



Software for
Business Intelligence

BizInt Smart Charts

Patents & IP Sequences | Clinical Trials | Drug Pipelines

Challenges in Visualizing Pharmaceutical Information - Competitive Launch Landscapes

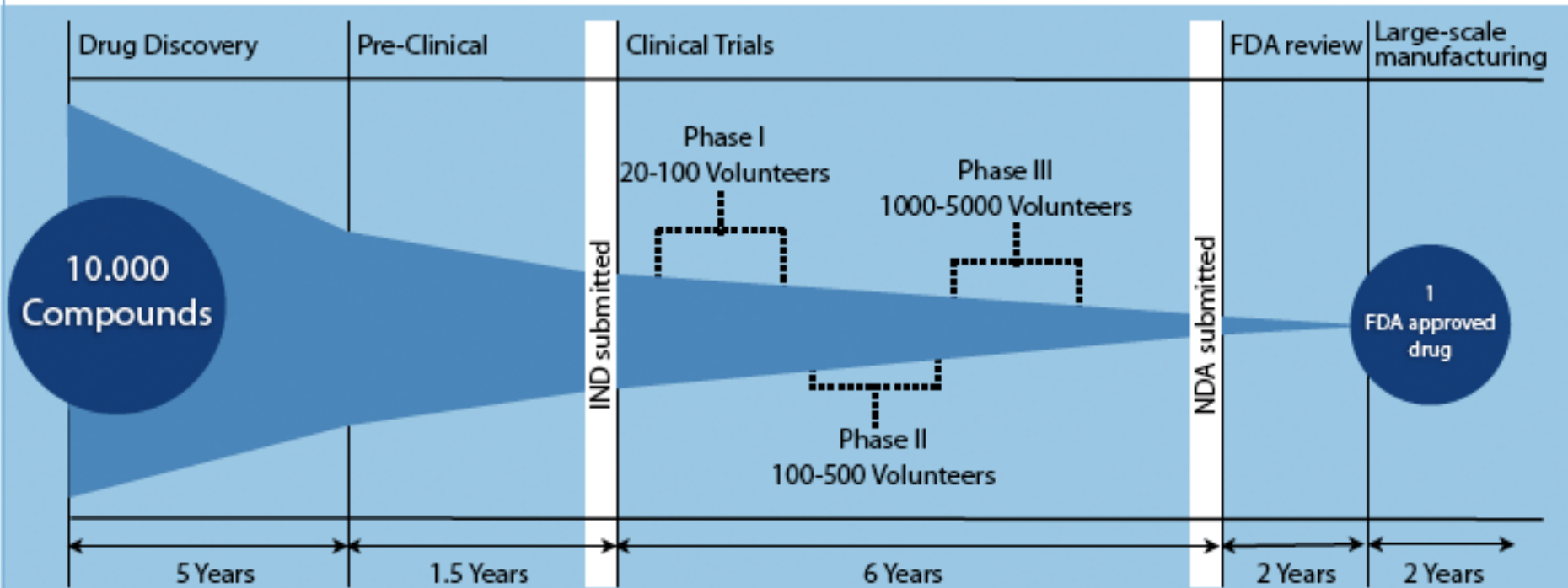
II-SDV 2016, Nice

Diane Q. Webb, President

18 April 2016

www.bizint.com

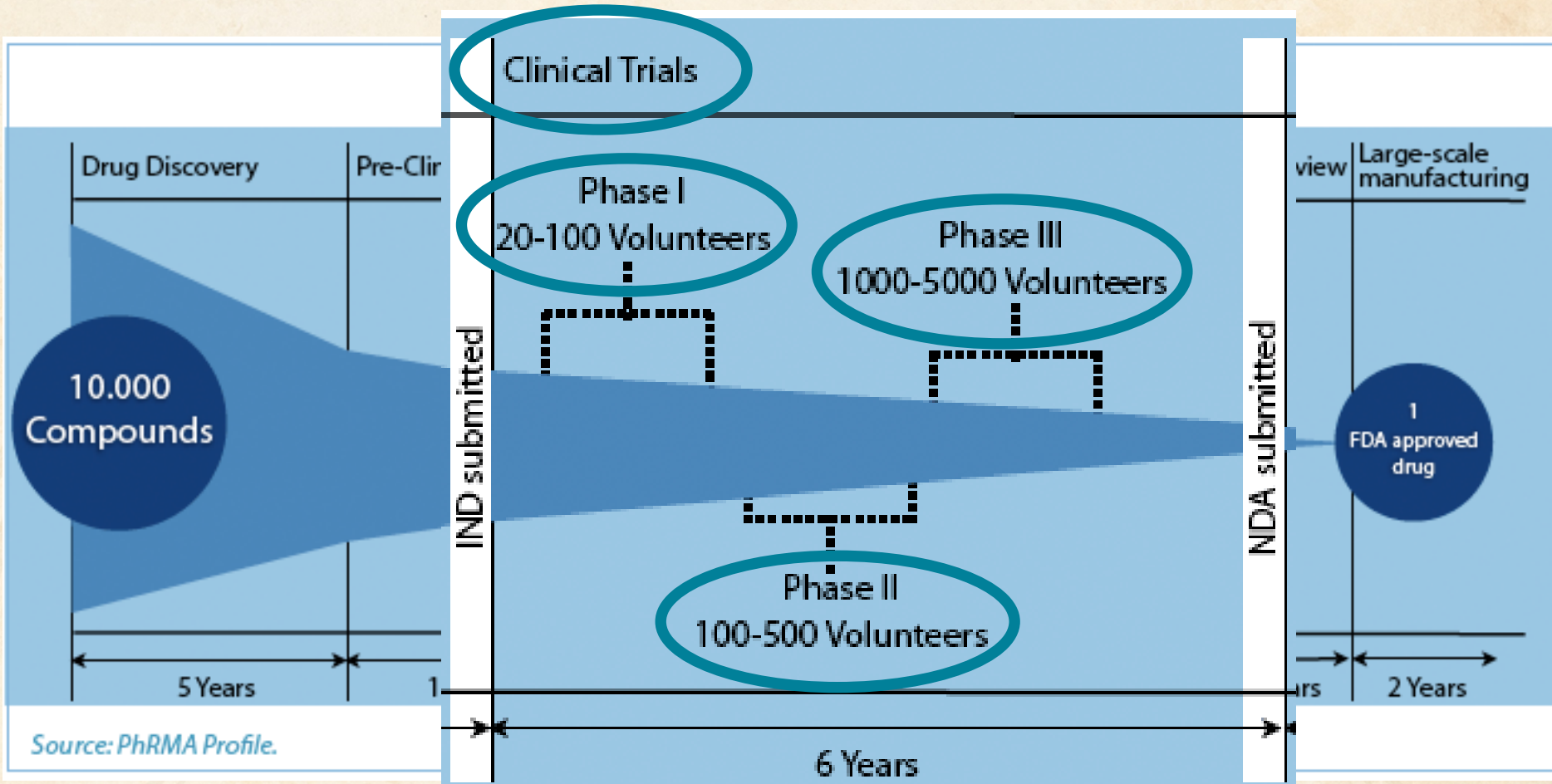
The Drug Development "Pipeline"



Source: PhRMA Profile.

At each stage of the pipeline, companies need information on drugs in development to make both business and research decisions.

Clinical Trials Phases in the Drug Pipeline



2013 II-SDV Paper: *Challenges in Visualizing Pharmaceutical Business Information*

“The Problem:

Visualizations developed for scientific and patent data do not do a good job of “telling the story” when applied to drug pipeline data and often need significant changes.”

2013 II-SDV Paper - sample "piano" charts

Research	Translational			Development			
	Lead Opt	Preclinical	Phase I	Phase IIa	Phase IIb/III	Registration	Phase IV
Pyrazoles Drexel	2 Projects Novartis	DSM265 UTSW/UW /Monash	CDRI 97/78 Ipsa	OZ439 Monash/UNMC /STI	Azithromycin/ chloroquine Pfizer	Mefloquine/ artesunate Farmagroup /DND/Cipla	Pyramax® Shin Poong University of Seoul APPROVED
Quinolones USFVAM C	2 Projects GSK	Aminoindole Sanofi/Genzyme	DF02 Difator	Ferroquine Sanofi	Tafenoquine GSK	Artesunate i.r. WHO/TDR	Coartem®-D Novartis APPROVED
Cell-based lead Merck Serono /WHO/TDR	Antimalarials St. Jude/ Rutgers/USF	MK4815 Merck	N-tert-butyl isoquine Liverpool School of Tropical Hygiene/GSK	Fosmidomycin/ piperazine Jornas	Co-trimoxazole Institute of Tropical Medicine	Arterolane/ piperazine Ranbaxy	ASAQ- Winthrop Sanofi APPROVED
Imidazolidinones WRAIR	Aminopyridine UCT	P218 DHFR Biotech/Monash /LSHTM	AQ-13 Immtech	Methylene Blue AQ Uni. Heidelberg	PR289CT DRC/Antwerp	ARCO® Naphthoquine/ artemisinin Kunming	Artesunate for injection Celis APPROVED
dUTPase inhibitors Medvir	Antimalarials Dundee	NPC1161B University of Mississippi	GNF156 Novartis	SAR97276 Sanofi	Argemone mexicana Mali/Genova	Eurartesim® sigma-tau APPROVED	
DHODH UTSW/ UW/Mon		RKA182 Liverpool	ACTXXXX Actelion	Artemisone LHKST	Artimis™ Pavia/Pharmaz		

Merck Pipeline February 22, 2013

Phase II	Phase II	Phase II	Phase III	Phase III
Allergy, Immunotherapy ¹ MK-8237	CMV Prophylaxis in Transplant Patients, Icternovir, MK-8228	Migraine MK-1602	Allergy, Grass Pollen ^{1,2} MK-7243	Herpes Zoster Inactivated VZV vaccine, V212
Alzheimer's Disease MK-8931 ³	Contraception, Medicated IUS MK-8342	Overactive Bladder MK-4618	Allergy, Ragweed ¹ MK-3641	HPV-related Cancers, V503 HPV vaccine (9 valent)
Asthma MK-1029	Contraception, next generation ring MK-8175A	Pneumoconjugate Vaccine V114	Atherosclerosis anacetrapib, MK-0859	Osteoporosis odanacatib, MK-0822
Bacterial Infection MK-7655	Contraception, next generation ring MK-8342B	Rheumatoid Arthritis MK-8457	Clostridium difficile Infection actoxumab/bezlotoxumab, MK-3415A	Parkinson's Disease preladenat, MK-3814
Cancer dalotuzumab, MK-0646	Hepatitis C MK-8172	1. North American rights. 2. The Company has submitted a BLA for MK-7243 and now awaits acceptance for review by the FDA. 3. Phase III/III adaptive design. 4. In November 2011, Merck received a Complete Response Letter from the FDA for NOMAC/E2 (MK-8175A). The Company is conducting an additional clinical study requested by the FDA and plans to update the application in the future. 5. For development in Japan only.	Contraception NOMAC E2 MK-8175A (US) ⁴	Pediatric Hexavalent Combination Vaccine, V419
Cancer MK-1775	Hepatitis C MK-8742		Diabetes Mellitus MK-3102	Platinum-resistant Ovarian Cancer, vintafolide, MK-8109 (US)
Cancer MK-2206	HIV MK-1439		Fertility, corifollitropin alfa injection, MK-8962 (US)	Psoriasis MK-3222
Cancer dinaciclib, MK-7965 ³	Insomnia MK-6096		Hepatitis C vaniprevir, MK-7009 ⁵	Thrombosis vorapaxar, MK-5348
Cancer ridaforolimus, MK-8669	Melanoma MK-3475			

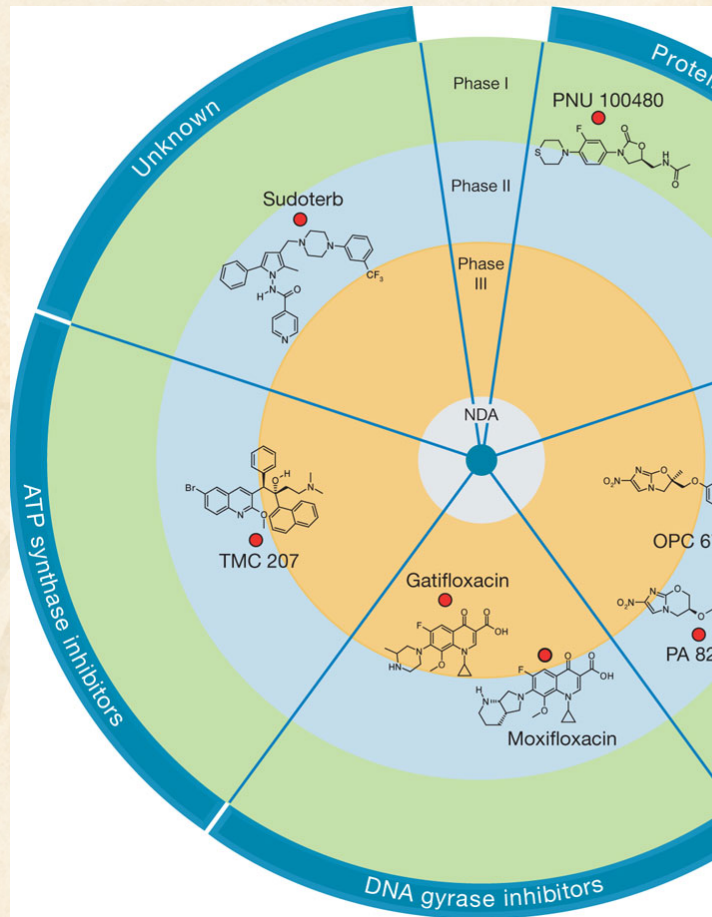
➡ Moved forward since last pipeline update.



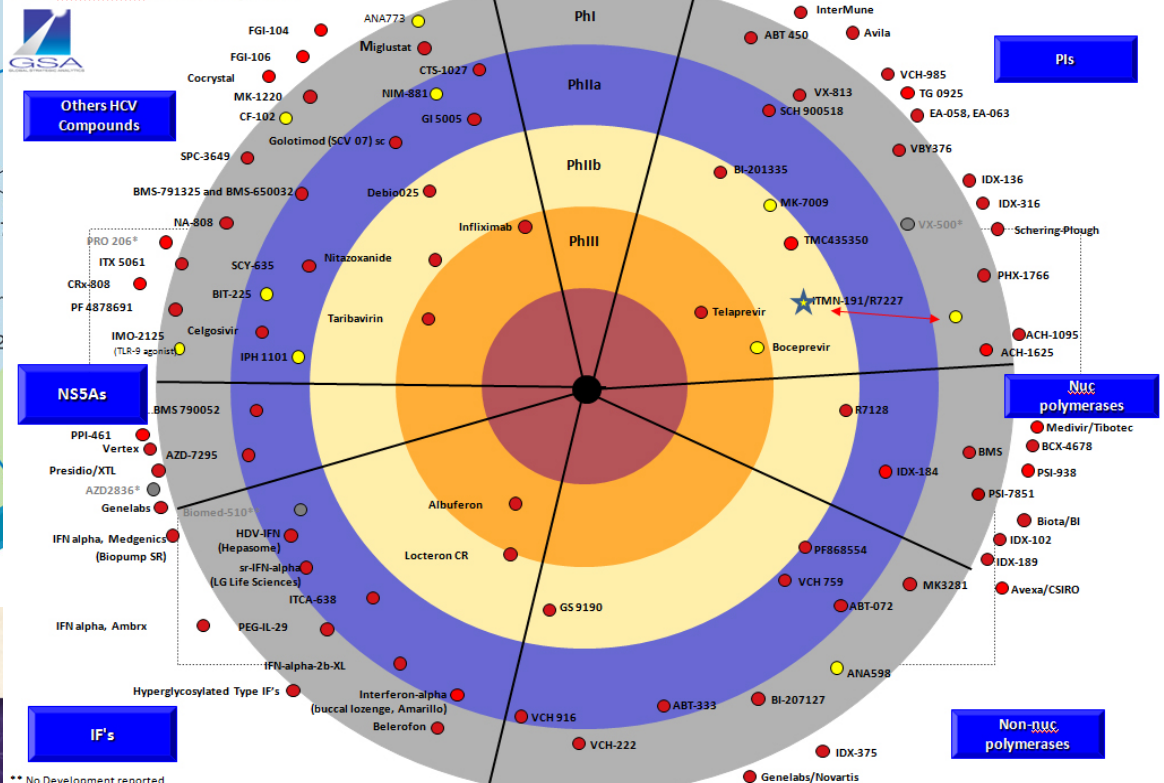
EXPLORATORY	CONFIRMATORY		REGISTRATION
	PHASE II	PHASE III	
HCD122 Hem. tumors	LBQ707 Solid Tumors	EPO906 Ovarian cancer	Tasigna® (JPN) IM ⁷ res. / intol.CML ³
TKI258 Hem./solid tumors	PKC412 AML ¹	SOM230 Acromegaly / Cushing's disease	Exjade® (JPN) Chronic iron overload
RAF265 Melanoma	LBH589 Hemat. tumors	Glivec® GIST ² adjuvant / CML ³	<div style="display: flex; justify-content: space-around;"> <div style="width: 15px; height: 15px; background-color: #e67e22; border: 1px solid black;"></div> NME⁹</div> <div style="width: 15px; height: 15px; background-color: #8e44ad; border: 1px solid black;"></div> NME ⁹ roll-out

- 1 Acute myeloid leukemia
- 2 Gastrointestinal stromal tumor
- 3 Chronic myeloid leukemia
- 4 Renal cell carcinoma
- 6 Pancreatic islet cell tumor
- 7 Imatinib
- 8 Hereditary hemochromatosis
- 9 New molecular entity
- 10 Life cycle management
- 11 Gastroenteropancreatic

2013 II-SDV Paper - sample "bull's-eye" charts



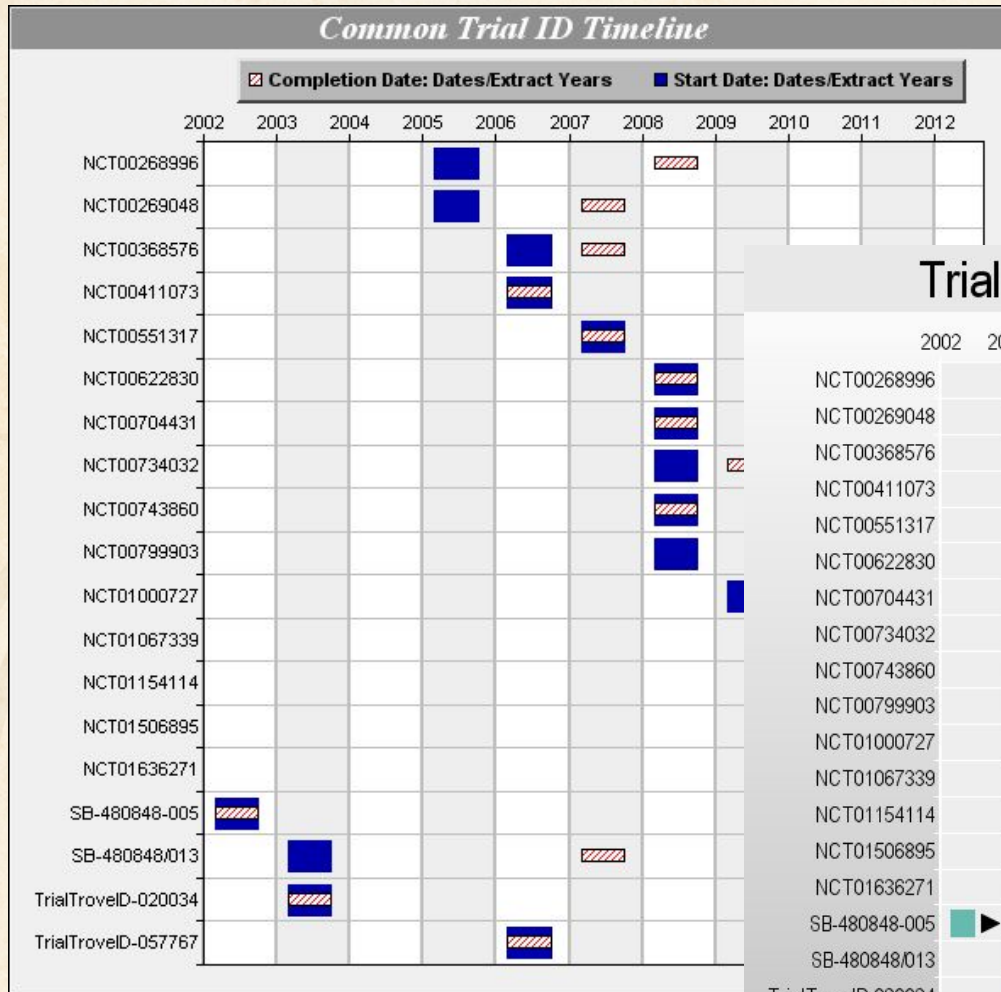
HCV Antivirals in Development



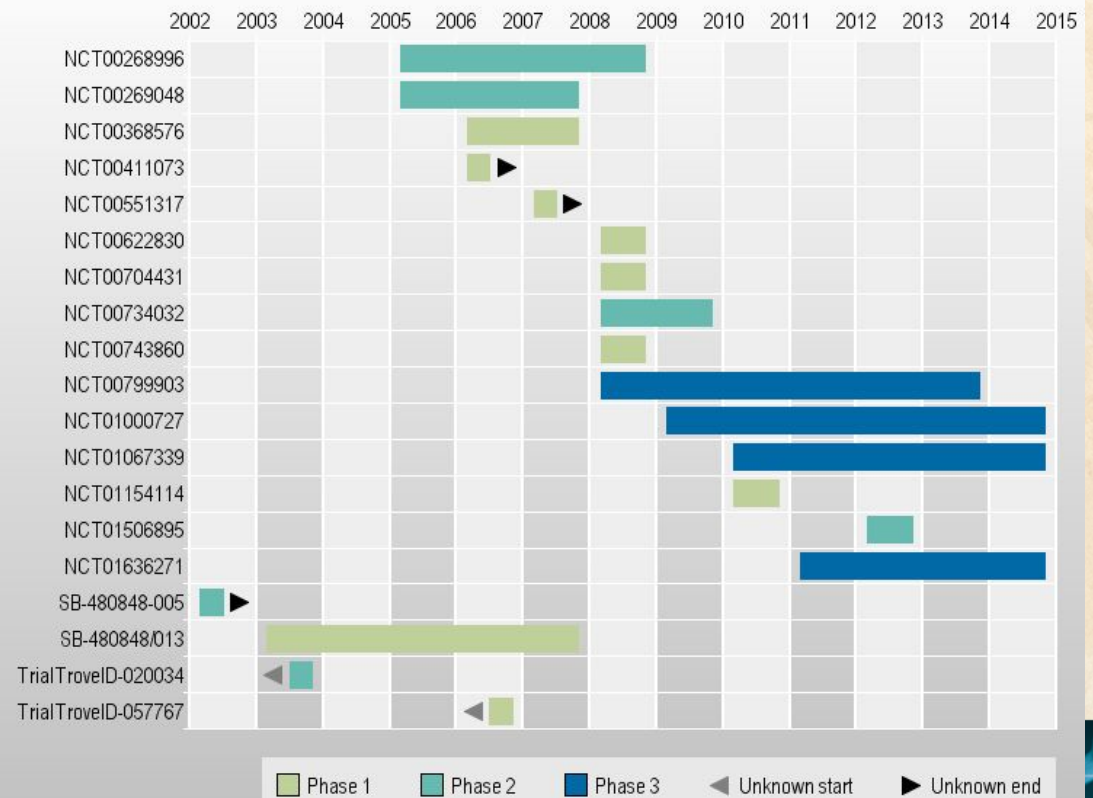
** No Development reported
 * Discontinued (VX-500: 1 March 2009 (IDB), AZD2836: 29 Jan 2009 (IDB), ANA773: 5 June 2009 (IDB), PRO 206: 8 June 2009 (IDB))
 Sources: GBI Analysis (12 June 2009), Pipeline Sources, Company Press Releases, Reuters Knowledge Analyst Reports

2013 II-SDV Paper - clinical trial timelines

Common Trial ID Timeline



Trial Timeline (CT.gov, Adis, TrialTrove)

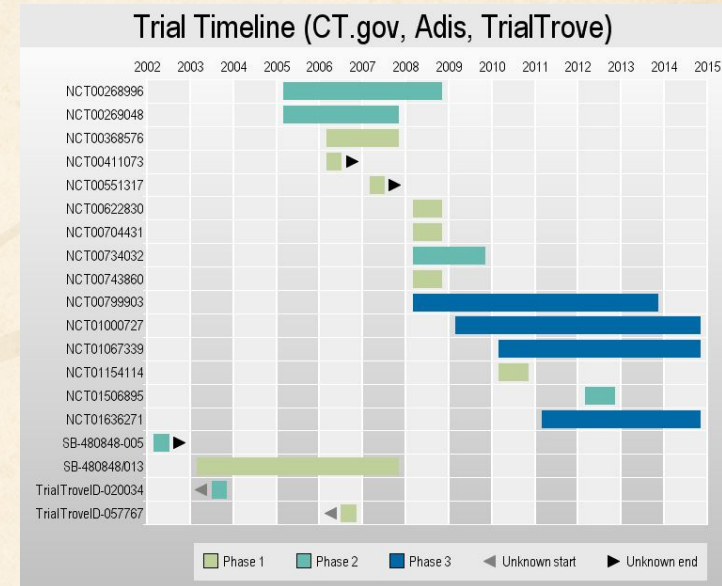


2013 II-SDV Paper - key conclusions for pharmaceutical visualizations:

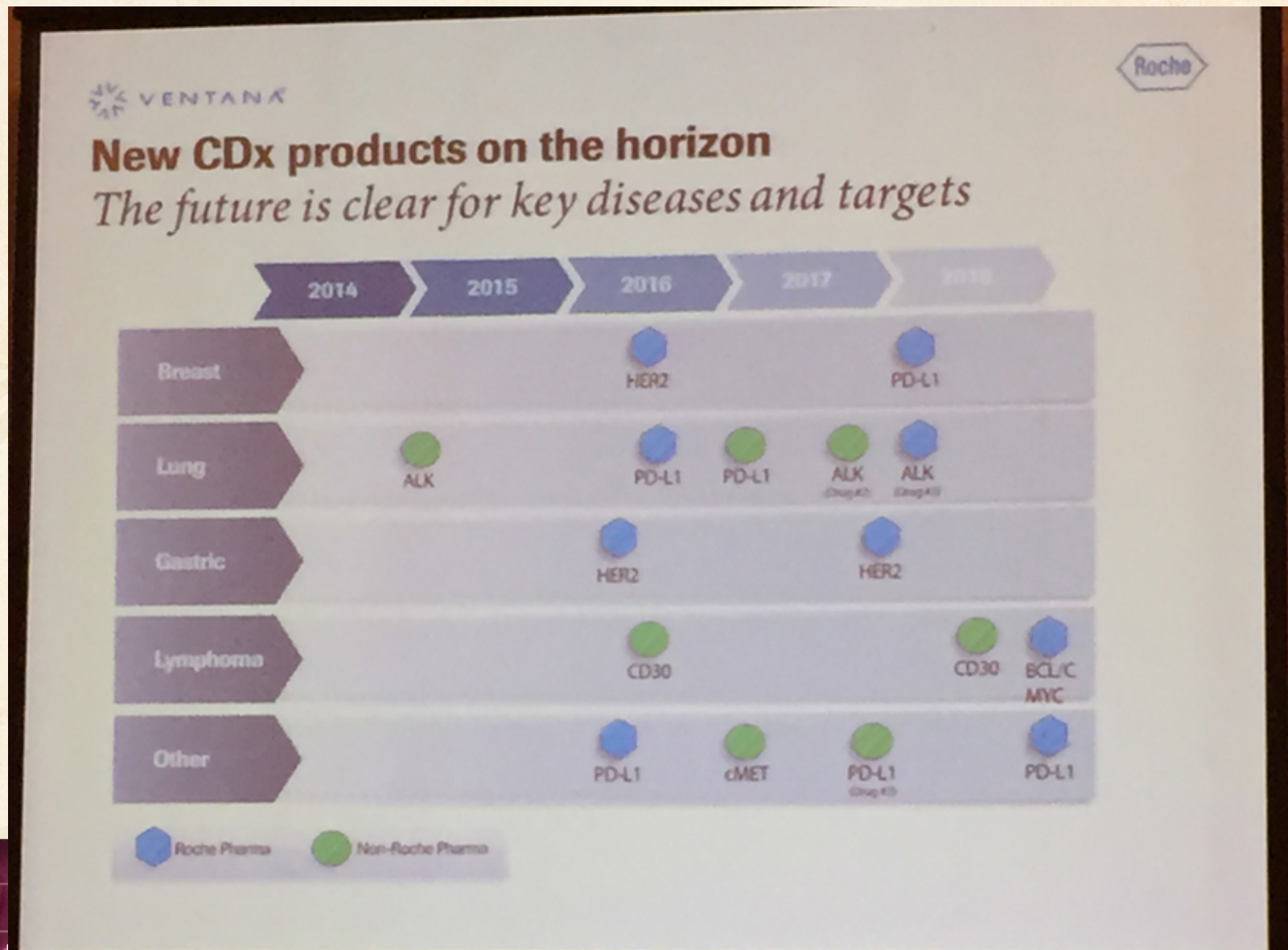
- Generally cannot be created with standard visualization libraries.
- Operate at both the exploratory and explanatory levels.
- Require multiple sources for completeness and accuracy.
- Rely on data cleanup and de-duplication tools.
- Often use categorical vs numeric coordinates; discrete vs. aggregate values.

2015: "Launch timeline" development

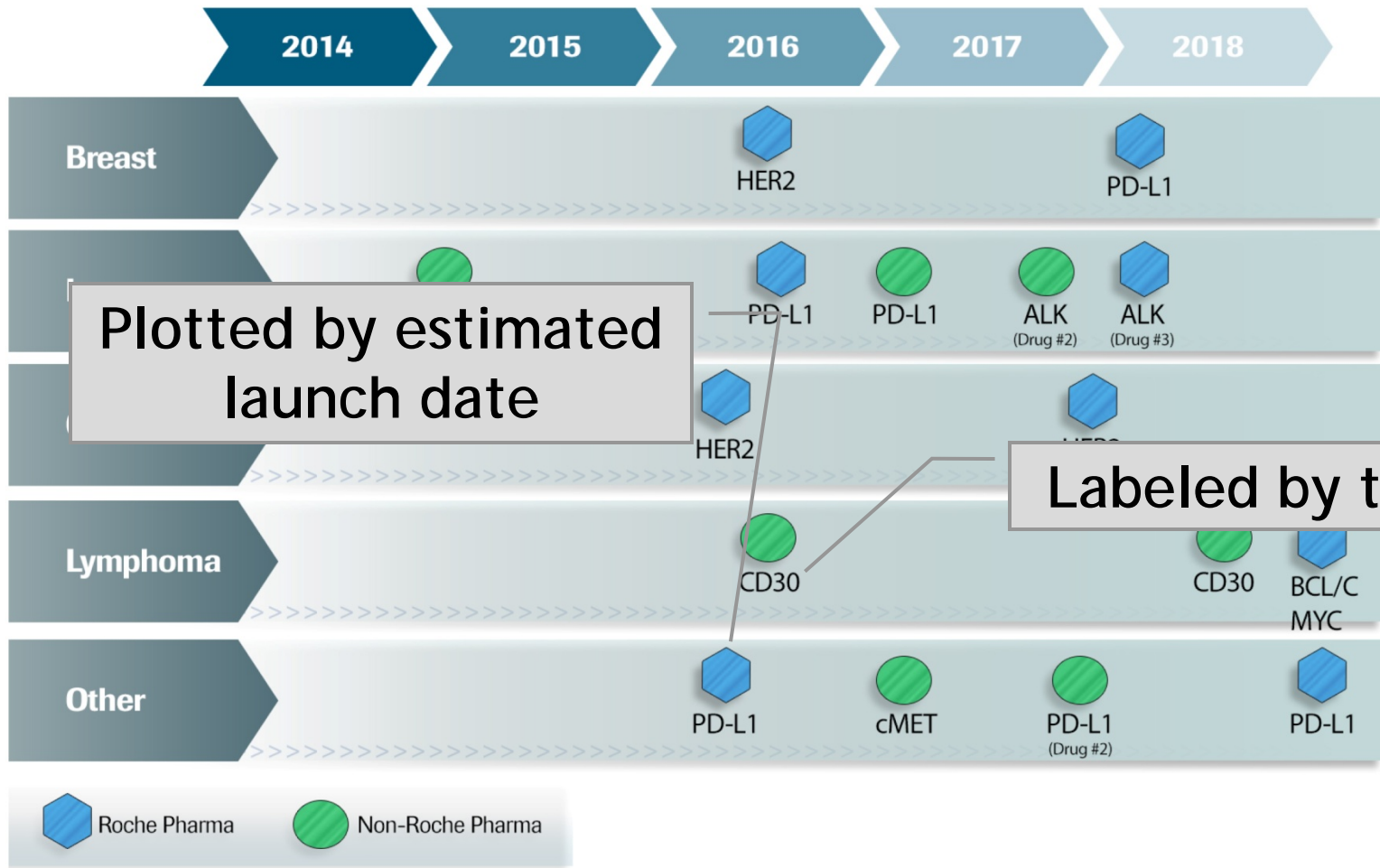
- Grows out of use of Trial Timelines by customers.
- Trial timelines show when a set of *clinical trials* for a drug are projected to end.
- CI analysts need a timeline showing "launch" dates -- when each of a set of *drugs* are expected to be on the market.



Launch Timelines - samples



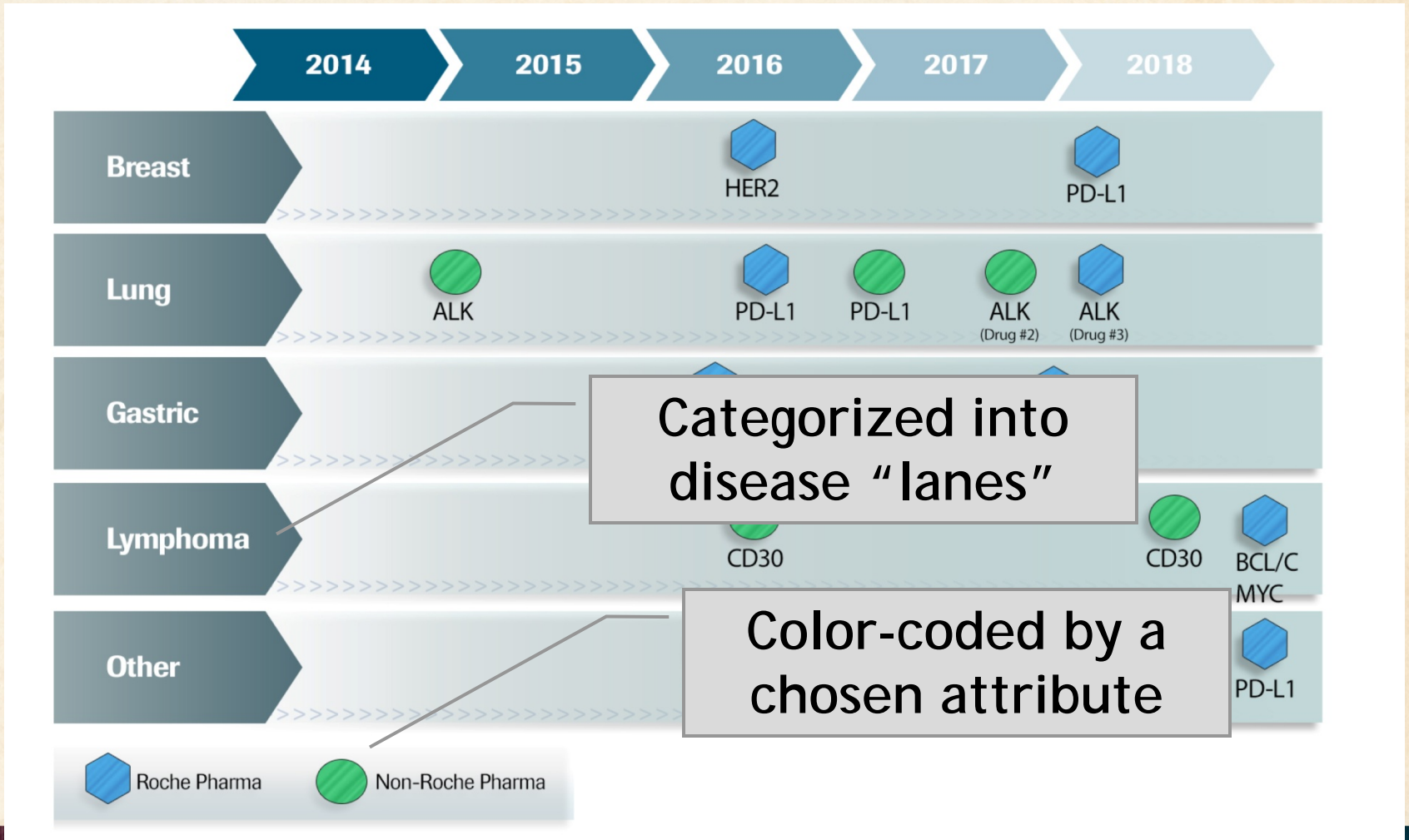
Key features of launch timelines



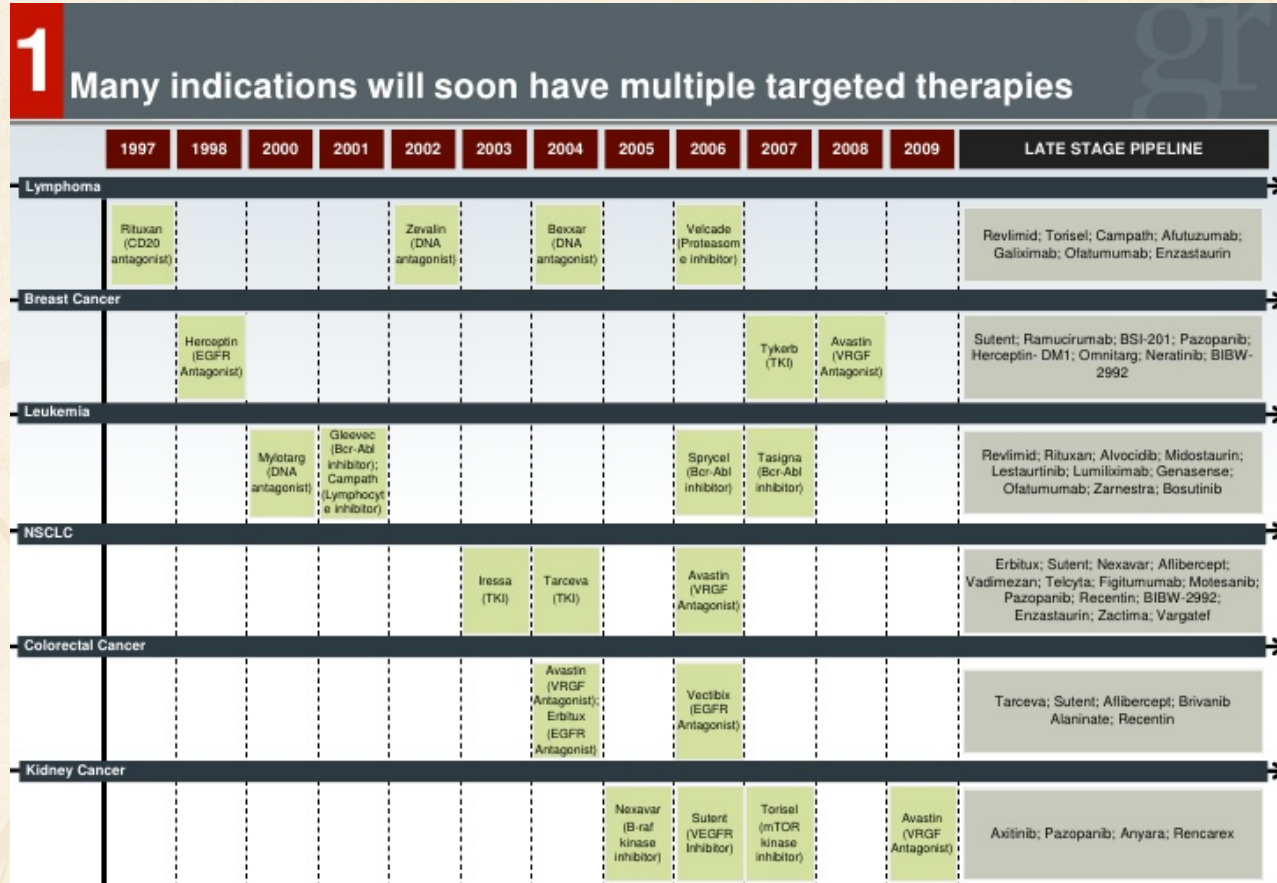
Plotted by estimated launch date

Labeled by target

Key features of launch timelines



Launch Timelines - samples

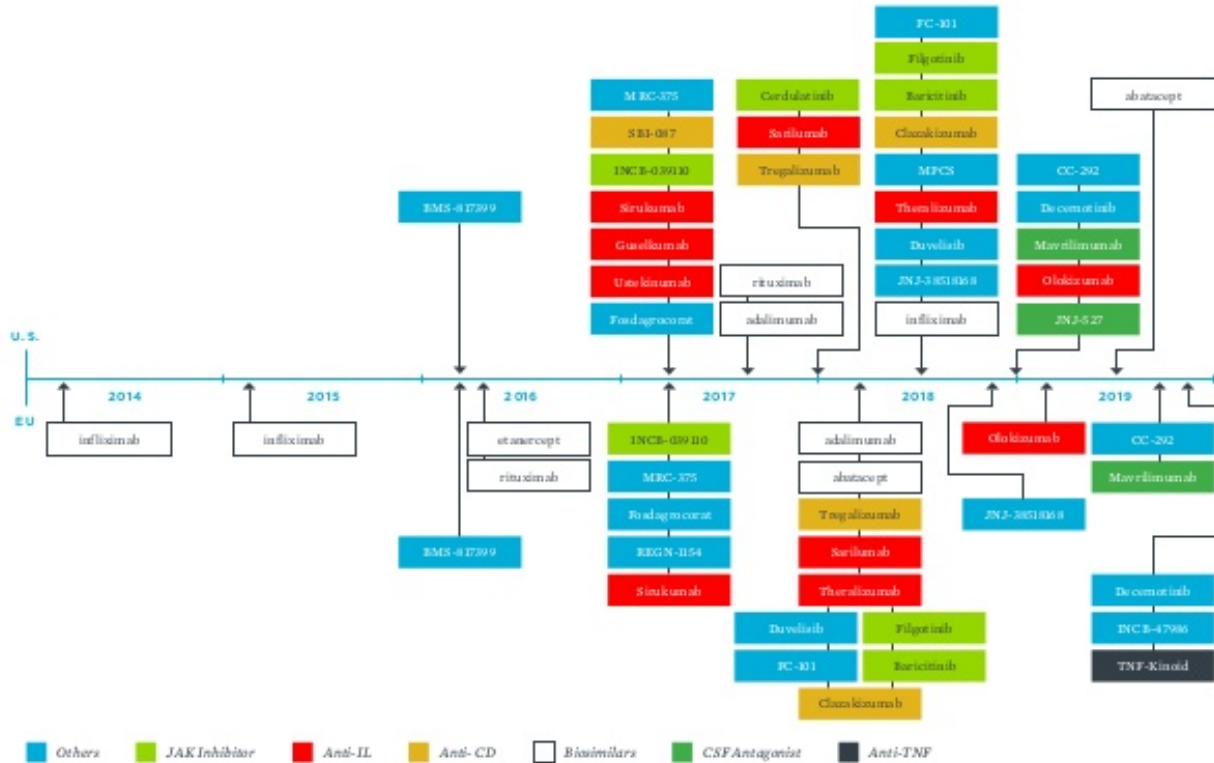


Note: Late Stage Pipeline includes only those drugs which are either in Phase III or pre-registration stage of development
 Source: Grail Research; PharmaProjects database (accessed in August 2009)

Launch Timelines - samples

Illustrative Examples of Clinical Competitive Intelligence –
RHEUMATOID ARTHRITIS LAUNCH TIMELINE

Uploaded:
December 5, 2014



ALIGNED INTELLIGENCE. FOCUSED RESULTS.

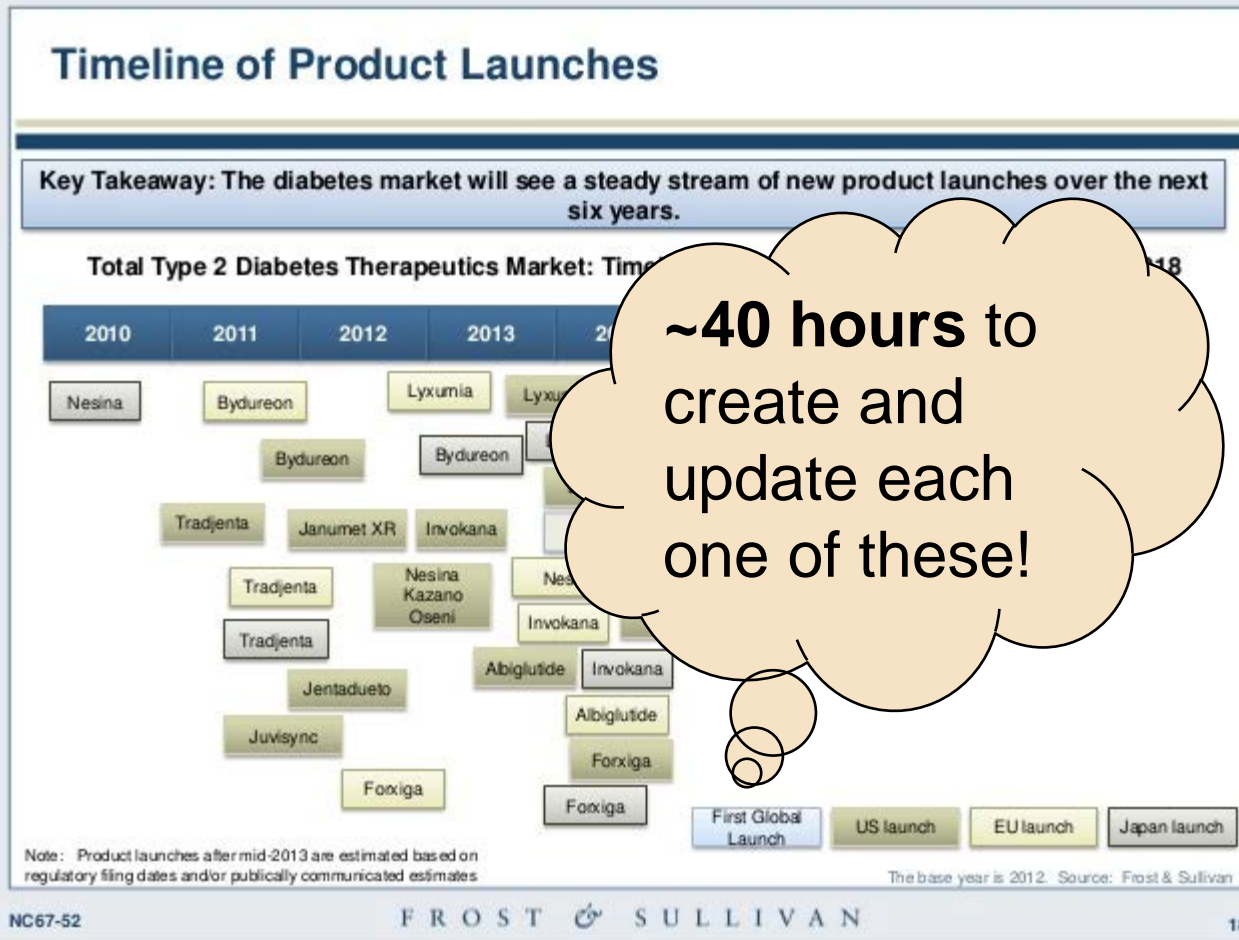
6

Launch Timelines - samples

Launching a Global MS Franchise⁽¹⁾



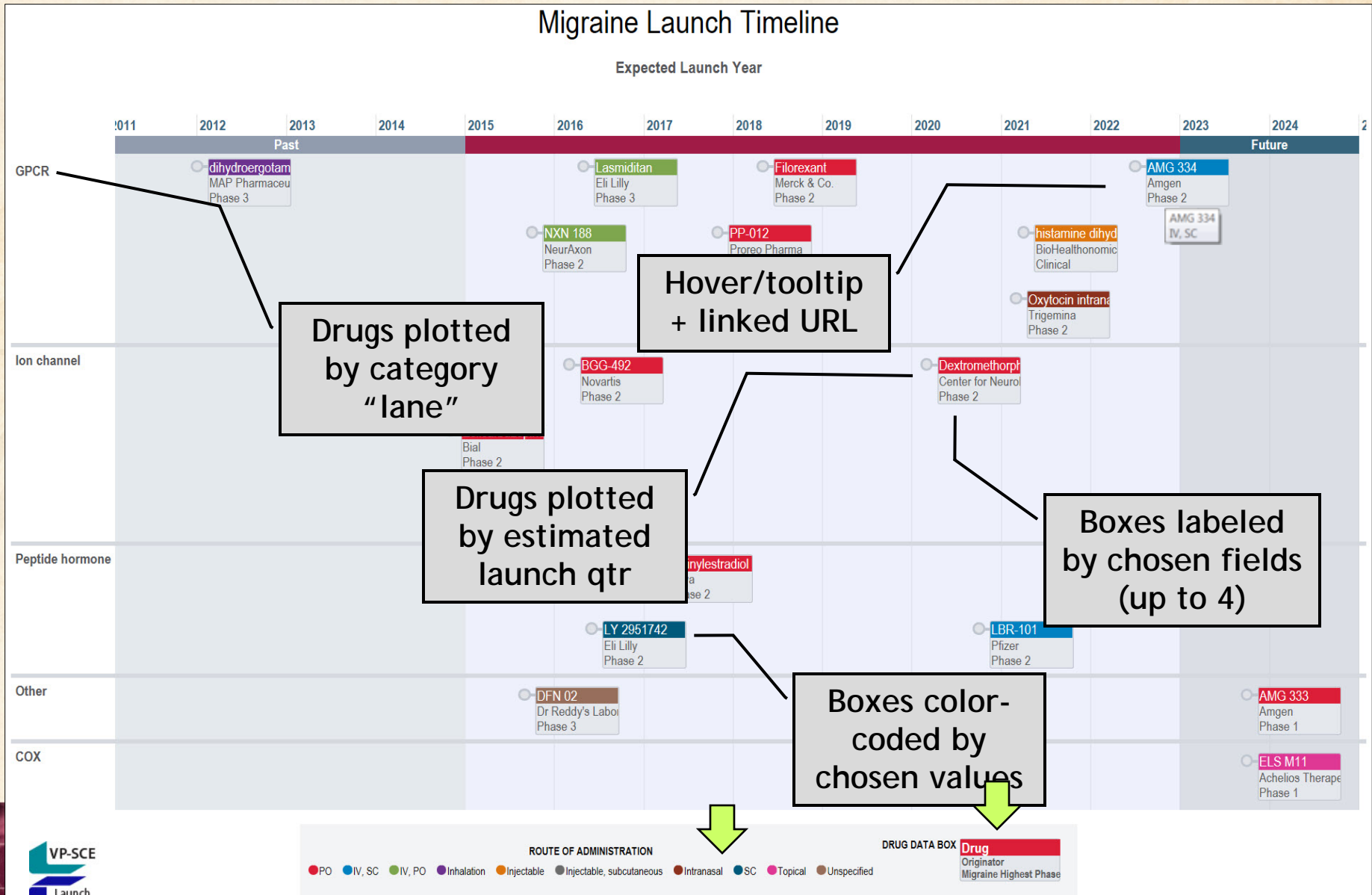
Launch Timelines - samples



Process to develop the Launch Timeline

- Analyze and discuss requirements with customers - Jan 2015.
- Identified a *vis.js* visualization with some of the key properties to use as a starting point.
- Worked with VantagePoint developers to integrate & customize in VP-SCE.
- Graphics designer adds polish to visualization and scripting user interface.
- Get customer feedback on the beta - Aug 2015.
- Deliver and train the customer - Sept 2015.

Launch Timeline - Final Product



Creating a Launch Timeline

- Fields for each element are selected in the script.
- Most of the data comes from drug pipeline databases.
- Data must be normalized and simplified.
- “Key Drugs” must be chosen from a larger set.
- Estimated launch date is determined by the analyst.

Create Launch Timeline

vantagepoint
Smart Charts Edition

Create Launch Timeline

Apply a Template (optional)

Saved Templates:

Step 1: Select Required Fields:

Select a Field for the Box Labels:

Select a Field for the Lane Labels:

Select a Field for the Launch Date:

Step 2: Choose Options:

Choose Year: First Year Last Year
Dates outside this range will appear in Past and Future regions

Choose up to 3 fields to add to the Boxes or to a tooltip: Boxes Tooltip

<input type="text" value="Company"/>	<input checked="" type="radio"/>	<input type="radio"/>
<input type="text" value="Phase in Migraine"/>	<input checked="" type="radio"/>	<input type="radio"/>
<input type="text" value="Route of Administration (Cleaned)"/>	<input type="radio"/>	<input checked="" type="radio"/>

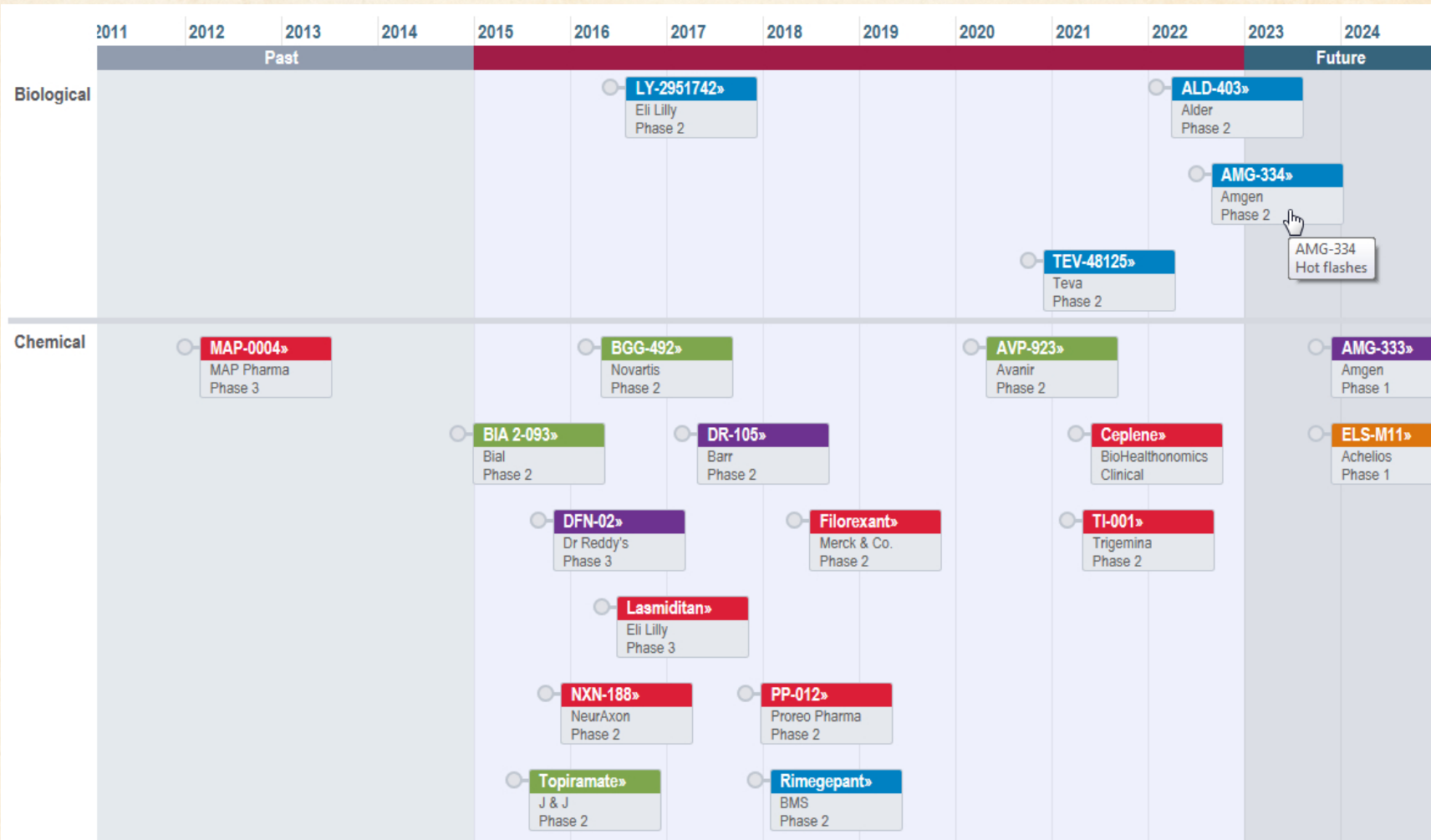
Choose a Field to Color Code the Boxes:

Single group Each group in field Each item in field

Step 3: Create Launch Timeline

Template Name:

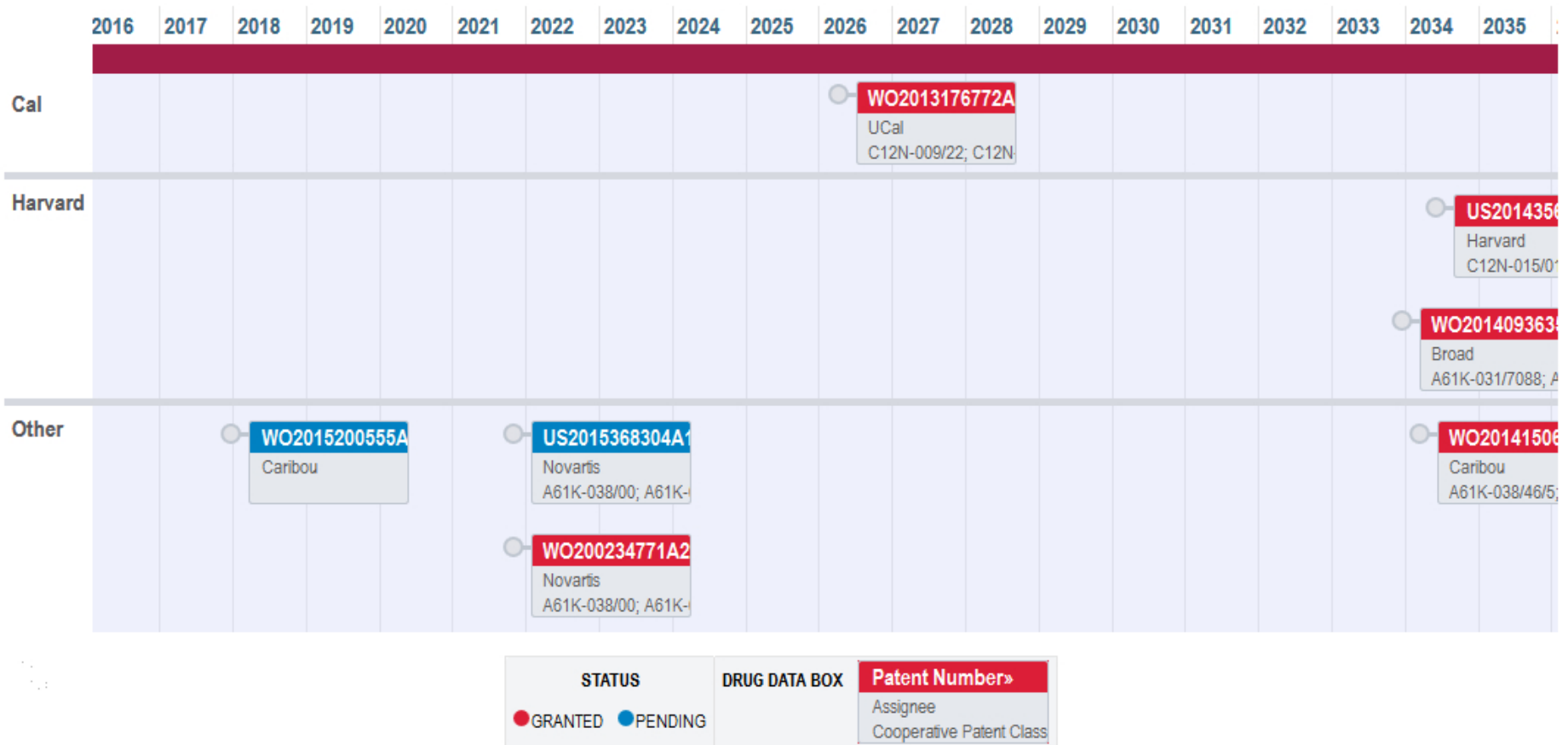
A different view of the same data



Or, we can create a Patent Expiry timeline

Selected CAS9 Patent Family Expiries

Calculated Expiry Date



STATUS	DRUG DATA BOX	Patent Number»
● GRANTED ● PENDING		Assignee
		Cooperative Patent Class

Launch Timeline - delivery issues

- New version of VantagePoint required IE10, which customers could not install.
- HTML delivery of the launch timeline didn't work in Chrome initially.
- Key user retired before delivery.
- Skilled tool users didn't know how to make the analytical decisions.
- And the analysts found the tools intimidating.

But after a difficult start, we now have users creating launch timelines!

Lessons Learned - It's not "Easy"



- Everyone wants an "easy" button!
- The actual drawing of the Launch Timeline is now very easy.
- But as I noted earlier...
 - A lot of data clean-up is needed.
 - The "key drugs" must be selected.
 - Estimated launch date must be determined by the analyst.

Lessons Learned - You need a team

- **Decision maker** who needs the visualization.
- **Competitive intelligence analyst** who knows the disease area and company interests.
- **Search specialist** to collect the correct data.
- **Sophisticated tool user** who can manipulate the data.
- *This will not typically be a single person!*



Lessons Learned - It's all about



- There is some interest in an interactive visualization that people can explore...
- But the primary requirement is for a **PowerPoint slide**.
- An image in a PowerPoint slide is okay...
- But you'd really like to create PowerPoint objects.

"Piano Chart" -- created in Excel with VP-SCE

Clostridium difficile (C-diff) Infection Drugs Under Development - March 2016

Phase I	Phase II	Phase III	Preregistration
BC-7013 Nabriva Therapeutics	AKT-10081 Akthelia Pharmaceuticals	ACAM-CDIFF Sanofi	actoxumab + bezlotoxumab Bristol-Myers Squibb
CRS-3123 Replidyne	CASAD, Salient Pharmaceuticals Salient Pharmaceuticals	actoxumab MassBiologics	bezlotoxumab Medarex
DAV-132 Da Volterra	GBV-006 Globavir	cadazolid Actelion	
DS-2969 Daiichi Sankyo	P1A Prevab R Llc	CB 01-11	
CGK-20045-15A	PF 6425090 Pfizer		
	ramoplanin Pfizer		
	RBX-2660 Rebiotix		
MGB Biopharma	ridinilazole Summit		
NVB-302 Novacta Biosystems	SER-109 Seres Health		
	SYN 004 Ipsat Therapeutics		
	VLA-84 Intercell		
	VP-20621 ViroPharma		

Each column contains the drugs in that phase

Option for hyperlink to pipeline record

Drugs color-coded by a chosen field

Labeled by drug name and a chosen field

Key (Delivery Route)

Injected
Oral
Rectal
Topical
Unspecified

"Piano Chart" -- prototype in PowerPoint

Phase I	Phase II	Phase III	Preregistration
BC-7013 Nabriva Therapeutics	AKT-10081 Akhelia Pharmaceuticals	ACAM-CDIFF Sanofi	actoxumab + bezlotoxumab Bristol-Myers Squibb
CRS-3123 Replidyne	CASAD, Salient Pharmaceuticals Salient Pharmaceuticals	actoxumab MassBiologics	bezlotoxumab Medarex
DAV-132 Da Volterra	GBV-006 Globavir	Cadazolid Actelion	
DS-2969 Daiichi Sankyo	P1A Prevab R Llc	CB 01-11 Cosmo Pharmaceutic	
GSK-2904545A GlaxoSmithKline	PF 6425090 Pfizer	Surotomycin Cubist	
MCB 3681 Morphochem AG	ramoplanin Pfizer		
MGB BP 3 MGB Biopharma	RBX 2660 Rebiotix		
NVB 302 Novacta Biosystems	Ridinilazole Summit		
	SER-109 Seres Health		
	SYN 004 Ipsat Therapies		
	VLA 84 Intercell		
	VP-20621 ViroPharma		

Key

- Injected
- Oral
- Rectal
- Topical
- Unspecified

vantagepoint
Smart Charts Edition

Create Piano Chart

Apply a Template (optional)
 Saved Templates:

Step 1: Select Required Fields:
 Select a Field for the Box Labels:

 Select a Field for the Phase:

Step 2: Choose Options:
 Select a Field to add to the Boxes (optional):

 Choose a Field to Color Code the Boxes:

Step 3: Set Chart Title:
 Chart Title:

Step 4: Create Piano Chart
 Template Name:

Thank you to
my “chef” colleagues
at BizInt and
VantagePoint!

Matt Eberle, John Willmore,
Joe Johnson, Bertha Adamson
and Jon Garner, Paul Frey,
Nils Newman



What's Next?

- Enhancements to BizInt Smart Charts to make it easier to prepare the backing data.
- Keep enhancing delivery formats to meet users' needs.
- Implement the "Bulls-Eye" visualization?
- Try some animation for change tracking?

See you again in 2019 ?





Software for
Business Intelligence

BizInt Smart Charts

Questions?

support@bizint.com
bizint.com/slides