

# ECAD/MCAD-Collaboration

General, underlying Use Case  
"Moving a mounting hole,"  
May 2007

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Establishing Leadership in IT-Based Engineering



# ECAD/MCAD-Collaboration: Project Aim

Aim of the ProSTEP iViP Association's "ECAD/MCAD-Collaboration" is to

- facilitate collaboration between the ECAD and MCAD domains in such a way that
- users in one domain have access to all relevant information in the other domain.

# Current Project Participants

- Delphi
- Siemens VDO
- :em
- Mentor Graphics
- PDTec
- PROSTEP
- PTC
- UGS
- xPLM
- FU Hagen

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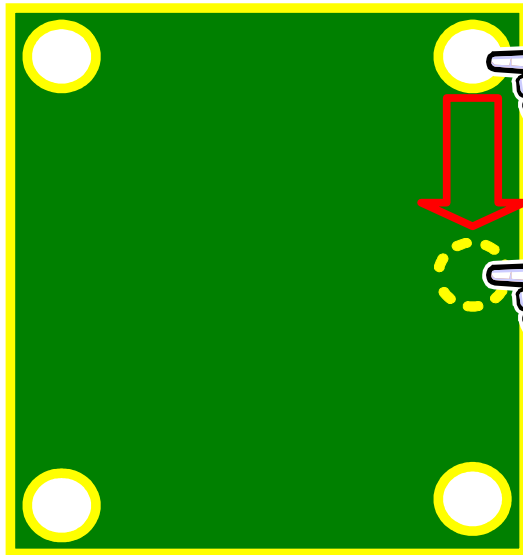


# Use Case: Moving a mounting hole

1/3



Engineer Knut



I want to  
move this  
hole...

... to this  
new  
position



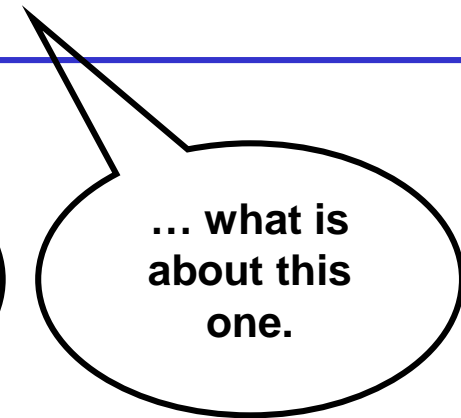
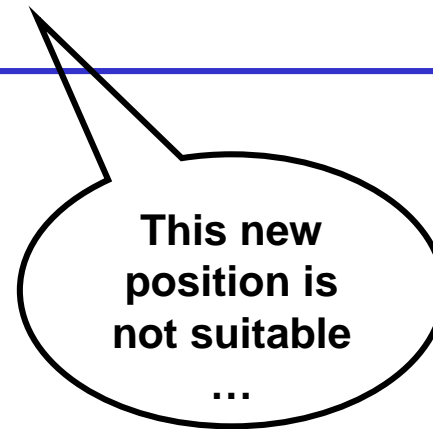
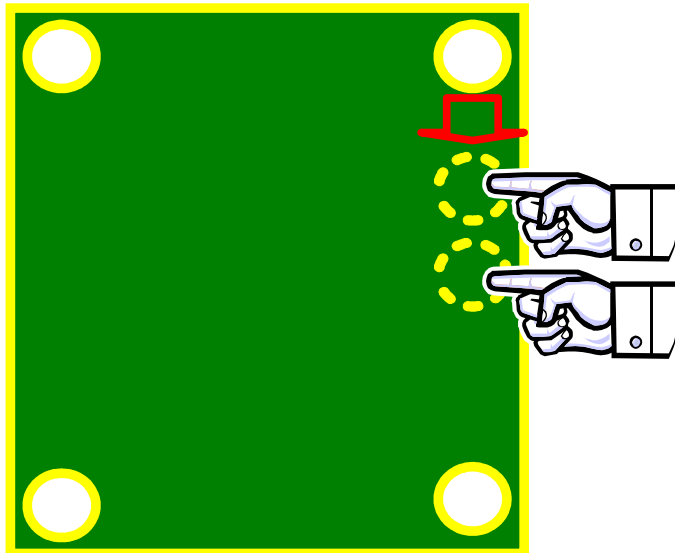
Engineer Paula

# Use Case: Moving a mounting hole

2/3



Engineer Knut



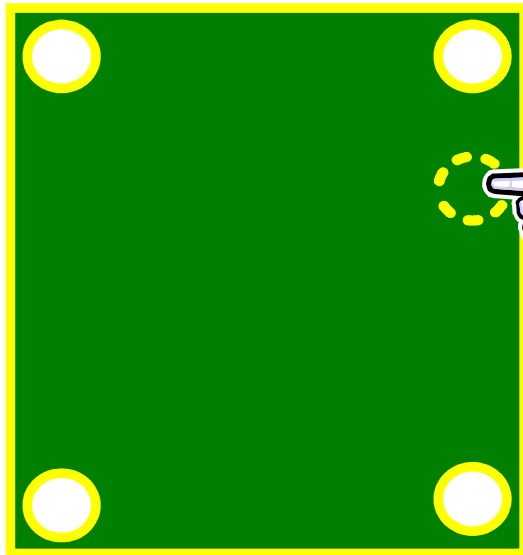
Engineer Paula

# Use Case: Moving a mounting hole

3/3



Engineer Knut



This new position is suitable for me.

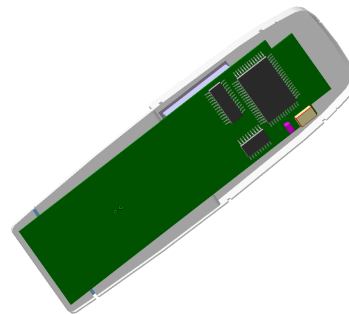
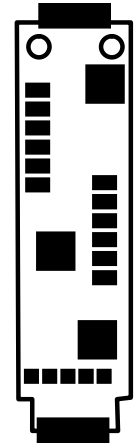
Thank you!



Engineer Paula

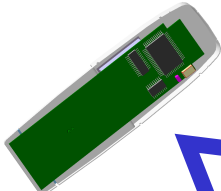
# Use case preconditions

- A design of the mechanical surrounding is available (major mechanical/electrical elements were placed (plugs, connections, LEDs etc.))
- The PCB board outline is defined within the mechanical CAD-system
- The use case can be done in synchronous or asynchronous mode:
  - In synchronous mode the changes are shown while designers communicate through another channel.
  - In asynchronous mode the information is stored and the designers can update the models on demand.
- There are there spaces, where data is stored:
  - **ECAD:** Represents the ECAD-System including the collaboration module
  - **MCAD:** Represents the MCAD-System including the collaboration module
  - **Collaboration Space:** Represents the shared data, where all relevant data is stored.

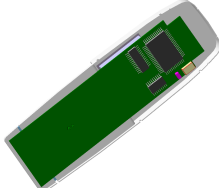


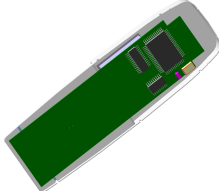
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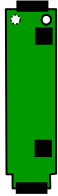



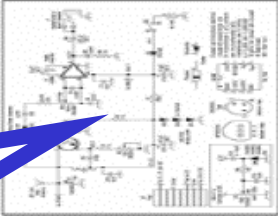
	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
1						
<p><b>MCAD starts the design of the 3D geometry in the MCAD system. Designs also components with electrical/mechanical function (plugs, LEDs, switches) or big mechanical impact (big ICs, capacitors). Also the mounting holes of the PCB are defined. This components need to be marked within the 3D CADmodel in order to distinguish between the pure 3D geometry like a hole and the semantic information that this hole represents a "mounting hole"</b></p>						


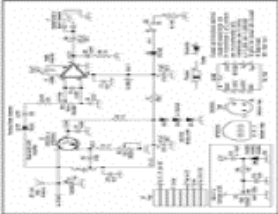


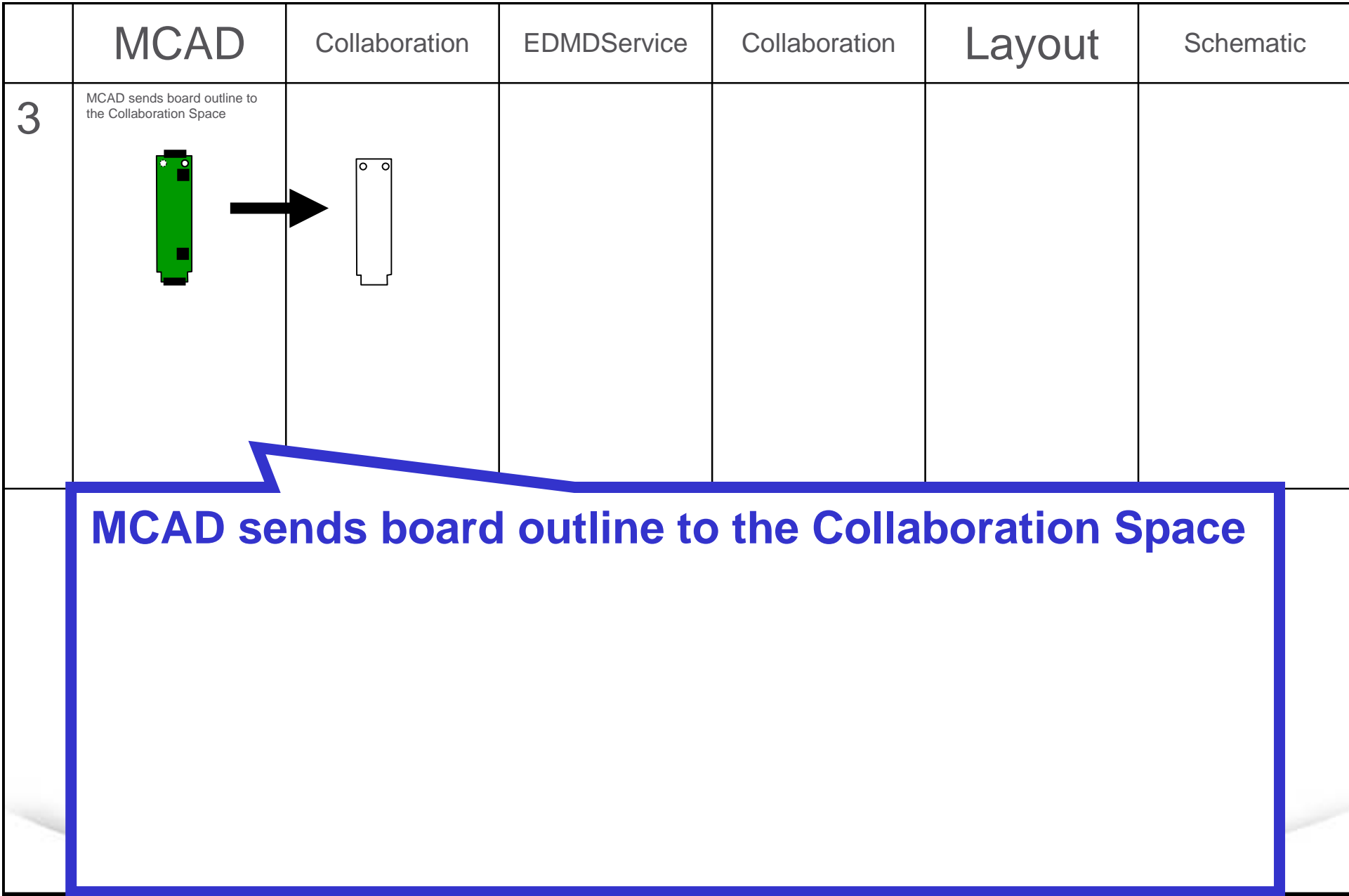
	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
1	<p>MCAD starts the design of the 3D geometry in the MCADsystem. Designs also components with electrical/mechanical function (plugs, LEDs, switches) or big mechanical impact (big ICs, capacitors). Also the mounting holes of the PCB are defined. This components need to be marked within the 3D CADmodel in order to distinguish between the pure 3D geometry like a hole and the semantic information that this hole represents a "mounting hole"</p> 					
<p><b>Starts the schematic design based on the functional requirements.</b></p>						

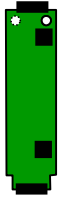

	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
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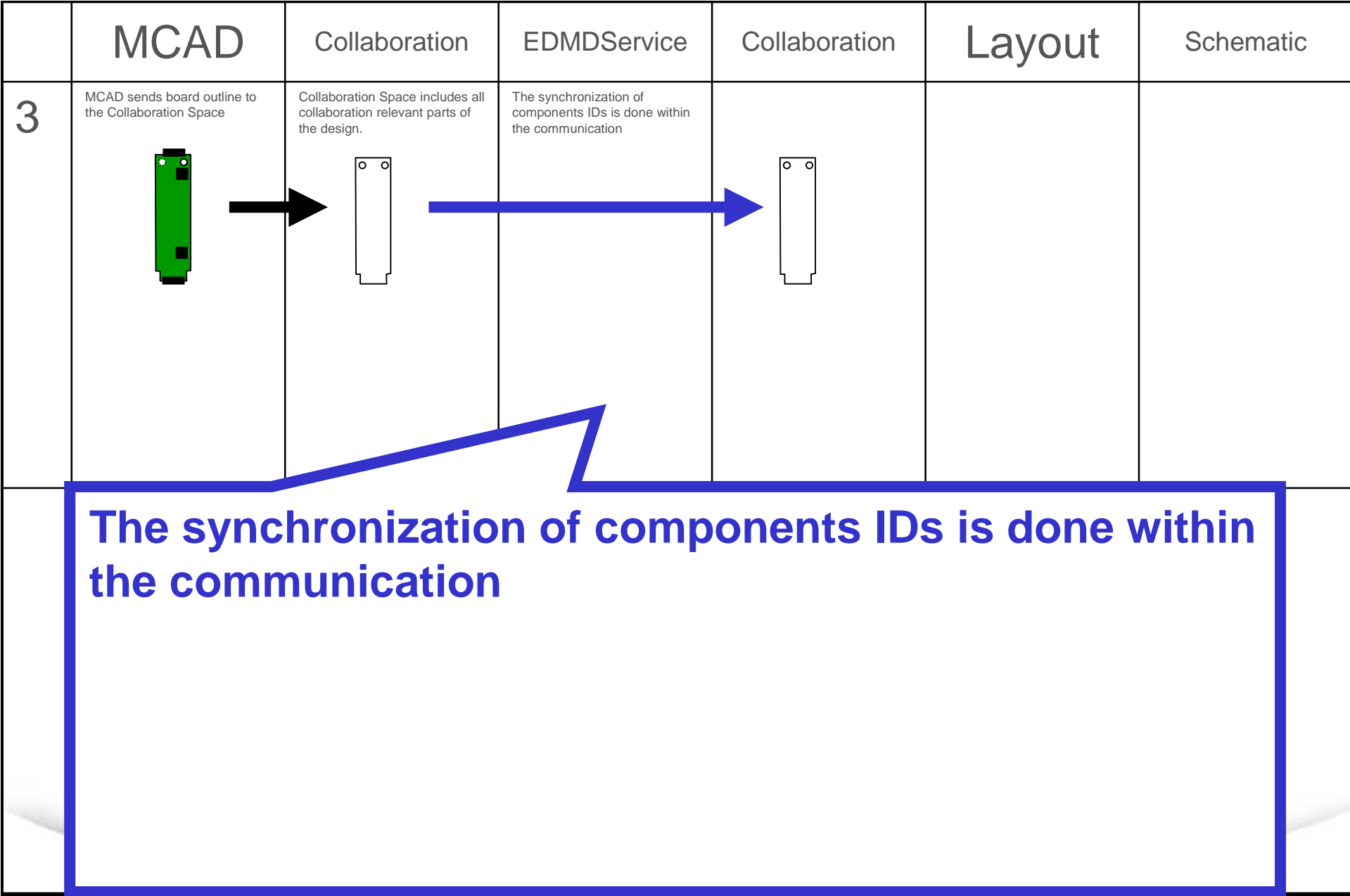
	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
2						
<p><b>After finishing the first version of the design a 2D boardoutline with position information about the components with mechanical/electrical interface function needs to be generated</b></p>						

	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
2	<p>After finishing the first version of the design a 2D boardoutline with position information about the components with mechanical/electrical interface function needs to be generated</p> 					
<p><b>Schematic generates the netlist with the components and their interconnection.</b></p>						

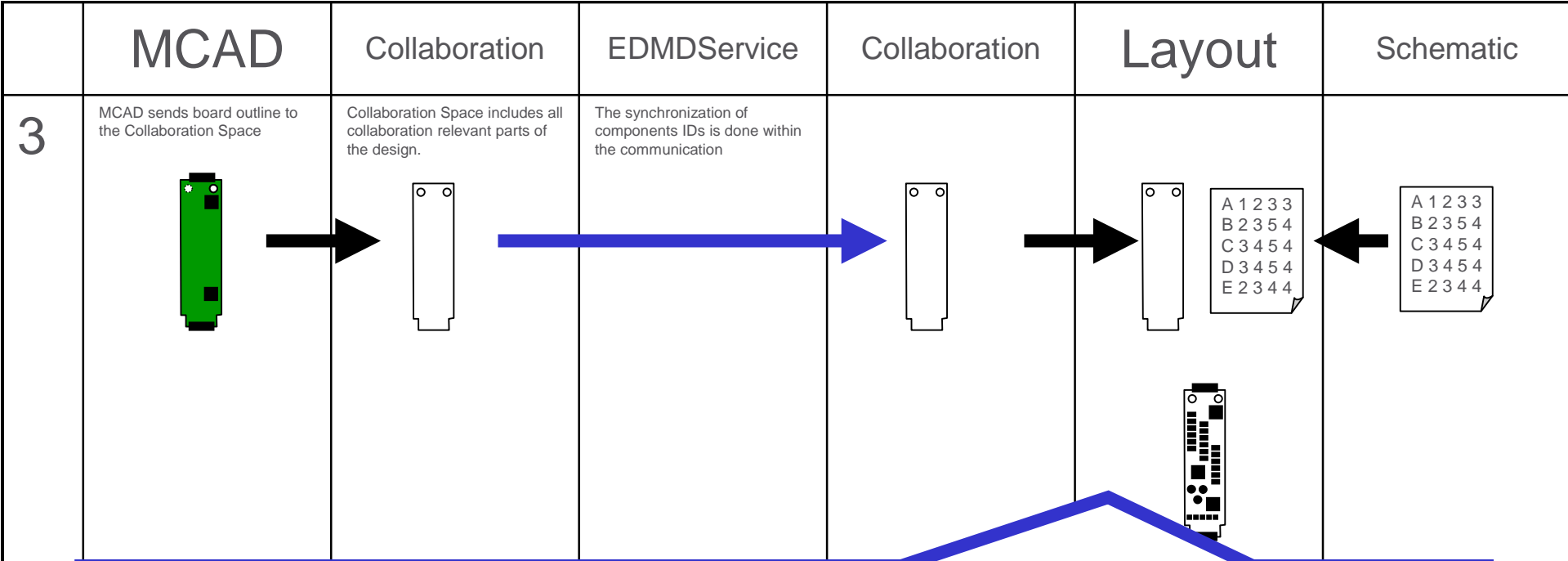
	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
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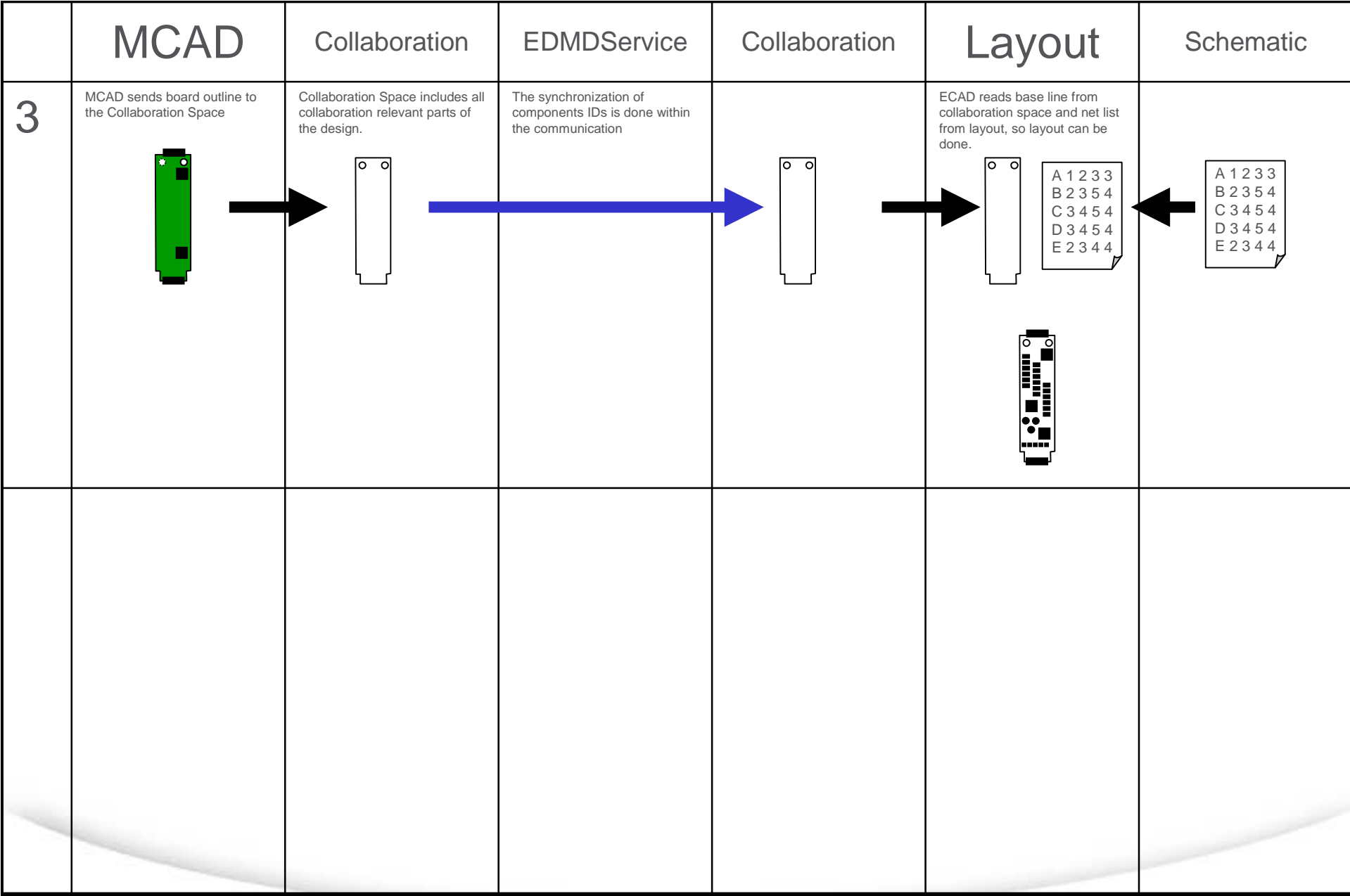
	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
3	<p>MCAD sends board outline to the Collaboration Space</p> 	<p>Collaboration Space includes all collaboration relevant parts of the design.</p> 				
<p><b>Collaboration Space includes all collaboration relevant parts of the design.</b></p>						

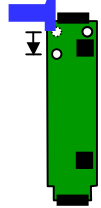


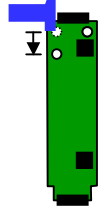


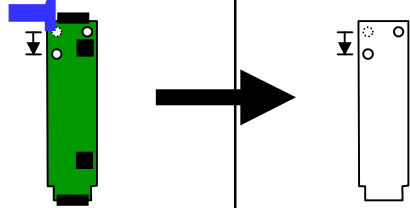


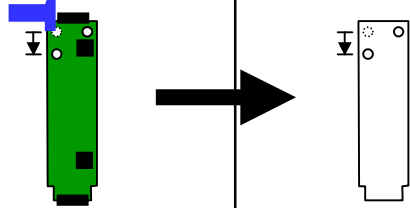
**ECAD reads base line from collaboration space and net list from Schematic, so layout can be done.**



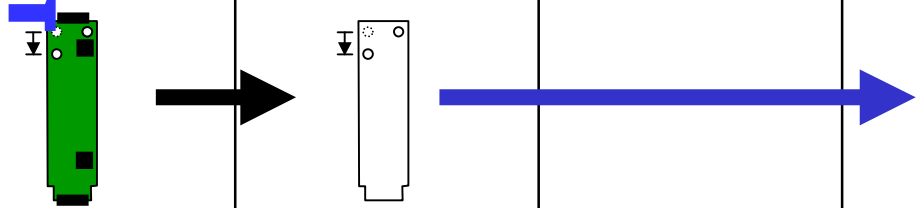
	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
4						
<p><b>Due to additional mechanical requirements (blue element). The position of a mounting hole needs to be updated. MCAD opens the 3D-model and modifies the hole-feature with the semantic "mounting hole" (an ID mapping already exist, see step 3)</b></p>						

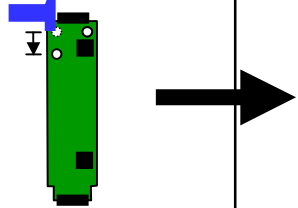
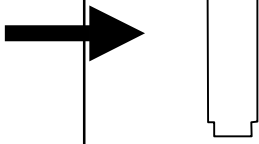

	MCAD	Collaboration	EDMDSservice	Collaboration	Layout	Schematic
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	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
5						
<p><b>Due to the fact that the electrical designer has done a PCB layout based on the first version the mechanical designer wants see if the placement modification is OK from the PCB point of view. He starts to send the changes to the collaboration space.</b></p>						

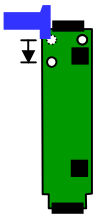


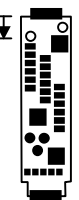
	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
5	<p>Due to the fact that the electrical designer has done a PCB layout based on the first version the mechanical designer wants see if the placement modification is OK from the PCB point of view. He starts to send the changes to the collaboration space.</p> 					

**The collaboration model for the change request is initialized with reduced information (released information) and the new position of the mounting hole.**

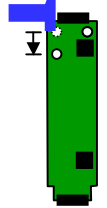


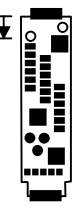
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<p><b>The change request is send via EDMDSERVICE.</b></p>						

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<p><b>Message is received and the user is asked if he wants to collaborate.</b></p>						



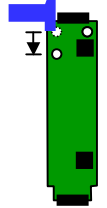




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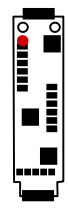
**After accepting the collaboration request the model will be retrieved and opened in collaboration mode, the changes are loaded to the ECAD-System. How changes are visualized and shown to the user is up to the special application (e.g. integrated in the CAD-System, special collaboration viewer, ...).**


	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
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## Remark:

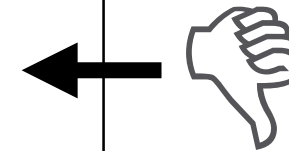
**There could be some components with no correspondence in the MCAD world and vice versa.**

	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
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						<p><u>Remark:</u> There could be some components with no correspondence in the MCAD world and vice versa.</p>

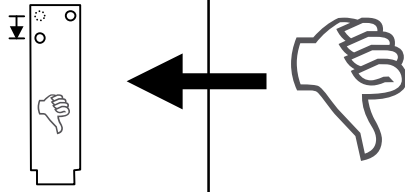
	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
6						
<p><b>The ECAD designer checks the change request, in this case the new position of the mounting hole. ECAD system will provide assistance. In this sample the mounting hole color turns to red. If there is a special collaboration viewer it checks the change against the native data.</b></p>						

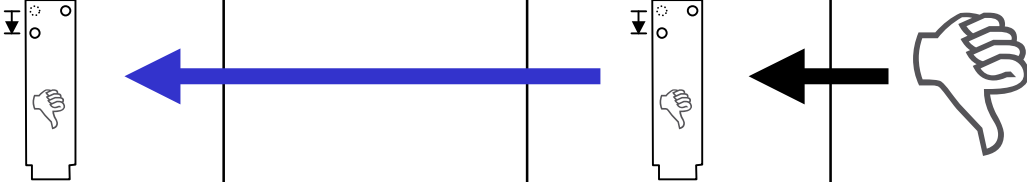
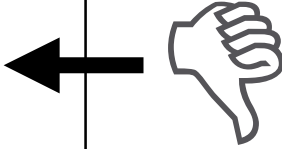
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	MCAD	Collaboration	EDMDService	Collaboration	Layout	Schematic
7						



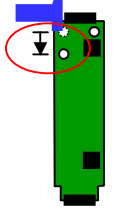
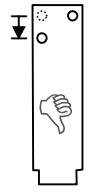
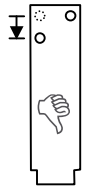

**On recognizing the problem the ECAD-System sends a ,reject' to the collaboration space.**

	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
7					<p>On recognizing the problem the ECAD-System sends a ,reject' to the collaboration space.</p> 	
<p><b>The changed version is marked as ,rejected' in the collaboration space.</b></p>						

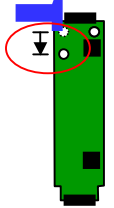
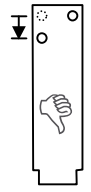
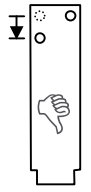

	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
7				<p>The changed version is marked as ,rejected' in the collaboration space.</p> 	<p>On recognizing the problem the ECAD-System sends a ,reject' to the collaboration space.</p> 	


**The ,reject' mark is transfered via EDMDSERVICE.**

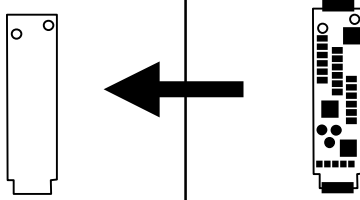


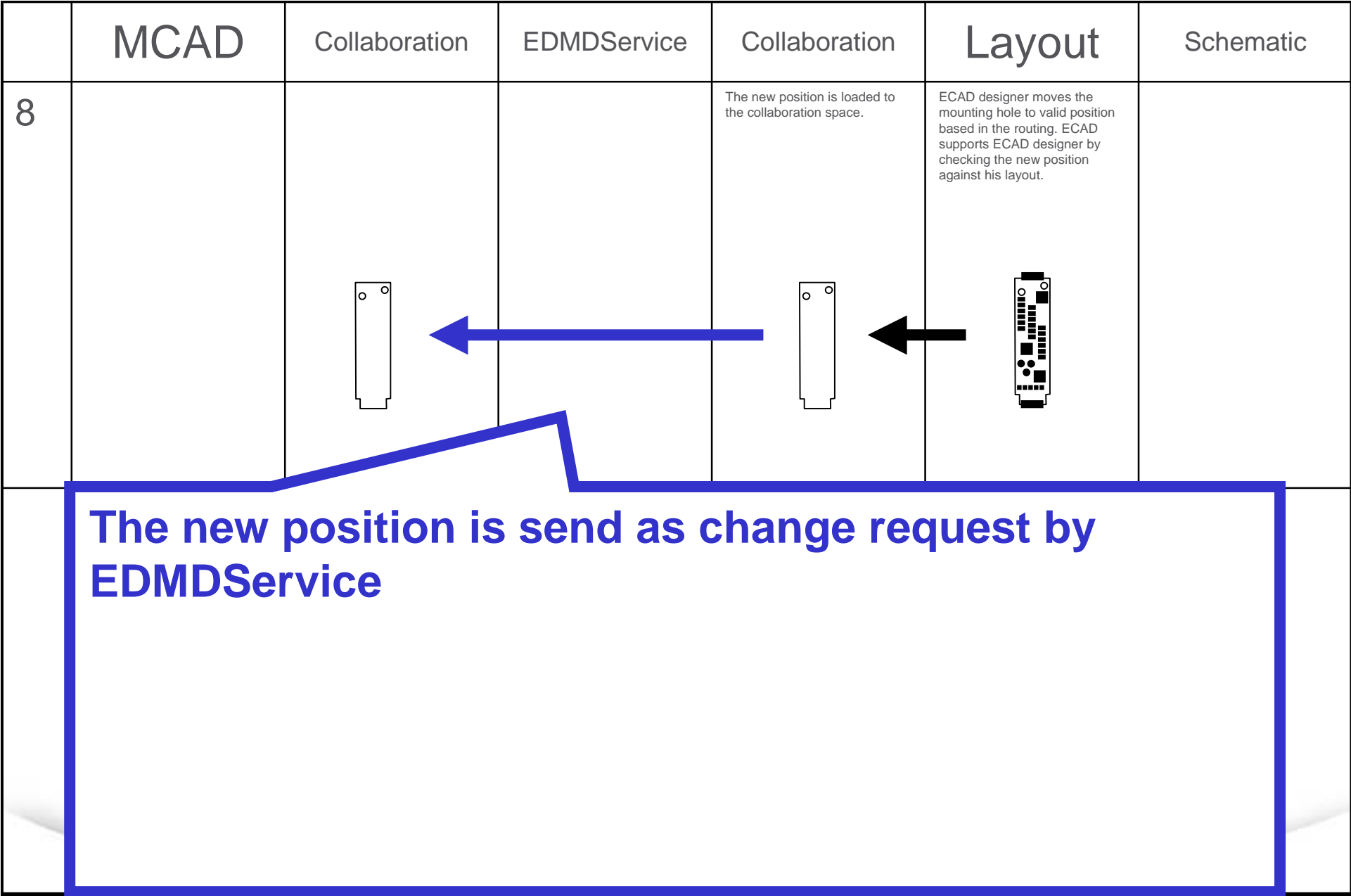
	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
7			The ,reject' mark is transferred via EDMDSERVICE.			

**The MCAD designer is informed about the rejection.**

	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
7	<p>The MCAD designer is informed about the rejection.</p> 		<p>The ,reject' mark is transferred via EDMDSERVICE.</p>			

	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
8						
<p><b>ECAD designer moves the mounting hole to valid position based in the routing. ECAD supports ECAD designer by checking the new position against his layout.</b></p>						

	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
8					<p>ECAD designer moves the mounting hole to valid position based in the routing. ECAD supports ECAD designer by checking the new position against his layout.</p> 	
<p><b>The new position is loaded to the collaboration space.</b></p>						

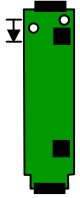




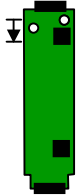
**The new position is send as change request by EDMDSERVICE**

	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
8			The new position is send as change request by EDMDSERVICE	The new position is loaded to the collaboration space	ECAD designer moves the mounting hole to valid position based in the routing. ECAD supports ECAD designer by checking the new position against his layout.	

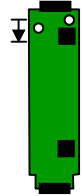



**The new position is loaded to MCAD and shown to the user. It is up to the application in which way this is done.**

	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
8	<p>The new position is loaded to MCAD and shown to the user. It is up to the application in which way this is done.</p> 		<p>The new position is send as change request by EDMDSERVICE</p>	<p>The new position is loaded to the collaboration space</p> 	<p>ECAD designer moves the mounting hole to valid position based in the routing. ECAD supports ECAD designer by checking the new position against his layout.</p> 	

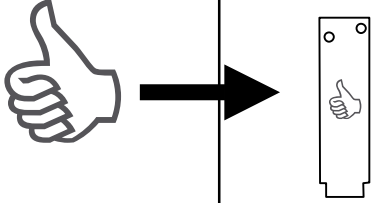
	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
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<p><b>The MCAD designer checks the change request, in this case the new position of the mounting hole. MCAD system will provide assistance. If there is a special collaboration viewer it checks the change against the native data.</b></p>						

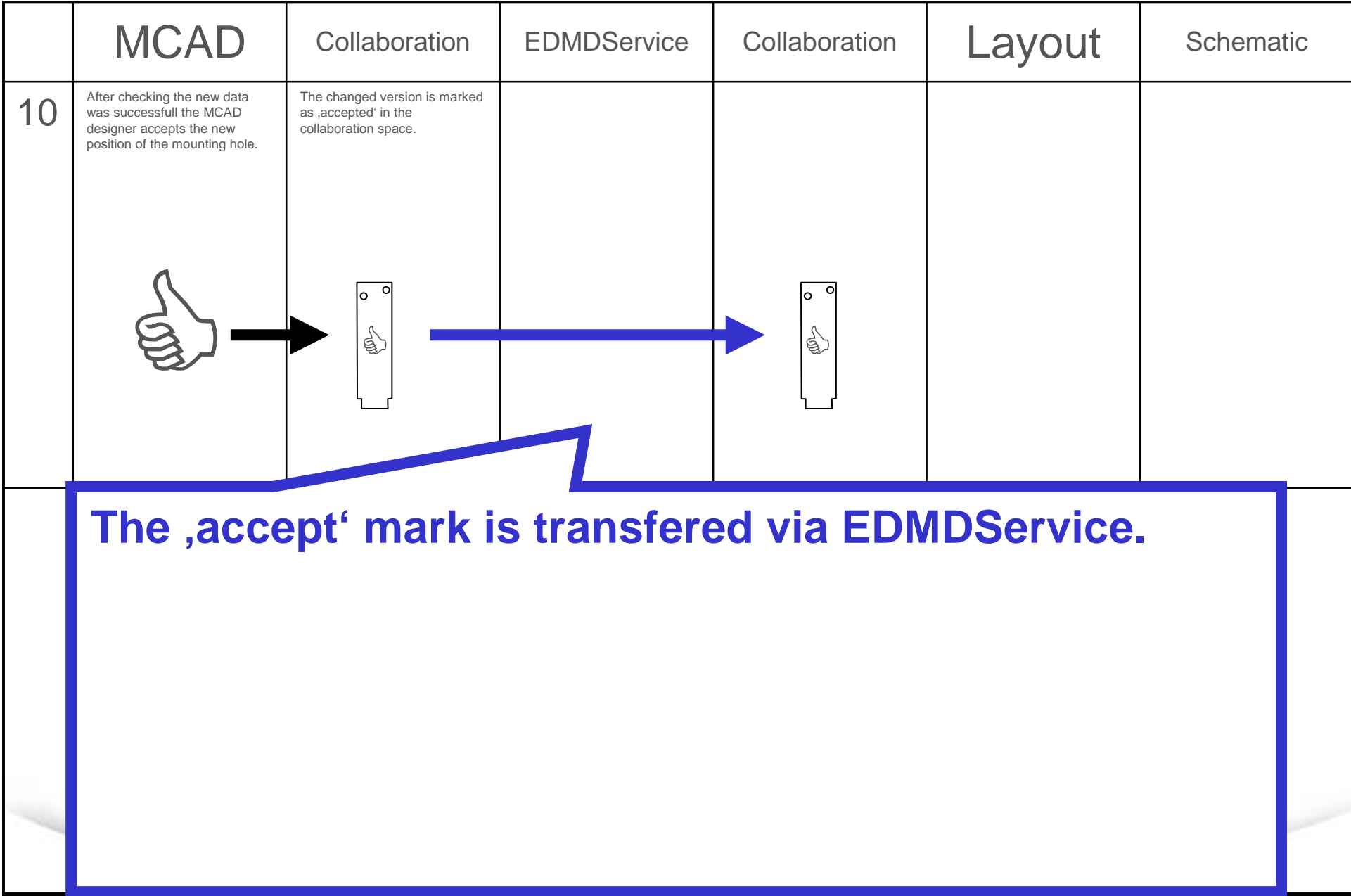


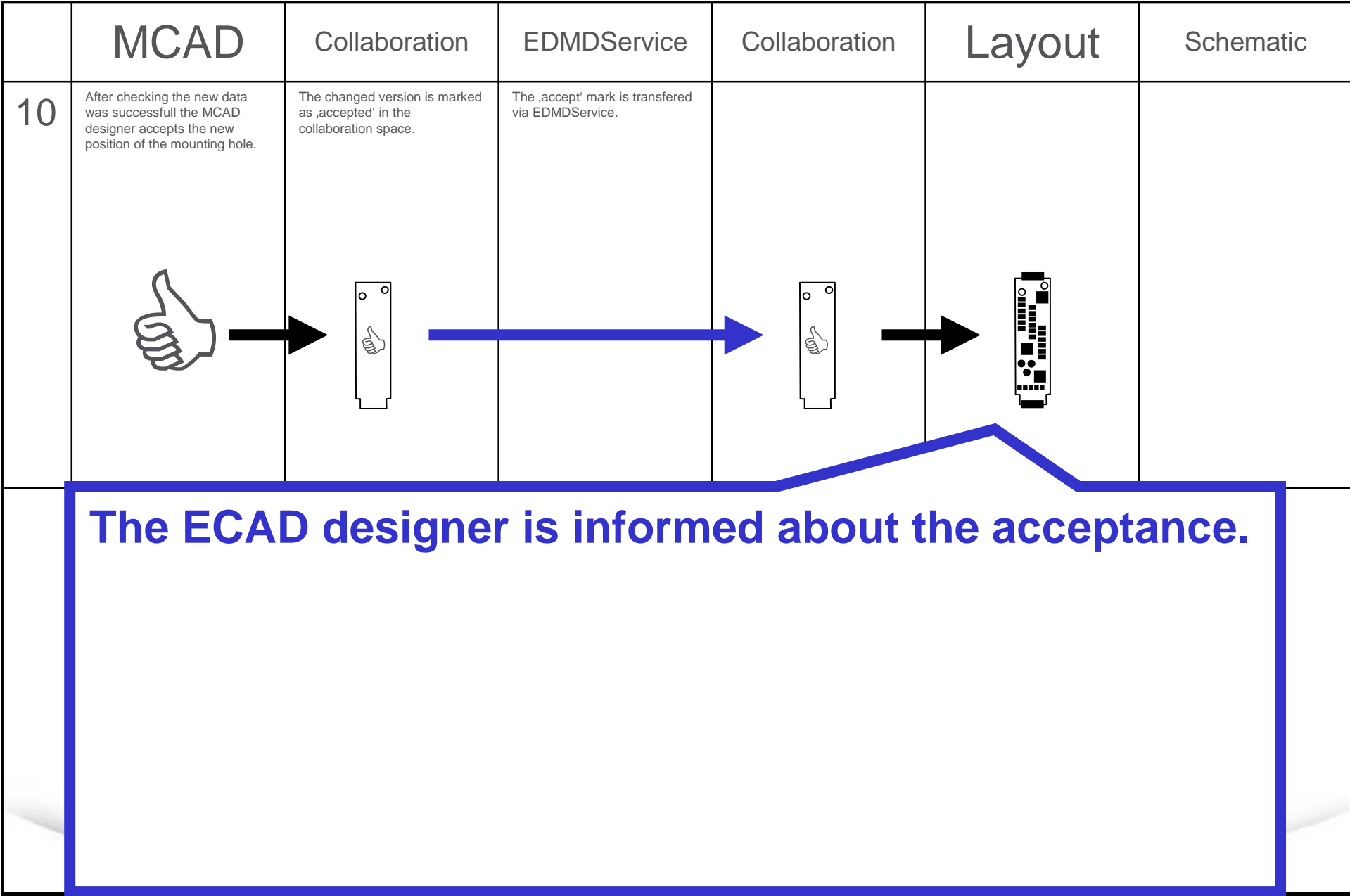
	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
9	<p>The MCAD designer checks the change request, in this case the new position of the mounting hole. MCAD system will provide assistance. If there is a special collaboration viewer it checks the change against the native data.</p> 					





	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
10						

**After checking the new data was successful the MCAD designer accepts the new position of the mounting hole.**

	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
10	<p>After checking the new data was successful the MCAD designer accepts the new position of the mounting hole.</p> 					
<p><b>The changed version is marked as ,accepted‘ in the collaboration space.</b></p>						





	MCAD	Collaboration	EDMDSERVICE	Collaboration	Layout	Schematic
10	<p>After checking the new data was successful the MCAD designer accepts the new position of the mounting hole.</p> 	<p>The changed version is marked as 'accepted' in the collaboration space.</p> 	<p>The 'accept' mark is transferred via EDMDSERVICE.</p>		<p>The ECAD designer is informed about the acceptance.</p> 	
<h1>THE END</h1>						