

# Palantír: Increasing Awareness among Distributed CM Workspaces

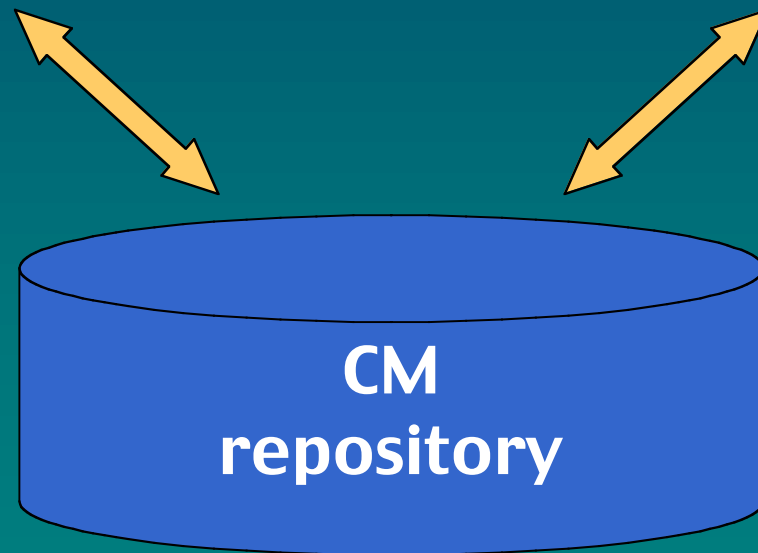
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# A Typical Development Scenario

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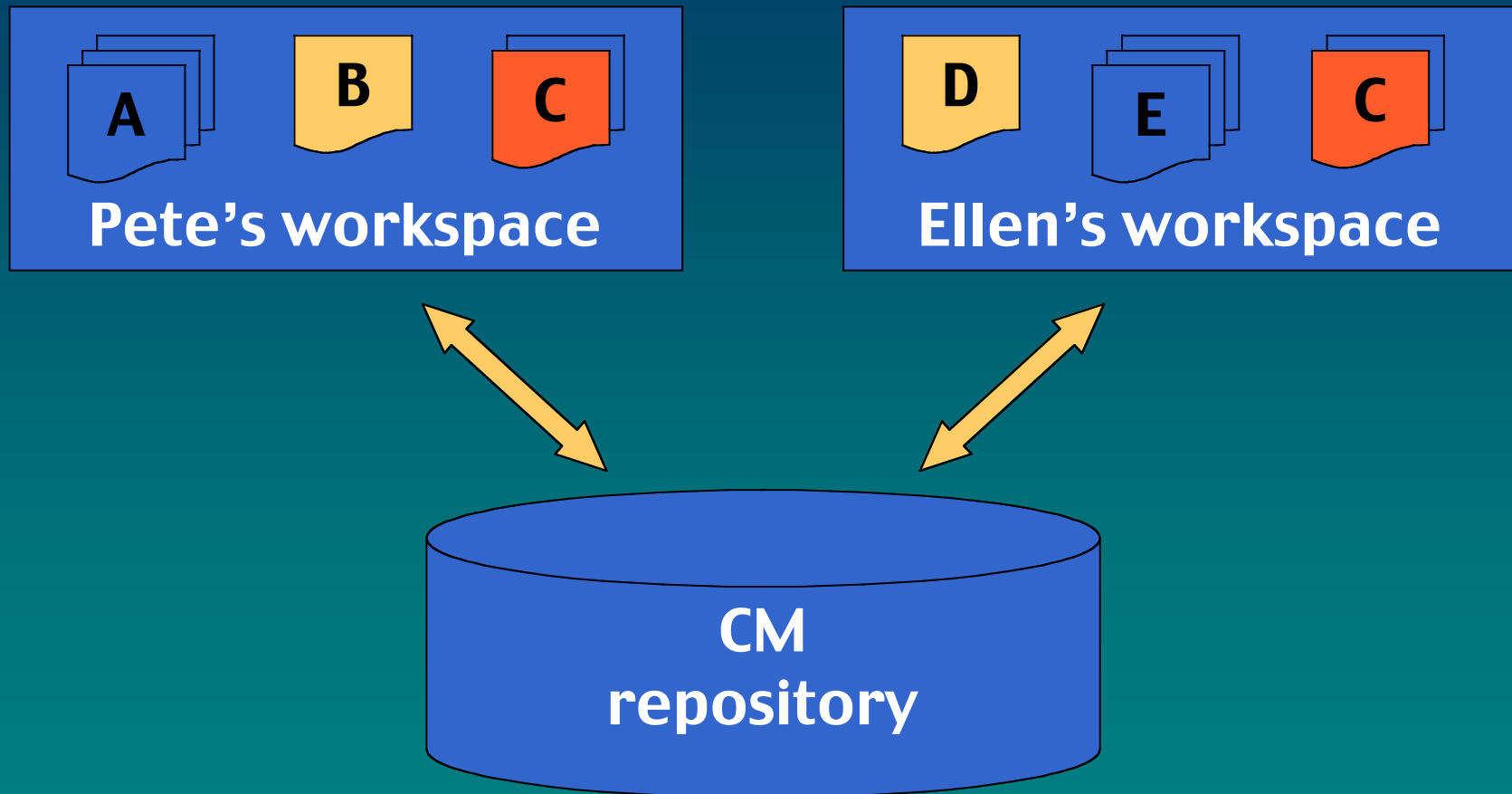
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# Direct Conflicts

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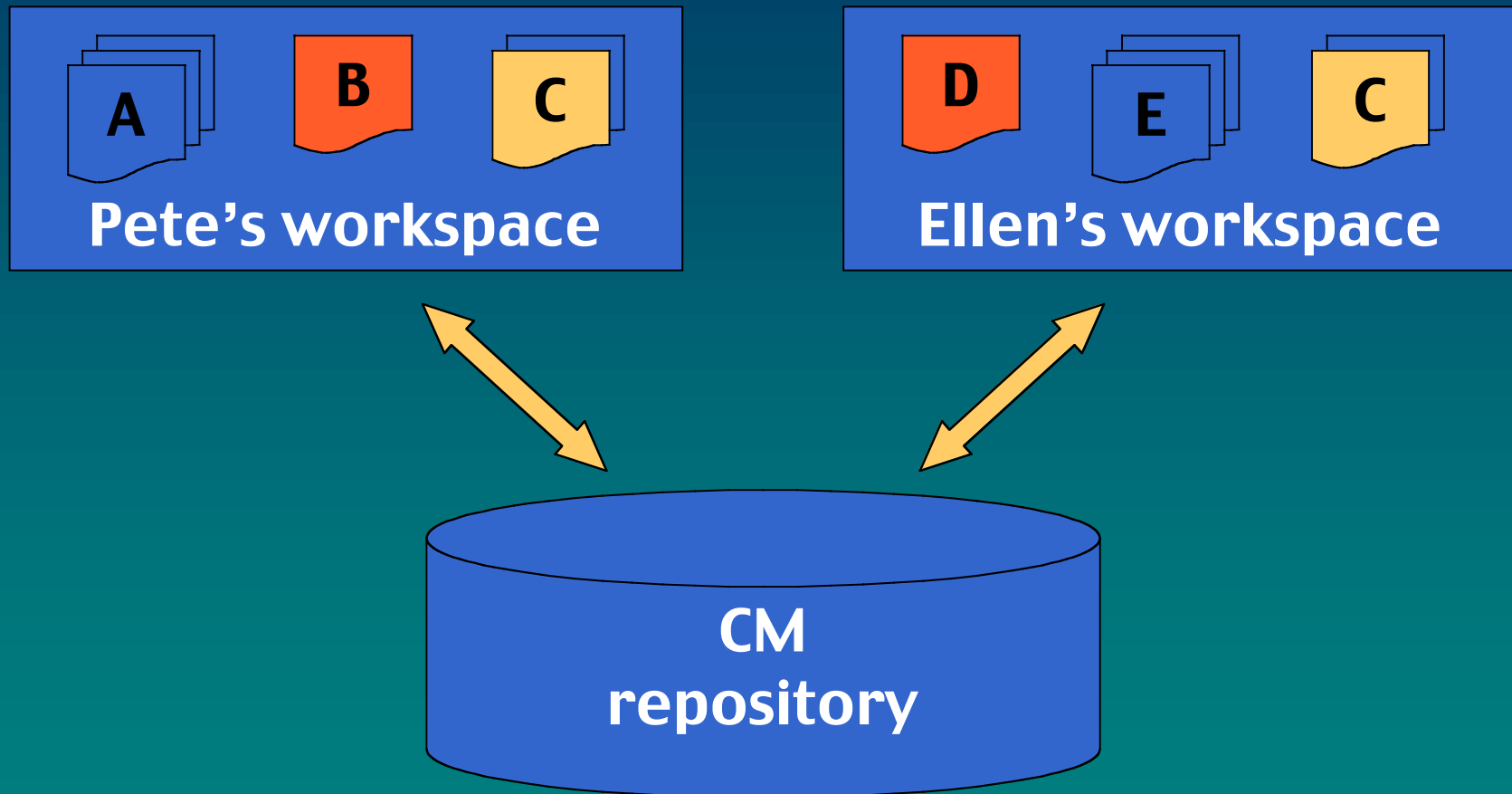
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**Overlapping changes to the same artifact**

# Indirect Conflicts

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Changes to one artifact modifying the behavior of another artifact

# Traditional CM Approaches

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## ■ Pessimistic

- An artifact can be changed by only one person at any one time
- Limited in not allowing any parallel work

## ■ Optimistic

- An artifact can be changed by many persons at the same time
- Limited in leading to merge problems that need to be resolved manually

# Traditional CM Approaches

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Neither solution addresses direct and indirect conflicts very well, especially in a distributed and decentralized setting

# Key Observation

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- **A CM workspace in reality provides two kinds of isolation:**
  - **Good isolation**
    - ❖ Hides actual changes to artifacts
  - **Bad isolation**
    - ❖ Hides knowledge of what artifacts other developers are changing

# Approach

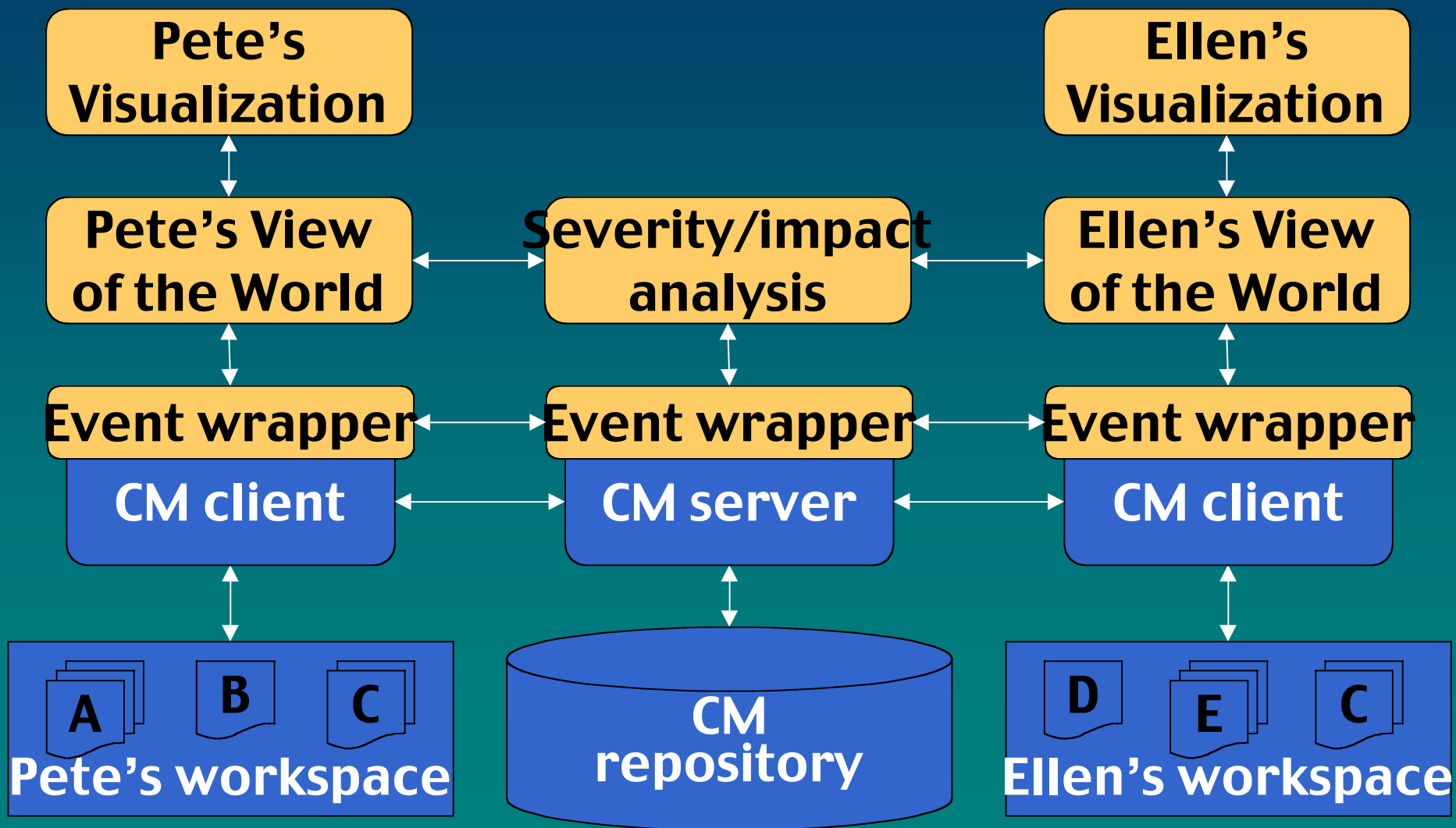
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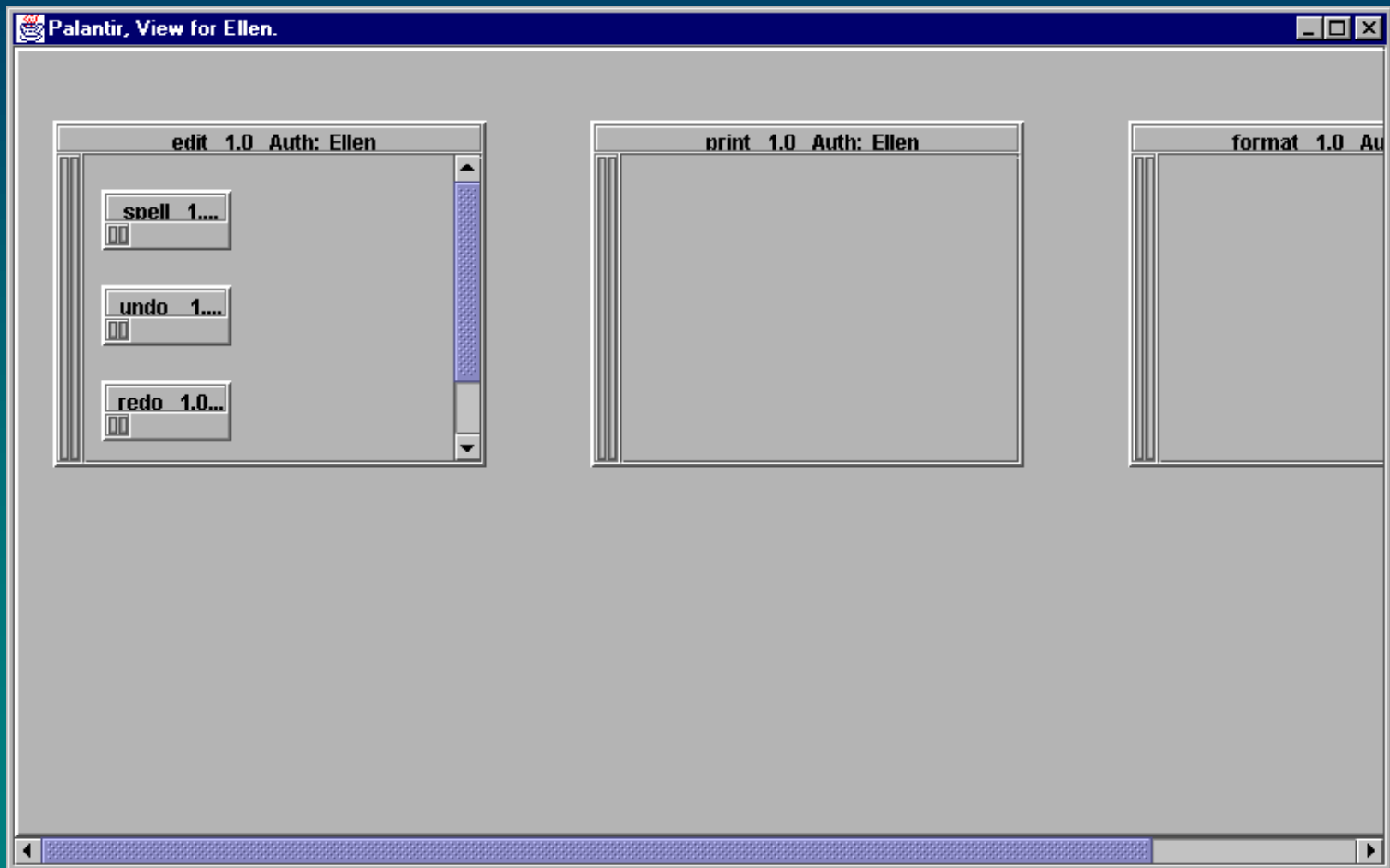
- **Continuous workspace awareness**
  - Which artifacts are being changed by whom?
  - What is the *severity* of the changes? (amount/size of change being made)
  - What is the *impact* of the changes? (effect of changes on one's current work)
- Such awareness has the potential to significantly reduce the number of direct and indirect conflicts



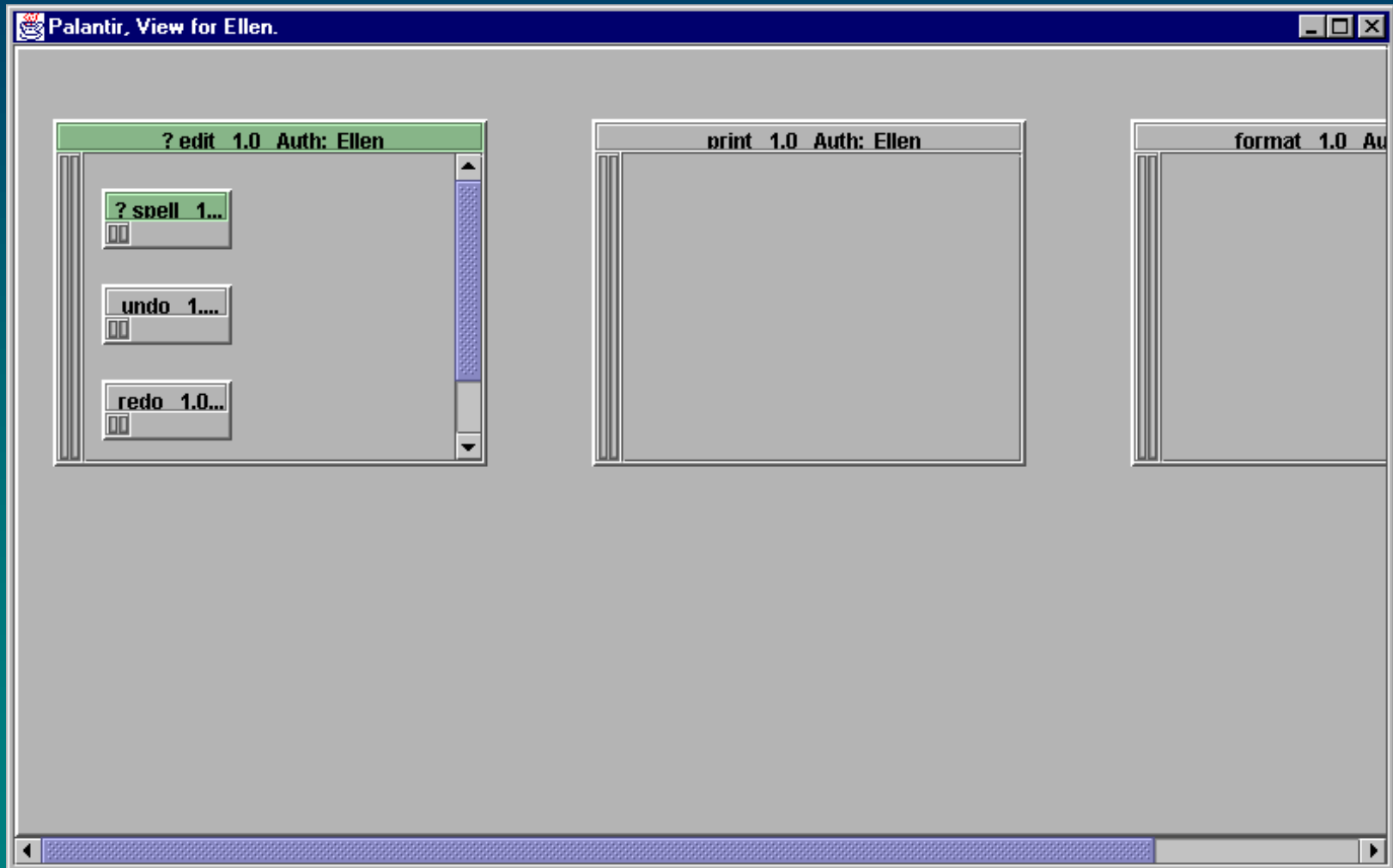
# Palantír Architecture



# Populating a Workspace

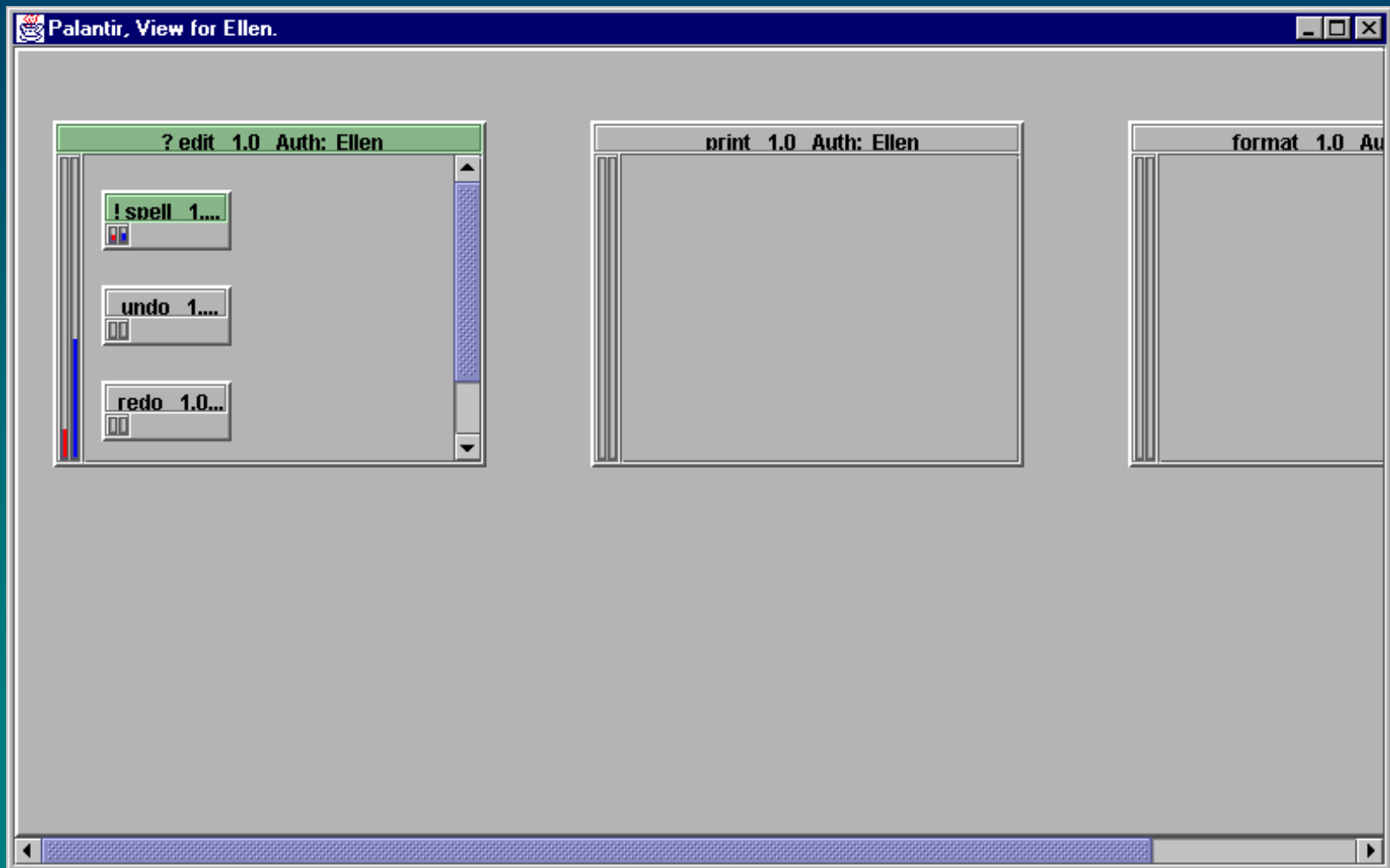


# Making Changes in the Workspace

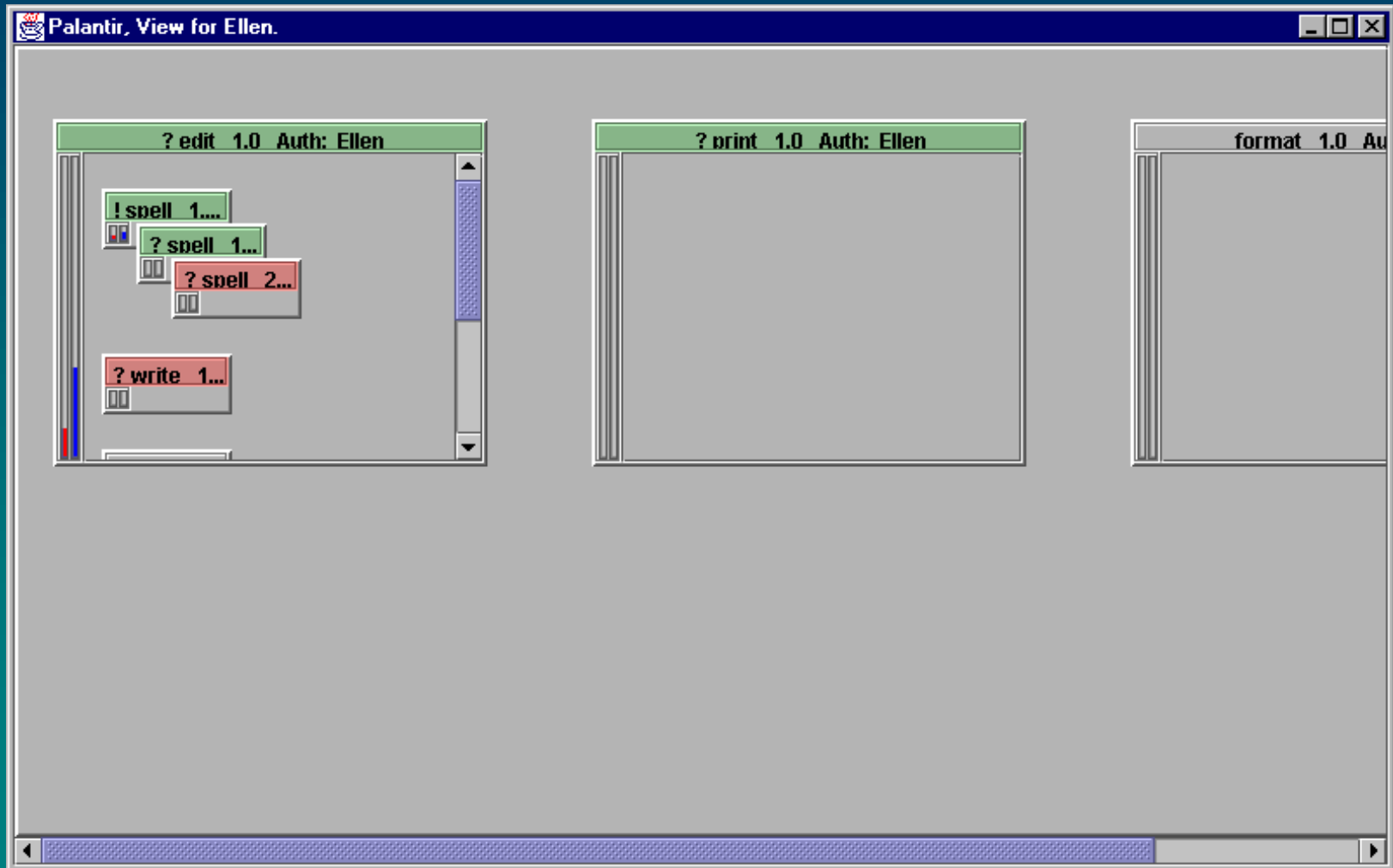


# Committing Changes

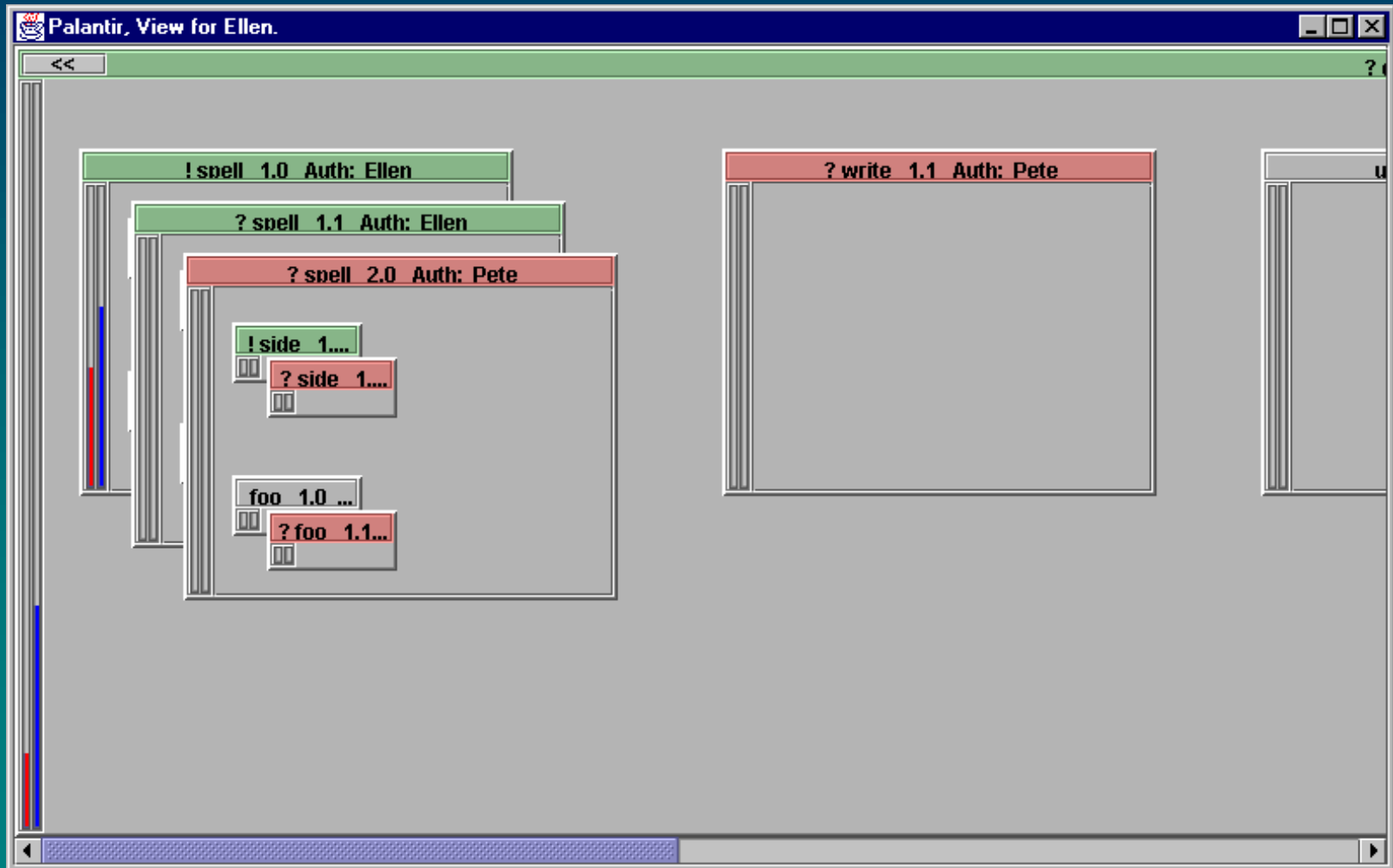
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# More Changes (by Other Developers)



# Etc., Etc., Etc...



# Visualization Features

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- **Different views with different trade-offs**
  - Amount of information versus level of intrusiveness
  - Scroll-bar, tabular, fully graphical
- **Configurable**
  - Selection of relevant developers, events, timeframes
- **Scalable**
  - Internal data structure versus actual visualization
  - Pair-wise workspaces
  - Sorting per severity or change impact
- **Extensive metadata**

# Severity Analysis

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- **Amount (size) of change being made**
- **Proposed algorithms**
  - **Number of files**
    - ❖ Simple, but inaccurate
  - **Lines of code**
    - ❖ Simple, but inaccurate
  - **Token based difference**
    - ❖ Measures structural changes, but language dependent
  - **Abstract syntax tree**
    - ❖ Very detailed analyses, but likely too expensive (and language dependent)
- **Current work in progress**



# Impact Analysis

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- **Effect of changes on one's current work**
- **Proposed algorithms**
  - **Overlapping number of files**
    - ❖ Simple, but inaccurate
  - **Overlapping lines of code**
    - ❖ Simple, but inaccurate
  - **Changed interfaces**
    - ❖ Potentially accurate and effective, but language dependent
  - **Dependency analysis**
    - ❖ Very precise, semantic results, but complex (and language dependent)
- **Current work in progress**

# Conclusions

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- **Palantír is a prototype that...**
  - ...brings awareness to distributed CM workspaces
  - ...shows pair-wise conflict
  - ...provides severity and impact analyses
- **Palantír is independent of the type of CM system used**
- **Use of Palantír results in fewer direct and indirect conflicts**
  - Case study to be planned in near future
- **Future work**
  - Integrate with different CM systems
  - Implement severity and impact analysis algorithms for both atomic and compound artifacts
  - Develop additional visualizations

# Research Projects

