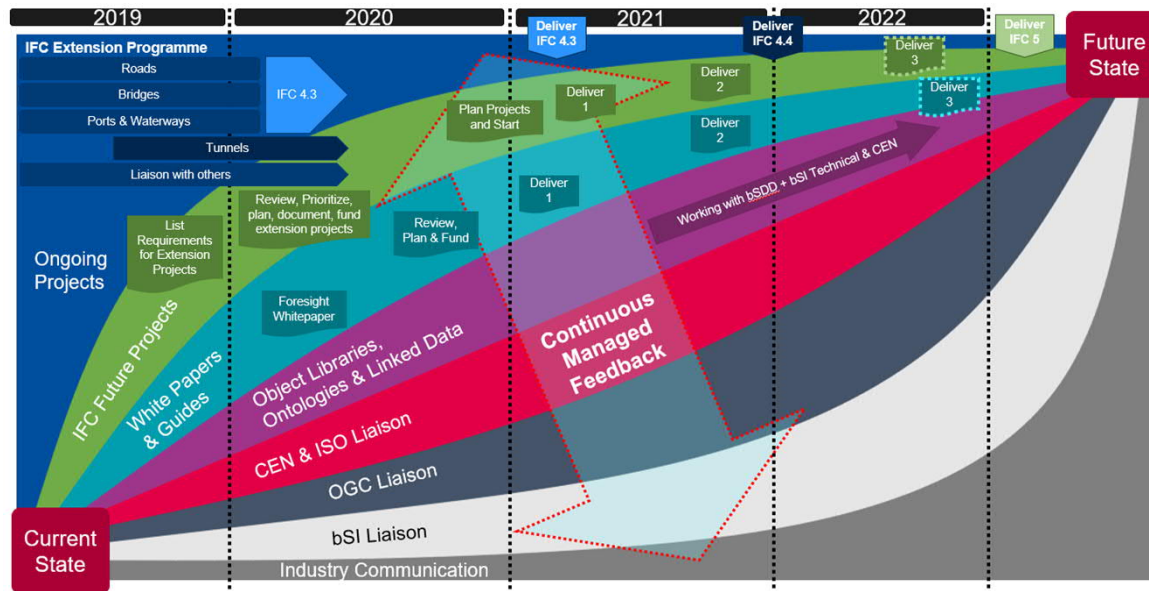


High Level Roadmap View for Infrastructure Room 2020-2022



Author: Phil Jackson
Contributions: Ronald Berg, Tristan McDonnell, Fleurike Krijgsmann and the IRSC

Produced for: buildingSMART InfraRoom Steering Committee

Version: 1

Infrastructure

- Horizontal BIM
- Deals with a Continuous World
- Handles Linear and Connected World
- Gives Location and Context to all BIM
- Contains Vertical BIM
- Covers the existing and new built environment



Infrastructure Includes

- Generally
Bridges, Tunnels, Retaining Structures, Earthworks, Drainage, Dams,
- Transport
Road, Rail, Metro, Trams, Canals, Ports,
- Environment
Floods, pollution, water courses,
- Utilities
Power distribution, Sewage, Potable water, Communications



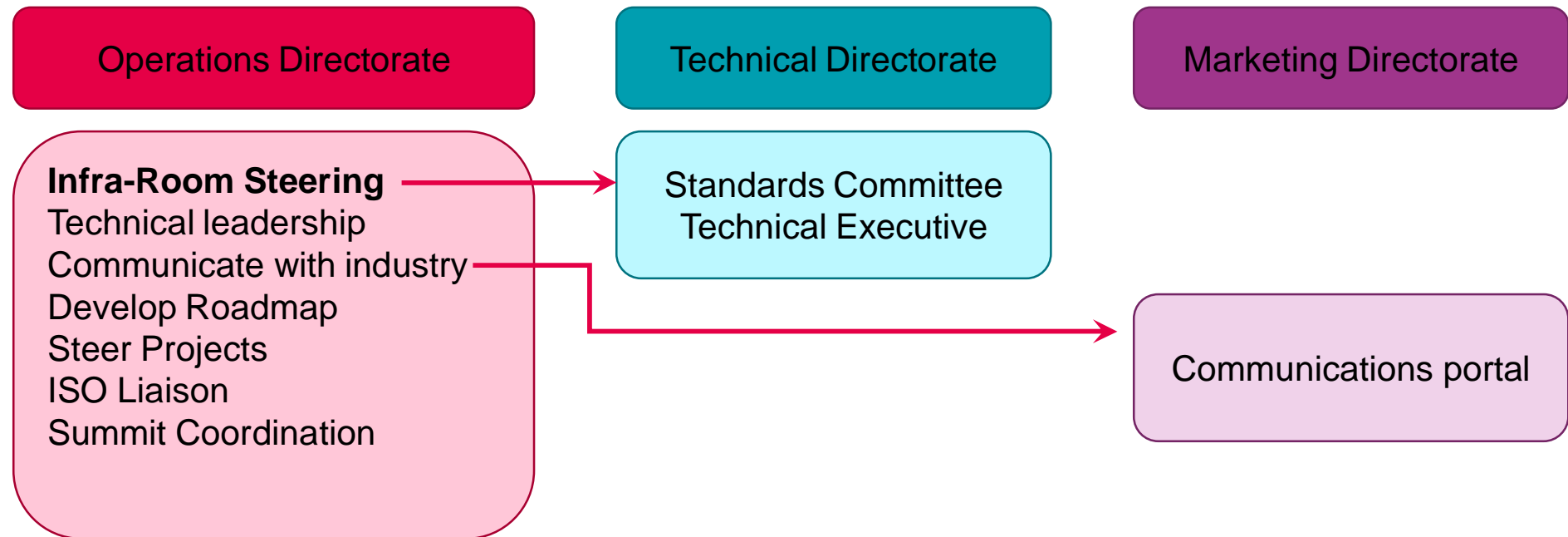
CEN TC 442 Work Group 6

Defines Infrastructure as:

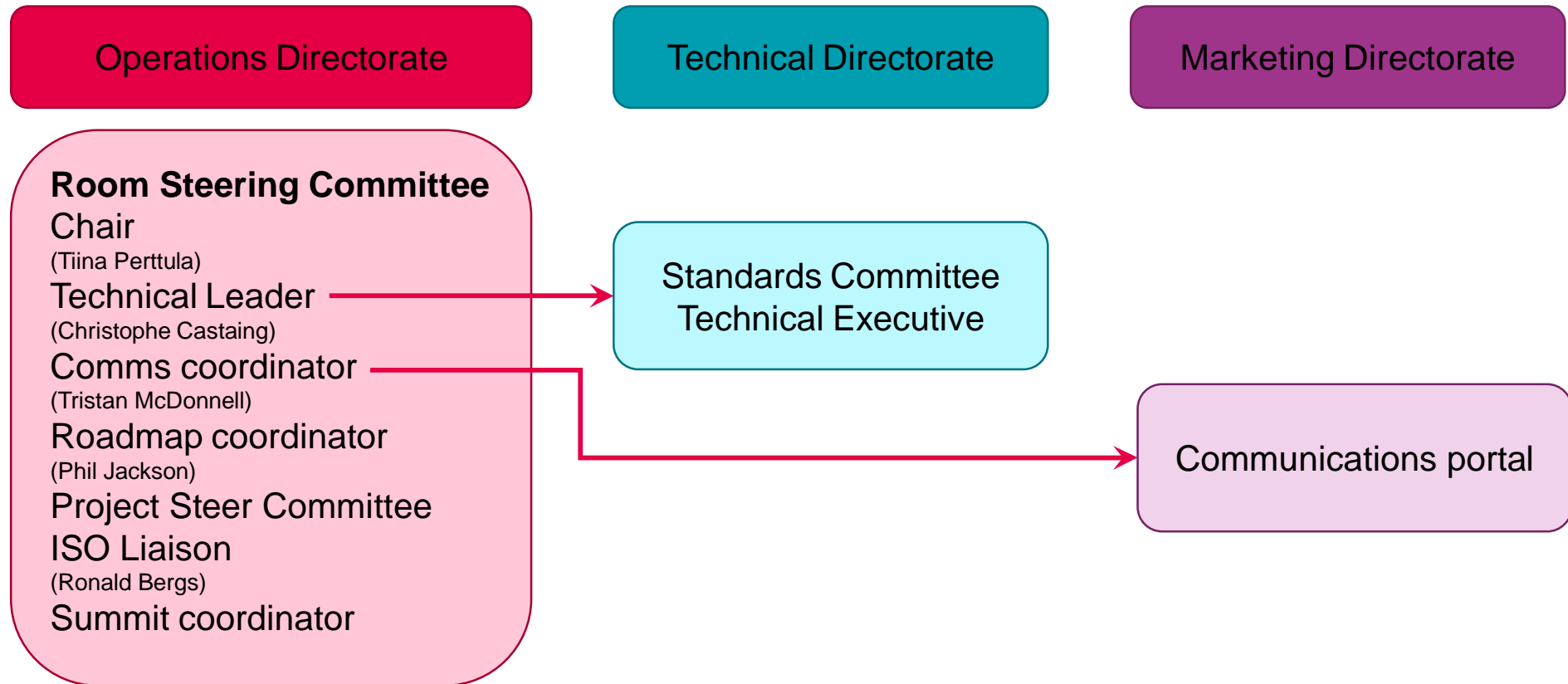
The physical components of interrelated systems that enable, sustain, or enhance society through the transportation of people, goods, water and utilities, or provide resilience to potential disruptive events.

- Examples include roads, railways, waterways, airports, ports, sewerage, power supply networks, communications networks, and flood defenses.
- For the purpose of this technical report, infrastructure is taken to exclude buildings.

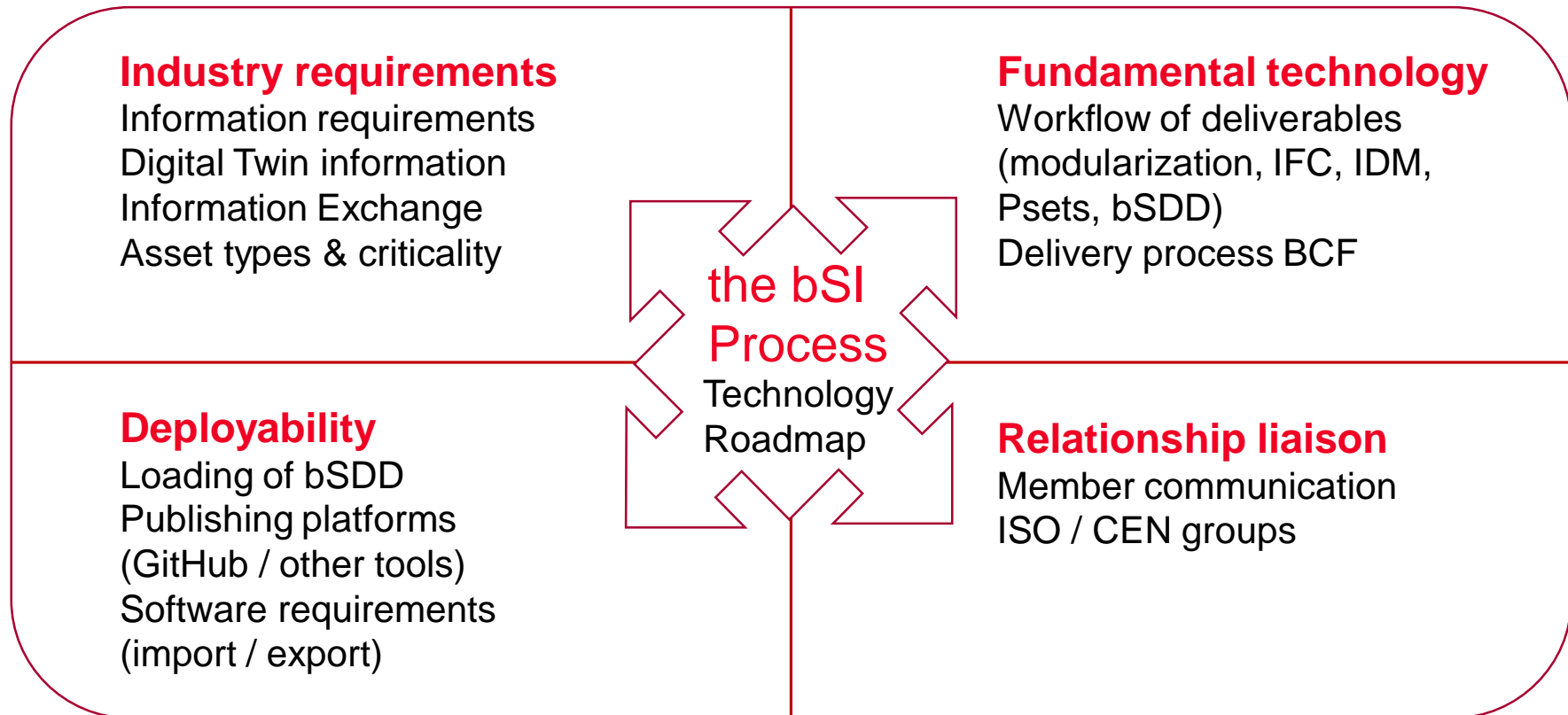
What we do



Room Responsibilities



Where we fit in

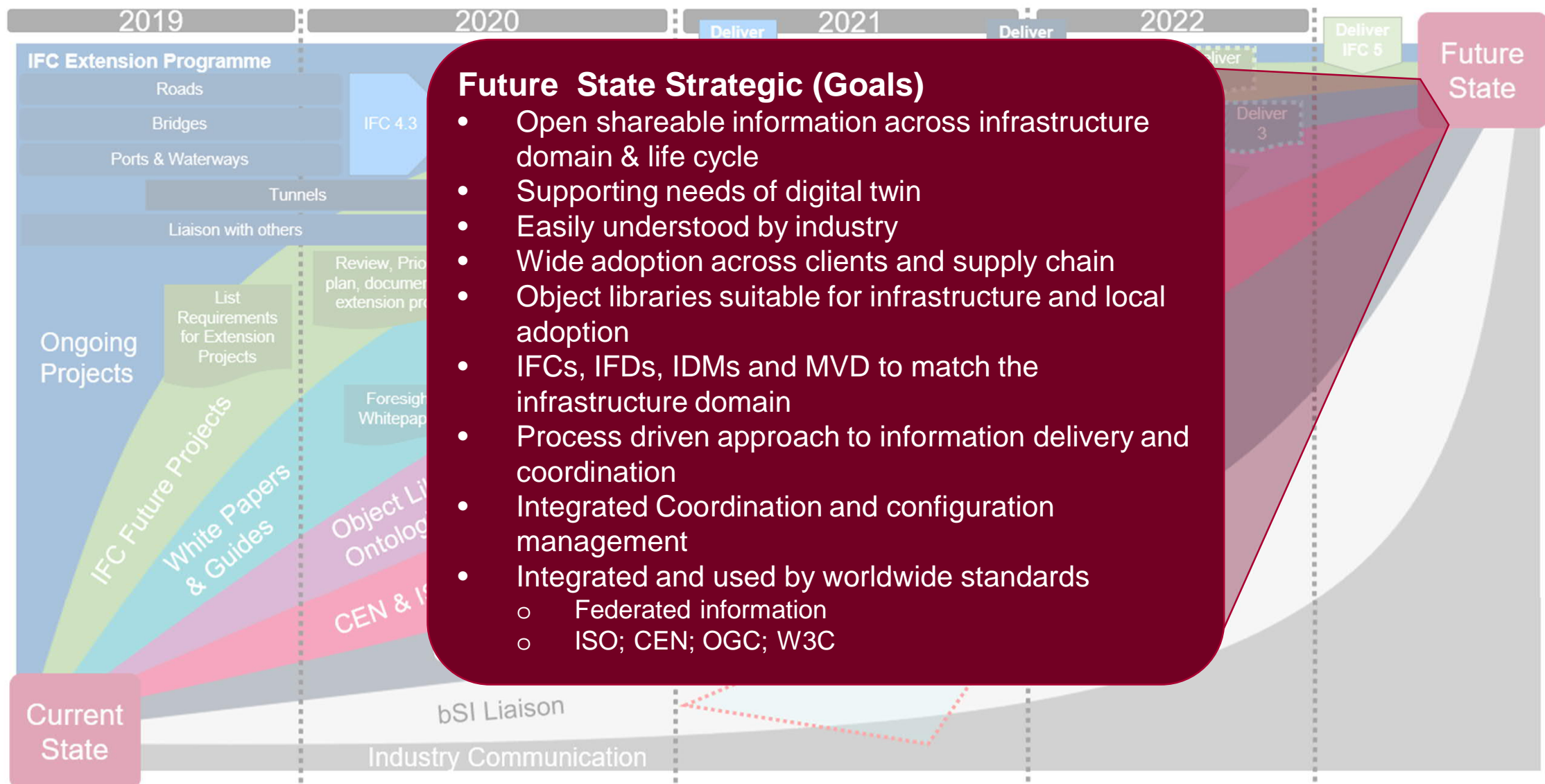


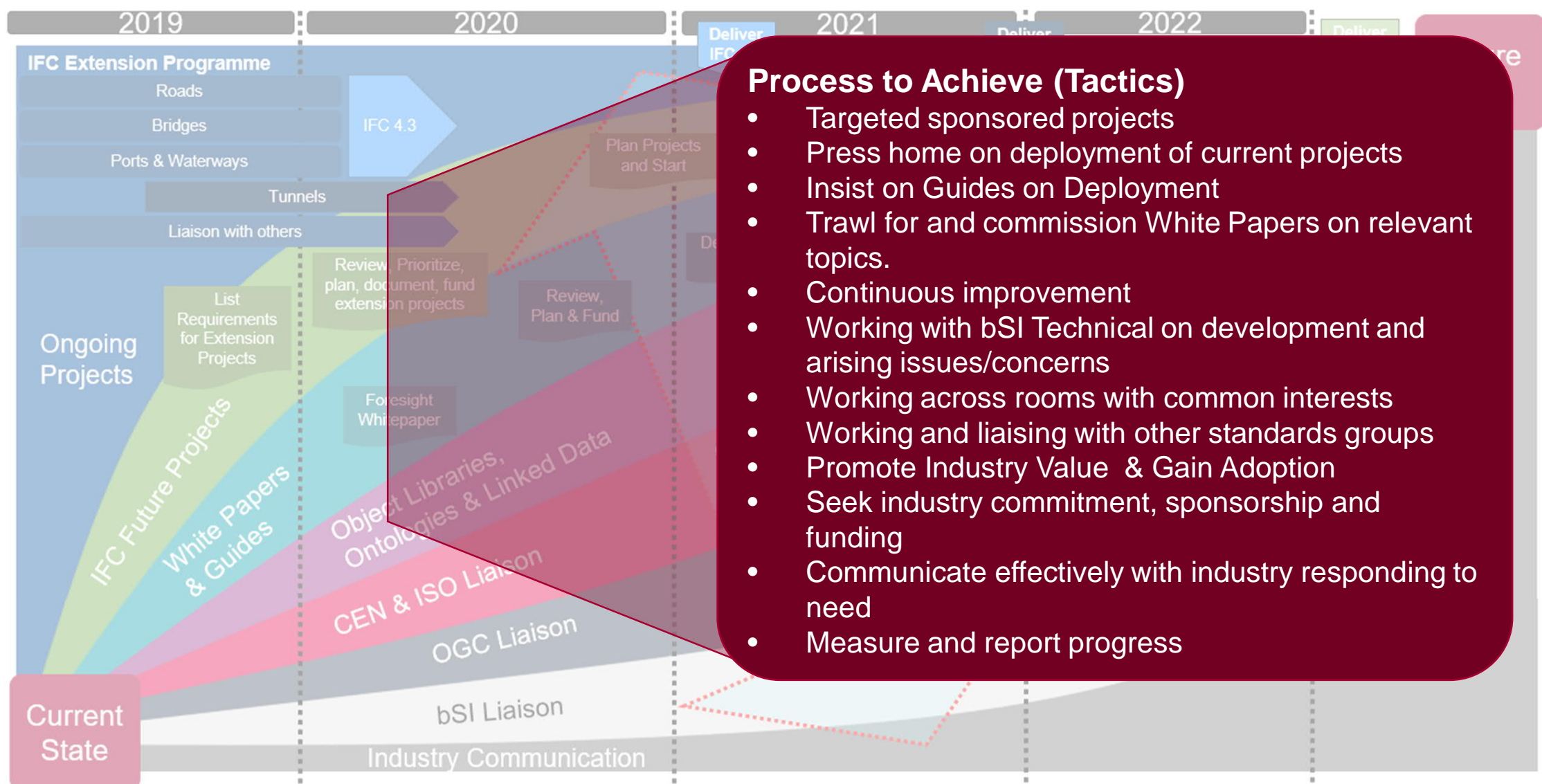
Assumptions of industry needs

- The infrastructure industry is asking for and developing openBIM-standards that can be used by them as a fundament to create their digital twins.
- The infrastructure industry is asking for tools that can be used in order to create, use and/or maintain digital twins.
- The infrastructure industry wants these tools to be interoperable, as a consequence there is a need for tools that are based on open-BIM standards.
- Clients want to mandate open BIM-standards to establish a digital twin and would like to refer to a roadmap, methodology and standards in order to ensure:
 - interoperability
 - an equal level playing field (open competition)
 - state of the art technology solutions
 - best practices of global standards to be implemented
 - an effective, efficient and standardized way of establishing a digital twin'.
- buildingSMART is about to provide a definition of a digital twin. The following definition is provided by Wikipedia: https://en.wikipedia.org/wiki/Digital_twin

Assumptions for solutions

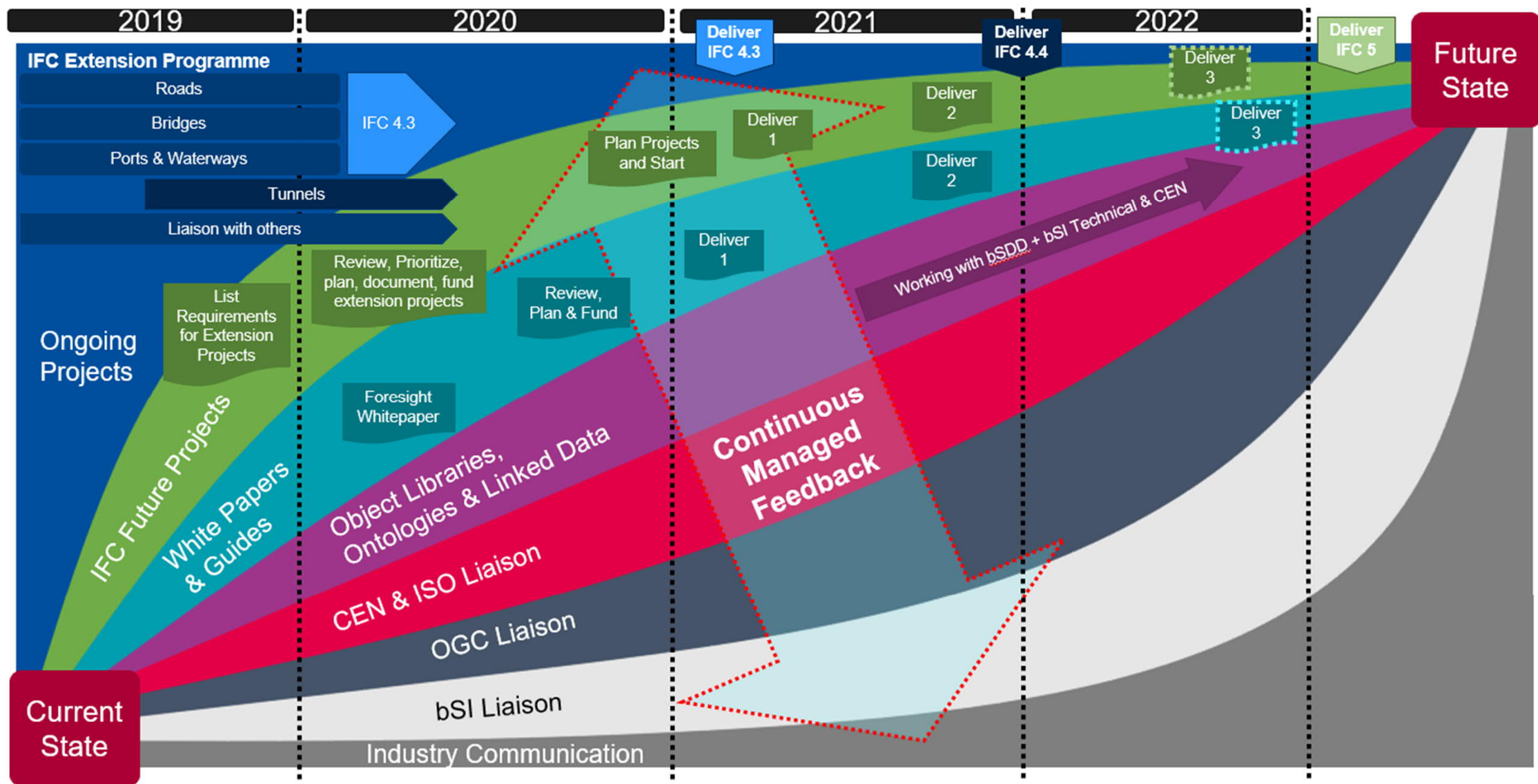
- There is a need for common understanding of definitions, principles and methodology.
- Fundamentals to establish a digital twin are available:
 - Gemini-principles (UK)
 - buildingSMART-standards and products
 - OGC-standards
 - ISO- and CEN-standards
 - W3C-standards
- We need to establish a roadmap in order to specify and illustrate how these open BIM-solutions should be used in a standardized and user-friendly manner in order to serve the infrastructure industry to develop, use and maintain their digital twins.
- For our buildingSMART InfraRoom roadmap, we should focus on the buildingSMART standards and products (IFC, IDM, bSDD and BCF) and their relationships in particular, in order to make them integral applicable, understandable and manageable for actors in the infrastructure industry globally.





Roadmap – Route Streams to Success

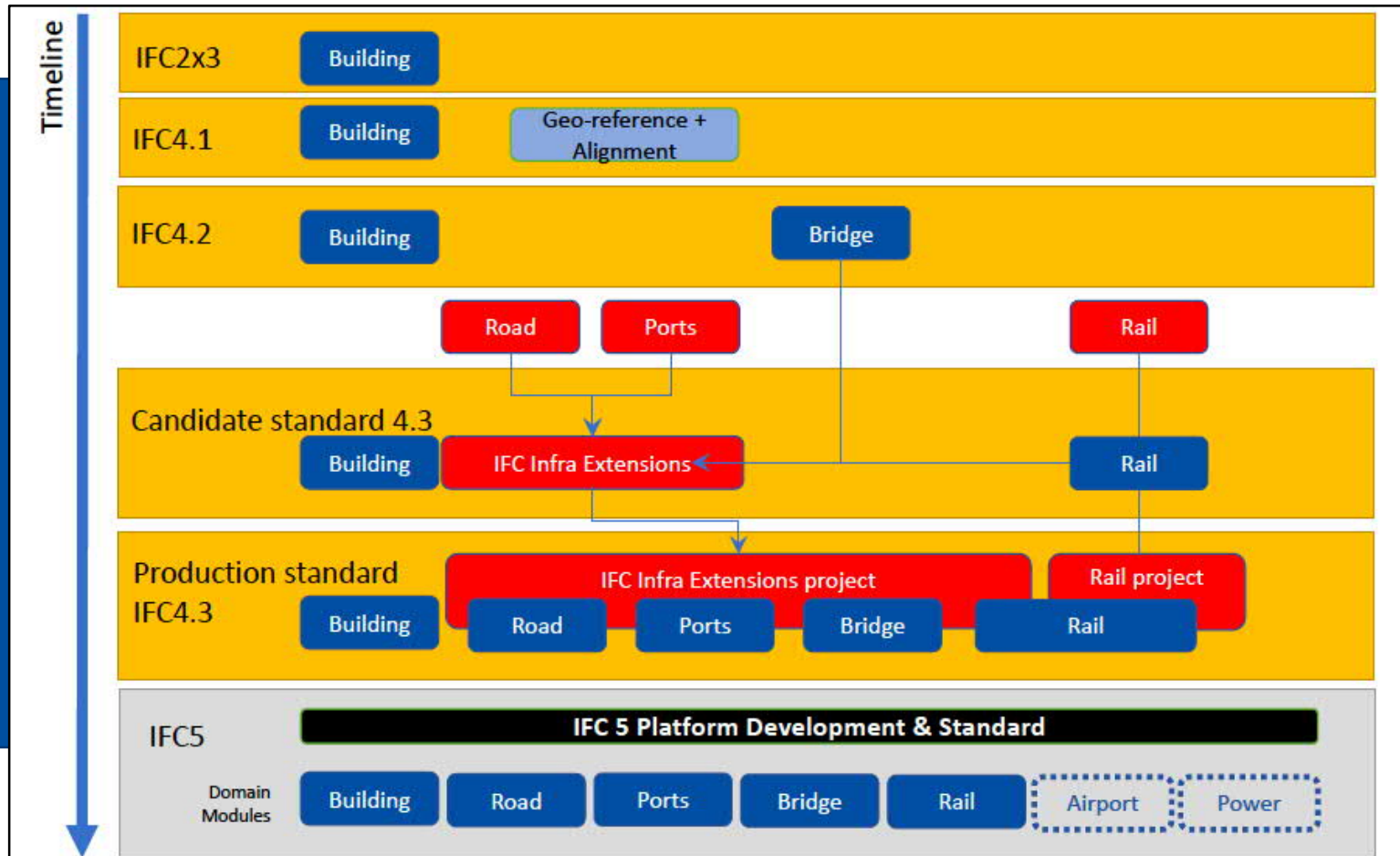
- 1 Completing and Deploying Ongoing Projects
- 2 IFC Infrastructure Future Requirements
Potential – Delivery Projects
- 3 White Papers & Guides
- 4 Object Type Libraries, Ontologies and Linked Data
- 5 CEN, ISO and other Standards Liaison
- 6 OGC Liaison – IDBE
- 7 bSI Liaison on overall approach and technical requirements
- 8 Industry Communication



Completing & Deploying Current Projects

- IFC Bridge, Road, Ports & Waterways, & Tunnel Reported elsewhere
- IFC Rail working in close liaison with Infra Room
- Common Schema now to be IFC Extension Programme
 - Harmonizing ongoing projects
 - Specifying extensions to meet requirements
 - Set out Work Packages
 - Govern, control and liaise on development across projects
 - Details reported elsewhere
- Deploying the standards

IFC Roadmap – Project View



Existing Projects Milestones and bSI Plans

bSI Infrastructure domains 5 Year Master Plan for IFC													
IMPORTANT CAVEAT: All Dates are Strictly Subject to Sourcing Required Levels of Annual Funding		2020		2021		2022		2023		2024		2025	
		Today	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		
IFC 4.3	IFC Platform							Compliance and Certification	IFC 4.3 Final Std	Governance, Maintenance and Support			
bSDD	Data Dictionary	Current bSDD (API 4.X)											
Projects	IFC Road	Candidate STD	Review & Validate		Production Standards IFC 4.3	Vendor Implementation		User Deployment					
	IFC Bridge	Candidate STD	Review & Validate			Vendor Implementation		User Deployment					
	IFC Rail	Candidate STD	Review & Validate			Vendor Implementation		User Deployment					
	IFC Ports and Waterways	Candidate STD	Review & Validate			Vendor Implementation		User Deployment					
	Infra IFC Extensions	Harmonization Project											
	IFC Tunnel *	Requirements	Development	Candidate STD		Review & Validate		Production Std	Vendor Implementation		User Deployment		
ISO/CEN	International Standard IFC 4.3	ISO PAS		Comment		ISO NWI	Finalize		Voting	ISO IS			
IFC 5	IFC Platform	IFC 5 Roadmap Development				Candidate Std	IFC 5.x	Production Std	Compliance and Certification				
bSDD	Data Dictionary	bSDD Roadmap Development				Next gen bSDD							
Modules	IFC Road					IFC 5 Updates	Candidate Standards IFC 5	Validate	Production Standards IFC 5	Vendor Implementation			User Dep
	IFC Bridge					IFC 5 Updates		Validate		Vendor Implementation			User Dep
	IFC Rail					IFC 5 Updates		Validate		Vendor Implementation			User Dep
	IFC Ports and Waterways					IFC 5 Updates		Validate		Vendor Implementation			User Dep
	IFC Tunnel					IFC 5 Updates		Validate		Vendor Implementation			User Dep
Projects	Airports	Requirements	Funding	Development		IFC 5 Updates		Candidate Standards IFC 5	Validate	Production Standards IFC 5	Vendor Imp		
	Power	Requirements	Funding	Development		IFC 5 Updates			Validate		Vendor Imp		
	Other ?	Requirements		Funding		Development			Validate		Vendor Imp		
ISO / CEN	International Standard IFC 5					ISO PAS		Comment		ISO NWI	Finalize -->		

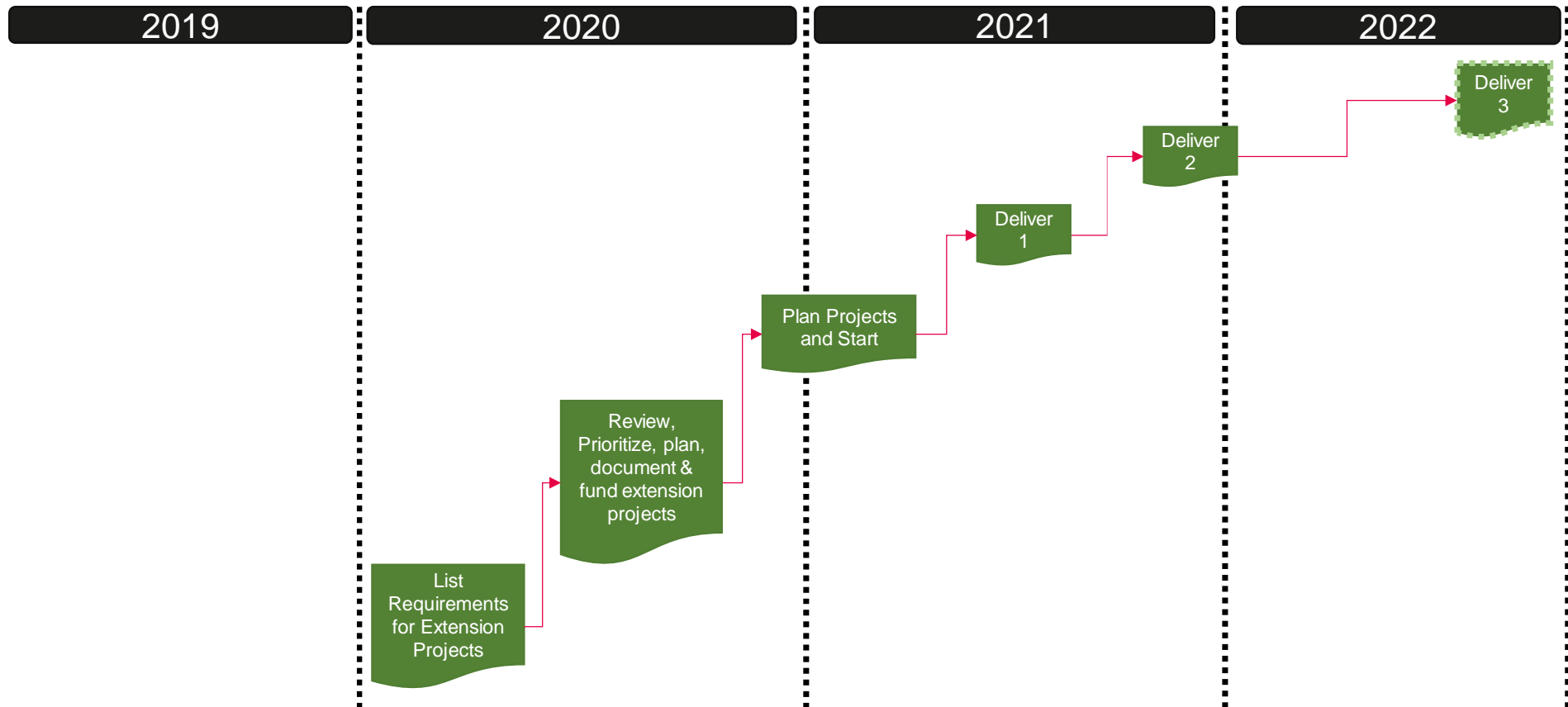
IFC Extension Infrastructure Future Requirements

- Draw on
 - Outputs to sessions at previous summits
 - Ongoing Projects requirements for further extension
 - Harmonization Workshop Outputs
 - IFC Extension Programme initial plans
- List potential projects
- Liaise and support projects in other rooms
- Produce Project Frameworks for Development of Scope & Business Plans
- Seek sponsors, stakeholders, resources and funds by going to market

Review Needs, Prioritise, Fund & Plan

- Review from industry input
- Review from existing project out of scope
- Develop Matrix of cross discipline use cases – deadline June 2020
- Publish for prioritization vote
- Produce outline business cases
- Seek funding
- Plan projects with milestones

IFC Extension Projects Proposed Timeline



Current Task: Call for Prioritization of IFC Infra Extensions Candidates

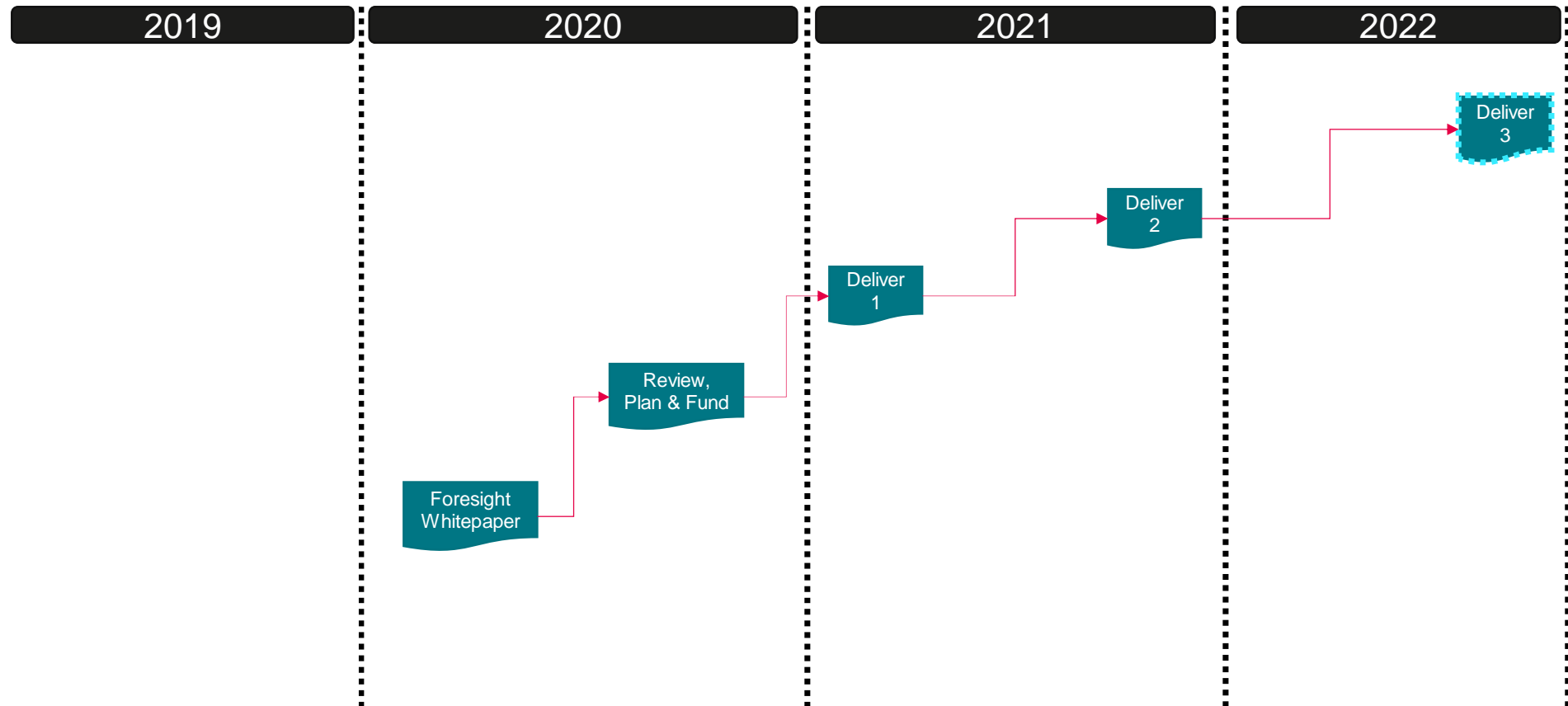
**BSI InfraRoom Steering Committee
2020 Roadmap Consolidated Common Requirements**

Headline Topic	Specific Use Case Topic	Source Requirement
Communications	Cabling and comms equipment	
Communications	Masts and mast equipment	
Communications	Communication centres	
Drainage	Drainage from runoff and protection works	
Drainage	Balancing Ponds; Oil Traps; Environmental	General; Rail; Tunnel; Road
Earthworks	Earthworks Embankment and cutting design	
Earthworks	Landscaping	
Earthworks	Planting	
Earthworks	Bunds, Levees;	
Earthworks	Erosion protection	
Earthworks	Seawalls	
Machine control	Earthworks machine control from design	
Maintenance Compounds	Parking, entry/exit and manouvering;	General; IFC Tunnel; Landscaping
Maintenance Compounds	Storage; workshops	Road; Rail; Ports;
Power	Distribution High Voltage, Low Voltage, transformers,	
Power	Lighting	General; Rail; Road
Visualisation	Passenger, driver sightlines, signal sighting, public visualisation of projects	
Water	Potable water distribution; pumping; storage	Tunnel; Rail
Water	Reservoirs	General
Water	Treatment Plants	
Water	Foul Water Distribution; pumping; storage	General
Water	Treatment Plants; filter beds	General
Water	Filter beds	

White Papers & Guides

- Publish Foresight - White Paper looking at immediate and forthcoming issues
- Continue with series of Technical White Papers to support and encourage bSI development and industry thinking
- Follow release of Infrastructure IFC with guidance on use and application
- Make these part of project plans or projects in themselves
- Seek sponsors, stakeholders and funding
- Framework for business case and plans

White Paper Planning

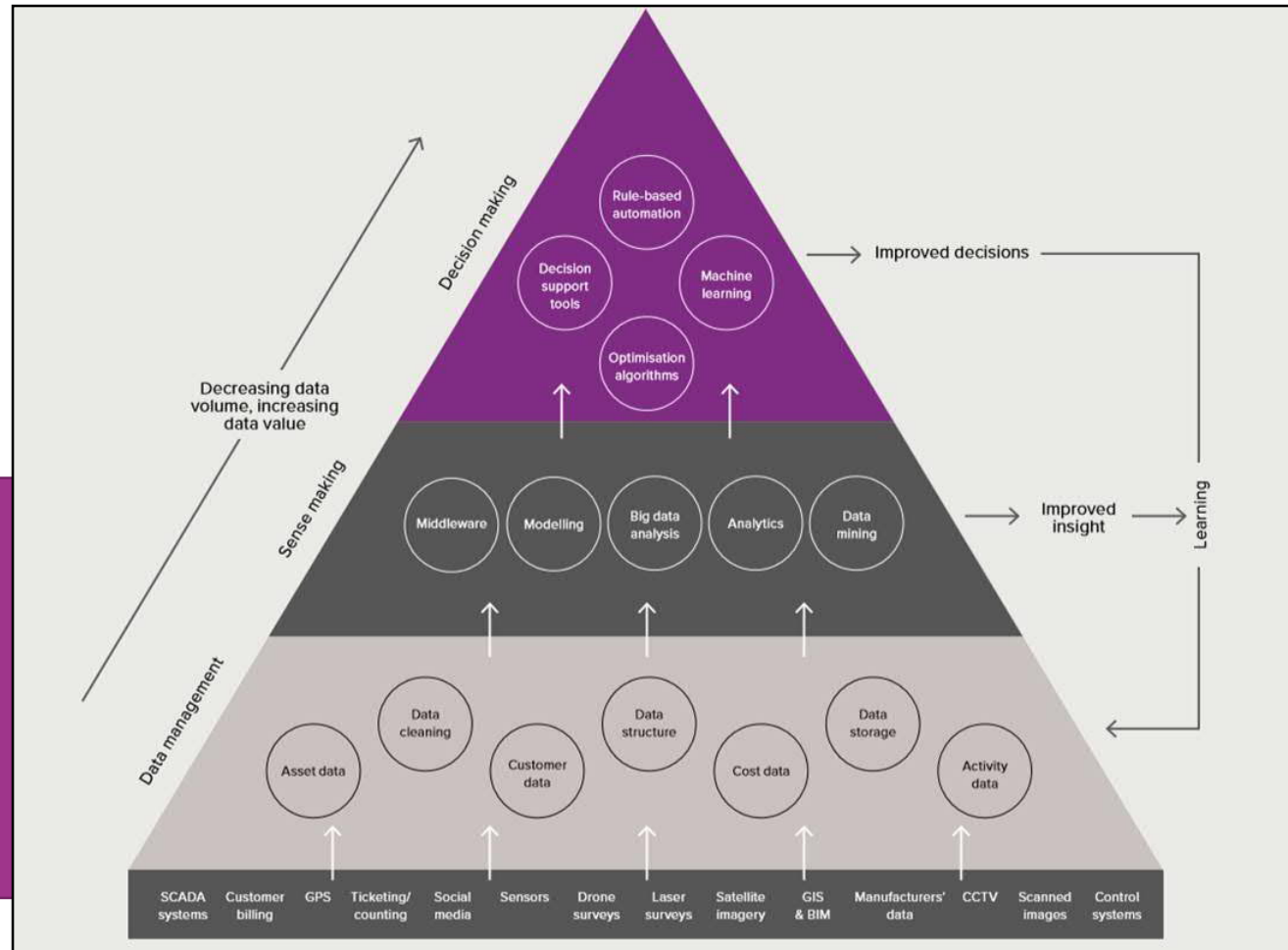


Object Type Libraries, Ontologies and Linked Data

- Work with bSDD and other areas
- We want to draw on the expertise of ontology and linked data specialists in bSI Technical Room and ISO / CEN
- We want to be sure to meet the InfraRoom requirements

Object Type Libraries, Ontologies and Linked Data

- Future State:
- Towards a data driven approach



Source: CDDB, the Gemini principles, UK 2019

CEN, ISO, and Other Standards Liaison

- Working with bSI representatives
- Ensure embedding IFC updates in future ISO updates by 2022
- Keep a watching brief
- Advise and influence

Specific OGC Liaison

- We do not see ourselves in competition with OGC but complimentary to each other
- Envision a future where we can easily federate information from Geo assets where it is more appropriate
- IDBE – Refresh and update working with OGC steering, discussion and joint work
 - Clarify areas of overlap and common concepts
 - Provide common working guidance

bSI Technical Roadmap Liaison

- Work with Technical Group leading standards process and development
- Raise and discuss issues and topics that require attention
- Gaps and current issues
 - To be addressed in Whitepaper accompanying Roadmap
 - Support for full Digital Twin Concepts
 - Persistent Unique ID through life cycle information process
 - Extending BCF to suit and support ISO 19650 Process
 - Exploration of 'Design to Design' requirements

Industry Engagement & Communication

- Post Roadmap report via bSI Forum
- Invite feedback regular on the Roadmap
- Review feedback and regularly update Roadmap recommendations
- Develop a dashboard & track progress.

Immediate Tasks

Issue IFC Extension proposals to community for prioritization

Produce and publish foresight White Paper

Review and refresh IDBE working group

