



Building visualizations to uncover insights in clinical trial and pipeline data: a COVID-19 vaccine case study

Matt Eberle, Lead Developer, Analytics and Custom Solutions, BizInt Solutions, Inc.

Diane Webb, President and Co-Founder, BizInt Solutions, Inc.

Wednesday, March 24, 2021, 2:00 pm ET

This session will start momentarily....

Webinar Host
Susie Corbett
PHT Chair

Pharmaceutical & Health Technology Community
<https://connect.sla.org/pht/home>

Matt Eberle

Lead Developer, Analytics and Custom Solutions, BizInt Solutions, Inc.

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Following over ten years of experience at Wyeth, Pfizer and Sunovion as a Senior Information Scientist and Pharmaceutical Information Analyst, since 2013 Matt has helped BizInt customers use the BizInt Smart Charts and VantagePoint tools to create new solutions to address their challenges and problems. Matt lives outside Boston, MA.

Diane Webb

President and Co-Founder, BizInt Solutions, Inc.

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Diane has over 30 years of experience managing the development of software tools to analyze and present competitive intelligence information, with a focus on drug pipeline, clinical trial and patent data. In 1996 Diane and John Willmore started BizInt Solutions to develop and market the BizInt Smart Charts product family. Diane & John live near Seattle, WA, with their current pack of four longhaired dachshunds.



Software for
Business Intelligence

BizInt Smart Charts

Building visualizations to uncover insights in clinical trial and pipeline data: a COVID-19 vaccine case study

Part I: Dashboard visualizations and initial challenges



Matt Eberle
Lead Developer, Analytics
and Custom Solutions

PHT Pharma Talk

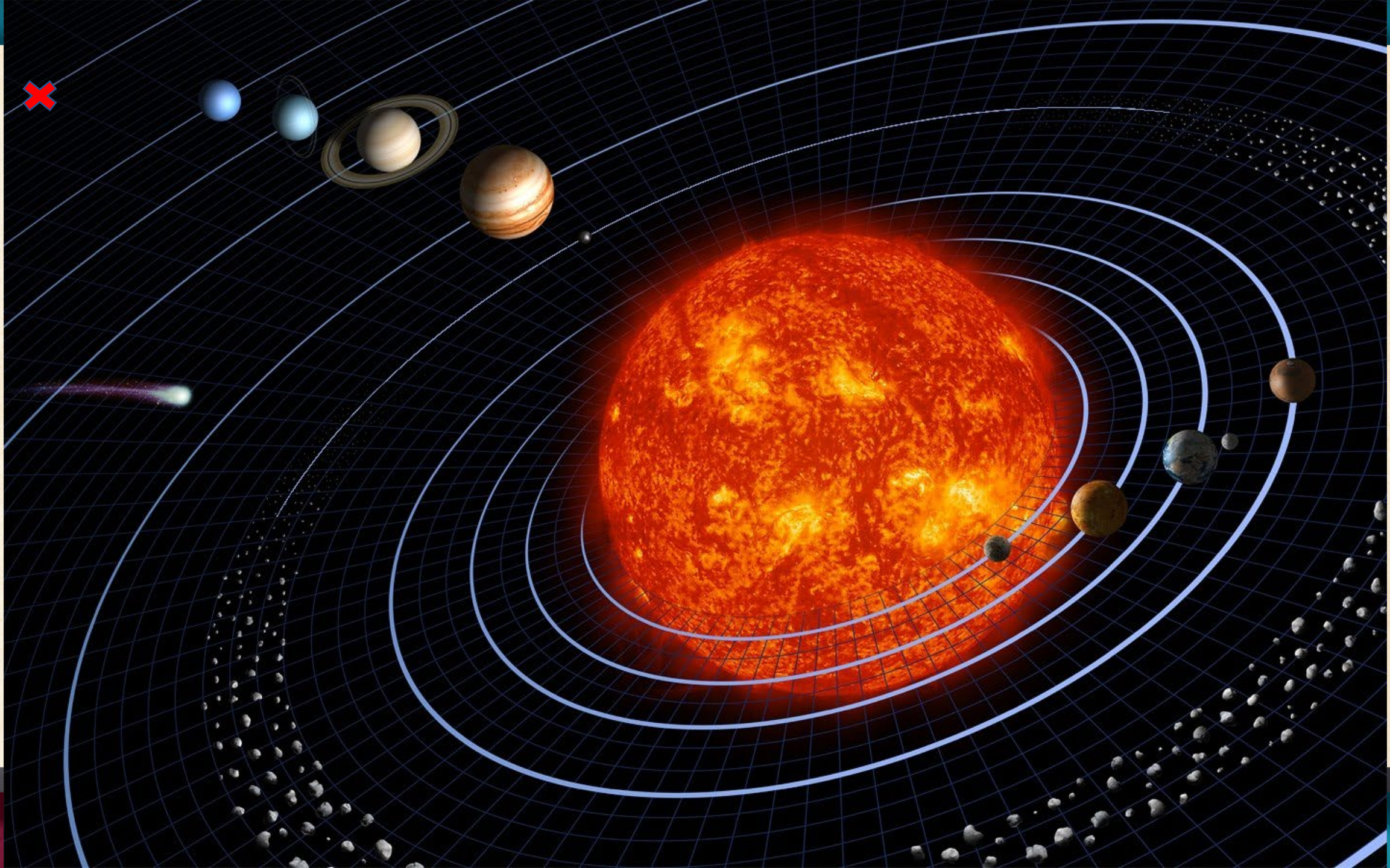
24 March 2021

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There are two types of people:
Those who can extrapolate from
incomplete data.

There are two types of *visualizations*

- **Exploratory** - no map, finding your story
- **Explanatory** - make the map, tell your story



There are two types of *visualizations*

- **Explore-y** - no map, finding your story
- **Story** - make the map, tell your story

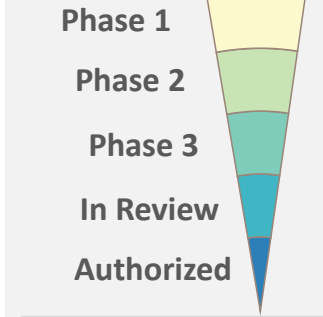
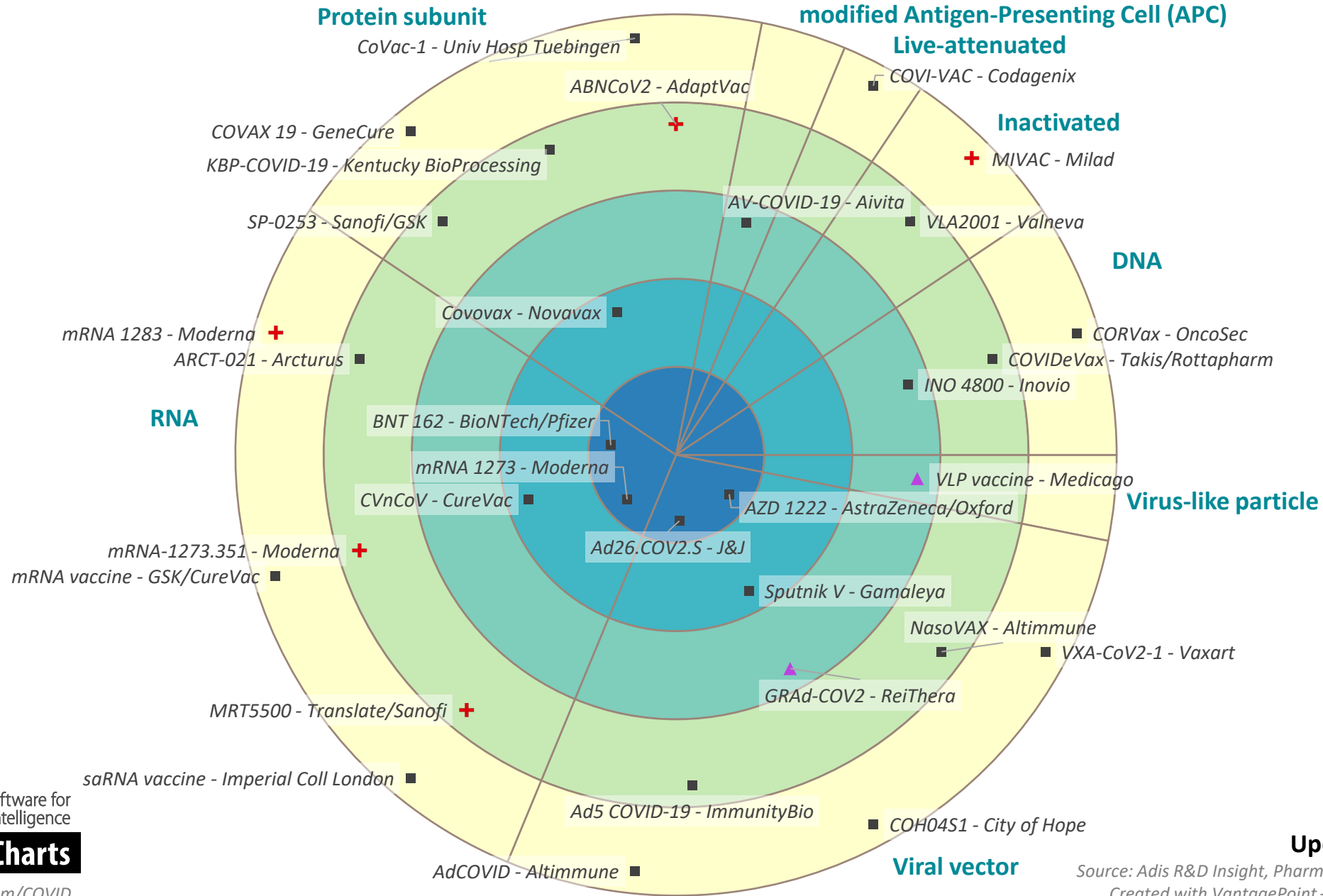
Exploratory, finding the story



April, 2020

COVID-19 Vaccines – US, UK, & Europe

VP-SCE BullseyeSM



Included: clinical phase or above in the US, UK, or Europe. Vaccines are placed at the highest phase attained in any of these countries. Some vaccines are at a higher phase globally.

Excluded: Vaccines only showing development outside of the selected countries.

Updated March 23, 2021

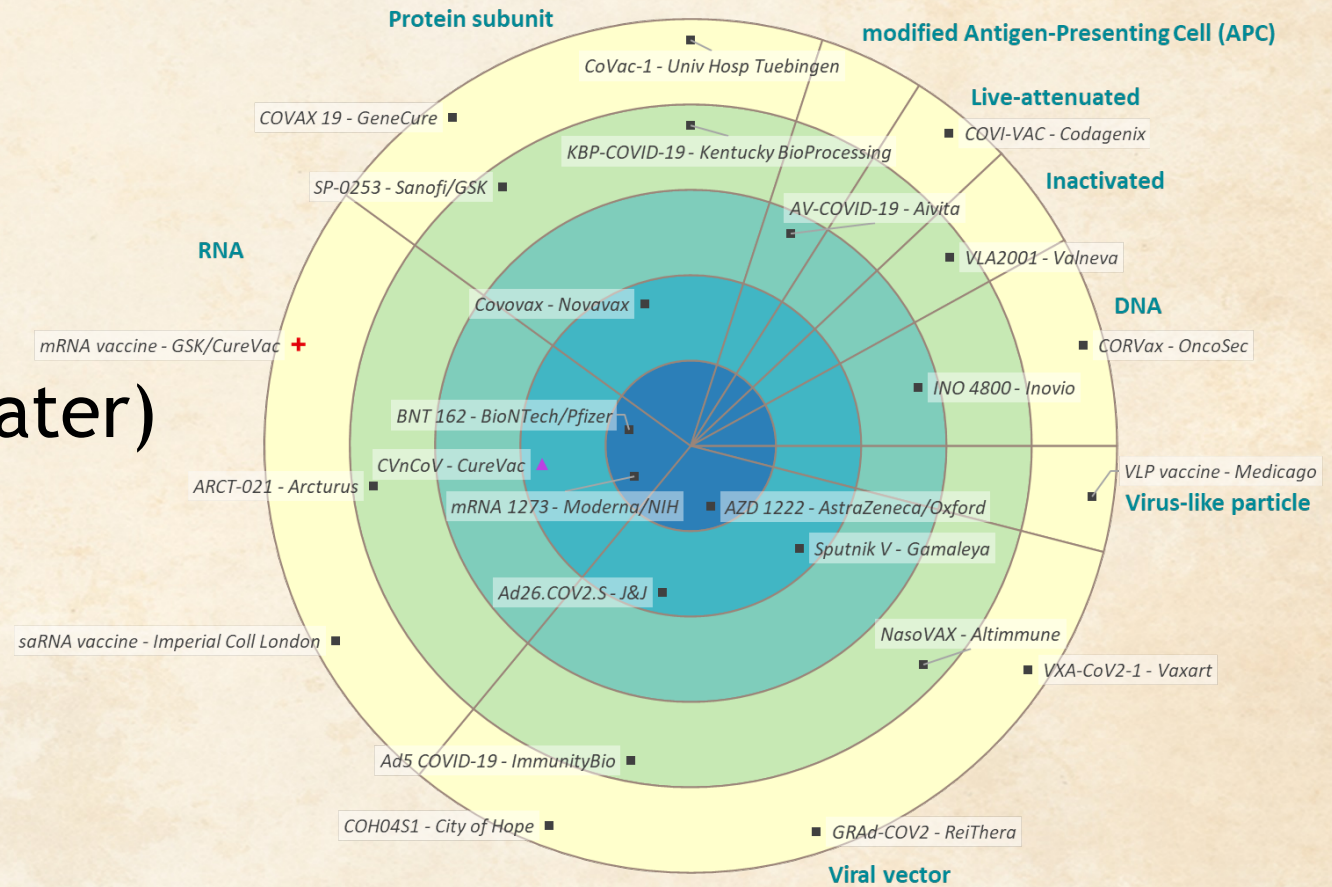
Source: Adis R&D Insight, Pharmaprojects, Cortellis, GlobalData
Created with VantagePoint – Smart Charts Edition (VP-SCE)

Pipeline landscape? (Bullseye, Piano)

Show me the data

Vaccine-level info

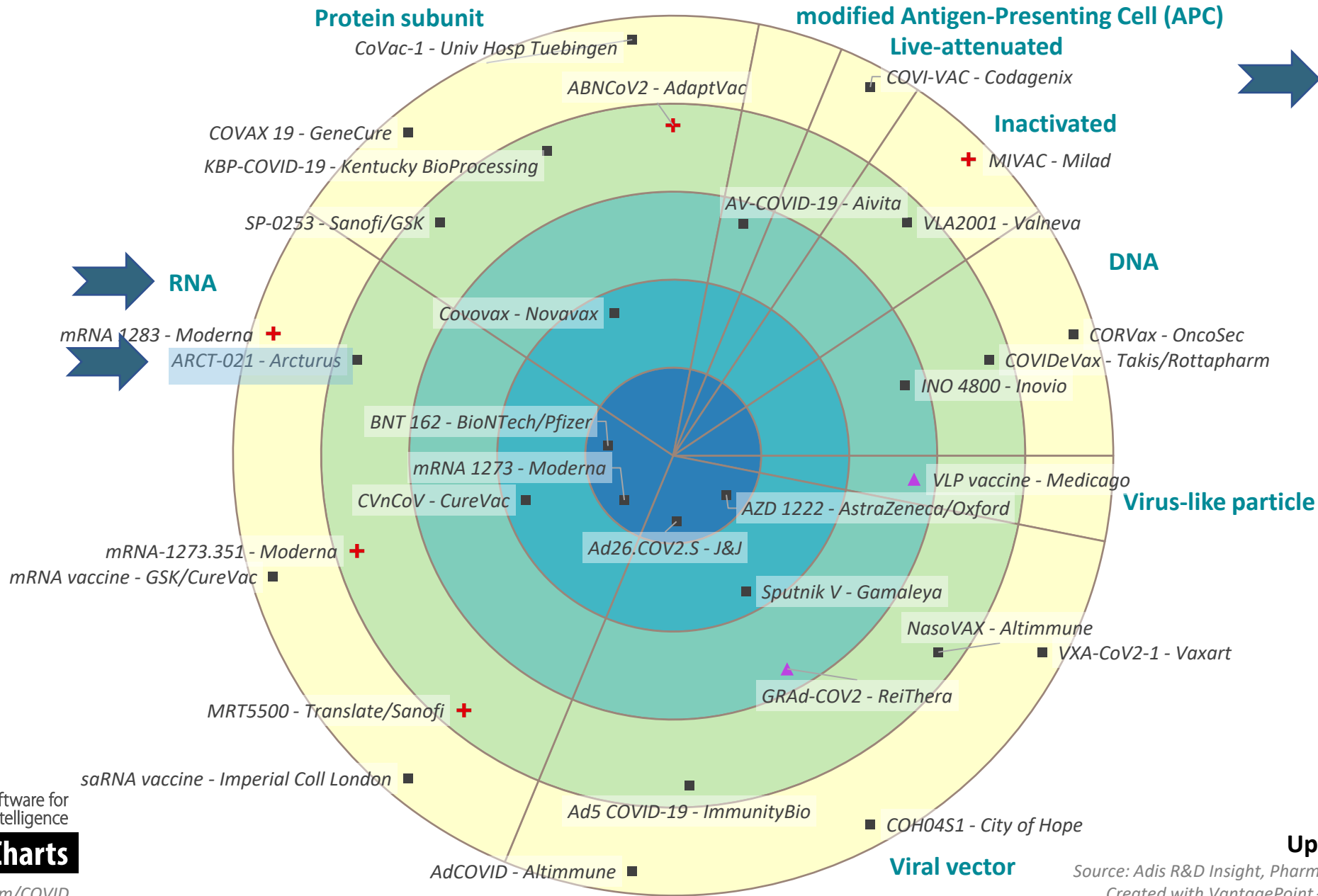
- A Name
- A Company/Organization
- Current Phase (more on that later)
- Vaccine technology
- Region



Updated February 23, 2021

COVID-19 Vaccines – US, UK, & Europe

VP-SCE BullseyeSM



- ▲ Phase change
- + New this update

Included: clinical phase or above in the US, UK, or Europe. Vaccines are placed at the highest phase attained in any of these countries. Some vaccines are at a higher phase globally.

Excluded: Vaccines only showing development outside of the selected countries.

COVID-19 Vaccines – US, UK, & Europe

Phase I	Phase II	Phase III	Registered	Launched
CORVax - OncoSec US	COVIDeVax - Takis/Rottapharm Italy	INO 4800 - Inovio US	Covovax - Novavax Australia, EU, UK, US, Canada, NZ	BNT 162 - BioNTech/Pfizer Multiple countries including US and EU
MIVAC - Milad Iceland	VLA2001 - Valneva	AV-COVID-19 - Aivita US	CVnCoV - CureVac Europe	mRNA 1273 - Moderna Multiple countries including US and EU
COVAX 19 - GeneCure US, Australia	SP-0253 - Sanofi/GSK Panama, US, Honduras	GRAd-COV2 - ReiThera Italy	Sputnik V - Gamaleya EU, India	Ad26.COVS.2 - J&J US, EU Liechtenstein, Norway, Canada, Iceland
CoVac-1 - Univ Hosp Tuebingen Germany	KBP-COVID-19 - Kentucky BioProcessing US	VLP vaccine - Medicago US, Canada		AZD 1222 - AstraZeneca/Oxford Multiple countries outside of US including EU, UK, Canada, Mexico
mRNA 1283 - Moderna US	ARCT-021 - Arcturus Singapore, US			
mRNA vaccine - GSK/CureVac US	mRNA-1273.351 - Moderna US			
saRNA vaccine - Imperial Coll London UK	MRT5500 - Translate/Sanofi US, France			
AdCOVID - Altimune US	Ad5 COVID-19 - ImmunityBio US			
COH04S1 - City of Hope US	NasoVAX - Altimune US			
VXA-CoV2-1 - Vaxart US				

**MIVAC - Milad
Iceland**

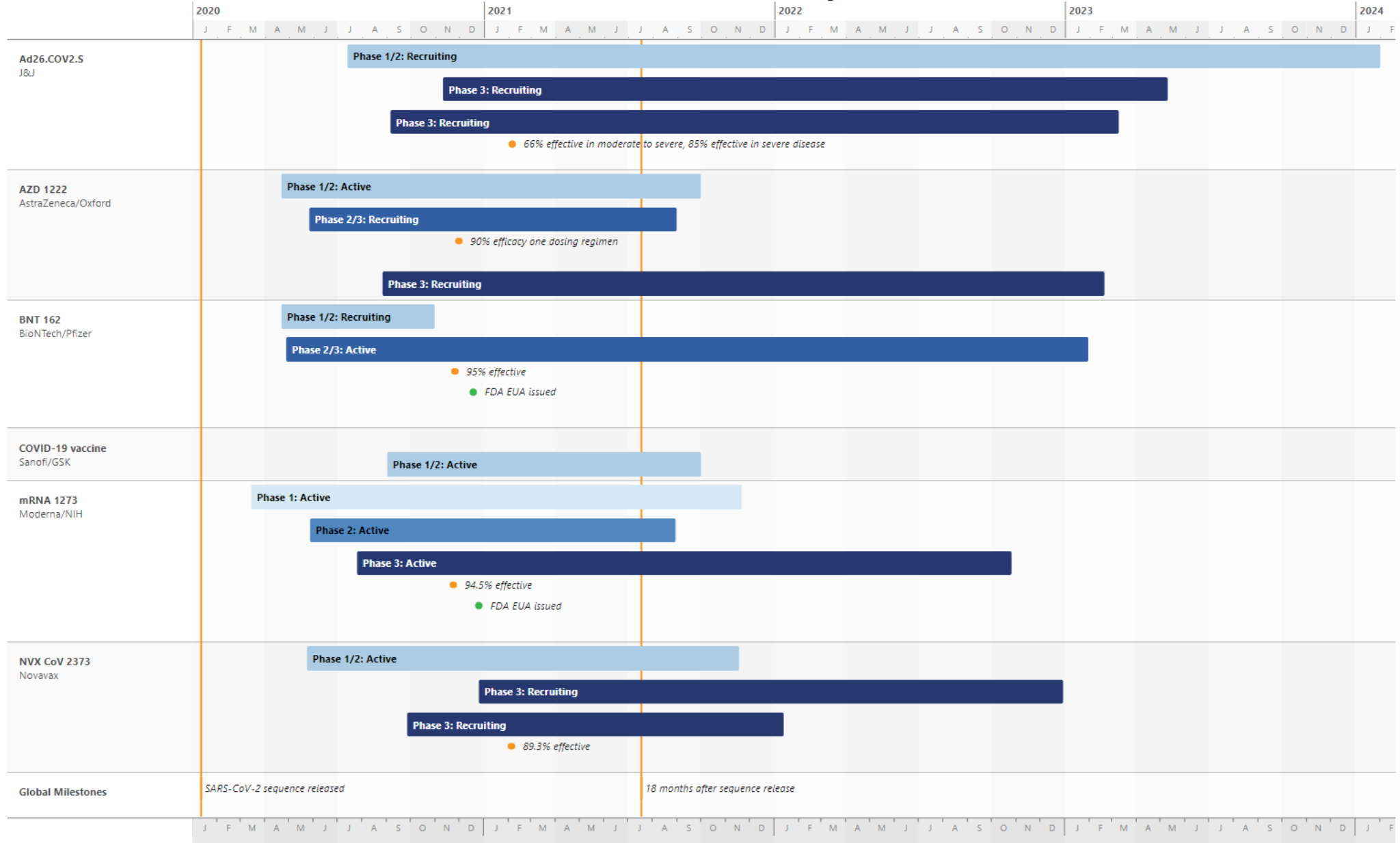
Vaccine type

DNA
Inactivated
Live-attenuated
modified Antigen-Presenting Cell (APC)
Protein subunit
RNA
Viral vector
Virus-like particle



COVID-19 Vaccine Landscape

Trial timing for selected vaccines



- Phase 1
- Phase 1/2
- Phase 2
- Phase 2/3
- Phase 3
- Milestone
- Authorized

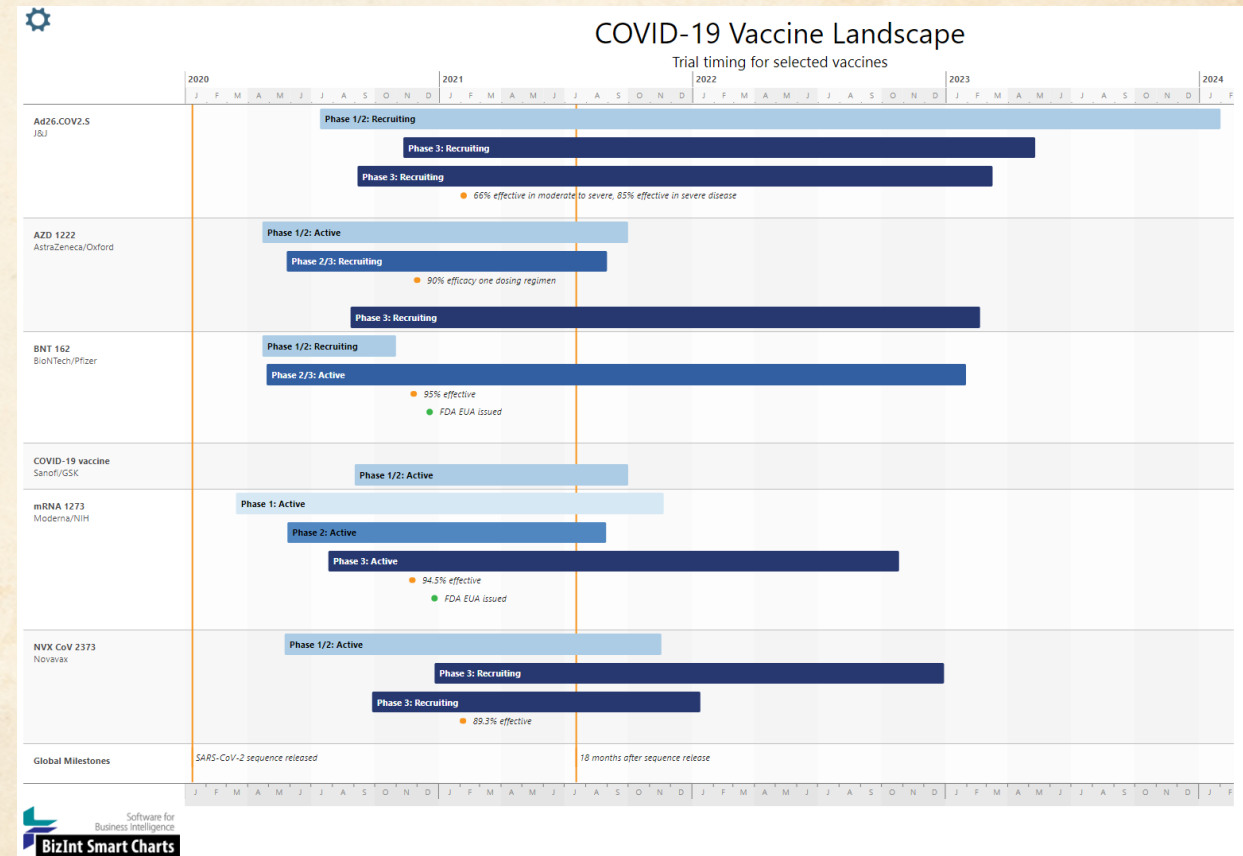
Key vaccine trials timing? (Milestone timeline)

Vaccine-level info

- A Name (what's in a name?)
- A Company/Organization
- Which vaccines?

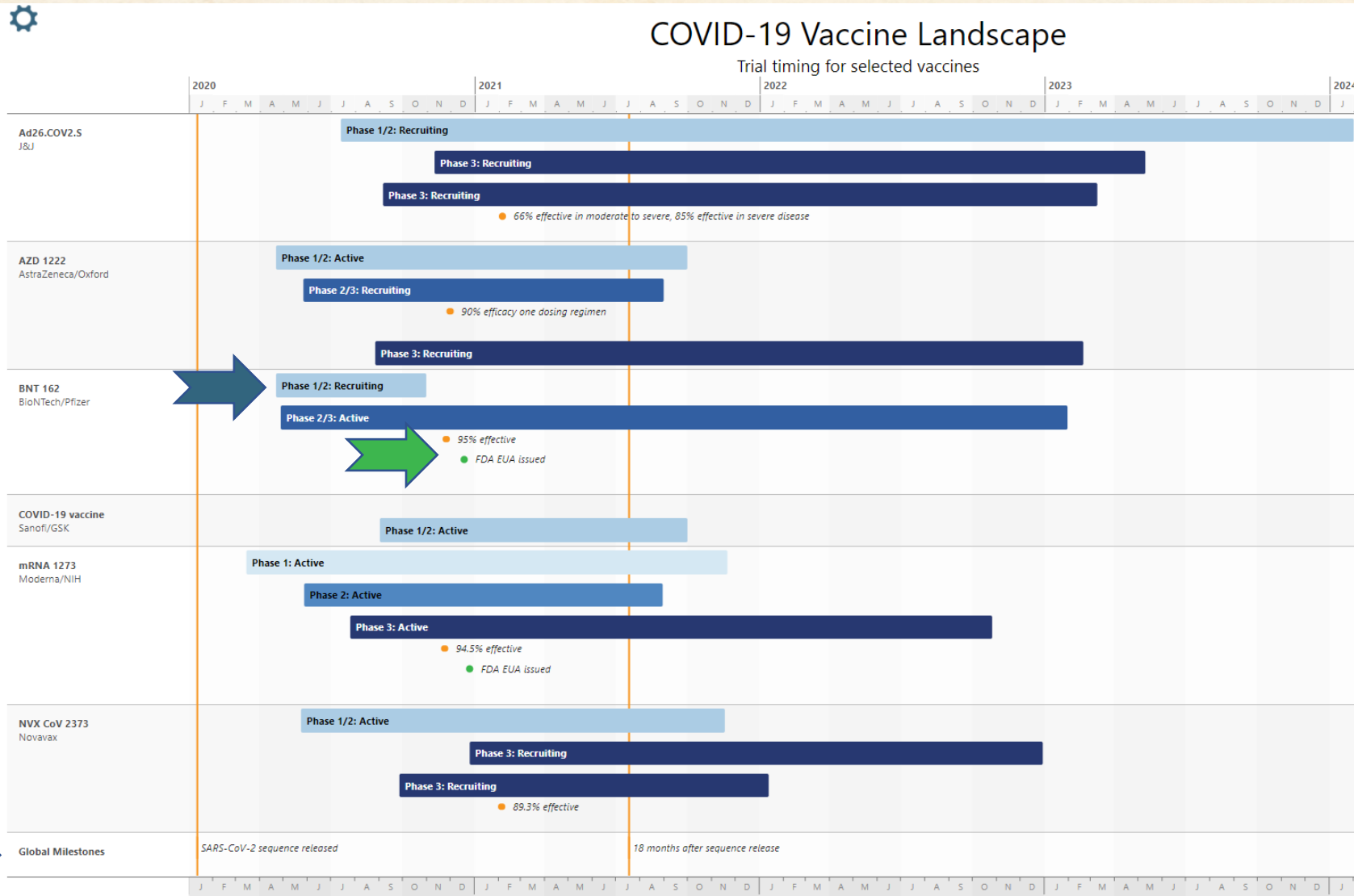
Trial-level info

- Trial timing - Start and end dates
- Trial Status
- *Trial* phase
- Which trials?



Milestone Timeline

VP-SCE TimelineSM



- Phase 1
- Phase 1/2
- Phase 2
- Phase 2/3
- Phase 3
- Milestone
- Authorized

Where did we get the data?

ClinicalTrials.gov (Starting July 2020)

- Freely available, easy to share source data
- Updated by sponsors, potentially most current
- Pipeline publishers were just starting to build up content
- But, it is trial-level info (great for a timeline, not for a bullseye)
- And, there are other challenges...

The Challenge

ClinicalTrials.gov doesn't:

- categorize vaccines by type or technology.
- reliably identify vaccines as vaccines.

	Trial Title	NCT Number	Drugs	Interventions			
				Name	Type	Description	Group
2801	A Phase I/II Randomized, Double-blind, Placebo-controlled Multicentre Study in Participants Aged 18 Years or Older to Determine the Safety and Immunogenicity of AZD1222, a Non-replicating ChAdOx1 Vector Vaccine, for the Prevention of COVID-19	NCT04568031	AZD1222 0.9% (w/v) saline	AZD1222	Drug	For subjects in part 1 will have that route of Administration as Intramuscular, 5×10^{10} vp (nominal, $\pm 1.5 \times 10^{10}$ vp) on V2	Part I
				0.9% (w/v) saline	Drug	For subjects in placebo will have that route of Administration as Intramuscular 0.9% (w/v) saline on V2 and V6.	Part II
2802	A Phase III Randomized, Double-blind, Placebo-controlled Multicenter Study in Adults to Determine the Safety, Efficacy, and Immunogenicity of AZD1222, a Non-replicating ChAdOx1 Vector Vaccine, for the Prevention of COVID-19	NCT04516746	AZD1222 Placebo	AZD1222	Biological	AZD12222 is a recombinant replication-defective chimpanzee adenovirus expressing the SARS-CoV-2-5 surface glycoprotein.	AZD1222
				Placebo	Biological	Commercially available 0.9% (n/v) saline for injection.	Placebo

Ok, the Challenges.

ClinicalTrials.gov *also* doesn't:

- Use a standardized name for each vaccine
- Use a standardized company name.
- Identify the owner company as a trial sponsor

Trial Title	NCT Number	Drugs	Interventions			
			Name	Type	Description	Group
A Phase III, Randomized, Double-Blind, Placebo-controlled Trial to Evaluate Immunogenicity and Safety of the Gam-COVID-Vac Combined Vector Vaccine in Prophylactic Treatment for SARS-CoV-2 Infection in the United Arab Emirates	NCT04656613	Gam-COVID-Vac	Gam-COVID-Vac	Biological	the Gam-COVID-Vac is combined 2 -component vector vaccine against the SARS-CoV-2-induced coronavirus infection	Vaccine
			placebo	Other	Placebo Comparator	Placebo
An Open Study on the Safety, Tolerability, and Immunogenicity of "Sputnik Light" Vaccine for Prevention of Coronavirus Infection Caused by the SARS-CoV-2 Virus	NCT04713488	Sputnik Light	Sputnik Light	Biological	solution for intramuscular injection Composition for 1 dose (0.5 ml)	Sputnik Light Vaccine

We need to create a category field.

Trial Title	NCT Number	Drugs	Interventions			
			Name	Type	Description	Group
A Phase III Randomized, Double-blind, Placebo-controlled Multicenter Study in Adults to Determine the Safety, Efficacy, and Immunogenicity of AZD1222, a Non-replicating ChAdOx1 Vector Vaccine, for the Prevention of COVID-19	NCT04516746	AZD1222 Placebo	AZD1222	Biological	AZD12222 is a recombinant replication-defective chimpanzee adenovirus expressing the SARS-CoV-2-5 surface glycoprotein.	AZD1222
			Placebo	Biological	Commercially available 0.9% (n/v) saline for injection.	Placebo
A Phase III Open-label Study in Adults to Determine the Safety and Immunogenicity of AZD1222, a Non-replicating ChAdOx1 Vector Vaccine, for the Prevention of COVID-19	NCT04540393	AZD1222	AZD1222	Biological	Participants will receive 2 doses of AZD1222; the first dose will be administered on Day 1 and the second dose on Day 29. Unit dose strength(s) > 0.7 × 10 ¹¹ vp/mL. Dosage level(s) 5 × 10 ¹⁰ vp (nominal). Route of administration Intramuscular injection	Arm A
A Phase 2/3 Study to Determine the Efficacy, Safety and Immunogenicity of the Candidate Coronavirus Disease (COVID-19) Vaccine ChAdOx1 nCoV-19	NCT04400838	ChAdOx1 nCoV-19 (Abs 260) MenACWY vaccine ChAdOx1 nCoV-19 (Abs 260) + 2.2x10 ¹⁰ vp (qPCR) boost Two dose MenACWY vaccine ChAdOx1 nCoV-19 (qPCR)	ChAdOx1 nCoV-19 (Abs 260)	Biological	A single dose of 5x10 ¹⁰ vp of ChAdOx1 nCoV-19 measured by spectrophotometry at Abs260	Group 1 a1; Group 2 a1; Group 4 a1; Group 5 a1; Group 5 c1
			MenACWY vaccine	Biological	Standard single dose of	Single dose

Vaccine type (Cleaned)

Viral vector

Viral vector

Viral vector

Where do we get the data now?

Pipeline Databases (Starting February 2021)

- Citeline
- Pharmaprojects
- Adis R&D Insight
- Clarivate Cortellis
- **GlobalData**

Drug level, editorial reviewed with standardized terminology:

- Highest Phase
- Vaccine Name
- Companies and their roles
- A wealth of detailed information including about vaccine technology, countries...

BizInt Smart Charts

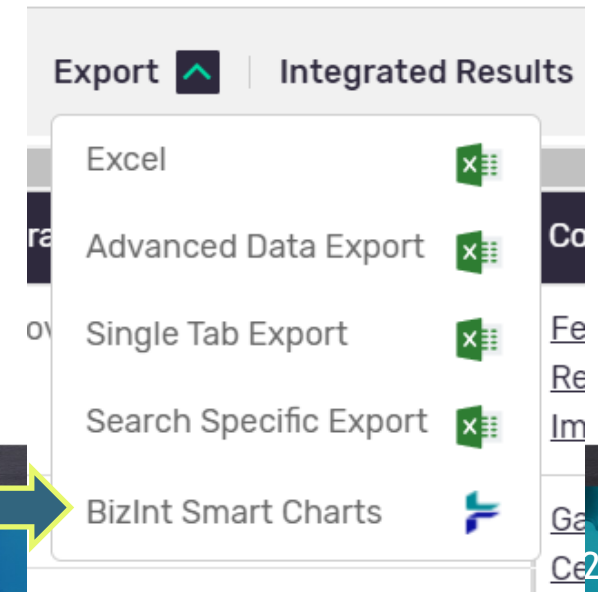
Drug Development Suite



Support for GlobalData!

Pipeline Drugs and Clinical Trials

- In BizInt Smart Charts Drug Development Suite 5.3
- Using the BizInt Smart Charts export for both drug and trials searches
- See bizint.com/drugs



More Data, More Problems? Search Strategies

Adis: Indication = "Coronavirus-disease-2019" AND Drug Class = "Vaccines"

Cortellis: Indications = Coronavirus disease 19 infection AND Other Actions = Vaccine

Pharmaprojects: Drug Disease = Infection, coronavirus, novel coronavirus prophylaxis) OR (Infection, coronavirus, novel coronavirus) AND Therapeutic Class = Prophylactic vaccine, anti-infective OR contains vaccine AND Therapeutic Class is not Vaccine adjuvant

GlobalData: Indication = Coronavirus Disease 2019 (COVID-19) AND Drug Descriptor = Prophylactic Vaccine

Pipeline data for a vaccine-level landscape

Still have to be the editor:

- Vaccine technology (still not in the data?)
- Which Company/Organization(s)?
- Pick a name, any name?
- What's the current phase?
- When is a vaccine not a vaccine?

We still need a category field

Different approaches are possible with different tools.

Trial Title	NCT Number	Drugs	Interventions			
			Name	Type	Description	Group
A Phase III Randomized, Double-blind, Placebo-controlled Multicenter Study in Adults to Determine the Safety, Efficacy, and Immunogenicity of AZD1222, a Non-replicating ChAdOx1 Vector Vaccine, for the Prevention of COVID-19	NCT04516746	AZD1222 Placebo	AZD1222	Biological	AZD12222 is a recombinant replication-defective chimpanzee adenovirus expressing the SARS-CoV-2-5 surface glycoprotein.	AZD1222
			Placebo	Biological	Commercially available 0.9% (n/v) saline for injection.	Placebo
A Phase III Open-label Study in Adults to Determine the Safety and Immunogenicity of AZD1222, a Non-replicating ChAdOx1 Vector Vaccine, for the Prevention of COVID-19	NCT04540393	AZD1222	AZD1222	Biological	Participants will receive 2 doses of AZD1222; the first dose will be administered on Day 1 and the second dose on Day 29. Unit dose strength(s) > 0.7 × 10 ¹¹ vp/mL. Dosage level(s) 5 × 10 ¹⁰ vp (nominal). Route of administration Intramuscular injection	Arm A
A Phase 2/3 Study to Determine the Efficacy, Safety and Immunogenicity of the Candidate Coronavirus Disease (COVID-19) Vaccine ChAdOx1 nCoV-19	NCT04400838	ChAdOx1 nCoV-19 (Abs 260) MenACWY vaccine ChAdOx1 nCoV-19 (Abs 260) + 2.2x10 ¹⁰ vp (qPCR) boost Two dose MenACWY vaccine ChAdOx1 nCoV-19 (qPCR)	ChAdOx1 nCoV-19 (Abs 260)	Biological	A single dose of 5x10 ¹⁰ vp of ChAdOx1 nCoV-19 measured by spectrophotometry at Abs260	Group 1 a1; Group 2 a1; Group 4 a1; Group 5 a1; Group 5 c1
			MenACWY vaccine	Biological	Standard single dose of	Single dose

Vaccine type (Cleaned)

Viral vector

Viral vector

Viral vector

To build this manually, we can review the relevant columns

Common Drug Name	Database	Chemical/Biological Class	Other Actions	Therapeutic Class Status	
				Class	Status
mRNA 1273	Cortellis from Clarivate Analytics		RNA vaccine Prophylactic vaccine		
mRNA 1273	Citeline Pharmaprojects			Messenger RNA Prophylactic vaccine, anti-infective	Launched Launched
mRNA 1273	Adis R&D Insight	COVID-19 vaccines RNA vaccines Viral vaccines			

Records from multiple databases help

Not all records make the category clear

Drug	Common Drug Name	Database	Chemical/Biological Class	Other Actions	Therapeutic Class Status	
					Class	Status
NVX-CoV2373	NVX CoV 2373	Citeline Pharmaprojects			Recombinant vaccine	Pre-registrati on
					Prophylactic vaccine, anti-infective	Pre-registrati on
NVX-CoV2373	NVX CoV 2373	Cortellis from Clarivate Analytics		Adjuvant Prophylactic vaccine Protein subunit vaccine		
NVX CoV 2373	NVX CoV 2373	Adis R&D Insight	COVID-19 vaccines Synthetic vaccines Viral vaccines			

Extracting just the relevant terms really helps

Common Drug Name	Database	Chemical/Biological Class	Other Actions	Therapeutic Class Status		Category (VP-SCE)
				Class	Status	
NVX CoV 2373	Citeline Pharmaprojects			Recombinant vaccine	Pre-registration	
				Prophylactic vaccine, anti-infective	Pre-registration	
NVX CoV 2373	Cortellis from Clarivate Analytics		Adjuvant Prophylactic vaccine Protein subunit vaccine			Protein subunit
NVX CoV 2373	Adis R&D Insight	COVID-19 vaccines Synthetic vaccines Viral vaccines				

But, there will always be decisions to make...

Common Drug Name	Database	Chemical/Biological Class	Other Actions	Therapeutic Class Status		Category (VP-SCE)
				Class	Status	
GX 19N ✓	Adis R&D Insight	COVID-19 vaccines ✓ DNA vaccines Viral vaccines				DNA ✓
GX 19N	Adis R&D Insight	COVID-19 vaccines DNA vaccines Viral vaccines				DNA
GX 19N	Cortellis from Clarivate Analytics		Recombinant viral vector vaccine ✓ Therapeutic vaccine DNA vaccine Antiviral Prophylactic vaccine		➔	DNA Viral vector
GX 19N	Citeline Pharmaprojects			Prophylactic vaccine, anti-infective	Phase II Clinical Trial ✓	
GX 19N	Citeline Pharmaprojects			Prophylactic vaccine, anti-infective	Discontinued	

GlobalData has Molecule Type...

			Molecule Type
Drug	Database	Vaccine - sponsor	Molecule Type
PTX COVID19 B	✓ Adis R&D Insight	PTX-COVID19-B - Providence	✓
PTX-COVID19-B	Citeline Pharmaprojects	PTX-COVID19-B - Providence	
PTX-COVID19-B	Cortellis from Clarivate Analytics	PTX-COVID19-B - Providence	
PTXCOVID-19B	GlobalData Drugs	PTX-COVID19-B - Providence	mRNA Vaccine ✓
mRNA-1273.351	✓ Citeline Pharmaprojects	mRNA-1273.351 - Moderna	✓
mRNA-1273.351	Cortellis from Clarivate Analytics	mRNA-1273.351 - Moderna	
Coronavirus Disease 2019 (COVID-19) (Strain B.1.351) vaccine	GlobalData Drugs	mRNA-1273.351 - Moderna	mRNA Vaccine ✓
self-amplifying RNA vaccine (im, COVID-19), Imperial College London	✓ Cortellis from Clarivate Analytics	saRNA vaccine - Imperial Coll London	✓
Coronavirus Disease 2019 (COVID-19) vaccine	GlobalData Drugs	saRNA vaccine - Imperial Coll London	mRNA Vaccine ✓
MRT 5500	✓ Adis R&D Insight	MRT5500 - Translate/Sanofi	✓
COVID-19 vaccine, Translate Bio	Citeline Pharmaprojects	MRT5500 - Translate/Sanofi	
MRT-5500	GlobalData Drugs	MRT5500 - Translate/Sanofi	mRNA Vaccine ✓

Pipeline data for a vaccine-level landscape

Still have to be the editor:

- Vaccine technology (*usually* not in the data)
- Which Company/Organization(s)?
- Pick a name, any name?
- What's the current phase?
- When is a vaccine not a vaccine?

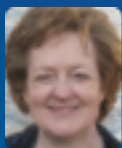


Software for
Business Intelligence

BizInt Smart Charts

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Part II: Lessons Learned







Diane Webb
Co-Founder and President

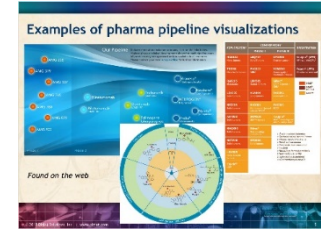
PHarma Talks Webinar

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Some lessons and tips for creating drug landscapes --

- The best visualization is the one that tells your story
- It's not 
- It's all about 
- It takes a team 
- Revisit your decisions 

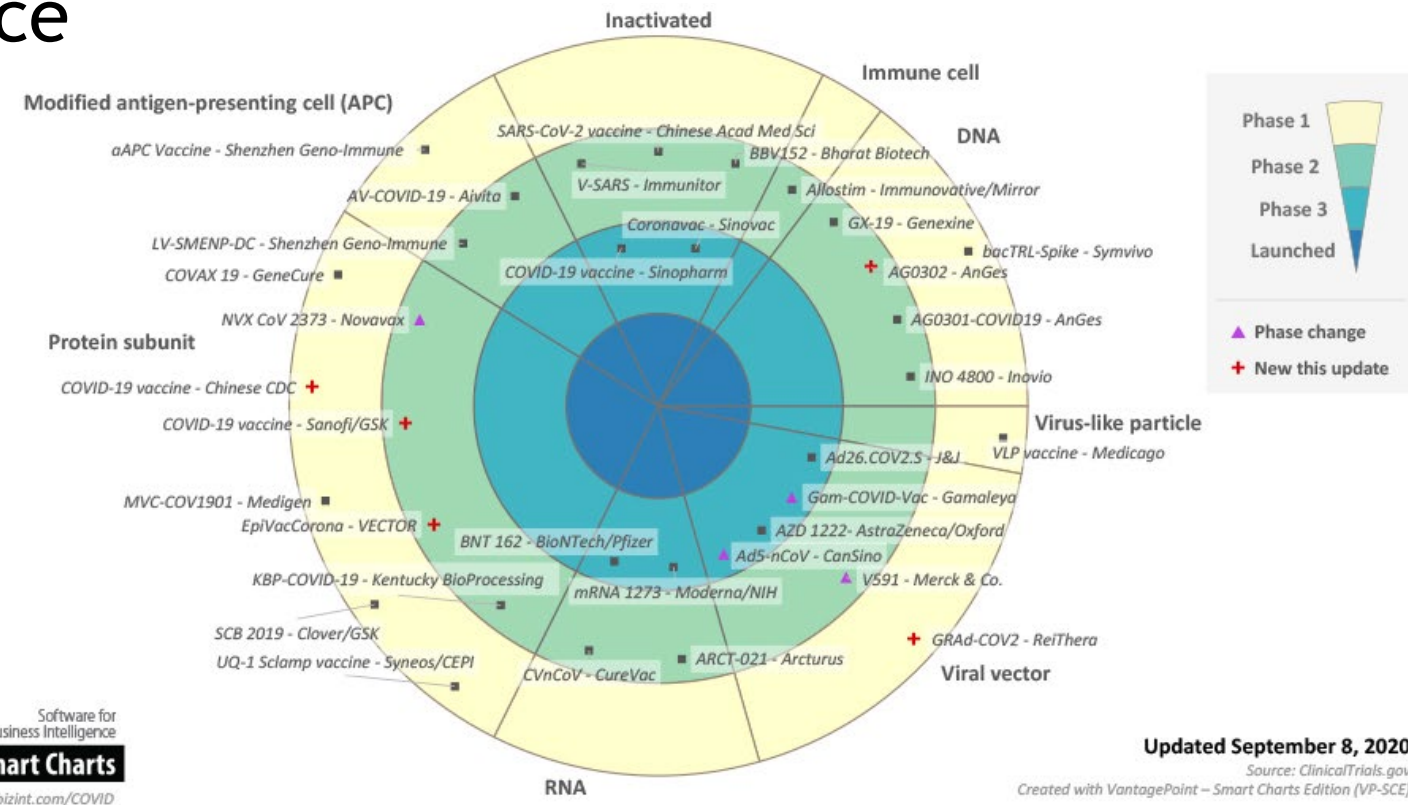


See bizint.com/slides for previous “*Challenges in Visualizing Drug Landscapes*” presentations.

Lessons Learned - The Best Visualization is...

...the one that “tells the story” for your topic and data.

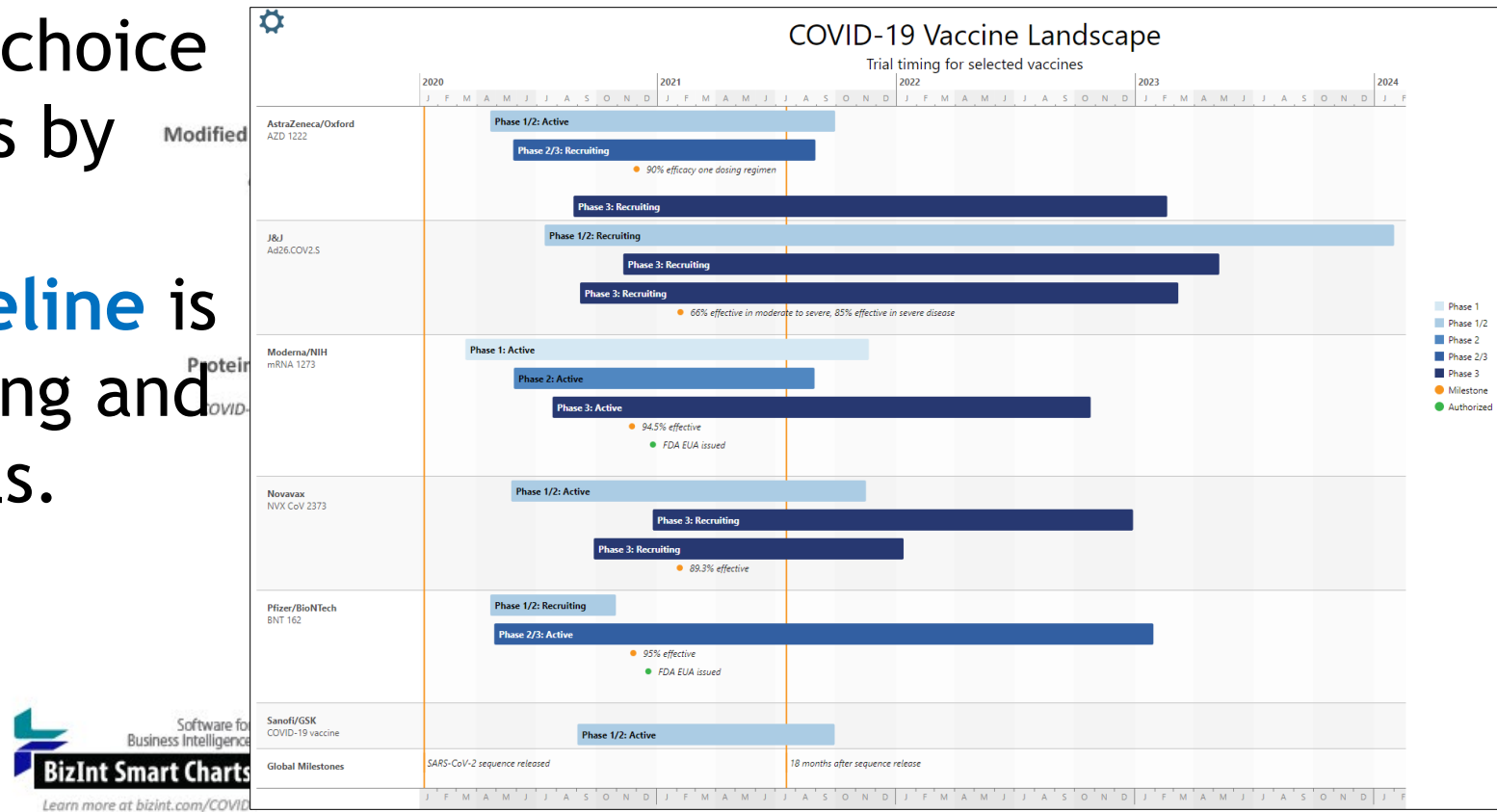
- The **Bullseye** is a good choice for showing all vaccines by phase and technology.



Lessons Learned - The Best Visualization is...

...the one that “tells the story” for your topic and data.

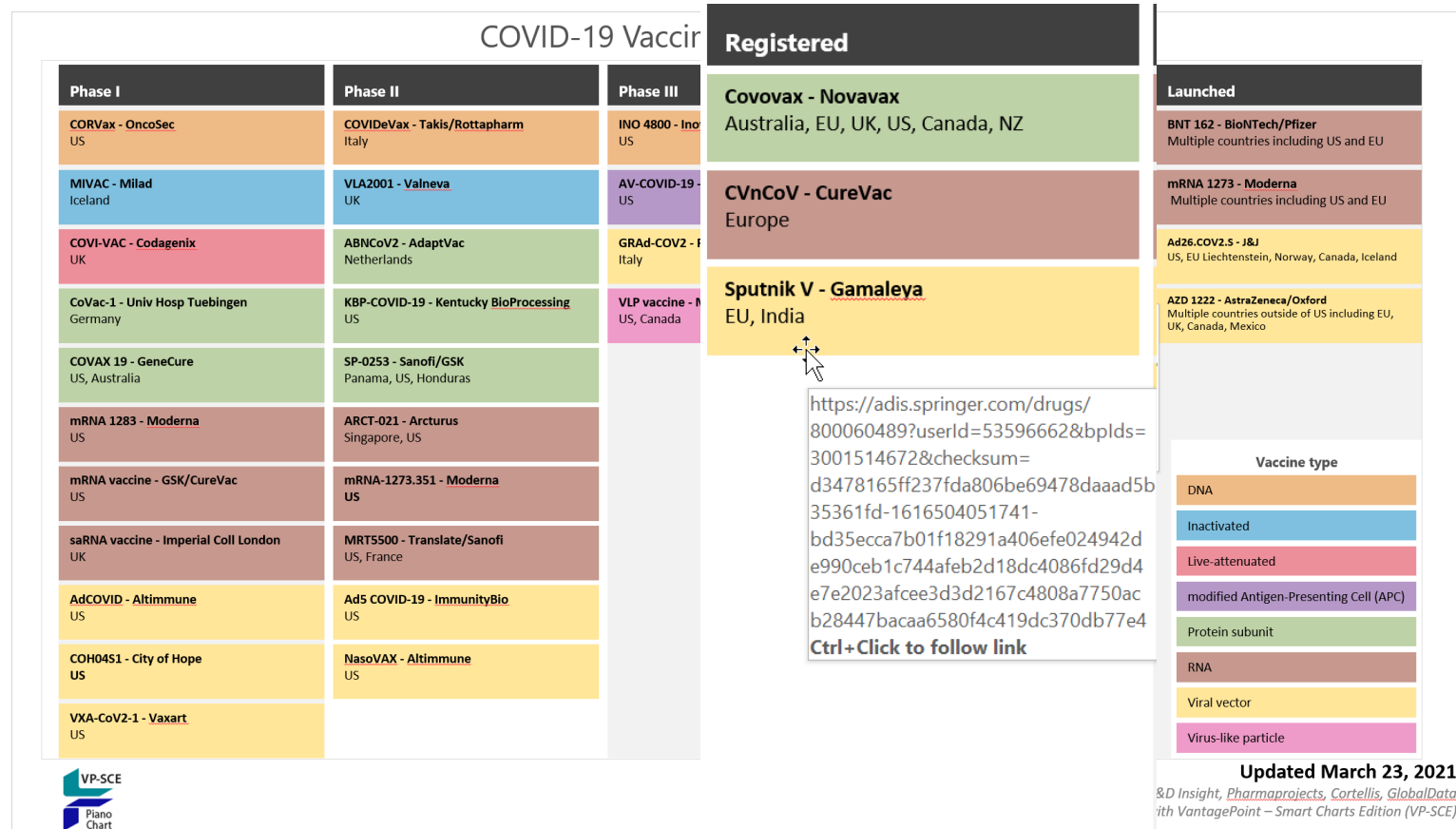
- The **Bullseye** is a good choice for showing all vaccines by phase and technology.
- But the **Milestone Timeline** is better for showing timing and details for vaccine trials.



Lessons Learned - The Best Visualization is...

...the one that “tells the story” for your topic and data.

- And the **Piano Chart** lets us show some additional details for the vaccines in the Bullseye...
- Including the **countries** at the highest phase
- And a **link** to a pipeline record.



Lessons Learned - It's not "Easy"

Multi-Database Visualizations are Hard!



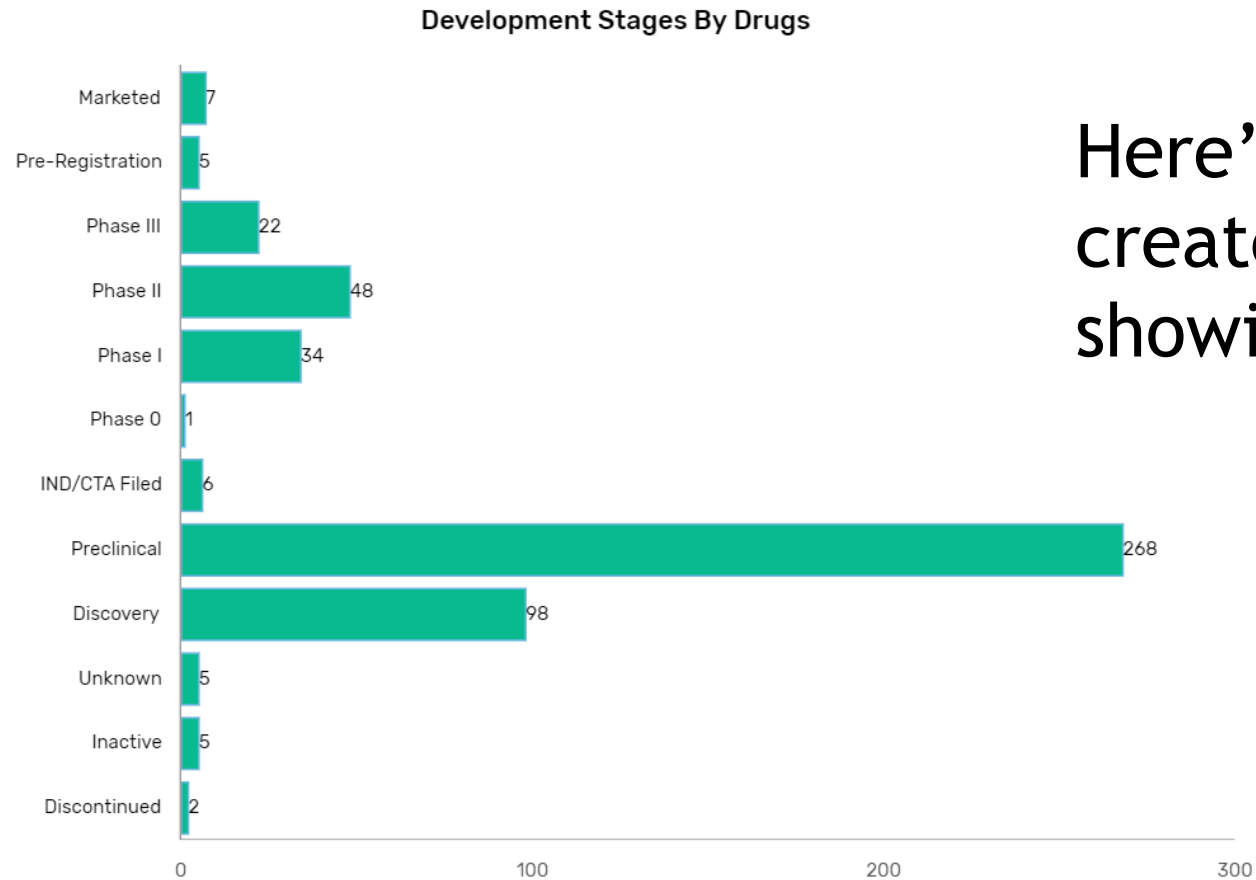
- You want to use **multiple databases** to improve completeness and accuracy.
- But this makes creating reports and visualizations **much more difficult!**

Not convinced?

See bizint.com/slides for "Surfing the Pipeline" case studies.

Lessons Learned - It's not "Easy"

Single Database Visualizations are Easy!

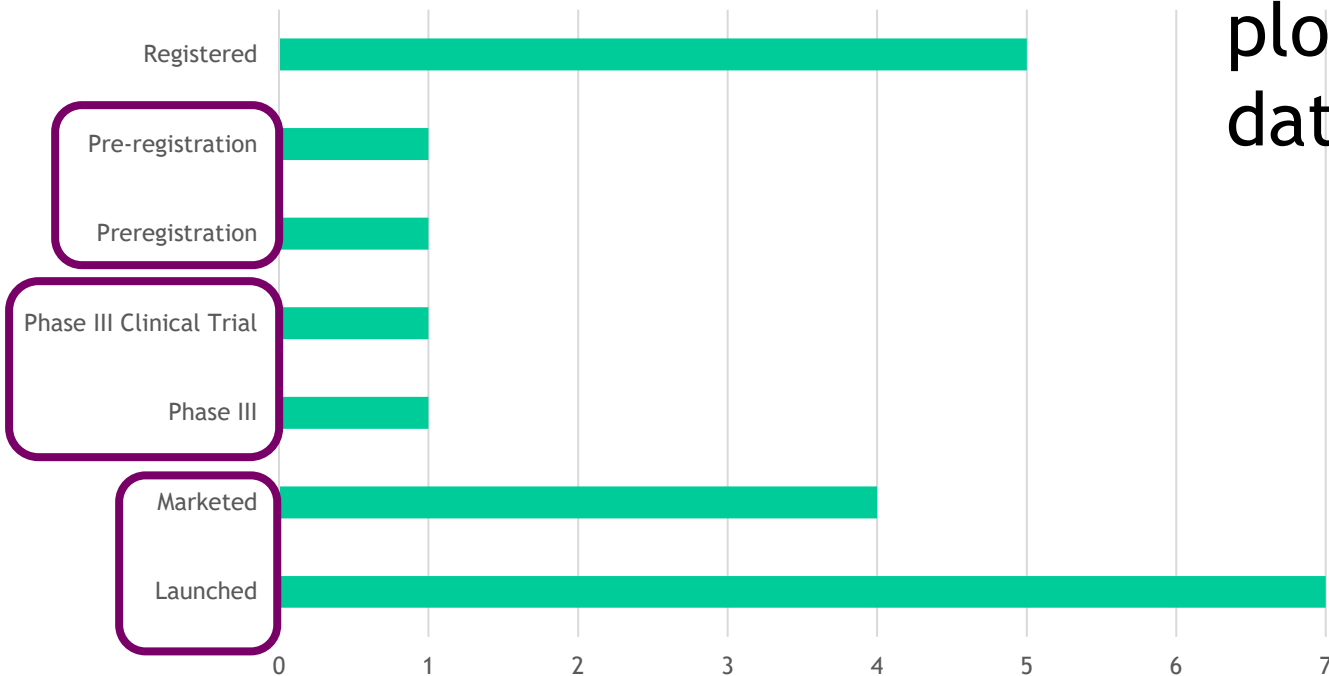


Here's a bar chart which you can create in seconds on GlobalData, showing all COVID-19 vaccines

Lessons Learned - It's not "Easy"

Multi-Database Visualizations are Hard!

5 Top COVID-19 Vaccines - Highest Status



But look what happens when we plot just 5 vaccines from 4 pipeline databases...

- We plot *20 records* rather than *5 vaccines*.
- And the same phase shows up on different bars.
- And not in multiples of 4...

Lessons Learned - It's not "Easy"

Multi-Database Visualizations are Hard!

	Drug Name	Database	Highest Status	Originator Company
1	Ad26.COV2 S	Adis R&D Insight	Registered	Janssen Pharmaceuticals (Originator)
2	COVID-19 vaccine, Johnson & Johnson	Citeline Pharmaprojects	Launched	Johnson & Johnson
3	JNJ-78436735	Cortellis from Clarivate Analytics	Registered	Johnson & Johnson
4	COVID-19 Vaccine	GlobalData Drugs	Marketed	Johnson & Johnson
5	AZD 1222	Adis R&D Insight	Registered	University of Oxford (Originator) Vaccitech (Originator)
6	COVID-19 vaccine, Oxford BioMedica	Citeline Pharmaprojects	Launched	Oxford BioMedica
7	AZD-1222	Cortellis from Clarivate Analytics	Launched	The Jenner Institute
8	COVID-19 Vaccine	GlobalData Drugs	Marketed	University of Oxford
9	Tozinameran - BioNTech/Pfizer	Adis R&D Insight	Registered	BioNTech (Originator)
10	COVID-19 vaccine, BioNTech	Citeline Pharmaprojects	Launched	BioNTech
11	tozinameran	Cortellis from Clarivate Analytics	Launched	BioNTech SE
12	tozinameran	GlobalData Drugs	Marketed	BioNTech SE
13	mRNA 1273	Adis R&D Insight	Registered	Moderna Therapeutics (Originator) National Institute of Allergy and Infectious Diseases (Originator)
14	COVID-19 vaccine, Moderna	Citeline Pharmaprojects	Launched	Moderna Therapeutics
15	mRNA-1273	Cortellis from Clarivate Analytics	Launched	Moderna Therapeutics
16	COVID-19 Vaccine	GlobalData Drugs	Marketed	Moderna Inc
17	NVX CoV 2373	Adis R&D Insight	Preregistration	Bill & Melinda Gates Foundation (Originator) Novavax (Originator)
18	NVX-CoV2373	Citeline Pharmaprojects	Phase III Clinical Trial	Novavax
19	NVX-CoV2373	Cortellis from Clarivate Analytics	Pre-registration	Novavax Inc
20	NVX-CoV2373	GlobalData Drugs	Phase III	Novavax Inc

Let's take a look at some of the issues...

- We have records from 4 pipeline databases for each vaccine.
- We want to plot each vaccine once, by the "correct" phase.

Lessons Learned - It's not "Easy"

Multi-Database Visualizations are Hard!

	Drug Name	Database	Highest Status
1	Ad26.COV2 S	Adis R&D Insight	Registered
2	COVID-19 vaccine, Johnson & Johnson	Citeline Pharmaprojects	Launched
3	JNJ-78436735	Cortellis from Clarivate Analytics	Registered
4	COVID-19 Vaccine	GlobalData Drugs	Marketed

Phases are hard!

Highest Phase for the J&J vaccine, which has **EUA** in USA.

- None of the pipeline databases have “emergency use authorization” as a standard phase.
- Citeline & GlobalData chose “Launched/Marketed” and Adis & Cortellis chose “Registered” as the highest phase.

Lessons Learned - It's not "Easy"

Multi-Database Visualizations are Hard!

17	NVX CoV 2373	Adis R&D Insight	Preregistration
18	NVX-CoV2373	Citeline Pharmaprojects	Phase III Clinical Trial
19	NVX-CoV2373	Cortellis from Clarivate Analytics	Pre-registration
20	NVX-CoV2373	GlobalData Drugs	Phase III

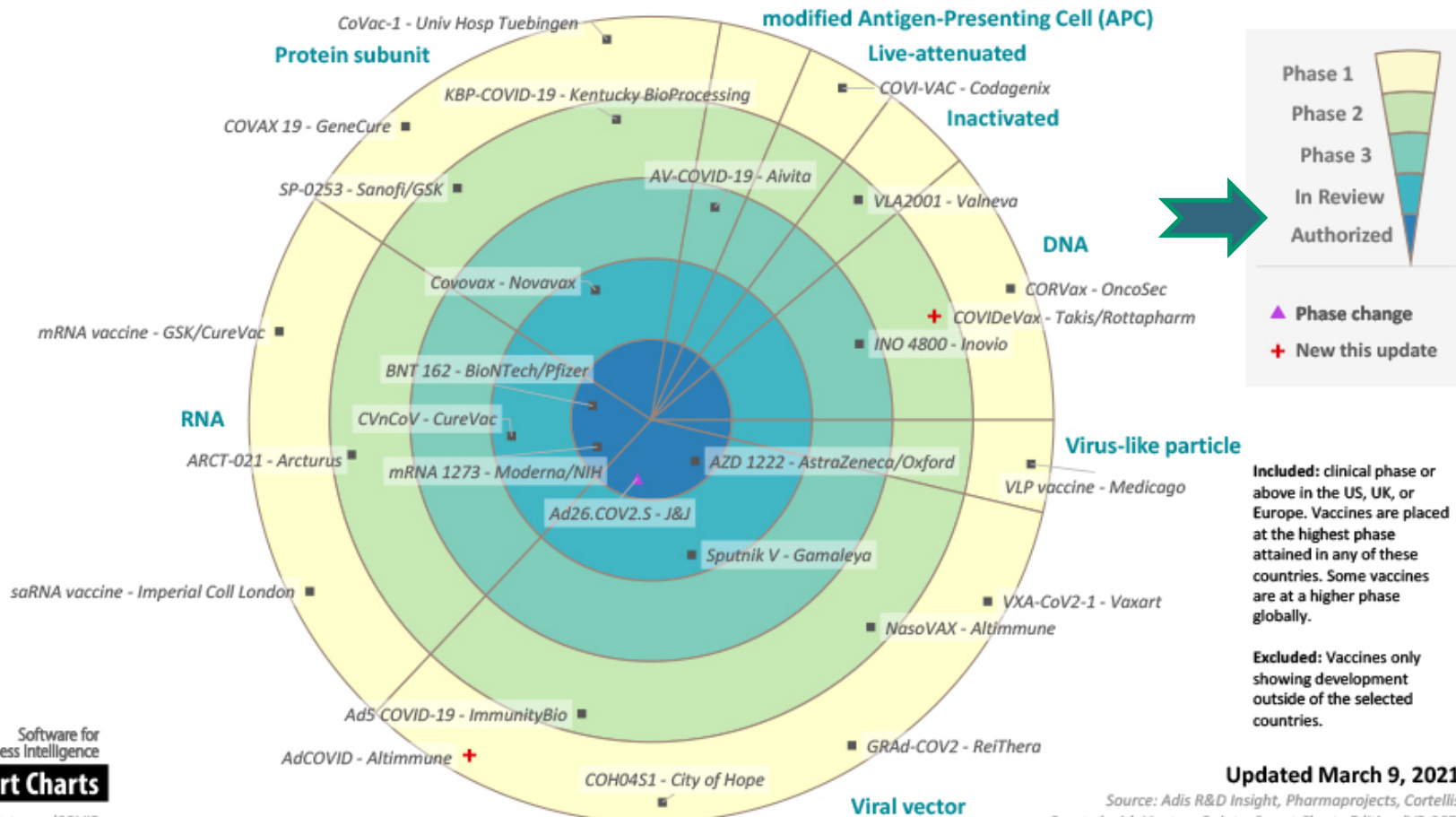
Highest Phase for the Novavax vaccine, which has **reported Phase 3 results.**

- Again, we see that the databases do not assign the same phase.
- We don't want to plot a vaccine in 2 different phases, so we have to make a choice.

Lessons Learned - It's not "Easy"

Multi-Database Visualizations are Hard!

COVID-19 Vaccines – US, UK, & Europe



We decided to create new phases - **In Review** and **Authorized**, and map the database phases to these for the bullseye.

Lessons Learned - It's not "Easy"

Multi-Database Visualizations are Hard!

- **Company clean-up** is harder than it looks.
- How many ways can you say "Moderna"?
- Can you teach software that Janssen is part of J&J?
- And that the Jenner Institute and Vaccitech are affiliated with Oxford?
- Often we need a single "key company."

Moderna Therapeutics (Originator)
National Institute of Allergy and Infectious Diseases (Originator)
Moderna Therapeutics
ModeRNA Therapeutics
Moderna Inc

Originator Company
Janssen Pharmaceuticals (Originator)
Johnson & Johnson
Johnson & Johnson
Johnson & Johnson

University of Oxford (Originator)
Vaccitech (Originator)
Oxford BioMedica
The Jenner Institute
University of Oxford

Lessons Learned - It's not "Easy"

Multi-Database Visualizations are Hard!

Drug: COVID-19 Vaccine

Drug Name COVID-19 Vaccine	Brand Name COVID-19 Vaccine: Covishield	Company Name AstraZeneca Plc
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Partnering Details

Agreement Date	Event / Partnering Type	Entity Role	Entity	Geography
06-Aug-2020	Licensing	Licensee	Shenzhen Kangtai Biological Products Co Ltd	China
		Licensor	AstraZeneca Plc	
21-May-2020	Licensing	Licensee	AstraZeneca Plc	Global
		Licensor	University of Oxford	
	Development Partner	Developer	University of Oxford	Global
		Development Partner	Vaccitech Ltd	

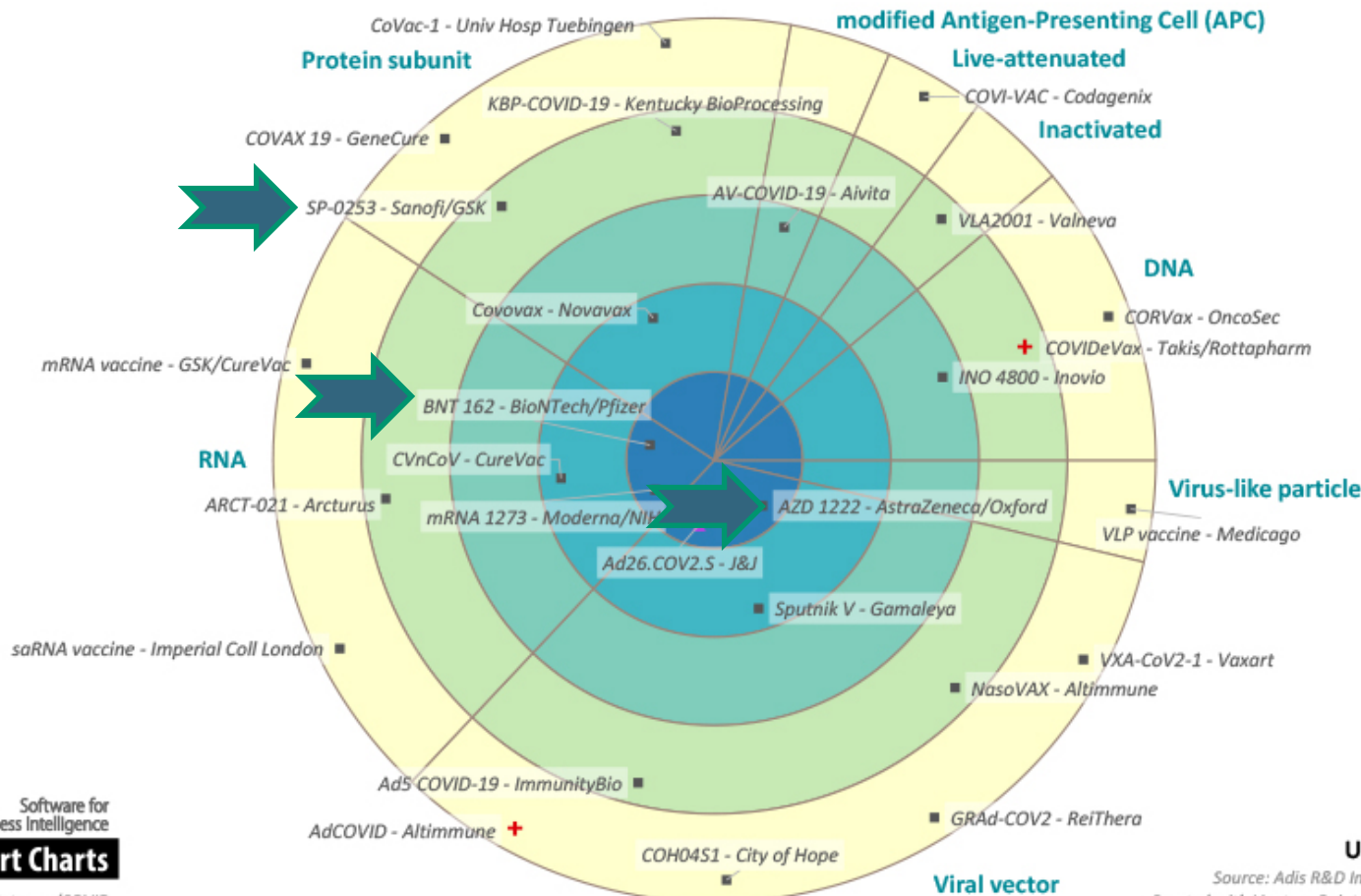
GlobalData Drugs: COVID-19 Vaccines			
	Drug Name	Company (Key)	Companies
1	Coronavirus Disease 2019 (COVID-19) Vaccine	Gamaleya Federal Research Center of Epidemiology and Microbiology	Gamaleya Federal Research Center of Epidemiology and Microbiology
2	COVID-19 Vaccine	Johnson & Johnson	Johnson & Johnson
3	COVID-19 Vaccine	Moderna Inc	Moderna Inc The National Institute of Allergy and Infectious Diseases
4	COVID-19 Vaccine	AstraZeneca Plc	University of Oxford Shenzhen Kangtai Biological Products Co Ltd AstraZeneca Plc Vaccitech Ltd
5	tozinameran	BioNTech SE	BioNTech SE Shanghai Fosun Pharmaceutical (Group) Co Ltd Pfizer Inc
6	MRT-5500	Sanofi	Translate Bio Inc Shire Pharmaceuticals International UC Massachusetts Institute of Technology Sanofi Pasteur SA RaNA Therapeutics Inc (now Translate Bio Inc)
7	MVCCOV-1901	Medigen Vaccine Biologics Corp	U.S. National Institutes of Health Dynavax Technologies Corp Medigen Vaccine Biologics Corp

GlobalData identifies a single “key company” for each drug.

Lessons Learned - It's not "Easy"

Multi-Database Visualizations are Hard!

COVID-19 Vaccines – US, UK, & Europe



In the bullseye we chose to concatenate Originators and Licensees for some vaccines.

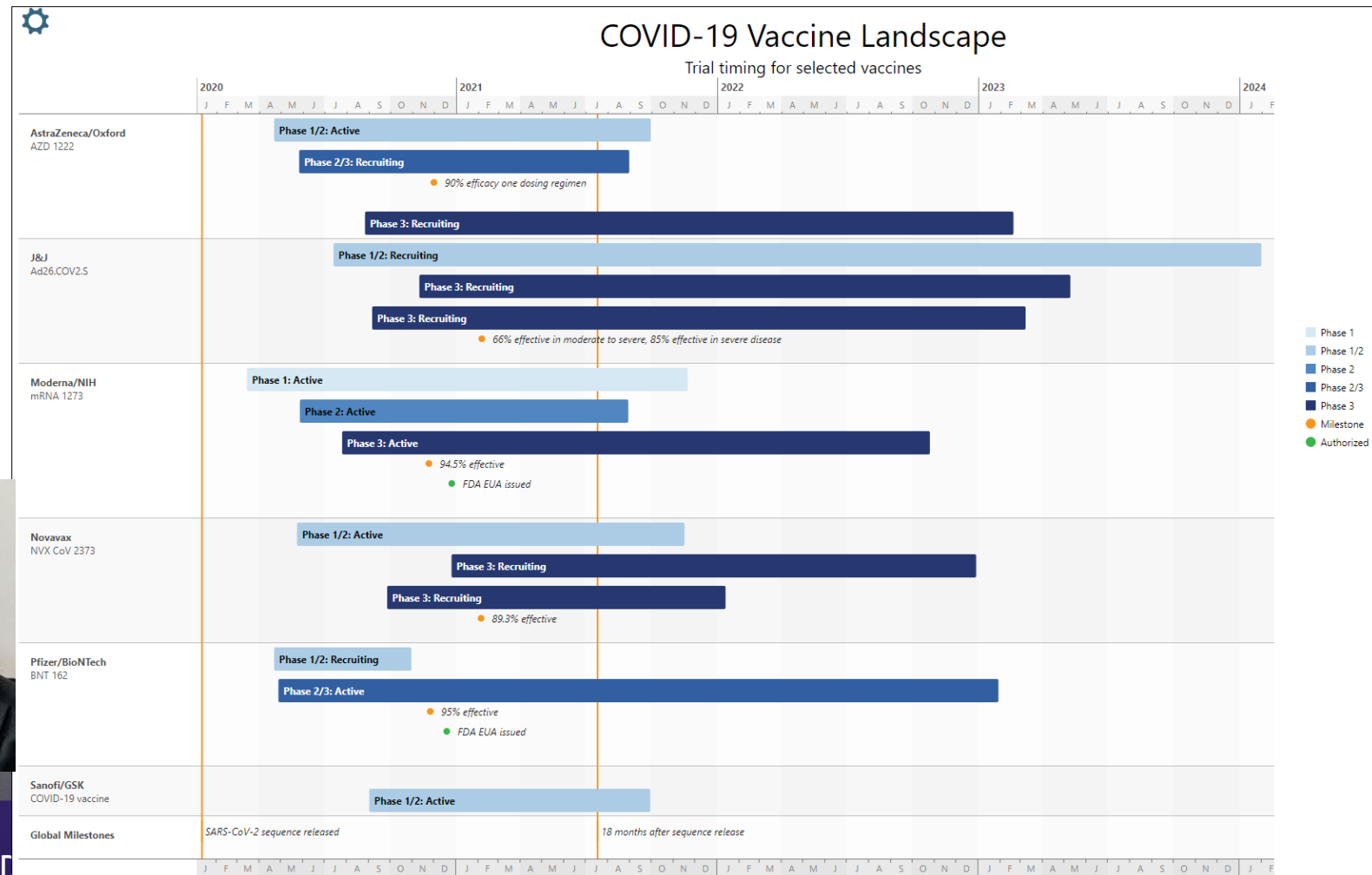
Updated March 9, 2021

Source: Adis R&D Insight, Pharmaprojects, Cortellis
Created with VantagePoint – Smart Charts Edition (VP-SCE)

Lessons Learned - It's not "Easy"

Selecting "Key" items from larger datasets

- For the timeline, an expert needs to select the "key vaccines" to plot.
- We decided to go with the ultimate COVID expert.



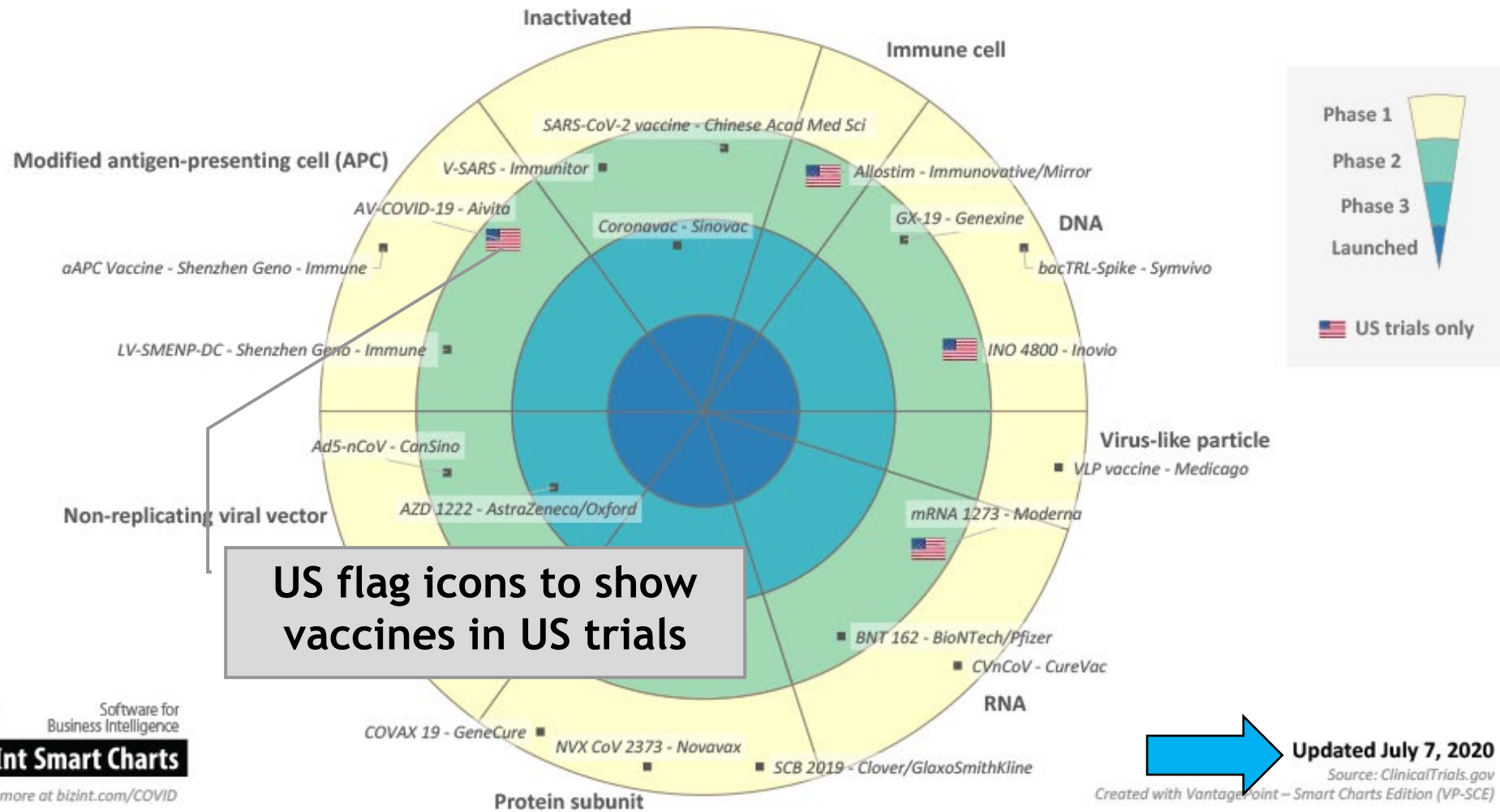
Lessons Learned - It's not "Easy"

Because the data issues are complicated

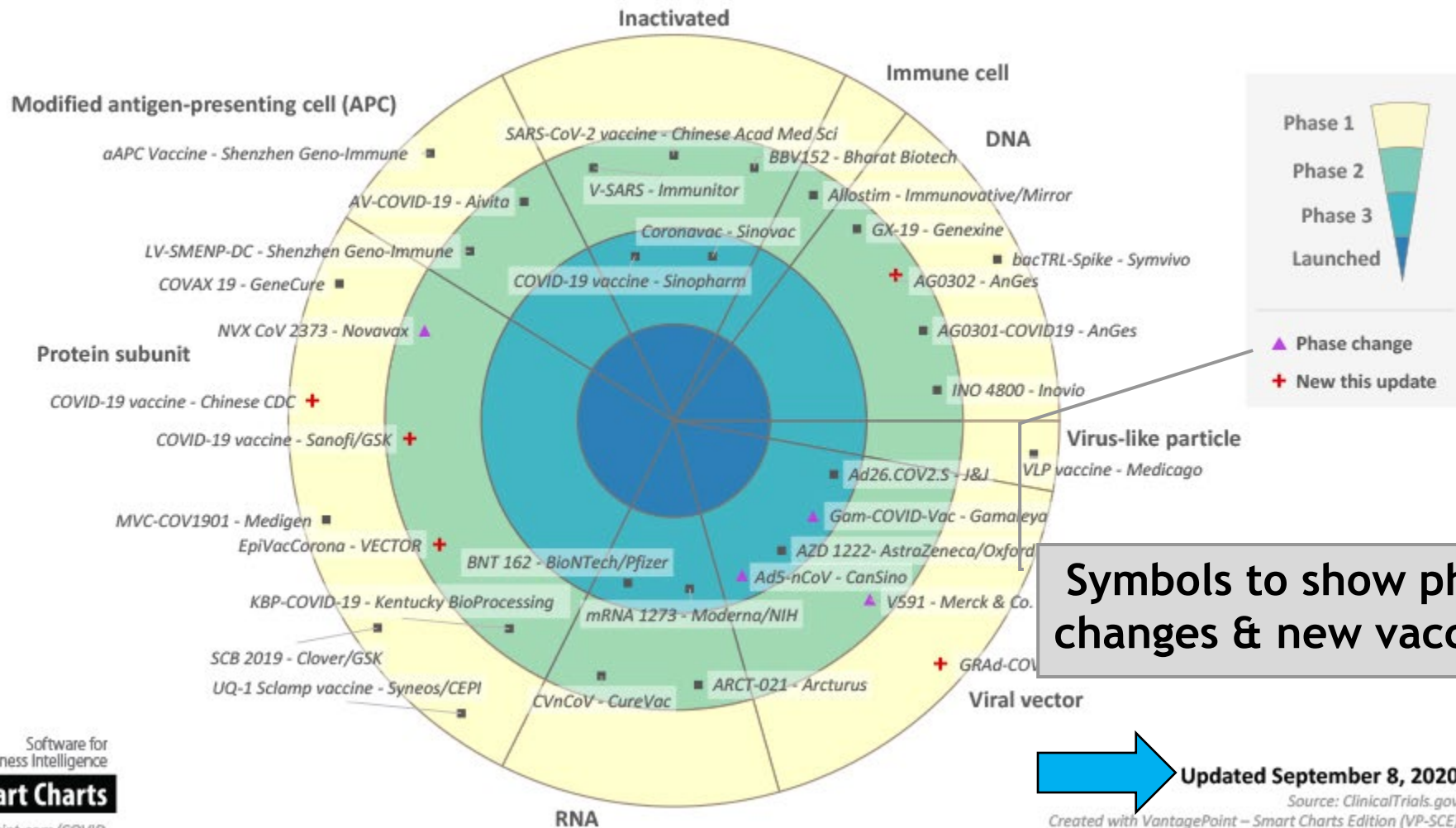


- *Before you can create the visualization, you need to...*
- **Integrate** the search results
- **Identify related** drugs (or trials)
- **Select** which information you want to use
(deal with conflicting values, select "key" drugs)
- **Create categories** (e.g. vaccine technology)
- And **normalize terms** across databases (drug names, companies, phases)

Lessons Learned - It's all about *Adding additional information*



Lessons Learned - It's all about



Symbols to show phase changes & new vaccines

Updated September 8, 2020
 Source: ClinicalTrials.gov
 Created with VantagePoint - Smart Charts Edition (VP-SCE)

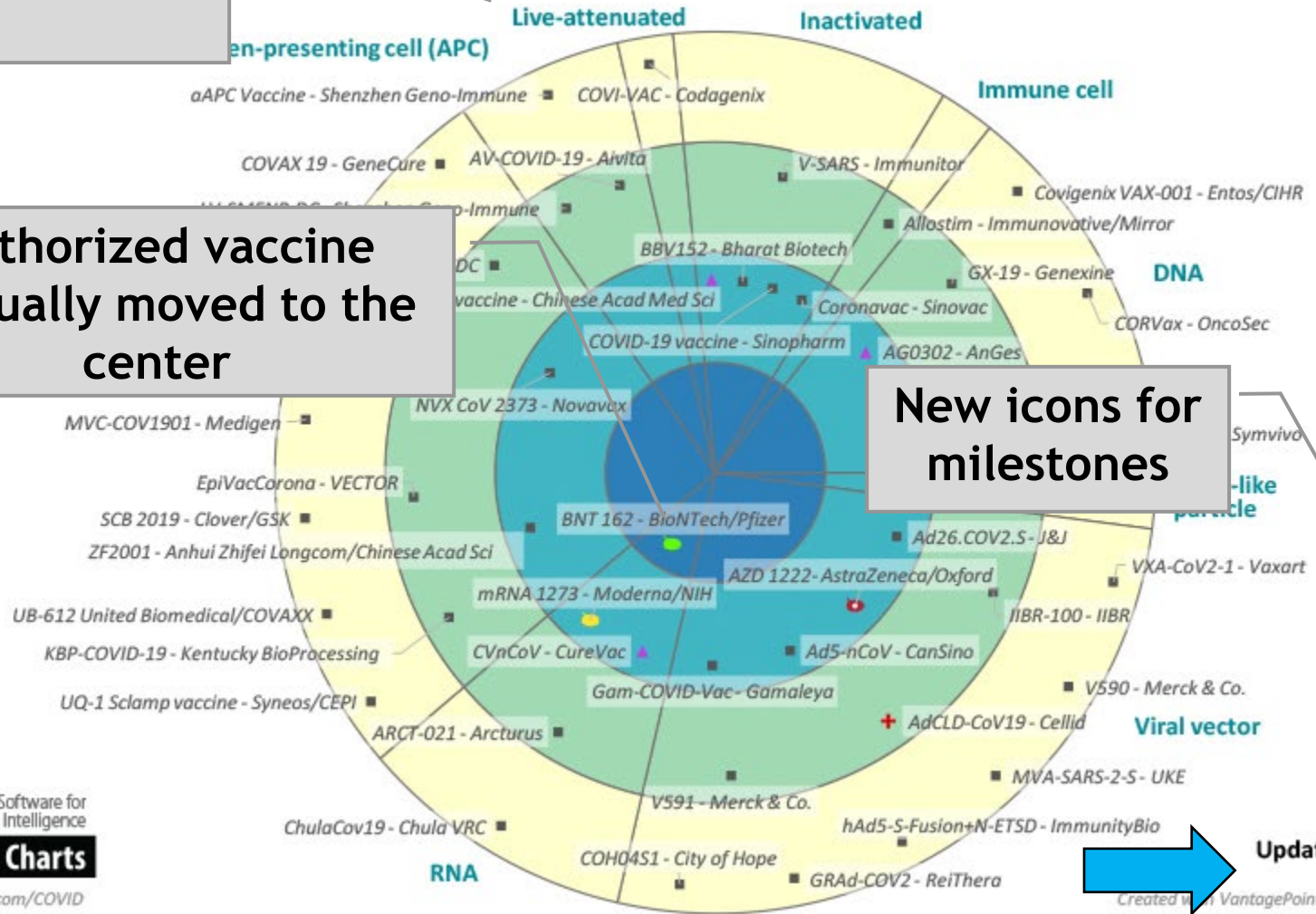
Lessons Learned - It's all about



Add color to vaccine type labels

Authorized vaccine manually moved to the center

New icons for milestones



Lessons Learned - It's all about



- **Explanatory** visualizations end up on PowerPoint slides.
- By automating the drawing of PowerPoint visualizations, we leave time for the analyst to **annotate and polish** the final slide.
- But, it's not easy to automatically generate PowerPoint visualizations.
- And the interactivity is limited.

Lessons Learned - It takes a team

- **BizInt team** designed the project and reviewed each version.
- **Public relations consultant** provided outside perspective.
- **Expert analyst** did the search, reviewed data, and implemented VP-SCE techniques to create each bullseye.
- **Graphics consultant** created the design and put finishing touches on each bullseye.
- **Webmaster** published each version.

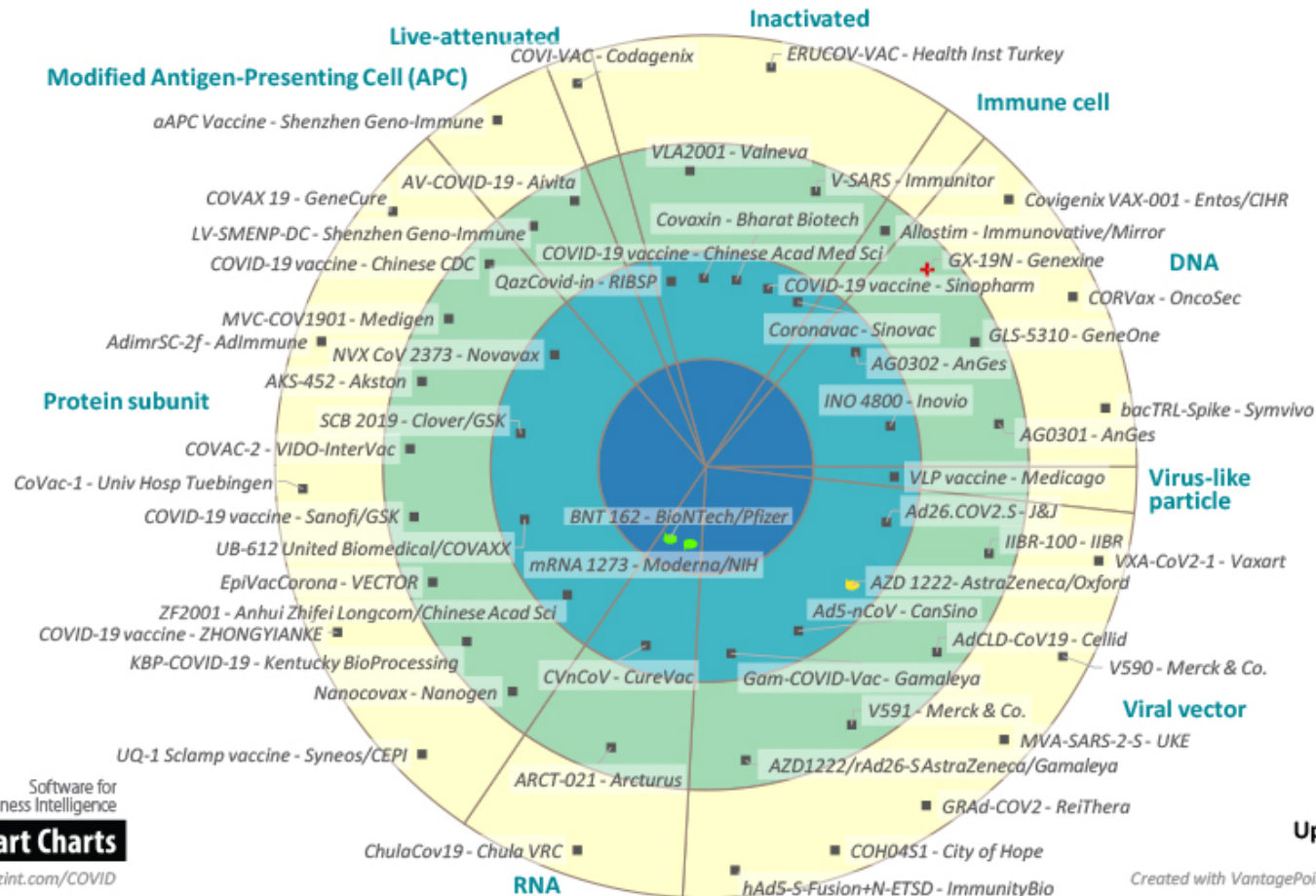


Lessons Learned - Revisit your decisions!

Decision	Where we started...	Where we are now...
How will we deliver the visualization?	publish an image of the bullseye on our website bizint.com/covid (not interactive)	Bullseye is part of a COVID-19 vaccine dashboard on bizint.com/covid
What data will we use?	ClinicalTrials.gov (a public source) using the provided search for COVID-19 clinical trials.	4 leading drug pipeline databases , with a search tailored to each database.
How will we plot vaccines in the bullseye rings?	highest trial phase for each vaccine in the CT.gov data.	Highest phase in all databases, for each region.
What vaccines will we show?	All COVID-19 vaccines in clinical trials, except repurposed vaccines.	Vaccines now shown in two bullseyes - US/EU/UK and rest of world.
How often should we update?	every 2 weeks, using Update features in BizInt Smart Charts.	Every 2 weeks, using Update features in BizInt Smart Charts.

Lessons Learned - Revisit your decisions!

COVID-19 Vaccine Landscape

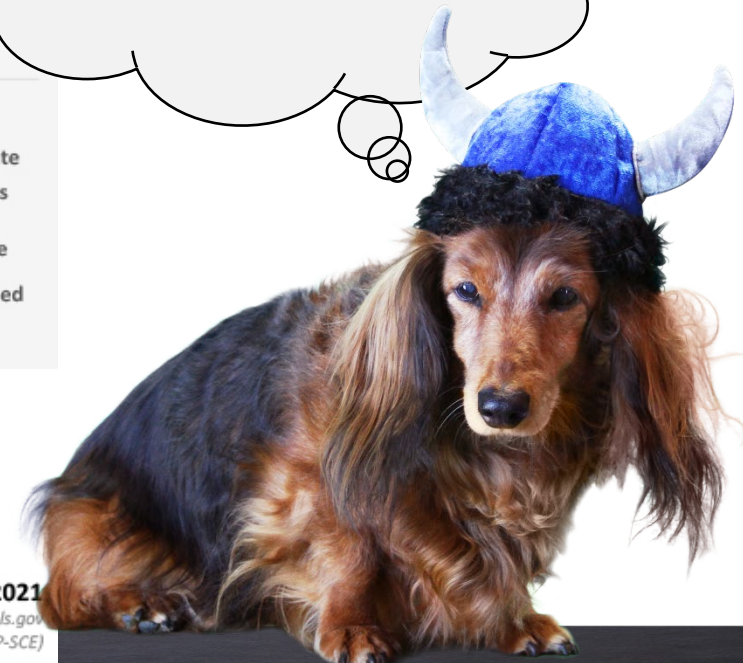


VP-SCE BullseyeSM

- Phase
- Phase
- Phase
- Authorized

Too much!
I can't make any sense of this....

- ▲ Phase change
- + New this update
- 🚫 Efficacy Results Announced
- 🗨️ Emergency Use Authorization (EUA) Requested
- 🟢 EUA Granted



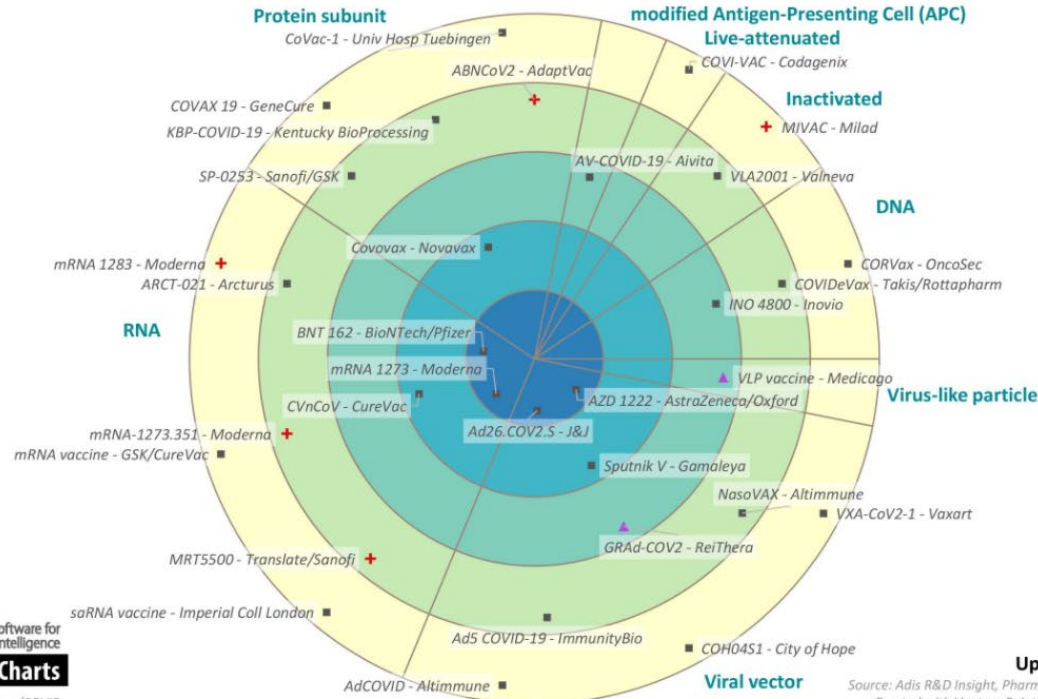
Updated January 26, 2021

Source: ClinicalTrials.gov

Created with VantagePoint - Smart Charts Edition (VP-SCE)

Lessons Learned - Revisit your decisions!

COVID-19 Vaccines – US, UK, & Europe



VP-SCE BullseyeSM



▲ Phase change
+ New this update

Included: clinical phase or above in the US, UK, or Europe. Vaccines are placed at the highest phase attained in any of these countries. Some vaccines are at a higher phase globally.

Excluded: Vaccines only showing development outside of the selected countries.

Updated March 23, 2021

Source: Adis R&D Insight, Pharmaprojects, Cortellis, GlobalData
Created with VantagePoint – Smart Charts Edition (VP-SCE)

Pipeline Bullseye [Visualization 1/4]

Our VP-SCE Bullseye is a compact way to show development progress of a number of projects divided into groups. This bullseye presents COVID-19 vaccines in clinical trials in the US, Europe and UK, grouped by vaccine technology. Vaccines are plotted by the highest phase in the US, UK or Europe.

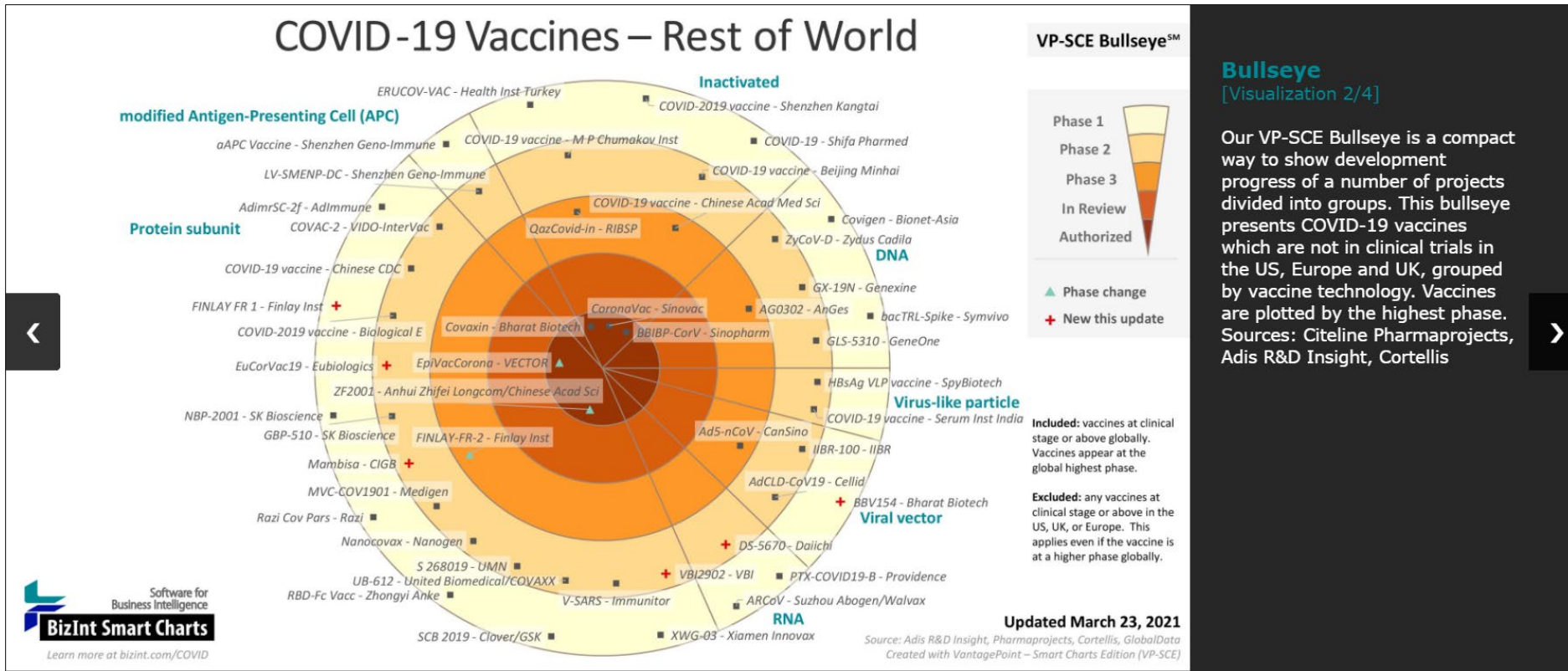
Sources: Citeline Pharmaprojects, Adis R&D Insight, Cortellis

[Learn more about how we built this and what's new >](#)

Dashboard now has one bullseye for vaccines in the US, UK and Europe...



Lessons Learned - Revisit your decisions!



...and another bullseye for vaccines in the rest of the world.

Each bullseye is now easier to read!



Lessons Learned - Revisit your decisions!

- **Can we make the process easier and faster?**
Do all steps have value? Can we automate steps?
- **Are we using the right data sources and tools?**
Trial vs. pipeline? PowerPoint vs Tableau?
- **Are we filtering data at the right level?**
Showing too much? Too little?
- **Should we update more frequently?**
Only when a key event happens?
- **Are we using the right visualization?**
Are we telling the story? Does it meet the needs of our clients?

Concluding thoughts:

- The right visualizations can help you tell the story.
- Creating and updating multi-database visualizations is challenging and requires expert analysts (that's you!)
- Tools can help (a lot) but don't automate the process.
- Revisit your decisions to make both your clients and your team happier!

Avoid this!



www.bizint.com/covid

www.bizint.com/slides



Software for
Business Intelligence

BizInt Smart Charts

**Questions?
Comments?
Ideas?**



THE JOURNEY CONTINUES