DFHX integration sequence in SM18
Updates

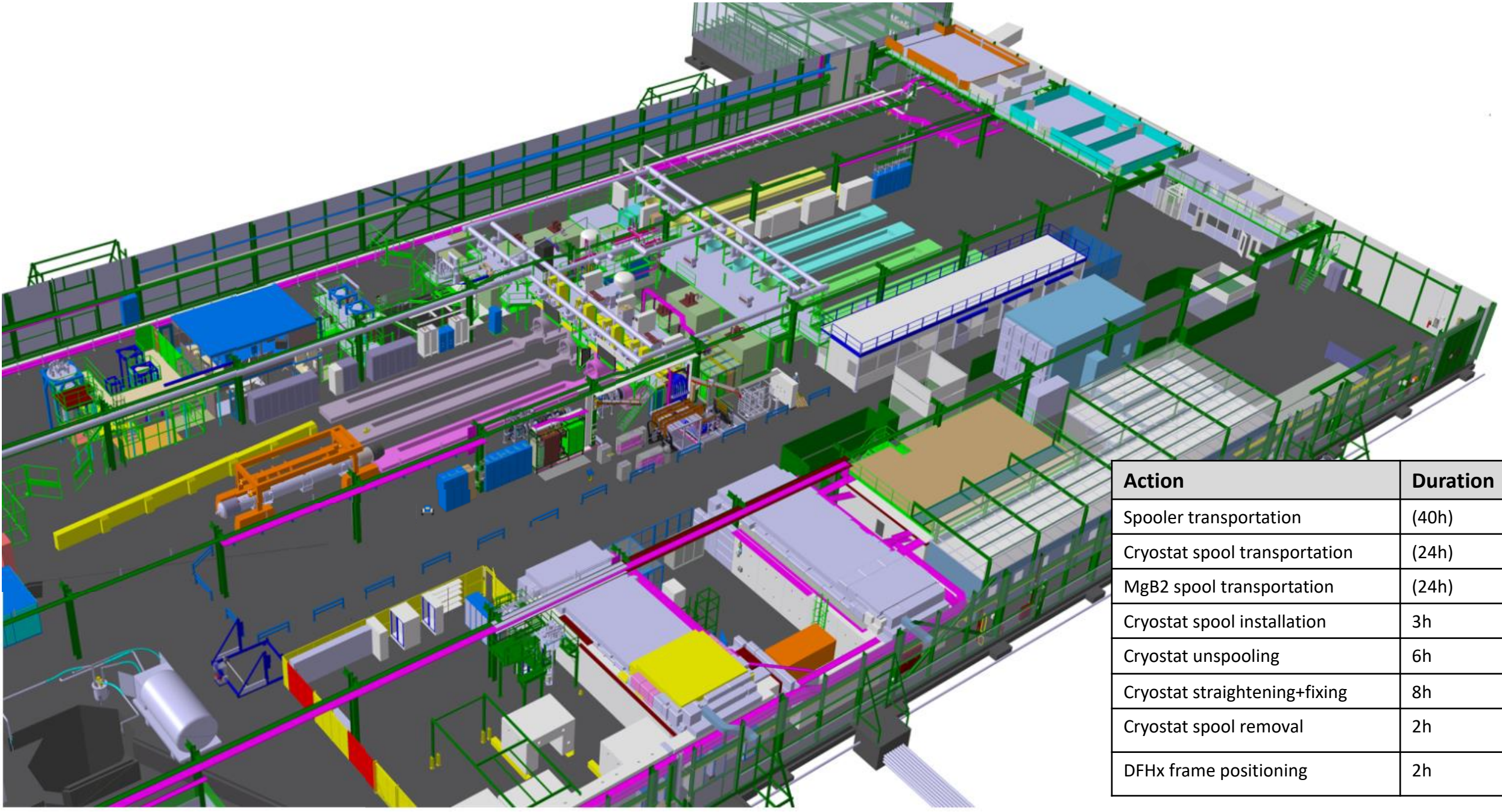
12/05/2022

Stefanos Christos Spathopoulos

Overview

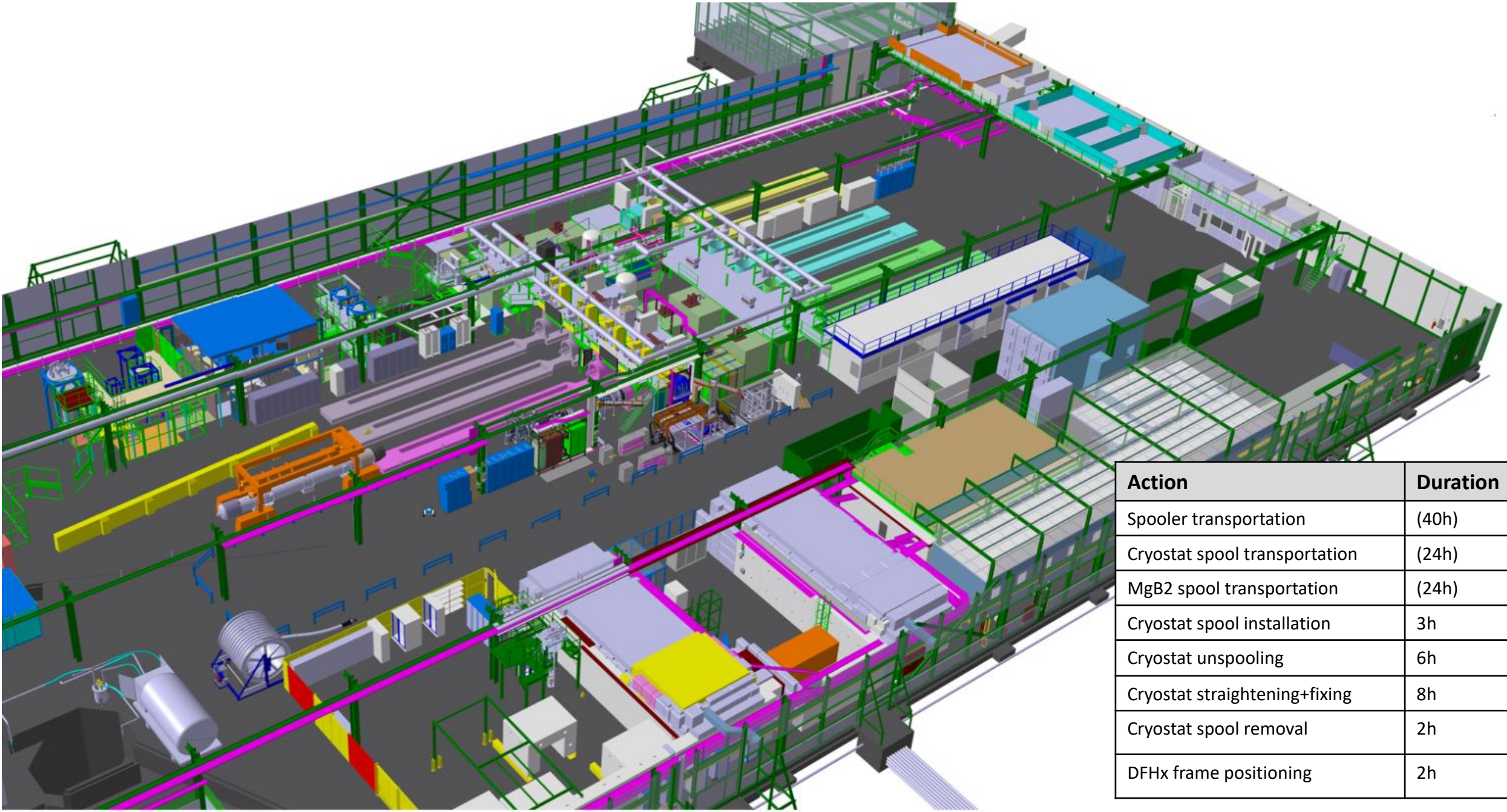
- Integration sequence updated based on the points raised during the last WP6a technical meeting.
- Time duration refined: Time unit converted from “days” to “hours”.
- Updated timescale integrated to Planning proposal

Phase 0: SCLink Cryostat+DFHx frame installation



Action	Duration
Spooler transportation	(40h)
Cryostat spool transportation	(24h)
MgB2 spool transportation	(24h)
Cryostat spool installation	3h
Cryostat unspooling	6h
Cryostat straightening+fixing	8h
Cryostat spool removal	2h
DFHx frame positioning	2h

Phase 0: SCLink Cryostat+DFHx frame installation



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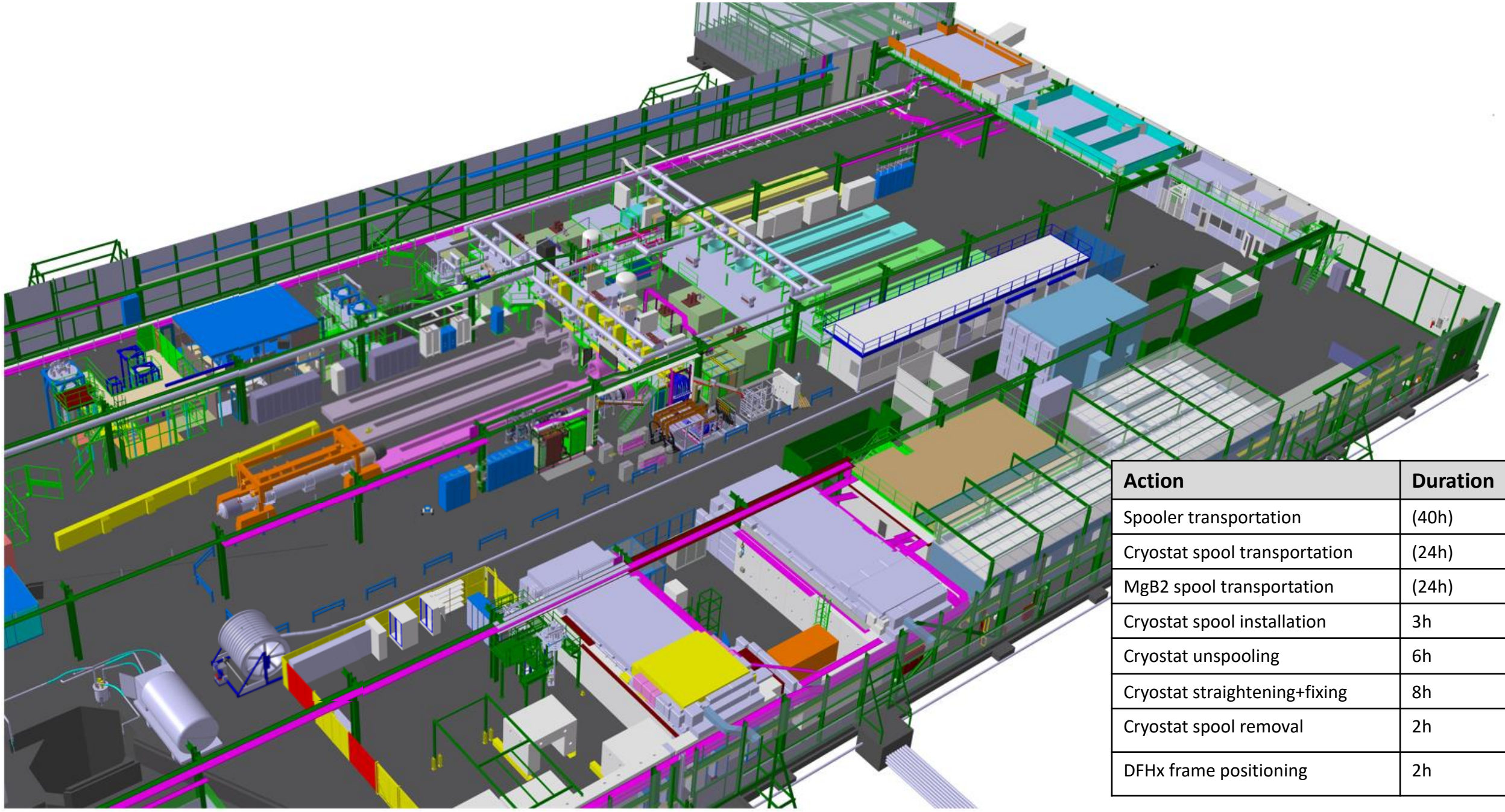

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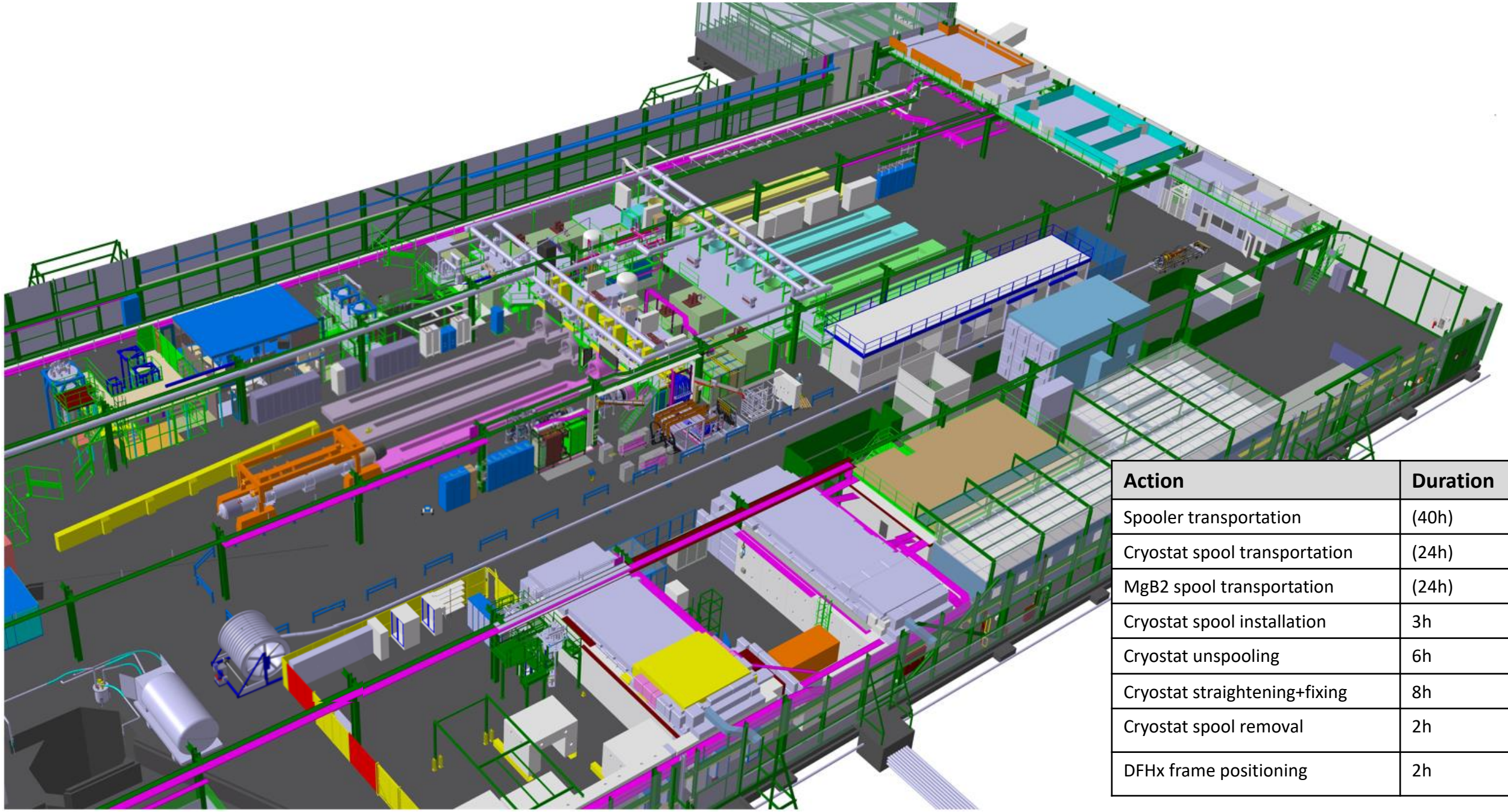

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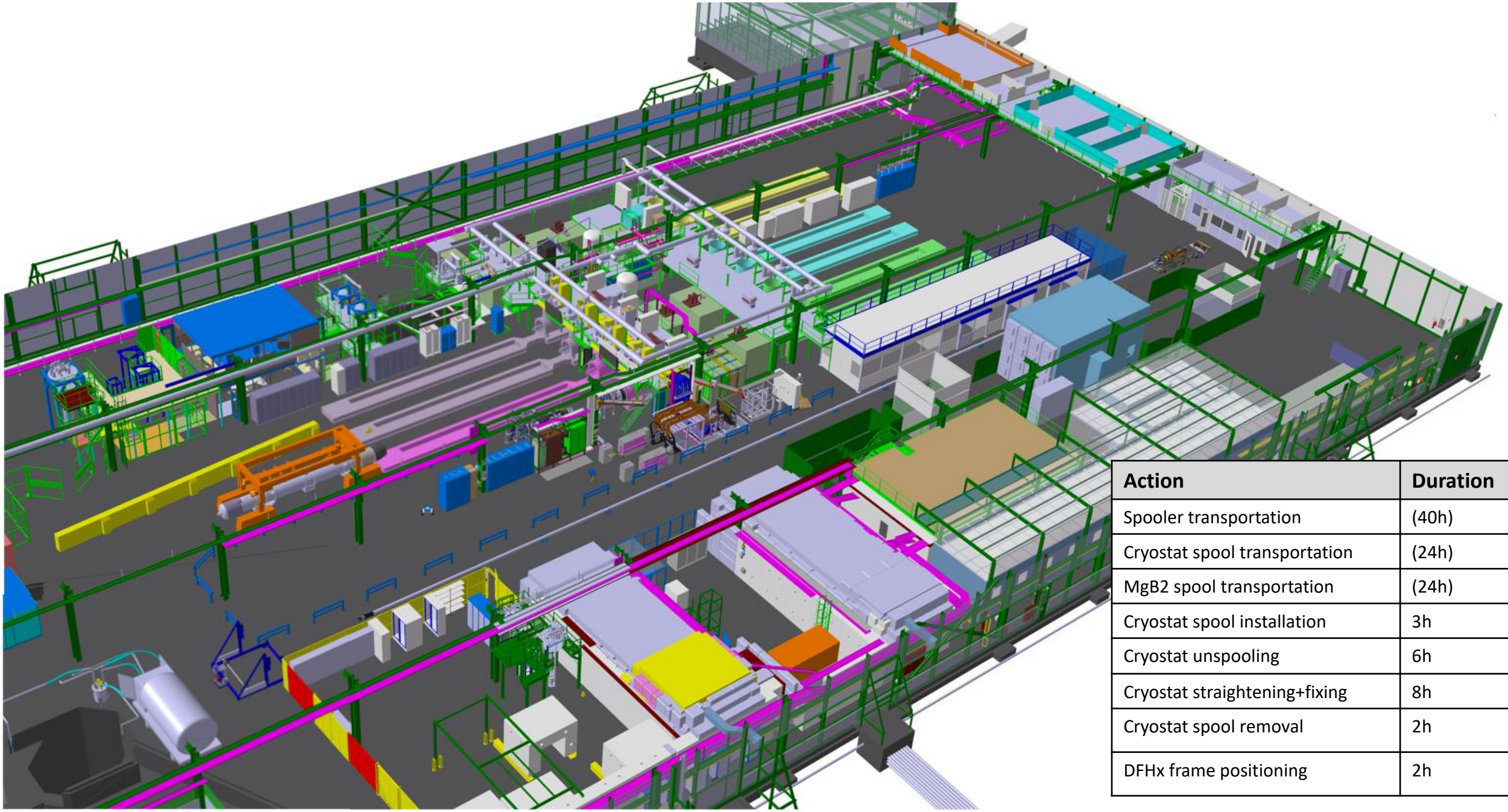

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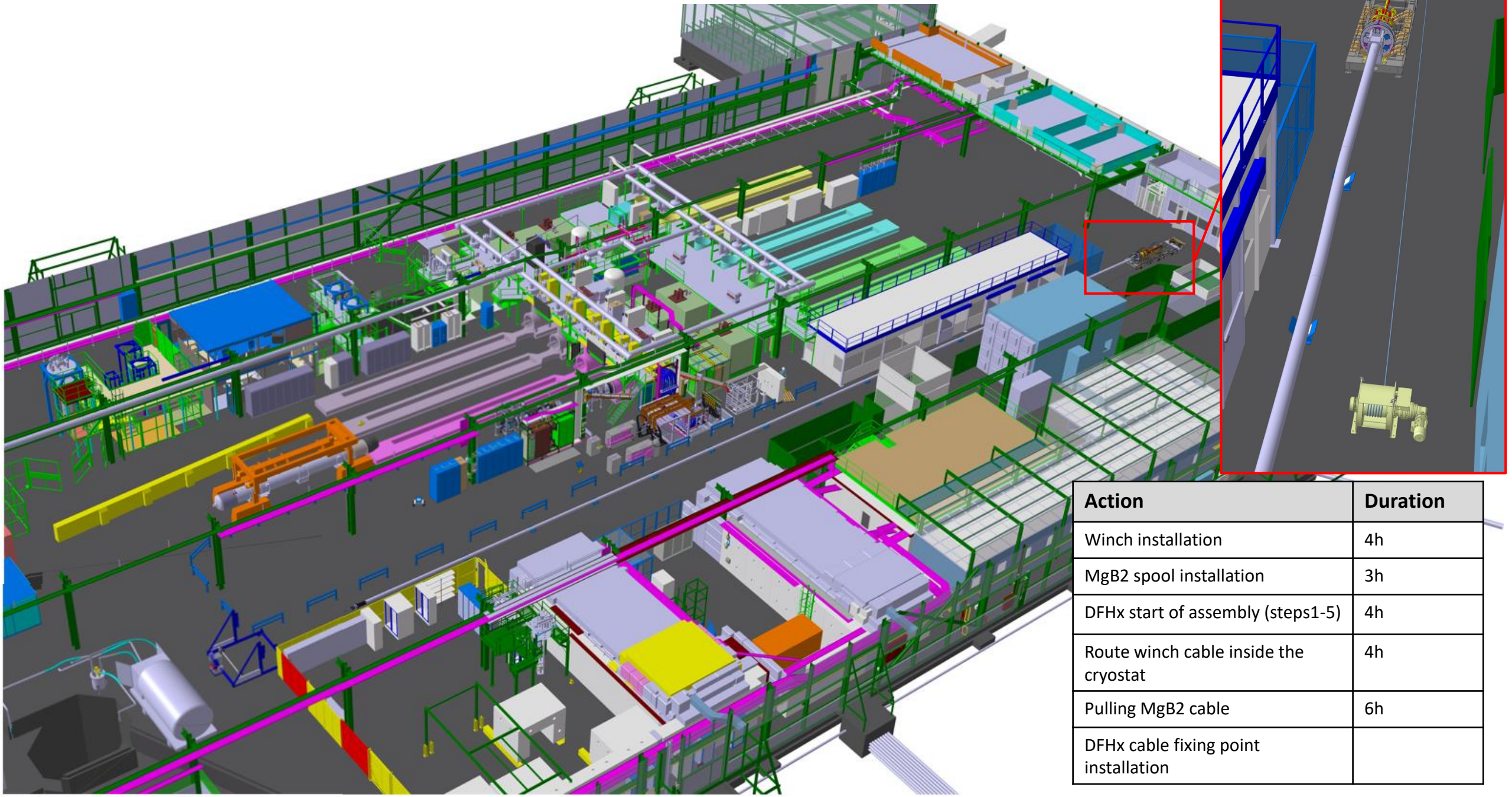
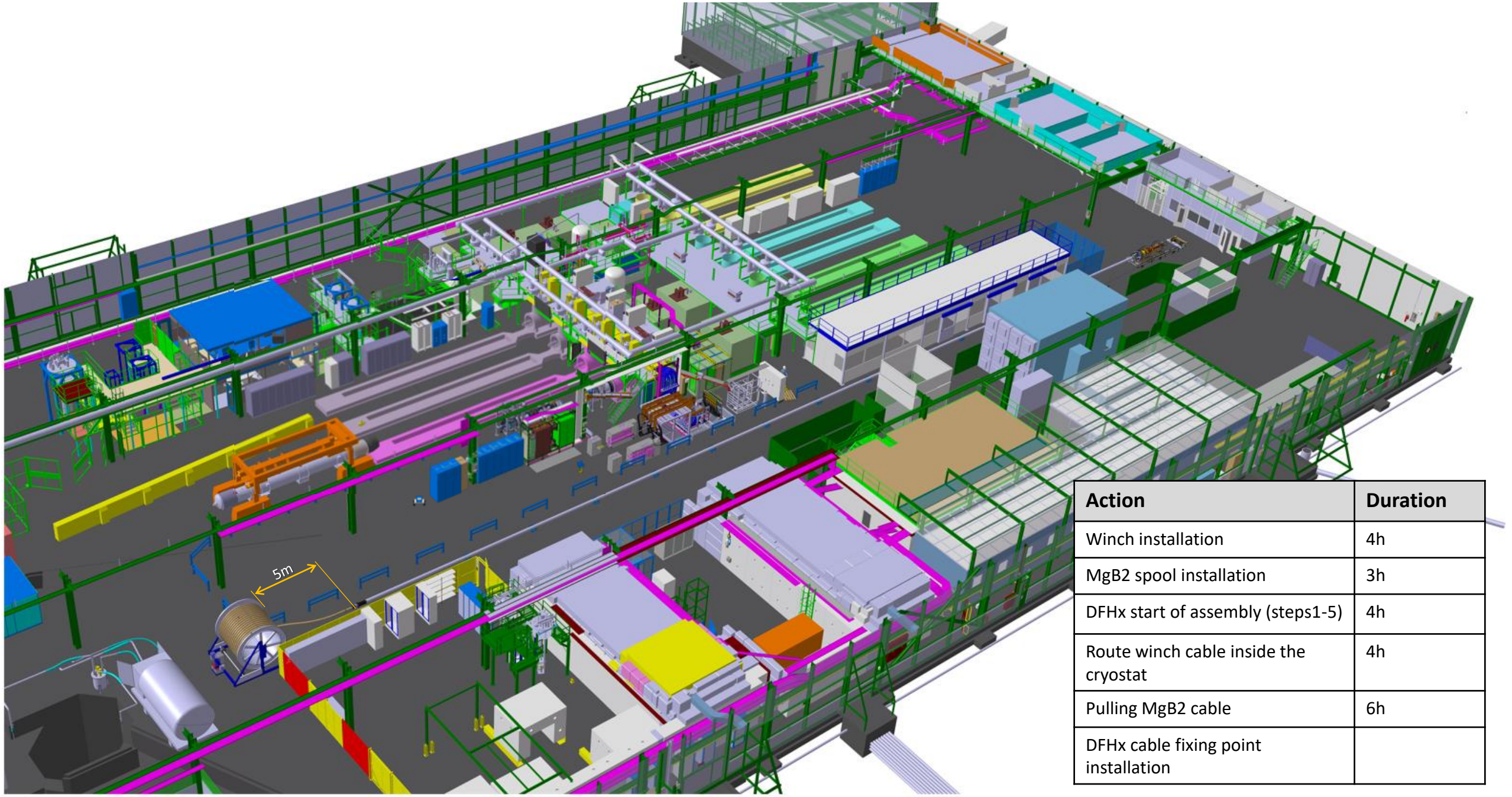
Phase 1: MgB2 spool installation + cable pulling



Action	Duration
Winch installation	4h
MgB2 spool installation	3h
DFHx start of assembly (steps1-5)	4h
Route winch cable inside the cryostat	4h
Pulling MgB2 cable	6h
DFHx cable fixing point installation	

Phase 1: MgB2 spool installation + cable pulling



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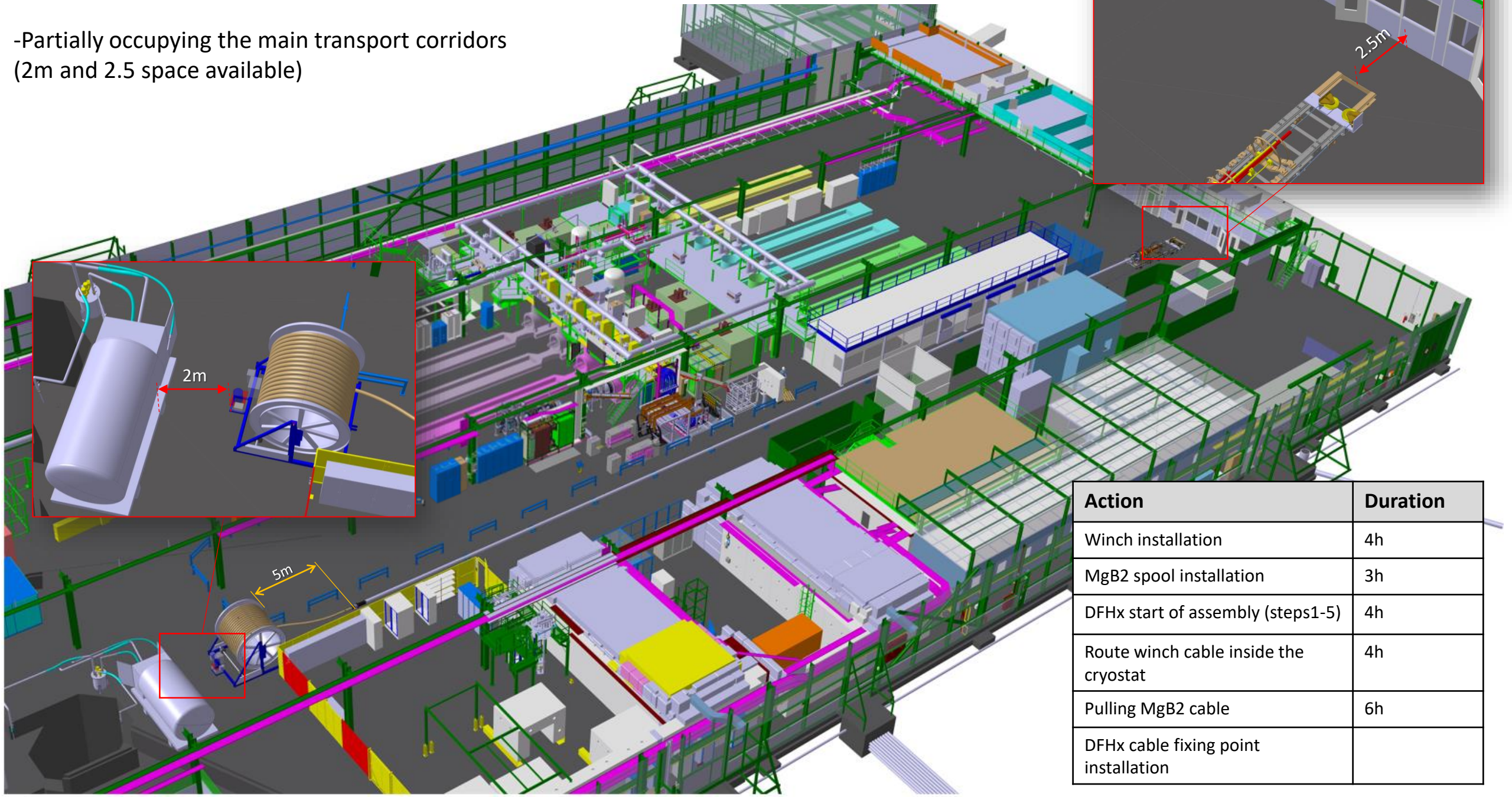
Phase 1: MgB2 spool installation + cable pulling

-Partially occupying the main transport corridors
(2m and 2.5 space available)



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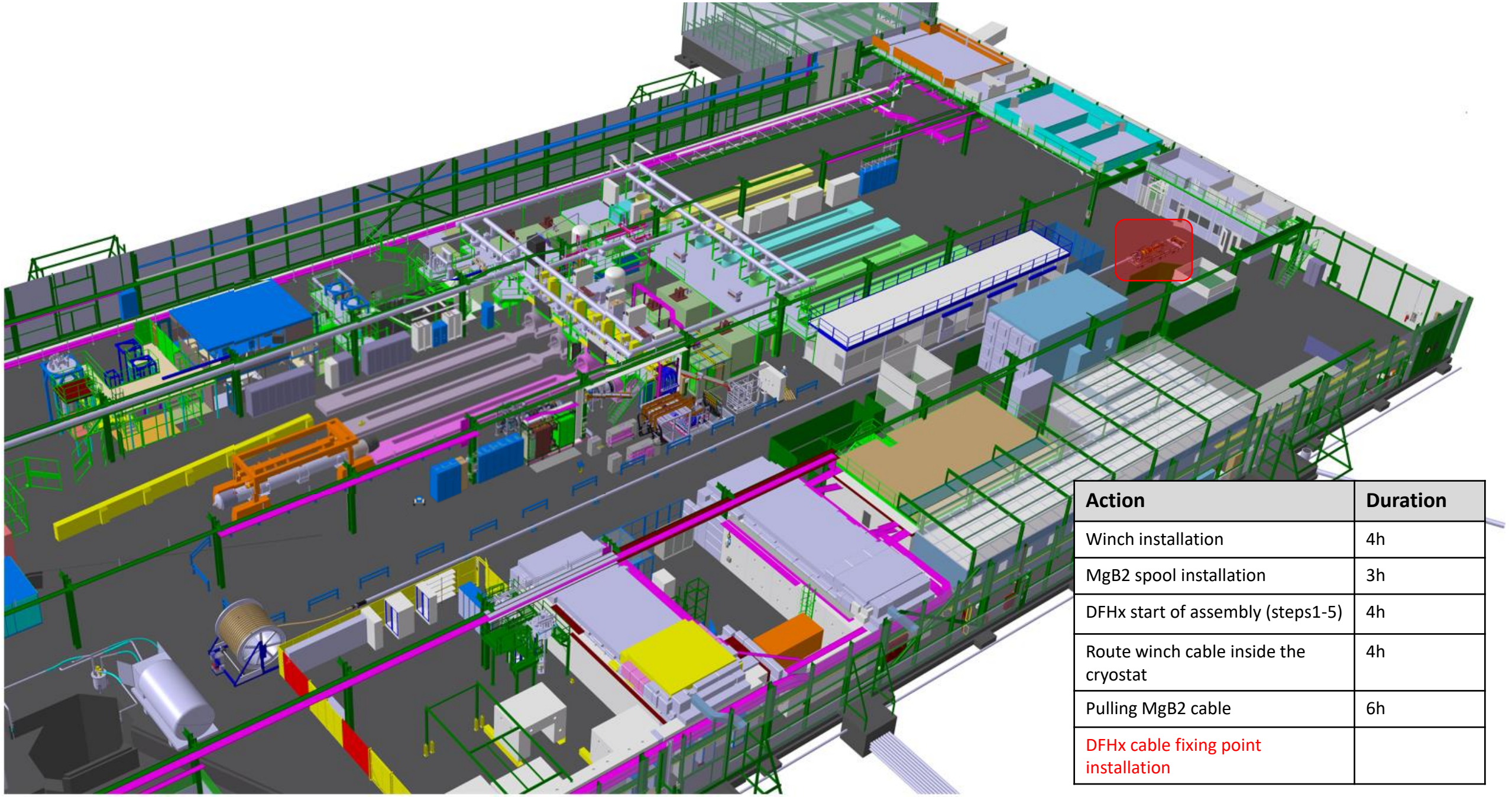

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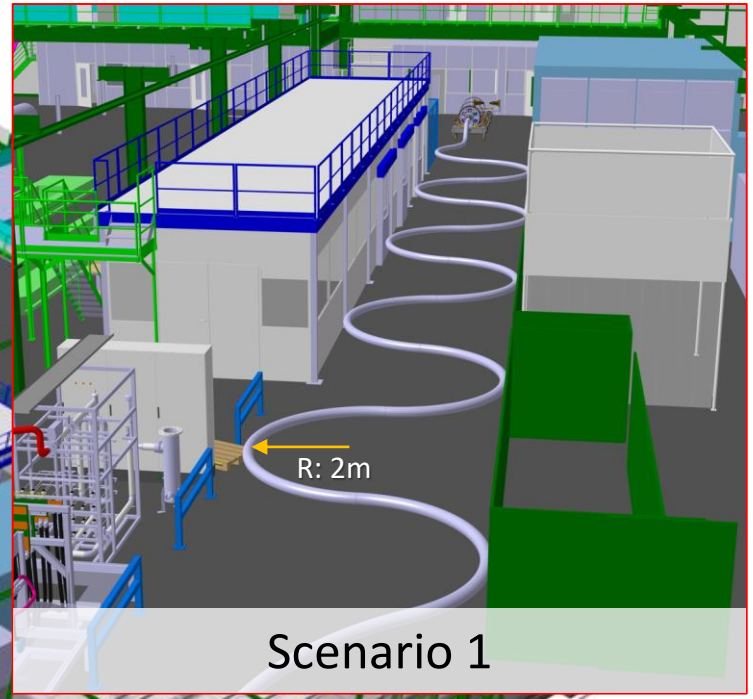
Phase 2: MgB2 spare cable unspooling

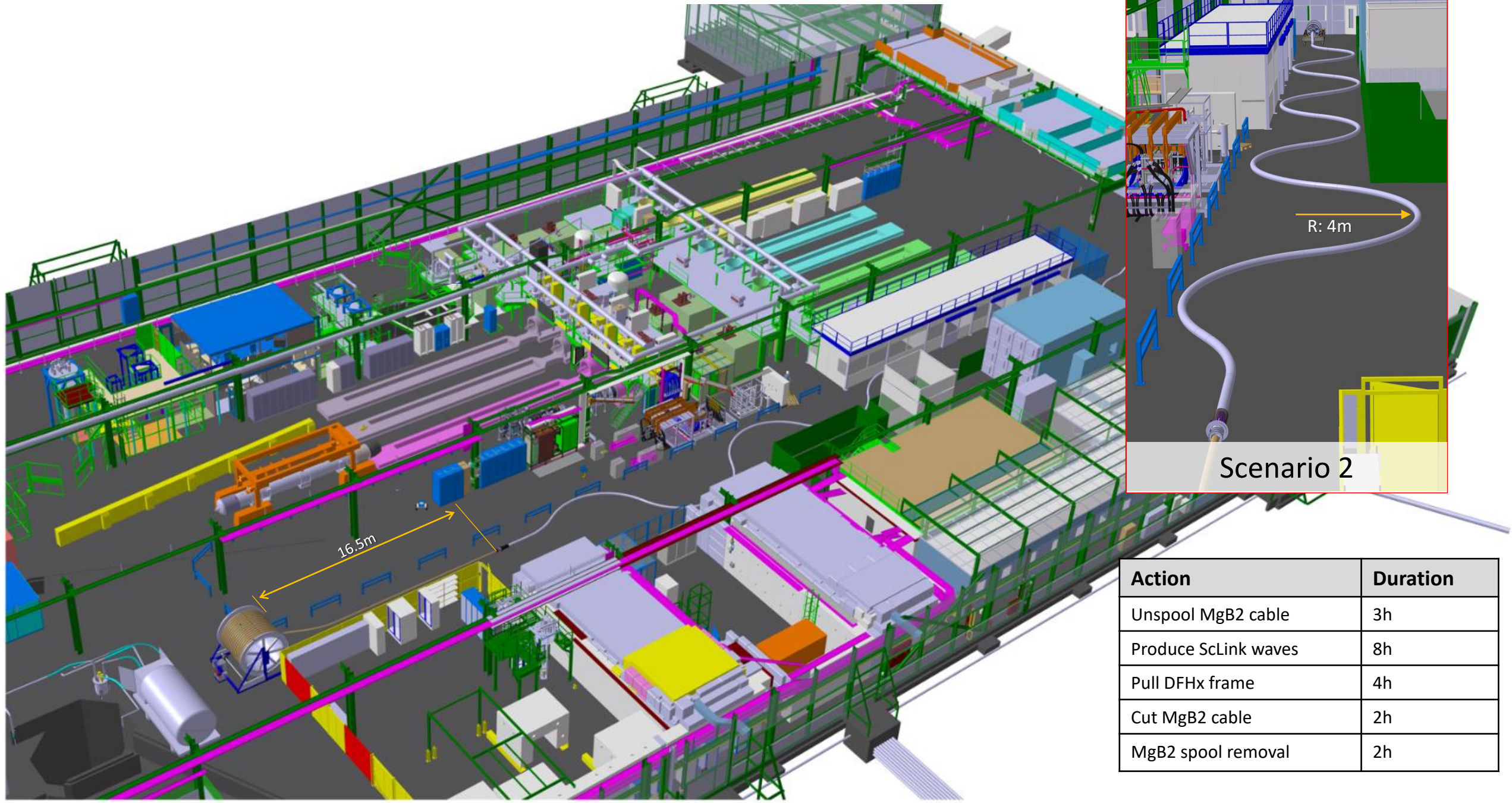
Min R:2m -> 25m of MgB2 cable can be stored



25m

Action	Duration
Unspool MgB2 cable	3h
Produce ScLink waves	8h
Pull DFHx frame	4h
Cut MgB2 cable	2h
MgB2 spool removal	2h

Phase 2: MgB2 spare cable unspooling



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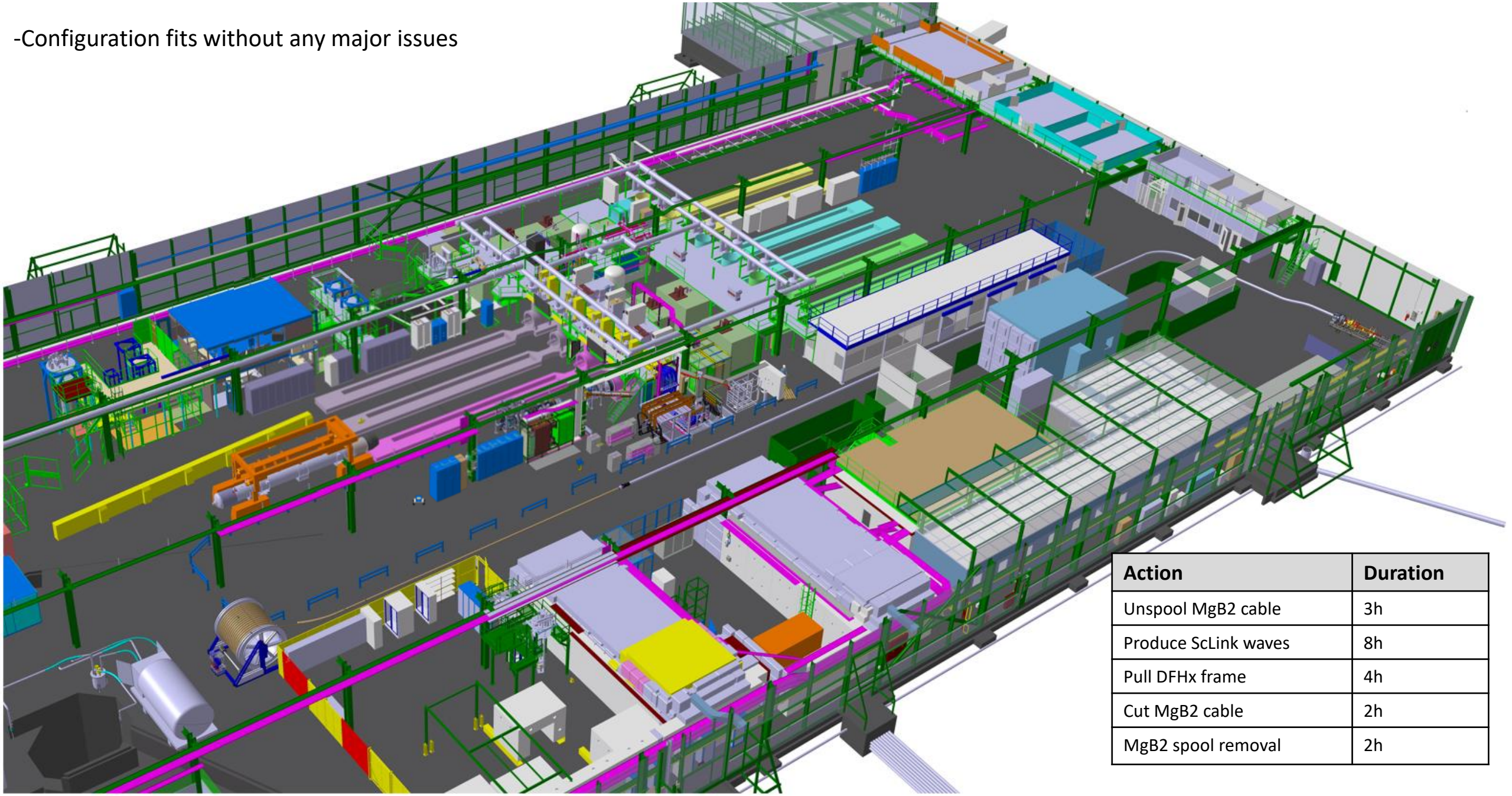
-Configuration fits without any major issues



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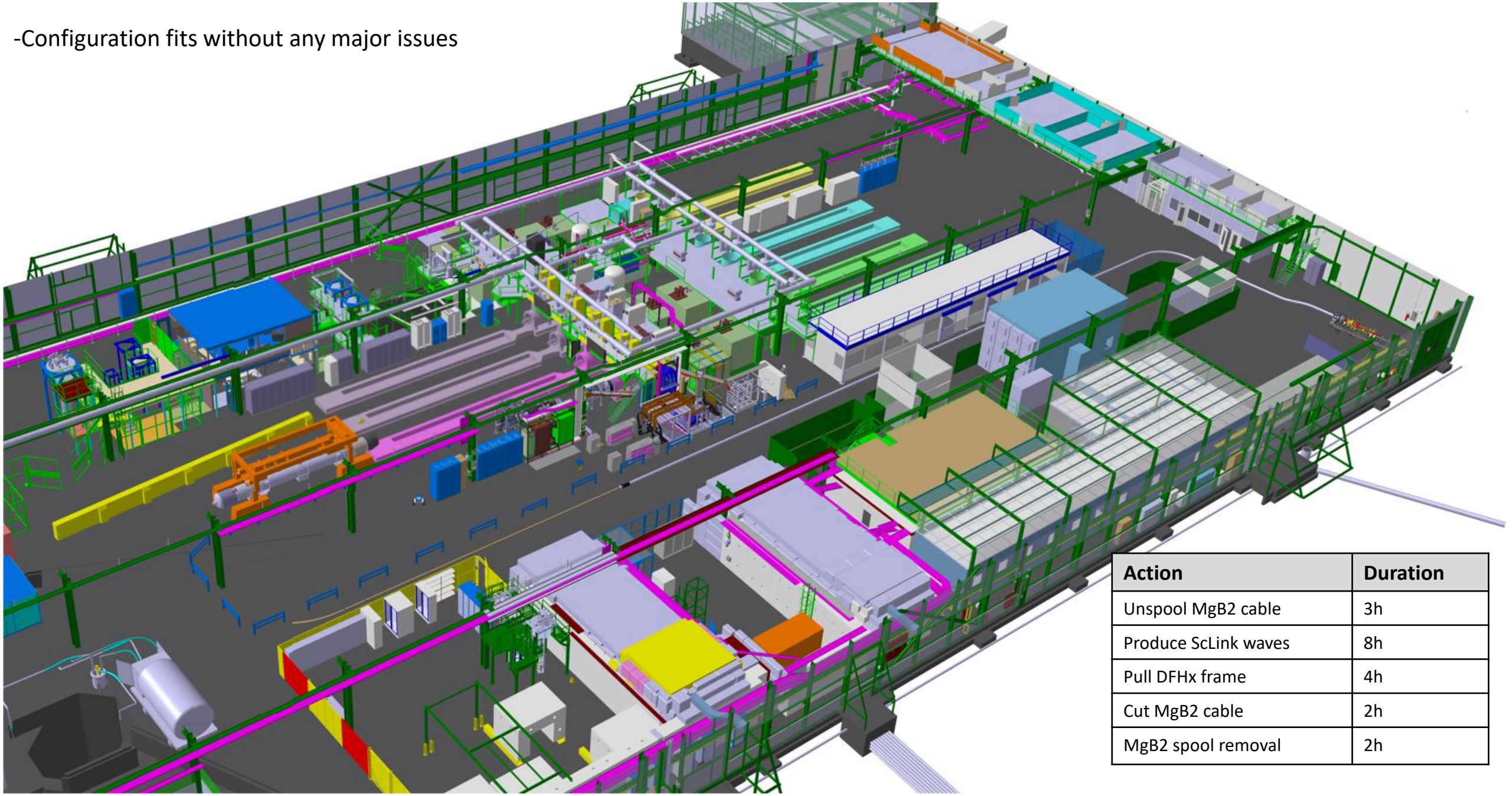

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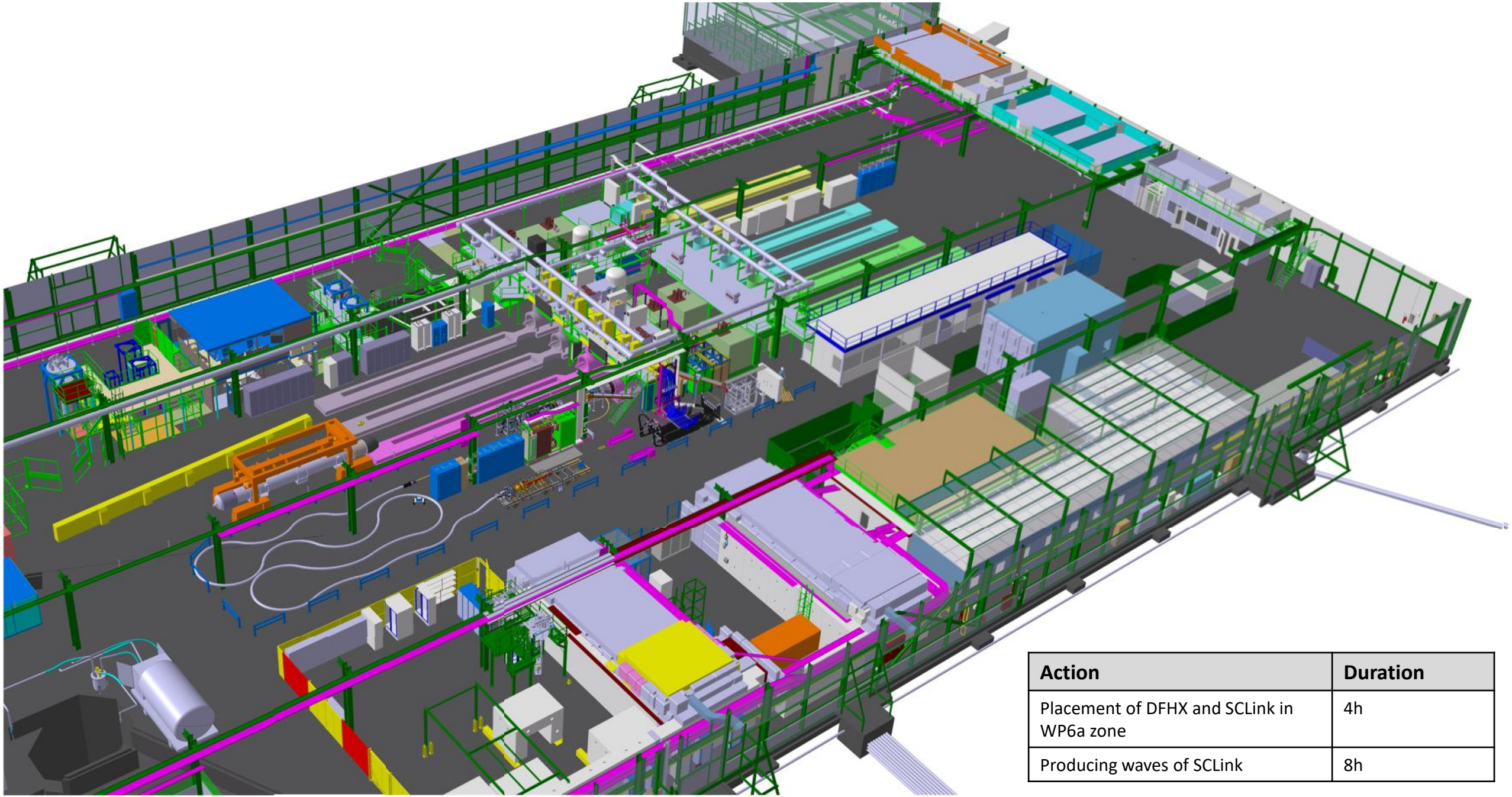
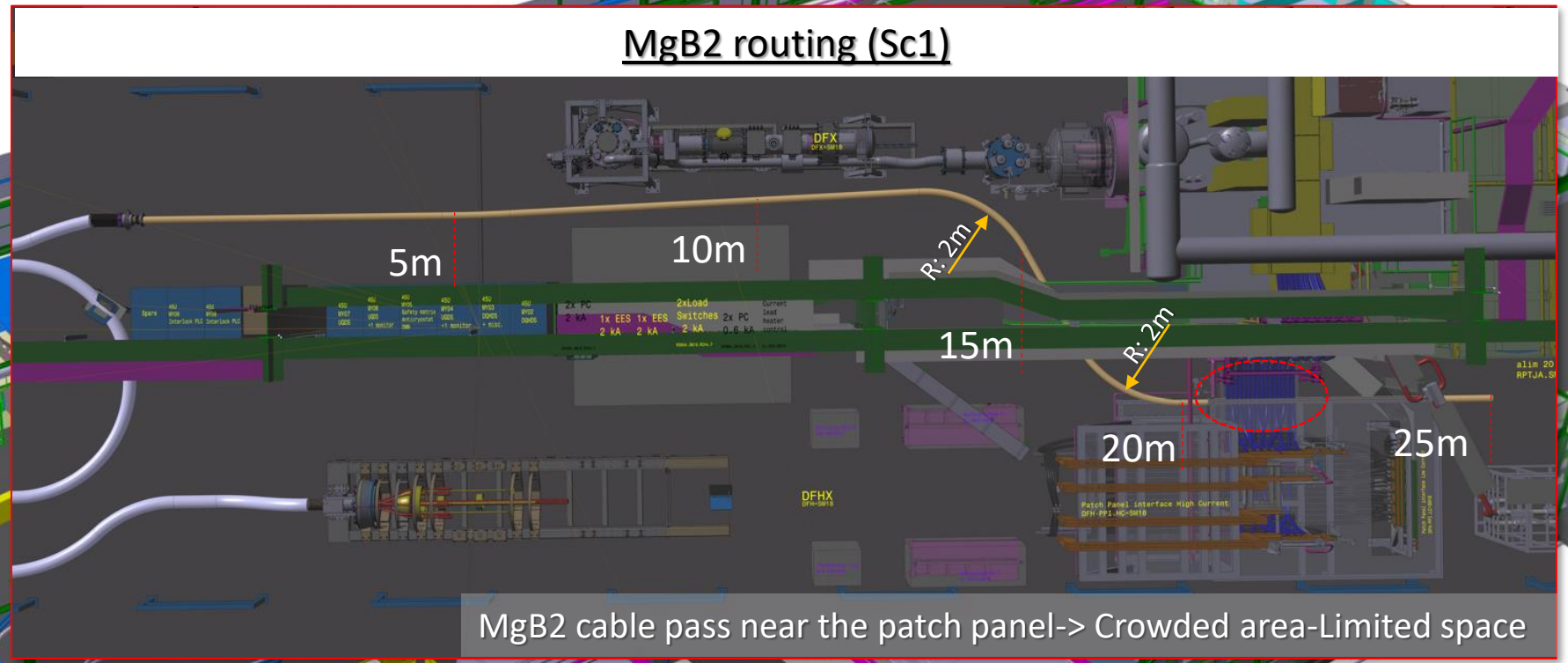
Phase 3: DFHx +SCLink positioning at the reserved WP6a zone



Action	Duration
Placement of DFHX and SCLink in WP6a zone	4h
Producing waves of SCLink	8h

Phase 3: DFHx +SCLink positioning at the reserved WP6a zone



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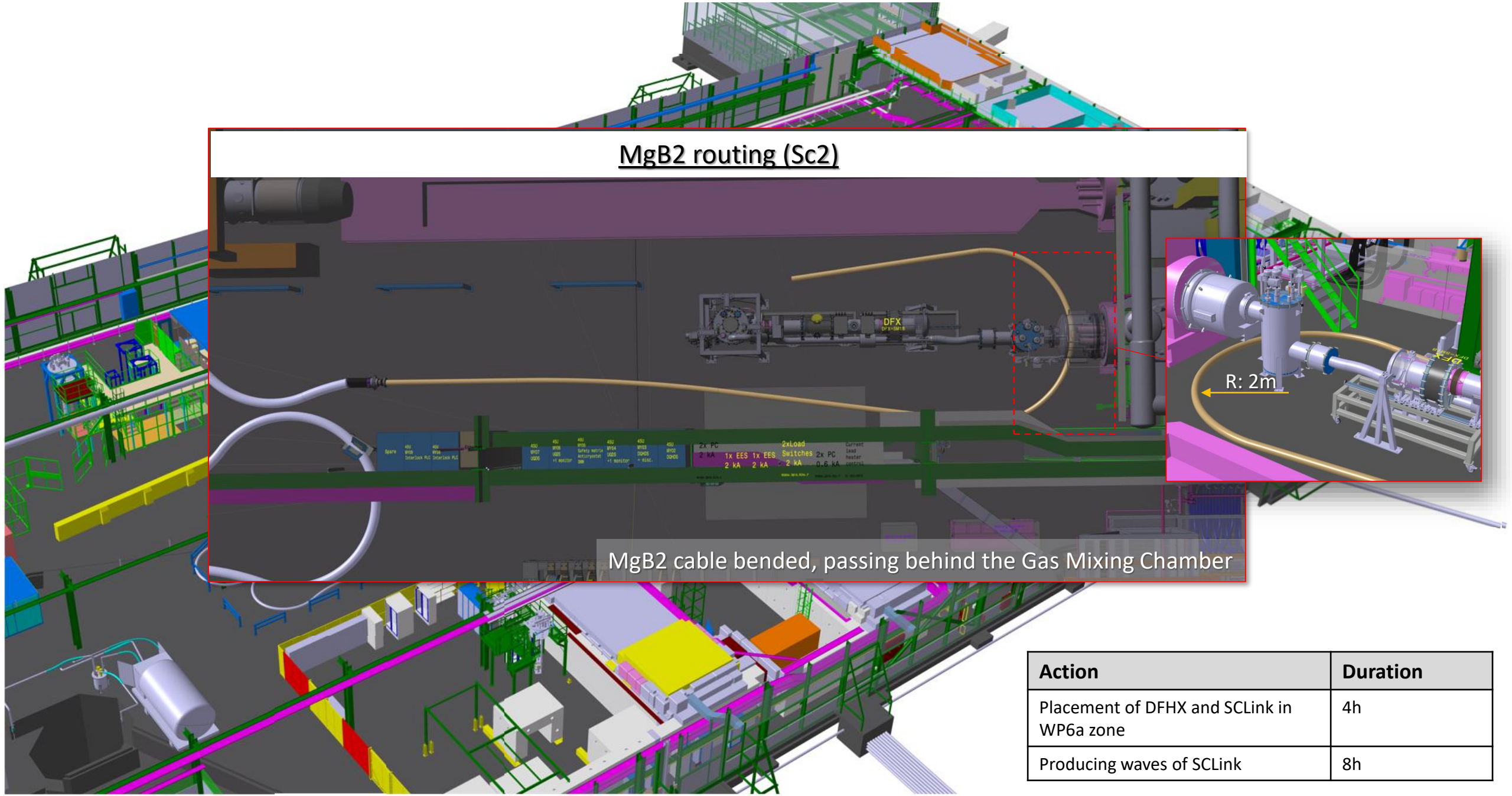

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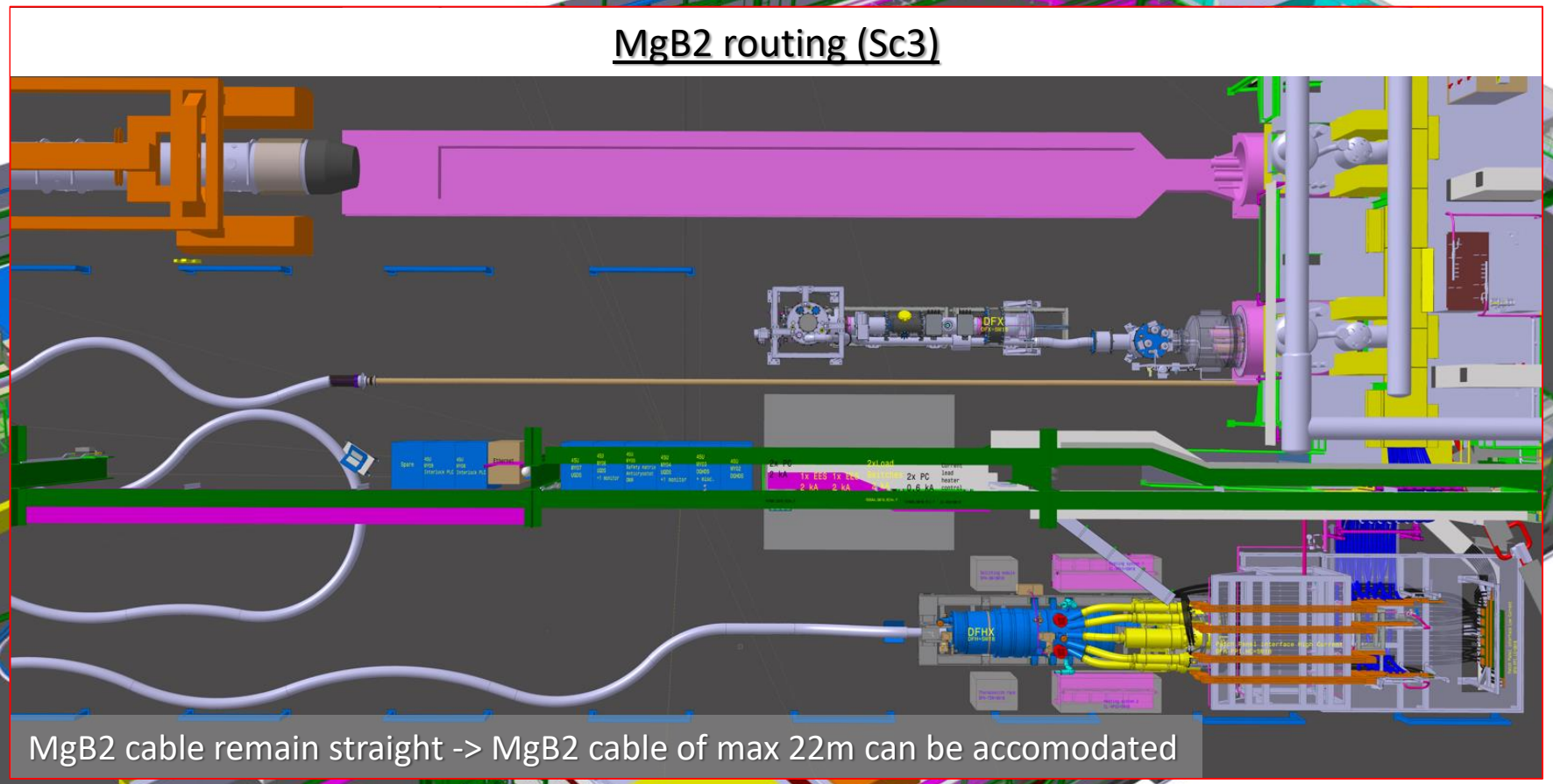

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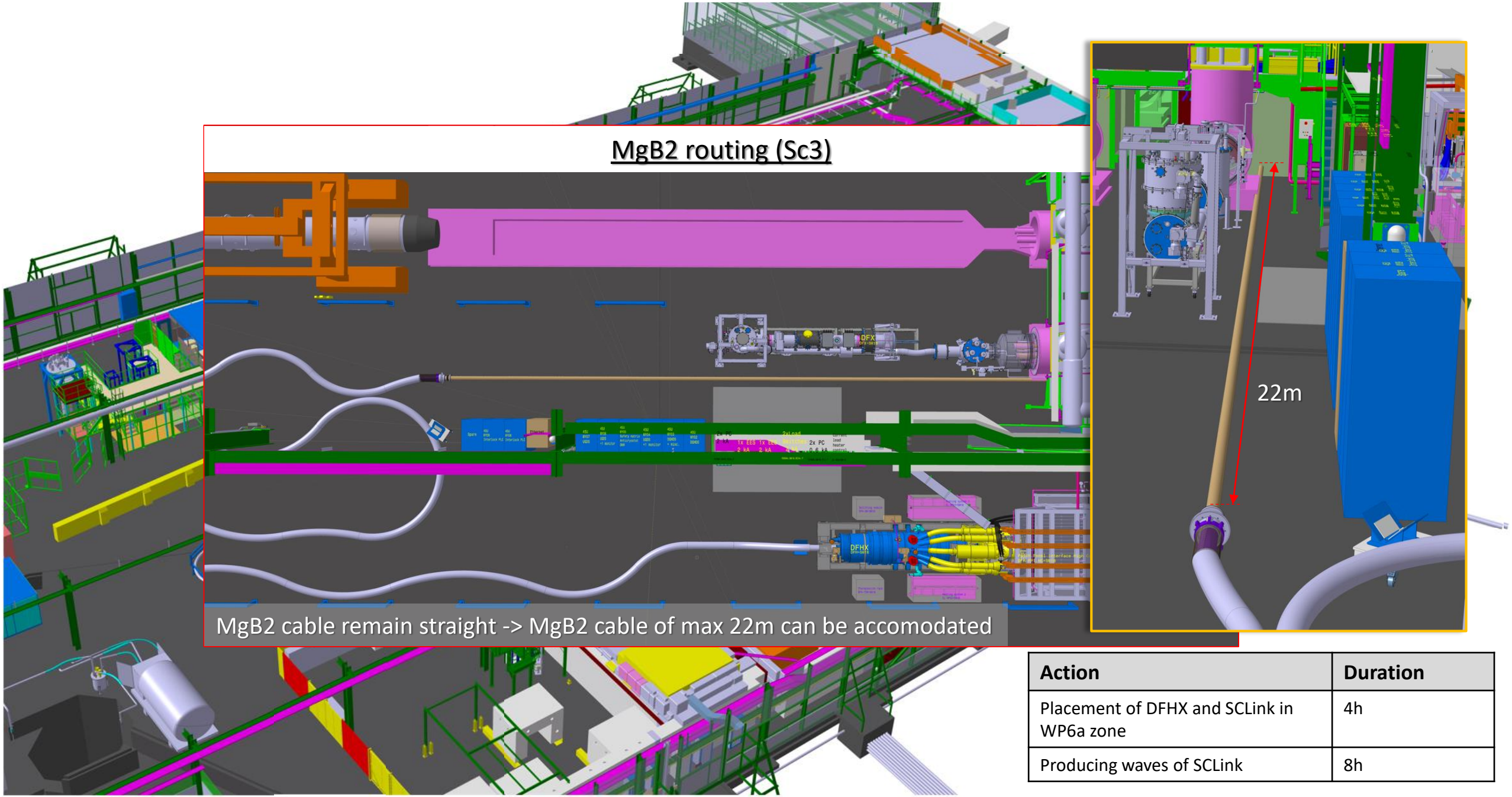
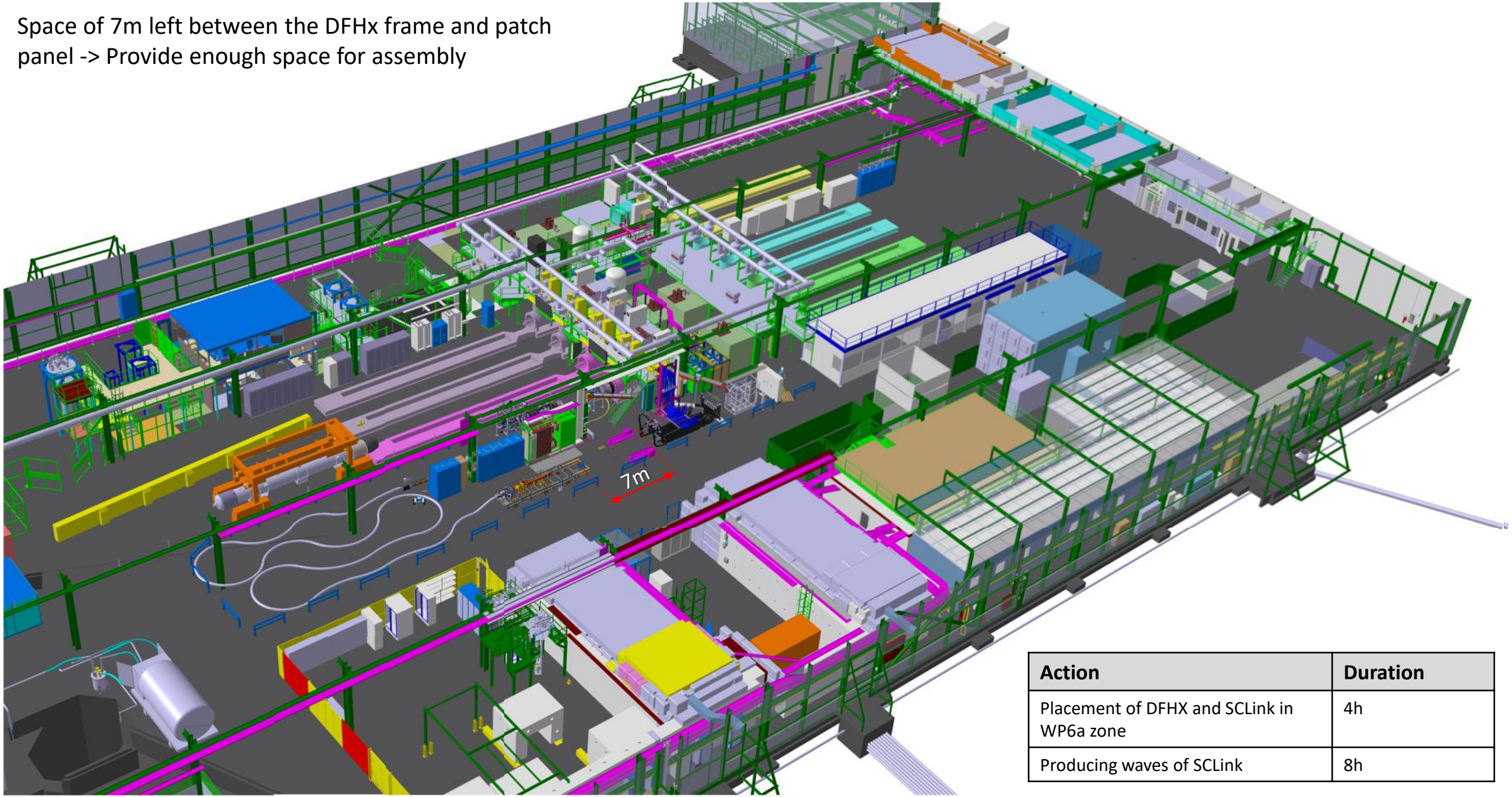


Action	Duration
Placement of DFHX and SCLink in WP6a zone	4h
Producing waves of SCLink	8h

Phase 3: DFHx +SCLink positioning at the reserved WP6a zone

Space of 7m left between the DFHx frame and patch panel -> Provide enough space for assembly



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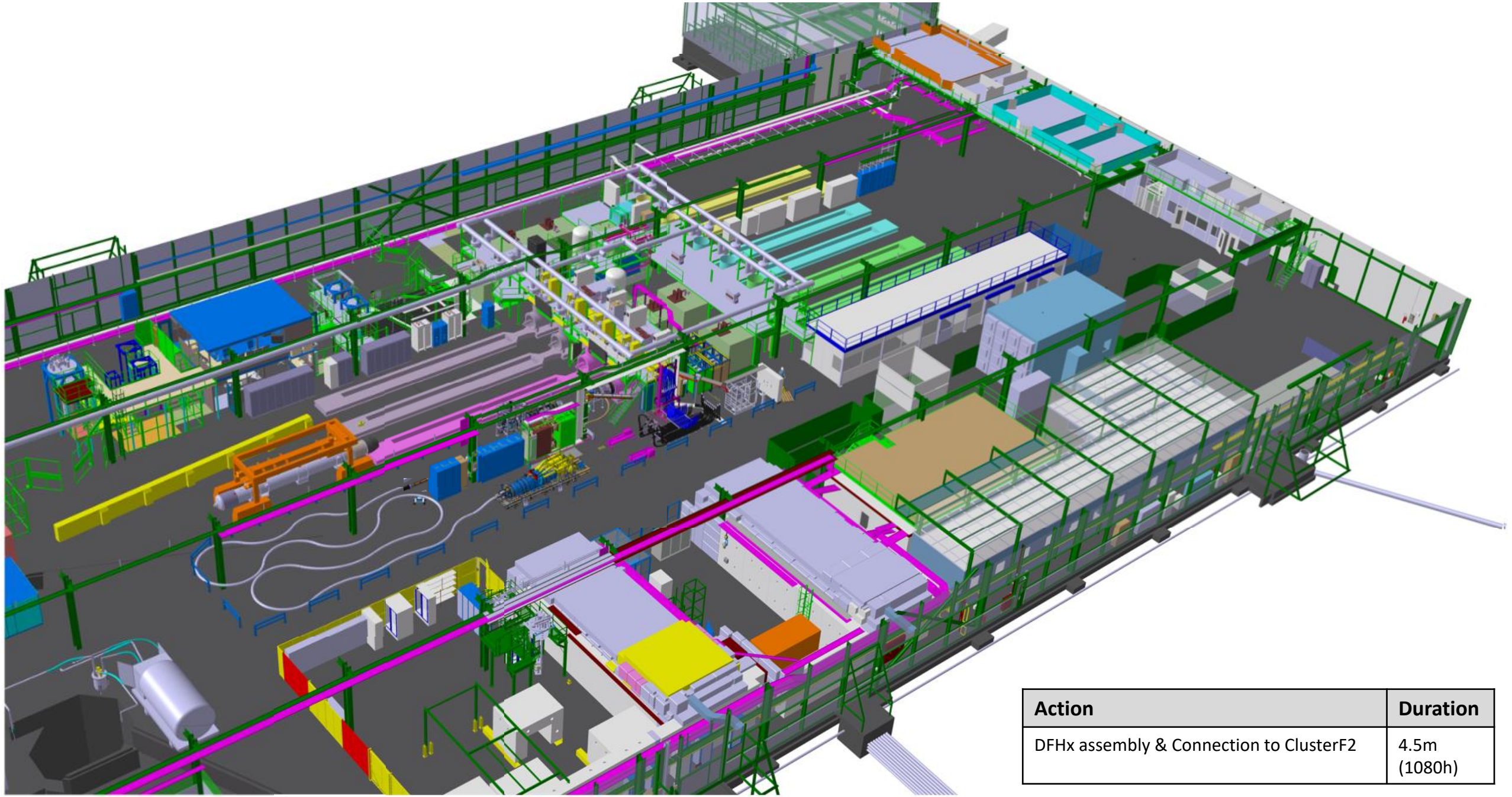
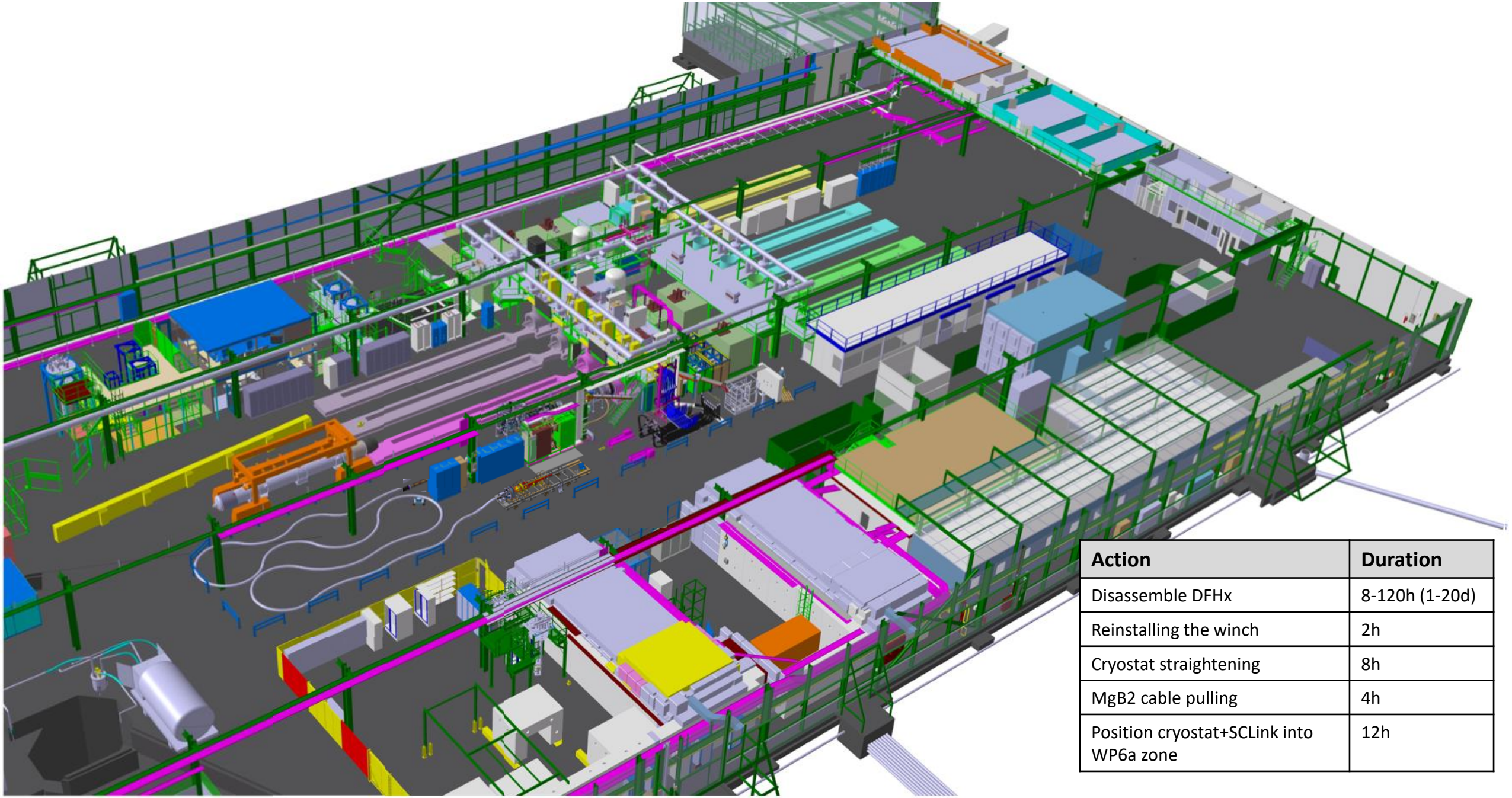
Placement of DFHX and SCLink in WP6a zone	4h
Producing waves of SCLink	8h

Phase 4: DFHx assembly & preparation to connect to Cluster F2



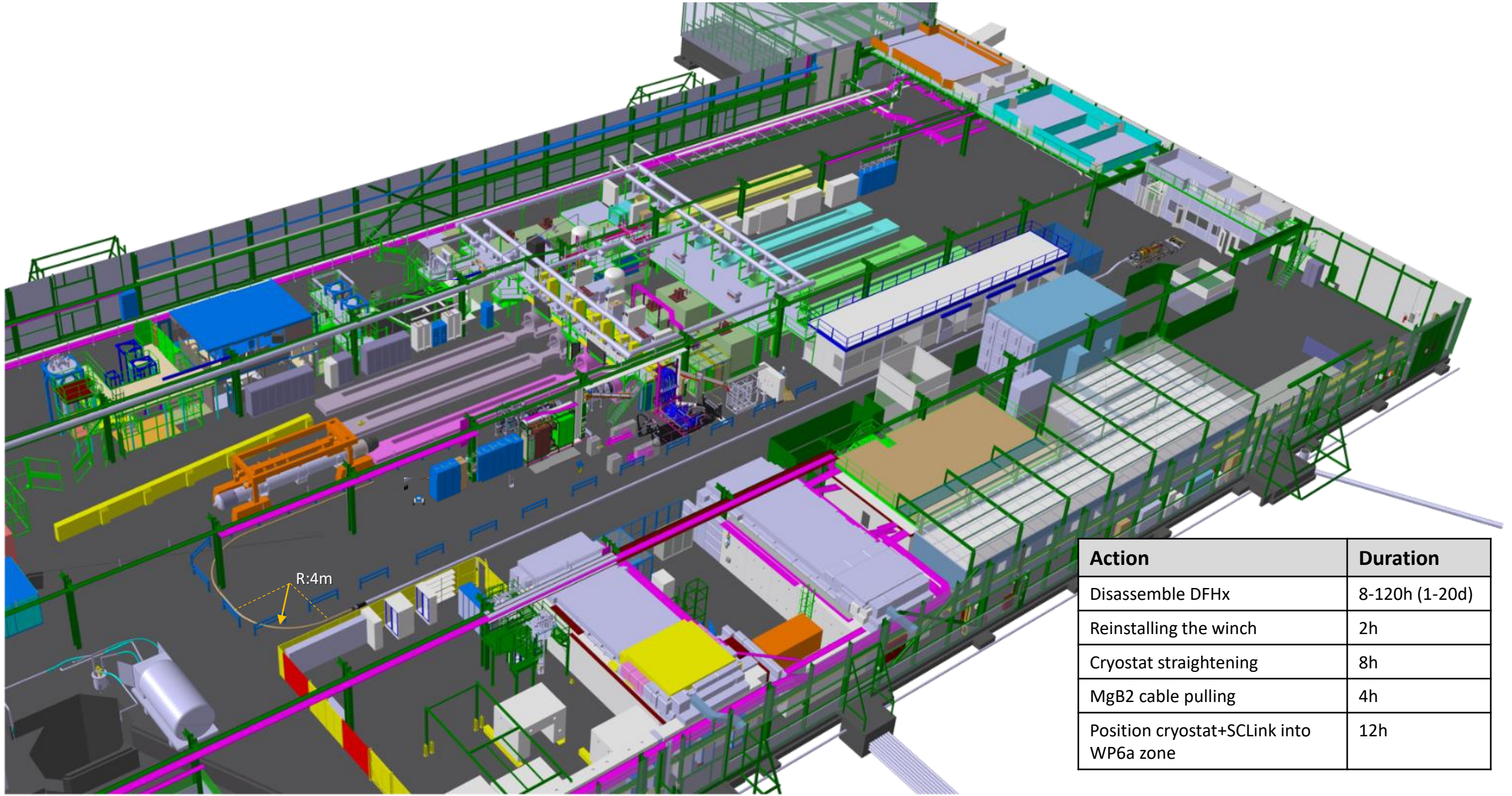
Action	Duration
DFHx assembly & Connection to ClusterF2	4.5m (1080h)

Phase 4.1: Cryostat straightening in case of splicing error



Action	Duration
Disassemble DFHx	8-120h (1-20d)
Reinstalling the winch	2h
Cryostat straightening	8h
MgB2 cable pulling	4h
Position cryostat+SCLink into WP6a zone	12h

Phase 4.1: Cryostat straightening in case of splicing error



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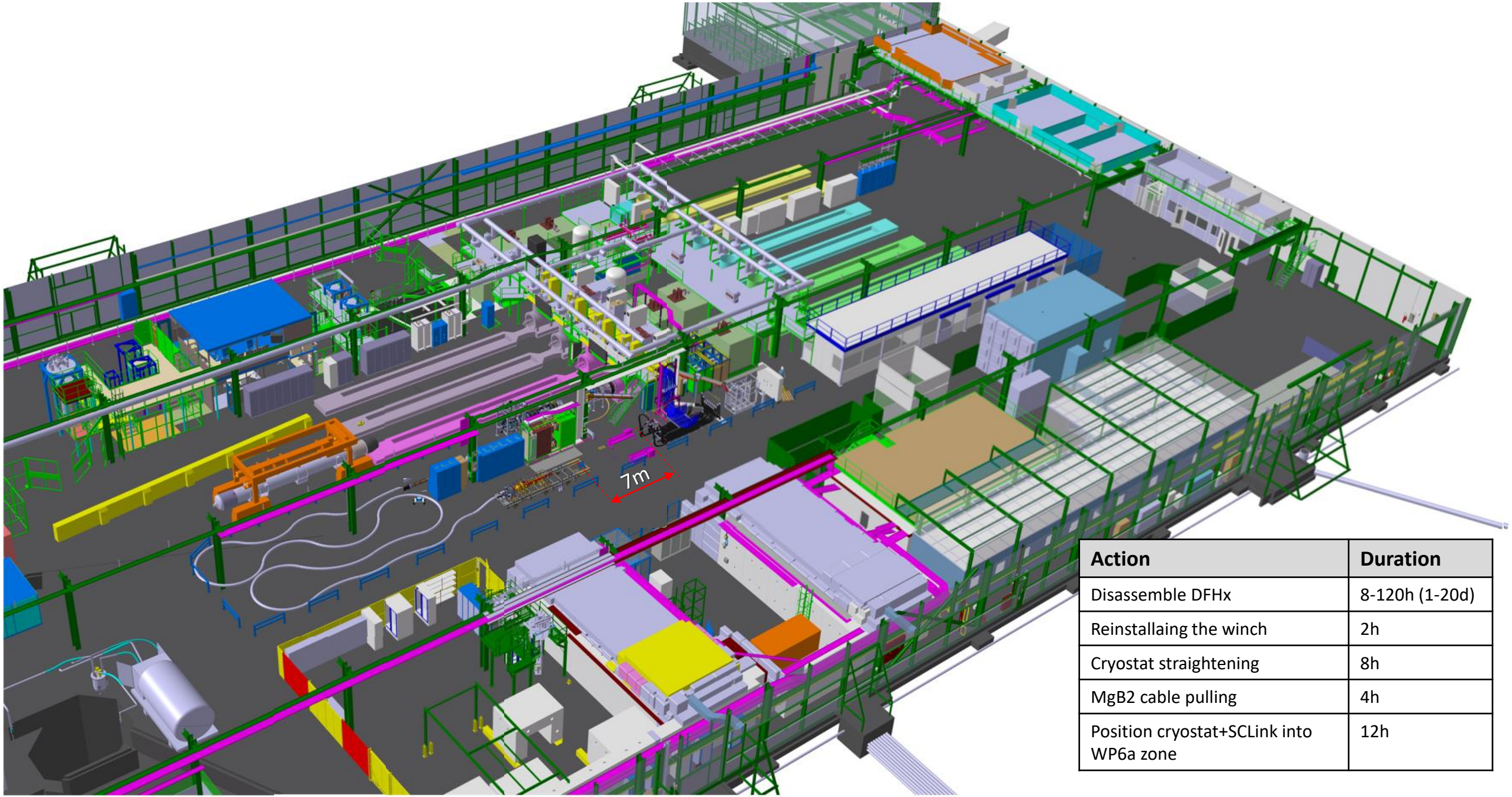

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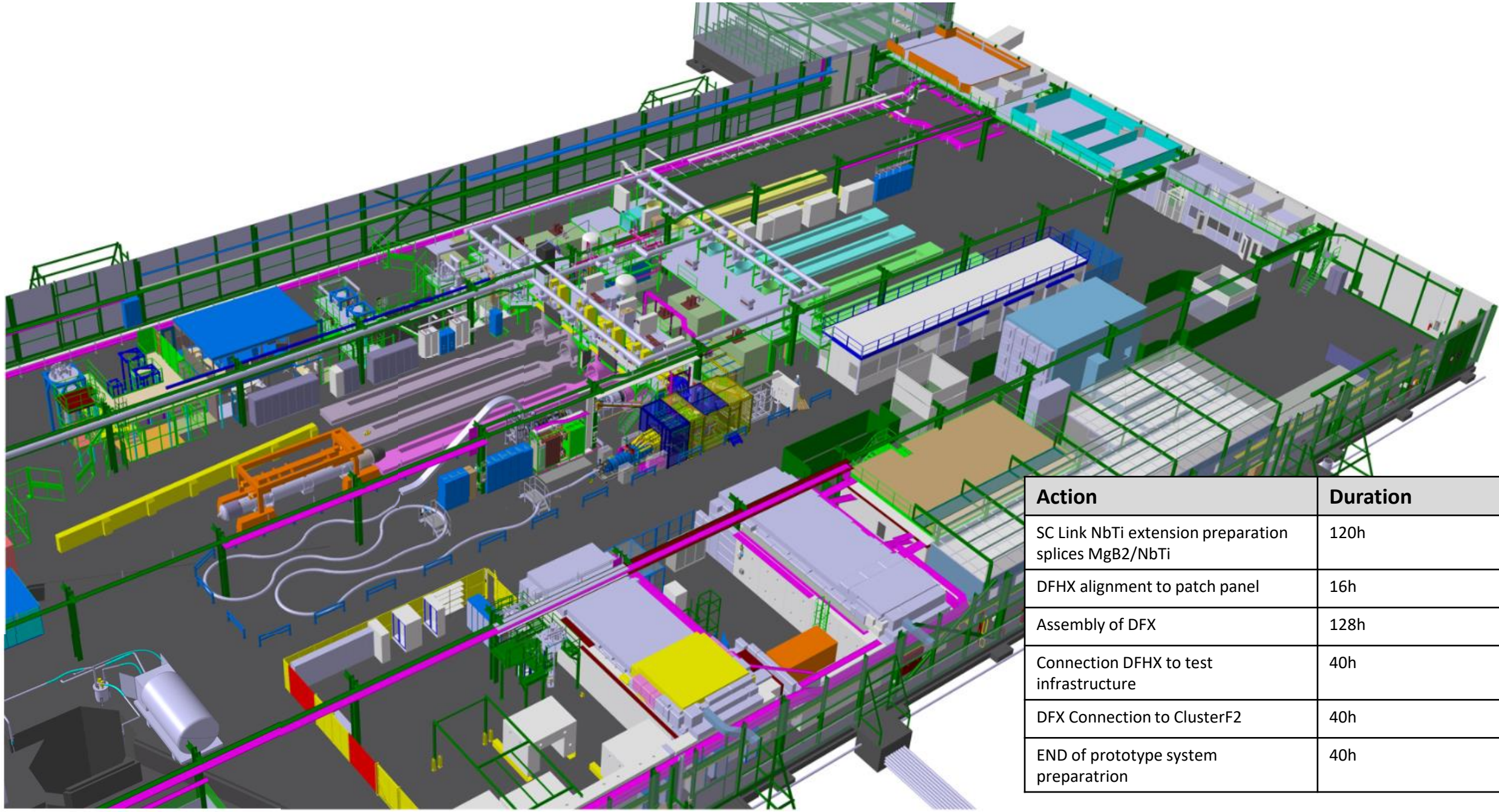
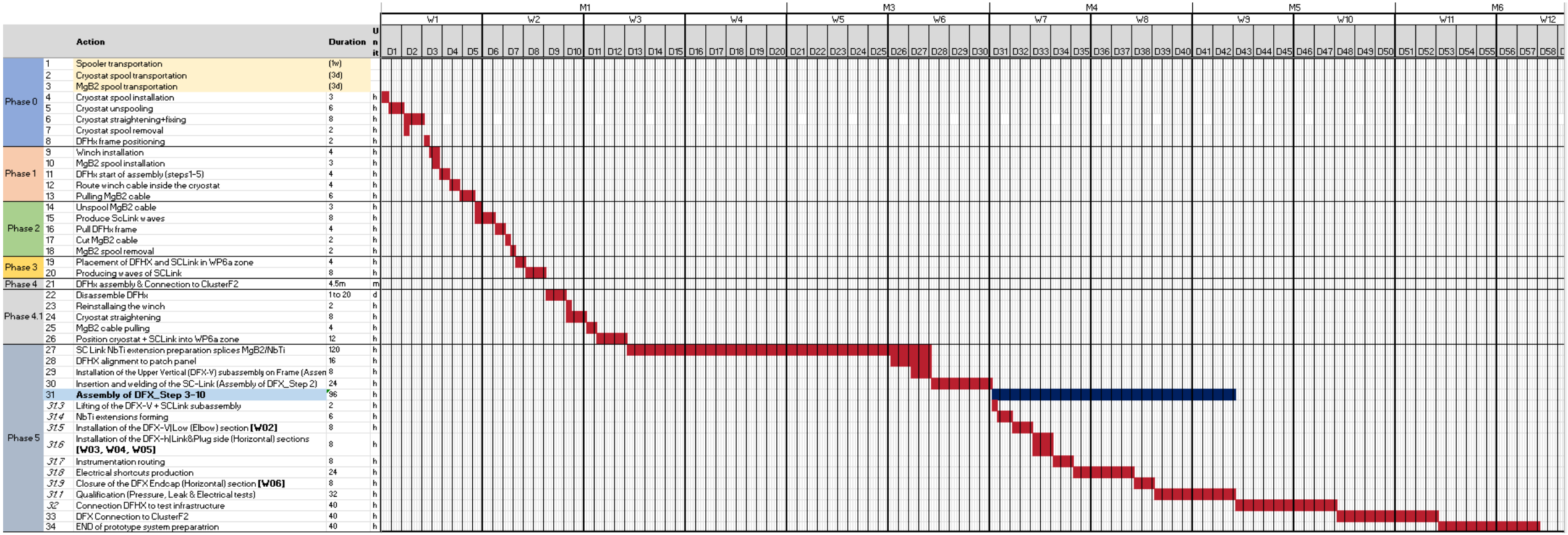
Phase 5: DFHx connection to ClusterF



Action	Duration
SC Link NbTi extension preparation splices MgB2/NbTi	120h
DFHX alignment to patch panel	16h
Assembly of DFX	128h
Connection DFHX to test infrastructure	40h
DFX Connection to ClusterF2	40h
END of prototype system preparatrion	40h

Planning proposal Update

- Assuming resources, space and services are available
  - 73hrs to fit in the WP6a reserved zone
  - 36hrs to be ready to pull MgB2 cable
  - 34-186hrs to repull the cable in case there is a DFHx splicing error
  - 208hrs to assemble-qualify and connect the DFX cryostat to the Cluster F2 bench



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	2	Cryostat spool transportation	(3d)	
	3	MgB2 spool transportation	(3d)	
	4	Cryostat spool installation	3	h
	5	Cryostat unspooling	6	h
	6	Cryostat straightening+fixing	8	h
	7	Cryostat spool removal	2	h
	8	DFHx frame positioning	2	h
Phase 1	9	Winch installation	4	h
	10	MgB2 spool installation	3	h
	11	DFHx start of assembly (steps1-5)	4	h
	12	Route winch cable inside the cryostat	4	h
	13	Pulling MgB2 cable	6	h
Phase 2	14	Unspool MgB2 cable	3	h
	15	Produce ScLink waves	8	h
	16	Pull DFHx frame	4	h
	17	Cut MgB2 cable	2	h
	18	MgB2 spool removal	2	h
Phase 3	19	Placement of DFHX and SCLink in WP6a zone	4	h
	20	Producing waves of SCLink	8	h
Phase 4	21	DFHx assembly & Connection to ClusterF2	4.5m	m
Phase 4.1	22	Disassemble DFHx	1 to 20	d
	23	Reinstallaing the winch	2	h
	24	Cryostat straightening	8	h
	25	MgB2 cable pulling	4	h
	26	Position cryostat + SCLink into WP6a zone	12	h
Phase 5	27	SC Link NbTi extension preparation splices MgB2/NbTi	120	h
	28	DFHX alignment to patch panel	16	h
	29	Installation of the Upper Vertical (DFX-V) subassembly on Frame (Assen	8	h
	30	Insertion and welding of the SC-Link (Assembly of DFX_Step 2)	24	h
	31	**Assembly of DFX_Step 3-10**	96	h
	31.3	Lifting of the DFX-V + SCLink subassembly	2	h
	31.4	NbTi extensions forming	6	h
	31.5	Installation of the DFX-V|Low (Elbow) section **[W02]**	8	h
	31.6	Installation of the DFX-h|Link&Plug side (Horizontal) sections **[W03, W04, W05]**	8	h
	31.7	Instrumentation routing	8	h
	31.8	Electrical shortcuts production	24	h
	31.9	Closure of the DFX Endcap (Horizontal) section **[W06]**	8	h
	31.1	Qualification (Pressure, Leak & Electrical tests)	32	h
	32	Connection DFHX to test infrastructure	40	h
	33	DFX Connection to ClusterF2	40	h
	34	END of prototype system preparatrion	40	h

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  - 36hrs to be ready to pull MgB2 cable
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  - 208hrs to assemble-qualify and connect the DFX cryostat to the Cluster F2 bench

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	3	MgB2 spool transportation	(3d)	
	4	Cryostat spool installation	3	h
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	7	Cryostat spool removal	2	h
	8	DFHx frame positioning	2	h
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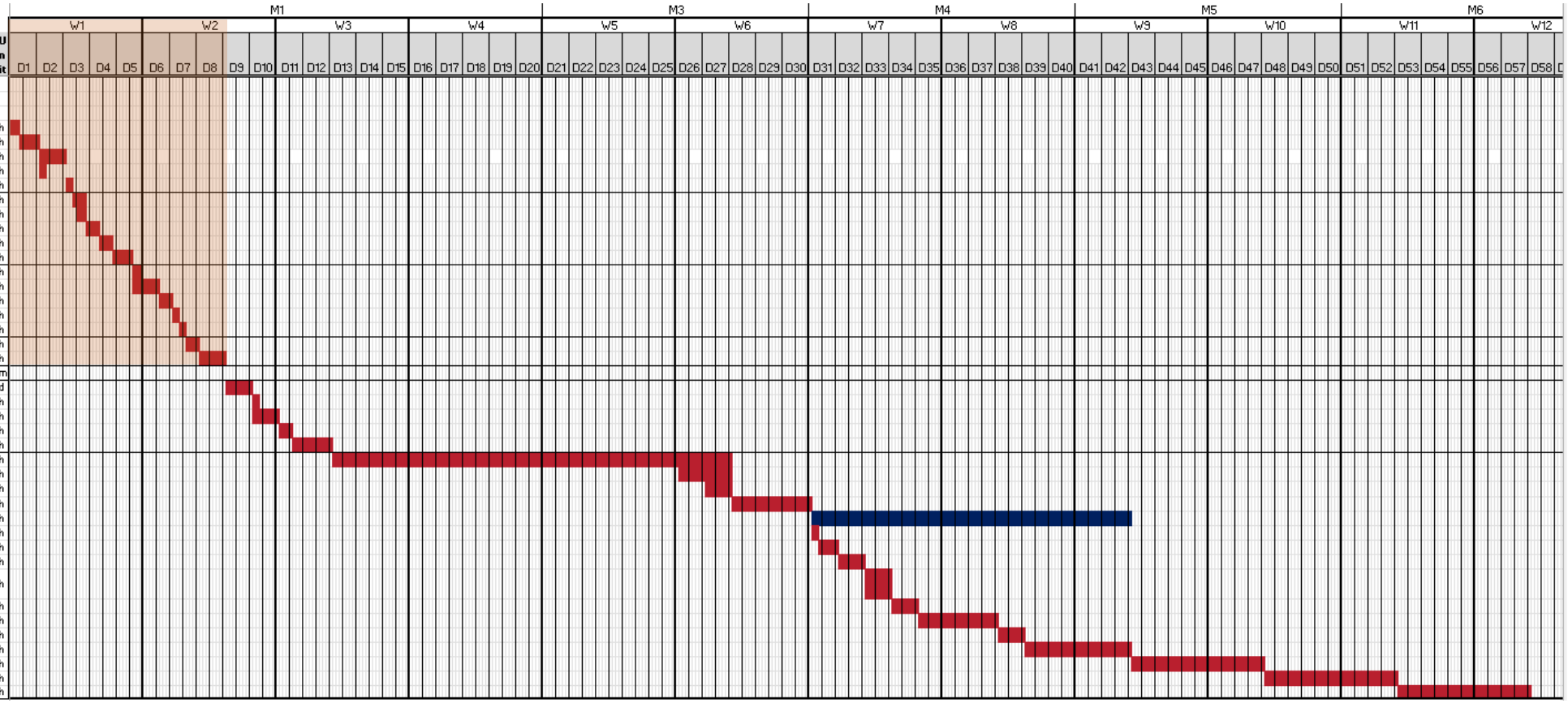

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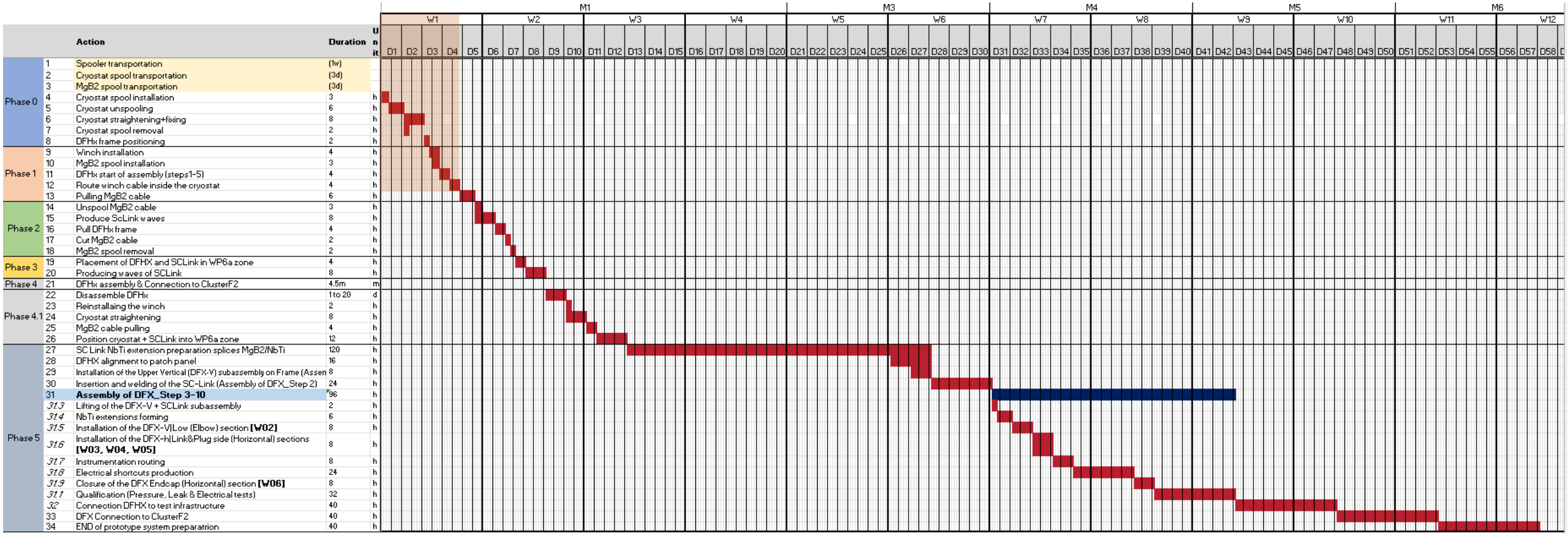

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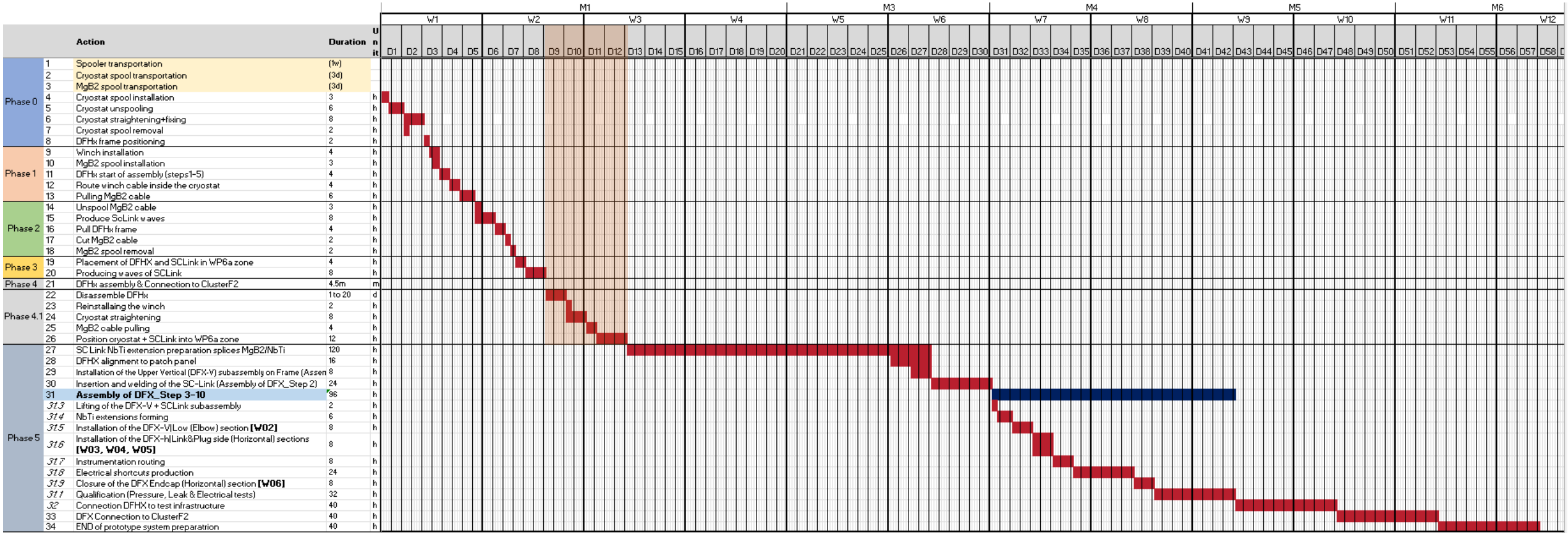
	16	Pull DFHx frame	4	h
	17	Cut MgB2 cable	2	h
	18	MgB2 spool removal	2	h
Phase 3	19	Placement of DFHX and SCLink in WP6a zone	4	h
	20	Producing waves of SCLink	8	h
Phase 4	21	DFHx assembly & Connection to ClusterF2	4.5m	m
Phase 4.1	22	Disassemble DFHx	1 to 20	d
	23	Reinstallaing the winch	2	h
	24	Cryostat straightening	8	h
	25	MgB2 cable pulling	4	h
	26	Position cryostat + SCLink into WP6a zone	12	h
Phase 5	27	SC Link NbTi extension preparation splices MgB2/NbTi	120	h
	28	DFHX alignment to patch panel	16	h
	29	Installation of the Upper Vertical (DFX-V) subassembly on Frame (Assen	8	h
	30	Insertion and welding of the SC-Link (Assembly of DFX_Step 2)	24	h
	31	**Assembly of DFX_Step 3-10**	96	h
	31.3	Lifting of the DFX-V + SCLink subassembly	2	h
	31.4	NbTi extensions forming	6	h
	31.5	Installation of the DFX-V|Low (Elbow) section **[W02]**	8	h
	31.6	Installation of the DFX-h|Link&Plug side (Horizontal) sections **[W03, W04, W05]**	8	h
	31.7	Instrumentation routing	8	h
	31.8	Electrical shortcuts production	24	h
	31.9	Closure of the DFX Endcap (Horizontal) section **[W06]**	8	h
	31.1	Qualification (Pressure, Leak & Electrical tests)	32	h
	32	Connection DFHX to test infrastructure	40	h
	33	DFX Connection to ClusterF2	40	h
	34	END of prototype system preparatrion	40	h

Planning proposal Update

- Assuming resources, space and services are available
  - 73hrs to fit in the WP6a reserved zone
  - 36hrs to be ready to pull MgB2 cable
  - 34-186hrs to repull the cable in case there is a DFHx splicing error
  - 208hrs to assemble-qualify and connect the DFX cryostat to the Cluster F2 bench



		Action	Duration	Unit
Phase 0	1	Spooler transportation	(1w)	
	2	Cryostat spool transportation	(3d)	
	3	MgB2 spool transportation	(3d)	
	4	Cryostat spool installation	3	h
	5	Cryostat unspooling	6	h
	6	Cryostat straightening+fixing	8	h
	7	Cryostat spool removal	2	h
	8	DFHx frame positioning	2	h
Phase 1	9	Winch installation	4	h
	10	MgB2 spool installation	3	h
	11	DFHx start of assembly (steps1-5)	4	h
	12	Route winch cable inside the cryostat	4	h
	13	Pulling MgB2 cable	6	h
Phase 2	14	Unspool MgB2 cable	3	h
	15	Produce ScLink waves	8	h
	16	Pull DFHx frame	4	h
	17	Cut MgB2 cable	2	h
	18	MgB2 spool removal	2	h
Phase 3	19	Placement of DFHX and SCLink in WP6a zone	4	h
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Phase 5	27	SC Link NbTi extension preparation splices MgB2/NbTi	120	h
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