

# Leveraging **Spotfire** for **Biologics Discovery**

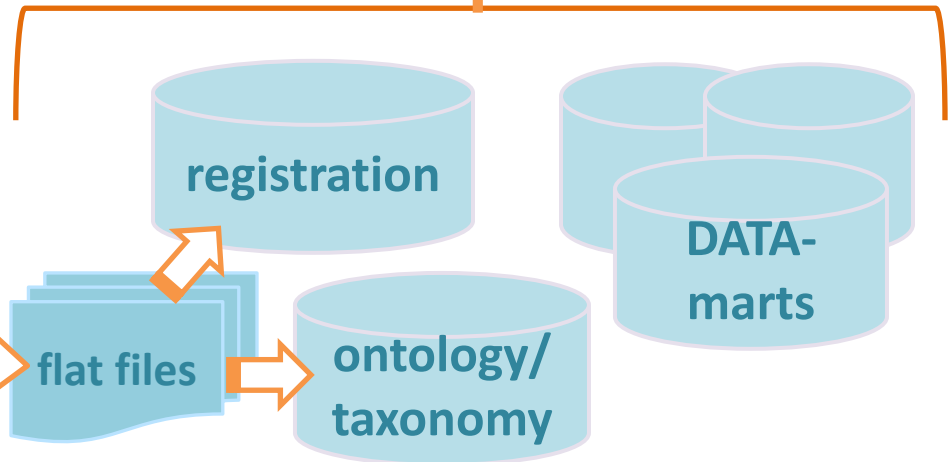
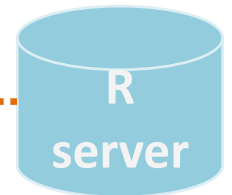
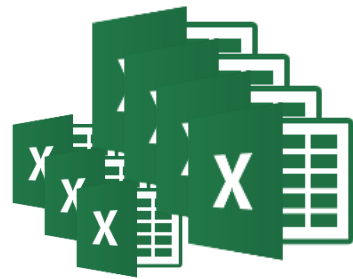
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**Dave Nakamura**

Business Capability Manager

Biologics IT (RWC)

# use.case\_datawarehouse\_analytics

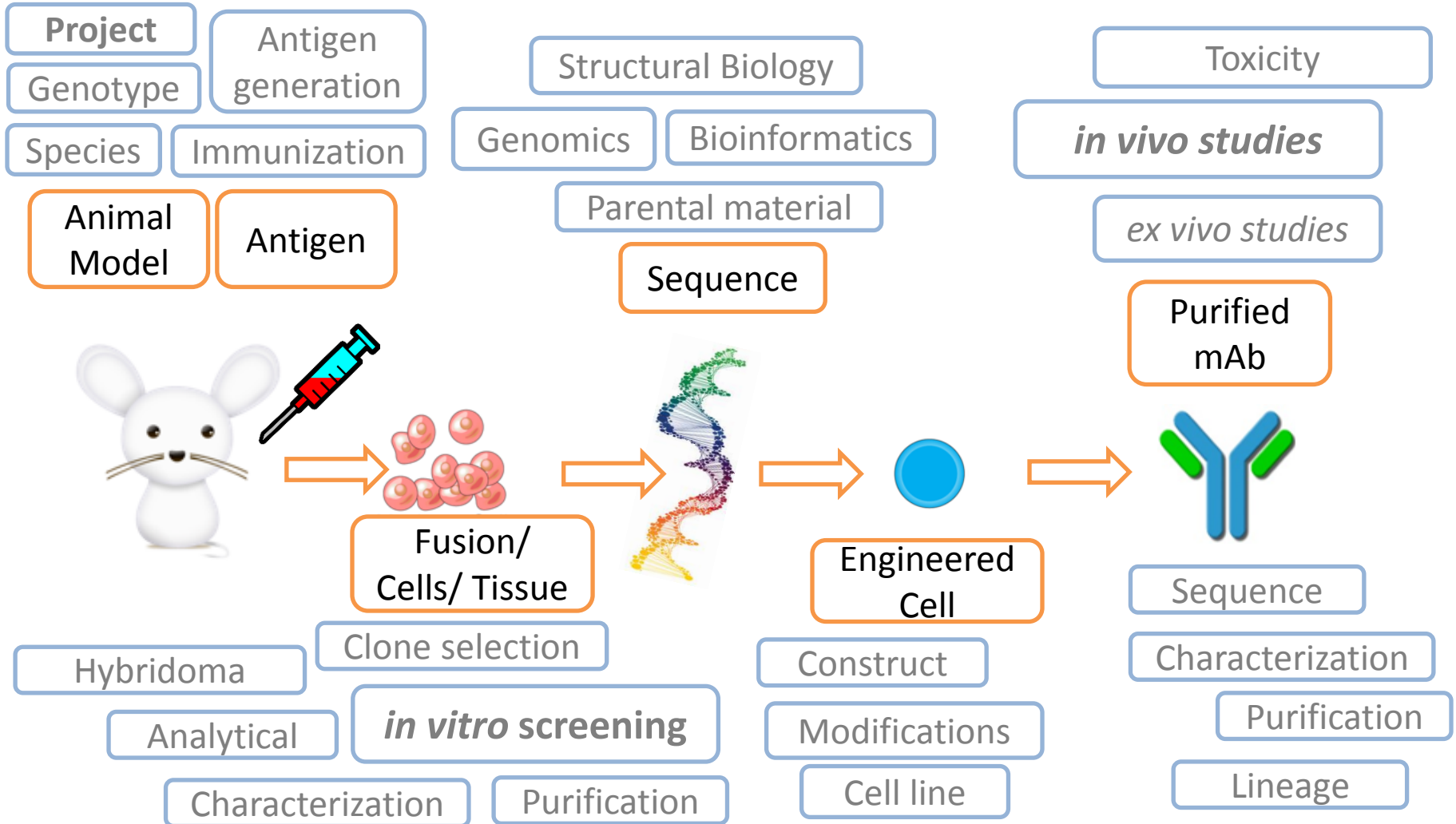


Background

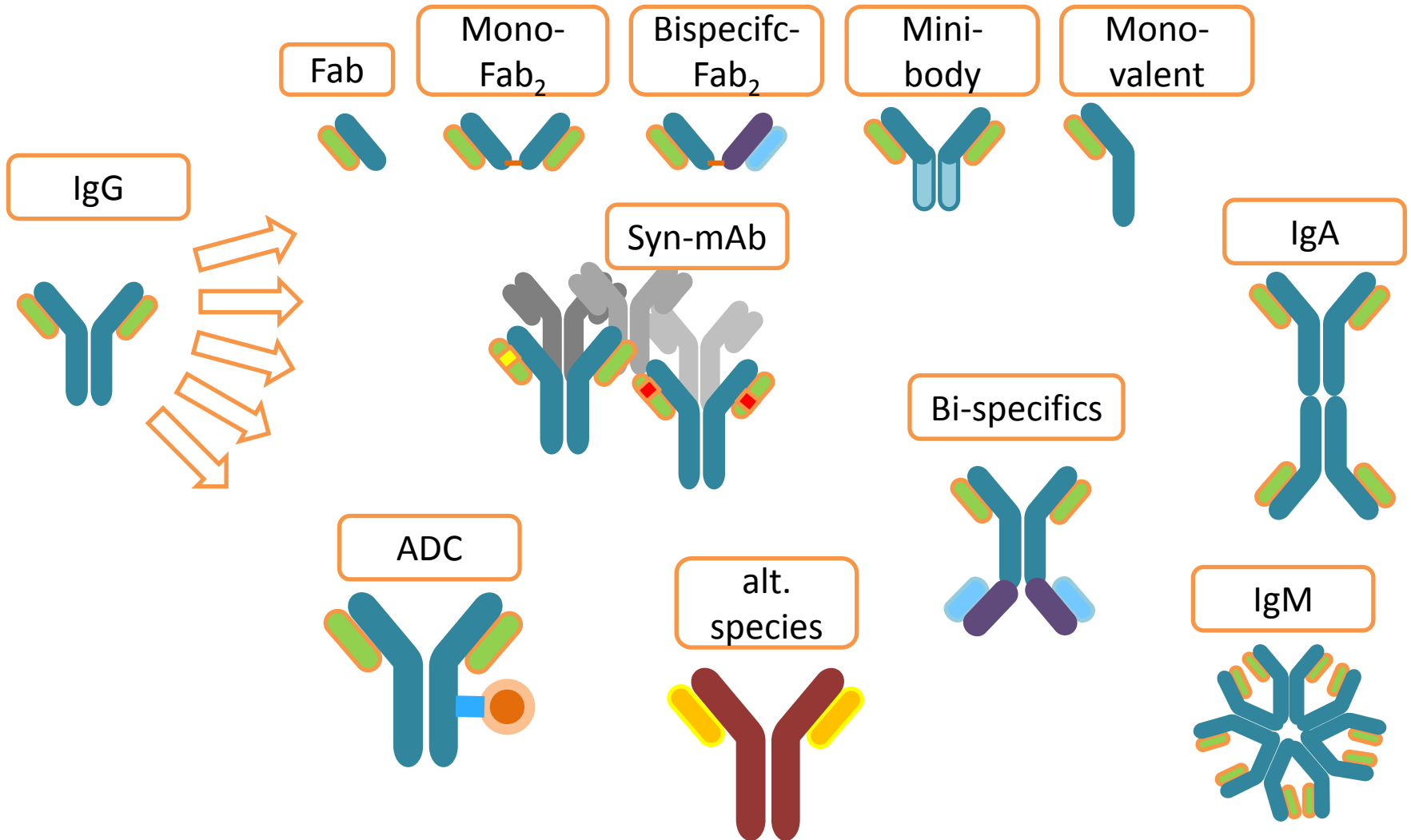
# **BIOLOGICS DATA AND WORKFLOWS**

# background\_biologics.data

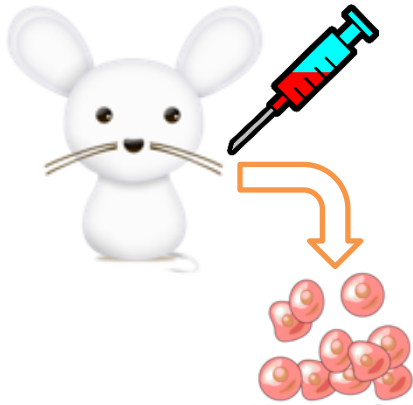
Hybridoma development



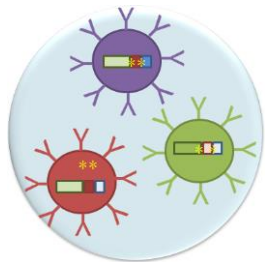
# background\_biologics.data.2



# background\_biologics.data.3

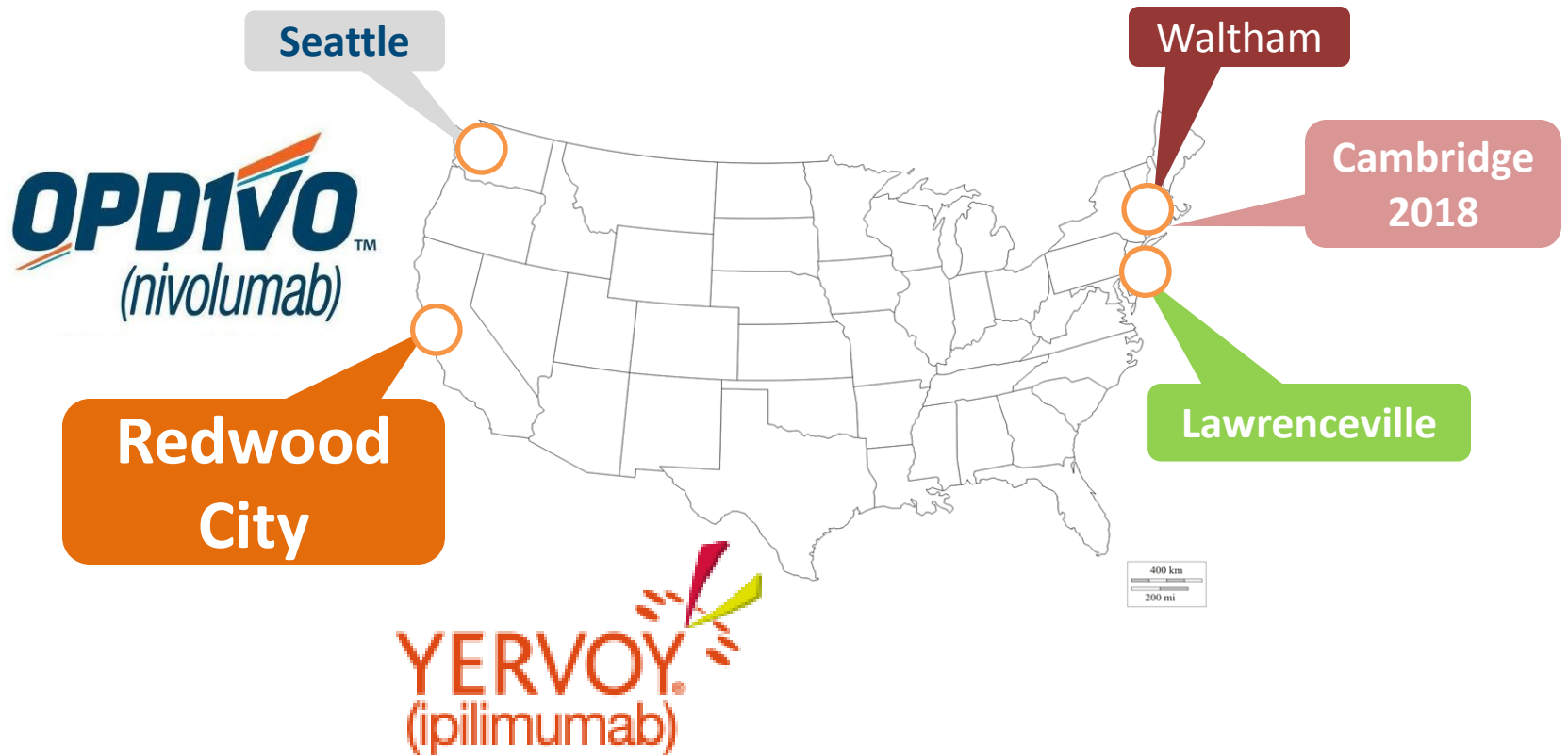


METHOD	PROS
<b>Hybridoma</b> Fusion of B cells to myeloma cells	<b>Automated, robust</b>
<b>Genetic immortalization</b> mRNA display, YSD Phage display	<b>Comprehensive, orthogonal</b>
<b>B-cell cloning</b> Single B cells for antigen specificity	<b>No fusions, species agnostic</b>

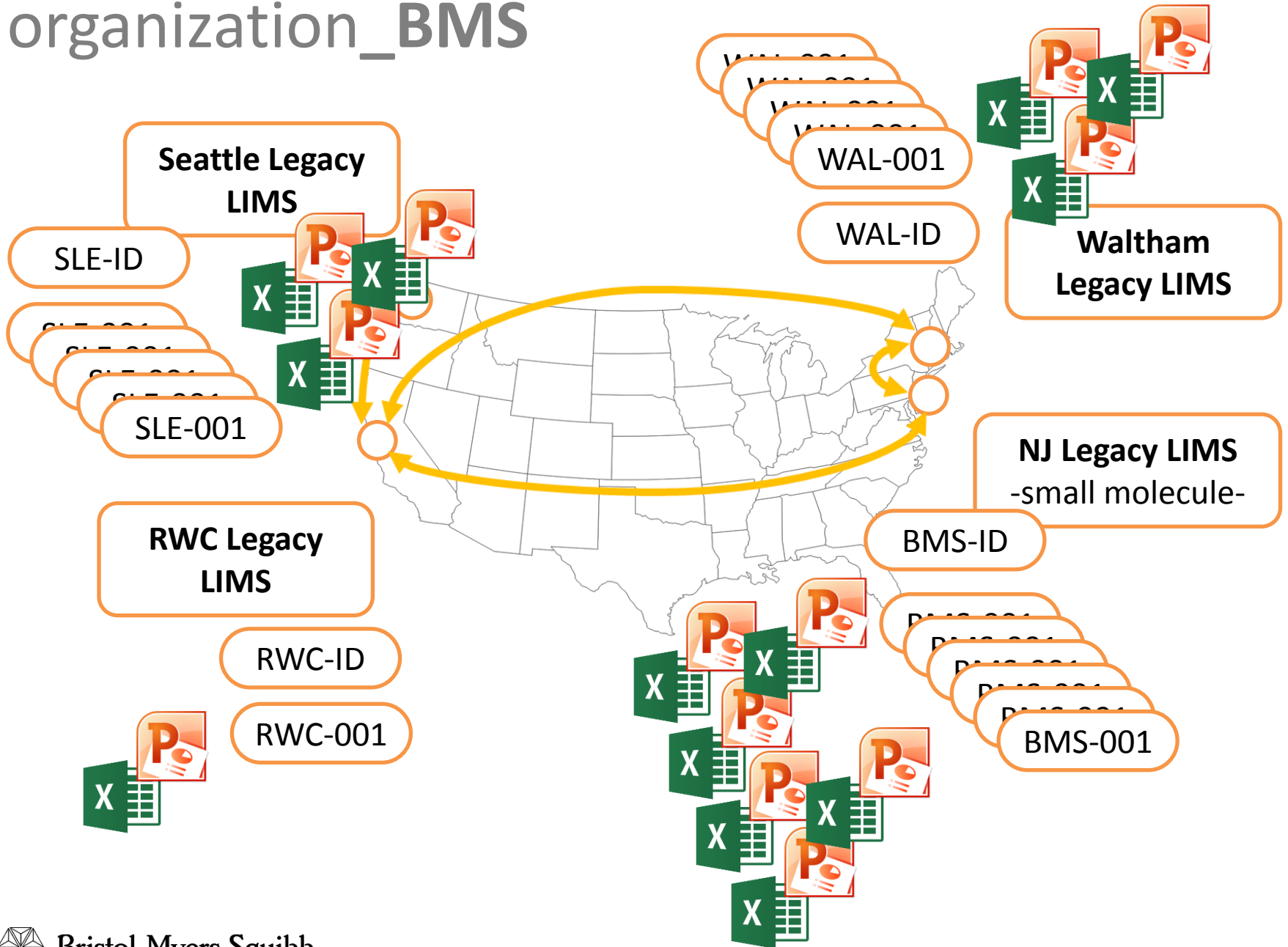


METHOD	PROS
<b>PHAGE display</b> Human repertoire on mammalian cells, phage display of synthetic repertoire	<b>Directed, no <i>in vivo</i> selection</b>

# organization\_BMS

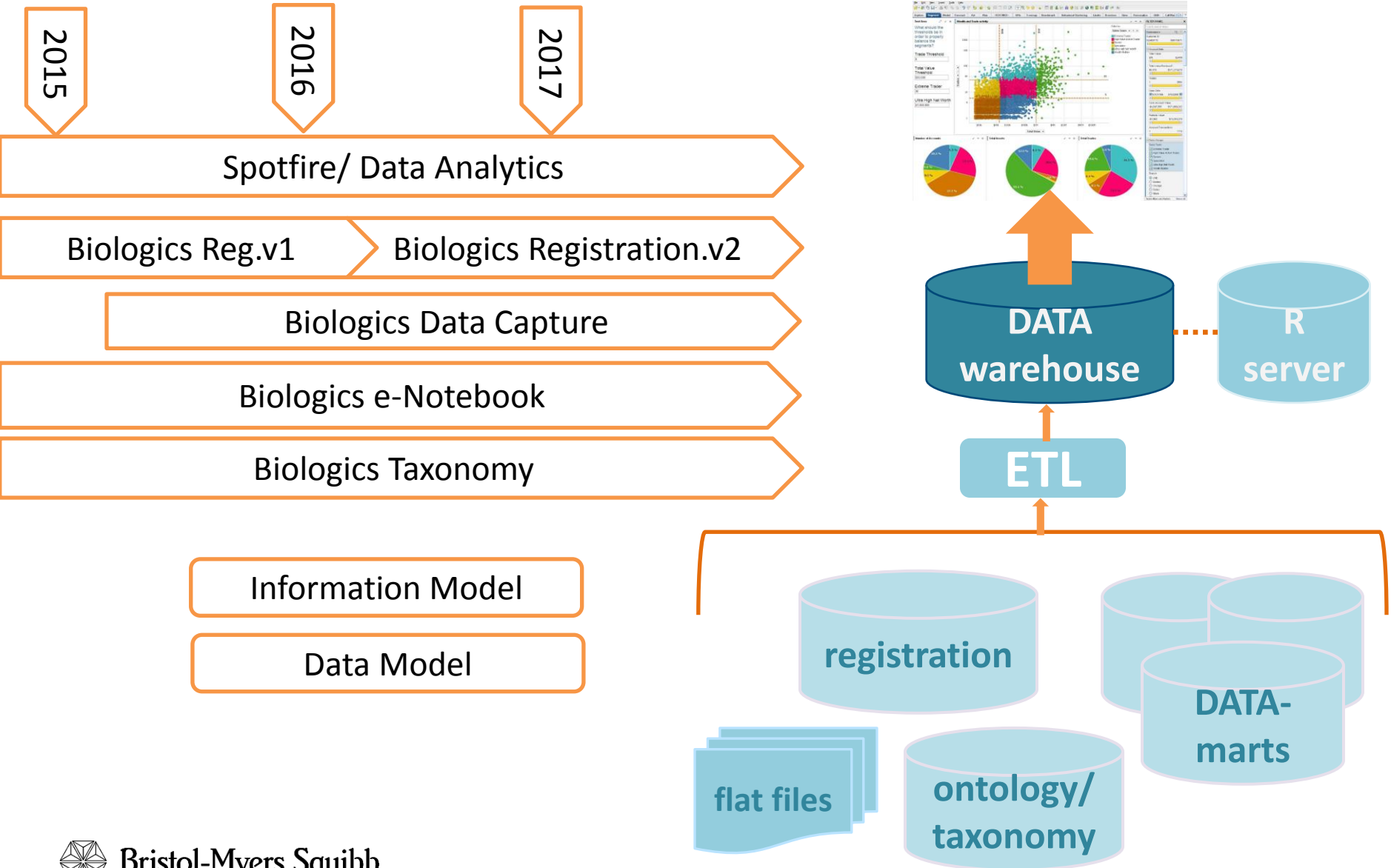


# organization\_BMS





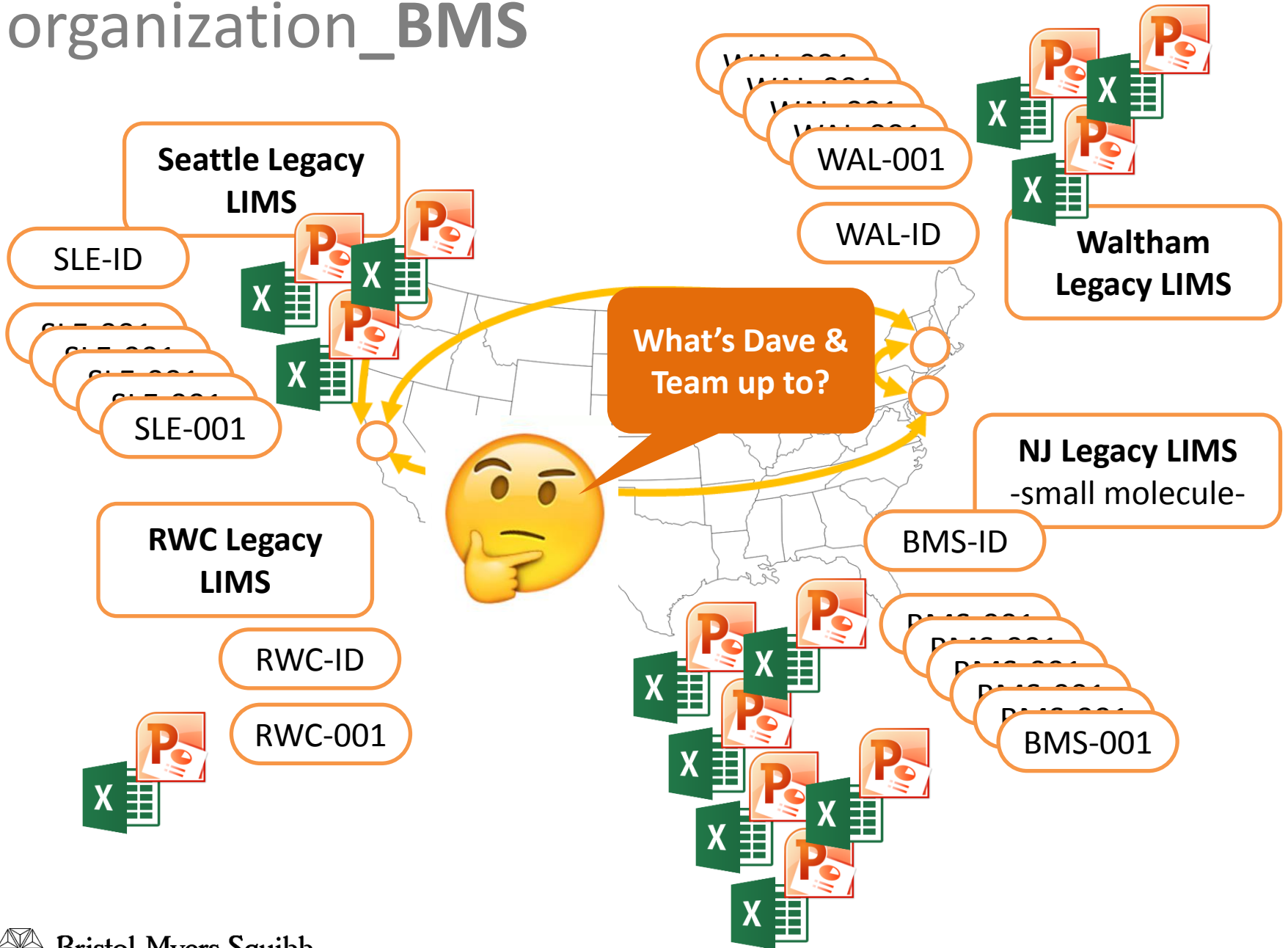
# use.case\_datawarehouse\_analytics



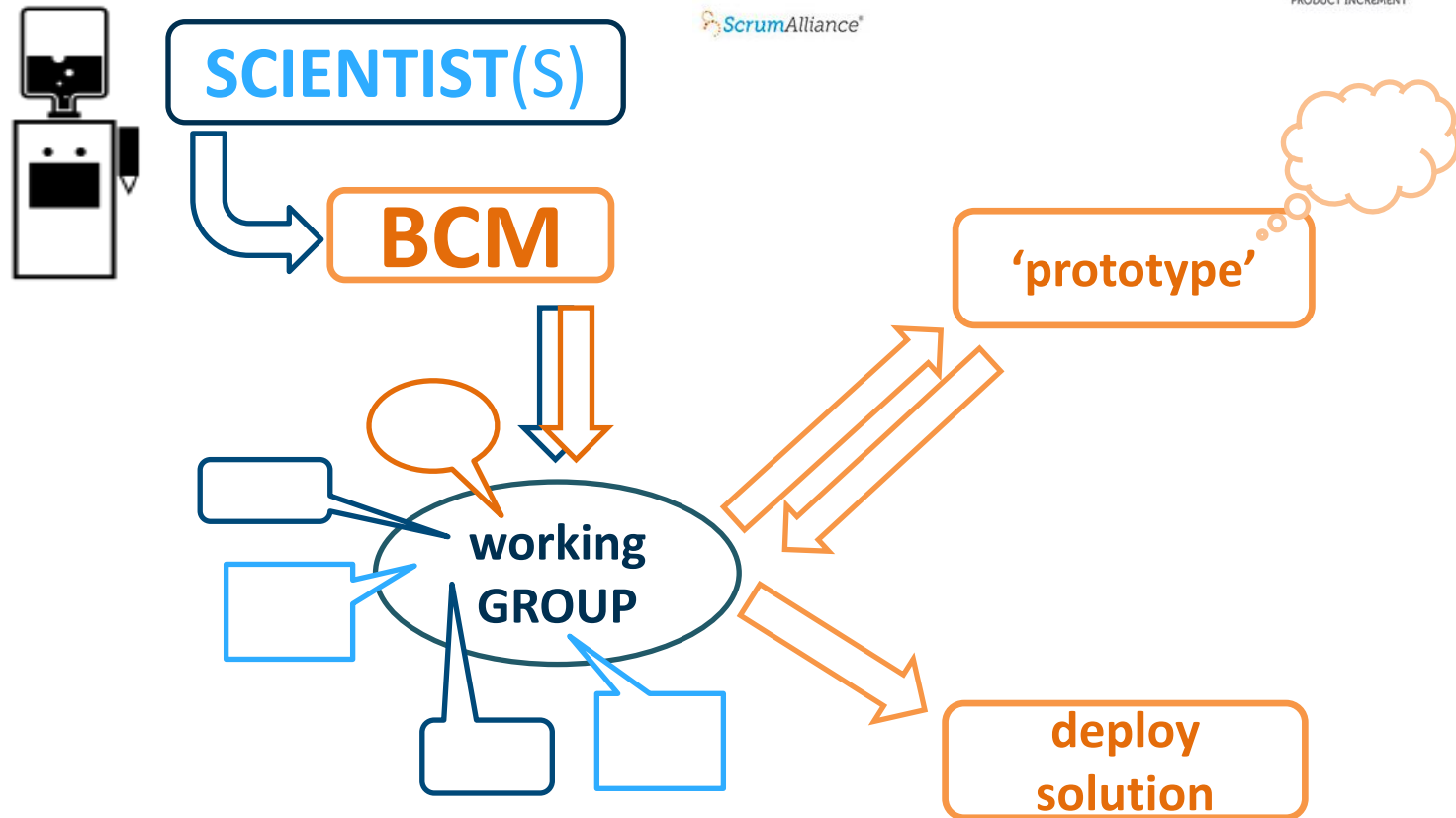
WORK IN-PROGRESS

# LEVERAGING TOOLS

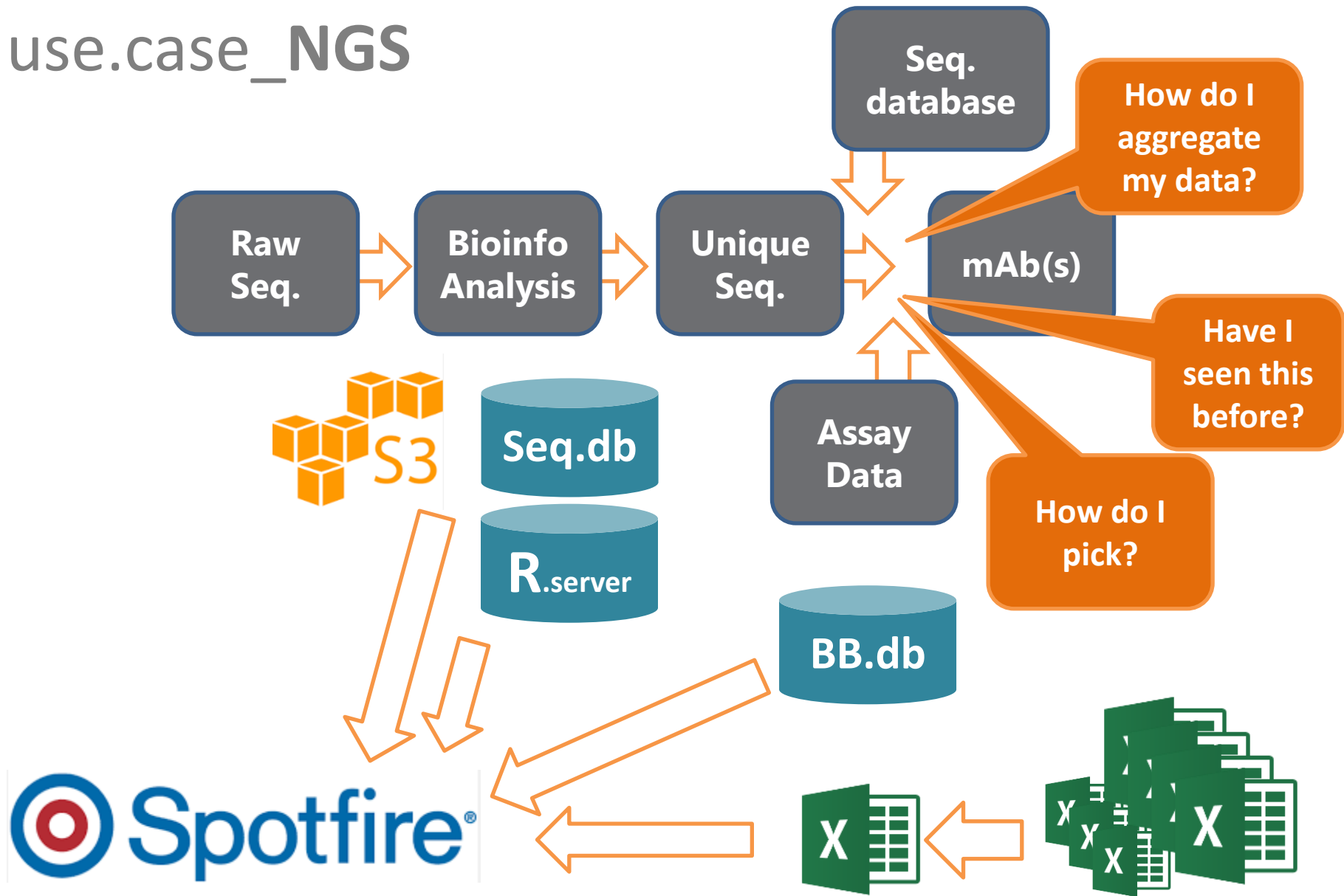
# organization\_BMS



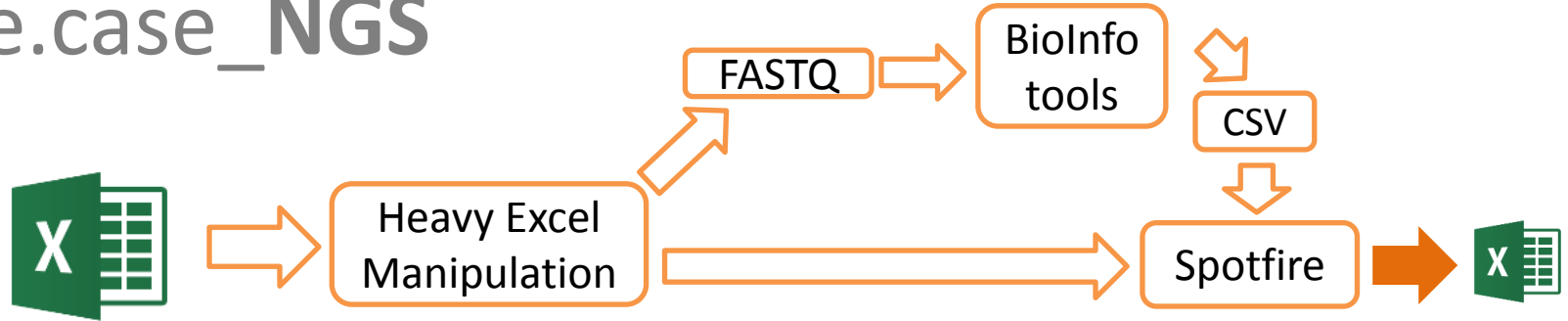
# data\_working.group



# use.case\_NGS



# use.case\_NGS

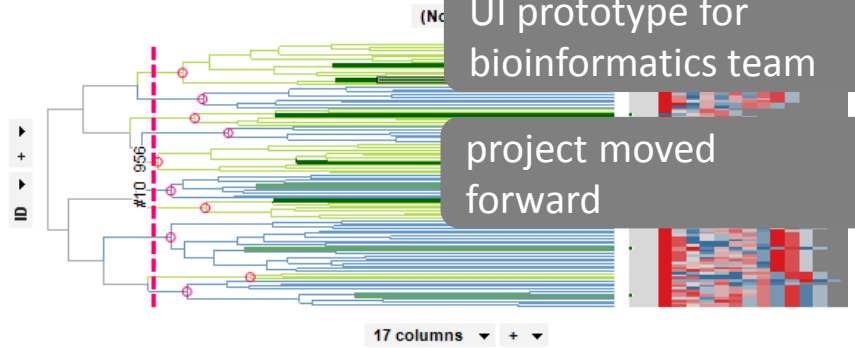


time spent: ~3 hrs  
time saved: 40+hrs

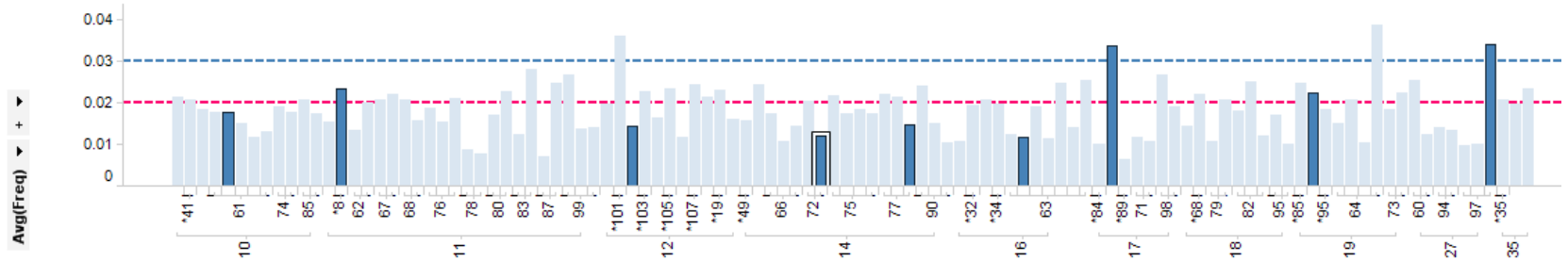
## VH

Well	Sample	Domain	Clone	Frame	H1	H2	H3	ID	Orig ID	Clust
B01_1	HC_B01_1	VH	IGHV3-...	IGHJ6	FTIS...	S...	C...	900...	M03558...	
C03_1	HC_C03_1	VH	IGHV3-...	IGHJ3	FTF...	A...	C...	900...	M03558...	
B09_2	HC_B09_2	VH	IGHV3-...	IGHJ4	STF...	S...	C...	900...	M03558...	
D04_3	HC_D04_3	VH	IGHV3-...	IGHJ3	FTF...	S...	C...	900...	M03558...	
A08_3	HC_A08_3	VH	IGHV3-...	IGHJ4	FTF...	A...	C...	900...	M03558...	
B06_1	HC_B06_1	VH	IGHV3-...	IGHJ4	FTF...	A...	C...	900...	M03558...	
A04_3	HC_A04_3	VH	IGHV3-...	IGHJ2	FTV...	S...	C...	900...	M03558...	
C03_3	HC_C03_3	VH	IGHV3-...	IGHJ3	FTV...	S...	C...	900...	M03558...	
A08_1	HC_A08_1	VH	IGHV3-...	IGHJ2	FTF...	A...	C...	900...	M03558...	

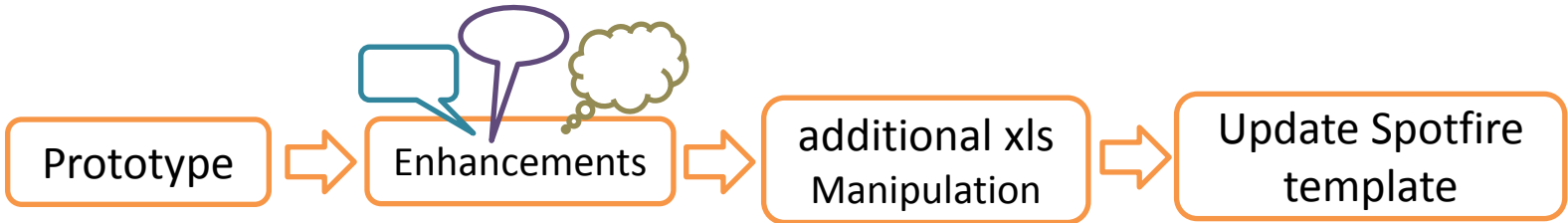
## VH - H3 diversity



## VH Frequency



# use.case\_NGS



Building Web-UI

Spotfire friendly data output

time spent: ~3 hrs  
time saved: ~  
**Additional capabilities**

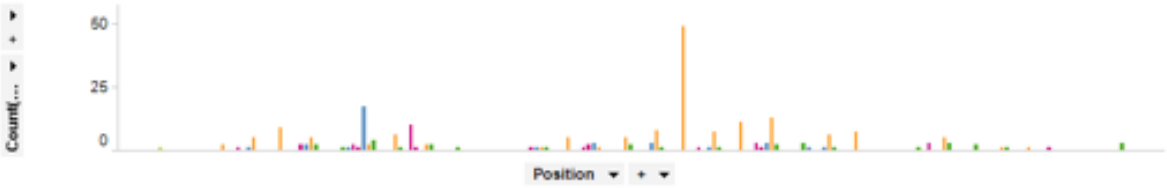
IVH

Well	Clone	Frame	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H12	H13	H14	H15	H16	H17	H18	H19	H20	Cluster Size	SeqCount	Freq
A01_1	IGHV3...	IGHJ3																					43		
A01_2	IGHV3...	IGHJ4																					62		
A02_3	IGHV3...	IGHJ2																					100		
A03_1	IGHV3...	IGHJ2																					140		

Algorithm development

Spotfire integration

IVH - AA substitutions

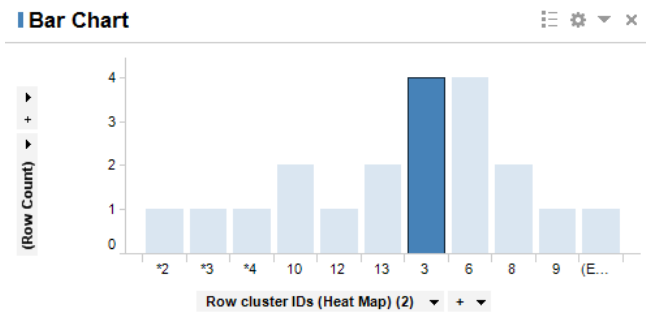


IVHB\_pivot

AA-Group	AA	1	3	4	5	6	9	10	11	12	13	14	15	16	17	18	19	20
Hydrophobic	C	1																
	I																	
	V																	
Polar	N																	
	Q																	
Positively charged	K																	
	R																	
Small nonpolar	G																	
	A																	
	S																	

Hydrophobic	L
Hydrophobic	F
Hydrophobic	Y
Hydrophobic	M
Hydrophobic	W
Hydrophobic	C
Hydrophobic	P
Negatively charged	D
Negatively charged	E
Polar	N
Polar	Q
Polar	H
Positively charged	K
Positively charged	R
Small nonpolar	G
Small nonpolar	A
Small nonpolar	S
Small nonpolar	T

# use.case\_NGS



Update Dendrogram

Update Tree

- a. Eventually Type in
- b. Add data interpretation

Manual workflow: 2-3FTE's, ~2 weeks  
 Automated workflow: 1 FTE, <1hr  
**Additional capabilities**

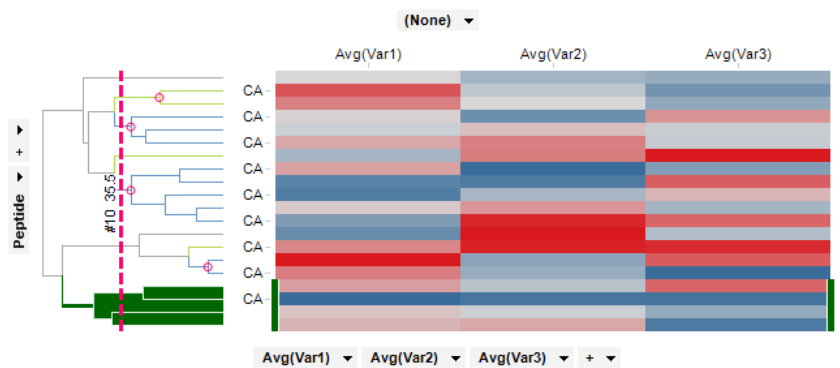
Lead Discovery, Discovery IT,  
 Bioinformatics, Genomics.

**dummy\_data**

Pe...	Var1	Var2	Var3	Row cluster IDs (Heat	Row cluster IDs (Heat Map) (2)
CA...	1.63	7.92	2.36	1	*2
CA...	0.36	-14.75	6.12	1	*4
CA...	0.84	-29.07	2.73	1	10
CA...	2.23	-6.31	7.39	1	6
CA...	0.44	34.35	3.43	1	8
CA...	-0.34	41.04	8.89	1	12
CA...	-0.79	64.97	7.13	1	8
CA...	0.32	0.60	3.13	1	
CA...	1.12	66.37	8.48	1	6
CA...	0.12	22.80	4.25	1	13
CA...	0.51	11.69	3.06	1	3
CA...	0.89	6.20	7.14	1	3
CA...	0.78	40.20	4.18	1	13
CA...	-1.24	-23.24	7.30	1	10
CA...	-1.64	-25.50	1.33	1	3
CA	-1.08	69.15	3.74	1	6

**Heat Map 2**

Clustered using sequence similarity





# overall\_success

Q1 2015- Q3 2016

completed **60+** Spotfire Projects

Spotfire Community of Practice : 100's of members

Spotfire active usage and demand growing

Lunch n' Learn: 25+% site  
attendance

**'Hackathons'**

# THANK YOU

## RWC SCIENTISTS

Alan Korman  
Arvind Rajpal  
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Rajkumar  
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Fei Cao  
Jenny Tung  
Pallavi Tawde  
Rena Bahjat  
Vibha Chauhan  
**MANY MORE!....**

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Mary Brawner  
Sovanda Som  
John Charles  
Stephen Skwish  
Jay Gill  
Alice Goshorn  
**MANY MORE!...**

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Sharon Cloud  
Shawn Smith  
Luke Turkcheck  
Martin Wright  
Ginger Rakestraw  
**MANY MORE!...**

