L-Prize Opportunities Using D4i and Zhaga Book 20

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Webinar: September 15, 2022

Welcome to the L-Prize Webinar

- Presented by:

Pacific Northwest NATIONAL LABORATORY

DALI® Alliance

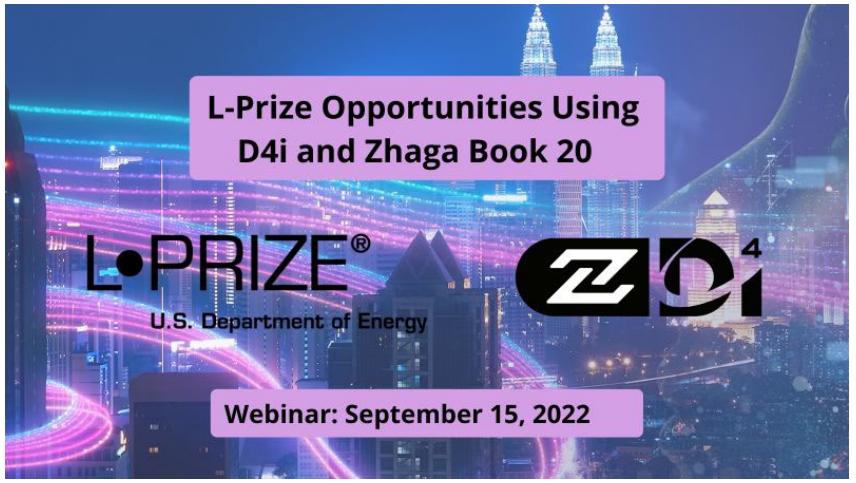
ZHAGA Consortium

- Presentations will last for 40-45 minutes

- Followed by a Q&A session

→ Please type questions into the "**Q&A**" box at any time

- Presentation materials and a webinar recording will be available **after the event**:
  - www.dali-alliance.org/events/prototype-phase-webinar.html



Agenda

- Welcome & introduction

Gabe Arnold
Senior Lighting Engineer, **PNNL**
Principal investigator on the advanced lighting team supporting the U.S. Department of Energy's Lighting R&D and Commercial Buildings Integration programs, focusing on development and deployment of emerging lighting and building technologies. His current work focuses on germicidal ultraviolet lighting technologies, improving environmental sustainability, and DOE's L-Prize competition.

Scott Wade
Technical & Certification Manager, **DALI Alliance**

Adrian Green
Engineering Director, **Amphenol** Commercial Industrial
Working Group Chair for **Zhaga** Book 20

- Q&A session

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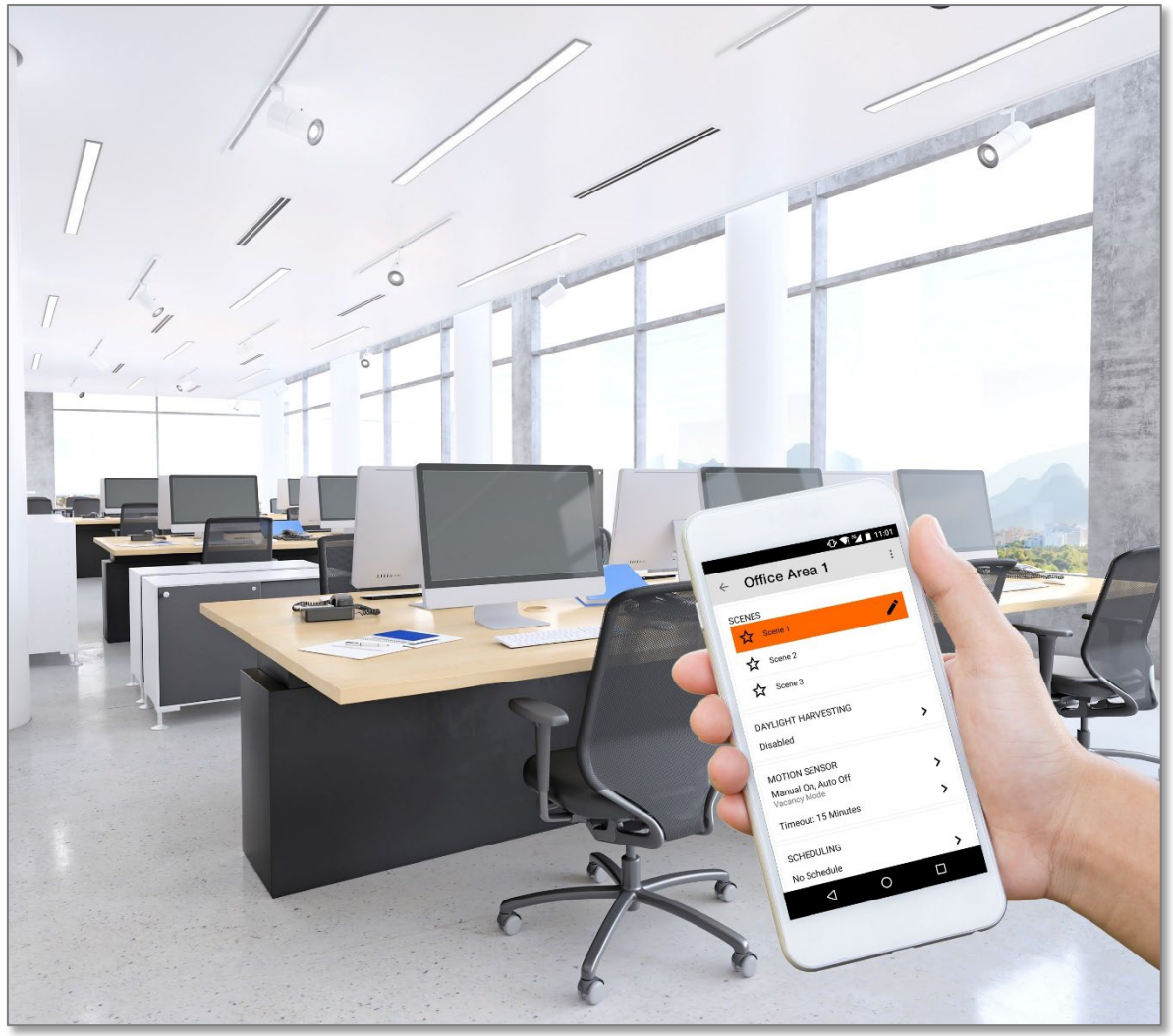
L-Prize Opportunities using D4i+NEMA/ANSI C137.4, and Zhaga Book 20+NEMA LS 20000-2021

September 15, 2022

L-Prize Opportunity



The L-Prize targets linear lighting in commercial buildings where large energy savings potential remains and where lighting system connectivity and data can drive new value and building system optimization.

PHASE 1: CONCEPT

UP TO 10 WINNERS
(**$20,000** EACH)

PHASE 2: PROTOTYPE

UP TO 6 WINNERS (**$2,000,000** PRIZE POOL)

TEAMING OPPORTUNITIES

FORM PARTNERSHIPS FOR PHASE 3

PHASE 3: MANUFACTURING & INSTALLATION

UP TO 4 WINNERS (**$10,000,000** PRIZE POOL)

9 MONTHS
COMPLETED

13 MONTHS
OPEN NOW

22 MONTHS

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LPrize@nrel.gov
americanmadechallenges.org/lprize

L-Prize Phase Descriptions

Concept Phase (Complete)

Participants:

Small players, nontraditional, students, individuals, etc. who receive feedback on their proposals from panel of experts

Criteria:

Quality of submission, innovation, and expected technical performance

Prizes:

$20k per winner, 4 winners awarded

Innovative concept proposals on paper that document lighting systems of the future

Prototype Phase

Participants:

Researchers, start-ups, small and large manufacturers

Criteria:

Technical performance, sustainability, approaches to address adoption hurdles, DEI

Prizes:

$2M prize pool, up to 6 winners

Real physical prototype systems, emphasizing technological innovation and challenging entrants to think outside standard forms, materials, and price points of commercially available products

M&I Phase

Participants:

Teams, small and large manufacturers

Criteria:

Technical performance, sustainability, approaches to address adoption hurdles, DEI, U.S. content and manufacturing, innovative deployment models

Prizes:

$10M prize pool, up to 4 winners

Demonstrate real-world viability with commercially available products and installations

- Efficacy
- Quality of Light
- Connectivity
- Product Life Cycle
- Technical Innovation
- Diversity, Equity, and Inclusion

- Competitors may participate in any phase of their choosing. New competitors are welcomed for each phase. There is no requirement for competitors to participate in all phases.

Prototype Phase – What's New?

1. Separate tracks for luminaires and connected systems
2. More possible winners: up to 6
3. Expanded innovation opportunities for technical innovation and DEI

Luminaire Track

Efficacy	Quality of Light	Connectivity	Product Life Cycle	Technical Innovation	Diversity, Equity, and Inclusion
✓+❑ Luminaire efficacy	✓ Chromaticity ✓ Dimming range ✓ Glare control ✓ Light output ✓ Spectral power data ✓+❑ Color rendition ✓+❑ Flicker ❑ White-tunable	✓ Standards-based digital driver ✓ Standards-based sensor port and connector	✓ Driver lifetime ✓ Chromaticity maintenance ✓+❑ Lumen maintenance ✓+❑ Circular design ❑ Materials and sustainability innovation	❑ Application efficiency ❑ Form factor and aesthetics ❑ Value proposition and cost	❑ DEI plans and protocols ❑ DEI gaps and opportunities ❑ DEI deployment and application

Connected Systems Track

Connectivity	Product Life Cycle	Technical Innovation	Diversity, Equity, and Inclusion
✓ Standards-based luminaire or system controller ✓ Interoperability ✓ Addressability ✓ Energy reporting ✓ Lighting control strategies ✓ Standards-based luminaire-level lighting control ✓+❑ System resilience ✓+❑ Fault detection and diagnostics ✓+❑ Grid services capable	❑ Life cycle and sustainability innovation	❑ Ease of installation and use ❑ Compatibility and interoperability ❑ Value proposition and cost	❑ DEI plans and protocols ❑ DEI gaps and opportunities ❑ DEI deployment and application

Visit https://www.herox.com/LPrize/resources for Aug. 17 webinar recording detailing all categories

Key
✓ = Mandatory
✓+❑ = Mandatory + Points Available
❑ = Points Only

Luminaire Track

Efficacy

- ✓+❑ Luminaire efficacy

Quality of Light

- ✓ Chromaticity
- ✓ Dimming range
- ✓ Glare control
- ✓ Light output
- ✓ Spectral power data
- ✓+❑ Color rendition
- ✓+❑ Flicker
- ❑ White-tunable

Connectivity

- ✓ Standards-based digital driver
- ✓ Standards-based sensor port and connector

Product Life Cycle

- ✓ Driver lifetime
- ✓ Chromaticity maintenance
- ✓+❑ Lumen maintenance
- ✓+❑ Circular design
- ❑ Materials and sustainability innovation

Technical Innovation

- ❑ Application efficiency
- ❑ Form factor and aesthetics
- ❑ Value proposition and cost

Diversity, Equity, and Inclusion

- ❑ DEI plans and protocols
- ❑ DEI gaps and opportunities
- ❑ DEI deployment and application

D4i / ANSI C137.4 compliant driver, sensor in luminaire; and compliant controller in connected system, ensure digital interoperability between any winning luminaire and any winning connected system

Connected Systems Track

Connectivity

- ✓ Standards-based luminaire or system controller
- ✓ Interoperability
- ✓ Addressability
- ✓ Energy reporting
- ✓ Lighting control strategies
- ✓ Standards-based luminaire-level lighting control
- ✓+❑ System resilience
- ✓+❑ Fault detection and diagnostics
- ✓+❑ Grid services capable

Product Life Cycle

- ❑ Life cycle and sustainability innovation

Technical Innovation

- ❑ Ease of installation and use
- ❑ Compatibility and interoperability
- ❑ Value proposition and cost

Diversity, Equity, and Inclusion

- ❑ DEI plans and protocols
- ❑ DEI gaps and opportunities
- ❑ DEI deployment and application

Key

✓ = Mandatory

✓+❑ = Mandatory + Points Available

❑ = Points Only

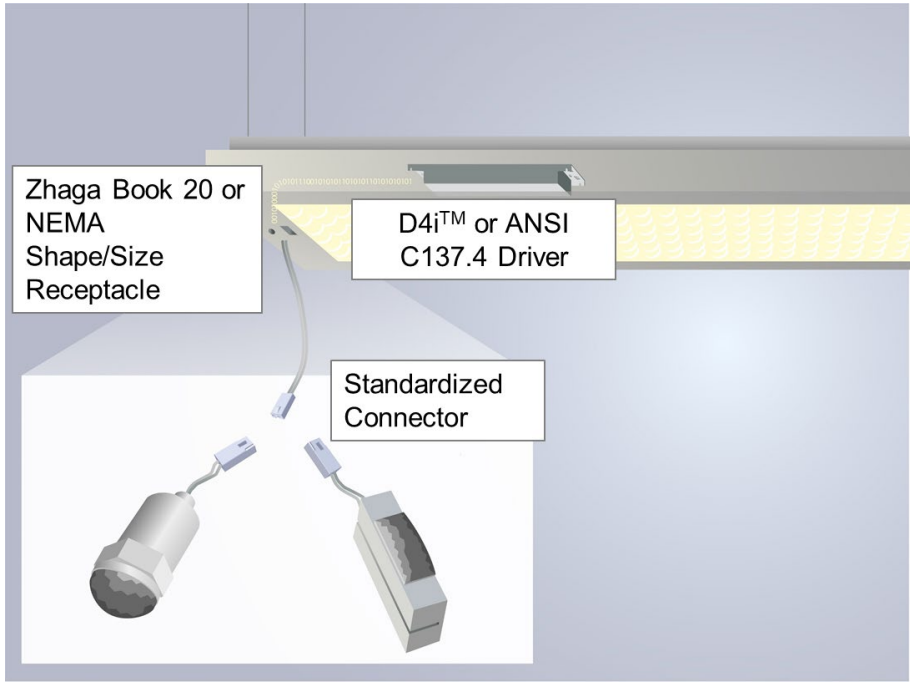
Luminaire Track – Connectivity

0 points possible; all minimum requirements

Connectivity

- ✓ Standards-based digital driver
- ✓ Standards-based sensor port and connector

- **D4i or ANSI C137.4-2021 compliant driver**
- **Zhaga Book 20 or NEMA LS 20000-2021 compliant shape/size sensor port**
  - NEMA sensor shapes RR1, RR2, CC1, CC3, ORC5, or EM1 only
- **Zhaga Book 20 connector from sensor port to D4i or ANSI C137.4 compliant driver**



Please see Appendices A+B of Official Rules for all Prototype Phase requirement details: www.herox.com/LPrize/resources

Key
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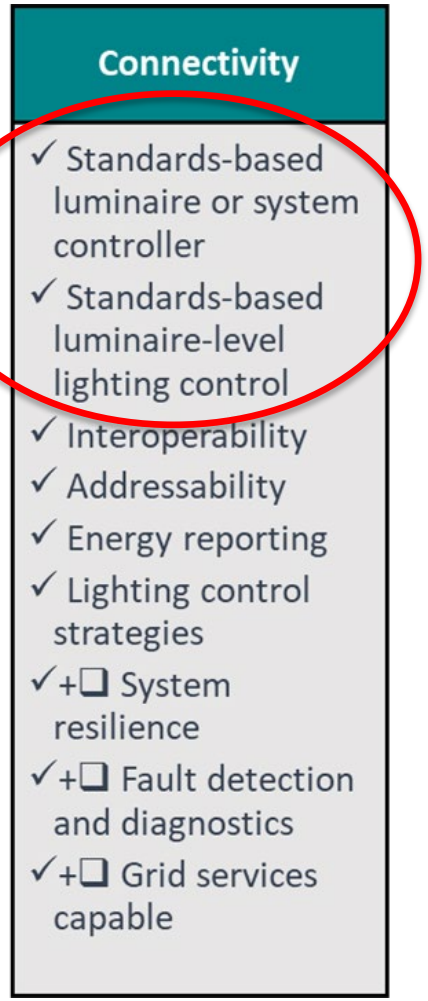
✓+❑ = Mandatory + Optional Points
❑ = Optional Points Only

Connected Systems Track – Connectivity

Up to 40 points possible



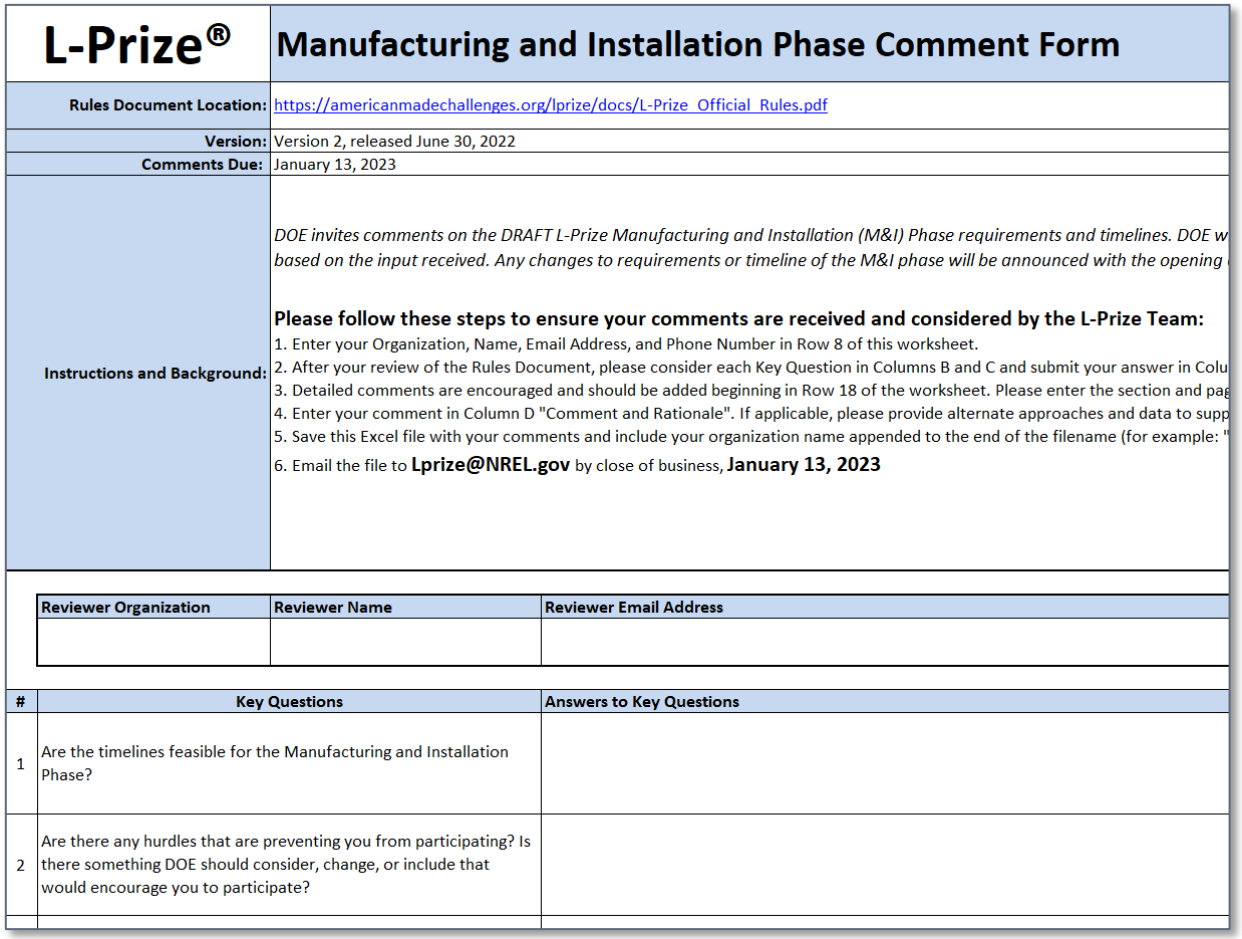
- **Connected system must be interoperable (able to communicate with and control) with a luminaire with D4i or ANSI C137.4 compliant drivers and/or sensors**
- **Connected system must provide a D4i or ANSI C137.4 and Zhaga Book 20 or NEMA LS-20000-2021 compliant LLLC sensor to be installed in luminaires**
  - NEMA sensor shapes RR1, RR2, CC1, CC3, ORC5, or EM1 only

Please see Appendices A+B of Official Rules for all Prototype Phase requirement details: www.herox.com/LPrize/resources

Key
✓ = Mandatory
✓+❑ = Mandatory + Optional Points
❑ = Optional Points Only

Comments on Phase 3 Rules — Due January 13, 2023

- DOE invites comments on the draft requirements and timeline for Manufacturing and Installation Phase
- Any revisions to requirements or timeline of Manufacturing and Installation Phase will be announced with the opening of that phase
- Download the Comment Form at www.herox.com/LPrize/resources



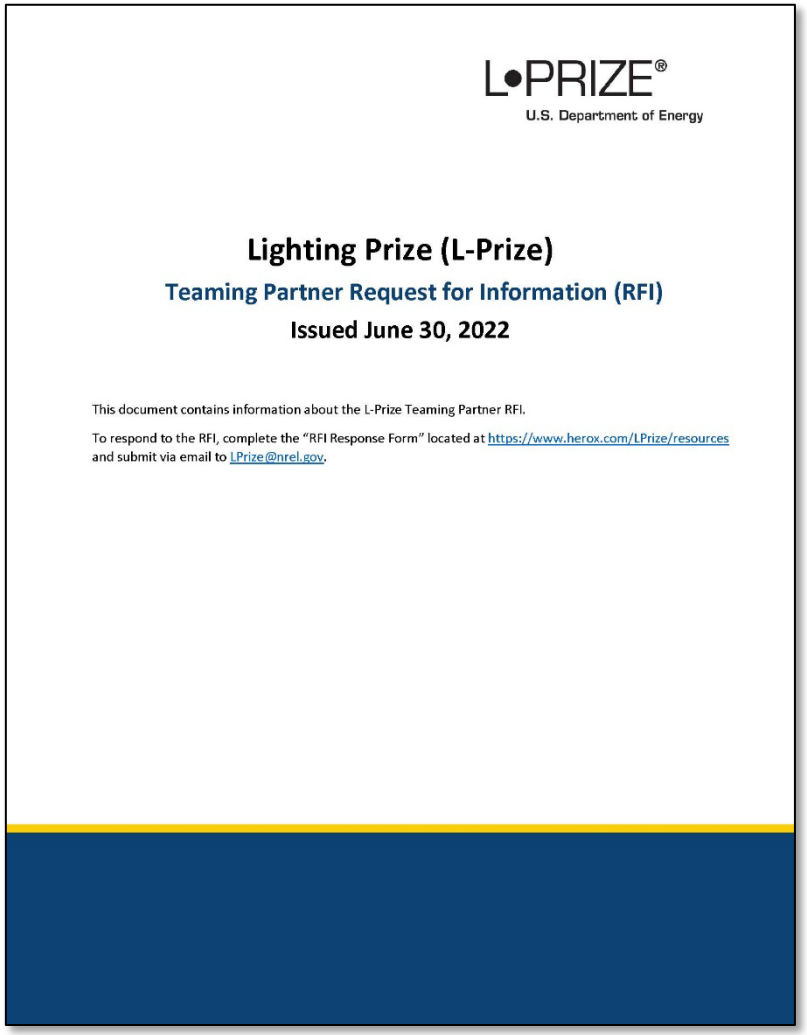
L-Prize®	Manufacturing and Installation Phase Comment Form
Rules Document Location:	https://americanmadechallenges.org/lprize/docs/L-Prize_Official_Rules.pdf
Version:	Version 2, released June 30, 2022
Comments Due:	January 13, 2023
Instructions and Background:	*DOE invites comments on the DRAFT L-Prize Manufacturing and Installation (M&I) Phase requirements and timelines. DOE w based on the input received. Any changes to requirements or timeline of the M&I phase will be announced with the opening* **Please follow these steps to ensure your comments are received and considered by the L-Prize Team:** 1. Enter your Organization, Name, Email Address, and Phone Number in Row 8 of this worksheet. 2. After your review of the Rules Document, please consider each Key Question in Columns B and C and submit your answer in Colu 3. Detailed comments are encouraged and should be added beginning in Row 18 of the worksheet. Please enter the section and pag 4. Enter your comment in Column D "Comment and Rationale". If applicable, please provide alternate approaches and data to supp 5. Save this Excel file with your comments and include your organization name appended to the end of the filename (for example: " 6. Email the file to **Lprize@NREL.gov** by close of business, **January 13, 2023**

Reviewer Organization	Reviewer Name	Reviewer Email Address

#	Key Questions	Answers to Key Questions
1	Are the timelines feasible for the Manufacturing and Installation Phase?	
2	Are there any hurdles that are preventing you from participating? Is there something DOE should consider, change, or include that would encourage you to participate?	

Teaming Opportunities

- **Prototype Phase:**
  - Find potential teaming partners on the HeroX Teams page
  - More information about Hero X teaming: https://www.herox.com/LPrize/forum
- **Manufacturing and Installation Phase:**
  - DOE issued RFI for manufacturing partners, materials or component suppliers, end-user installation host sites, utilities, energy service companies, and others interested in collaborating with or supporting an L-Prize team
  - View the M&I Phase Teaming RFI: https://americanmadechallenges.org/challenges/lprize/docs/L-Prize_Teaming_RFI.pdf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Lighting Prize (L-Prize)

Teaming Partner Request for Information (RFI)

Issued June 30, 2022

This document contains information about the L-Prize Teaming Partner RFI.

To respond to the RFI, complete the "RFI Response Form" located at https://www.herox.com/LPrize/resources and submit via email to LPrize@nrel.gov.

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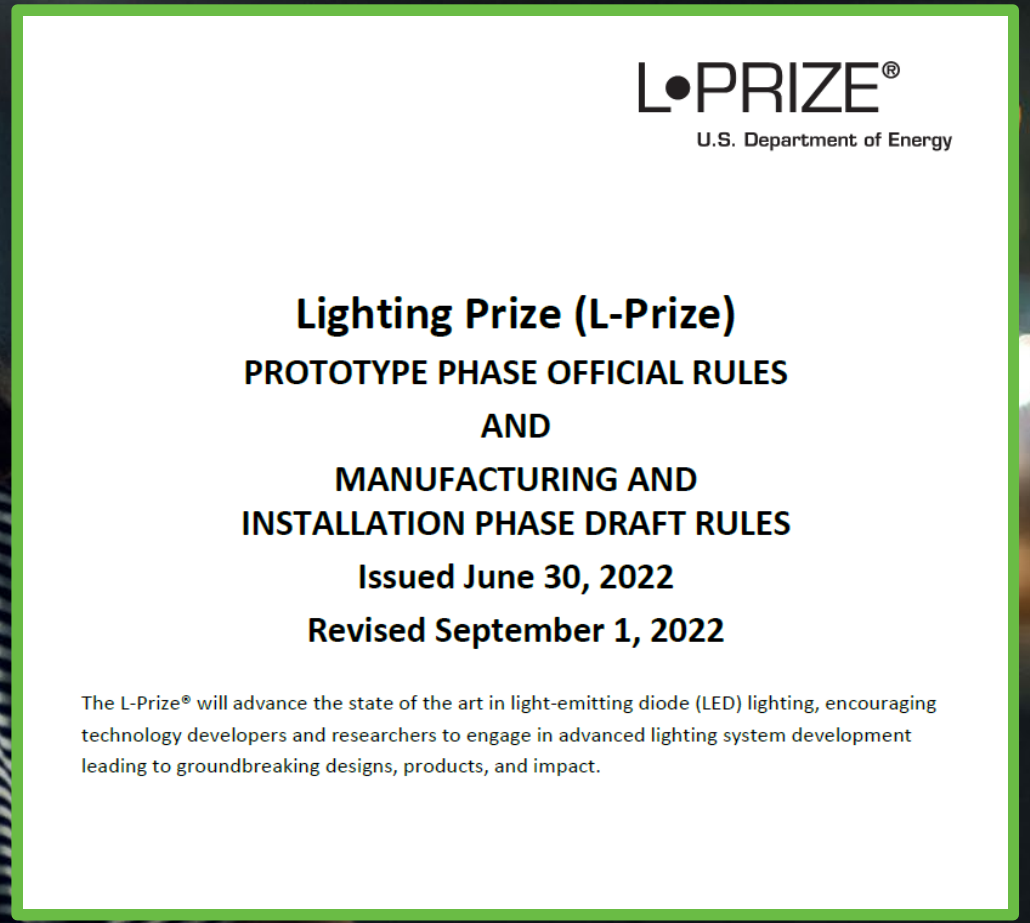
Official Rules of the L-Prize are available online

https://americanmadechallenges.org/challenges/lprize/docs/L-Prize_Official_Rules.pdf

Additional resources, webinar recordings, and more available on L-Prize HeroX Resources page

https://www.herox.com/LPrize/resources



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Lighting Prize (L-Prize)

PROTOTYPE PHASE OFFICIAL RULES

AND

MANUFACTURING AND INSTALLATION PHASE DRAFT RULES

Issued June 30, 2022

Revised September 1, 2022

The L-Prize® will advance the state of the art in light-emitting diode (LED) lighting, encouraging technology developers and researchers to engage in advanced lighting system development leading to groundbreaking designs, products, and impact.


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QUESTIONS?
www.herox.com/LPrize/forum
Email: LPrize@nrel.gov
www.herox.com/LPrize
www.americanmadechallenges.org/LPrize

How D4i and DALI-2 can help you win the L-Prize - Prototype phase

Scott Wade, DALI Alliance

15th September 2022

DALI® Alliance

DALI®2 D4i™

Agenda

How D4i and DALI-2 can help you win the L-Prize

- Prototype phase

- Introduction: DALI, DALI-2, D4i and the DALI Alliance
- What is D4i?
- What is needed for the:
  - luminaire track
  - connected system track
- Testing & Certification

Scott Wade,
Technical &
Certification Manager,
DALI Alliance

DALI: The basics

Digital **A**ddressable **L**ighting **I**nterface

- DALI® is the industry-standard protocol (language) for bi-directional, digital communication between lighting-control devices.
  - Dedicated to lighting, with a rich feature set
- DALI is derived from the open, global standard IEC 62386.
- DALI-2™ is the certification program based on the latest version of the DALI protocol.
- DALI-2 is driven by the DALI Alliance (DiiA)
  - Ensures interoperability through testing and certification with trademark use
- DALI, DALI-2, D4i and DALI+ trademarks controlled by the DALI Alliance

The DALI Alliance

- The DALI Alliance is an open, global consortium of lighting companies that aims to grow the market for lighting-control solutions based on DALI.
- Also known as Digital Illumination Interface Alliance
- More than **320 members** worldwide
  - Industry leaders in lighting and control
  - Full list on our website
- Membership allows certification or registration of products:
  - Over **2,600 DALI-2 certified products**
  - Over 1,600 DALI version-1 registered products
- Membership allows DALI, DALI-2, D4i and DALI+ **trademark use**.

What is D4i?

D4i is an extension to DALI-2:

- D4i control gear (drivers) include a mandatory set of functionality
- D4i control devices include functionality to aid “plug & play”
- Luminaires require one to four D4i drivers.

→ Especially for intra-luminaire use: DALI is inside the luminaire

- All D4i LED drivers provide luminaire, energy & diagnostics data
  - Enables DALI inside intelligent, IoT-ready luminaires
  - Some D4i drivers also provide color control or emergency lighting

- D4i simplifies the addition of sensors and communication devices to luminaires

- D4i enables plug-and-play interoperability when combined with a connector system
  - e.g. Zhaga Book 18 & 20 or NEMA/ANSI C136.41

What is needed for the *luminaire* track?

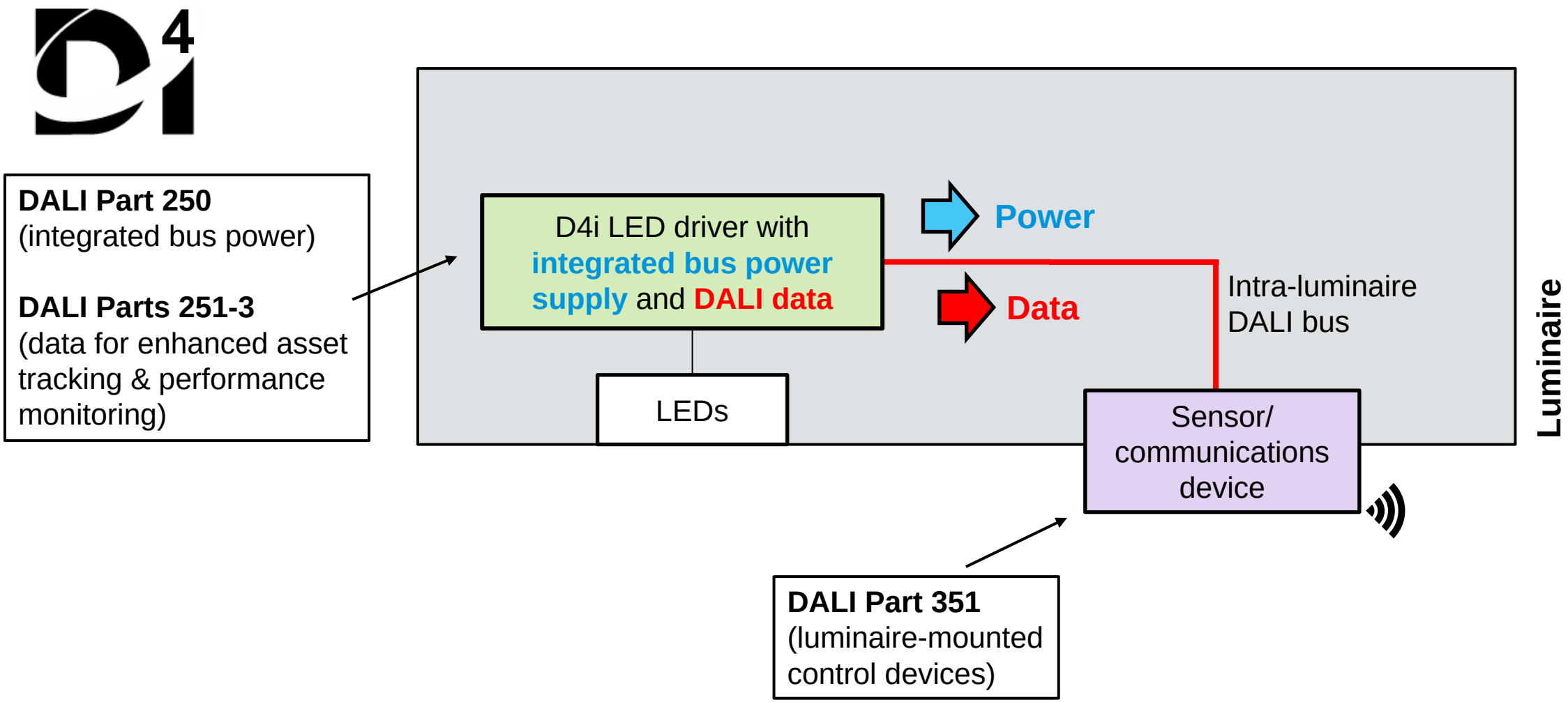
Driver requirements for luminaires:

- Use LED drivers meeting **D4i** or **ANSI C137.4** requirements.
- Dimming range down to 5% or lower.
- Sensor port: see later, in the Zhaga part of the webinar.

Optional:

- White tuning capability. In the prototype phase, the luminaire output is to be fixed at 4000K, but white tuning capability could be an advantage for the next phase of the competition.

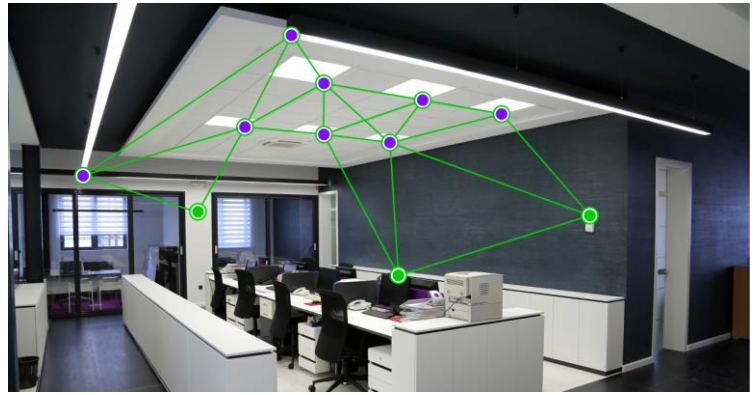
D4i example luminaire



What is needed for the *connected systems* track?

D4i products can help meet many of the requirements:

- **Controller**
  - The connected system must be able to control the D4i/ANSI C137.4 drivers across multiple luminaires.
- **Interface to other network**
  - e.g. Ethernet, Wi-Fi, Zigbee, 6LoWPAN, Thread, Bluetooth Mesh etc.
- **Connectivity to luminaires**
  - Communication is either through the DALI bus (2-wire bus that connects the drivers and sensors), or though a wireless interface.
- **Data access**
  - The luminaire, power/energy and diagnostics data available from the drivers must be leveraged by the connected system.
- **Application Programming Interface** (API)
  - Provides access to data: **luminaires** and zones, **occupancy**, **faults**, **energy**.
  - (**Bold** shows data provide by D4i drivers and sensors).
- **Addressability**
  - Devices need to be individually addressed and reconfigurable.
- **Energy reporting**
  - Energy and power data is available from D4i drivers, allowing fully automated measurement, reporting and logging.



What is needed for the *connected systems* track?

Other requirements that D4i products can help to provide :

- **Lighting control strategies**
  - All are possible with a D4i or DALI-2 system.
- **System resilience**
  - The configuration including automatic power-on level settings are stored in non-volatile memory in all certified drivers.
  - Control devices, including sensors, can automatically issue a power notification message after detecting a power-cycle, helping the system controller decide on any action to be taken.
- **Fault detection and diagnostics (FDD)**
  - Reporting of driver and lamp problems are standard in all DALI-2 drivers. All D4i drivers additionally provide a much wider range of diagnostics information, including reporting on driver and lamp issues.
- **Standards-Based Luminaire Level Lighting Control (LLLC)**
  - D4i or ANSI C137.4 compliant control devices can include occupancy and light sensing.
  - Examples of D4i certified sensors can be found in the product database.
- **Grid services capable**
  - A simple method to implement this would be to set the maximum level depending the demand-response signal from the utility.

Data specifications

- Data for enhanced asset management & performance monitoring
- Data storage in DALI memory banks, with standardized format & locations

Luminaire Data

DALI Part 251 – Luminaire Data

- Information about the luminaire (e.g. GTIN, light output, CCT & CRI, light distribution etc) can be stored in the LED driver
- Enables asset management

Energy Data

DALI Part 252 – Energy Reporting

- Provides real-time power & energy usage for LED drivers

Diagnostics Data

DALI Part 253 – Diagnostics & Maintenance

- Operating data for control gear and lamps, including failure conditions, run-time data
- Enables predictive maintenance

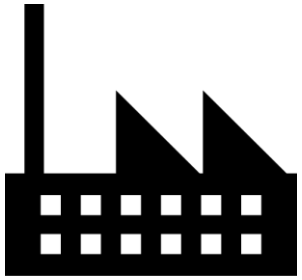
- **These specifications are available from DiiA, and are also included in ANSI C137.4.**

ANSI C137.4-2021 standard

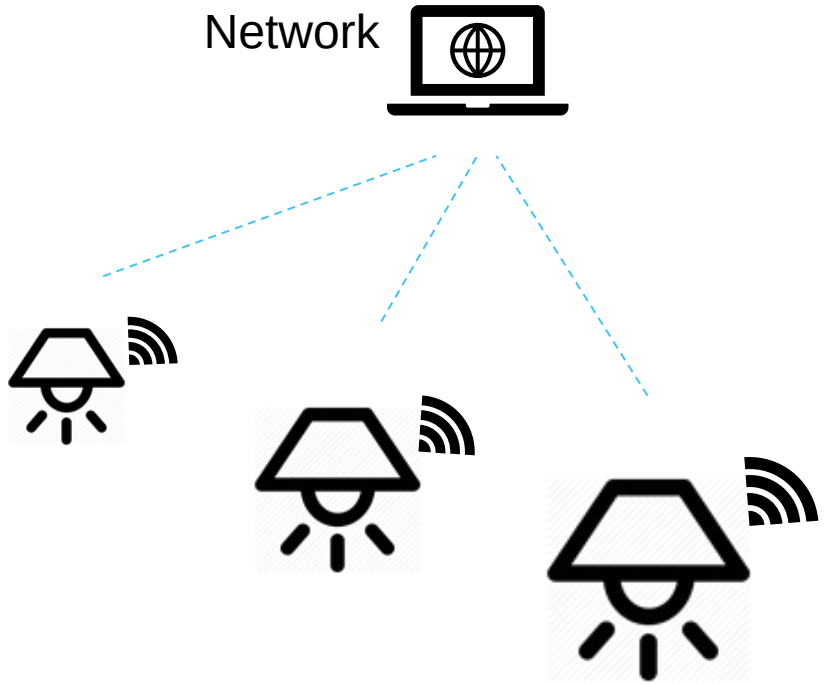
- Closely aligned with D4i family of specifications
- DALI Alliance represented on C137 committee, which developed the standard

	DiiA Specification	D4i certification requirement	Included in ANSI C137.4	
			2019	2021
LED Drivers	DALI Part 150 – AUX Power Supply	Optional	✓	✓
	DALI Part 250 – Integrated Bus Power Supply	Mandatory	✓	✓
	DALI Part 251 – Luminaire Data (Memory Bank 1)	Mandatory	✓	✓
	DALI Part 252 – Energy Data	Mandatory		✓
	DALI Part 253 – Diagnostics Data	Mandatory		✓
Control Devices	DALI Part 351 – Luminaire-mounted control devices	Mandatory		✓

Using DALI data: Example



In the factory:
Luminaire data is programmed into drivers.



In the field:
Automated commissioning

- When installed, luminaires can automatically transfer data to a remote network
- Reduces human error, saves installation time and cost
- Operator has a full map of asset information

During operation:
Performance monitoring

- Energy usage data can be used e.g. for billing

During operation:
Predictive maintenance

- Diagnostics data allows network operator to anticipate need for maintenance
- Repair team has knowledge of location and type of fixture

Testing & certification

DALI-2 and D4i products are tested and certified:

- **Testing**
  - Compliance testing may be carried out by the DALI Alliance member, or at an accredited test-house.

- **Test-houses**
  - Accredited test-houses are listed on the DALI Alliance website:
  - www.dali2.org/testing/test-houses.html

- **Certification**
  - Product information and test results are submitted to the DALI Alliance for verification, before D4i or DALI-2 certification is granted.
  - Once certification is granted, products are publicly listed on the website: www.dali-alliance.org/products

D4i and Zhaga–D4i certification

	DALI Alliance members	Zhaga members
LED driver	D4i certification ⇨	
Control device	(1) D4i certification ⇨	(2) Zhaga certification ⇨
Luminaire	*Use of D4i components*	Zhaga certification ⇨
Connector		Zhaga certification ⇨

(1) + (2) both required

Book 20
Smart interface between indoor luminaire and sensing/communication modules

Aug 2022

The Zhaga Consortium

Advantages of Smart, future-proof LED luminaires using IoT connectivity

Connected: Capable of becoming part of the IoT

Intelligent: Able to collect and report a wide variety of data

Versatile: Supporting sensing and communication applications

Future-proof: Easily upgradable to keep pace with rapid developments in digital networking technology

Standardized: Specified interoperability

Certified: Create trust in interoperability

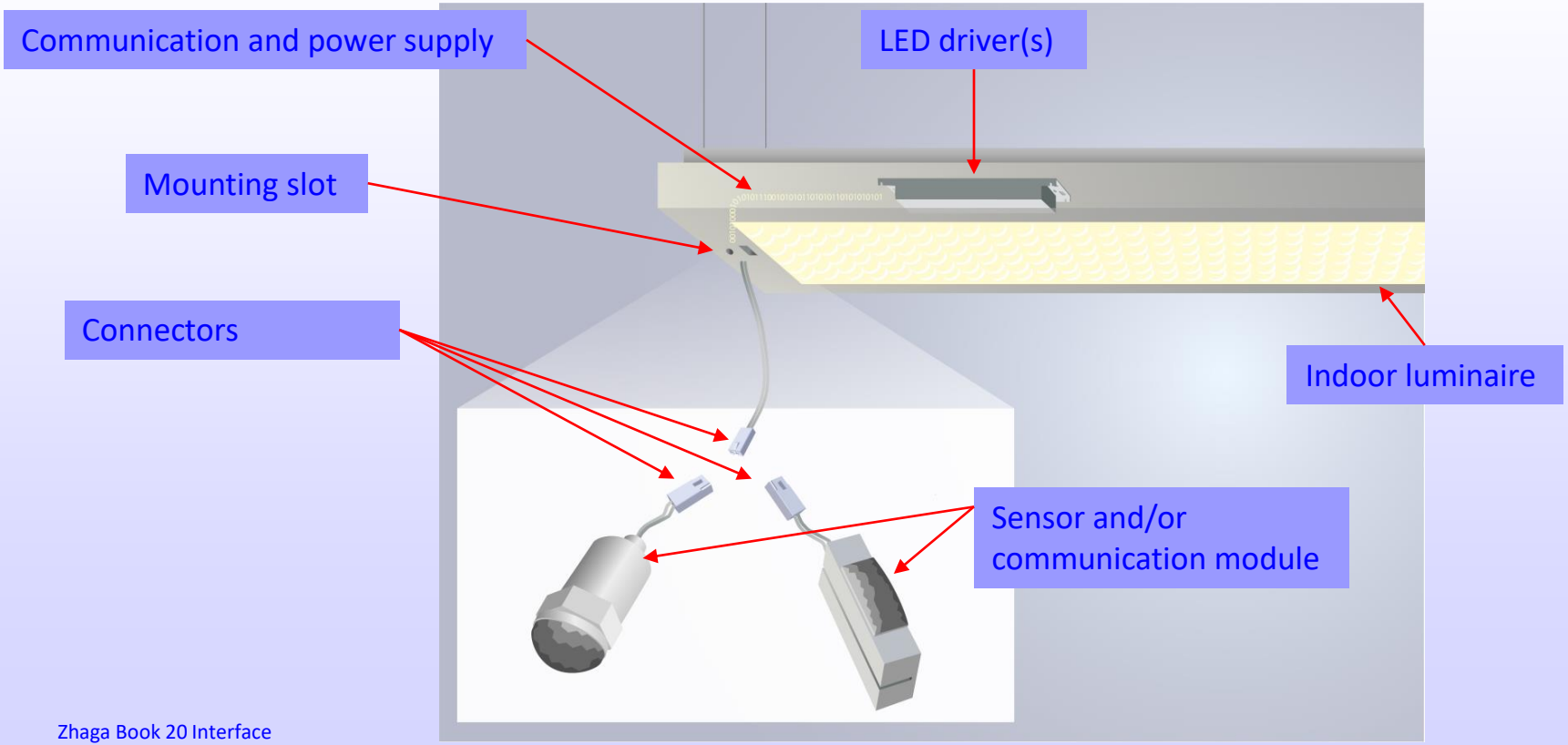
The Market Need:

Digital networking technology is rapidly developing, but the smart building infrastructure needed to take advantage of this technology doesn't fully exist today. The market needs smart LED luminaires that are easily upgradable using standardized interfaces.

Solution: The Book 20 Zhaga-D4i interface standard

- A simple way to add sensors and/or wireless communication modules to luminaires. Zhaga and DALI Alliance collaborate to develop and maintain a standardized interfaces between luminaires and sensor and/or communication modules
- The combination of complementary specifications for mechanical fit, digital communication and power supply for modules
- Zhaga-D4i certification to ensure full interoperability

Book 20: smart interface for indoor luminaires

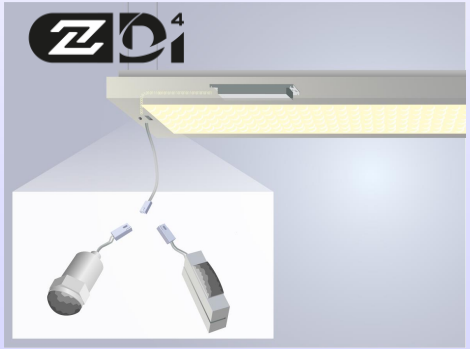


Features of Zhaga-D4i interface standard

- Easy to add or upgrade sensors or communication modules:
  - Enables future-proof luminaires that can keep pace with rapid developments in digital networking and sensing technology.
- Intra-luminaire DALI-2 bus:
  - Bi-directional communication between sensors and/or communication modules and LED drivers is enabled using the well-established and standardized DALI-2 protocol.
- D4i drivers are smart:
  - Operational and diagnostic data can be reported to an external network and inventory-related information about luminaires can be provided.
- IoT connectivity:
  - With a suitable wireless communication module, the luminaire is able to interact with an external lighting-control network and to become part of the IoT.

Complementary specifications in Zhaga and DALI Alliance

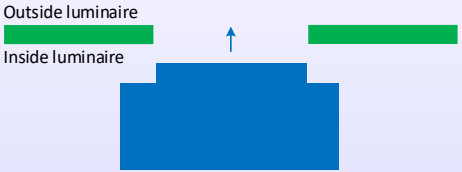
D4i specifications from DALI Alliance:
DALI Part 250: Integrated bus power supply
DALI Part 251: Luminaire data for asset management
DALI Part 252: Energy reporting for drivers
DALI Part 253: Diagnostics & maintenance data for drivers
DALI Part 351: Luminaire-mounted control devices



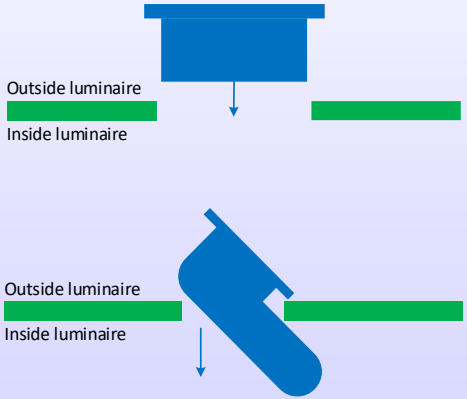
Book 20 specification from Zhaga:
- **Mechanical interface between Module and luminaire**
- **Specified electrical connector**
- **Specification of luminaire's interface**

Book 20 – fitting systems

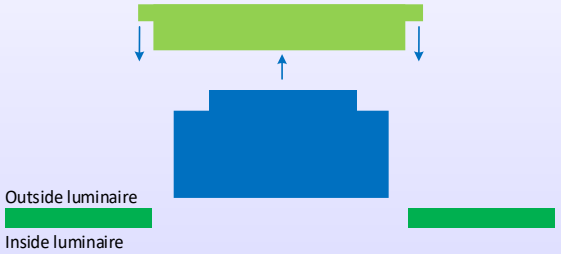
Book 20 enables a number of fitting system appropriate for the application, including plug-and-play



Module is mounted from the inside of the luminaire into the opening



Module is mounted from the outside of the luminaire into the opening



The module is mounted from the outside of the Luminaire by using a bracket

Standardized mechanical interfaces enable flexible and cost effective solutions

Five form factors:

- R44x17 (44 x 17 mm)
  → Rectangular modules with small volumes and indifferent orientation

- R60x22 (60 x 22 mm)
  → Rectangular modules requiring more volume and surface, e.g. gas detectors or complex presence detectors

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- C22-T1A (Ø 22 mm):
  → Cylindrical modules as already widely used in the field, adjustable orientation, minimum surface

- C22-T1B (Ø 22 mm):
  → Cylindrical modules as already widely used in the field, adjustable orientation, larger lenses

- C22-T2 (Ø 22 mm):
  → L-shaped modules enable ultraflat luminaire designs

Standards Alignment of Module Form Factors

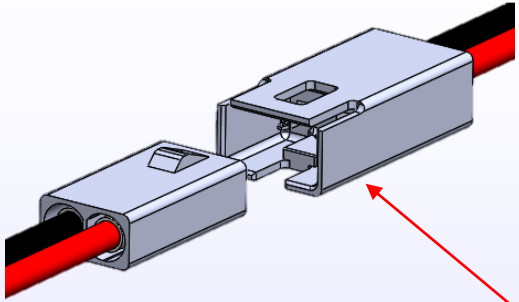
Zhaga and NEMA worked in partnership to align the requirements wherever possible between Book 20 and the LS 20000.

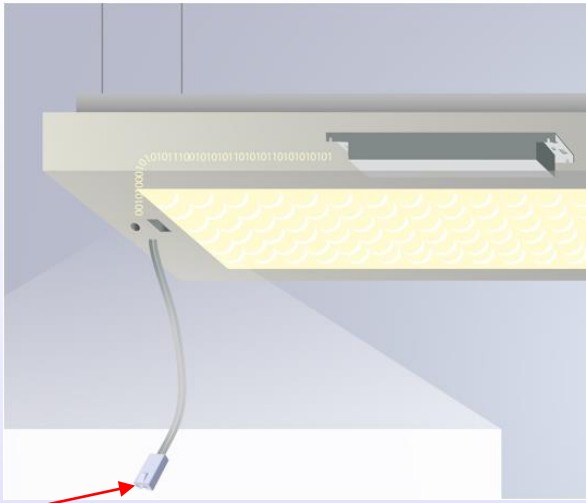
Below is a cross reference of compatible NEMA sizes to match Zhaga Book20.

Module shape	Zhaga Book 20	*NEMA LS 20000
Rectangular 44x17	R44x17	RR2
Rectangular 60x22	R60x22	RR1
Round Ø 22mm	C22-T1A	CC3
Round Ø 22mm	C22-T1B	CC1
Round Ø 22mm	C22-T2	ORC5

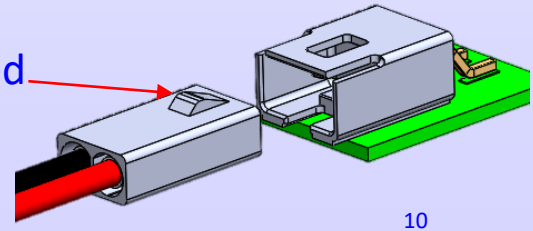
*Modules complying with Book 20 will comply with these corresponding LS 20000 sizes

Features of the Connector





- Two position plug and receptacle interface:
  - Easy to use separable connection provides reliable DALI connectivity
- Poka Yoke features prevent incorrect mating.
  - Enables connection with polarity ensured
- Connector provides finger proof protection
  - Housing provides touch proof protection for separable contacts
- Plug & play functionality can be installed by a generalist
  - Does not require a specialist to upgrade luminaire functionality
- Integrated latch feature provides 5N minimum retention when mated
  - Slim profile latch ensures that connectors remain intact over its lifetime



Zhaga-D4i certification

- **Zhaga-D4i certification:** A joint program from Zhaga and DALI Alliance
  - Certification of interoperable luminaires and sensing and/or communication modules
- Based on **complementary specifications** from Zhaga and DALI Alliance
  - Zhaga **Book 20** plus **D4i** specifications
- Product certification allows for use of Zhaga and D4i logos
  - For **indoor luminaires, sensing** and **communication modules**
  - Logos indicate multi-vendor **product interoperability**
- LED drivers are eligible for D4i certification from DALI Alliance

Benefits of Zhaga-D4i certification

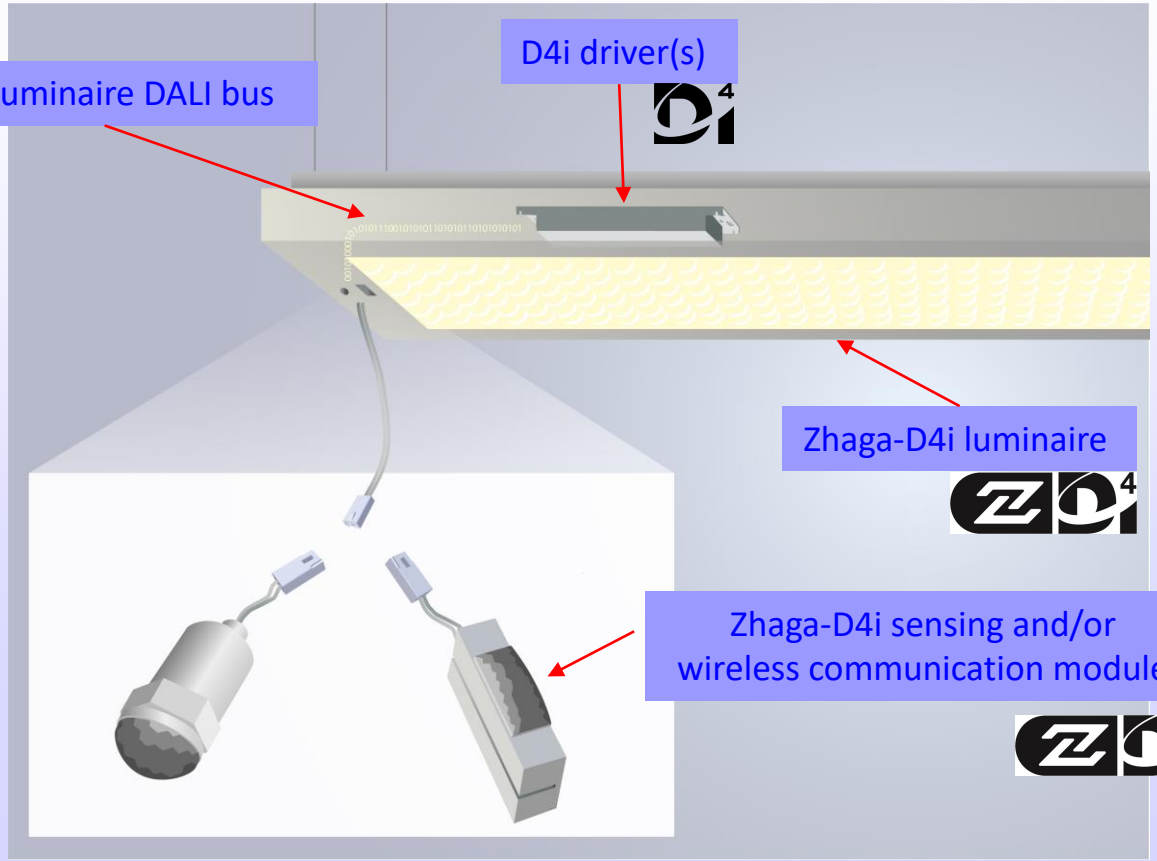
ZHAGA Consortium

- Certification gives confidence for interoperability
  - Certifications carried out by independent authorities
  - Certified products are traceable in public databases
  - Certification logos are trademarked to prevent misuse
- Certification gives business advantages
  - Certified luminaires and components are available from multiple suppliers
  - Certification logos provide an established brand for product marketing
- Certification ensures that luminaires are future-proof and will be able to host next-generation Zhaga-D4i modules

Scope of Zhaga–D4i certification

Zhaga-D4i **Module**	Zhaga and D4i logo	Certification by Zhaga, after D4i certification by DALI Alliance
Zhaga-D4i **Luminaire**	Zhaga and D4i logo	Certification issued by Zhaga
D4i **Driver**	D4i logo	Certification issued by DALI Alliance (includes DALI-2 certification)
Zhaga Book 20 **Connector**	Zhaga logo	Certification issued by Zhaga

Zhaga-D4i certification for indoor luminaires



Zhaga-D4i Certification – Summary

Zhaga and DALI Alliance have developed a joint certification program for indoor luminaires, which is based on a standardized interface between drivers, luminaires and sensing/communication modules.

Zhaga-D4i certified luminaires will be the backbone of intelligent building management and more.

- It creates a simple way of adding control/ sensing modules into the building system architecture.
- A large ecosystem of modules will become available for Zhaga certified luminaires.
- It allows selection of luminaires today for the technology advances that sensing, and control modules will bring tomorrow.
- Adding the requirement of Zhaga-D4i certification simplifies tender processes
  - The certification provides an assurance of interoperability and gives confidence that the different parts of the system will operate together.
  - All Zhaga-D4i certified products can be traced through an easily accessible database on the Zhaga website.

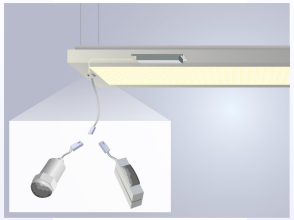
Certification Process: Book 20 Zhaga-D4i Modules

ZHAGA Consortium

Organisation		Process	Comment
			
		1 Product self tested or tested by a DALI Test House	Zhaga-D4i certification starts with D4i certification and is based on Part 351. For a device to be compliant and qualify for Zhaga-D4i certification, it must be a Type C or a bus powered Type D device only.
DALI Alliance Associate or regular membership of the DALI Alliance is required. How to join.		2 Submit results to the DALI Alliance for verification and D4i certification.	Only one LEX-M is permitted for indoor lighting applications defined in Book 20. Type C devices are always bus powered and are designed to take control of the ECG. Type D single master application controllers are permitted if powered only by the DALI bus.
		3 Submit product documentation to Zhaga Test Centre	Once D4i certification is achieved, a product can be submitted to a Zhaga Test Centre for Zhaga Book 20 testing. This is typically a paperwork exercise to confirm the products meet the requirement of Book 20. Each module must include one module receptacle to connect with the luminaire.
ZHAGA Consortium Associate or regular membership of Zhaga is required. Joining Zhaga.		4 Tested for compliance against Zhaga specifications	Either a Type C or a bus powered Type D control device can be plugged into a Book 20 compliant luminaire.
		5 Product awarded Zhaga-D4i certification and use of Zhaga and D4i logos	Zhaga-D4i certification requires that a product is tested and certified to both Zhaga Book 20 and the DALI Alliance Specification Part 351.

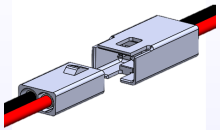
A List of Zhaga approved test centres can be found here. Only specific test centres can certify for specific books. Test centres can offer advice and direction with product approval, as well as DALI and D4i testing.

Certification Process: Book 20 Zhaga-D4i Luminaires

Organisation		Process	Comment
			
		1 Compile required documentation and submit to Zhaga Test Centre	A compliant luminaire will include a D4i driver, a Book 20 defined mounting interface, and will have one and only one Zhaga Book 20 compliant LEX-LP.
		2 Tested for compliance against Zhaga specifications	A compliant luminaire will use a D4i driver. An intra luminaire DALI bus will provide connection to the LEX-LP interface. Certification is typically a paperwork exercise to confirm the products meet the requirement of the book
Associate or regular membership of Zhaga is required. Joining Zhaga.		3 Product awarded Zhaga-D4i certification and use of Zhaga and D4i logos	To certify a luminaire only Zhaga Consortium membership is required.

A List of Zhaga approved test centres can be found here. Only specific test centres can certify for specific books. Test centres can offer advice and direction with product approval, as well as DALI and D4i testing.

Certification Process: Zhaga Book 20 Components

Organisation		Process	Comment
			
		1 Compile required documentation and sample and submit to Zhaga Test Centre	Both documentation, including a measurement report, and samples of the product are required to be submitted to an approved test centre. A compliant component will meet all the requirements of Book 20.
		2 Tested for compliance against Zhaga specifications	The test centre will confirm that the submitted measurement report meets the specified dimensional and tolerance requirements of Book 20. The test centre will also conduct physical testing of specified dimensions and features designated in Book 20.
Associate or regular membership of Zhaga is required. Joining Zhaga.		3 Product awarded Zhaga certification and use of Zhaga logos	To certify a component only Zhaga Consortium associate or regular membership is required.

A List of Zhaga approved test centres can be found here. Only specific test centres can certify for specific books. Test centres can offer advice and direction with product approval, as well as DALI and D4i testing.

Zhaga Book 20 Video

- The Zhaga Consortium has produced a video which provides a summary of the features and benefits of the Zhaga Book 20 interface.
- The video can be viewed by following the below links:
- https://youtu.be/qAF4FymbUJw
- https://www.zhagastandard.org/media-events/videos.html

Thank you

For further information, please contact

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