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# Assisted Self Reflection: Combining Lifetracking, Sensemaking & Personal Information Management

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**Abstract**

The web, personal computers and instant ubiquitous digital communications have brought unprecedented constant demands on our attention. As a result, people do not spend as much time thinking, reflecting upon situations, decisions and activities as they used to. As a consequence, people feel less organized, and often lack the situational clarity to make informed decisions. In this paper, we present an ongoing project designed to make self-reflection an integral part of daily personal information management activity, and to provide facilities for fostering greater self-understanding through exploration of captured personal activity logs. We describe an application that visualizes such personal activity logs using many available "life-tracking" tools, and uses visual and textual PIM metaphors to convey this information in a familiar way that is personally relevant and meaningful.

**Keywords**

personal informatics, awareness, life-tracking, sensemaking, personal information management

**ACM Classification Keywords**

H.5.2 Information Interfaces and Presentation: User interfaces – Evaluation/ methodology

## Introduction

The demands of modern day information technology and instant ubiquitous digital communications place unprecedented constant demands on our attention. As a result, the “interrupt-driven lifestyle”[4] has become commonplace. The effects of this lifestyle, such as feeling stressed, disorganized and overwhelmed, are correlated with a lack of self understanding, suggesting need for informed self reflection[1]. In particular, an abundance of psychology literature suggests correlations between activities of self reflection and improved self-awareness, decision making ability, and overall quality of life[6]. Modern-day personal information technology, however, has been designed to optimize productivity rather than self-understanding.

In this paper we introduce an application that uses automatically captured activity logs to promote self-understanding by contextualizing self-reflection within common personal information management (PIM) practice, and by using visual and textual PIM metaphors to convey this information in a familiar way that is personally relevant and meaningful. Furthermore, we demonstrate that many of the various “life-tracking” tools available today provide a simple means of heterogeneous activity tracking without need for additional sensing or infrastructure. The ultimate goal of the system is to determine whether appropriately summarizing and presenting a user’s captured activity data, can have a positive effect on his or her ability to make informed decisions, self-image, perceived quality of life.

## Related Work

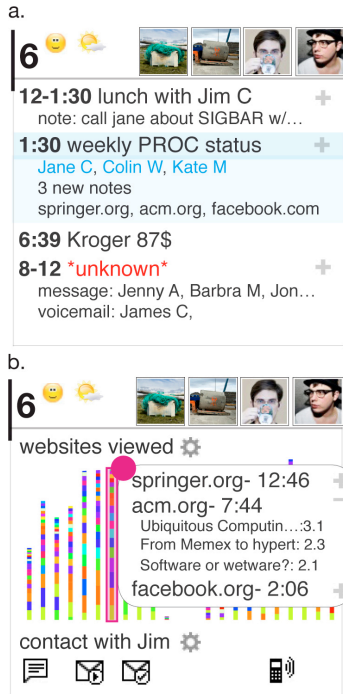
A number of previous “automatic diaries” introduced summaries of life events based activities from sensed user activity. Pepys[3] devised such a diary for use as a memory prosthesis; LifePatterns[2] developed methods of summarizing raw video and sensor data to derive high-level overviews

of an individual’s daily patterns. With the rise of life-tracking on the web, a gamut of websites dedicated to automatically tracking various statistics of individuals’ lives have arisen, from time spent interacting with documents and applications (e.g. Rescuetime and Slife) to tracking physical activity, sleep and nutrition (e.g., Nike+, myZeo, FitBit, CaloriePal). While each of these sites are oriented to tracking one specific type of activity DAYTUM and mycrocosm let users manually track arbitrary metrics of their choice through manual contribution. Since different statistics are relevant to different people (as demonstrated by the diversity of tracked information in DAYTUM and mycrocosm), Poyozo generates summaries and statistical visualizations from heterogeneous activity data to better support the creation of an informed life narrative for facilitating self reflection and understanding.

## Poyozo: Recording, Modeling & Visualizing Personal Data

Poyozo is an automatic diary that generates summaries and statistical visualizations based on web-based activity data from life tracking sites for the purpose of facilitating reflection and understanding. Poyozo uses long-term statistics of the individual’s life through longitudinal analysis of the user’s activities to increase the individual’s self-awareness. Unlike most services, which use a timeline or simple charts, we integrate this information in an everyday PIM interface, the calendar.

As the web has become a medium for the ever increasing dissemination of information about people places, events and basically anything else on such a massive scale, we are able to use it as the primary source of life activity data. Our user modeling framework, PRUNE[5] operates as a Firefox plugin with a feeder component, RDF entity store and event store. The feeder component periodically retrieves a list of all the web based data sources the user has added, and pulls



**Figure 1:** One day detail view of the Poyozo calendar in text mode(a) using PLAN to show a list of the most significant events occurring on that day, and graphs mode(b) allowing users to correlate events and activity statistics.

data from each. For each item retrieved from a source, the feeder updates the corresponding entity in the world model, or creates a new entity if no such corresponding item is found and records each update in the event store. This uniform RDF representation reduces overall system complexity and makes it possible for users to examine, access and update parts of the world model using the entity inspector user interface which acts as a “global address book” for the system.

### Calendar Interface

Poyozo’s calendar interface (Figure 1) allows you to view and edit your life activity records. The top portion displays your emoticon rating of the day, the weather forecast and pictures you captured that day. The bottom portion is modal; it uses PLAN to display an editable textual summary of the most significant events occurring on that day(Fig. 1a), and graphs two activity streams, such as websites viewed per hour and messages from Joe P (Fig. 1b). You may click on any entity to view a detail or hide it from view.

### PLAN: Personal Life Activity Notation

Since people naturally use narrative to convey past events to others, we thought that allowing Poyozo to represent captured user activity data in textual narrative form would allow this data to be more immediately meaningful and evocative. This led us devise PLAN, a notation which, like the proposed *activitystrea.ms* format<sup>1</sup> is used to express sequences of sensed activities, but which is designed for human-consumption as well– specifically, it is designed to be easy for people to read, edit, and author. Reducing the barrier to authoring and editing captured data is important to the system because it enables users to effectively engage in a dialog with the system, fixing erroneous sensor data, supplementing activity logs with new data (sensor-unobservable) data, and deleting undesired records.

<sup>1</sup><http://activitystrea.ms/>

PLANs syntactically look like meeting agendas: each PLAN is an ordered sequence of consecutive events under a common “episode” (short period of time, analogous to a meeting), where each event consists of a timestamp, optional subject, action (predicate), object, and optional duration. When the subject is omitted, the user’s own self is implied; this allows entries to remain succinct and easy to read. The agenda display in figure 1a shows an example PLAN sequences.

Raw captured activity logs generated by sensors often are extremely detailed and voluminous; the sheer quantity of such entries often makes reading PLANs tedious and overwhelming. For example, Poyozo captures every action performed by the user as s/he navigates the web, including querying search engines, switching tabs, and intermediate pages viewed while seeking information.

Thus instead of dumping raw activity logs as PLANs, Poyozo generates PLANs as responses to queries which can restrict and filter which events are selected in various ways. Queries can select events by subject (user performing the action), action type, or object that the action is being performed upon. Furthermore, queries can be set to include only events that take more than a certain duration, or which exceed a combined uniqueness-importance measure analogous to TF-IDF for document retrieval. For filters with thresholds, Poyozo provides a graphical slider which can be used to interactively expand or restrict returned results.

## Discussion & Future Work

Instead of as a stand-alone application, we imagine Poyozo’s mechanisms to be integrated into common personal information management tools to help users better understand their state and improve their ability to make informed decisions.

But with Poyozo and any of these prospects, there are three likely challenges to adoption: accurate monitoring, concerns with being recorded and usefulness. We are currently conducting a study to investigate how to optimize the systems utility towards self perceived self awareness through a variety of methods, such as sharing/comparing selected PLANs and allowing users to conduct their own experience sampling tests and correlate results with recored activities.

#### *Social Life Management*

Just as we are able to submit papers to peer-reviewed conferences and journals, we could anonymously share selected portions of our life activities for peer or professional consultation when making major career decisions, learning a new skill or in the process of recovery. By seeing ourselves through the eyes of others, we are more able to normalize behavior patterns and raise awareness of suppressed abnormalities. PLAN's querying mechanism could provide an easy way for individuals to selectively share and compare their logs and aggregate statistics with other individuals and groups.

#### *Privacy & Security*

Given that Poyozo records data locally on the user's own personal devices under their control, we have relieved many of the privacy concerns with sharing personal information by leaving it in the user's discretion. People may be initially hesitant to being monitored but may get used to it, just as with cameras in the UK. The question is how do we provide mechanisms that let users make good judgements with respect to how and with whom they want to share their data. For example, a future system may support securely sharing data of different degrees of exposure to different people

#### *Information Accuracy & Fidelity*

We see two major problems facing the challenge of gathering accurate information pertaining to a user's activities via web APIs: fidelity and accuracy. Currently, many useful web feeds are severely delayed, inaccurate or unavailable due

constraints of the APIs or server down time. This makes building trust in the system and relevant in-situ recommendation particularly difficult. Even once the information is recorded, the plethora of web based feeds may raise many false positives, such as with common calendar applications that do not differentiate between attended and unattended events. With Poyozo, we hope to encourage the development of high-quality life-tracking APIs and by allowing users to easily edit their records we hope to the begin to address the accuracy problem.

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