

A Preliminary Investigation of the Utility of Goal Model Construction

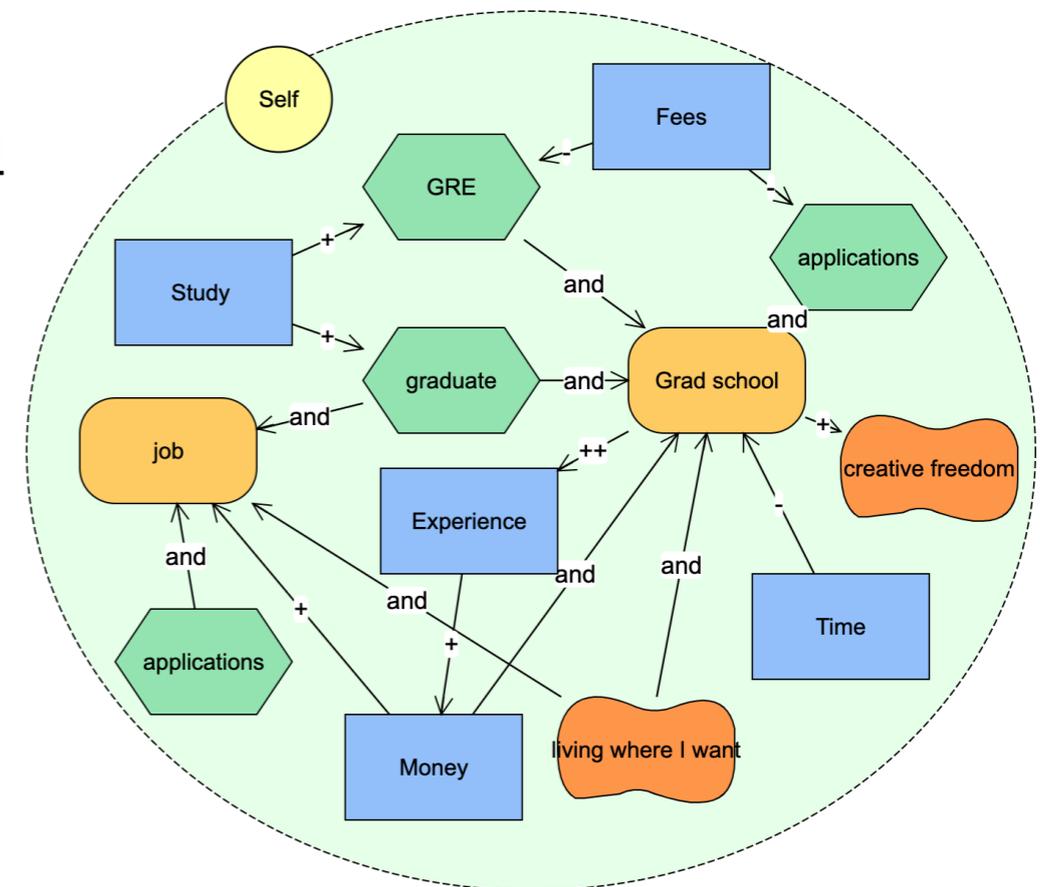
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Aim: Investigate Goal Model Construction

Research Question

To what extent do participants gain utility in manually drawing goal models (in a tool or on paper)?

Utility: discovering new insights or changing decisions



Null Hypothesis: There is no utility in the goal model construction process (i.e., drawing models on paper or in a tool).

Study Methodology

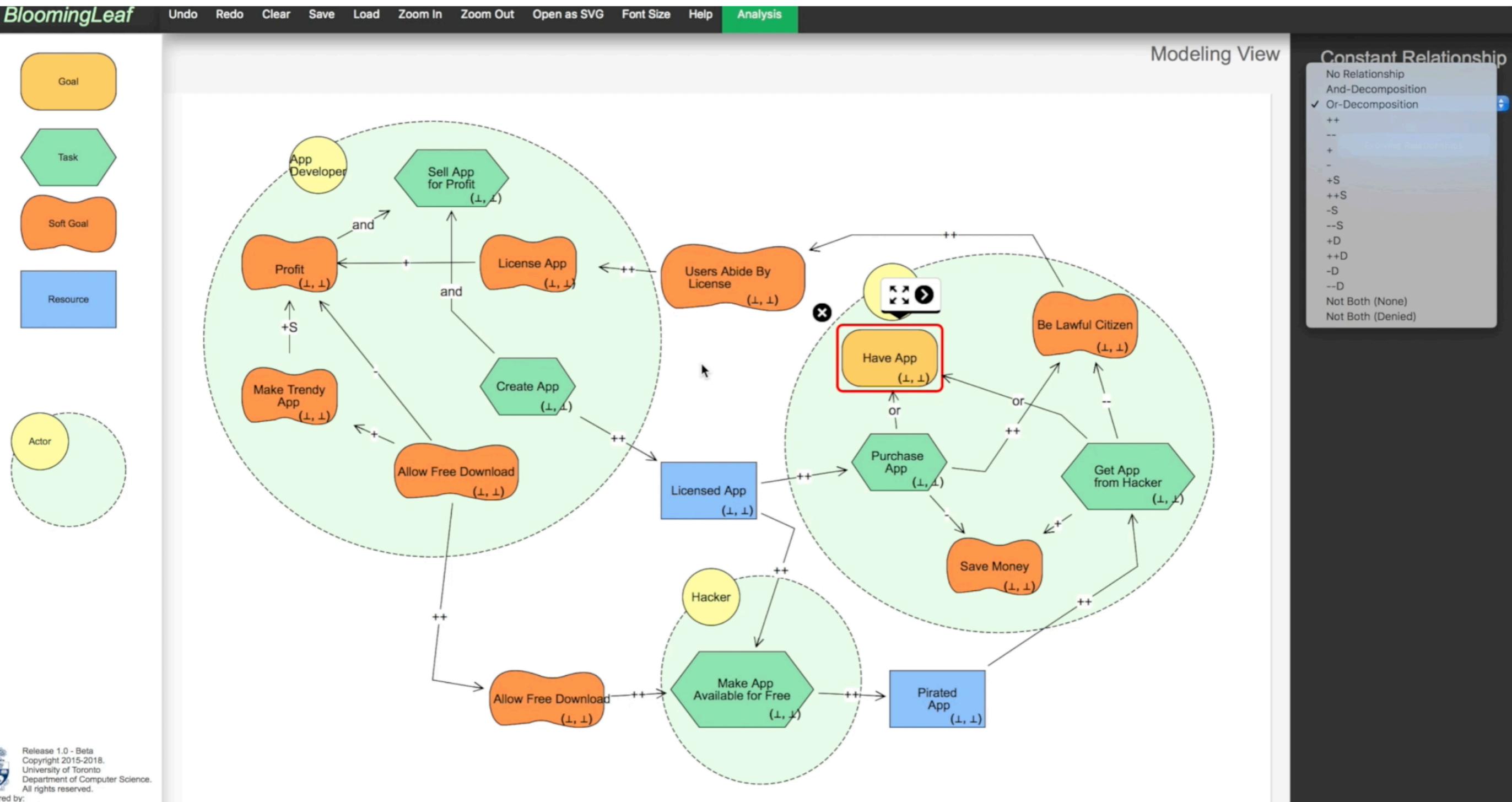
Online

- Recruitment (Flyer / Email)
- Pre-Study Questionnaire - Scenario Choice
 - (i) choosing between majors, (ii) planning for after graduation, and (iii) deciding between study abroad options
- Randomly assigned to either PAPER or TOOL groups
- Research created AUTO model based on pre-study questions

In Person

- Training: Tropos + modeling on paper/BloomingLeaf
- Questions to validate understanding
- Create USER model based on scenario + questions
- Review AUTO model + questions
- Choose USER or AUTO model + give justification
- Extend preferred model and answer their scenario question
- Post-Study Questionnaire - Updates

BloomingLeaf: Trusted Computing Model



Contributions

An exploratory study of the utility of goal model construction.

RQ1: Were novice participants able to **understand and use** goal **model constructs**? If so, what **difficulties** were experienced by novices when being introduced to goal modeling and Tropos?

RQ2: To what extent were participants able to **understand the AUTO model**?

RQ3: Did participants **choose** to extend the USER or AUTO model?

RQ4: What **utility** (if any) was described by participants or observed by researchers?

RQ1: Were novice participants able to **understand and use goal model constructs**? If so, difficulties?

- Participants were able to identify actors, decomposition links, and contribution links

Difficulties:

- Difference between the specific types of *contribution links*
Difference between ++, +, and ++S
- Asked *clarifying questions* about model elements to add (e.g., is this a soft-goal or a goal?)

Discussion: To what extent should we evaluate correctness of subject's models?

RQ2: To what extent were participants able to **understand the AUTO model?**

Participants were able to *present a clear cut answer* about the major trade-offs

- Proposed new connections between existing intentions
- Decomposed intentions into children

Discussion: What level of understanding is required for update a goal model?

RQ3: Did participants **choose** to extend the USER or AUTO model?

USER

3 Subjects (1P:2T)

- More detailed information
- New information

“I’ll extend the one I just made, it has a lot of links I don’t want to recreate on auto”

AUTO

5 Subjects (3P:2T)

- More organized
- Had more information
- Visual appeal

“I think auto is more clear and the arrows make more sense”

Discussion: What is the impact of first exposure and beautiful layouts? How to control for these?

RQ4: What **utility** (if any) was described by participants or observed by researchers?

Four aspects of utility observed:

(1) Elicit Underlying *Assumptions* & Motivations

- Discover tacit information

(2) Explicitly Consider *Structural Relationships*

- Learned how to break down a bigger goal into smaller tasks
- Compare things that are required vs possibilities

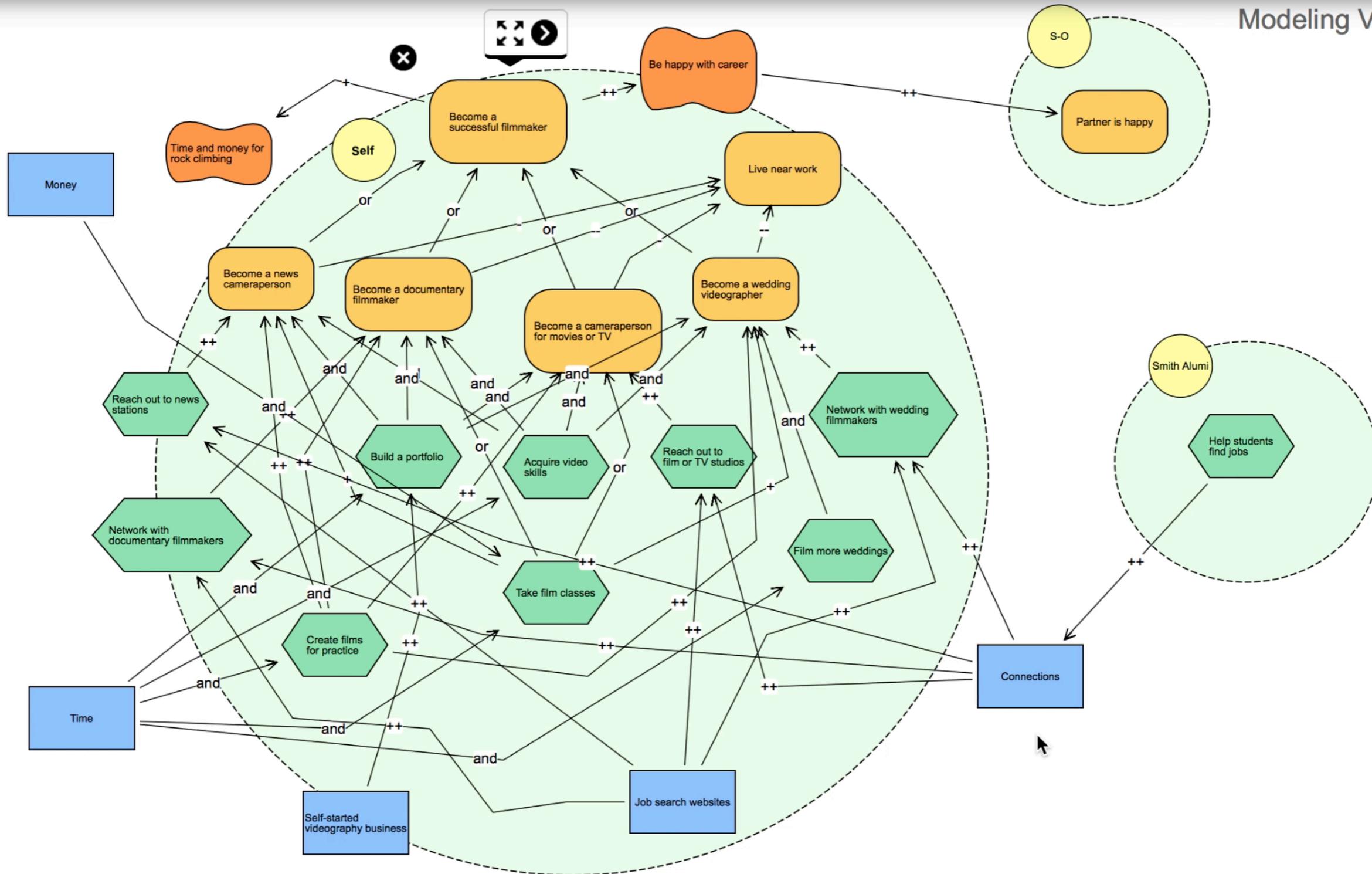
(3) *Learned* Something New

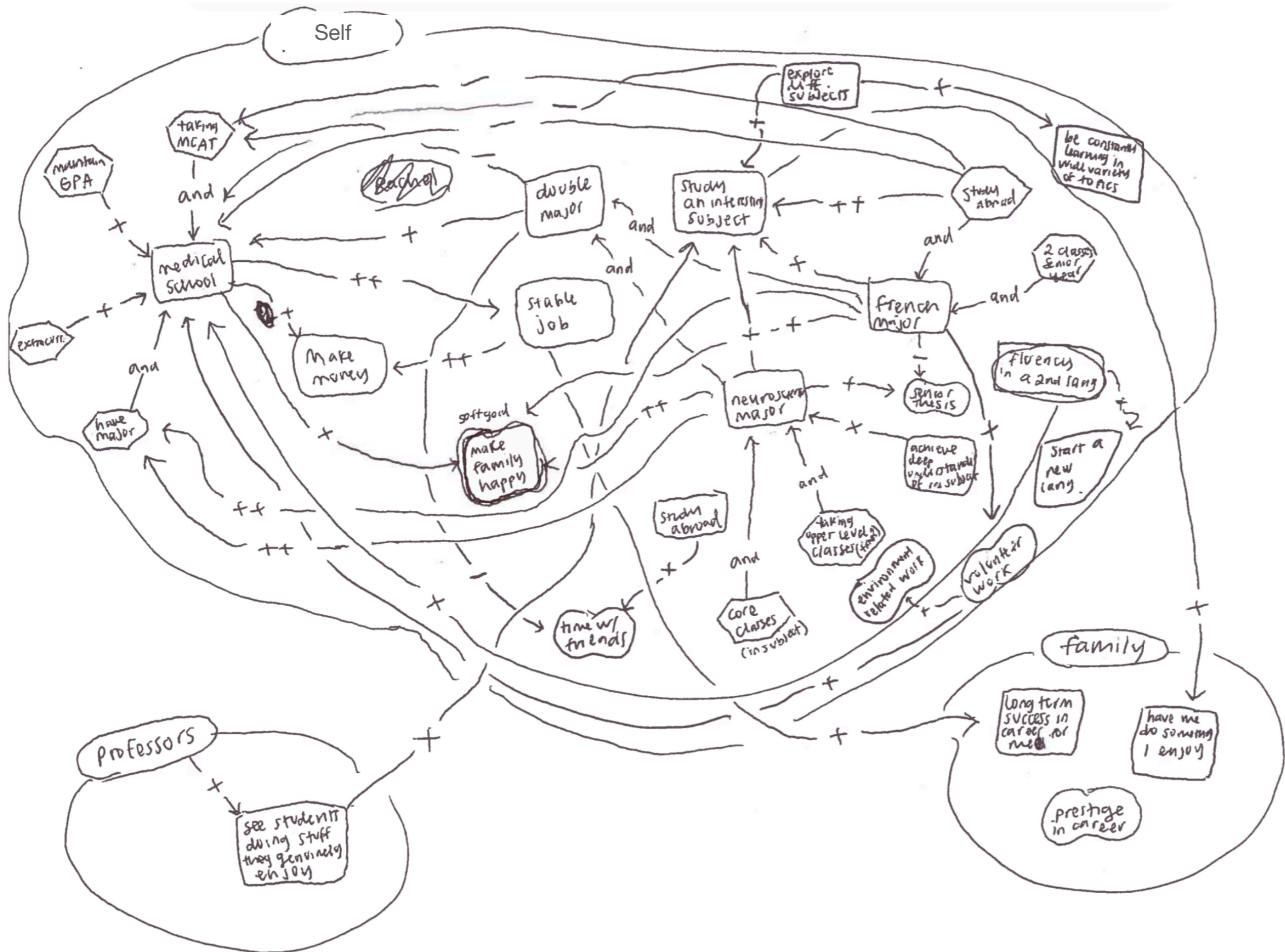
- Saw connections in model and considered links
- Consider perspectives of other stakeholders

(4) Update *Conclusions*

- Reinforced or changed after the modeling experience
- See whole picture

Discussion: How can we isolate each of these factors in future studies?





Overall Research Question

Recall our research question:

To what extent do participants gain utility in manually drawing goal models (in a tool or on paper)?

We found that participants:

- *Understood* and were able to use model constructs
- Found *utility* in both the USER and AUTO models
- Gained *insights* into their
 - assumptions
 - goals
 - structural nature of their scenarios
- some participants *changing* their decision (impact)

These results are **only preliminary** and inform our **future work**.

Future Work

- Explore cause of model choice
 - USER -> mere/first exposure
 - AUTO -> better layouts
- Impacts of *talking out loud*
 - Compare with pro/con lists or mind maps
- Vary study subjects
 - Trained modelers
 - SE domain models

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Questions?

What future work is most interesting or promising?

Where do you believe there to be utility in drawing models?

Interested in collaborating? iStar/GORE Educators?

Contact: amgrubb@smith.edu

Study Materials: <https://github.com/amgrubb/gore-study>



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iStar'20 - September 1st, 2020