INSITER step	INSITER description / main task	Task name	Subtasks	Actors	BIM-role	K1: List of what to know (knowledge)	K2: List of what to understand (skill)
1	Mapping actual technical conditions of the site and building in a BIM-model, and performing economic valuation of the property; capture the requirements and compare them to as-is situation						
	Optional	Map actual technical conditions of the site and building	Create laserscan	3D-scanner		Correct positioning, use of 3D-scanner	Perform a 3D-scan
			Post-process laser scans	Architect/Engineer	BIM-modeller	Geografical positioning, relevant, geometric objects, pointcloud data processing	Translate the pointcloud to geometric objects Filter irrelevant objects
			Create mesh of BIM model	Architect/Engineer	BIM-modeller	Required software for mesh creation	Use software for mesh creation
			Combine mesh & point cloud	Architect/Engineer	BIM-modeller	Required software for mesh and point cloud combination	Use software for mesh and point cloud combination
			Create model checks (rulesets)	Architect/Engineer	BIM-coördinator	BIM-model elements; project requirements; BIM base ILS	Able to use modelcheck software; able to compose rulesets; able to assess BIM model quality
			Perform model check and deviation analysis	Architect/Engineer	BIM-coördinator / BIM modeller	Visual control of BIM-model; clash detection; clash tresholds; project requirements, realisation requirements	Perform visual assessment of the BIM-model; Perform clash detection(s) Assess clashes found with model and project specific tresholds & requirements
			Approve of BIM-model on actual technical conditions	Architect/Engineer	BIM-coördinator		Able to define when the model is fit for purpose
		Merge aspect models	Create or assess aspect models	Architect/Engineer	BIM modeller	Aspect-specific (p.e. MEP, structural, architectural) modelling knowledge	Translate the needs of the project/client into the aspect model and know the demarcation of the model
			Merge the aspect models	Architect/Engineer	BIM-coördinator	Model aggregation (software) knowledge, demarcation between models	Coordinate the (timely and qualitative) delivery and aggregation of aspect models
		Validate attributes	Create model checks (rulesets)	Architect/Engineer	BIM-coördinator	BIM-model elements; project requirements; BIM base ILS	Able to use modelcheck software; able to compose rulesets; able to assess BIM model quality
			Perform model checks	Architect/Engineer	BIM-coördinator / BIM modeller	Visual control of BIM-model; clash detection; clash tresholds; project requirements, realisation requirements	Perform visual assessment of the BIM-model; Perform clash detection(s) Assess clashes found with model and project specific tresholds & requirements
			Approve of BIM-model on semantic and attributes	Architect/Engineer	BIM-coördinator		Able to define when the model is fit for purpose
		Create Design Content (Energy, Cost, Planning)	Add information to objects on energy, cost and planning	Architect/Engineer	BIM modeller	BIM Object properties relevant to energy, cost and planning parameters	Add parameters to involved objects
			Create model checks (rulesets)	Architect/Engineer	BIM-coördinator	BIM-model elements; project requirements; BIM base ILS	Able to use modelcheck software; able to compose rulesets; able to assess BIM model quality
			Perform model checks	Architect/Engineer	BIM-coördinator / BIM modeller	Visual control of BIM-model; clash detection; clash tresholds; project requirements, realisation requirements	Perform visual assessment of the BIM-model; Perform clash detection(s) Assess clashes found with model and project specific tresholds & requirements
			Approve of BIM-model on energy, cost and planning	Architect/Engineer	BIM-coördinator		Able to define when the model is fit for purpose

		Capture the requirements and compare them to as-is situation	Compare requirements with the as-is situation	Building engineer / installation engineer	BIM-manager	Requirements	Translate functional requirements to technical solutions Assess the applicability of the technical solutions with the as-is-situation
			Create Model Checks (rulesets)	Architect/Engineer	BIM-coördinator	BIM-model elements; project requirements; BIM base ILS	Able to use modelcheck software; able to compose rulesets; able to assess BIM model quality
			Perform Model Checks	Architect/Engineer	BIM-coördinator / BIM modeller	Visual control of BIM-model; clash detection; clash tresholds; project requirements, realision requirements	Perform visual assessment of the BIM-model; Perform clash detection(s) Assess clashes found with model and project specific tresholds & requirements
			Approve BIM-model on Geometry (Deviation)	Architect/Engineer	BIM-coördinator		
			Add Clash related instructions for the construction worker(s)	Architect/Engineer	BIM-coördinator		
		Pick relevant Information from INSITER Guidelines	Select correct Guideline	Architect/Engineer/Quality inspector	BIM-coördinator	How to realise quality	
			Select relevant information from guideline	Architect/Engineer/Quality inspector	BIM-coördinator	How to realise quality	
			Upload in guideline requested detail information	Architect/Engineer/Quality inspector	BIM-coördinator	How to realise quality	
			Upload in guideline requested additional Energy, Cost, Planning information	Architect/Engineer	BIM-coördinator	Energy, Cost and Planning information	
			Select or add relevant INSITER checklists	Architect/Engineer/Quality inspector	BIM-coördinator	How to realise and assess quality	
		Create and deploy BIM-based Augmented Reality (AR) for self-instruction and self-inspection	Inventory the wished instructions and inspections	Architect/Engineer/Quality inspector		Different forms of AR instructions and inspections	Check which AR instructions and inspections are needed and possible for the construction worker
			Develop and upload the selected AR instructions and inspections	BIM modeller	BIM modeller	Structure of the BIM-model; AR requirements to the BIM-model; AR viewer requirements	Change the BIM-model suitable for AR device
2	Self-inspection at procurement, production and delivery of prefab components	Self-inspect at procurement	Order the components according to planning	Building site manager			
		Self-inspect at production	Add the right QR-code to the (pre)fabricated components	Production worker factory			
		Self-inspect at delivery	Transport the components by using the QR-code to the right position with tablet and BIMmodel	Construction worker		Where to store or install the components according to the BIM-model; how to work with the QR-code	Select correct storage or installation place of the components (by using the QR-code)
3	Deploying BIM on construction site	Get relevant information from BIM	Validation of quality and performance by BIM Model Checking	Construction worker	BIM user	BIM-model, BIM-viewer	Visual check BIM-model with reality
4	BIM based AR to validate delivered elements against design requirements	Use of BIM based Augmented Reality	Validation of quality and performance by using AR	Construction worker	BIM user	How to use the AR device	Use the AR device for visual check

			Task	Role		Knowledge	Skill
			Communicate validation results	Construction worker		What to document (based on company procedures)	How to document (based on company procedures and tools)
			Give additional instructions related to newly found clash(es)	Building site manager		Knowledge of a broad spectrum of clashes and what to do if required materials are not yet in place or not correctly assembled/installed	Understand a broad spectrum of clashes and what to do if required materials are not yet in place or not correctly assembled/installed
			Communicate improvements made	Construction worker		What to document (based on company procedures)	How to document (based on company procedures and tools)
5	Clash detection: verification of the current site situation	Validate quality and performance by Clash Detection and solving	Check for clashes	Construction worker		BIM-viewer, AR device, several types of clashes	Use of AR or BIM-viewer to find clashes present
			Execute instruction(s) related to the clashes detected during design	Construction worker			
			Signal clash(es) if not already detected during design	Construction worker		Knowledge of a broad spectrum of clashes	Able to mark or signal clashes using the BIM-viewer or AR
			Communicate clash results	Construction worker		What to document (based on company procedures)	How to document (based on company procedures and tools)
			Give additional instructions related to newly found clash(es)	Building site manager		Knowledge of a broad spectrum of clashes and what to do if required materials are not yet in place or not correctly assembled/installed	Understand a broad spectrum of clashes and what to do if required materials are not yet in place or not correctly assembled/installed
			Communicate improvements made	Construction worker		What to document (based on company procedures)	How to document (based on company procedures and tools)
6	Self-instruction: guiding the construction process using a mobile device	Follow self-instruction during preparation and execution of construction site and logistics.	Follow self-instruction during preparation and execution of construction site and logistics.	Construction worker		How to open the several types of instruction (in AR or on smart device)	Follow the instructions given (in AR or on smart device)
7	Self-inspection: verify the current application or installation and fill in checklists for further processing	Perform self-inspection during construction / refurbishment / maintenance process	Find and assess critical deviation and know what to do: start again, repair or talk with the building site manager how to solve the problem	Construction worker		Not correct deviation(s) or leakage(s) Which deviation(s) or leakage(s) are critical for the energy performance; repairing possibilities; when to report to site manager	Pin-point a critical deviation; able to assess the impact of the deviation; report to building site manager when needed
			Control the quality of the façade with thermographic camera; communicate with the building site manager asap if the deviatons are critical	Inspector		How to use a thermographic camera, how to register thermographic images of agreed areas, how to identify thermal bridges, critical joints in the façade	Pin-point a critical deviation; able to assess the impact of the deviation; report to building site manager when needed
			Verify tasks via Checks Lists			What to document	How to document
			Give additional instructions related to newly found clash(es)	Building site manager		Knowledge of a broad spectrum of clashes and what to do if required materials are not yet in place or not correctly assembled/installed	Recognise a broad spectrum of clashes; assess what to do if required materials are not yet in place or not correctly assembled/installed
			Terugkoppeling results			What to document	How to document
8	Final check: Quality, time and cost evaluation by the Construction Managers	Perform self-inspection and self-instruction during pre-commissioning, commissioning and project delivery	Review the delivered quality documents and reports	Building site manager		Knowledge on building and installation quality. Which deviation or leakage is critical for the energy performance of the building?	Assess which deviation or leakage is critical for the energy performance of the building
			Report relevant information and proof to the commissioner	Building site manager		Requirements on information and quality assurance	Select which information and proof needs to be reported

				Control the delivered documents and recent thermographic images	Commissioner		Technical specifications of the façade, Critical joints in the façade, how to check the delivered documents	Which deviation or leakage is critical for the energy performance of the façade?
				Verify energy, cost and planning (compared to design) via Dashboard	Commissioner		Benchmark values for energy, cost and planning	Assess if the realised values on energy, cost and planning are fitting within the to be expected range

K3: List of what to be able to do (competence) and responsibility
Deliver a correct 3D-scan
Deliver a geometric BIM-model
Deliver mesh/wireframe BIM-model
Deliver combined mesh and point cloud
Deliver a set of conditions to validate the BIM model with the project requirements
Communicate the overview of to be addressed clashes with relevant stakeholder
Approve the BIM-model after model check
Deliver a consistent and complete (aspect)model
Deliver a consistent and complete (federated)model
Deliver a set of conditions to validate the BIM model with the project requirements
Communicate the overview of to be addressed clashes with relevant stakeholder
Approve the BIM after BIM-model check
Deliver complete and consistent objects on energy, cost and planning.
Deliver a set of conditions to validate the BIM model with the project requirements
Communicate the overview of to be addressed clashes with relevant stakeholder
Approve the BIM after model check

Deliver an overview of influences on the to be added optimisation measures
Deliver a set of conditions to validate the BIM model with the project requirements
Communicate the overview of to be addressed clashes with relevant stakeholder
Deliver on Geometry (Deviation) approved BIM-model
Select of specify clash related instructions for the construction worker(s)
Assure correct guideline selection
Assure selection of relevant information from guideline
Provide in guideline requested detail information
Provide requested additional Energy, Cost, Planning information
Provide or select for the project relevant quality inspection points in a checklist
Make a selection of AR instructions and inspections for construction workers
Develop and deliver the selected AR instructions and inspections
Order the components according to planning
Add the right QR-code to the components
Transport the components by using the QR-code to the right position with tablet and BIMmodel
Verify the position of the component(s) in the BIM-model; Which materials have already to be in place (visible in BIM) before the component(s) can be assembled/installed
Verify the position of the component(s) in the BIM-model; Which materials have already to be in place (visible in AR before the component(s) can be assembled/installed

Deliver correct documentation
Decide on the appropriate actions to handle the clash(es)
Deliver correct documentation
Find clashes present related to the to be installed component(s)
Execute the given instructions
Mark all additional detected clash(es)
Deliver correct documentation
Decide on the appropriate actions to handle the clash(es)
Deliver correct documentation
Assemble/install the component(s) according the instructions (in AR or on smart device)
Shows responsibility for finding, assessing, repairing and reporting critical deviations.
Shows responsibility for finding, assessing, repairing and reporting critical deviations.
Deliver correct documentation
Decide on the appropriate actions to handle the clash(es)
Deliver correct documentation
Review the delivered documents and proof
Report relevant documentation and proof to the commissioner

Control the delivered documents and recent thermographic images
Report the results on project indicators concerning energy, cost and planning