy Solutions	 Zero Energy Solutions 	• 2015	• A	http://www.zero.energy	We make smart energy optimizers th
11	Zensplit	Zensplit	2013	No value>	http://zensplit.com	Zensplit is a web-based platform for fr
12	Zebra Medical Vision	 Zebra Medical Vision Ltd 	• 2013	Series Unknown	http://www.zebra-med.com	Zebra Medical Vision has set out to cr
13	Zazoo	Zazoo	• 2010	Series A	http://www.zazoo.it	Zazoo is a web app that adds synchro
14	Z-eyez	Z-eyez	• 2011	No value>	http://www.z-eyez.com	Z-eyez has been a leader UAV and p
15	Yummi Home Food	Yummi Home Food	2011 ≠ 2012	 Bootstrapped 	http://www.yummi.co.il	Yummi is a marketplace for home-ma
16	YubiTech	YubiTech	• 2008	No value>	http://www.yubitech.com	Migrate Applications to Smartphones
17	YoYo	YoYo	2011 ≠ 2012	 Bootstrapped 	http://www.yoyo-il.com	Data Management and Audience Targ
18	YourMove	YourMove	2008 ≠ 2009	Revenue Financed	http://www.yourmovetp.com	Average enterprises lose 36% of their
19	YouFig	YouFig	• 2006	Angel	http://www.youfig.com	YouFig develops collaboration commu
20	Yoovi	Yoovi	• 2013	Angel	http://www.yoovi.co	Yoovi is a application enabling users t
21	yooHook	yooHook	• 2013	No value>	http://www.yoohook.com	where when who
22	yoocan	yoocan	2015	 Convertible Note 	http://www.yoocanfind.com	The first global empowerment site for
23	YonYon	YonYon	<no value=""></no>	No value>	http://www.yonyon.co.il	YonYon - Digital Content Projects
24	yes.no	• yes.no	2014 ≠ 2015	Seed	http://yes.no	yes.no is a social networking platform
25	Yedda	Yedda	• 2005	Series B	http://aolanswers.com	Yedda is a community-driven questio
26	yapQ	• yapQ	• 2014	Seed	http://yapq.com	The world's first Scenic navigator.
27	YaloStar Holdings	 YaloStar Holdings 	• 2009	No value>	http://www.yalostarholdings.com	Technological and Business Incubator
28	Yalla.Do	• Yalla.Do	• 2014	No value>	http://yalla.do	The community based resource for ev
29	Yadwire Technology	 Yadwire Technology 	• 2012	Angel	http://www.yadwire.com	Monetize WiFi - Premium Advertising



Conflict Resolution

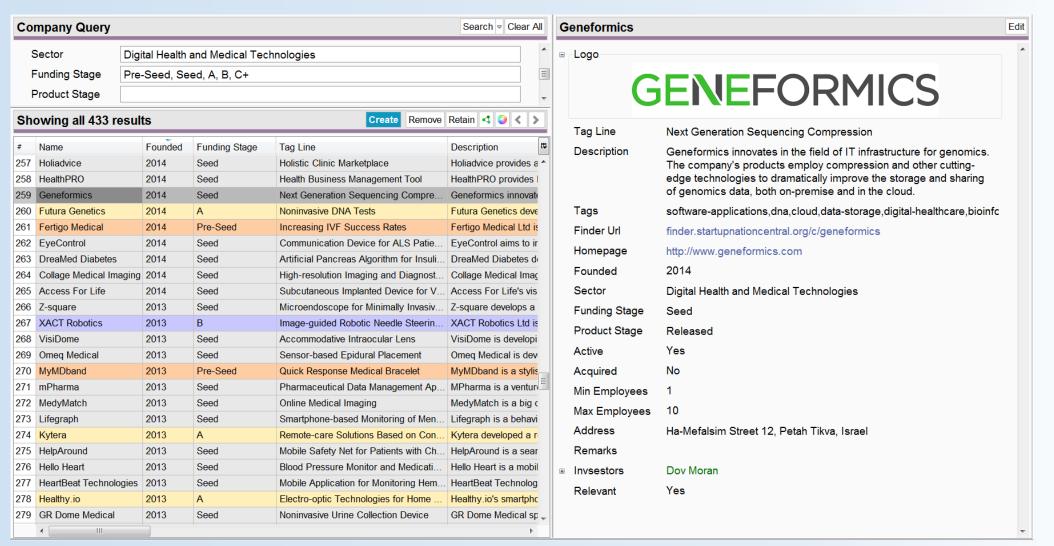


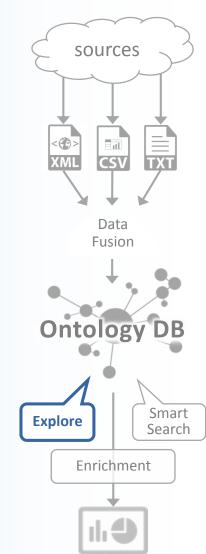
So	urce Crunchbase companies ¬	Anchor Class info2017.Com	mpany	Hide Successful Show All Export	to Excel Unresolved: 28 Total: 100
#	company_name •	company_ref	year_founded <	last_funding_type <	website
1	ZUtA Labs	 ZUtA Labs 	2013 ≠ 2014	■ Product Crowdfunding ≠ Seed	http://www.zutalabs.com
2	Zuckerim	Zuckerim	• 2013	Revenue Financed	http://www.zuckerim.com ≠ http:// www.zbamdesign.co
3	Zikit	Zikit	2014 ≠ 2015	Pre-Seed	http://www.zik-it.com
4	Yummi Home Food	 Yummi Home Food 	2011 ≠ 2012	 Bootstrapped 	http://www.yummi.co.il
5	• YoYo	YoYo	2011 ≠ 2012	 Bootstrapped 	http://www.yoyo-il.com
6	YourMove	YourMove	2008 ≠ 2009	Revenue Financed	http://www.yourmovetp.com
7	• yes.no	• yes.no	2014 + 2015	Seed	http://yes.no
8	Xtras	Xtras	2015	 Convertible Note ≠ Seed 	http://www.xtr.as ≠ http://www.xtras.co.il
9	XPlace	XPlace	2014	 Seed ≠ Revenue Financed 	http://www.xplace.com
10	 Workgroup ≠ WorkGroup 	 WorkGroup 	Set Empty	 Bootstrapped 	http://www.workgroup.im
11	woosh water systems ≠ Woosh Water Systems	 Woosh Water Systems 	Discard Row	Seed	http://www.wooshwater.com
12	WonderVoice Technologies	 WonderVoice Technologies 	2009 ≠ 2011	Seed	• http://wondervoiceapp.com ≠ http://www.wondervoice-
13	WizeGem ≠ Wizegem	Wizegem	• 2014	 Bootstrapped 	http://www.wizegem.com
14	• wit-me ≠ Wit-Me	• Wit-Me	• 2012	Seed	http://www.wit-me.com
15	Wishbox	Wishbox	• 2015	Seed	http://www.wishbox.co ≠ http://wishbox.co
16	 WiseShelf ≠ Wiseshelf 	Wiseshelf	• 2016	Seed	http://www.wiseshelf.com ≠ https://www.wiseshelf.com
17	Winkapp ≠ WinkApp	WinkApp	• 2013	 Private Equity ≠ Seed 	http://winkapp.co
18	Winflex	Winflex	• 2009	Seed	http://www.winflex.co.il/ ≠ http://www.winflex.co.il
19	Wikiwand	 Wikiwand 	• 2013	Angel ≠ Seed	http://www.wikiwand.com
20	WhoDoYou	WhoDoYou	• 2012	 Convertible Note ≠ Seed 	http://www.whodoyou.com
21	WeTrip	WeTrip	• 2014	Pre-Seed	http://wetrip.me ≠ http://www.weskitravel.com
22	Westham Innovations	 Westham Innovations 	• 2006	Revenue Financed	• http://www.wsthm.com/ ≠ http://westhamco.com
23	Wemark	Wemark	• 2015	 Convertible Note ≠ Seed 	http://www.wemark.com
24	WebyClip	 WebyClip 	• 2013	Series A ≠ A	http://www.webyclip.com
25	Webbing Labs	 Webbing Labs 	• 2014	Angel ≠ Seed	http://webbinglabs.com
26	Waveit	Waveit	• 2014	• Seed	http://waveitapp.com/ ≠ http://waveitapp.com
27	Water.io ≠ Water.IO	Water.IO	• 2015	Seed	http://www.water-io.com



Exploration

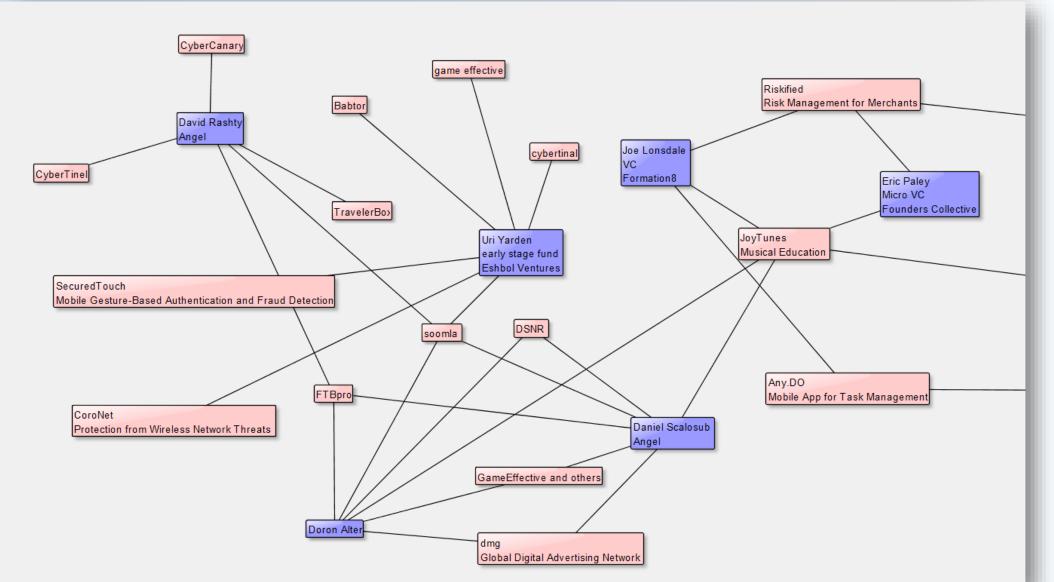


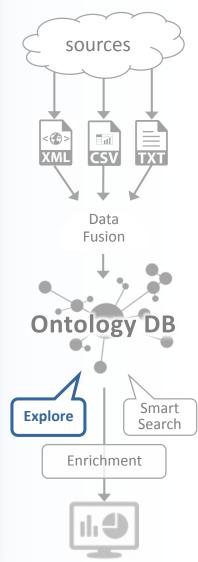




Companies and Investors

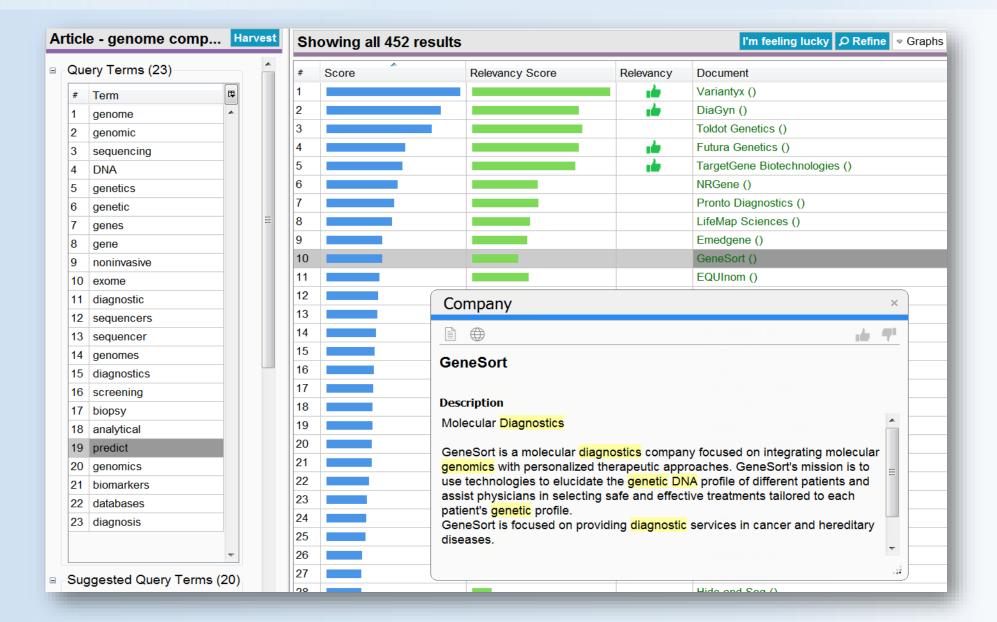


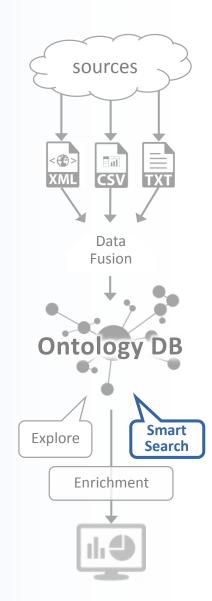




Finding Similar companies

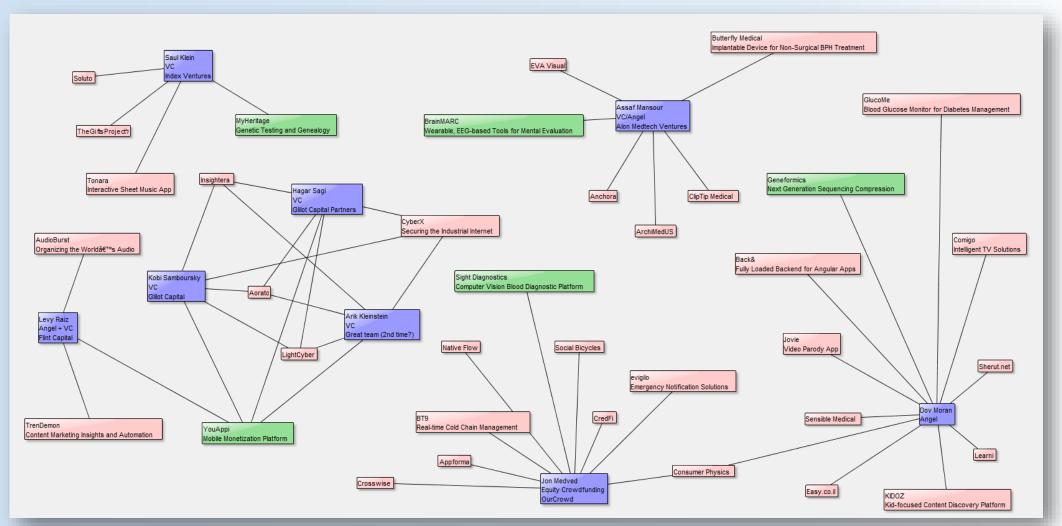


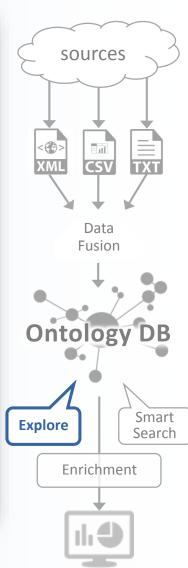




Mission accomplished!



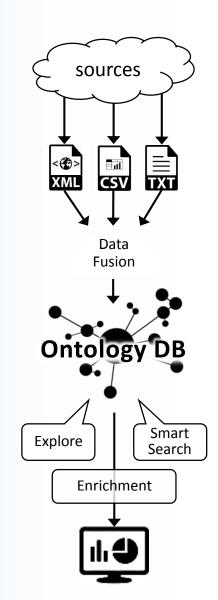




Summary



- Until recently, investigations that required non-trivial processing of large data sets were out of reach for the information specialist
- One challenge is building a custom data management system for the relevant investigation.
 With the ontology DB concept, this becomes as simple as using Excel
- A second challenge is handling data fusion and especially conflict resolution.
 The approach presented here brings data fusion within the information specialist's reach





Thank You

