



# The S-Network BioPharma M&A Index

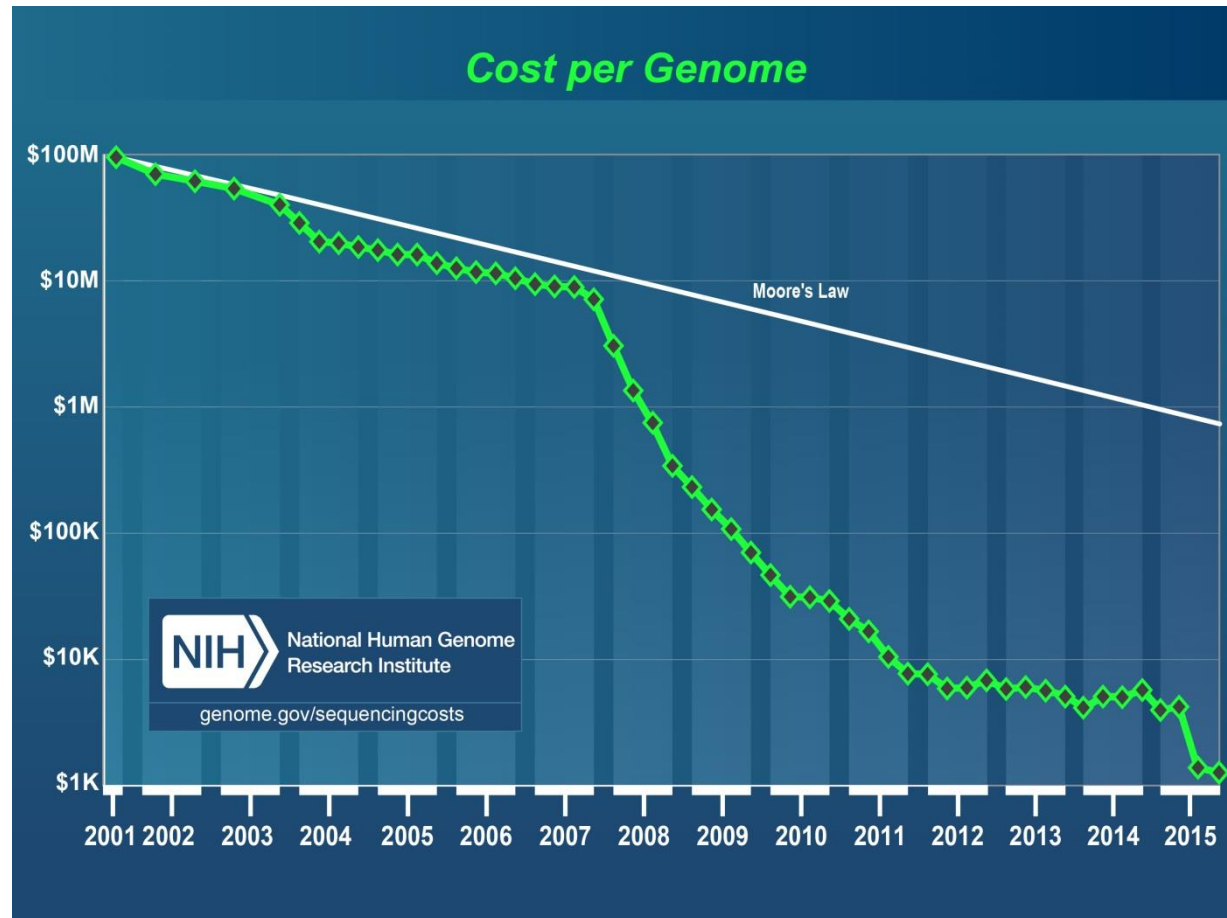
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**Q4 2019**



## Scientific Innovations Driving Opportunities:

- ❑ Increasing Understanding of Disease Mechanism
- ❑ Genomics Enabling Precision Medicine
- ❑ Better Therapeutics Increasing Investor Opportunity



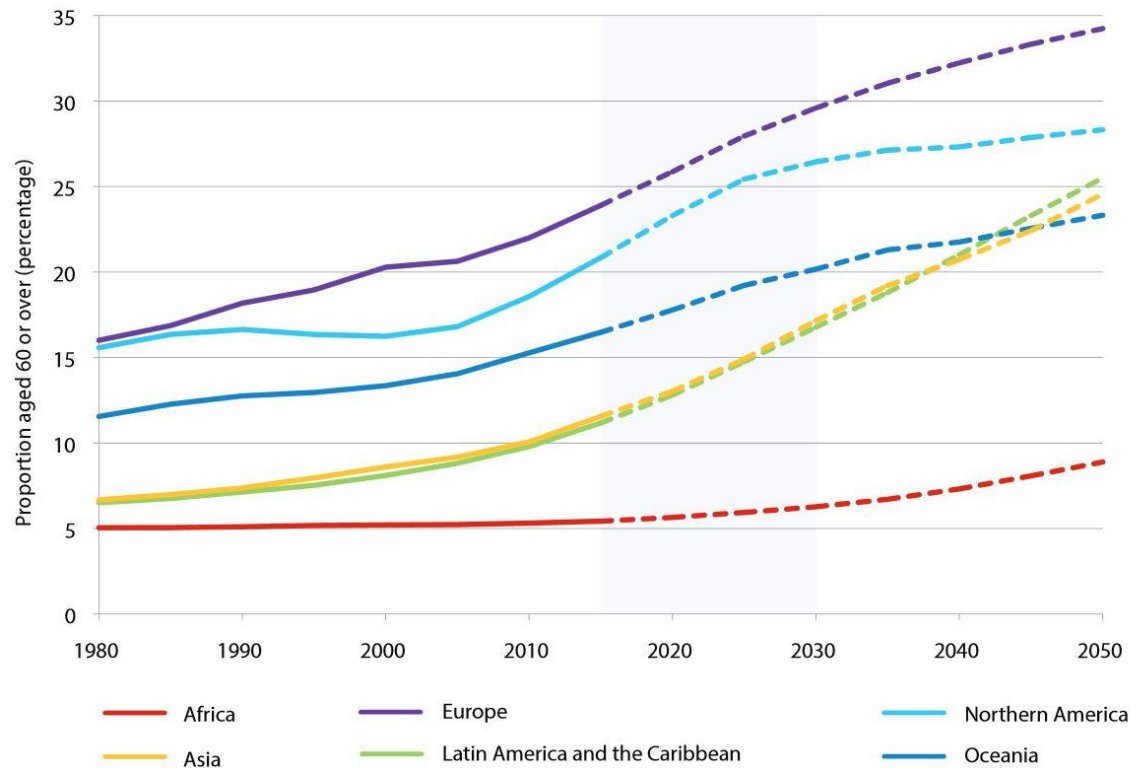
# Index Rationale

- ❑ **Mergers and Acquisitions in Biotechnology and Pharmaceutical (“Biopharma”) Industry Driven By Constant Expiration of Patent Exclusivity on Marketed Drugs and Lack of Productivity in Internal Development Programs**
- ❑ **The Loss of Pharmaceutical Patent Exclusivity for 2018 was \$33 billion and Estimated to Approach \$55 Billion in 2015**
- ❑ **\$219.4 Billion Worldwide Biopharma M&A Transaction Volume (Including Completed and Announced Deals, Asset Deals, Acquisitions of Divisions)**
- ❑ **\$81.8 Billion Upfront Transaction Volume of Completed US and European Biopharma Company Trade Sales**
  - ❑ Up from \$48.5 Billion in 2013
  - ❑ \$87.7 Billion Overall Deal Value Including Contingent Payments
- ❑ **Additional \$78.8 Billion Value of Announced US & European Transactions**
  - ❑ Including \$66 Billion Acquisition of Allergan by Actavis and \$8.4 Billion Purchase of Cubist by Merck & Co.
- ❑ **Mid-Sized Pharma Companies Spent Substantially More on Acquisitions than Traditional Large Pharma Firms**

## Demographics Drive Demand for Healthcare:

- ❑ Aging Population (More Than 1.4 Billion Over 60 by 2030)
- ❑ Increase in Life Expectancy
- ❑ Increase in Rate of Chronic Illness Globally
- ❑ Half of All Lifetime Care Expenditures are from 65 On

Percentage aged 60 years or over by region, 1980-2050



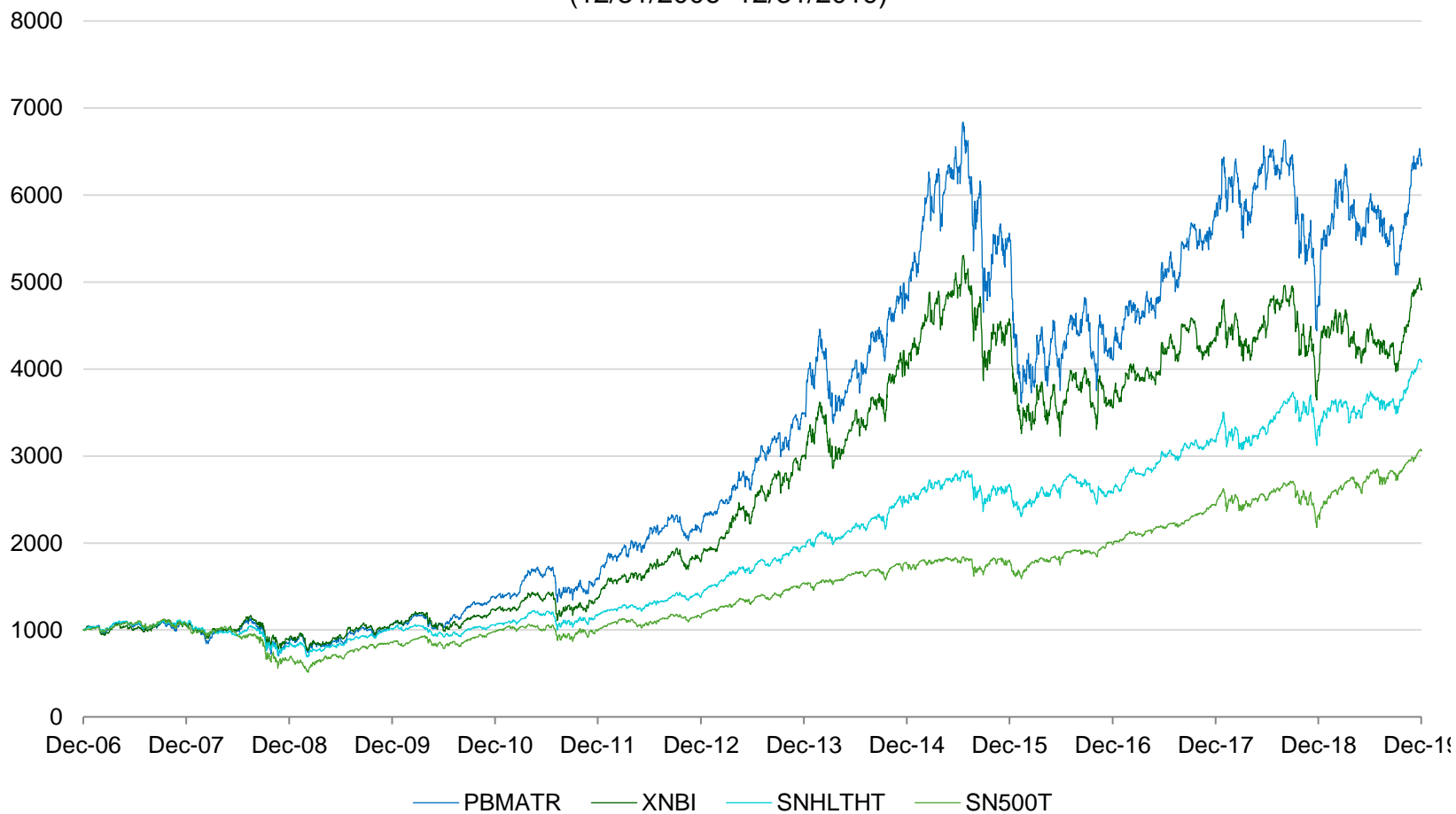
Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Ageing 2015 - Highlights (ST/ESA/SER.A/368).

# Index Description

- ❑ **Equity Index Designed to Isolate US Biotechnology Companies That Are Potential Takeover Targets**
- ❑ **Comprised of Three Main Business Segments**
  - ❑ Biotechnology
  - ❑ Pharmaceuticals
  - ❑ Life Sciences Tools & Services
- ❑ **Inclusion Criteria**
  - ❑ Constituents Must Be Principally Engaged in the Biotechnology Industry
  - ❑ Listed on Recognized Exchange
  - ❑ Minimum Capitalization USD 1 Billion
  - ❑ Maximum Capitalization USD 15 Billion
  - ❑ Minimum Average Daily Trading Volume Greater Than 1 Million USD
  - ❑ Existing Constituents Remain in Index Until Market Capitalization Exceeds USD 50 Billion
- ❑ **Weighting Methodology**
  - ❑ Modified Capitalization Weighted
  - ❑ Maximum weight 3.00%
  - ❑ Minimum weight 0.5%

**The S-Network BioPharma M&A Index Embraces Companies That Mainly Participate in the Biotechnology Industry in the US.**

## Poliwogg Biopharma Merger & Acquisition TR Index vs. Benchmarks\* (12/31/2006–12/31/2019)



\*To ensure fair comparisons, all of the starting index values are normalized to 1,000 as of December 31, 2006.

Source: Bloomberg, as of 12/31/2019

# Calendar Year Appreciation

Year	PBMATR	XNBI	SNHLTHT	SN500T
12/31/2007	6.37%	4.64%	7.54%	6.86%
12/31/2008	-17.79%	-12.56%	-22.49%	-36.87%
12/31/2009	21.31%	15.84%	20.59%	26.24%
12/31/2010	28.48%	15.25%	4.64%	15.01%
12/30/2011	16.93%	12.08%	11.34%	1.69%
12/31/2012	35.17%	32.29%	18.81%	16.13%
12/31/2013	62.29%	65.97%	41.39%	33.47%
12/31/2014	37.67%	34.40%	25.42%	13.43%
12/31/2015	13.92%	11.77%	7.09%	1.45%
12/31/2016	-25.14%	-21.35%	-2.66%	11.65%
12/31/2017	40.06%	21.63%	22.91%	22.56%
12/31/2018	-15.84%	-8.86%	6.00%	-4.33%
12/31/2019	31.60%	25.11%	22.10%	31.88%

Source: Bloomberg, as of 12/31/2019





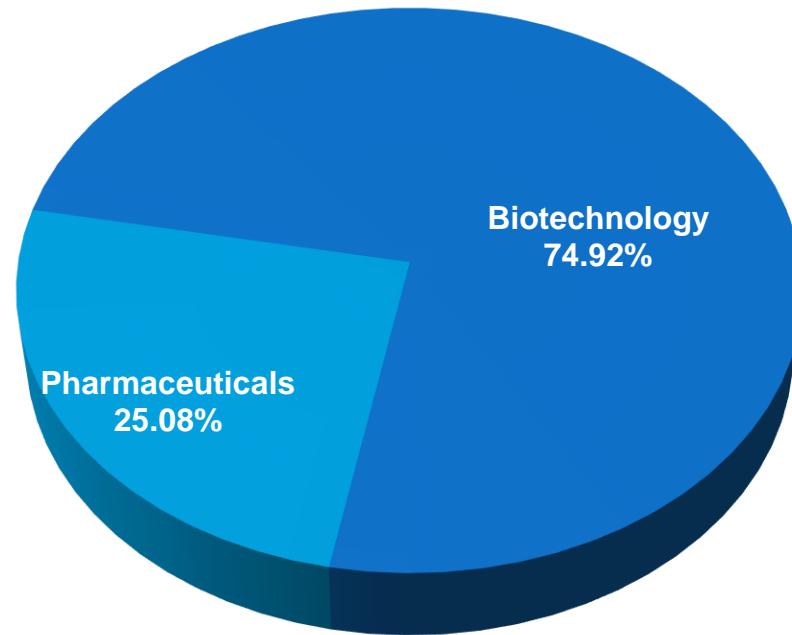
# Market Capitalization Profile

Market Capitalization Profile	
<b>Number of Constituents</b>	102
<b>Total Market Capitalization</b>	430.61 Billion USD
<b>Largest Market Capitalization</b>	23.93 Billion USD
<b>Smallest Market Capitalization</b>	274.83 Million USD
<b>Average Market Capitalization</b>	4.22 Billion USD
<b>Median Market Capitalization</b>	2.55 Billion USD

Source: Bloomberg, as of 12/31/2019



## The Poliwogg BioPharma M&A Index: Sector Distribution



Source: Bloomberg, as of 12/31/2019



# Historical Acquisitions

Year	Total Acquisitions
2007	3
2008	6
2009	1
2010	3
2011	3
2012	6
2013	3
2014	5
2015	9
2016	4
2017	1
2018	6
2019	5
<b>Total</b>	<b>55</b>

Source: Bloomberg, as of 12/31/2019

# Top Ten Constituents

Company	Ticker	Country	Weight
Exact Sciences Corp	EXAS US	United States	3.18%
Biomarin Pharmaceutical Inc	BMRN US	United States	3.16%
Seattle Genetics Inc	SGEN US	United States	3.01%
Alexion Pharmaceuticals Inc	ALXN US	United States	2.94%
Alnylam Pharmaceuticals Inc	ALNY US	United States	2.93%
Incyte Corp	INCY US	United States	2.86%
Elanco Animal Health, Inc.	ELAN US	United States	2.53%
Teva Pharmaceutical-Sp Adr	TEVA US	Israel	2.44%
Mylan NV	MYL US	United States	2.38%
Beigene Ltd-Adr	BGNE US	China	2.33%

Source: Bloomberg, as of 12/31/2019



# Statistical Profile I

## Total Return Appreciation

	PBMATR	XNBI	DZOTR	SNHLTHT	SN500T
5 Year	32.28%	21.91%	14.07%	65.80%	75.14%
3 Year	55.12%	38.69%	46.05%	59.07%	54.64%
1 Year	31.60%	25.11%	19.02%	22.10%	31.88%

## Compound Annual Growth Rate

	PBMATR	XNBI	DZOTR	SNHLTHT	SN500T
5 Year	5.75%	4.04%	2.67%	10.64%	11.86%
3 Year	15.76%	11.52%	13.46%	16.73%	15.64%
1 Year	31.60%	25.11%	19.02%	22.10%	31.88%

Source: Bloomberg, as of 12/31/2019



# Statistical Profile II

## Annualized Monthly Standard Deviation

	PBMATR	XNBI	DZOTR	SNHLTHT	SN500T
5 Year	27.84%	23.41%	24.65%	13.72%	12.15%
3 Year	23.43%	20.90%	21.40%	13.26%	12.31%
1 Year	27.58%	23.37%	23.19%	11.95%	13.19%

## Sharpe Ratio

	PBMATR	XNBI	DZOTR	SNHLTHT	SN500T
5 Year	0.3060	0.2421	0.1894	0.7291	0.8974
3 Year	0.6706	0.5457	0.6191	1.1122	1.1115
1 Year	1.0520	0.9802	0.7694	1.5608	2.0220

Source: Bloomberg, as of 12/31/2019



# Statistical Profile III

## Information Ratio vs. SN500T Index

	PBMATR	XNBI	DZOTR	SNHLTHT
5 Year	-0.1120	-0.3059	-0.3405	-0.1087
3 Year	0.1275	-0.1632	-0.0293	0.1354
1 Year	0.1139	-0.2238	-0.5566	-0.7947

## Jensen's Alpha vs. SN500T Index

	PBMATR	XNBI	DZOTR	SNHLTHT
5 Year	-0.74%	-0.77%	-0.90%	0.01%
3 Year	-0.37%	-0.53%	-0.37%	0.23%
1 Year	-0.86%	-0.88%	-1.45%	0.18%

Source: Bloomberg, as of 12/31/2019





# Statistical Profile IV

## Treynor Ratio vs. SN500T Index

	PBMATR	XNBI	DZOTR	SNHLTHT
5 Year	0.0154	0.0120	0.0095	0.0319
3 Year	0.0308	0.0254	0.0296	0.0486
1 Year	0.0569	0.0527	0.0390	0.0871

## Downside Risk vs. SN500T Index

	PBMATR	XNBI	DZOTR	SNHLTHT
5 Year	22.60%	19.49%	21.56%	8.41%
3 Year	14.29%	15.14%	15.82%	8.01%
1 Year	17.54%	15.50%	16.82%	11.06%

Source: Bloomberg, as of 12/31/2019



# Statistical Profile V

## Sortino Ratio vs. SN500T Index

	PBMATR	XNBI	DZOTR	SNHLTHT
5 Year	-0.0304	-0.0775	-0.0835	-0.0309
3 Year	0.0410	-0.0434	-0.0079	0.0384
1 Year	0.0385	-0.0702	-0.1516	-0.2093

## Correlation Matrix (5 Year / Monthly)

	PBMATR	XNBI	DZOTR	SNHLTHT	SN500T
PBMATR	1.0000	0.9673	0.9567	0.8441	0.6952
XNBI	0.9673	1.0000	0.9731	0.8951	0.7079
DZOTR	0.9567	0.9731	1.0000	0.8645	0.7009
SNHLTHT	0.8441	0.8951	0.8645	1.0000	0.8018
SN500T	0.6952	0.7079	0.7009	0.8018	1.0000

Source: Bloomberg, as of 12/31/2019



# Statistical Profile VI

**Beta Matrix (5 Year / Monthly)**

	<b>PBMATR</b>	<b>XNBI</b>	<b>DZOTR</b>	<b>SNHLTHT</b>	<b>SN500T</b>
<b>PBMATR</b>	1.0000	0.8133	0.8470	0.4160	0.3033
<b>XNBI</b>	1.1505	1.0000	1.0246	0.5246	0.3674
<b>DZOTR</b>	1.0807	0.9242	1.0000	0.4812	0.3455
<b>SNHLTHT</b>	1.7131	1.5273	1.5532	1.0000	0.7100
<b>SN500T</b>	1.5934	1.3642	1.4221	0.9055	1.0000

**R-Squared Matrix (5 Year / Monthly)**

	<b>PBMATR</b>	<b>XNBI</b>	<b>DZOTR</b>	<b>SNHLTHT</b>	<b>SN500T</b>
<b>PBMATR</b>	1.0000	0.9357	0.9153	0.7126	0.4833
<b>XNBI</b>	0.9357	1.0000	0.9469	0.8012	0.5012
<b>DZOTR</b>	0.9153	0.9469	1.0000	0.7474	0.4913
<b>SNHLTHT</b>	0.7126	0.8012	0.7474	1.0000	0.6429
<b>SN500T</b>	0.4833	0.5012	0.4913	0.6429	1.0000

Source: Bloomberg as of 12/31/2019



# Index Methodology

## ❑ Eligibility Criteria

- Market Capitalization > \$1 Billion and < \$15 Billion
- ADTV > \$1 Million
- Must Be Principally Engaged in Biotechnology/Pharmaceutical Industry
- Fundamental Screens
  - Must Have At Least One Drug in Phase II or Phase III FDA Clinical Trials
    - -- or --
  - Must Have YOY Net Sales Growth
- Companies Remain in Index Until Market Capitalization Exceeds \$50 Billion

## ❑ Weighting Methodology

- Weighting Based on Full Market Cap
- Weights Capped at 3%
- Weights Floored at 0.5%

Complete data availability and index transparency facilitate more effective benchmarking and investment analytics.

# Index Details & Data Distribution

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- ❑ **Index Values Distributed in EOD in USD and EUR**
- ❑ **Total Return Index Calculated Daily in USD and EUR**
- ❑ **Index Values Distributed via Consolidated Tape**
  
- ❑ **Comprehensive Historic Data (including simulated back-tests from 12/29/2006)**
  - Daily Prices for Price-Only + TR Indexes in USD + EURO
  - Quarterly Portfolio Snapshots (Historic Constituents and Weights)
- ❑ **Extensive Analytic support**
  - Quarterly Reports (“Index Insights”)
  - Industry Overviews
  - Extensive Statistical Data
- ❑ **Comprehensive website**
- ❑ **Broad data distribution via third party vendors**
  - S&P/Bloomberg/Yahoo, etc.
  - S-Network contribution page on Bloomberg: SNET