Newland Next-Generation Neighborhood Design

Project + Technology Application Overview

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Newland Technology Roadmap Project Overview

Purpose: Identify, prioritize and develop opportunities leverage emerging technologies to improve the vision and reality of the Wendell Falls development

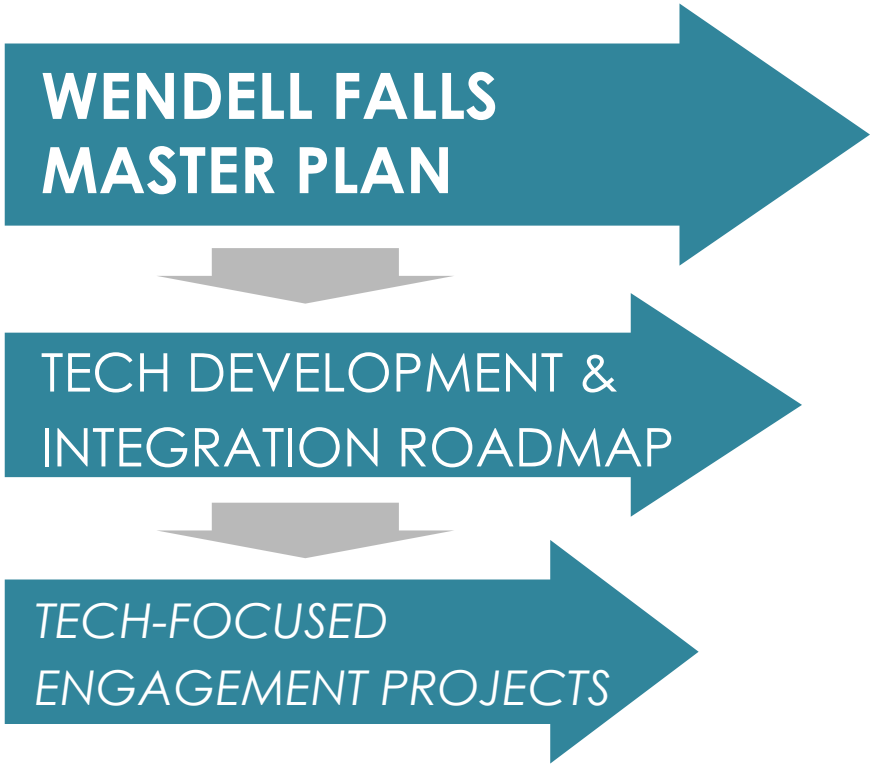
Timeframe: Technologies maturing in the next 2-10 years

Key Outcomes:

Phase 1: A Technology Roadmap with prioritized integration opportunities

Phase 2: Engagement project(s) to share Newland's technology-enabled vison with key market segments and stakeholders

Tech Roadmap & Engagement Concept



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Neighborhood Tech Application Overview

We developed an initial set of 44 tech applications for consideration

- Based on extensive review of industry and technology analysis
- Selected 20 tech applications for detailed description (Task 1) for subsequent assessment and prioritization (Task 3)
- Will revise and expand tech application list based on stakeholder input (Task 2)

Implementation feasibility and tech-enabled outcomes were key considerations for list development

- Feasability of execution was a key consideration for selection of technologies for the list of applications to assess
- Set of tech applications optimized to address each of the seven tech-enables outcomes identified

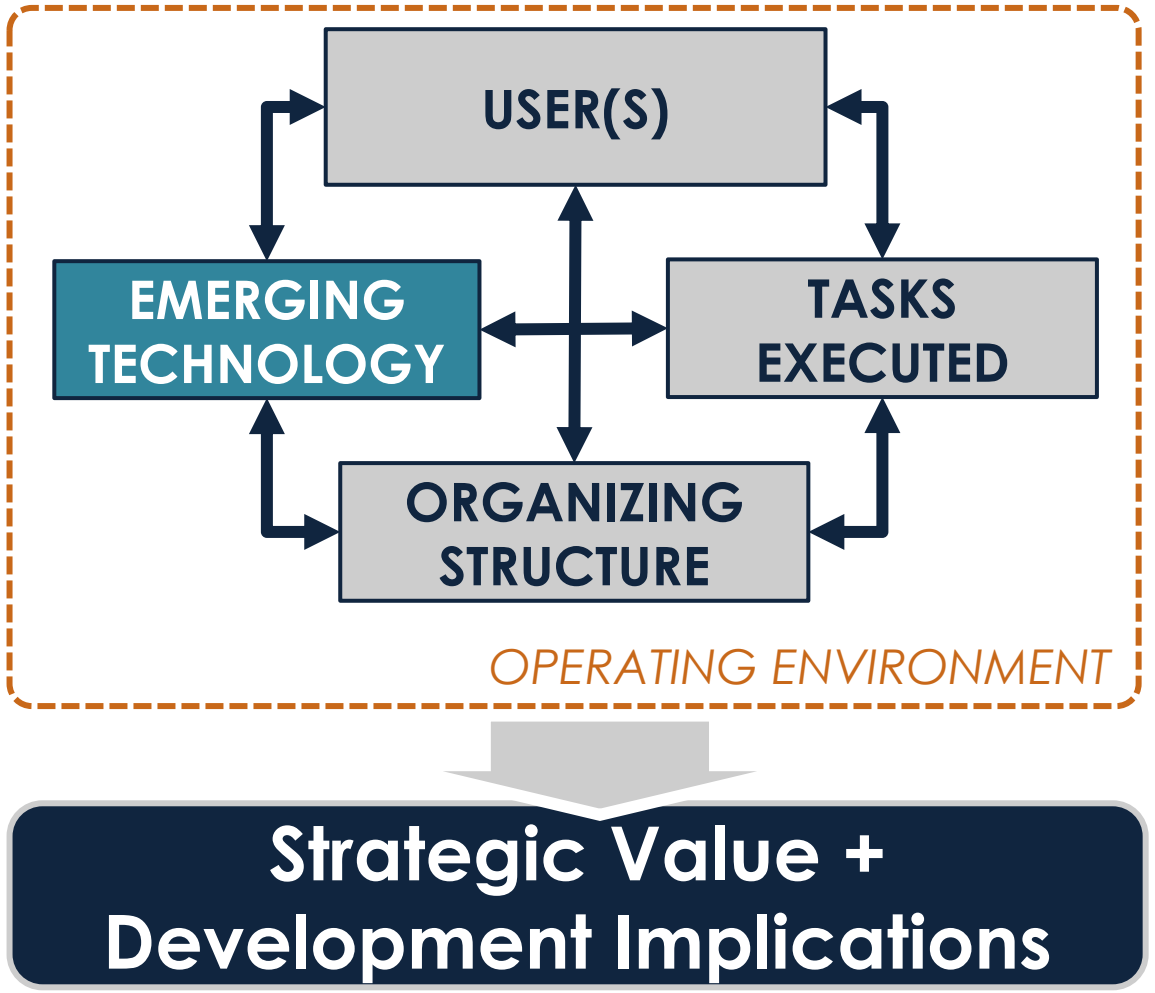
Initial Tech Analysis Identified Promising Tech Applications

Zylter identified emerging technologies with application(s) that enable achievement of the Wendell Falls tech-enabled outcomes

Describe the key factors that will influence appropriateness and actions for WF implementation

- Based on the Zylter Sociotechnical Systems construct →

Zylter Sociotechnical System Construct



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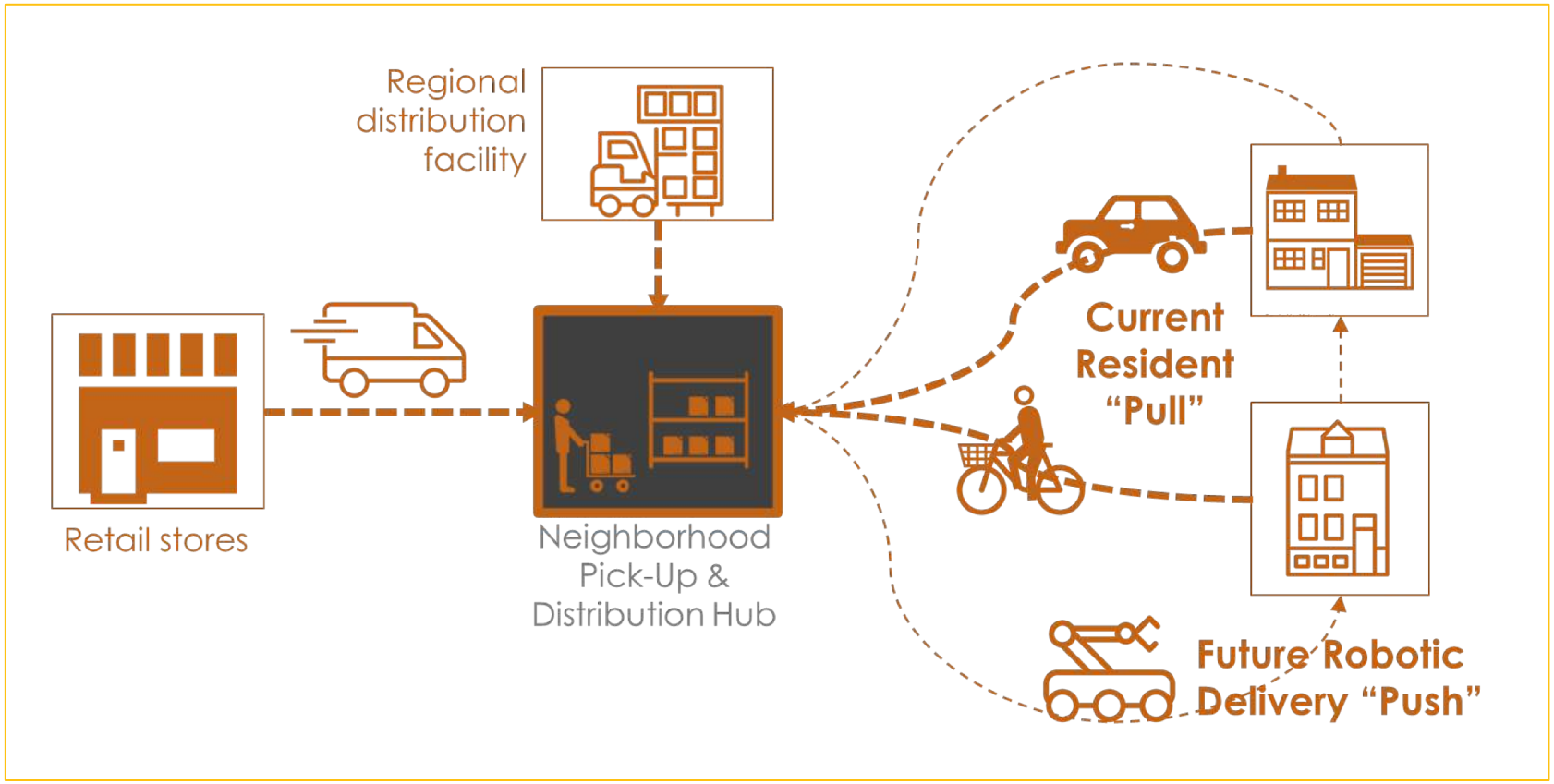
Example Tech Application Concept: Last Mile Delivery

Neighborhood-Centric Use of Technology for Last-Mile Delivery



Current Tech-Enabled Local Delivery

SHIPT℠

This concept represents a evolutionary approach to planning for, support and integrating neighborhood-focused technologies

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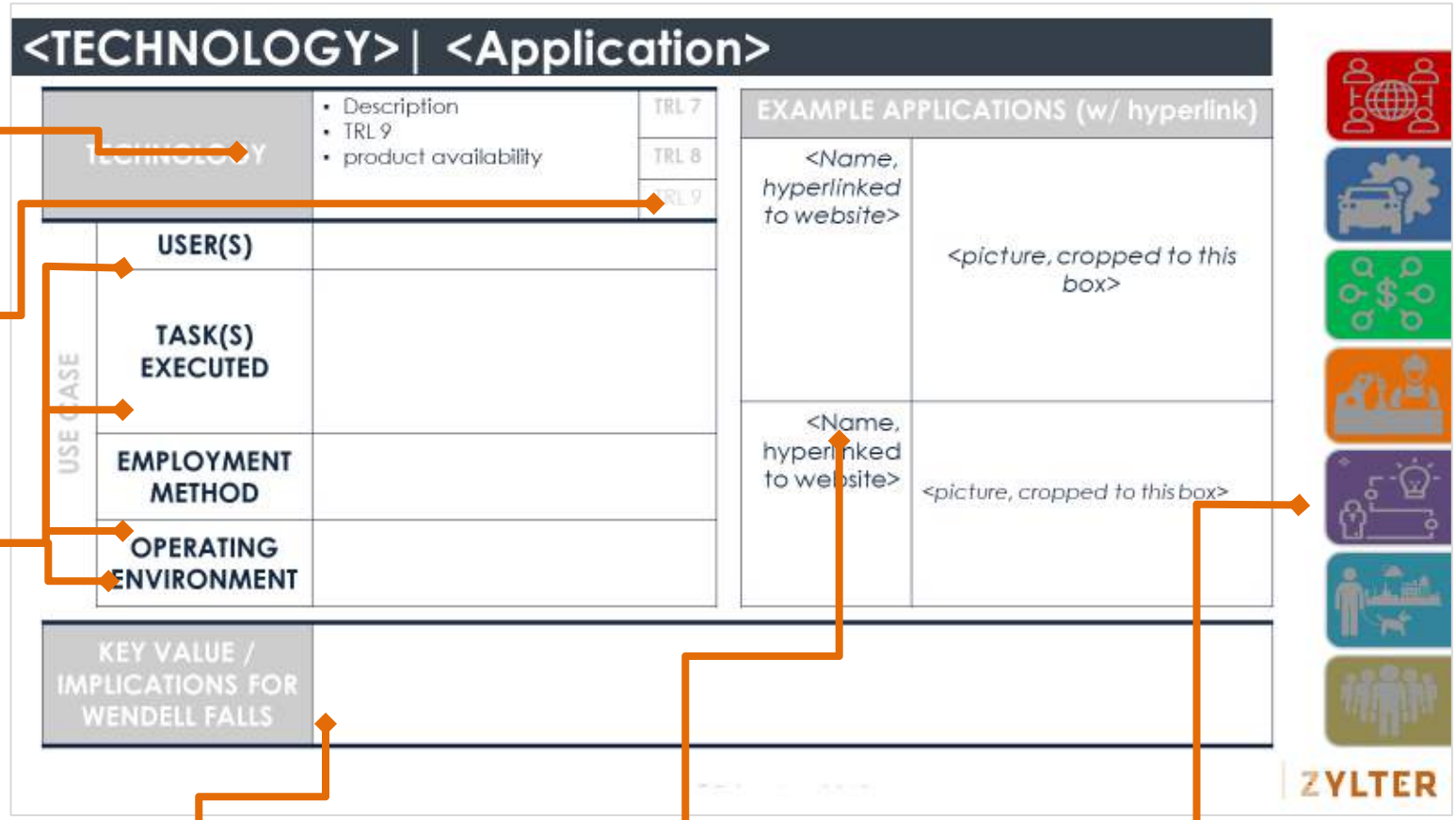
Technology Application Summary Slide Structure

Description of the core emerging technology and its Technology Maturity Level

Assessment of technology maturity based on the Technology Readiness Level (TRL)
- See Slide 17 for TRL definitions

Description of key use case elements that describe how the technology is applied and generates value for Wendell Falls



Summary od strategic opportunity and implications for of the Wendell Falls planning and development

Examples of the emerging technology application with links to leading companies and key information sources

The priority tech- enabled outcome for the tech application

Priority Tech-enabled Outcomes for Emerging Tech Applications

Tech-Enabled Outcome	Description
1. CONNECTED COMMUNITY	Sustainable, robust and evolving physical, virtual and social linkages that support engagement and inclusion of community member individuals, organizations and other community aspects.
2. INTEGRATED TRANSPORT & DELIVERY NETWORK	Multi-modal and regional, local and intra-community transport that enables efficient access to opportunities, resources and events; includes commuter transport and transport of goods to/from the community.
3. ENTREPRENEURIAL ECOSYSTEM	A dynamic and engaged set of commercial, social and functional actors that supports opportunity for enterprises of varied scales, maturity levels and industries.
4. SUSTAINABLE SOURCING, PRODUCTION & VALUE-ADDING	Thoughtful cultivation, collection and use of local resources and skills that generate economic and social value over time.
5. SMART RESOURCE MANAGEMENT	Progressive planning, use and monitoring of community and local resources that balances community development and evolution with sound ecological and conservation practices.
6. AUTHENTIC & COMMUNITY-SPECIFIC EXPERIENCES	Organic and engaging physical, virtual and social experiences that provide unique and interactive opportunities to experience diverse aspects of the local physical, social and cultural geography.
7. EVOLVING POPULATION & WORKFORCE	Resident, worker and visitor access to resources, interactions and environments that promote and enable development of knowledge, skills and abilities for sustained personal and professional development.

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4 AUTONOMOUS GROUND VEHICLES | Intra-Neighborhood Transport

TECHNOLOGY	▪ Autonomous shuttle vehicles ▪ Mostly prototype products ▪ Limited real-world use	TRL 7 **TRL 8** TRL 9
USE CASE — **USER(S)**	Individual or small groups of residents or visitors seeking to move faster or easier than possible by walking.	
USE CASE — **TASK(S) EXECUTED**	Individuals or small groups use transport options to move between locations in or adjacent to the neighborhood that are beyond comfortable walking distance with greater ease, enjoyment and/or speed that alternative modes (e.g., driving or walking).	
USE CASE — **EMPLOYMENT METHOD**	Potentially circuit-riding vehicle are on-demand transport distributed and managed throughout the neighborhood.	
USE CASE — **OPERATING ENVIRONMENT**	Primarily use designated bike paths or designated roadway areas, potentially ad hoc and unintended use of pedestrian walkways (e.g. sidewalks); Designated parking or drop-off areas near key destinations and transfer points.	

EXAMPLE TECH APPLICATIONS

Local Motors -- Olli

Ultra Micro Transit Systems

KEY VALUE / IMPLICATIONS FOR WENDELL FALLS	**Improve resident and visitor experiences in and journeys through neighborhood by provide readily-accessible, flexible, safe and enjoyable transit alternatives to driving.**

5 SHARED + ON-DEMAND VEHICLES | Commuter Transport

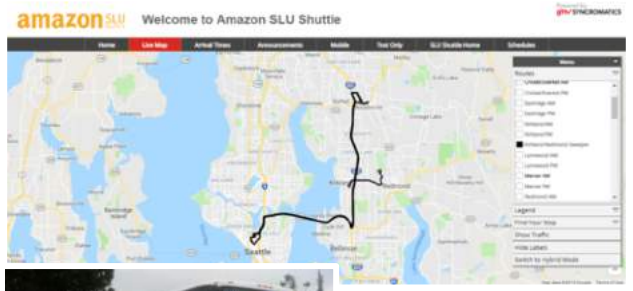
USE CASE

TECHNOLOGY	▪ Shared workforce mobility enabled with mobile and flexibly routed platform ▪ Currently manned, but likely to transition to autonomous	TRL 7 TRL 8 **TRL 9**
USER(S)	Individual or small groups of residents or visitors seeking flexible access to major regional employment areas.	
TASK(S) EXECUTED	Individuals or small groups use transport to comfortably and productively move between major residential areas and key regional employment destinations.	
EMPLOYMENT METHOD	Vehicles operate as part of a centrally coordinated and dynamically managed commercial system.	
OPERATING ENVIRONMENT	Operate along major thoroughfares and interstates with defined stop locations optionally used based on rider demand.	

EXAMPLE APPLICATIONS (w/ hyperlink)

Chariot On-Demand Commuter Transport

Amazon Commuter Bus Service



KEY VALUE / IMPLICATIONS FOR WENDELL FALLS	**Increase desirability of WF as a desirable residential destination by improving resident access to and connectivity with local employment centers, especially in high-tech activity clusters.**

6 SHARED + ON-DEMAND VEHICLES | Intra-Neighborhood Transport

TECHNOLOGY	▪ Bikes, Scooters, Mopeds, ▪ Numerous and growing commercial service options ▪ Fully mature (TRL 9)	TRL 7 TRL 8 **TRL 9**

USE CASE

USER(S)	Individual or small groups of residents or visitors seeking to move faster or easier than possible by walking.
TASK(S) EXECUTED	Individuals or small groups use mobility options to move between locations in or adjacent to the neighborhood that are beyond comfortable walking distance with greater ease, enjoyment and/or speed that alternative modes (e.g., driving or walking).
EMPLOYMENT METHOD	Utilize current roadway infrastructure and on-demand app connectivity for locating and using service.
OPERATING ENVIRONMENT	Primarily designated bike paths or roadway areas, potentially ad hoc and unintended use of pedestrian walkways (e.g. sidewalks); Designated parking remains an area of concern.

EXAMPLE APPLICATIONS (w/ hyperlink)

Bird Shared Electric Scooter Service

Ofo Station-Free Bike Sharing

KEY VALUE / IMPLICATIONS FOR WENDELL FALLS	**Improve resident and visitor experiences in and journeys through neighborhood by provide readily-accessible, flexible, safe and enjoyable transit alternatives to driving.**

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7 AUTONOMOUS GROUND VEHICLES | Ground Package Delivery

TECHNOLOGY	▪ Use of unmanned vehicles for pick-up, movement and drop-off of small packages ▪ Limited field trials ongoing	TRL 7 **TRL 8** TRL 9
USER(S)	Individual residents or businesses seeking to have ordered goods delivered quickly and efficiently.	
TASK(S) EXECUTED	Delivery of small parcels and assorted items with accuracy, efficiency and precision tracking.	
EMPLOYMENT METHOD	Fleet of autonomous ground vehicles using existing roadways or specified delivery roadways to move packages from pre-defined pick-up location to various destinations.	
OPERATING ENVIRONMENT	Primarily use designated bike paths or roadway areas, potentially ad hoc and unintended use of pedestrian walkways (e.g. sidewalks); parking or drop-off areas near key destinations and transfer points.	

USE CASE

EXAMPLE APPLICATIONS (w/ hyperlink)

Nuro Local Delivery

Starship Technologies Local Delivery Robot

KEY VALUE / IMPLICATIONS FOR WENDELL FALLS	**Improve resident / business quality of life or efficiency through rapid, timely and consistent delivery of commercial items directly to the resident or business.**

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8 AUTONOMOUS AERIAL VEHICLE | Aerial package delivery

TECHNOLOGY	▪ Unmanned aerial systems for autonomous delivery of packages ▪ Protypes, but regulatory risk	TRL 7 TRL 8 TRL 9
USER(S)	Parcel or service companies seeking to address individual residents or businesses seeking to receive ordered goods quickly and efficiently.	
TASK(S) EXECUTED	Deliver small parcels from a distribution or launch point to the intended destination with accuracy, efficiency and precision tracking.	
EMPLOYMENT METHOD	Autonomous aerial vehicles designed to carry payload leverage designated airspace.	
OPERATING ENVIRONMENT	Use designated airspace over and around neighborhood (e.g. below 1000' AGL) for delivery from and to established (and managed) landing zone.	

EXAMPLE APPLICATIONS (w/ hyperlink)

[Workhorse Drone Delivery System]

[Amazon Prime Air]

KEY VALUE / IMPLICATIONS FOR WENDELL FALLS	**Improve resident and business satisfaction by consistent delivery of packages with increased speed and decreased cost. Demonstrate WF / Newland leading adoption of emerging tech.**

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23 AUTOMATED PACKAGE HANDLING | Central Distro Center

USE CASE

TECHNOLOGY	▪ Centralized site for receiving, short-term storage and pick-up of retail online purchases ▪ Limited but growing installation of sites	TRL 7 **TRL 8** TRL 9
USER(S)	Neighborhood residents, visitors and small businesses seeking to receive or return parcels from online retail.	
TASK(S) EXECUTED	Store, organize and provide rapid consumer access to retail items in dense urban settings.	
EMPLOYMENT METHOD	Installation currently provided by the retailer (e.g. Amazon) to provide exclusive support only online purchases. However, new offerings seeking to general capability.	
OPERATING ENVIRONMENT	Facilities installed as a free-standing facility (e.g. Amazon Fresh) or as part of a larger mixed use building or multi-building site (e.g. Package Concierge)	

EXAMPLE APPLICATIONS (w/ hyperlink)

Amazon Parcel Locker

Package Concierge

Key Reference Documents

1. "Parcel delivery The future of last mile"

Amazon Fresh Pickup

KEY VALUE / IMPLICATIONS FOR WENDELL FALLS

Central parcel distribution can provide WF residents and small business more improved access to retail products and reduce need for intensive parcel delivery traffic

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11 ADDITIVE MANUFACTURING | Local Additive Production Lab

TECHNOLOGY	▪ Systems that build 3D objects by adding layer-upon-layer of material ▪ Individual systems available, integrated labs evolving	TRL 7 **TRL 8** TRL 9
USER(S)	Individuals or organizations manufacturing on-demand prototype or replacement parts, products or related items.	
TASK(S) EXECUTED	Rapid manufacture of goods with 3-D printing and prototyping tools by creating an item or integrated product from electronic source data.	
EMPLOYMENT METHOD	Multiple connected and complementary additive manufacturing machines and supporting systems.	
OPERATING ENVIRONMENT	Light industrial facility with power, connectivity and other infrastructure to enable systems.	

EXAMPLE APPLICATIONS (w/ hyperlink)

Matsuura Manufacturing Center

Advanced Manufacturing Technology Center

KEY VALUE / IMPLICATIONS FOR WENDELL FALLS

Provides opportunity for local training and commerce from the development, prototyping and production of parts and items to address immediate needs of the local market without the need for massive warehousing, shipping & logistics .

Additional Information

TECH USER GROUPS | Wendell Falls Market Segments & Their Evolving Needs

Market Segments		CURRENT	NEAR-TERM (2-5 years)	MID-TERM (5- 10 years)
BUSINESSES	Established Business			
	Emerging Business			
	Emerging Entrepreneur			
RESIDENTS	Domestic Engineer			
	Emerging Youth			
	Senior Entrepreneur			
	Resident Professional			
VISITORS / PROSPECTIVE RESIDENTS				

Assessment of personas and priority needs for each market segment should guide prioritization of technologies for the Wendell Falls road map

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A TECHNOLOGY READINESS LEVELS | Definitions

	TECHNOLOGY READINESS LEVEL	DEFINITION
TRL 7	**System prototype demonstration in an operational environment**	Prototype near, or at, planned operational system. Represents a major step up from TRL 6, requiring demonstration of an actual system prototype in an operational environment such as an aircraft, vehicle, or space. Examples include testing the prototype in a test bed aircraft.
TRL 8	**Actual system completed and qualified through test and demonstration.**	Technology has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of true system development. Examples include developmental test and evaluation of the system in its intended weapon system to determine if it meets design specifications.
TRL 9	**Actual system proven through successful mission operations.**	Actual application of the technology in its final form and under mission conditions, such as those encountered in operational test and evaluation. Examples include using the system under operational mission conditions.

http://acqnotes.com/acqnote/tasks/technology-readiness-level

https://www.nasa.gov/pdf/458490main_TRL_Definitions.pdf

B Operating Environment Aspects | Definitions

	Description	Off-Highway AV Examples
Terrain (Natural & built)	Physical character of a piece of ground or area, especially with reference to its impact for operations	▪ Physical terrain, road or work site "furniture", static or dynamic obstacles, etc.
Infrastructure	The basic, underlying framework of facilities or systems features	▪ Availability and condition of transportation and communication systems to support AV operations
Legal/ Regulatory	Federal, state, and local laws and regulations that prescribe one more aspect of STS operations	▪ Occupational Safety & Health Act (OSHA) or International Safety Organization (ISO) requirements
Threats	An object, actor or event with ability to generate intentional harm or damage	▪ Cyber exploitation of vehicle data ▪ Denial of vehicle communications, GPS, etc.
Hazards	An object, actor or event with ability to generate unintentional harm or damage	▪ Human-vehicle, vehicle-vehicle, or vehicle-obstacle collision
Electro-magnetic	Of or relating to the interrelation of electric currents or fields and magnetic fields	▪ Sensor or communications signals ▪ Vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I) communications
Weather / Atmosphere	The state of the atmosphere at a place and time as regards heat, cold, wind, precipitation, etc.	▪ Impact of participation, heat, or obscuration on AV sensor systems
Other Factors	Other aspects of the operating environment that can influence AV system and/or broader STS operating requirements	▪ Trade union agreements and negotiations (e.g., longshoremen's unions at ports)

4 Full Tech Application List (1/4)

Index #	Technology (Tech-Enabled Capability)	Application	1. Transport /Logistics Connectivity	2. Connected Community	3. Entrepreneurial Ecosystem	4. Sustainable Sourcing, Production & Value-Adding	5. Smart Resource Management	6. Authentic & Community-Specific Experiences	7. Evolving Population & Workforce
1	IOT MOBILITY INFRASTRUCTURE	Wireless Connectivity 5G Cellular Communications Networks	■						
2	CONNECTED BUILDING SYSTEMS	Home monitoring and management systems	■						
3	INTERNET OF THINGS (IOT) ARCHITECTURE	Location-based immersive exploration	■						
4	AUTONOMOUS GROUND VEHICLES	Intra-neighborhood transport		■					
5	SHARED / ON-DEMAND VEHICLES	Metro-Area & Commuter Transport		■					
6	SHARED / ON-DEMAND VEHICLES	Intra-Neighborhood Transport		■					
7	AUTONOMOUS GROUND VEHICLES	Ground package delivery		■					
8	AUTONOMOUS AERIAL VEHICLE	Aerial package delivery		■					
9	CONNECTED CORPORATE CAMPUS	Connected Corporate Campus	▒		■				
10	CONNECTED WORK TECHNOLOGY	Collaborative Entrepreneur Space			■				▒
11	ADDITIVE MANUFACTURING	Local Additive Production Lab				■			
12	INTEGRATED AGRICULTURE SYSTEMS	Vertical Farming			▒	■	▒		
13	INTERNET OF THINGS (IOT) ARCHITECTURE	Neighborhood monitoring & analytics					■		
14	ELECTRIC VEHICLE INFRASTRUCTURE	Charging-Centric Facilities	▒				■		

Priority Tech Applications with Summary (see Reference Book) ■ Primary Benefit ▒ Secondary Benefit

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4 Full Tech Application List (2/4)

Index #	Technology (Tech-Enabled Capability)	Application	1. Transport /Logistics Connectivity	2. Connected Community	3. Entrepreneurial Ecosystem	4. Sustainable Sourcing, Production & Value-Adding	5. Smart Resource Management	6. Authentic & Community-Specific Experiences	7. Evolving Population & Workforce
15	SMART ENERGY STORAGE	Commercial / Shared Power Storage				Secondary	Primary		
16	TECH-ENABLED SUPPLY CHAIN	Modular Construction					Primary		
17	INFRASTRUCTURE MONITORING	Cloud-Based Parking Management					Primary		
18	EXTENDED REALITY	Neighborhood visioning and marketing experience		Secondary				Primary	
19	VIRTUAL & AUGMENTED REALITY	Entertainment and Recreational Interaction			Secondary			Primary	
20	AUTOMATED DATA ANALYTICS	Neighborhood Usage Intelligence							Primary
21	ADAPTIVE + AI-ENABLED LEARNING	Immersive Ed + Training Hub							Primary
22	VIRTUAL & AUGMENTED REALITY	Virtual Workforce Training Center							Primary
23	AUTOMATED PACKAGE HANDLING	Central Package Sorting & Distribution Hub	Primary	Secondary					
24	FIBEROPTIC NETWORKS	High Data Capacity Communications		Primary	Secondary				
25	PIEZOELECTRIC ENERGY SURFACES	Energy-Generating Roads					Primary		
26	COMMUNITY SHARING PLATFORMS	Shared Community Resources		Primary	Secondary				

Priority Tech Applications with Summary (see Reference Book) | Primary Benefit | Secondary Benefit

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4 Full Tech Application List (3/4)

Index #	Technology (Tech-Enabled Capability)	Application	1. Transport /Logistics Connectivity	2. Connected Community	3. Entrepenuerial Ecosystem	4. Sustainable Sourcing, Production & Value-Adding	5. Smart Resource Management	6. Authentic & Community-Specific Experiences	7. Evolving Population & Workforce
27	MOBILE TRANSIT / WORK PLATFORM	Work-Centered Shuttle Service	■	■					
28	DISTRIBUTED LEDGER TECHNOLOGY	Cryptocurrency infrastructure			■				
29	SMART ENERGY STORAGE	Residential / Individual Power Storage					■		
30	APP-BASED COMMUNITY PLATFORM	Visualize happenings in one place		■	■				■
31	AUTONOMOUS GROUND SYSTEMS	Autonomous Open Space Maintenance					■		
32	AUTOMATED HOSPITALITY SYSTEMS	Automated Visitor Services		■				■	
33	FLEXIBLE TRIP SUPPORT	Flexible / Multi-Modal Transportation	■	■					
34	ELECTRIC VEHICLE INFRASTRUCTURE	Charging-Centric Infrastructure & Facilities	■		■		■		
35	ENERGY GENERATING SURFACE	Solar Roadways and Parking					■		
36	PERVIOUS ROAD SURFACES	Low-Runoff Pavement					■		
37	AUTONOMOUS VEHICLES	Automated Regional Transit	■				■		

Priority Tech Applications with Summary (see Reference Book) — ■ Primary Benefit — ■ Secondary Benefit

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4 Full Tech Application List (1/4)

Index #	Technology (Tech-Enabled Capability)	Application	1. Transport /Logistics Connectivity	2. Connected Community	3. Entrepreneurial Ecosystem	4. Sustainable Sourcing, Production & Value-Adding	5. Smart Resource Management	6. Authentic & Community-Specific Experiences	7. Evolving Population & Workforce
38	ENVIRONMENTALLY-POWERED INFRASTRUCTURE	Solar-power lights, community message board, etc.					Primary		
39	LOCAL SOURCING PLATFORM	Smart Material and Agricultural Sourcing		Secondary	Secondary	Primary			
40	ARTIFICIAL INTELLIGENCE-BASED ENGAGEMENT APP	Virtual Community Interaction & Engagement		Secondary				Primary	
41	ADVANCED MATERIALS	Sustainable Buildings					Primary		
42	CARGO ORIENTED DEVELOPMENT	Next-Gen Highway Interchange	Primary		Secondary		Secondary		
43	AUTOMATED LOGISTICS & CARGO TRANSFER	Automated Freight Center	Primary		Secondary				

Priority Tech Applications with Summary (see Reference Book) | Primary Benefit | Secondary Benefit

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