

## Problem statement

User-supplied textual passwords used today have significant problems:

1) Hard to remember, 2) Easily guessed 3) Reused at many servers

There is inherent tension between memorability and guessability of passwords – humans do not easily create new memories and do not retain them well.

## Proposed Solution

We propose **Life-Experience Passwords (LEPs)**. Users create passwords based on facts they remember about past events from their life. LEPs provide the following benefits to end users:

1) **Easy to remember**: facts and events are already in user's episodic memory

2) **Hard to guess**: details of memorable events are unique and difficult for others to guess

3) **Abundance of memories**: humans have many personal experiences to use

## LEPs with Free Form Input (Approach 1)

1. Ask users to provide their personal short stories (2-3 sentences) in the following categories:

**#1 Life Time Story (Type 1)**: Story about a specific event in a user's life that was memorable: e.g., a birthday, a vacation trip, memories from high school, college, work events, a graduation, a funeral, a wedding ...

**#2 Flashbulb Story (Type 2)**: Story about the circumstances/the moment when a user heard surprising and consequential news (e.g. about 9/11, the death of Princess Diana, the 2004 World Series win by the Boston Red Socks, Hurricane Katrina etc.)

**#3 First time learning (or doing) Story (Type 3)**: Story about learning or doing something for the first time. E.g. What did a user learn, where, who taught him, did something memorable happen, etc.

2. Extract keywords from user provided stories based on **Named Entities**, and *Where*, *When*, *Who* and *What* information (Store keywords only)

3. **Auto-generate** authentication questions tailored to specific users based on keywords

4. When user wants to authenticate, prompt them with appropriate questions about these keywords

## LEPs with Prompted Input (Approach 2)

1. Ask users to provide short answers to prompts that are fixed and belong to the categories:

- **Learning** (riding, biking, swimming, ice skating, skiing, snowboarding, paragliding)
- **Location** (visiting a certain place)
- **Person** (an event about a person from user life)
- **Lifetime** (death, wedding, engagement, graduation from high school, graduation from college, prom, job)
- **Flashbulb** (9/11, Hurricane Sandy, Earthquake)

2. For authentication, users are simply asked to provide same answers to prompt questions

## Sample User Story for Free Form Input

**User story**: When I was **seven**, my family traveled to our first **vacation** abroad. We **went** to **Paris** and visited **Louvre** and **Versailles**. We **traveled** with my cousins **Paul** and **Laura**. We also **visited** friends **Marie** and **Jacques** in **Paris**. We took a trip with TGV to **Geneva**, a fast train that I loved.

**Association Keyword**: First vacation abroad

Q. When was it ? A: **seven**

Q. Where did you go ? A: **Paris**

Q. Where did you visit ? A: **Louvre, Versailles**

Q. Who did you travel with ? A: **Paul, Laura**

Q. Who did you visit also ? A: **Marie, Jacques**

## Sample Story for Prompted Input

### Learning Category

- Q: What did you do ? A: Learned snowboarding
- Q: When was it? A: 2001
- Q: Where was it? A: Snoqualmie pass
- Q: Who were you with? A: my girlfriend

## Feasibility Study

- **Data Sets**: Initially gathered short personal stories from 10 users, where each user provided 4 different stories
- 70% of answers were supplied correctly
- Hobbies and feelings have low recall rates

## Issues/Challenges

- Detecting Synonyms: Father vs. Dad vs. John
- How much user guidance
- How to obtain the right amount of personal info
- How to provide enough context: jog memory but do not reveal answers
- Can someone use social network/data mining to guess answers

## Future Work

- Improve NLP algorithms
- Explore psycholinguistic aspects