

## 1. Artifact description

- High-level description
- Motivation, background for making this artifact, or some part of it
- Requirements/end-goals/intent for the artifact
- Explaining how some already written code works, or how some model was created, or some content on a slide, or in general something that's been done already
- Explanation of program input/output
- Sharing opinions/facts about the content; tangents about content
- Talking about the nature of the artifact/notes
- Intended audience, or what additional info/context is needed to understand the artifact

## 2. Regarding some in-progress work; or, intermediate step that may/may not be informative about the final artifact

- A step taken with certainty
  - Active work/progress
    - What the user is currently doing/about to do; intermediate goal; maybe will include approach for achieving it
    - Speaking verbatim what they're currently typing, or the action they're performing
    - Doing some cleaning/refactoring of the artifact (e.g., the code)
    - Changing/deleting something existing (e.g., code) due to some change in needs or creator having better clarity
    - Trying to make the artifact (e.g., slides) more fun/interesting
    - Explanation for why they're doing something (for functional or stylistic reasons)
    - Explanation of what a current action enables
    - Talking about tool usage
  - Evaluating work
    - Testing/trying something out; checking the accuracy of something (e.g., by googling)
    - Prediction about the outcome (e.g., of some code)
    - Checking their work
    - Realization
    - Commenting on the state of something (e.g., variable/input arg, model feature)
    - Indicating that something is done now, or commenting on the output
    - Sharing their opinion about the state of the artifact
- A step involving some uncertainty
  - Unexpected result
    - Encountering an error/mistake or an edge case, something unexpected, and possibly making a fix
    - Retrying something

- Frustrations, difficulties, confusion; or indication something isn't working
  - Making/planning for a decision
    - Planning, decision making, thinking
    - Making a quick, maybe arbitrary decision
    - Talking about a change/refactoring that needs to be made (i.e., due to change in requirements)
  - Skimming/reading the web for relevant content
  - Uncertainty about content
- 3. Design intent
  - Things to keep in mind, or that would need to be changed, for different environments, different configs, different materials, different parameters; or explaining that something was built to allow flexibility or satisfy some requirements wrt other parts/objects
  - Explaining decisions related to manufacturing intentions and needs
  - Design decisions (e.g., regarding implementation, modularity, placement of slide content)
- 4. Regarding unfinished work (things that aren't/won't be finished by end of study session)
  - Limitations or unfinished work
  - Simplification/trick they're using, or something that's messy/probably not ideal
  - Says they'll get back to something later; may or may not do something temporary
  - Warnings
  - What they would do differently in the future/with more time
  - Todo items or delegating
  - Saying what can be modified
- 5. Process-related
  - Simplification/trick they're using, or something that's messy/probably not ideal
  - Says they'll get back to something later; may or may not do something temporary
  - High-level description of their process and thoughts; possibly including challenges/pitfalls they faced
  - Process suggestions/opinions, or things to do just to be safe; tips
  - Following/not following best practices
  - Challenges, things that are tricky
- 6. Related to environment or tools
  - Environment config, or basic software interactions
  - Info about tool/software or how to use it
  - Talking about the tool, opinions about it
- 7. Talking to self/computer
  - Short utterances, talking to self

- Talking to software/computer, usually with some dissatisfaction

8. External reference

- Google/web search
- Reference to something external (e.g., library, part)
- References some documentation, or says they need to check documentation

9. Related to the study (probably unlikely to occur in real system use)

- Questions/comments related to study environment
- Meta comments about think-aloud
- Meta discussion about conveying a design, handing it off to others
- General discussion of creation process
- Discussing how they would share their artifact with others, collaborate with others