



Evaluation of Information Visualization Tools Using the NFR Approach

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AGENDA



- Motivation
- InfoVis Tools
- The NFR Approach
- SIG Development
- Observations
- Conclusions and Future Work

MOTIVATION

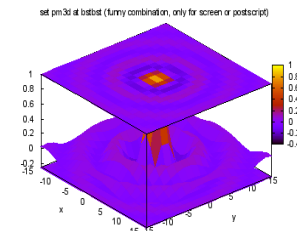
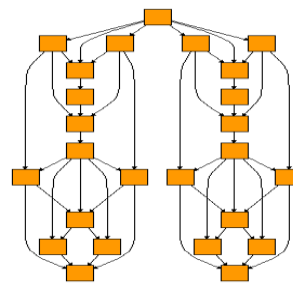
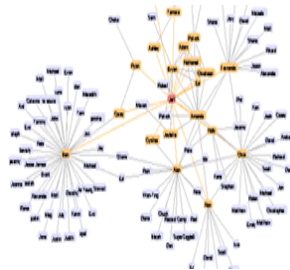


- **INFOVIS TOOLS** - widely used to visualize data-intensive applications
- Determination of quality permits selection of the most appropriate infovis tool
- Quality - one or more desirable characteristics a product should possess
- “**visualizability**” as a characteristic to evaluate quality of infovis tools
- Qualitatively evaluate **visualizability** of infovis tools
- We employ **NFR Approach** for qualitative evaluation
- NFR Approach treats visualizability as a non-functional requirement (NFR)
- Assist practitioners to choose the appropriate tools for their needs

INFOVIS TOOLS



- **PREFUSE** – An open source software framework, Java programming language, helps to create interactive information visualization applications.
- **TOM SAWYER** – visualization product family, develop graph visualization applications quickly and efficiently, licensed software, supports multiple editions like ActiveX, ASP.NET, Java, JSP, and MFC Editions that quickly and easily integrate into applications.
- **GNU PLOT** - portable command-line driven interactive data and function plotting utility for UNIX, IBM OS/2, MS Windows, DOS, Macintosh, VMS, Atari and many other platforms.

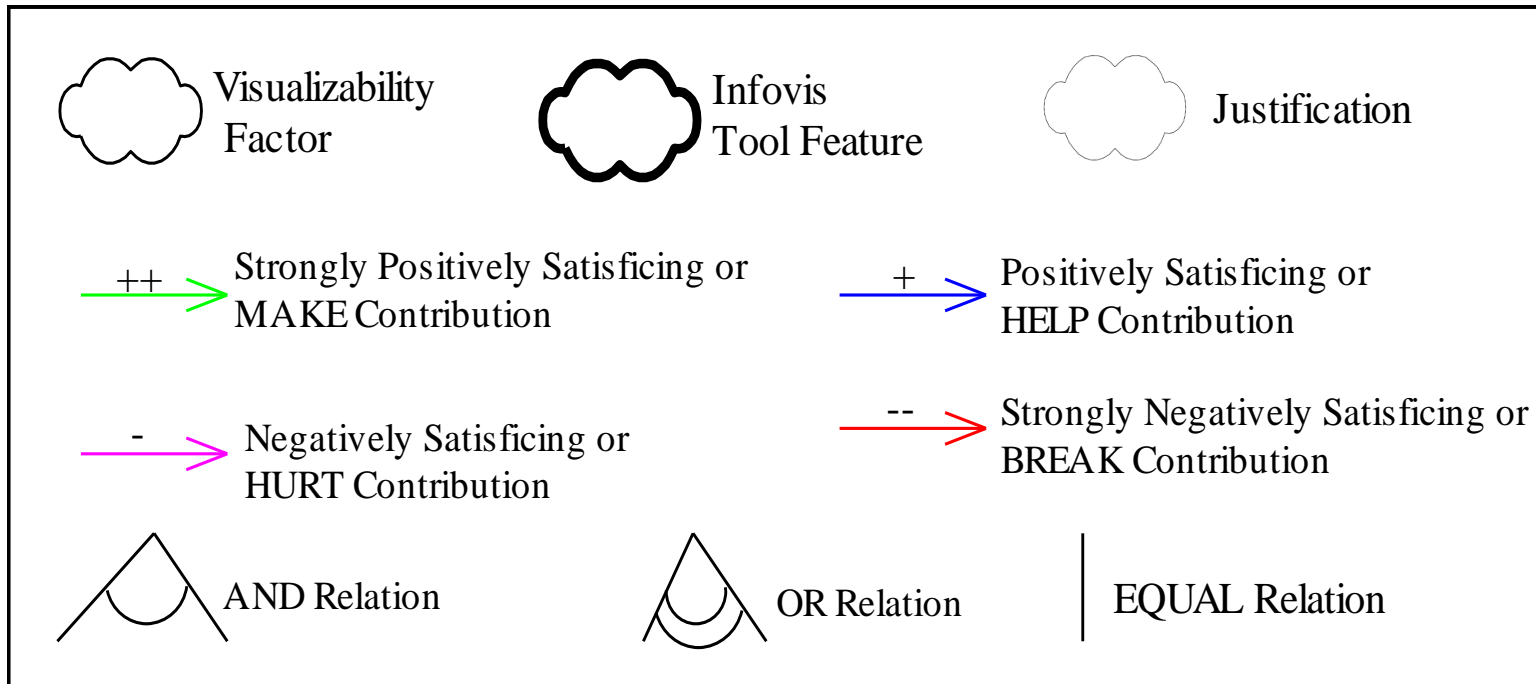


THE NFR APPROACH



- Goal oriented approach, based on the **NFR Framework**
- **Visualizability** - Ability to achieve good visualization of infovis tools
- Visualizability as a non-functional requirement (NFR)
- **Softgoal Interdependency Graph** (SIG) - Used to qualitatively evaluate visualizability
- Contributions to the visualizability factors - satisfy or deny that factor
- **Satisficing** - relative satisfaction as opposed to absolute satisfaction
- Propagation rules of the NFR Framework applied to propagate the contributions

Ontology of NFR Approach



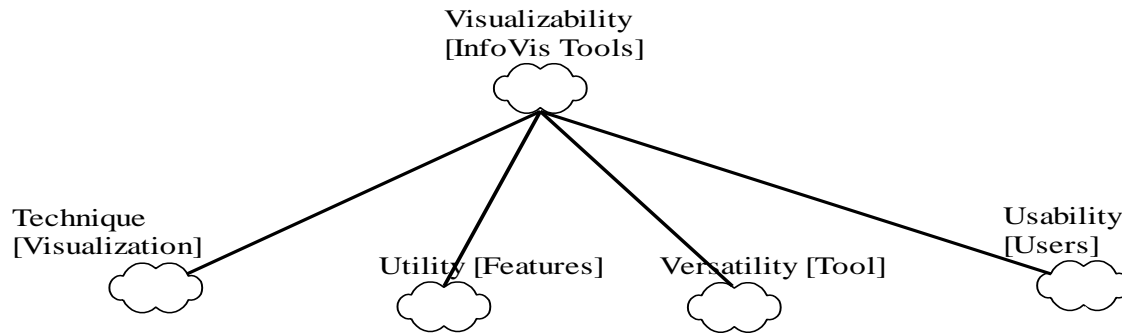
SIG Development



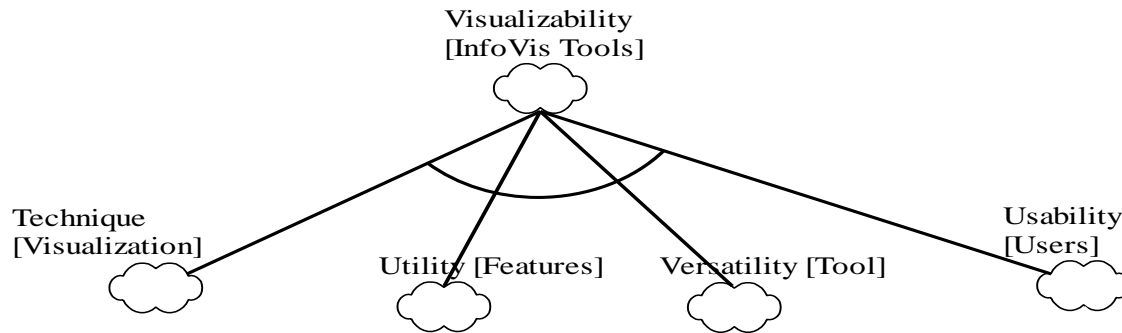
Visualizability
[InfoVis Tools]



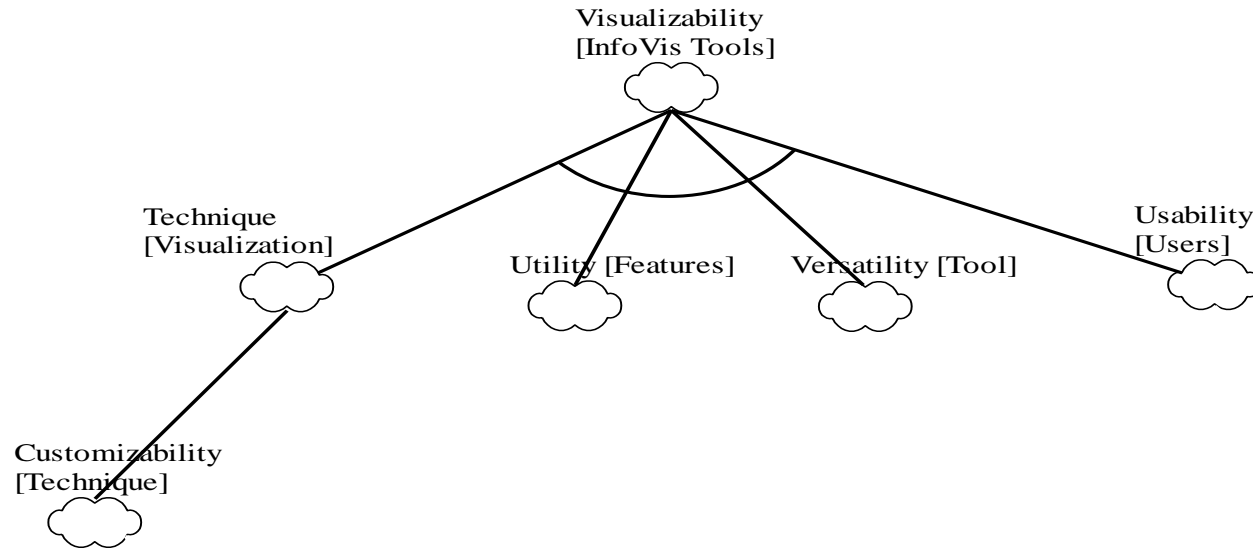
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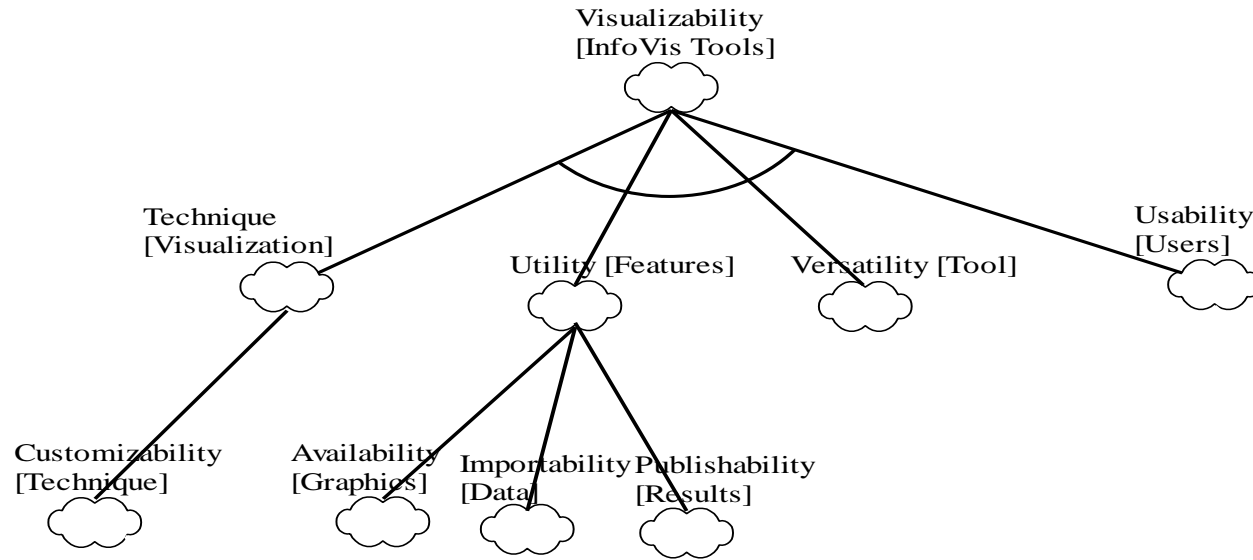
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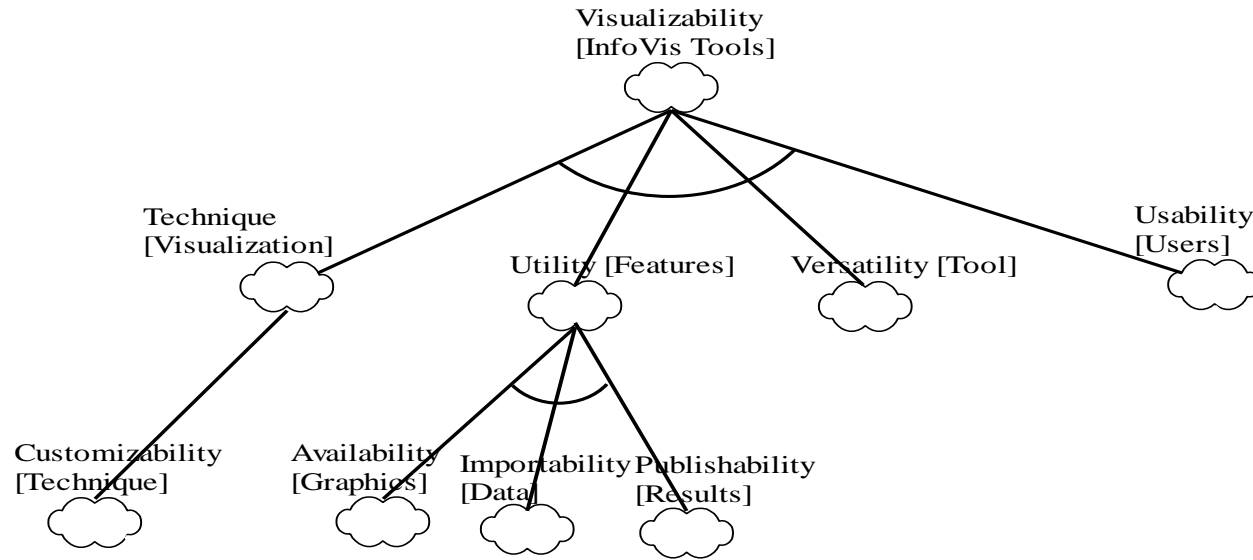
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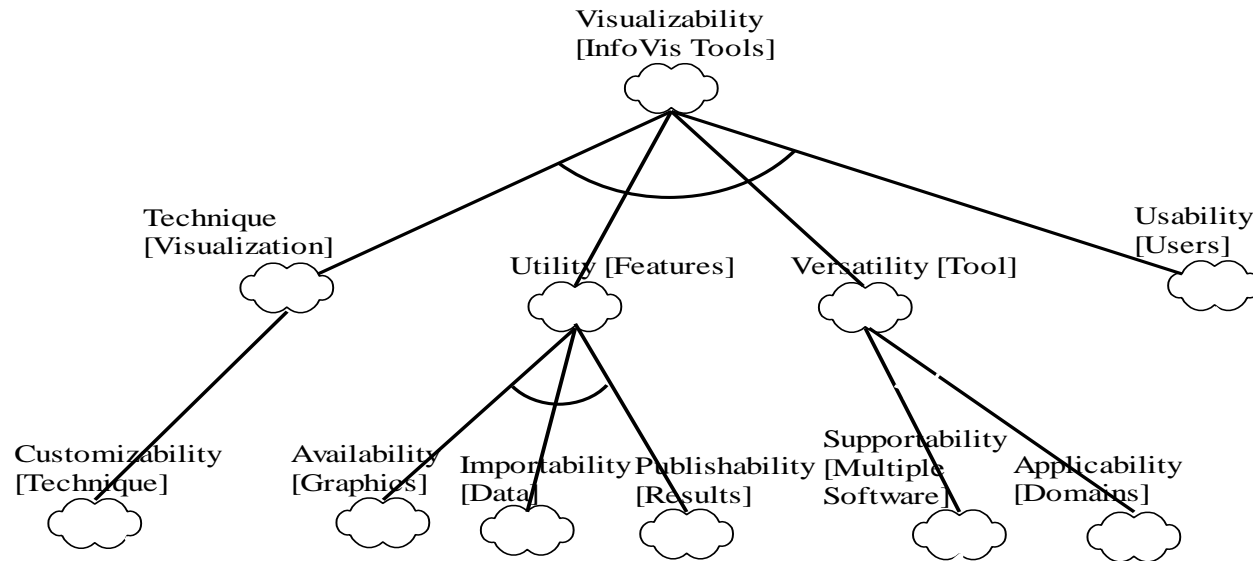
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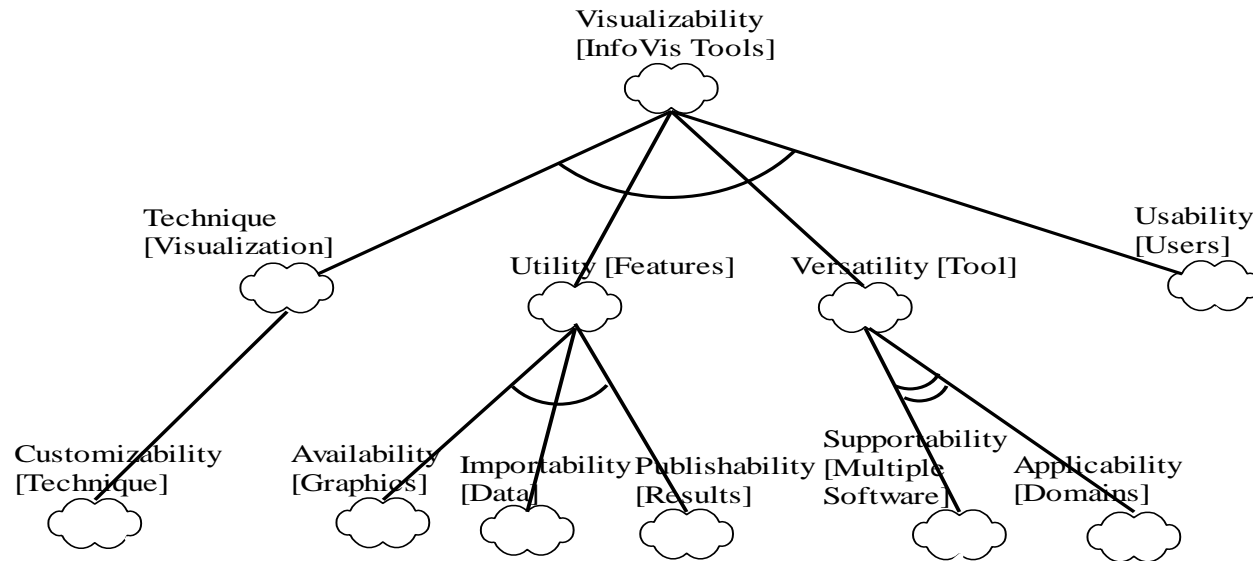
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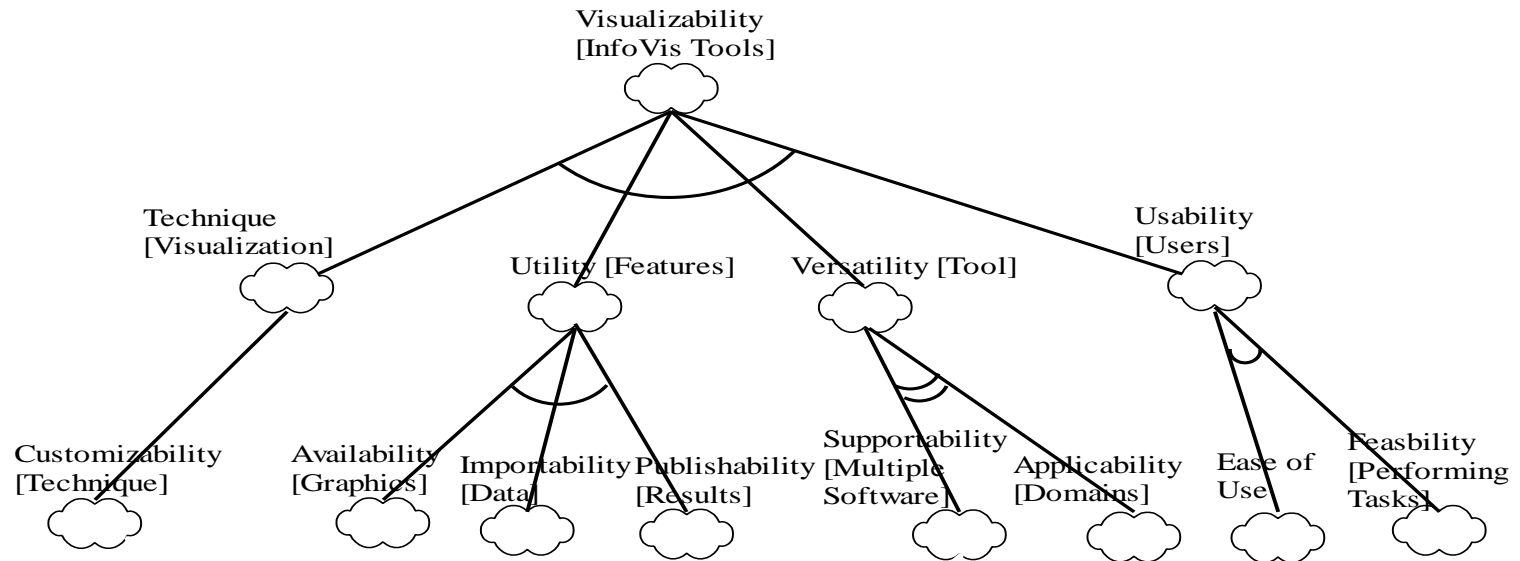
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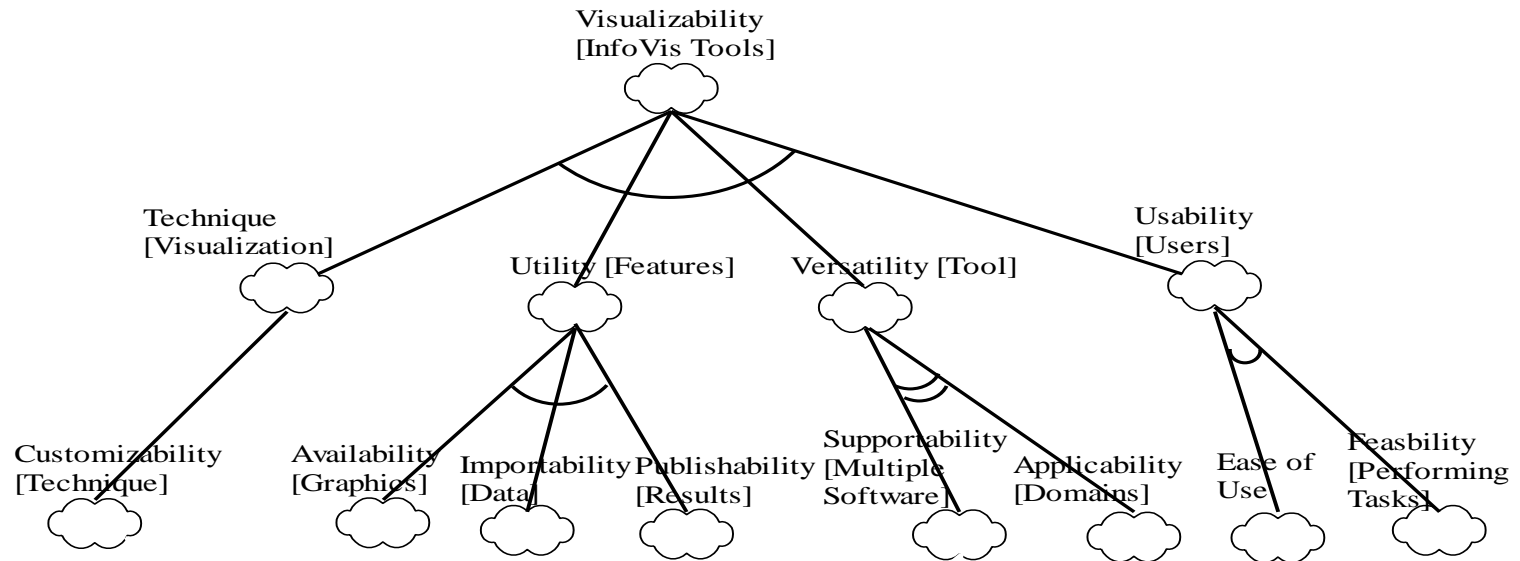
SIG Development



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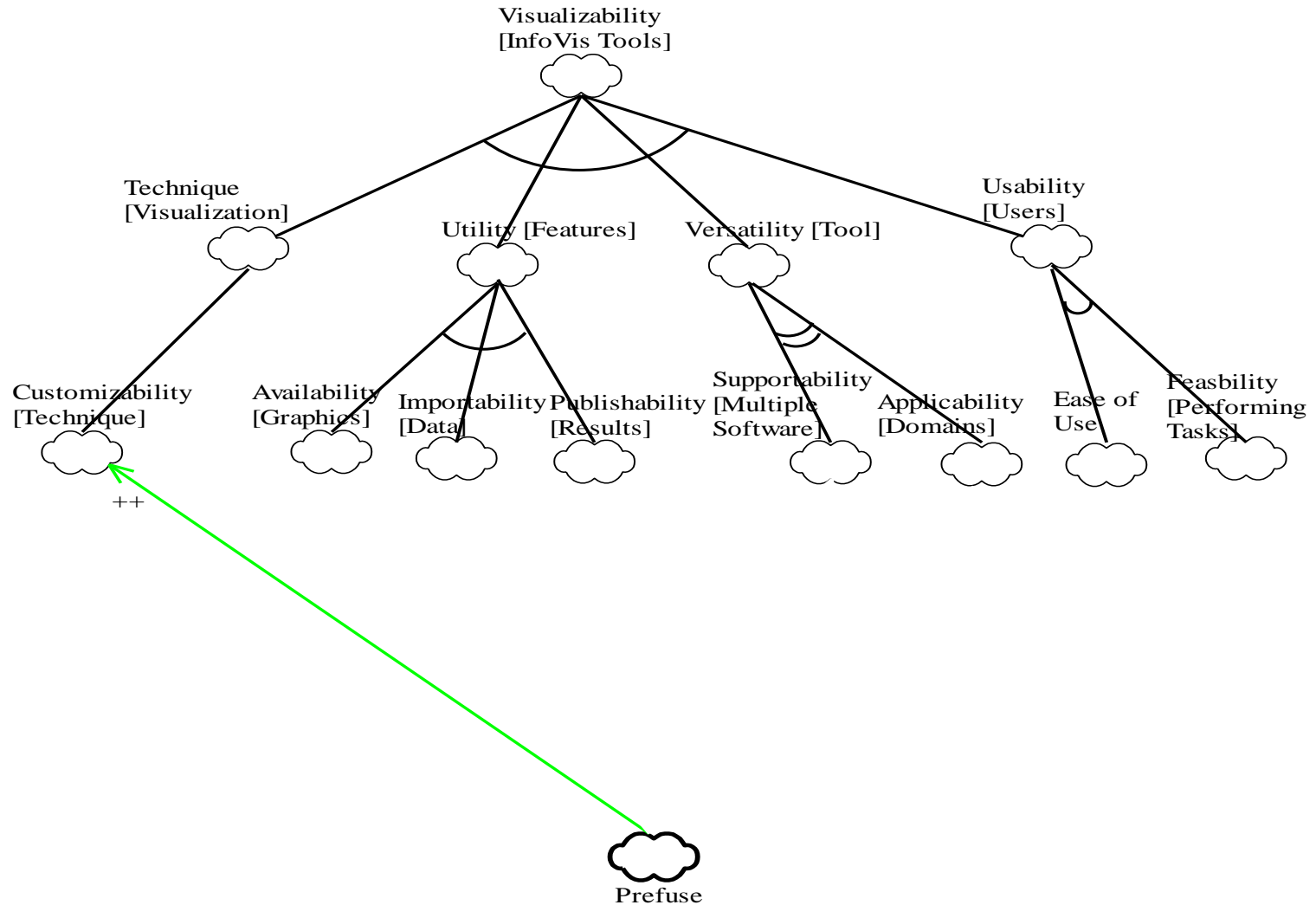


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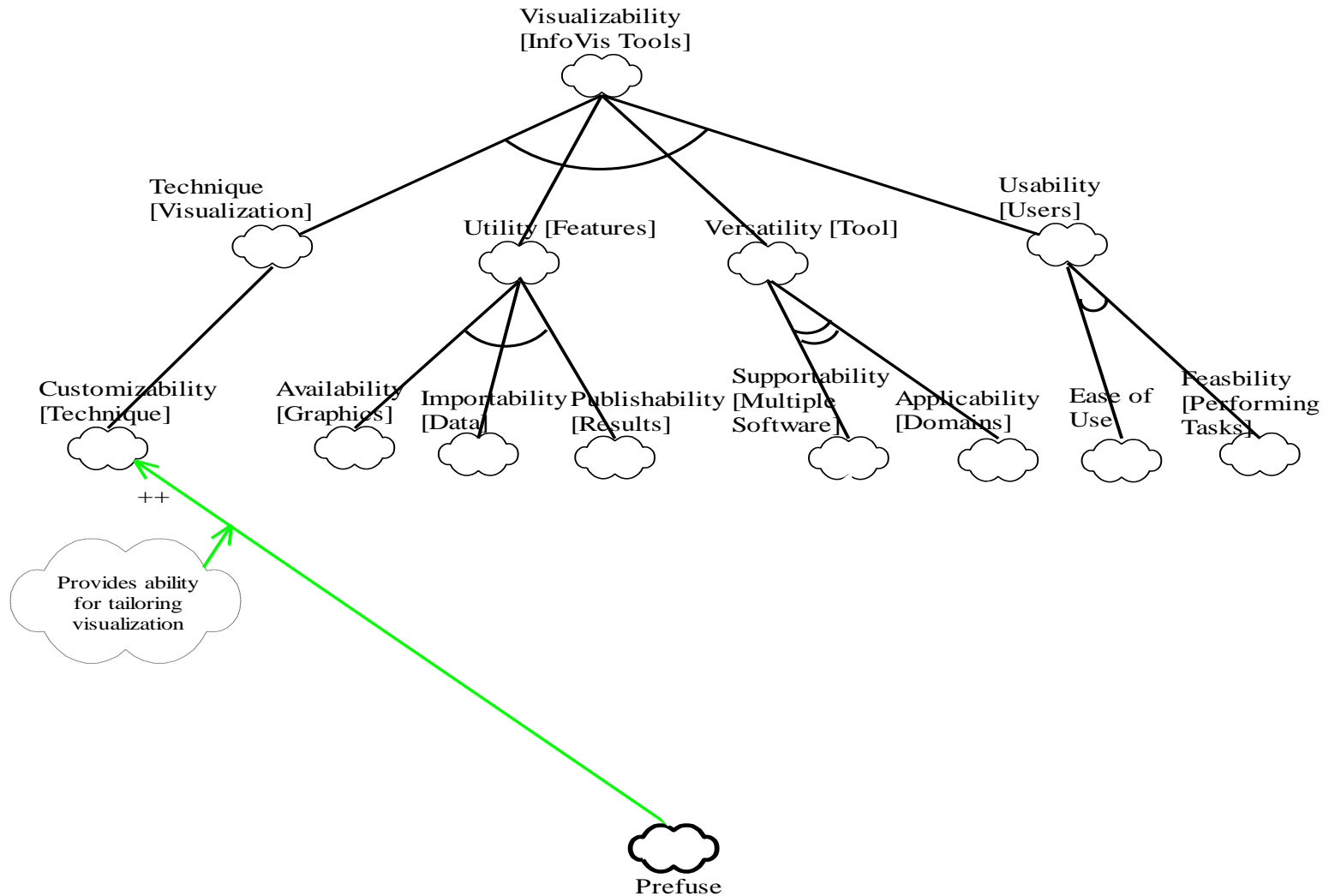


Prefuse

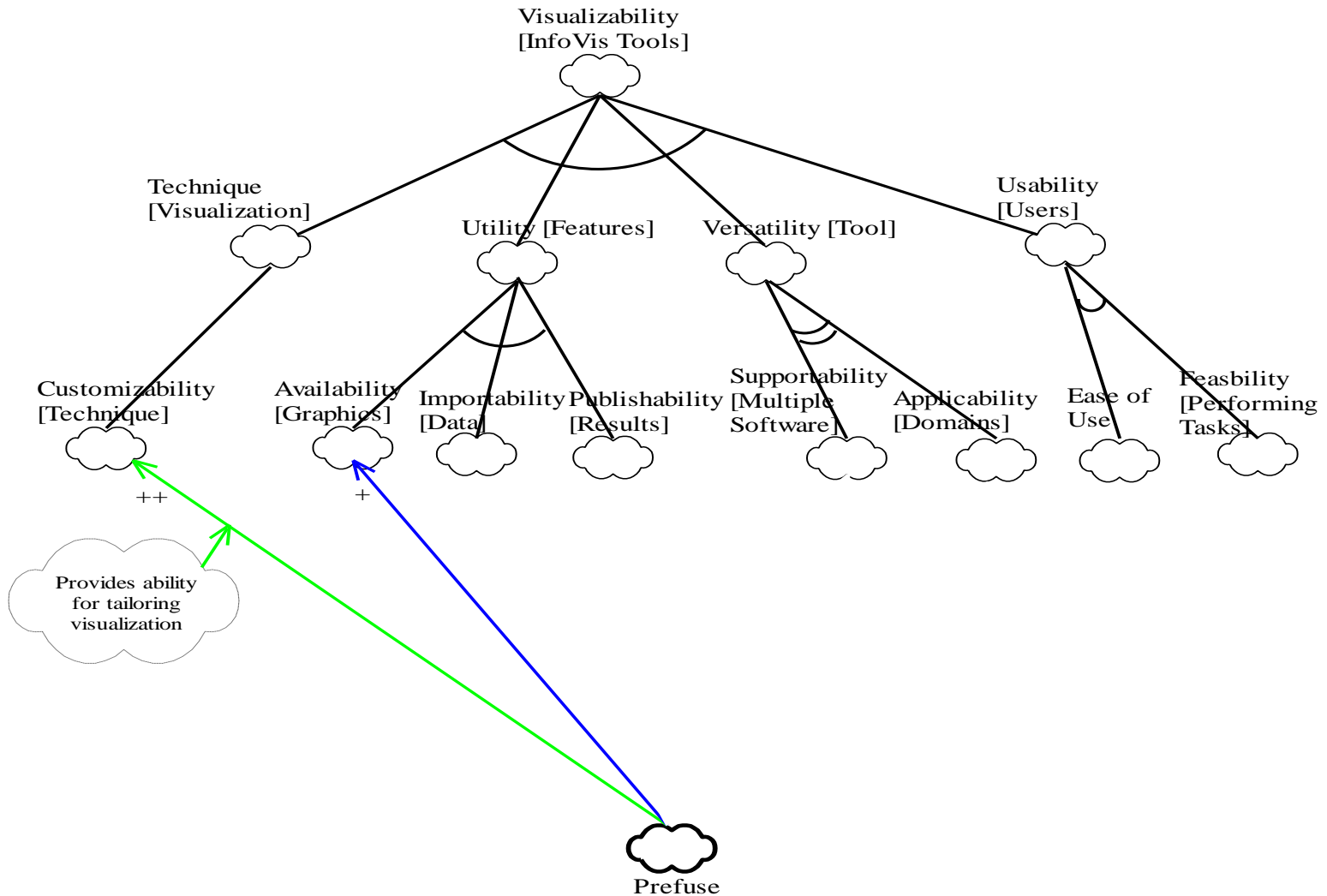
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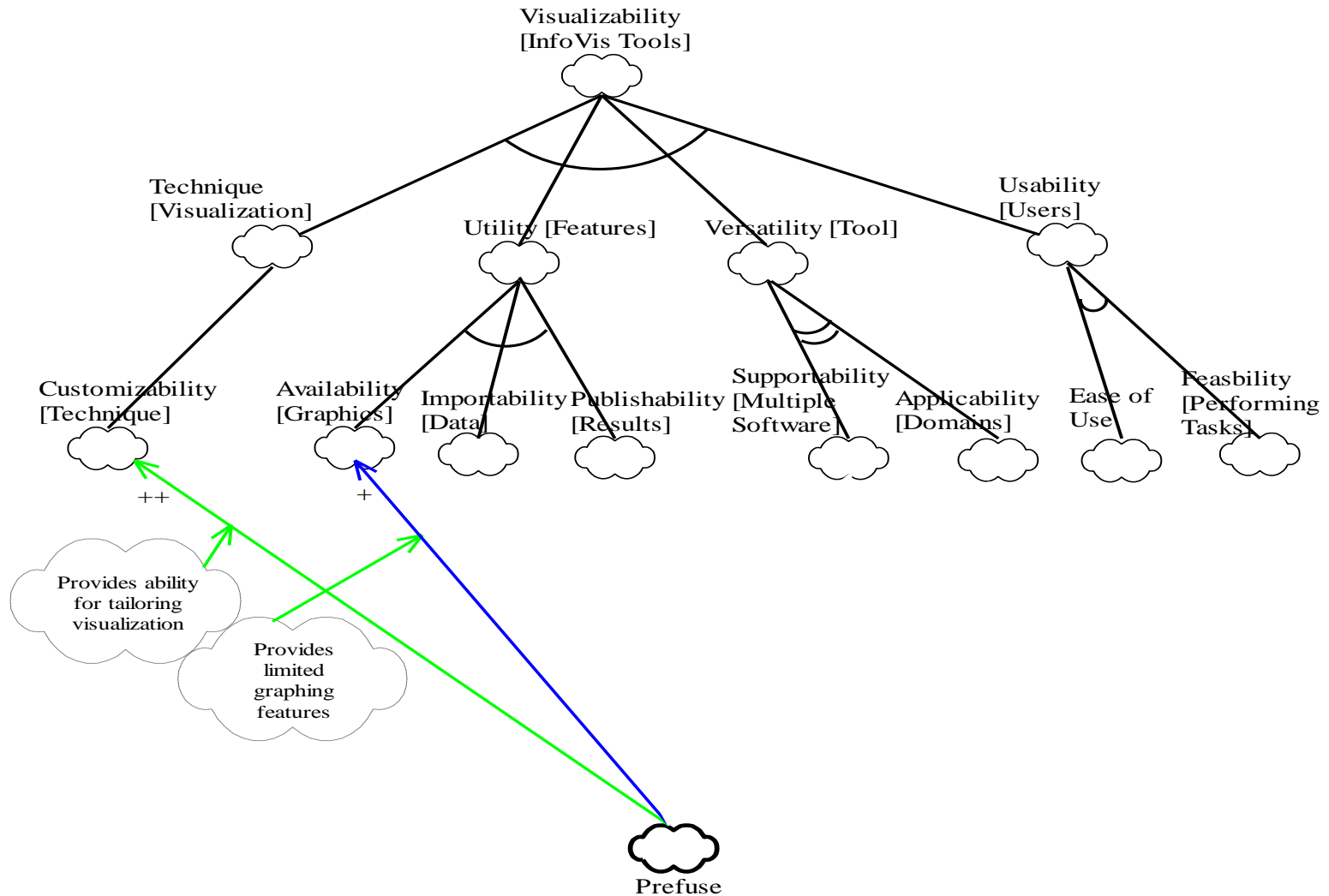
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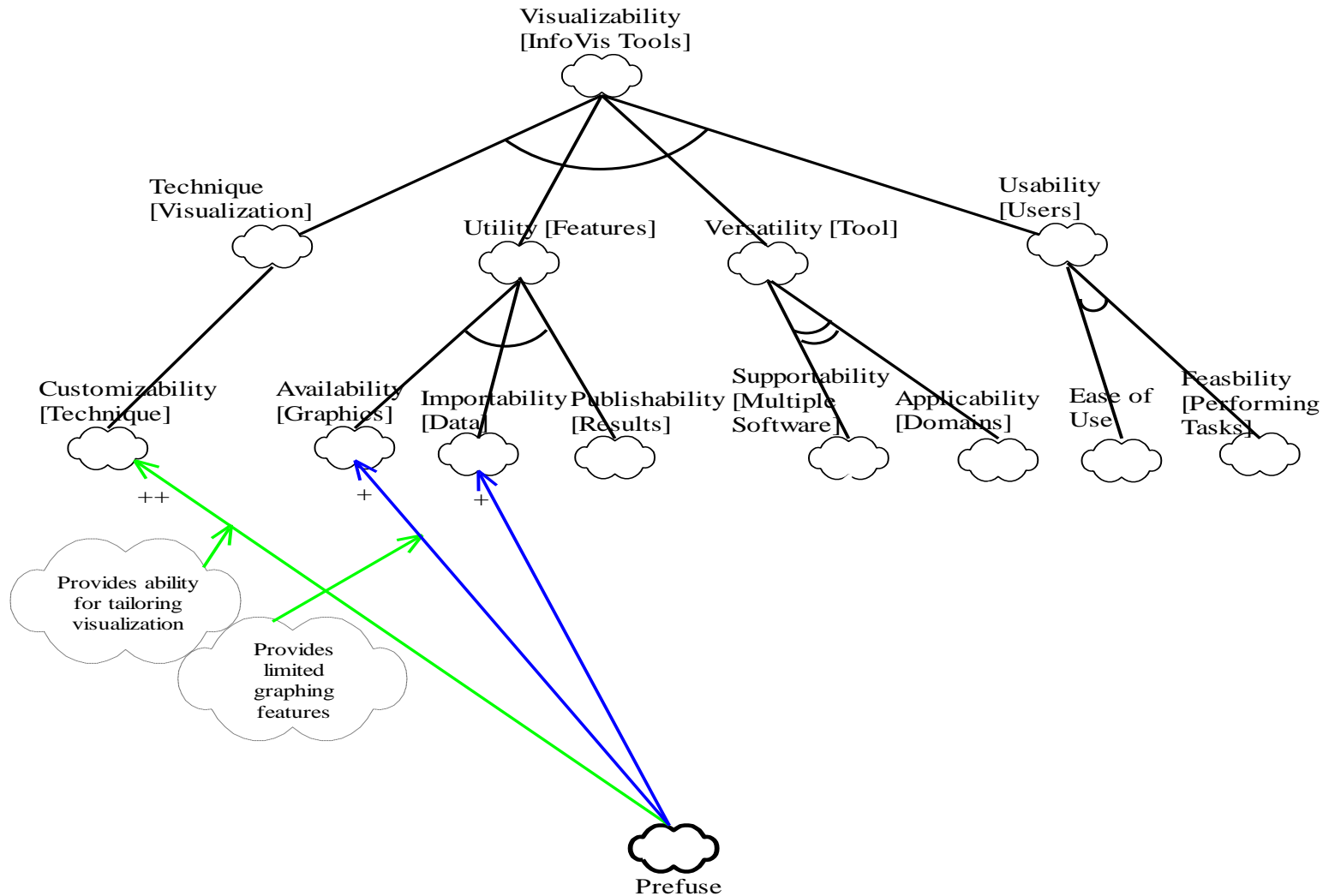
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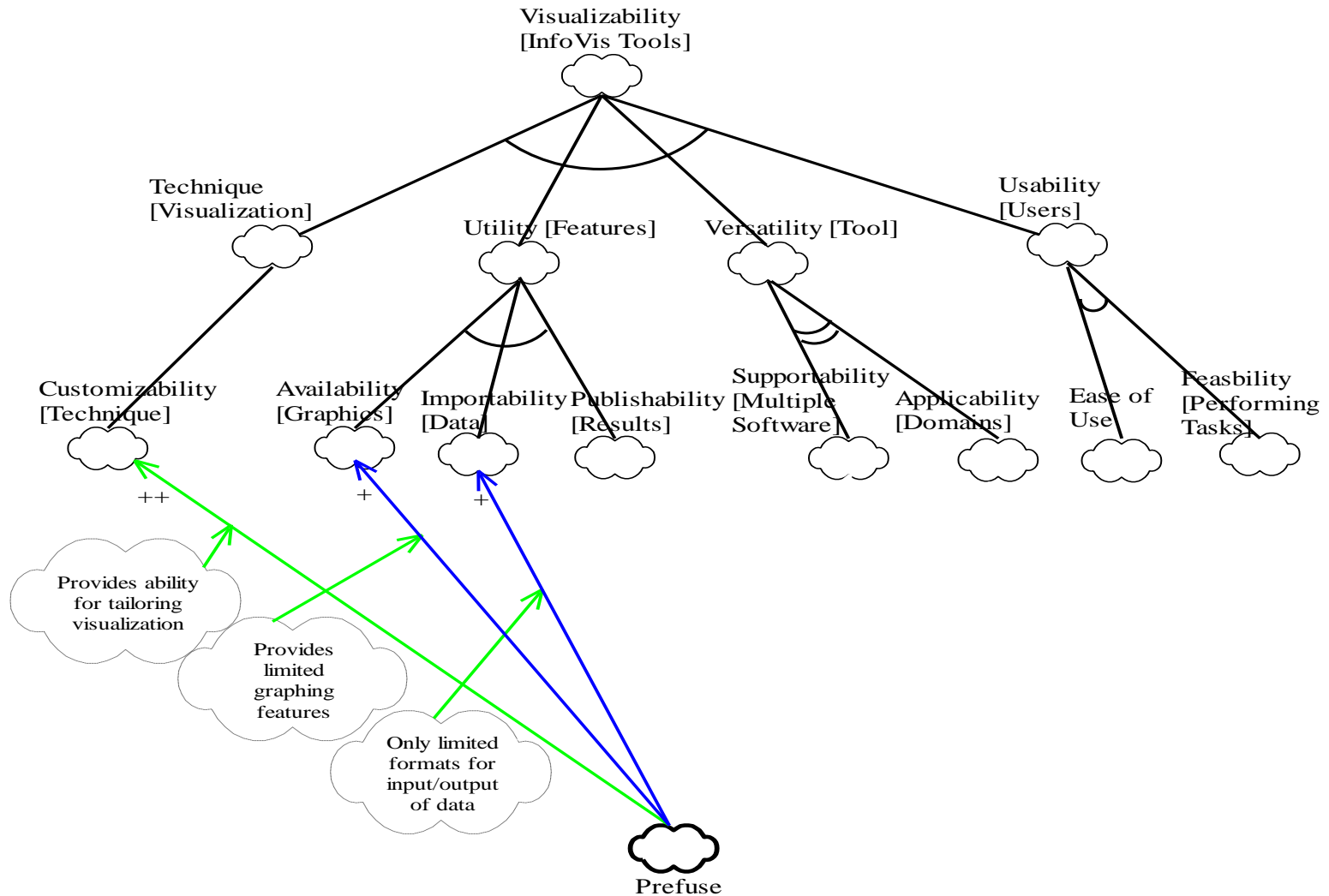
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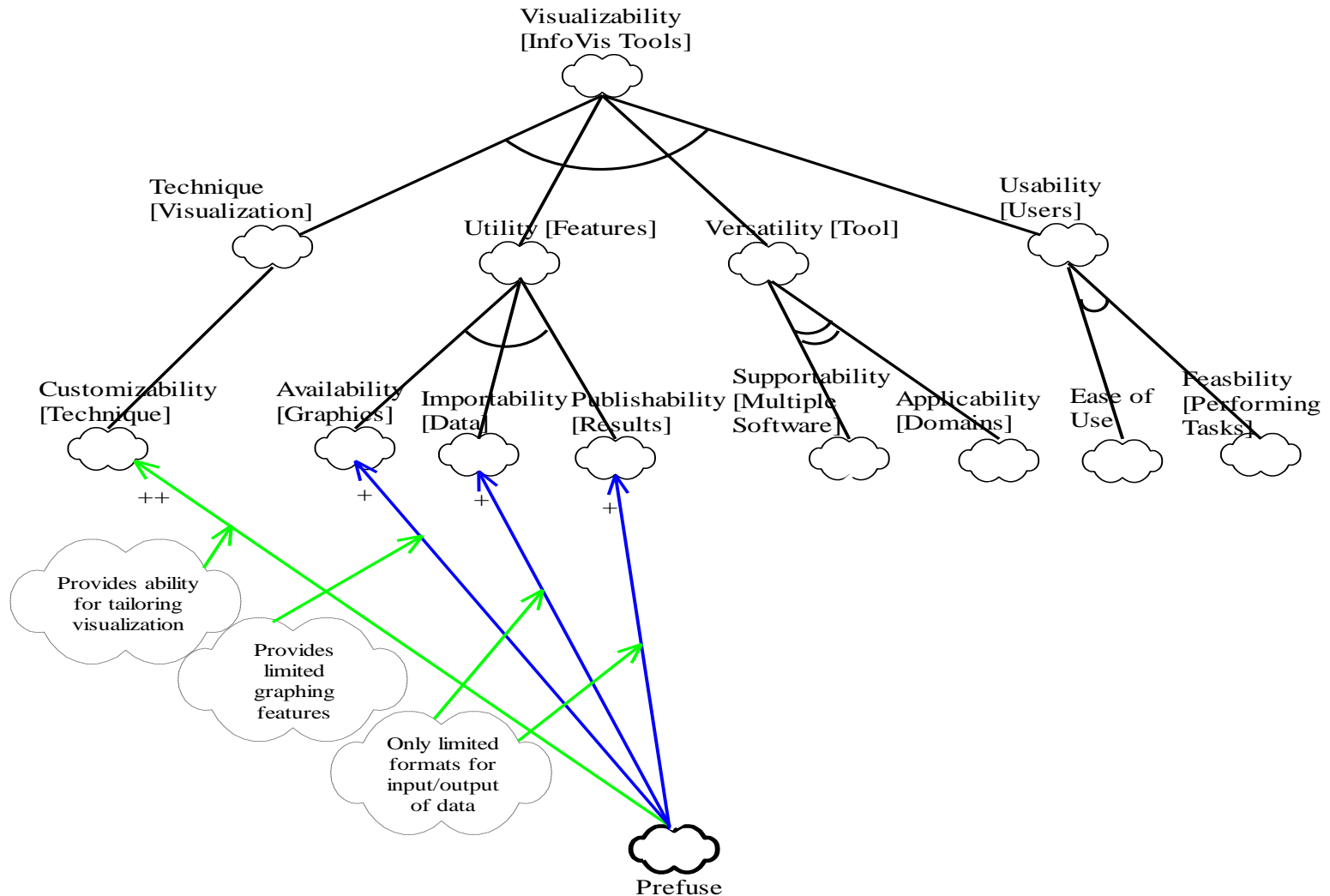
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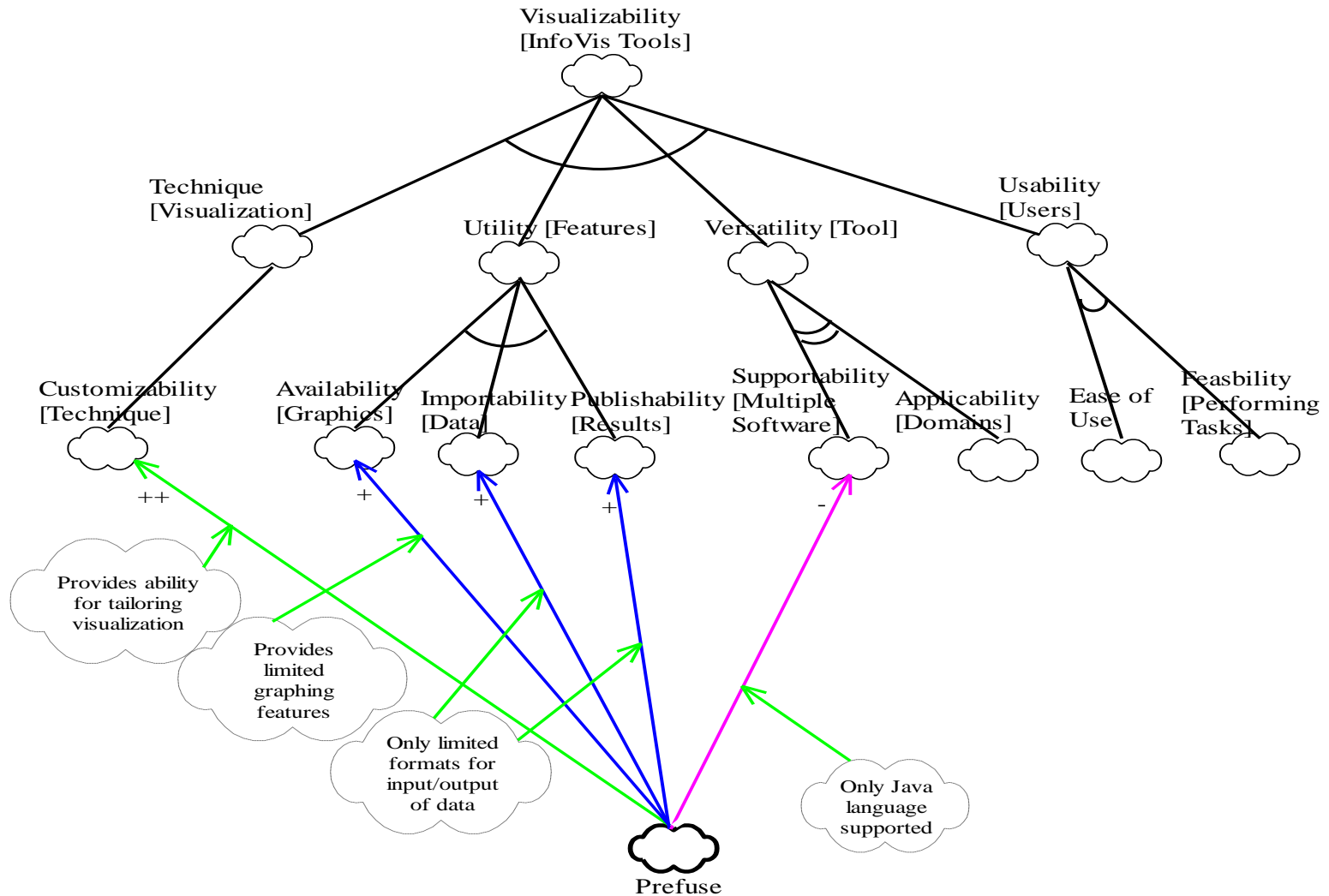
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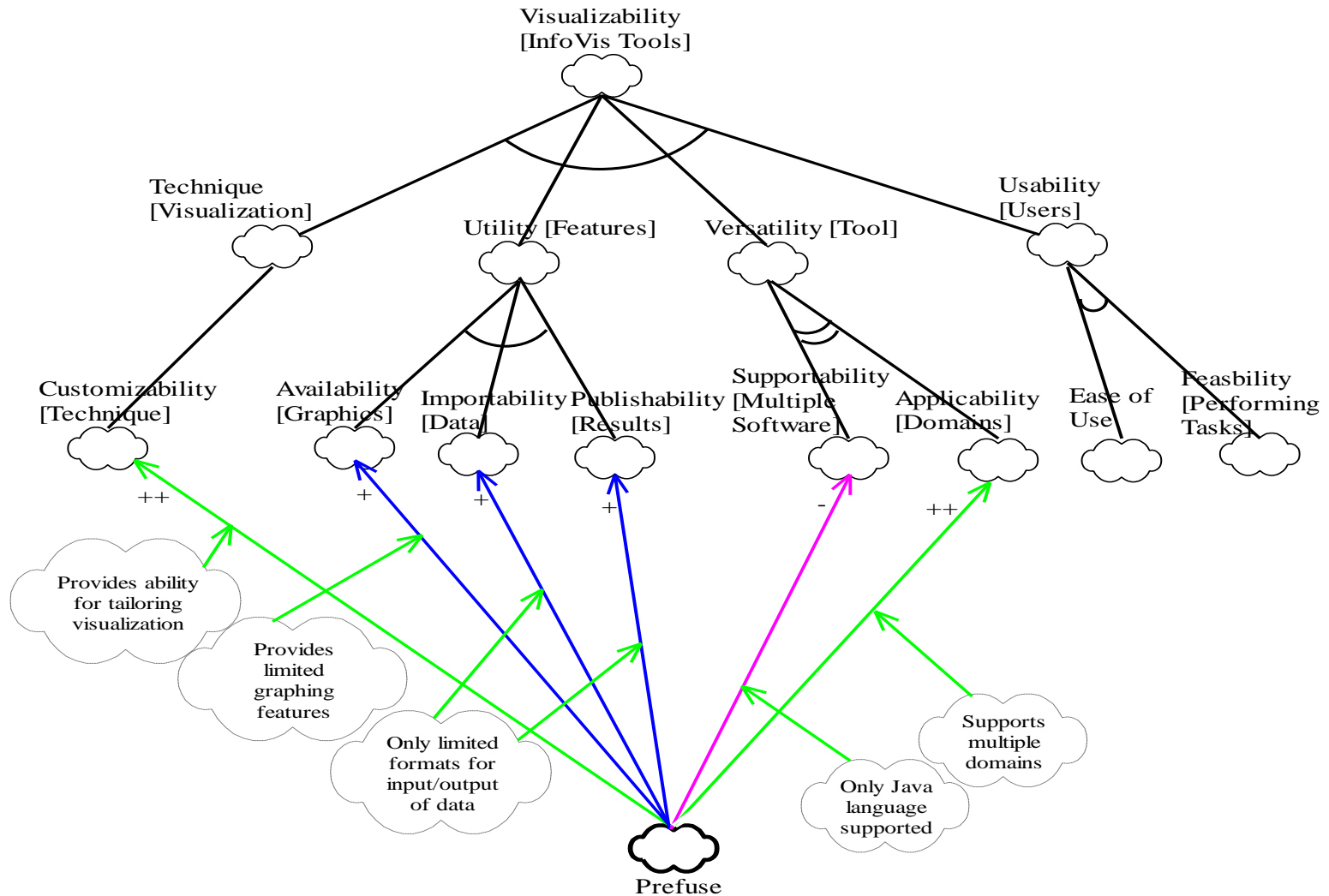
SIG Development



SIG Development



SIG Development



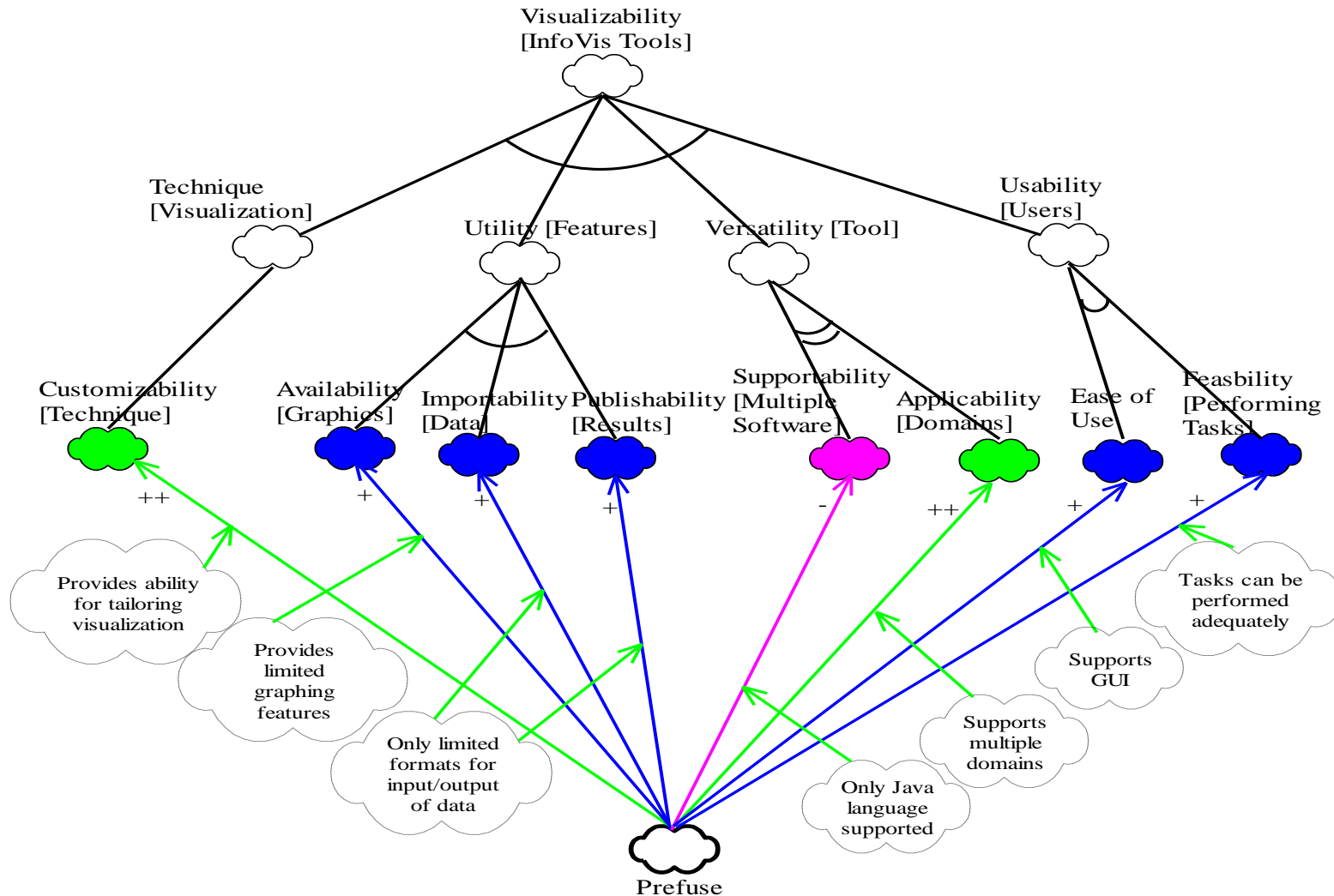
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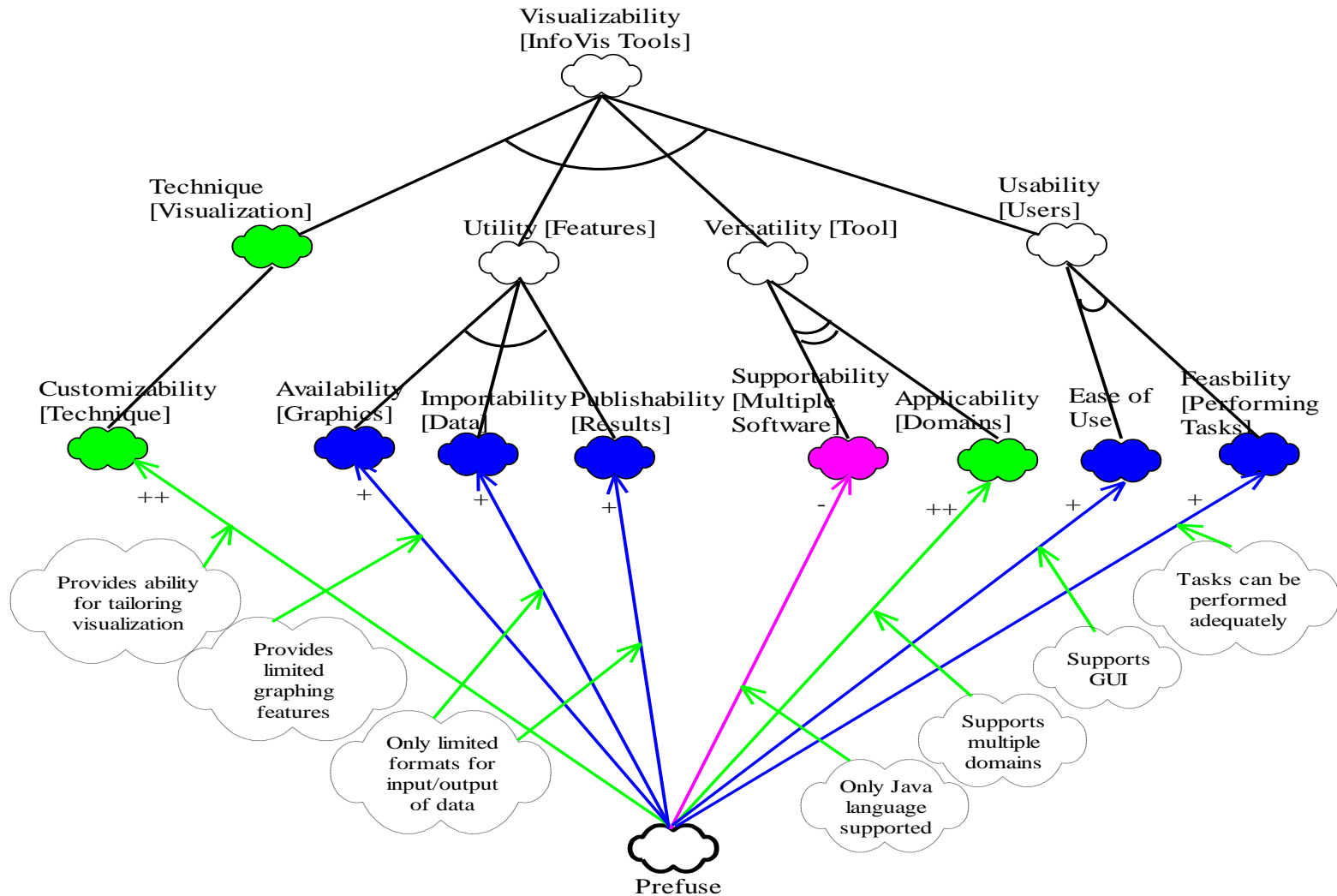
Propagation Rules

1. If all the contributions received by a leaf visualizability factor are TYPE then that leaf visualizability factor is considered TYPE-satisficed.
7. In the case of AND-related factors, if all child factors are TYPE-satisficed then the parent visualizability factor is TYPE-satisficed.
8. In the case of AND-related factors, if even one of the child factors is TYPE-satisficed then the parent visualizability factor is TYPE-satisficed; the priority decreasing in the order: BREAK > HURT > HELP > MAKE.
10. In the case of OR-related factors, if even one of the child factors is TYPE-satisficed then the parent visualizability factor is TYPE-satisficed; the priority decreasing in the order: MAKE > HELP > HURT > BREAK
11. In the case of EQUAL-related factors (only one child) the parent is TYPE-satisficed if the child is TYPE-satisficed.

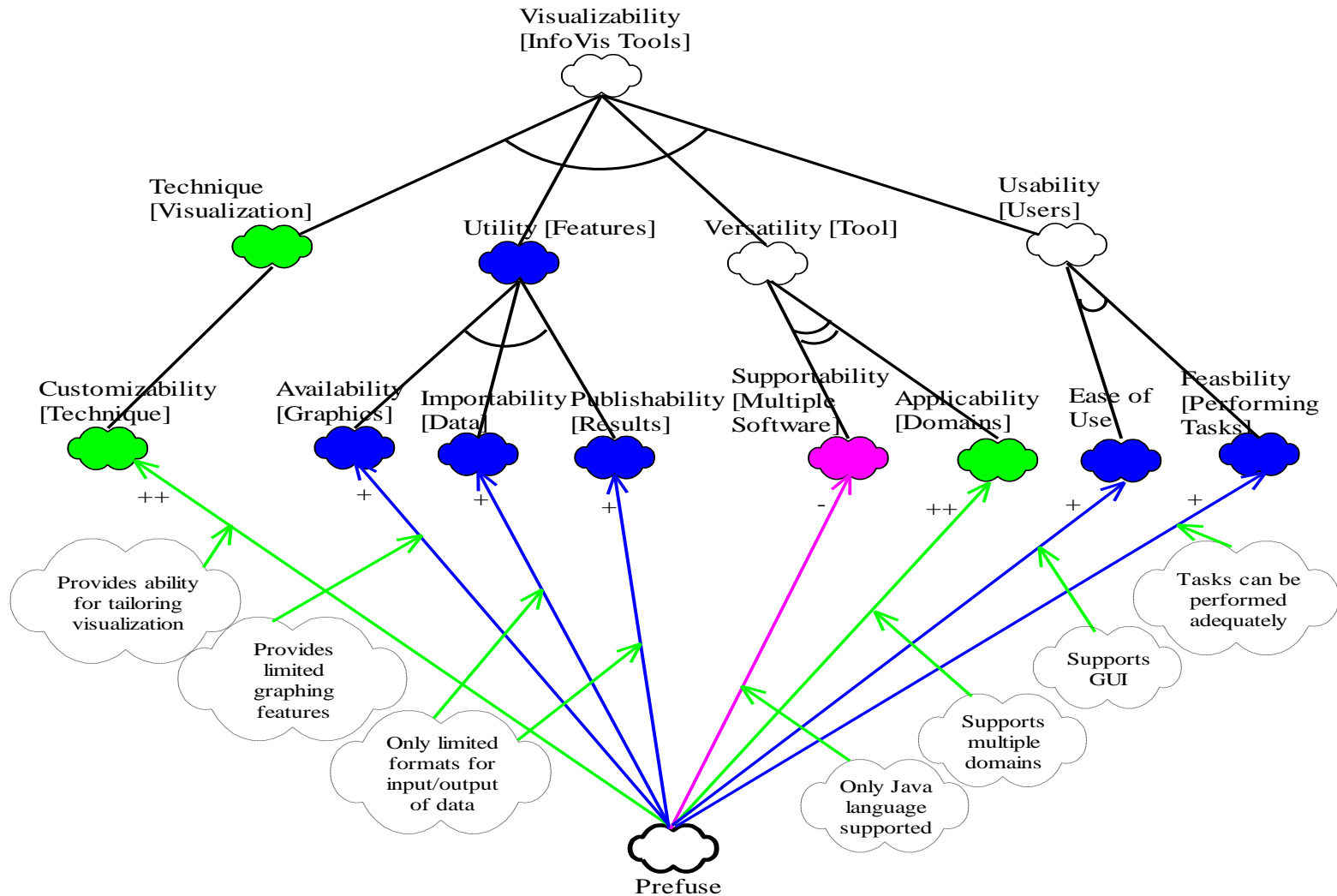
Applying Propagation Rule R1



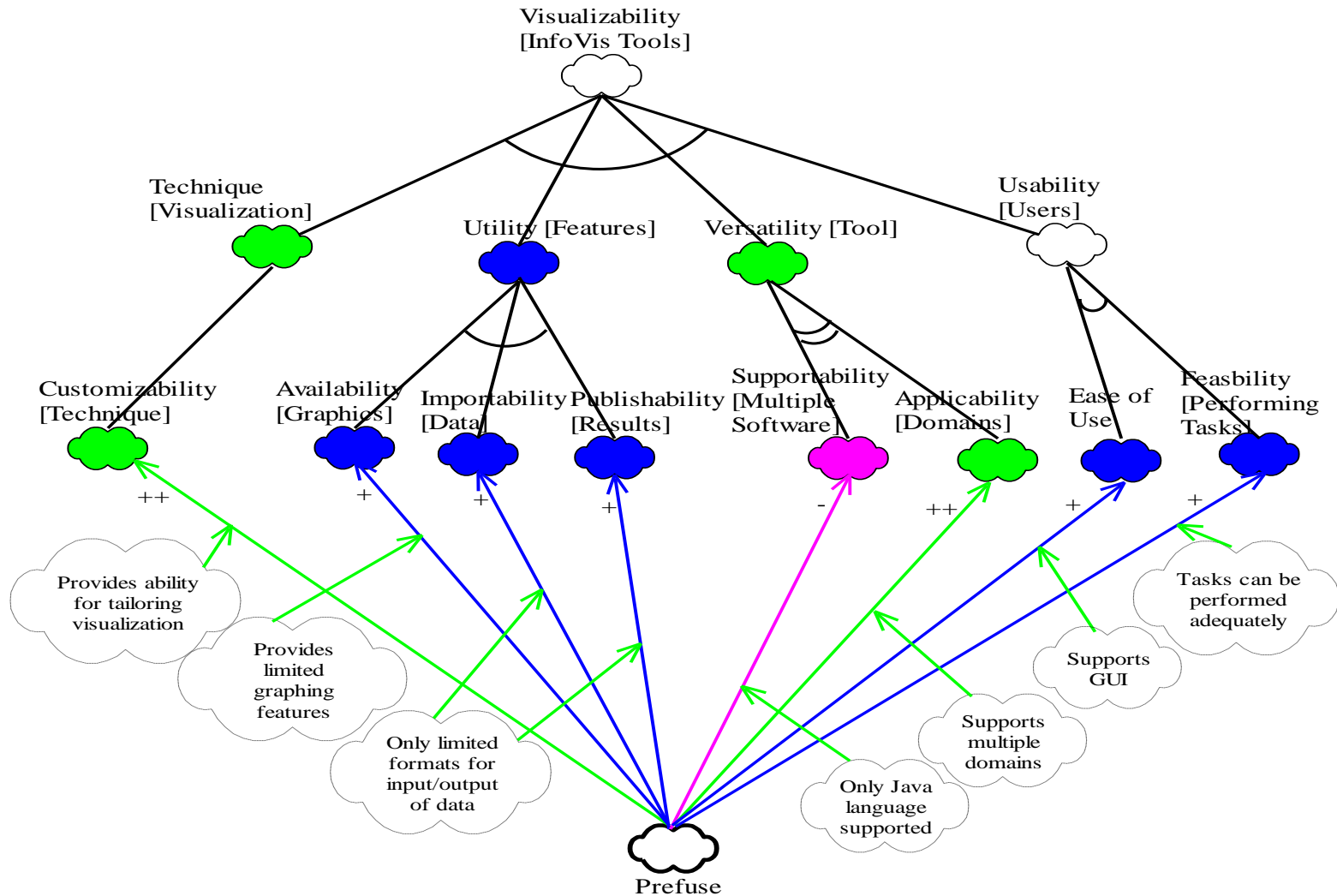
Applying Rule R11



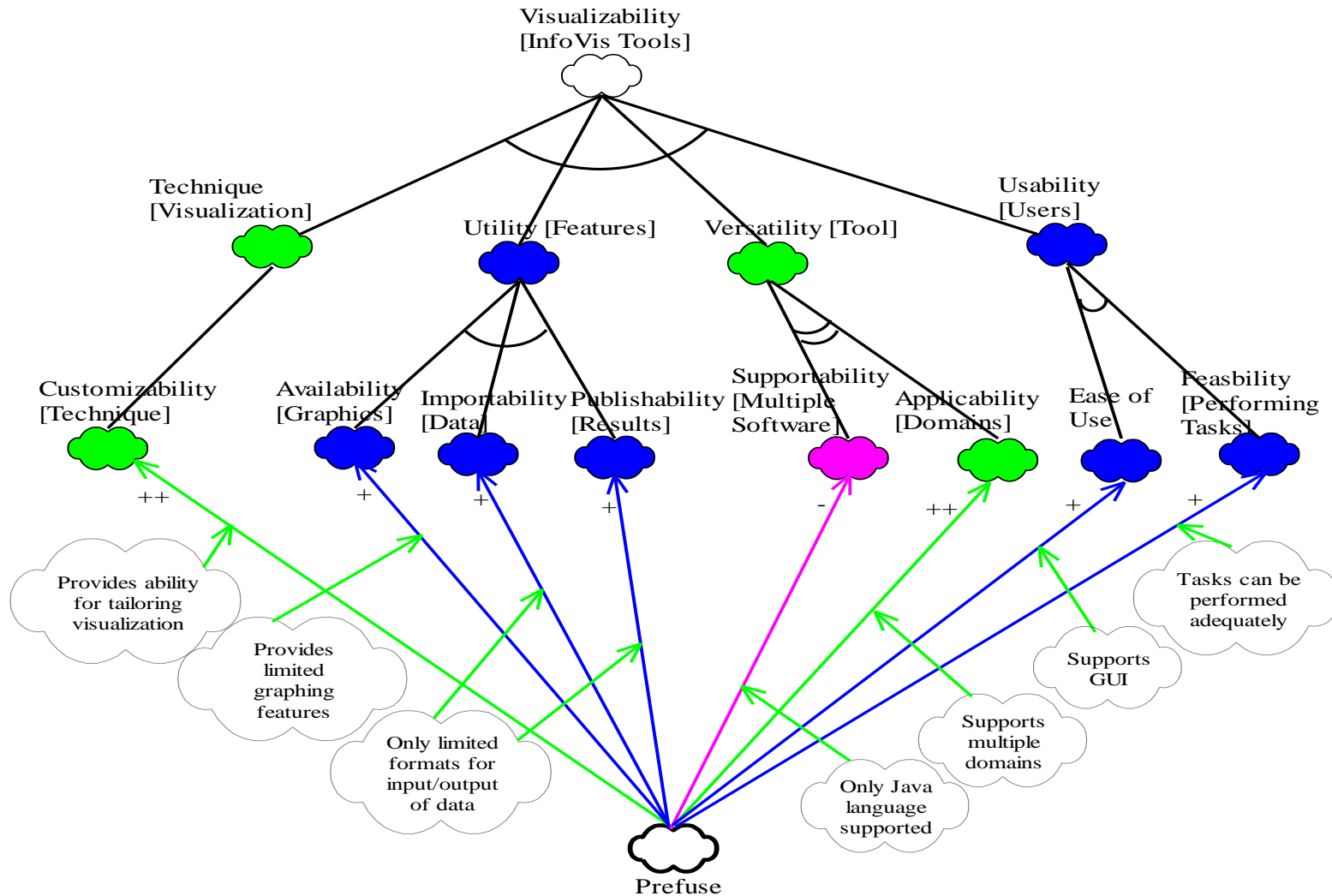
Applying Rule R7



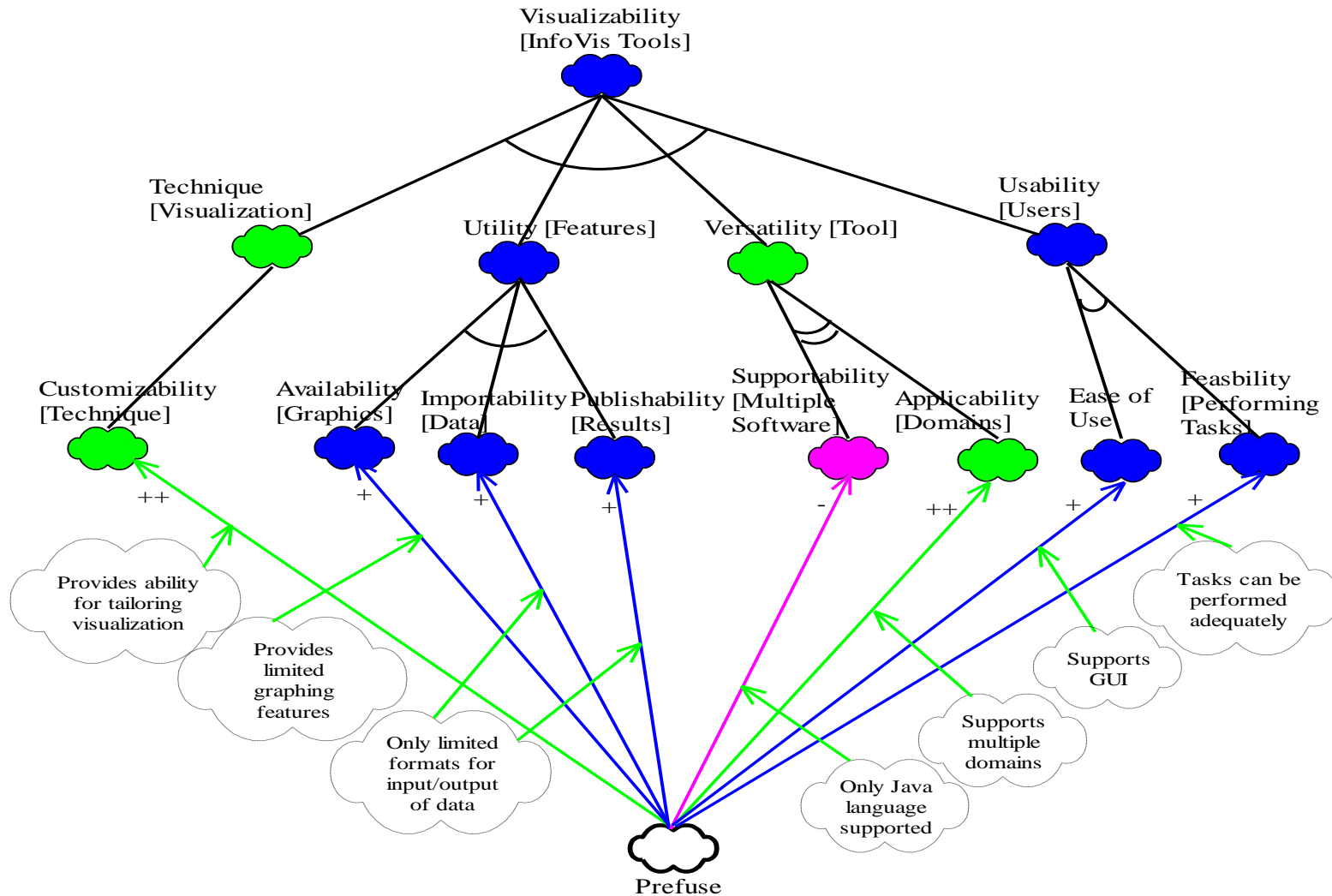
Applying Rule R10



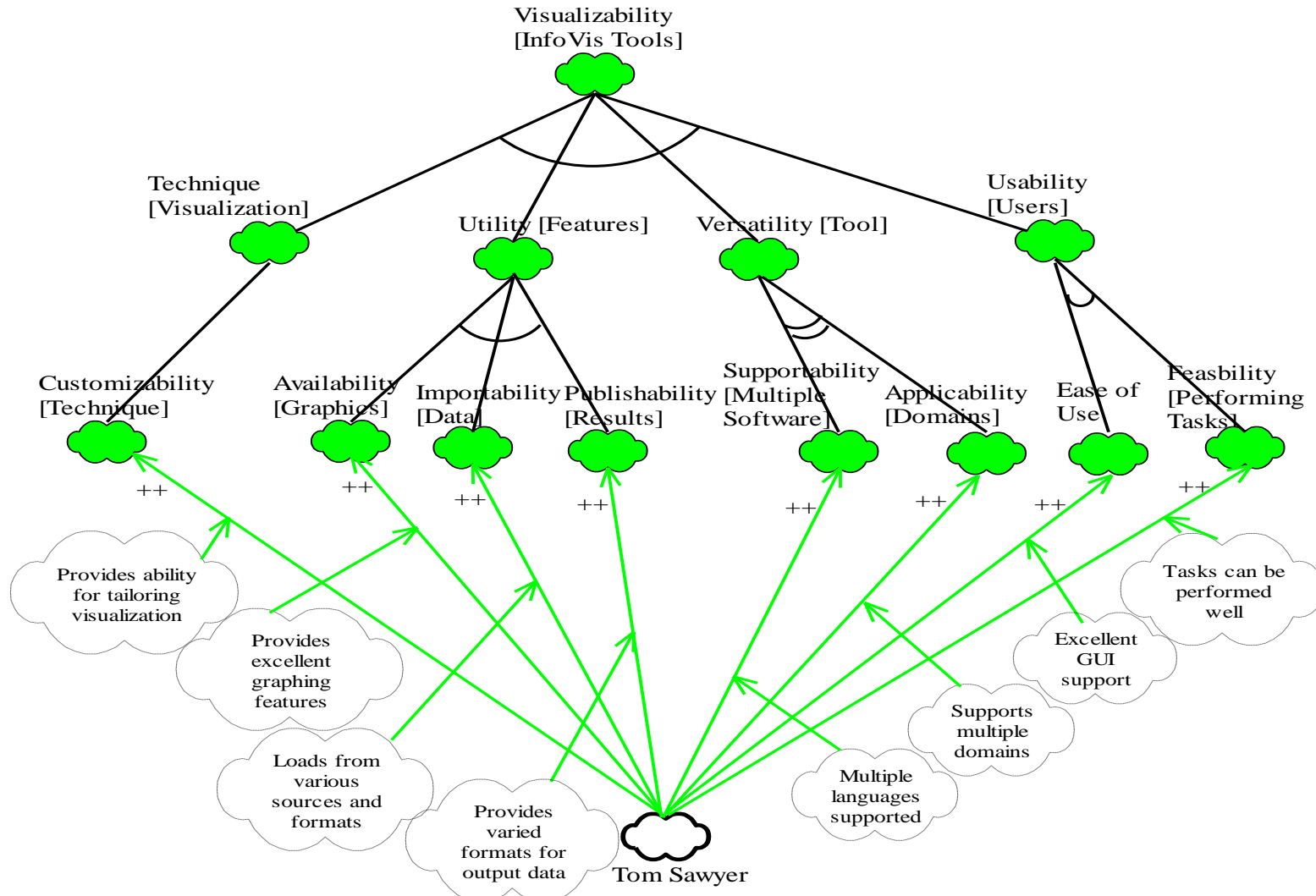
Applying Rule R7



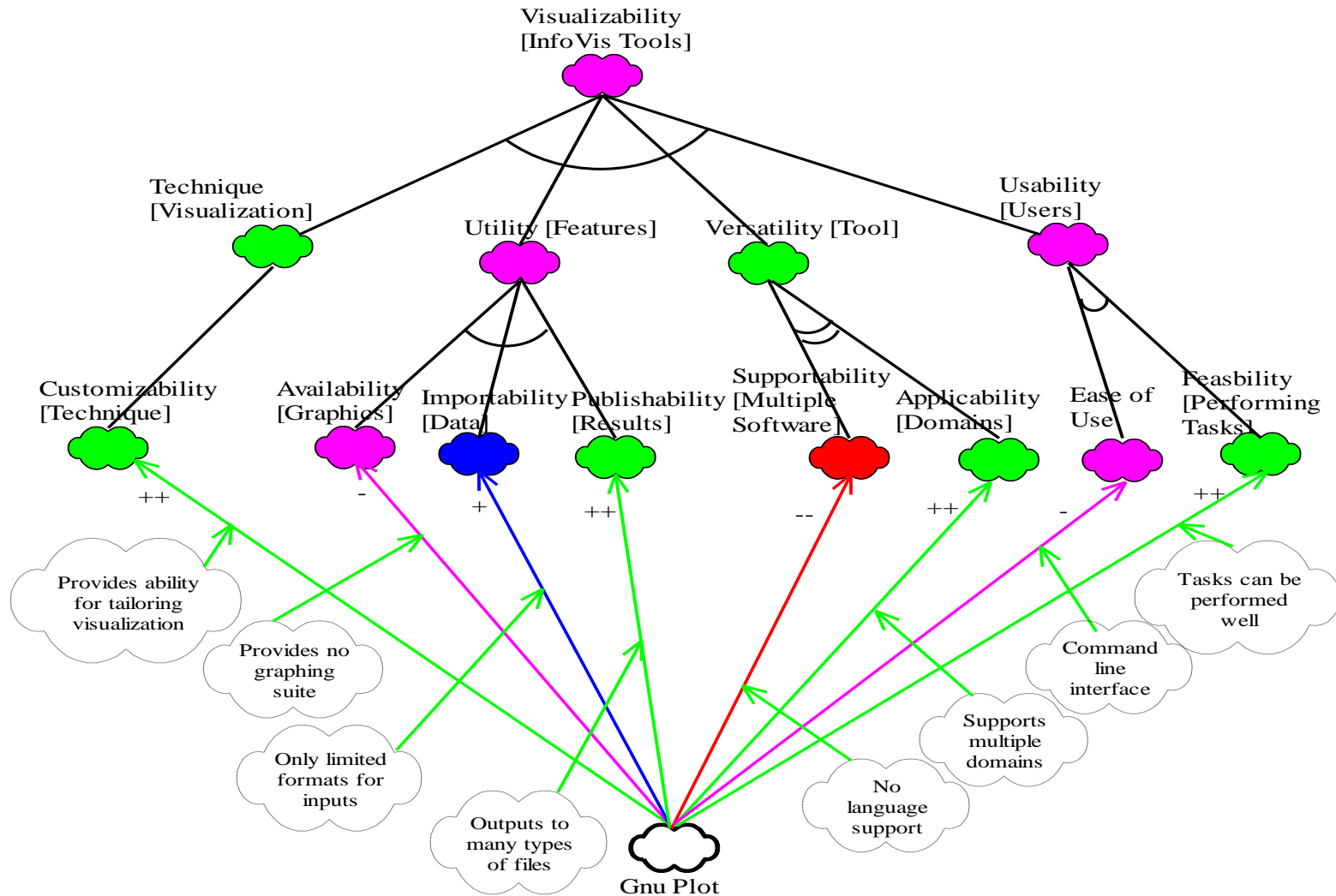
Applying Rule R8



Tom Sawyer Evaluation



Gnu Plot Evaluation



OBSERVATIONS



- Accommodate different definitions for visualizability
- Capture of justifications
- Reasons for evaluation captured by SIG
- Can help improve design of infovis tools
- Historical record maintained by SIGs
- Automatable

CONCLUSIONS AND FUTURE WORK



- Evaluating quality of infovis tools helps practitioners choose the better one
- Visualizability is an important characteristic of infovis tools
- Employed NFR Approach to compute visualizability
- Tom Sawyer > Prefuse > Gnu Plot
- Develop software to automatically compute visualizability for different infovis tools
- Develop catalogs of definitions for visualizability
- Prioritize different factors and study their impact on the final evaluation



Questions for Discussion

1. How do we accommodate a different definition of visualizability?

2. How can priorities be handled by the NFR Approach?

Others?