

POSI Overview

Andrew Dougherty
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Motivation for FRDCSA

Zero Marginal Cost (ZMC) enables free software to deliver benefits to large numbers of users, only cost is development

How do we maximize the benefits?

General Problem Solving

Computers as theorem provers

How do we maximize solution space?

Turns out no program can solve all mathematical problems

But we can find a sequence of programs, each more complete than the next

This sequence has to eventually increase in size, otherwise, cannot fit the information required

This is the goal of the FRDCSA

Maximizing Software Capabilities

Creating more sophisticated, capable software

Write it ourselves

Or, gather and index existing software

FRDCSA takes both approaches

Indexing Existing Software

RADAR/Packager/Architect (the
Cluster/Study/Apply (CSA) of FRDCSA)

Make packages of all software

Create a comprehensive ontology (a database of
facts) about all free software

Writing Our Own Software

Indexing is necessary, however insufficient

Must write our own software

Many areas (especially “humanitarian”) that needed software

- Doctor software (Akahige)

- Meal planner

Bus planner, Task Manager (Verber/PSE), etc

In all, > 90 internal, > 50 minor codebases

Solve Problems That Affect People

How can we be of the most assistance

Help people achieve their goals

Index their goals

Find out what skills they want to learn

Help them to work collaboratively to complete their goals

Started new meta-project to address these issues

POSI (POSI Open Source Initiative)

POSI Collaboration Group, Software and Services

POSI is a group that wants to help members achieve their goals through improved collaboration on shared goals and projects

Map out many of the goals of POSI members, their abilities, and their interests, and connect members with others who have the interest and ability to complete shared goals

Mainly meet online

Hanging Out

IRC

Daily IRC meetings

VOIP Conferencing

Ad-hoc team assembly

Web UIs

Occasional productivity

Shared servers

“competitions” or

POSIthons

Screen “kibitzing”

Simple Example of Goals, Interests and Abilities

Person A

Goals:

Learn Java

Purchase new laptop

Abilities:

Python

Shell scripting

Interests:

Biology

Person B

Goals:

Develop for Android

Abilities:

Acting

Java

Interests:

Teaching: Java

Simple Example of Goals, Interests and Abilities (GIAs)

In reality user probably asserts hundreds or thousands of goals, same for interests and abilities

The software looks at the constraints and helps to start ad-hoc teams to solve problems that are critical to the entire group and also problems that are critical to individual members

How GIAs are Added

Example: IRC Interface

User enters:

“Goal: install gnewsense on a VM”

“Learn: RDF, OWL-S, Android Development”

Other possible key words (so far):

done assert skills suggestion feature poll policy goal
skill learn project master interests note question
study

Flows naturally in conversations:

18:09:54 aindilis what time?

18:10:25 aindilis hmm I don't have all your contact information...

18:10:50 aindilis Goal: periodically upload the contact info of new contacts to all different sites like Facebook, icedove, etc.

GIAs are Stored in a Knowledge Based System (KBS)

```
andrewdo@justin:/var/lib/myfrdcsa/codebases  
/internal$ corpus --senders PSE-X -s . -d 100  
-k pse-x
```

Starting ModManager...

'Get a new laptop'

```
("eases" "107405" "107420")  
("depends" "107407" "107405")  
("eases" "107405" "107408")  
("depends" "107405" "107409")  
("eases" "107405" "107410")  
("costs" "107405" "$400")  
("goal" "107405")  
("prefer same" "107405" "107408")
```

'install FRDCSA on my new laptop'

```
("depends" "107407" "107405")
```

'Present at Flourish'

```
("eases" "107405" "107408")  
("goal" "107408")  
("prefer same" "107405" "107408")  
("ethicality-concern" "107408" "evangelism")
```

'Make a list of the features we want to have in a laptop'

```
("depends" "107405" "107409")
```

'Have mobile wireless access through phone'

```
("eases" "107405" "107410")  
("eases" "107411" "107410")  
("costs" "107410" "$60 / mo")  
("provides" "107410" "107415")
```

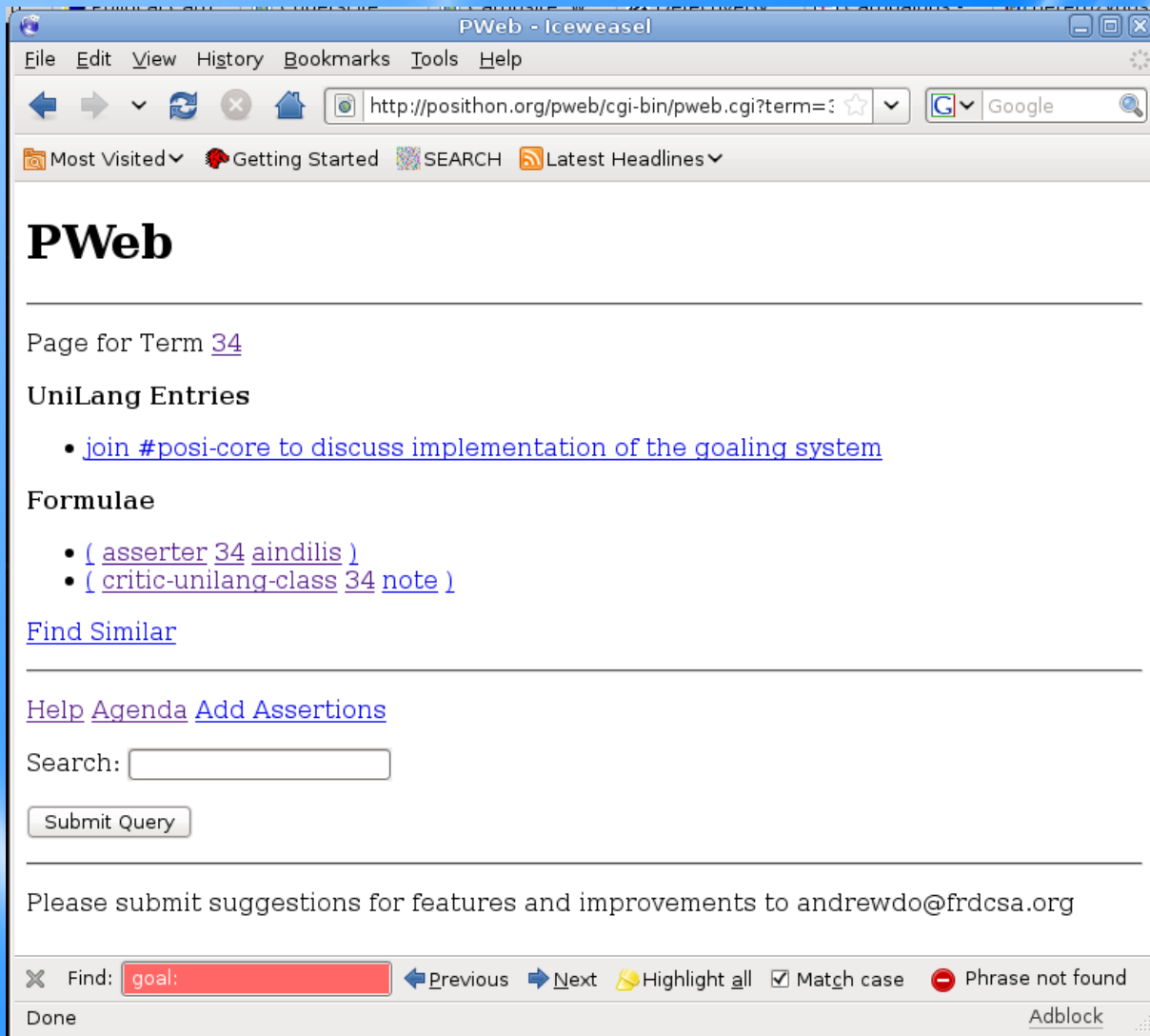
'Get an android based phone'

```
("eases" "107411" "107410")  
("costs" "107411" "$200")  
("depends" "107412" "107411")  
("eases" "107414" "107411")
```

'Have FRDCSA Interactive Execution Monitor working'

```
("depends" "107412" "107411")  
("depends" "107412" "107413")  
("goal" "107412")  
("prefer same" "107412" "107416")
```

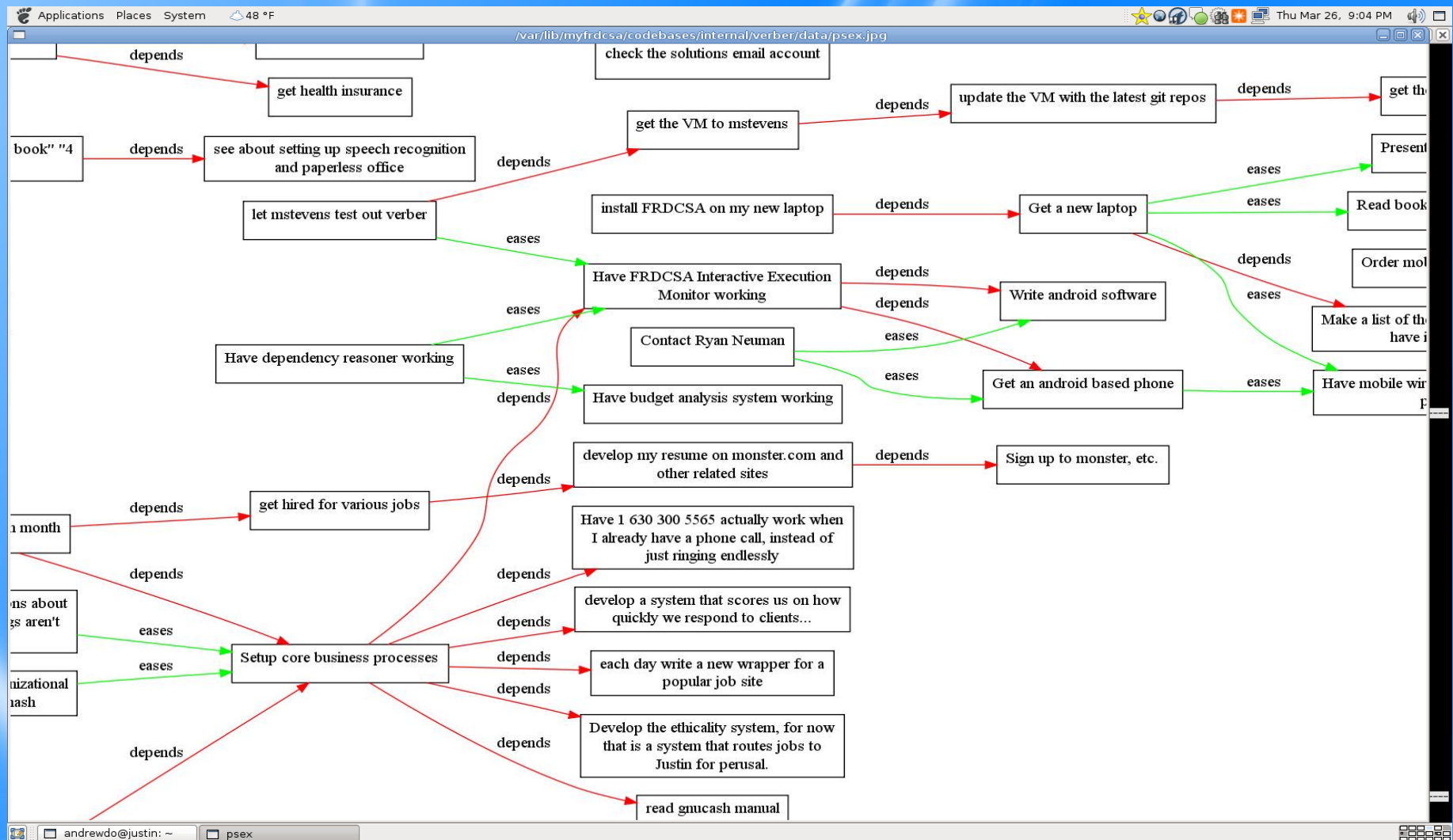
POSI Web Interface



Web-based
semantic web
like knowledge
editor for POSI
knowledge

Additional social
networks
under
development

Priority System Editor Sample Interface



Have a Priority System GUI Editor

Show completed goals as darkened out

Enable full text search

Drop down menus on right click

Allow persons to lodge disputes about the utility or purpose of a goal

Real time updating across multiple clients

Enforce goals as being subgoals of larger goals

Enable linking goals with various predicates

Goal of Collaboration

Identify shared goals, both automatically and by the user

Calculate the relative importance of each goal to the group as a whole, calculated by how much it enables the group to satisfy other goals

Calculate the relative importance of each goal to each member

Still need to work out the exact logic

Illustration of Identifying Shared Goals

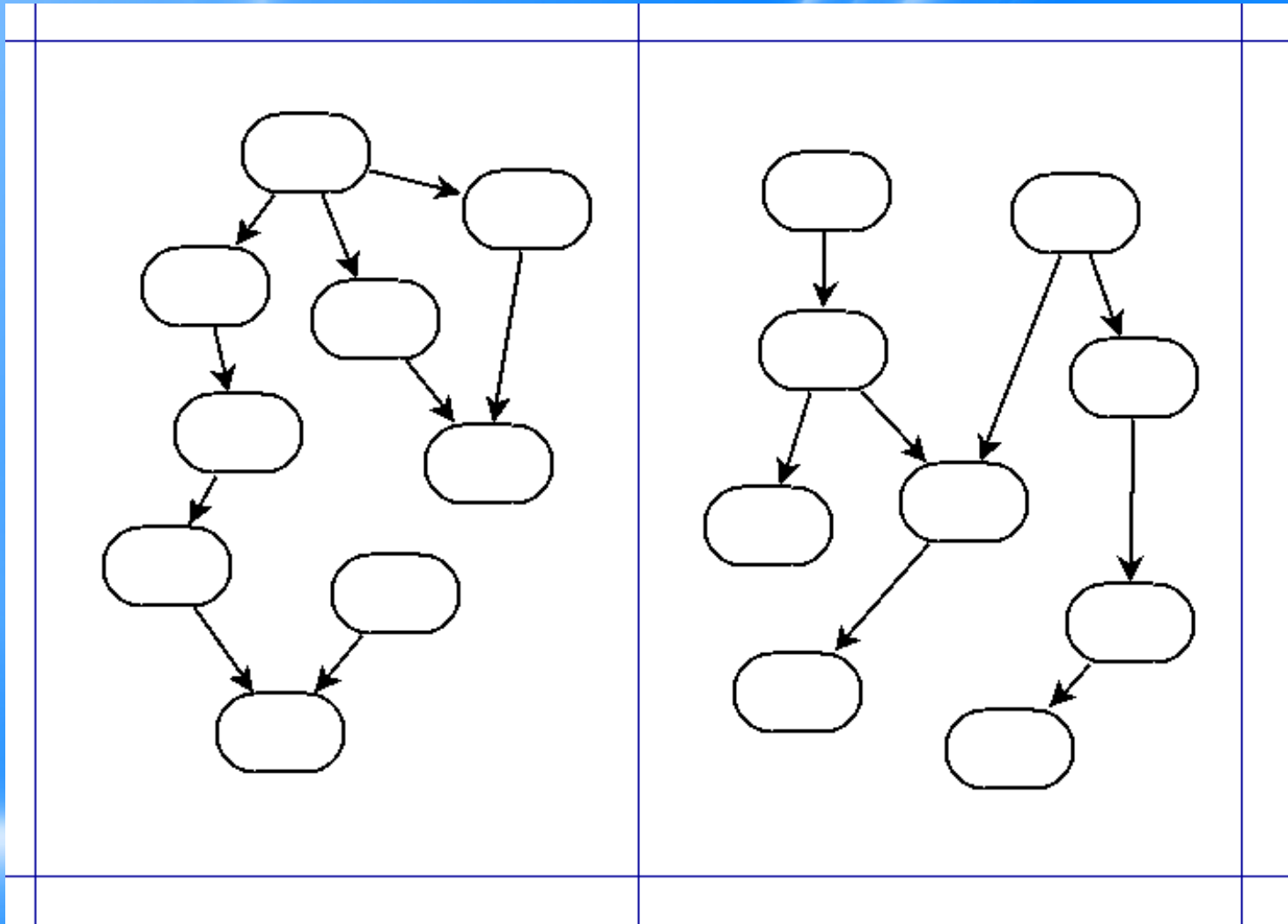


Illustration of Identifying Shared Goals

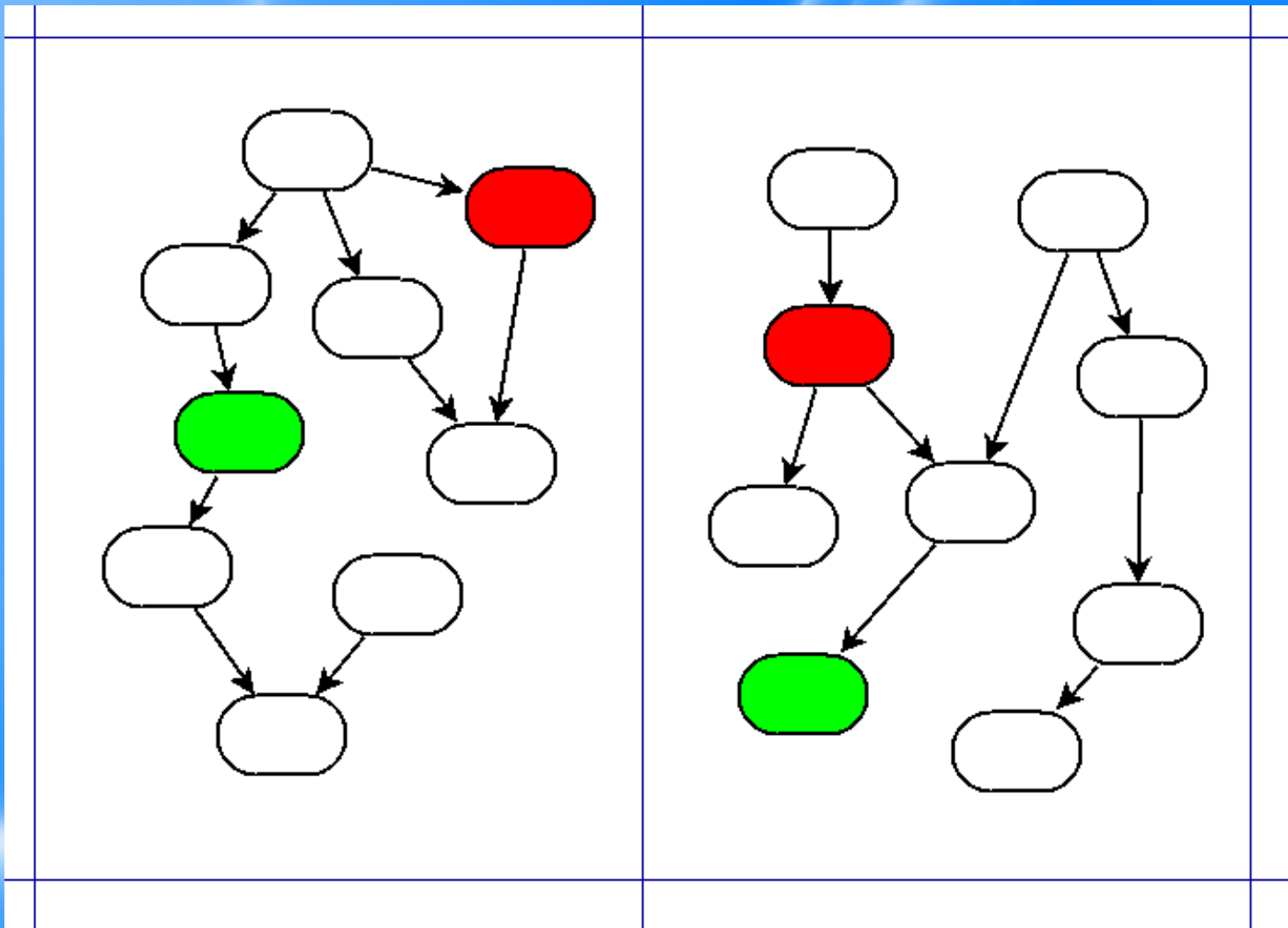


Illustration of Identifying Shared Goals

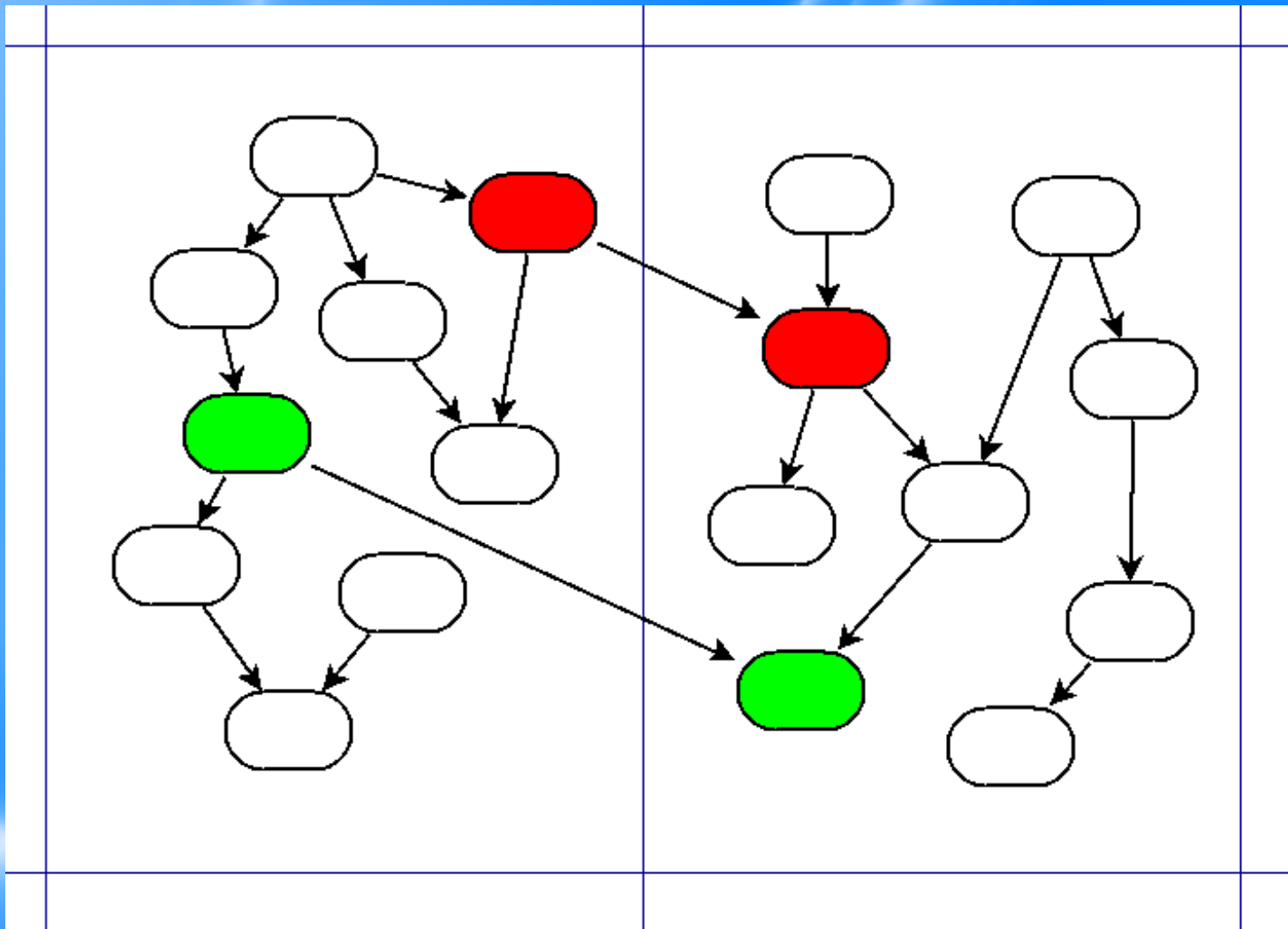


Illustration of Identifying Shared Goals

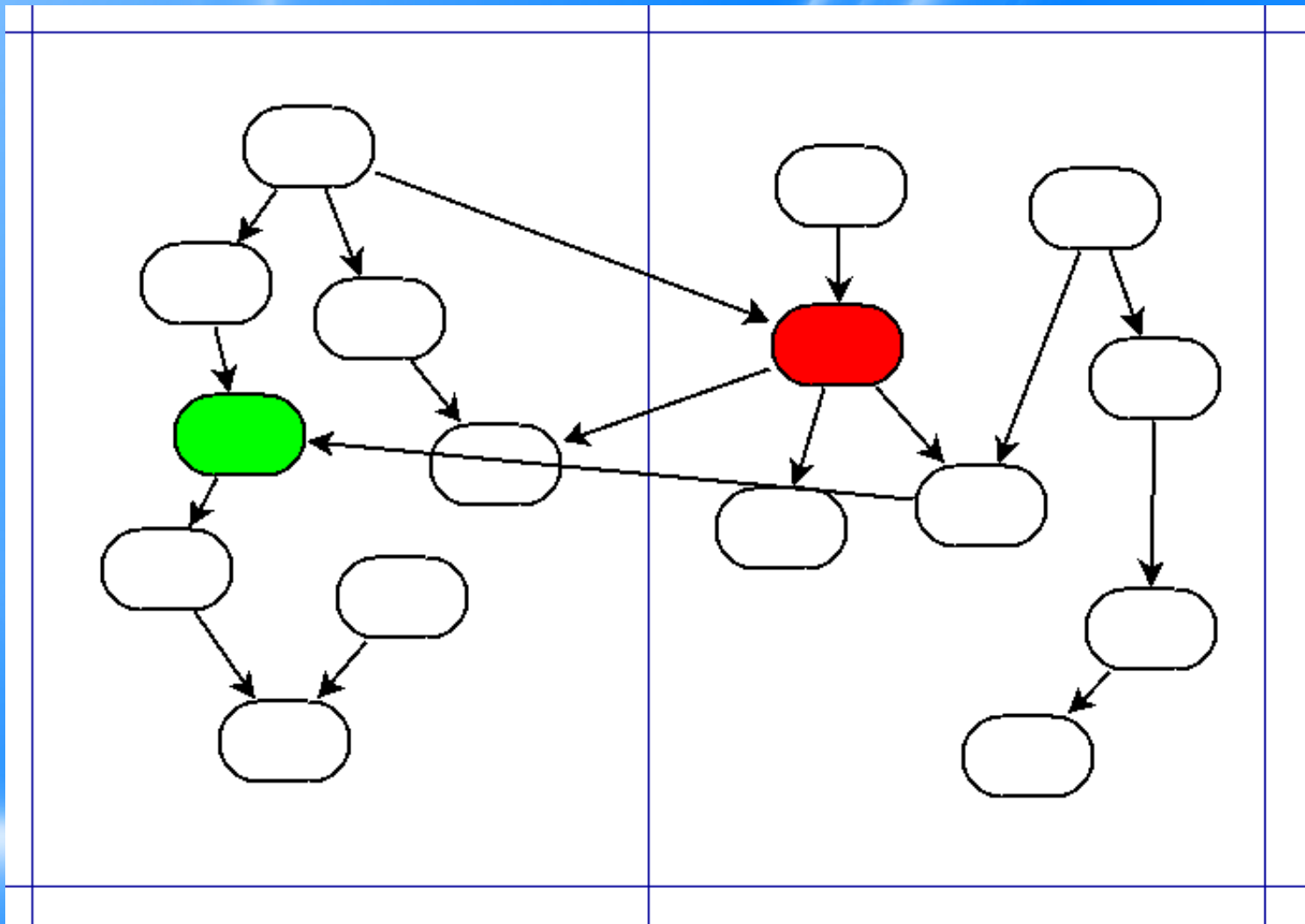
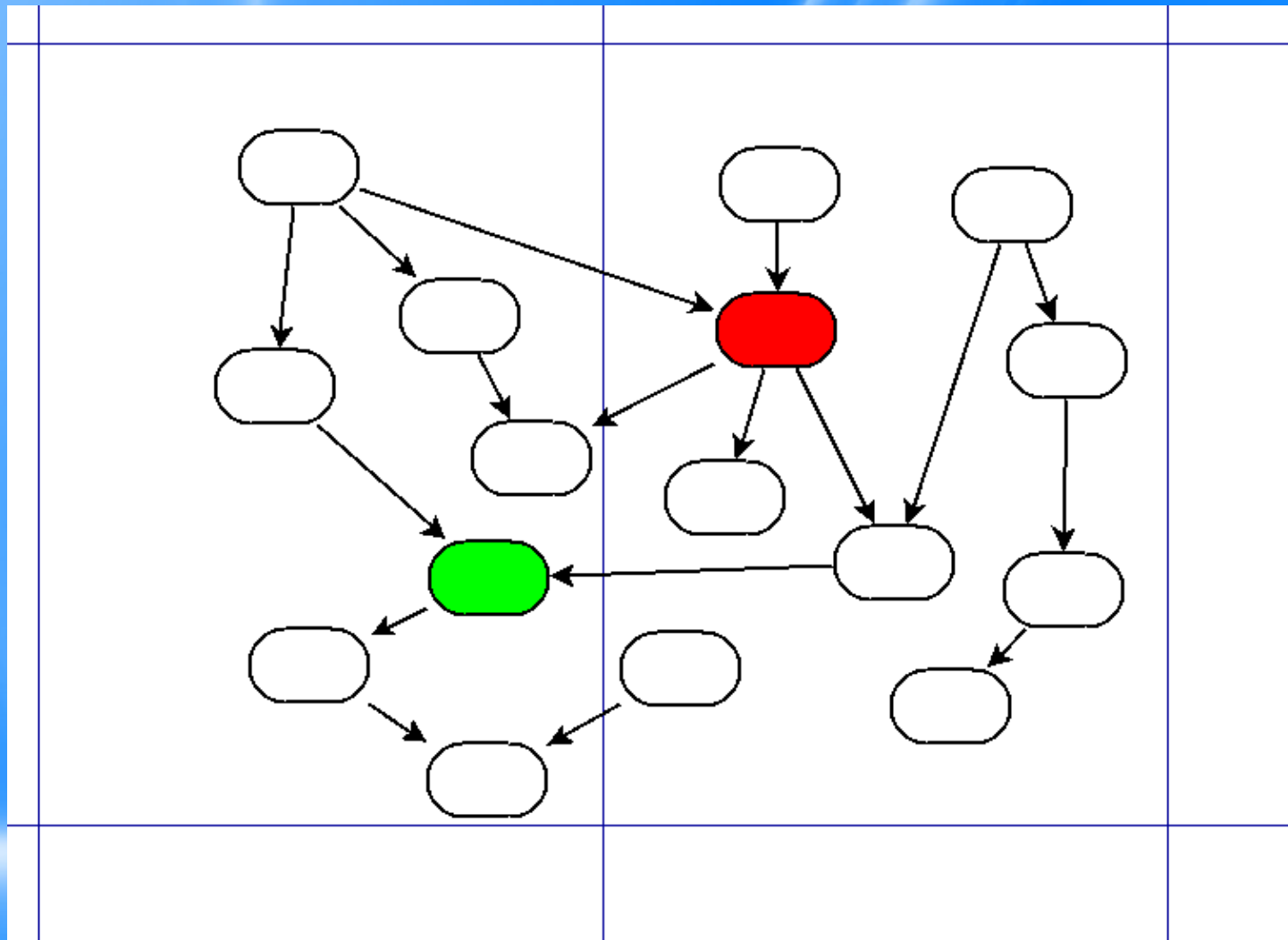


Illustration of Identifying Shared Goals



Identifying Shared (or Repeated) Goals

Goals are expressed in a Natural Language (NL)
eg. English: “Install FRDCSA on my new laptop”

Can be translated into logic (not very well yet):

“aindilis: we can mine the projects of members by scraping those sites”

we (x1)', 'mine (e5, x1, x2)', 'project (x2)', 'of (x2, x3)',
'member (x3)', 'by (e5, e6)', 'scrap (e6, x1, x4)', 'site (x4)’”

Recognizing Textual Entailment (RTE) identifies goals with the same meaning

Recognizing Textual Entailment

RTE asks, given two texts, if we assume the first one is true, must the second one also be true?

Example sentence pair:

- a) Some plants grow really well in a hydroponic environment, but others do not.
- b) Plants are grown in water or in substances other than soil.

In this case, the answer is YES - a entails b

Determine Who Can Solve Which Goals

We need to:

- Figure out who is competent in what skills

- Who is interested in what subjects

- Who works well with whom

Turns out all of this can be done with Social Network Analysis (SNA)

SNA involves looking at organizations or groups and measuring their characteristics

Experience Modeling System (EMS)

Need to figure out members' abilities

Directly ask members (web forms, chat bots)

Have members actively assert them

On IRC:

Determine abilities from available data

EMS Gathers Information About Member's Abilities

Pre-formatted or extracted ability data

- Resumes and cover letters

- Online skill profiles

Inferred ability data

- Automatically analyze text (emails, status updates (tweets/facebook), IM/IRC chats, web pages, documents, deliverables, etc)

- Other methods (please suggest)

Ability Extraction from Text

Use Wikipedia, Library of Congress subject hierarchy, subject ontologies, resume and position datasets, skills inventories, etc, to develop a model of what terms are used in which area

Use Bayesian inference or other techniques to figure out which skills the user is probably familiar with based on which terminology they use

Planning for Collaboration

POSI has an advanced Project Management system

Based on the FRDCSA systems Verber/PSE

All these constraints on who knows what, who is interested in what, who has what goals, deadlines, duration of events, members calendars are fed into a temporal planner, and the resulting possible choices are returned

Verber Domain and Problem Specs

```
andrewdo@justin: ~
(define
  (domain PSEX)

  (:timing
   (units hours)
  )

  (:requirements :timed-initial-literals :negative-preconditions
   :equality :typing :fluents :durative-actions
   :derived-predicates)

  (:types
   unilang-entry person - object
  )

  (:predicates
   (completed ?e - unilang-entry)
   (depends ?e1 ?e2 - unilang-entry)
   (provides ?e1 ?e2 - unilang-entry)
   (eases ?e1 ?e2 - unilang-entry)
   (plan-start-date)
  )

  (:functions
   (costs ?e - unilang-entry)
   (earns ?e - unilang-entry)
   (budget ?p - person)
  )

  (:durative-action Complete
   :parameters (?e1 - unilang-entry ?p - person)
   :duration (= ?duration 1)
   :condition (and
     ;; ensure that we have made it to the future of now
     (over all (plan-start-date))
     ;; ensure we have enough money
     (at start
      (>= (budget ?p) (costs ?e1)))
    )
  )
)

(define
  (problem PSEX)
  (:domain PSEX)
  (:includes)
  (:timing
   (start-date TZID=America/Chicago:20090313T053356)
   (units hours))
  (:objects work_out_meal_planning update_the_VM_with_the_latest_git_r$)
  (:init
   (= (budget andy) 500)
   (= (costs Get_a_new_laptop) 400)
   (= (costs Get_an_android_based_phone) 200)
   (= (costs Have_mobile_wireless_access_through_phone) 60)
   (= (costs Order_mobile_broadband) 60)
   (= (earns Do_job_for_Eric) 250)
   (at TZID=America/Chicago:20090318T183000 (overdue present_at_Chicago$
    (completed Agenda__Breakfast__Make_breakfast__Wed_Mar_11_08_00_00$
    (completed Agenda__Call_Chris_Lampkin__Check_on_Chris__Wed_Mar_11_08_00_00$
    (completed Agenda__Call_Justin__Check_on_Justin__Tue_Mar_10_21_55$
    (completed Agenda__Call_Justin__Check_on_Justin__Wed_Mar_11_21_55$
    (completed Agenda__Dinner__Make_dinner__Wed_Mar_11_16_00_00_CDT_2$
    (completed Agenda__Ensure_Mom_is_hydrated__Ensure_Mom_is_hydrated$
    (completed Agenda__Evening_Meds__Take_your_evening_meds__Tue_Mar_11_16_00_00_CDT_2$
    (completed Agenda__Evening_Meds__Take_your_evening_meds__Wed_Mar_11_16_00_00_CDT_2$
    (completed Agenda__Fetch_snail_mail__Bring_in_the_mail__Thu_Mar_11_16_00_00_CDT_2$
    (completed Agenda__Have_Mom_Call_Grandma__Have_Mom_check_on_Grandma__Wed_Mar_11_16_00_00_CDT_2$
    (completed Agenda__Morning_Meds__Take_your_morning_meds__Wed_Mar_11_16_00_00_CDT_2$
    (completed Agenda__Organize__Organize_per_Joe_s_recommendation__Wed_Mar_11_16_00_00_CDT_2$
    (completed Agenda__Read_scan_snail_mail__Read_scan_snail_mail__Thu_Mar_11_16_00_00_CDT_2$
    (completed Agenda__Read_scan_snail_mail__Read_scan_snail_mail__Wed_Mar_11_16_00_00_CDT_2$
    (completed Agenda__Talk_to_Mom__Check_on_Mom__Wed_Mar_11_16_55_00$
    (completed Develop_emergency_procedures_for_psychotics_)
    (completed eventually_convert_all_of_this_into_pse)
    (depends Get_a_new_laptop Make_a_list_of_the_features_we_want_to_have)
    (depends Have_FRDCSA_Interactive_Execution_Monitor_working Get_an_android_based_phone)
    (depends Have_FRDCSA_Interactive_Execution_Monitor_working Write_an_android_app)
    (depends Make_adequate_money_each_month Setup_core_business_process$)
    (depends Make_adequate_money_each_month get_hired_for_various_jobs)
    (depends Present_at_Flourish present_at_Chicago_Semantic_Web_user_group)
  )
)

--uu-:**-F1 psex.d.pddl Top L1 (PDDL)-----|--uu-:**-F1 psex.p.pddl Top L1 (PDDL)-----
```

Verber/PSE vs. Bug Tracker

Similarities

Due dates

Task status

Assignees

Project

Differences

Verber has

Temporal planner

Logic and rules

Verber will have

Translation of goal text
into logic

Interactive Execution
Monitor

GUI editor for task
dependencies

Verber

More information is available from:

<http://frdcsa.org/~andrewdo/writings/semweb.odp>

<http://frdcsa.org/~andrewdo/writings/semweb.pdf>

Concerns with POSI in General

HUGE privacy concerns

All this information can and will be used against members, if they do not secure the information

Solution:

distribute the POSI code to each user, anonymize it, set up privacy controls, and so on

put users themselves in control of the data (on their local machines) and use peer to peer, encrypted, deidentified etc techniques

Conflict Resolution

Develop sophisticated techniques for resolving resource conflicts, identifying false conflicts

Allow people to dispute goals (i.e. that marginalize them for instance)

FRDCSA Revisited

FRDCSA is the middleware that runs POSI

Consists of over 90 internal (relatively major) codebases and maybe 50 minor, along with hundreds of external codebases (acquired from the web)

10 year old project with lots of cumulative development

More info:

<http://frdcса.org>

<http://frdcса.onshore.net/frdcса>

Job-Search

One of the FRDCSA internal codebases

Helps free software developers be financially stable and thus able to work on free software

Spidered Craigslist, resumeXML generation

Will use Experience Modeling System when that's complete

Developed a resume matcher that matches users with jobs they can perform, also will suggest in-demand skills they can learn

POSIC

Job-search was a popular software/service,
decided to turn it into a consultancy

Hence POSI Consultancy = POSIC

POSIC is therefore a business which supports
POSI and free software in general

POSI is free software, hence POSIC and others
can use it

Help developers find projects that pay them to
extend their projects

Intelligent Tutoring Systems

Long tradition of research in developing automated tutors for subjects

Develop fine-granularity models of exactly what the person knows

Based on what they know and what they want to know, compute a lesson plan

System-X Intelligent Tutor

POSI helps connect learners with teachers, or if none exist, teach the subject with System-X

Develops a large library (mainly using text summarization of existing online learning resources) of learning materials

Uses CLEAR to read learners the texts

Assesses understanding through tests

Records results in Experience Modeling System

Conclusion

FRDCSA is a 10 year old project developing Friendly Artificial Intelligence

POSI is a group that tries to identify and satisfy fine-grained goals of its members through collaboration and ad-hoc team creation

Availability

POSI uses FRDCSA as the middleware

Unfortunately, FRDCSA has not been released

Need to clean it up (license compliance, personal information removal) before release

Is available to checkout on GIT for people interested in using it/helping to clean it up

Very capable system

10 GB without datasets, 100 GB with

Ways to Succeed with POSI

Get an account on posithon.org (has copy of FRDCSA)

Visit website (<http://posithon.org>) and read up

Join #posi channel (on irc.freenode.net) and record statements about what you'd like to learn, your skills, goals, and interests

Join mailinglist (link on website)

Record intentions about how to improve POSI to meet your needs and talk to existing members

Ways to Succeed with POSI

If you are a developer, consider:

- Work on few remaining bugs with IRC bot

- Developing software for extraction of skills from text

- Develop Java or otherwise (perhaps Processing?)
GUI for Shared Task Manager / Priority System
Editor

- Figure out how to use POSI software to meet your
own software development needs

- Suggest new development projects

POSI-Chicago Meeting (Immediately following this talk)

We will be meeting at the POSI/FRDCSA booth
after this talk (10:50 am)

Come see what's going on and/or sign up to the
mailing list

The End - Questions?

More information is available online at:

<http://posithon.org>

<http://frdcasa.org>

Thank you !!!