

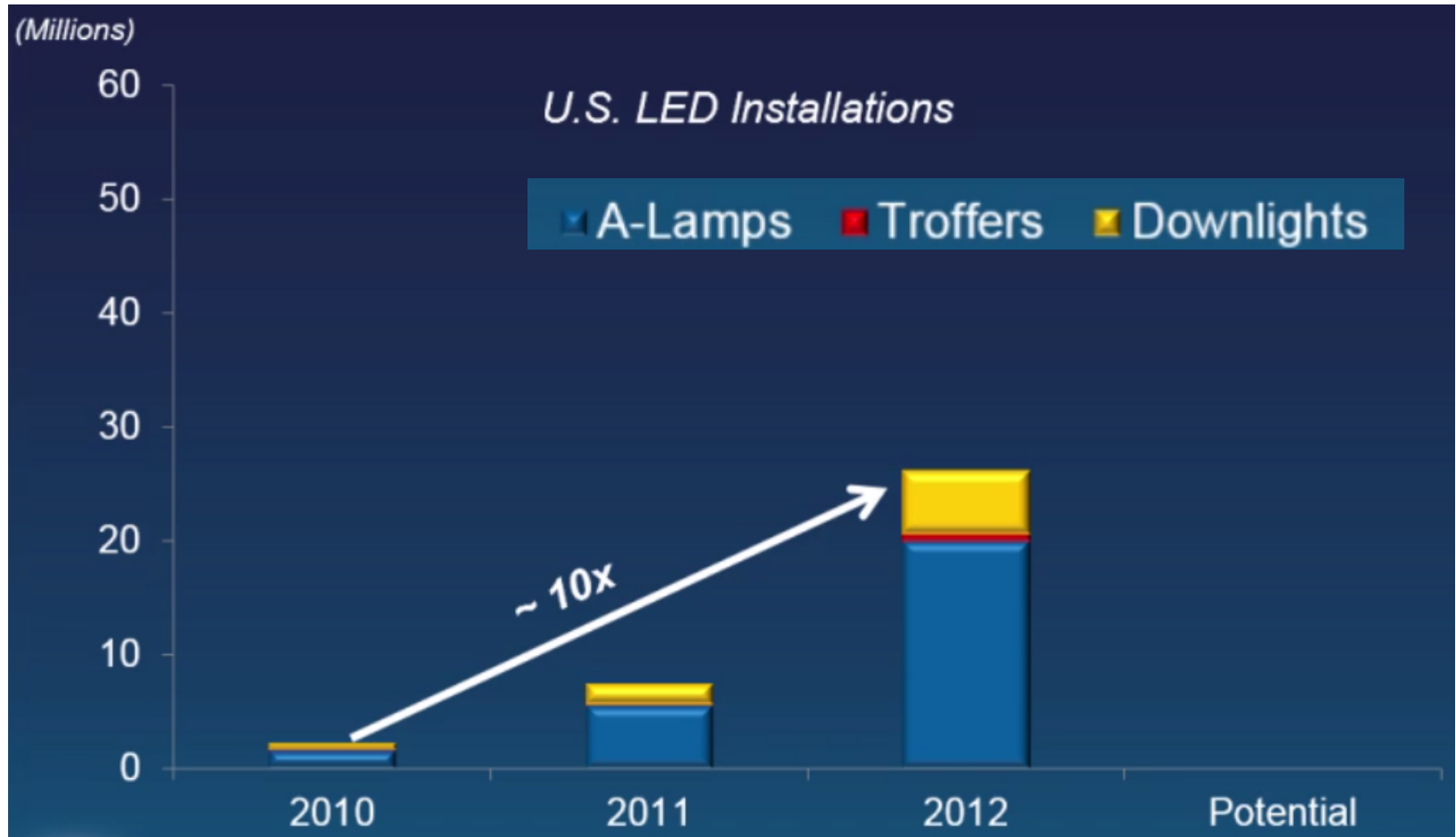


LED Lighting – Value and Opportunities

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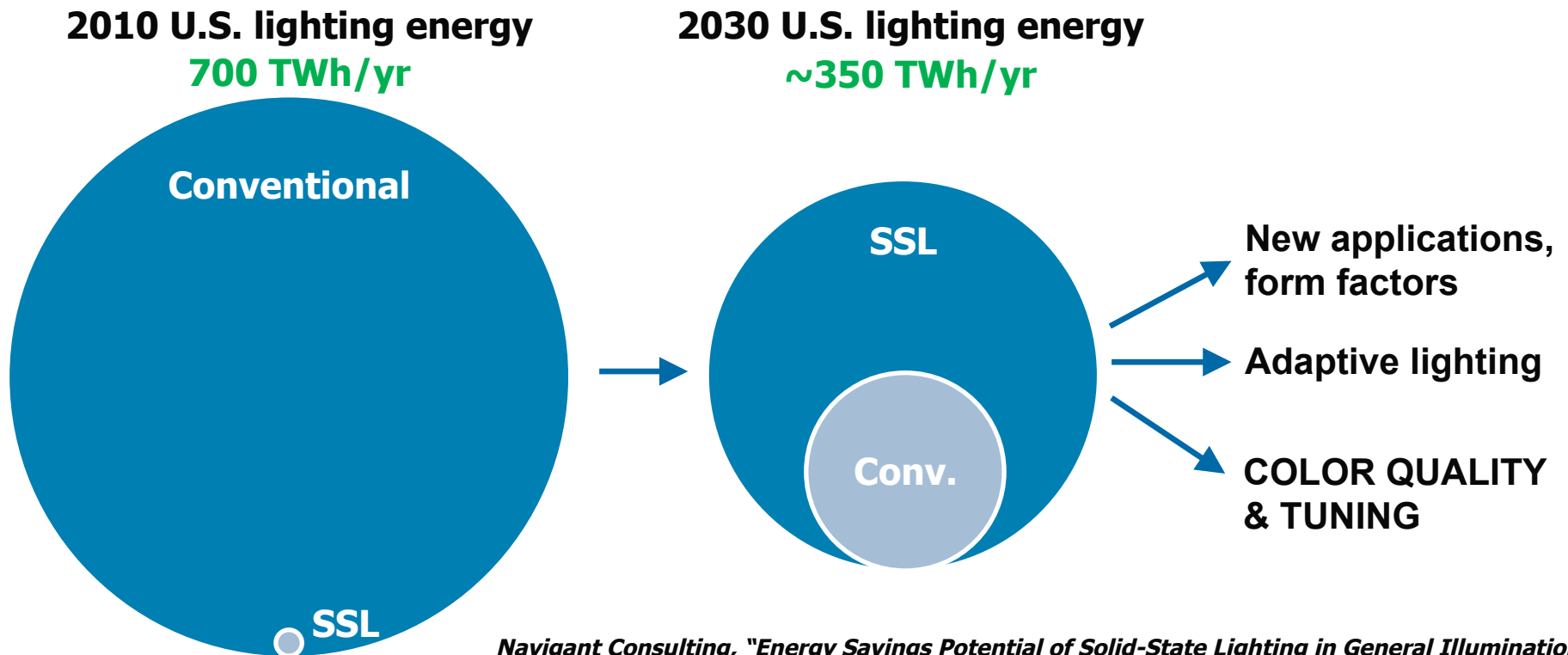
SSL Market Growth – It's Happening!

- By now, superior LED efficiency in any application, 10+ year reliability, and high light quality are a given



SSL – Lighting that goes “beyond”

- Driving SSL adoption – what’s needed?
 - Value – features not possible/feasible with conv. sources
 - Purchase Cost – parity w/ conventional, or lower!
 - Education – informed consumers who recognize benefits








































Navigant Consulting, "Energy Savings Potential of Solid-State Lighting in General Illumination Applications", Jan. 2012.

LEDs in Various Applications

- SSL: requirements vary widely by application

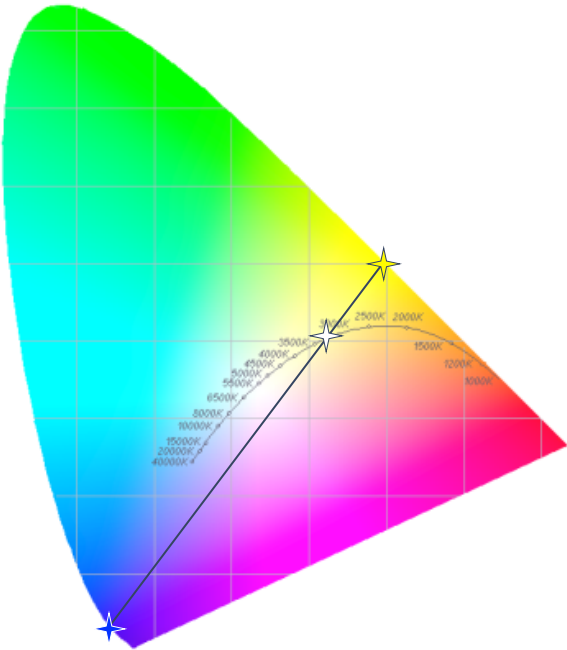
		OUTPUT & CONTROL		QUALITY OF LIGHT		RELIABILITY	
		Flux and Efficacy	Optical Control	Color Quality (CRI)	Color Consistency	Color Stability	Lumen Maintenance
Value 							
INDOOR	Omnidirectional, A-bulb						
	Accent, Track, PAR, MR bulb						
	Ceiling-mounted, Recessed						
	Linear, Commercial, Retail						
	Industrial, High Bay						
OUTDOOR	Roadway, Parking, Bollard						
	Landscape						
PORTABLE	Consumer						
	High-end, High-output						

An LED “flavor” for every application

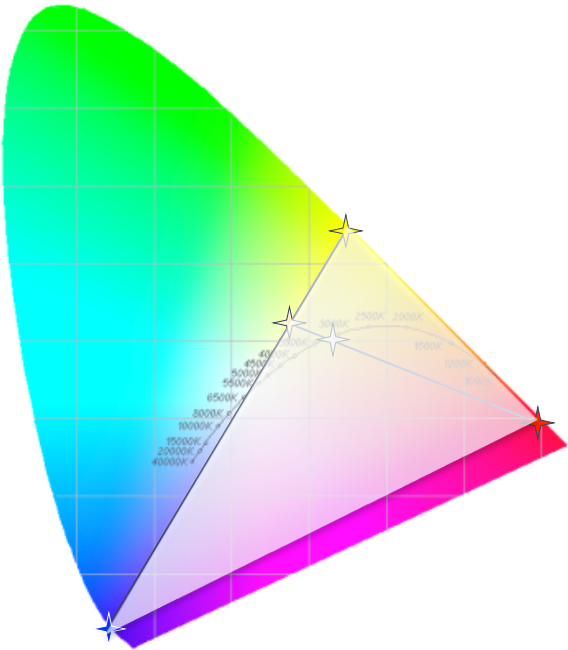
	DISCRETES	ARRAYS	INTEGRATED ARRAYS	MODULES
Non-Directional A, BR, E Bulbs, Sconces	    XQ-B XQ-D XQ-E <div> XB-E XB-G XM-L </div> High Voltage	 XM-L EasyWhite	 CXA Family	 LMH2 Dome
Directional MR & PAR, Spot, Track	    XQ-E XB-D XT-E XP-E2 XP-G2	    XM-L MT-G EasyWhite MK-R MK-R2	  CXA HD CXA Family	  LMH2 Flat & Dome
Downlight Ceiling Mount, Pendant	   XQ-E XB-D XT-E		 CXA Family	   LMR2 LMH2 Flat & Dome
Linear Cove, FL Retrofit, Panel	  XQ-B XH-B XH-G			
Outdoor & High Bay Roadway, Industrial	    XB-D XT-E XP-G2 XM-L2		 CXA Family	
Portable Consumer, High End	    ML-E XQ-E XP-E2 XP-G2 XM-L2			

Opportunities for Color & Gamut

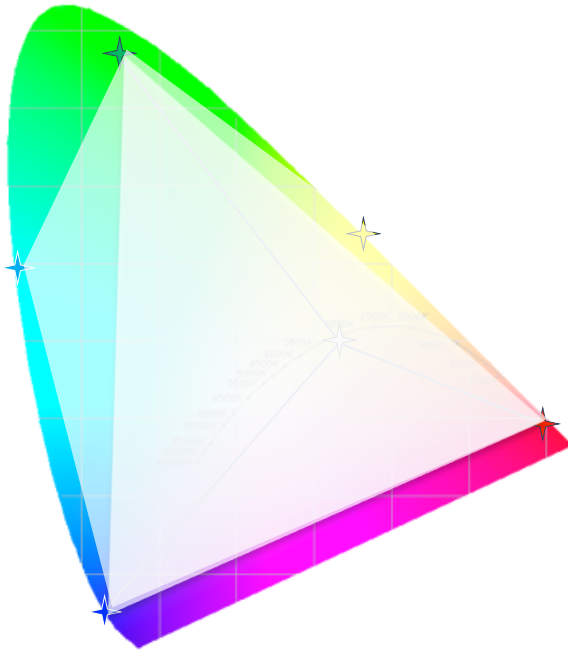
$B_{chip} / Y, R_{phos}$



$B_{chip} / Y_{phos} + R_{chip}$



All chip: B + G + R + X



CRI	CRI	CRI
Efficacy	Efficacy	Efficacy
Tunability - Consistency	Tunability - Consistency	Tunability - Consistency
System Cost	System Cost	System Cost

Summary

- **SSL adoption is underway and will continue to be a technology driven race**
 - *How best to accelerate it?*
- **SSL has several added features not feasible/practical with conventional sources – exploit this!**
- **Flexibility: tailor LEDs and systems to applications**
- **Master the often competing demands of features, application requirements, and cost**

Q & A



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