

Code	Subcodes	Definition	Sentence
Workflow Definition		The definition provided by the participants for WORKFLOW	P1 - "I mean it's synonymous to a pipeline, or maybe I should actually explain what, what I mean by pipeline. I mean just like a scheme of which software is running in which order. For like a package of software that are online or in parallel or in sequence in different constellations."
			P3 - "From an input file going through different tools ending, uh, ending up with output file which I'm looking for and this can be like a huge number of different tools and processes."
			P5 - "Something that you can quickly see how you run the program. That's my definition, I guess a summary of what you have."
			P4 - "So I would say some computation of workflow that has an inputs and that has an outputs, and can consist of several intermediate steps."
			P6 - "Aaa it's a process to follow through project."
Step Definition		The definition provided by the participants for STEP	P1 - "It could be either a program being run or some kind of script or a conversion to another file type or it could be moved over the network. Basically. I guess the step would be like some file changing shape, or being transferred to another computer."
			P3 - "It depends, but different steps would be the different tools, I want to say eh. And if they are paralysed I would say that this step is still the same, but maybe the workflow goes in different directions but it still the same step, if they do same kind of things."
			P4 - "It's um, probably as well something that takes some files or something as an input and produce something as an output and either intermediate files or something"
			P5 - "like input, output or tool, i'm not sure"
			P6 - "Um, what you're going to do at certain points."
Notations & Concepts Improvement	<i>Dislike</i>	Notations that the participants commented on how to improve or in what the problems consist of	P3 - "These text boxes are like far away from."
			P5 - (tool + input/output) "What is the best way when you have it like this? Because it will go really, if you have deiu deiu deiu then it will go really in diagonal.or can I spin it around or something or have it like this does up."
			P6 - "Maybe write a text to say this is done by a human or when you say I'm doing some or if you have a tool, you are using and you say the name of that tool. People will know it's a tool. If it's done by a human, people know it's done by humans. I don't think necessarily to come with different shapes."
	<i>Understandability</i>	Notations and concepts that required further explanations or that caused confusion	P1 - "What's the difference between tool and action?"
			P1 - "So process end and start, is that just like the end and start of the whole thing?"
			P3 - "Where do I write the condition?"
			P3 - "what's an action?"
			P3 - "the workflow name place 1, place2, place 3, I don't about that one either."
			P3 - "the standard reference, I don't know what that is or how to use it."
			P4 - "I want 2 input files. How do I do that?"
			P4 - "can choose here if you want to use the tool or action. So I think it's a little bit what, what is the difference?"
			P6 - "What's this one I don't understand?" (end flow)
			P6 - "what is this shape is it like a different tools we will use them?" (tool + input/output)
			P6 - "these 2 are the same?" (hard and soft condition)
P6 - "If you're using a tool it is also an action, right?"			
Missing Notations & Concepts	<i>Additions</i>	Lack of notations and concepts identified by the participants	P1 - "There's no file database with a box." (input/output)
			P1 - "I would like different kind of arrows. Like, cause sometimes it's files that are moved somewhere and sometimes there like files are just in place but they're just used in another software." --- "I usually want to display kind of how the data moves around on our physical cluster, like different computers and so on."
			Researcher "Anything missing apart from the parallelogram thing?" / P5 - "No, I don't think so either. Okay. It's usually no."
	<i>Nothing identified</i>	No missing notations or concepts	P3 - "No, not what I see. No, probably not"
			P4 - "Hmm, no."
Unnecessary Notations	<i>Unneeded</i>	The participants do not see usage for these notations	P3 - "Goal, description. I would never use this goal I think."
			P5 - "I'm not sure. For me it's like the goal and maybe the note, because I would write that outside of the workflow, but it depends because we are doing it for publications then you don't want those. But it might be for others. So that's just for me."
	<i>Unfamiliar</i>	Due to unfamiliarity with the language, the participants would remove these notations	P1 - "this vertical join/fork thing. I'm not exactly sure. I would probably just do many arrows pointing to one tool or something like that."
			P6 - "oh, this horizontal join/fork."
	<i>Nothing identified</i>	The participant did not identify any unnecessary notation	P4 - "Yeah. No, I, I think there's no"
Notations & Concepts Usage		The participants' answers to the query: would they use the notations and concepts at their work?	P1 - "Sure. Yeah why not."
			P3 - "Maybe, because the why I would use it is I still think it's nice to have the inputs and outputs. Why I don't think I would use it, is it takes time to do it and all the text things are a bit far away from the actual boxes."
			P4 - "Yes. I. I think that that is good. Um, the, I, I, I, yeah, I, I would use that. I think."
			P5 - "Yes. I think I definitely liked the tool ones, which I only used almost." --- "Frequently, Probably not because we usually don't write the workflows. I mean if we need to, we do it for publications, but usually it's just text, like we did this and this and this."
			P6 - "Yeah. I actually use this website, as well. --- The work we do, its quite standard so we have kind of the workflow in our mind. We actually have, um, uh, when we do scripting, we have the report you can see what kind of workflow we have from the reports. That's why we don't use it that often."

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Notations Complexity		The participants' answers to the query: are the notations and concepts complex?	P1 - "No, they are not."	
			P3 - "No, they're not complex. I mean, it's just as few as we need they are not more than what we actually do need. Um, so when you get used to knowing, which boxes you will use or the arrows you will use, then it will probably be easier to use them."	
			P4 - "No. They are very nice and clear. --- except for the drawing program not so easy to use, but the the shapes are clear"	
			P5 - "No, I mean there's some like the input and output, for instance, I think because that's just a square and usually you have like a form for a file, which I don't think are found or?" -- "but It a parallelogram for a lot of the files usually?" --- "I'm used to it like that and I did that once"	
			P6 - "Yeah a little bit." --- "If somebody learns this quite well, I would say it's quite straightforward, you know. The shape, the different shapes represent different procedures or, yeah, but cause cause the flowchart you want to show also the other people, that's why you have this one, right. when you show it to other people If they don't learn these tools and they don't understand the shapes, It may be difficult for that to follow the flow." --- "Cause there are too many shapes it makes it a little bit difficult to use."	
Notations & Concepts Tutorial Necessity	Descriptive Manual	The participants' answers to the query: would a person need training or tutorial to learn how to use the notations' library and its concepts?	P3 - "No, I think it's good to have like just some kind of uh, paper telling me, okay, so this is is, and this is not this and getting the experience. I mean it says quite clearly on them what it is."	
	Familiarity		P5 - "At least like a manual or something that you can follow, I think"	
	Training		P4 - "I will learn just by using it."	
			P1 - "Yeah. yeah." --- "I don't know which ones to use in which occasions. I mean, usually I would just draw a box. like a box for everything and then try to adobe it after I'm done maybe."	
			P6 - "yeah, training is definitely useful."	
Confidence to use the Notations & Concepts		The participants' answers to the query: did you feel confident using the notations and concepts while drawing?	P1 - "Yeah. Umm, you only look at the shapes and things here. But, I mean, <u>draw.io</u> is a little bit like junk."	
			P3 - "It's new, definitely. Uh, and I have to, but that's, that's draw, probably, takes a lot of time moving the boxes and things coming up in the wrong directions, and I don't know."	
			P4 - "Yeah. That's fine."	
			P5 - "Beside that It's fine, but it's difficult as you say for <u>draw.io</u> I, I think."	
			P6 - "Yeah, I think so."	
WDST Improvement	Annoyance	The participants mentioned something on the template that annoyed them	P3 - "This took long, It just keep going"	
			P3 - "all these ID needs, it's a lot of them. They are probably consistent, but in my mind, there's a lot of them. And, and it's probably good if you do a really complex workflow then you need them."	
			P5 - "it's a lot of writing the same thing I think there."	
			P6 - "Ahh, you have the workflow and the different steps, you better if like the first, uh, description part, you can automatically link, so you don't have to fill it again."	
	Understandability	Fields that required further explanations or caused confusion	P1 - "I don't know, what to put in here" (process step ID)	
			P1 - "Concurrent to another. Hmm. I mean, not in this workflow, but should this be in relation to like the start point cause the start point has to be triggered by something."	
			P3 - "Where should I put that source?" --- "the step source. You will have differences. Sometimes it changes, but if you have the tool and the version, you can always find where you can download it, where you get it."	
			P3 - "Step ID for me it is the same"	
			P3 - "Process step name. Process step Id. Its the whole, I mean you said the process was all of it, so then it's Glenn. Process step name, fine step one. This is a bit confusing"	
			P3 - "Super Process, ohh Nice, I don't know what it is, but sounds great."	
			P3 - "what was hard and soft conditions?"	
			P4 - "where this step, Okay, this I don't understand."	
			P5 - "workflow ID. Ah what is that?"	
			P5 - "step ID still not sure what it is."	
			P5 - "Date of creation. It's, it's same as before. or is that suppose to be like when you create that step?"	
			P5 - "Super process, Eh, I don't know what that is."	
			P5 - "Is this concurrent to another?"	
			P6 - "So you have different steps here or?" (First and second steps)	
			P6 - "But these aren't the same?" (the header)	
	P6 - "What does this mean?" (Order of execution)			
	Fixing	The participants identified a mismatch in the template's pages, a wrong meaning, or a wrong field	P1 - "Here it says process step name and step ID and here process step ID."	
			P5 - "Where the step happens. Office I guess, I don't feel that I'm, that I don't feel why that would be of interest to anyone."	
	Format	The participant said something related to the way the template was provided	P1 - "Is it meant to be like in an excel?"	
	WDST Missing fields	Nothing	The participants think that nothing should be included	P3 - "No, nothing is missing."
		Field addition	An undescribed field that the participants felt it is important to have included	P4 - "No. Not what I can think of."
P1 - "Maybe like a description for what we do if something happens. Like here and step condition for judgment, we have a condition, but we don't say what is done as a result of that condition. So, like here we would collect the standard error and email ourselves or something."				

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WDST Content Flow		The participants' answers to the query: do you think that the documentation template has a good flow?	P1 - "Yeah, sure."
			P3 - "yes, it's actually kind of good flow, it is. You have the right things in the beginning and you're going through the steps in a nice order. Yes. it's a good flow."
			P4 - "yes, yeah."
			P5 - "yeah, yeah, I don't think you can change the order of things."
WDST Usage		The participants' answers to the query: would they use the documentation template at their work?	P1 - "yeah, we had to, sure. I mean we don't like these kind of documents, but yeah. If someone tell that we have to. Sure. --- I mean, as frequently as i have to." --- "It makes it easier than just writing free text."
			P3 - "No, I wouldn't use it I think. I don't think I need it in the workflows I make today, I usually, I only do the scripting directly. I don't draw it or write it down if I do, if I need, if I need to, why I usually draw something, it's because I need to explain it to someone else or if I, it's kind of complex. So in order, for me to make the workflow, I need to write it down to get my head around how it actually works. So using this one with all text, no, because I wouldn't get my head around how it works really."
			P4 - "Yeah. Yeah. Yes. I think so. Um, but yeah, if it's like, I guess that most people are lazy. So if someone doesn't specifically ask to documenting this way, then people will just documenting in their own way."
			P5 - "I don't think so." --- "because it's so much to fill in and I think for reading it, it would also be too much. I think for the workflows. You want to have an overview and quick see aha I recognise this tool and this tool, but if you have, like if I do this for the entire workflow, I think it would be like 10 pages and no one has the energy to do that."
			P6 - "No, it's so complicated. This may occupy more time than if i just run the script." --- "Hmm. Yeah. In a way, yes. If you, if your projects you need to check in detail"
WDST Complexity		The participants' answers to the query: is the documentation template complex?	P1 - "um, a little bit, yeah."
			P3 - "I would say it's complex. Or too much. Too much information. I don't think you need all of this, probably in other types of workflows, but nothing to ones I'm doing."
			P4 - "No, I don't think so." --- "I think it was clear."
			P5 - "Yeah. It's complex , it's a lot." --- "I think, the largest problem was for the writing, but that's usually because I i'm not used to that. I don't know if anyone is writing."
			P6 - "Yeah, it's quite complicated, as I can see."
WDST Tutorial Necessity	<i>Manual or Example</i>	The participants' answers to the query: would a person need training or tutorial to learn how to use the documentation template?	P1 - "It's not really needed with training." --- "I would like to have like a template that describes exactly like examples."
	<i>Unneeded</i>		P3 - "Yeah, one example sheet maybe, or, but it's kind of a nice draw already in this uhm, with the light grey. So, maybe not."
	<i>Manual or Example</i>		P4 - "No, it's the same self-explained."
	<i>Training</i>		P5 - "Yeah, I think so. Or a manual or something."
			P6 - "Yeah definitely, but also training needs time."
Confidence to fill the WDST		The participants' answers to the query: did you feel confident using the documentation template?	P1 - "Yeah."
			P3 - "It's also difficult to write these type of pipeline without actually having a pipeline. Then you don't know like this process. This is a step in this process I'm just coming up with something right now. So I don't know, but I don't think it went smoothly."
			P4 - "Yeah. I think so, this one was even more easy than drawing."
			P5 - "No, not really, no."
			P6 - "Yeah. I mean if you get used to it, it's not really hard."
Artefacts Usage	<i>Validation</i>	The participants' description for which is the purpose of the two artefacts presented to them (library for drawing and documentation template)	P1 - "It could be good for us, when we work against the hospital we have to, um, we develop something and then we have to validate it to check that it does what it's supposed to and then we have to write everything down in the hospital documentation system, so it could be useful to fill out and just put in to that system and not have to make, write this free texts, which we have to do now. But everything they do there is like on Word, So it would be good if is compatible with a Word on Windows so we can just paste it and work."
	<i>Process overview</i>		P3 - "They are for workflows, showing how it, how it is created, how it is running, how people should run it."
	<i>Traceability & Learnability</i>		P4 - "maybe to get a diagram and overview of the workflow, like if you have a workflow that consists of several steps."
	<i>Publication</i>		P6 - "I don't think how we'll use the tables. Yeah. Of course. The Diagram and the flowchart is quite useful for some really complicated and big projects. It's better to have a flowchart."
			P3 - "In a couple of years, when I go back and I want to know, what did I do then I can see exactly using this drawings. Like, Okey I did this step, this step, this step very quickly or if another person suddenly gets the same costumer that I had a couple of years ago, um, they can see exactly what we did. What tools did we run."
			P5 - "The template i don't know when. the diagram, I def, publication or if you just want a nice picture and a poster and everything, then I think that would be good."
Artefacts Users	<i>Researchers & Tools developers</i>	The described people as users of the documentation and workflow diagram	P3 - "I don't think this one is only for bioinformaticians, everyone building a workflow probably." --- "it's more for people with the same knowledge or similar knowledge, but sure. If a PHD come here and they have some experience from before or something, they can get a good understanding of we use."
			P5 - "The researchers, tools' developers, definitely the workflow, that no, I don't, then I don't know about the template, but the diagram."
			P4 - "I guess in, in my case it would be another researcher, uh, like someone that is maybe not a bioinformatician, but someone that has a produced some data and they want to, to use the workflow for analysing the data. So it's a, it's a PHD student or a postdoc or someone like that that, yeah. That's the the use or is, it's not, it's not the developer of the workflow but it's the user."
	<i>Bioinformaticians</i>		P1 - "yeah, like me and my colleagues, like bioinformaticians, because I don't think the geneticists want to go into this much of details."
			P6 - "Bioinformaticians."

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Artefacts General Impression		The participants' answers to the query: what is your general impression of the documentation template and the notations' library?	P1 - "In general it's good, you just, it's just needs a better tool for the <u>draw.io</u> maybe for making the diagrams. But it's form with some like better distinction between like the terms. Maybe so we what each thing means. It's good."
	P3 - "the diagram I think it's good. I would absolutely use it with these inputs and outputs and everything and especially if I learned how to use it, but that's has nothing to do with your work, yeah, that's me. And about these documents and my general impression is that it would take more time just to fill it out and what it actually gives us as back."		
	P4 - "I think it looks nice and can be a lot clear overview. but. Like, what. One is more overview, and this one's more, the document, is more detailed of them, steps. I think it's good. --- I could say that they complement each other. Here, it's difficult to get the overview of the whole even. Yeah, it's, um, but, yeah, it depends a little bit on the the complexity like here."		
	P5 - "I think, I think it's a good idea that we keep the documentation better, because. Because there's always a problem, especially for us, when you are delivering data or if you're working with the same things. So it's, I think it's a good thing to have it really well documented so you can follow the steps. So the idea is good, but I think it's too much for the, the template. The diagram I think that's really, I think that's good."		
	P6 - "The chart is good, I would like to use it. just maybe decrease that number of shapes. The table, mhhh, I think it can be used for legal usage like If somebody is going to sue you, and this is really a good control and it goes into details so like if you're doing, for example, human data and you are maybe making a drug in the end. and, in the process when you analyse the data, you are using a different, with a wrong tool, I think, that this will be a really useful. If they say this drug, it's unuseful or shouldn't be approved because you used this tool."		