

have with the trust an individual feels towards a particular SNS by highlighting that participants are only willing to share certain information with the site. In response to this concern, the ACANTO SNS should make the information which is made public on the site explicitly clear to the users when signing up to the site. Future quantitative research could investigate what information potential users of the site would feel comfortable in sharing with the site to inform which required information should be made optional when signing up to the site.

Credibility Validation (Trust in site)

A further strategy used by participants to assess trust in a SNS was to look for validation of that site's credibility from friends or family. For example, participants stated that they would feel more comfortable using a site that had been recommended to them by a family member or friend.

P9: 'if I know you that well and you've been involved and you say to me that's great that's a good site you should try it then maybe that would make me get involved'.

However, this process was even more evident when making trust evaluations on other users of SNS. In particular, participants described how they felt more confident adding an individual as a friend on a SNS if they had shared contacts. Similarly, participants described how they would feel more comfortable meeting up with someone through the ACANTO SNS if the individual had already met up with someone they knew.

P6: 'if you go into your shared contacts some of your friends that you know they might know, you're more likely to trust them than'.

P5: 'If you had shared contacts that would mean other people had met you, had liked you, they were happy, your feet don't smell, you don't have bad breath, you don't get drunk and f and blind and things like that'.

The finding that older adults are more likely to trust a site or individual recommended by a friend supports literature highlighting the propagative nature of trust (Sherchan et al., 2013), whereby some level of trust is passed through members of a social network. This finding provides support for the proposed shared contacts feature of the ACANTO SNS (Figure 50), as it will allow participants to see whether an individual whom they are suggested to meet up with has met up with anyone they know.

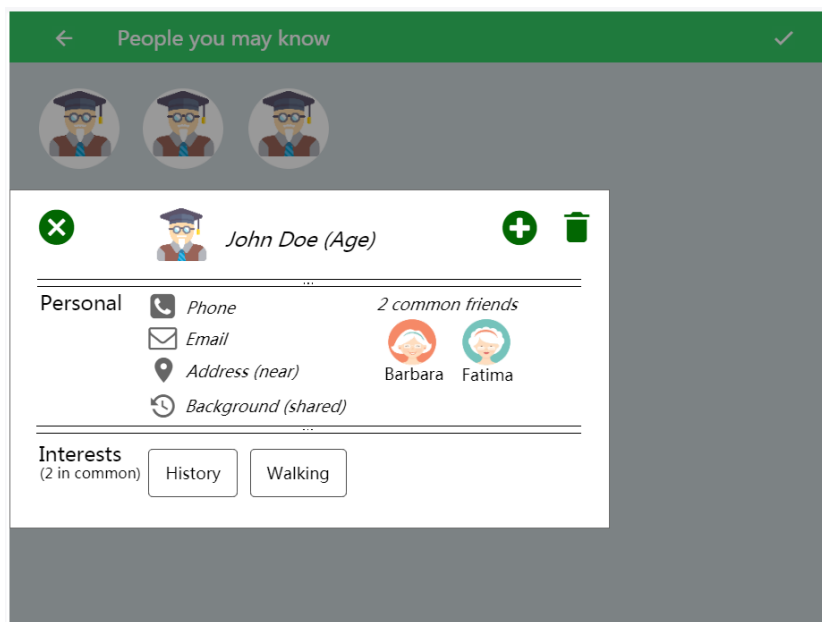


Figure 50. Prototype UI showing shared friends and interests.

Participants also look to validate a SNS's credibility by looking at who owns a SNS.

P6: 'I think it would have to be an organization that you would trust, probably more if it was a government organization like the council you know, I think you're more likely to trust sites like that as opposed to (.) what somebody's just started a business up you know.'

P10: 'Well you don't want it secretly coming from the Kremlin or something like that you know (laughs) with a funny name you know so you know if Newcastle University were running the site, well, fair enough.'

This clearly highlights how participants are more likely to trust a site which is owned by a source they deem to be credible, such as a government organization or university. This potentially links back to the previously highlighted concerns around financial vulnerability when using a SNS if it was being ran by a company who may have ulterior motives for running the site, however further research would be needed to confirm this. In terms of the ACANTO SNS, it would be sensible to clearly state on the site who is responsible for running the site in order to instil confidence in potential users of the site.

Similarities (Trust in recommendations and other users)

A further theme that emerged within the data was that the participants had an increased level of trust towards those individuals who were similar to themselves in some way. For example, participants discussed how they would be more willing to meet up with someone they met through a SNS if they shared similar interests with that person.

P7: 'I played for the Falcons when it was Gosforth rugby club and if they said something similar to that then I would have great trust in them well less, yeah I would have great trust in them.'

P8: 'If you gave me a picture of a little old man I would probably still meet up with him if he had a similar interest to me and wanted to talk.'

Since meeting up with an individual through a SNS involves a certain degree of risk, it appears that participants feel an increased level of trust in those with similar interests to themselves. This offers confirmation that the shared interests and shared friends information provided by the ACANTO SNS would be useful in helping older adults decide on whether they want to meet up with another individual on the site. However, participants also commented on how understanding whether they had any shared experiences with an individual they met on a SNS would affect their decision to meet up with that individual.

P1: 'That would tell me if they've had the same experiences that I've had because I'm divorced or are they widowed'

P6: 'I mean I'm more likely to meet up with an ex-army pal or an ex-army guy than a stranger than I don't know even though he is a stranger but he's been in the forces'

This supports the findings of research which has found that shared experience and identity is a key factor in developing interpersonal trust in a relationship (Sundaramurthy, 2008). The current study builds upon this by highlighting how this is also applicable to older adults developing interpersonal relationships within an online environment. The ability to view another user's background has also been implemented in the ACANTO UI in that recommended friends are described in terms of shared features, including shared occupational backgrounds.

Conclusion

A strength of the current research is that the qualitative nature of the research allowed participants to talk freely around the issues they had with trusting a SNS. This built upon the previous research which stated that trust was a predictor in an older adult's intention to use SNS (Braun, 2013) by gaining an understanding of the issues older adults associate with trust in a SNS. In addition, a further strength of the current study is that the participant sample featured participants of ranging technological competence, therefore not limiting issues of trust to being simply a result of technological incompetency. However, a potential limitation of the study is that participants had to have experience of using a SNS. Whilst this exclusion criteria was employed to ensure participants had enough knowledge of a SNS to talk freely around the topic, it could be argued that this may have led to more serious issues of trust in SNS being missed.

To conclude, the current study aimed to assess how older adults make trust judgements of SNS and their users, as well as highlighting trust barriers for older adults using a proposed activities-based SNS. It was found that participants associated trust in SNS with issues related to control of personal information and with validation through credible site ownership or recommendations from family or friends. Trust in other users of SNS was related to understanding motives for making contact on a SNS, discussion of finances and by assessing how similar an individual was to themselves. Potential trust barriers preventing older adults from following suggestions made by the ACANTO site include participants not understanding why

an individual wants to meet up with them and not having shared contacts with an individual who they are suggested to meet up with. Future research should focus upon whether the highlighted concerns related to finances and being scammed on a SNS are related to an inability to confidently navigate the online environment or whether they specifically represent a lack of trust towards current SNS. Suggestions for the development of the ACANTO SNS include the following concrete suggestions:

- providing information on ownership and aims of the site
- making clear no discussion of finances is allowed on the site
- including a section on the site where participants can explain why they are using the site
- showing shared interests, backgrounds and shared contacts for recommended friends

Some of these recommendations have already been implemented (e.g. showing shared interests, contacts and backgrounds for suggested friends) while others can be implemented in due course. While these are relatively simple suggestions, they offer significant advantages in terms of the levels of trust that users can then bring to the site, and this holds huge advantages for the system overall.

8. Conclusion

This deliverable has presented the initial and ongoing work at developing a usable UI for older adults in the ACANTO social network system (SNS). The early work demonstrates the fundamental usability of the system, highlights areas for improvement, and identifies areas where training will be needed (e.g. providing a list of icon definitions for users).

More detailed work relating to building trust, also shows how the system can be designed to facilitate trust, both in the system, and between users. Such work on trust is valuable because it shows how trust is facilitated by allowing users to disclose information about their interests, backgrounds, and friends, which potentially increases recommendation-acceptance.

Ongoing work continues and includes further evaluation of the mockup with older adults, both in the UK and in Italy. Future steps are:

- 1) Modification of the mockup based on the results and incorporation of trust factors identified.
- 2) Implementation of the FriTab interface based on the mockup (can be done in parallel with step 1).
- 3) Integration and evaluation of the FriTab interface with the walker.

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Appendix 1

Starting FriTab requirements. The aggregated list of the UI-specific requirements based on the larger list of the requirements for the ACANTO system (McNeill et al., 2016).

General (across all below):

1. Interaction very easy, language of use (clearly-worded instructions); manual/handbook

1 – Authentication feature

1. Personalization feature
 - a. Bootstrap - questions about interests and background for initial user setup/login
 - i. transportation mode
 - ii. the distance the user is willing to travel for activities

2 – Profile feature

1. Interests – Manual entry or Browsing categories (proposing activities, tags)
2. Background information
3. Privacy
 - a. Settings
 - i. what information to reveal and to whom (not reveal too much info)
 - ii. trust circles/levels
 - b. Display activity-plans of users to specific others depending on privacy profile

3 – Activities feature

1. User's history of rejecting and accepting recommendations
 - a. User can tell system that they no longer want to do an activity and why
 - b. Users' satisfaction with recommended activities to that system can learn and recommend favourable activities
2. Input (implicit and explicit) data about user engagement and satisfaction
3. Recommendation of activities (system-generated)
4. Recommendation determinants
 - a. Choose the attributes on which they wish to receive recommendations
 - b. Location-aware (localized) recommendations
 - c. Weather-aware recommendations
 - d. Marial/relationship status-aware recommendations
 - e. Intergenerational contact (with younger people) should be clear
5. Persuasive elements (reminders, self-achievement, ...)
 - a. The system must be persuasive in encouraging users to adopt recommendations
 - b. Display data about number of steps, distance, and time after each activity
 - c. Provide feedback to participants on their progress towards physical activity targets
6. Control over the number of recommendations they wish to receive
7. Navigation
 - a. Use/communicate local transport information
 - b. Navigation instructions in public spaces (easy-to-follow)
 - i. Display consistent naming of places over time and location
 - c. Pre-compiled guided tours of public spaces such as museums
 - d. Guide user back to starting location and home with easy-to-follow instructions

4 – Events feature

1. Appointments, social events, family/friends dates

5 – Groups feature (selection of people by the user; recommendation of people by the system)

1. Communication with existing friends and family

- a. Circles/lists, meetings, messages
2. New friendships based on location and/or common interests
 - a. Link users with similar interests by offering criteria to be matched upon

Appendix 2

Connection with the CPSN components. The source fields are described in (Ramos, Brauckhoff, & Britez, 2016).

CPSN component	FriTab component	Comment
User profile	Profile	User profile is an aggregation class which contains Person, Profession, Address and Contact information
Person		
Profession		
Address		
Contact information		
User location	-	current user location, as such it is not explicitly present as UI component, but shown in activity navigation part, also controlled through privacy settings
Place	Event (location)	current user location and location of the activity
Circle	Groups	Circle is a generic class, instances of user groups (caregivers, friends, etc.) are created dynamically, by the recommendation system. For the purpose of clarity of the UI and based on the WP1 studies with users, concrete groups are defined
Activity	Events (Calendar)	-
Tag	Interests (Profile)	Tag connects User Profile and Activity, activities are described, chosen or recommended by tags (interests)
Evaluation	Events – Rating view	connects User Profile and Activity (has score attribute)
Cargiver_of	Groups – Profesionals	this class represents relation between User Profiles
Connected_to	Groups – Contacts of the groups	this class represents relation between User Profiles
Follower_of	Groups – Contacts of the groups	this class represents relation between User Profiles
Is_located_at	-	relation between User Profile and User location, presence similar as for User Location
Is_member	Groups – groups membership	this class represents relation between User Profile and Circle
Is_near	-	relation between Place and User Location
Attends	Events (Upcoming events, Past events)	relation between User Profile and Activity

Appendix 3

Design for behavior change guidelines. The table describes design strategies for lifestyle behavior change technologies (Consolvo et al., 2009), with the target mockup elements.

Requirement	Description	Target mockup element
Abstract and reflective	Use data abstraction, rather than raw or explicit data collected from the user and any technologies, to display information to encourage the user to reflect on his/her behaviors by showing the user what s/he has done and how those behaviors relate to his/her goal.	Events performance page, Garden view; Past events, Photo album
Unobtrusive	Present and collect data in an unobtrusive manner, and make it available when and where the user needs it, without unnecessarily interrupting his/her everyday life or calling attention to him/her. For example, by using mobile devices.	Tablet UI that can be used with the walker and independently
Public	Present and collect the data, which is personal in nature, such that the user is comfortable in the event that others may intentionally or otherwise become aware of it. Because the data needs to be available whenever and wherever the user needs it, it is likely to be something that s/he wears/carries, resides in a shared/common space, or uses while in the presence of others. The technology should not make the user uncomfortable in those situations. For example, by using mobile devices.	Tablet UI that can be used with the walker and independently
Aesthetic	If the display and any accompanying devices function as a personal object(s) that may be used over time, they need to be inquisitive and sustain interest. The physical and virtual aspects of the technology must be comfortable and attractive to support the user's personal style.	Events performance page, Garden view; Past events, Photo album
Positive	Use positive reinforcement to encourage change. Reward the user for performing the desired behavior and attaining his/her goal. When the desired behavior is not performed, the user should not receive a reward nor a punishment, but his/her interest should be sustained.	Activities performance page; Garden view (Challenges); History of activities (Photo album)
Controllable	When appropriate, permit the user to add to, edit, delete, and otherwise manipulate data so that it reflects the behaviors that s/he deems suitable. The user should be in control of who has access to what aspects of his/her data.	Recommendation of events and users (accept/reject); Events performance page (setting goals); History of events (rating, photos)
Trending/Historical	Provide reasonable and accessible information about the user's past behavior as it relates to his/her goals. Historical data should accommodate changes in lifestyle goals over time and provide for the portability of data across devices.	History of events
Comprehensive	Account for the range of behaviors that contribute to the user's desired lifestyle; do	Events performance page

	not artificially limit data collection and representation to the specific behaviors that the technology can sense or monitor.	(distance, time)
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Appendix 4

Privacy profile of older adults. Table taken from (Coventry et al., 2016).

Variable	Parameters	Options
Location	Who	Carers High-trust friends Medium-trust friends Low-trust friends
	When	Incognito Delayed Real-time
	Detail	City-level District-level Building level
Physical fitness (incl. gait, steps, calories burned, balance)	Who	Medical professionals High-trust friends Medium-trust friends Low-trust friends
	When	Month-summary Day-summary Real-time
	What	General fitness Step count
	Emotional state	Who
	When	Month summary Daily summary Real-time
	Specificity	Positive only Positive + negative Detailed
	Health information	Who
	When	Delayed Real-time
	Specificity	General health Diagnosed conditions Symptoms
	Companions (who the user is with)	Who
	When	Weekly summary Daily summary Real-time
	What	General (e.g. "work colleagues") Specific
	User-activity	Who
	When	Weekly summary Daily summary Real-time
	What	General (e.g. "high/low intensity") Specific

Appendix 5

Groups from participant-aided sociograms. Table taken from (Coventry et al., 2016).

Group	Description
Family	Most participants reported close relationships with family and many reported close relationships with grandchildren.
Online contacts	These were people whom the participant had known in an offline context and because of distance were now contacted online (usually through email).
Long-term friends	Participants often reported friendships that had been sustained for many years. These were seen as particularly valuable.
Interest groups	These were groups such as U3A (University of the Third Age), craft clubs, writers' groups, quiz groups, etc. Many in these groups were not particularly close but it often depended on the size and nature of the group.
Volunteering groups	Some reported that they were actively engaged in volunteering (e.g. in charity shops or in hospitals).
Physical activity groups	For example, dancing groups and walking groups.
Neighbours	Most participants had at least one neighbour they were close to. They were sometimes important sources of support.
(Ex-)work colleagues	Even though the participants were all retired, many sustained close relationships with previous colleagues. Sometimes there were organised groups of previous colleagues who would arrange activities together.

Appendix 6

Framework to analyze FriTab UI quality (Hartmann et al., 2008).

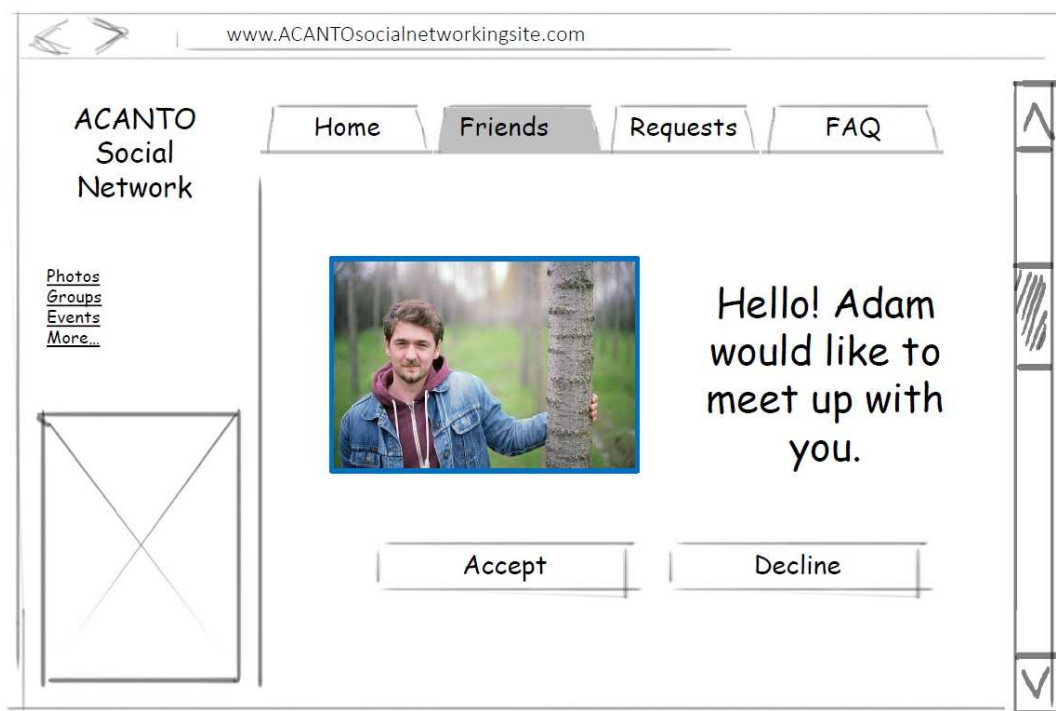
Category	Dimension	Description
CONCEPT	Metaphor	Describes a set of user interface visuals, actions and procedures that exploit specific knowledge that users already have of other domains. The purpose of the interface metaphor is to give the user instantaneous knowledge about how to interact with the user interface.
	Attraction	Represents the way users perceive the concept, and the engagement found in it.
INTERACTION	Usability	Can be described as the ease of use and learnability of a human-made object such as a tool or device. It includes: ease of learning, efficiency of use, memorability, low error frequency and subjective satisfaction.
	Aesthetics	Reflects the format in which the content and services are presented, as well as the design, look and feel, and overall experience with the system.
	Content	The set of services describing the functions of the interface and its utility. It should be appropriate and interesting.
	Customisability	The ability for the user to adapt the system to his or her needs, which can encourage users to take ownership over a system and has been found to influence perceived usability and aesthetics.

Appendix 7

In this appendix, we have included all the images used for section 7 (Maximising trust on the social network via user interfaces). The images were selected on the basis of differences in age (images being divided in young, middle-aged, and older categories) and gender (male and female categories). Differences in pose or other impressions conveyed by the images were not selected systematically but users sometimes commented on the difference between photos that appeared to be unstaged and those that appeared to be more formal, or staged. Such comments are discussed in Section 7. The names associated with each image are purely fictional.

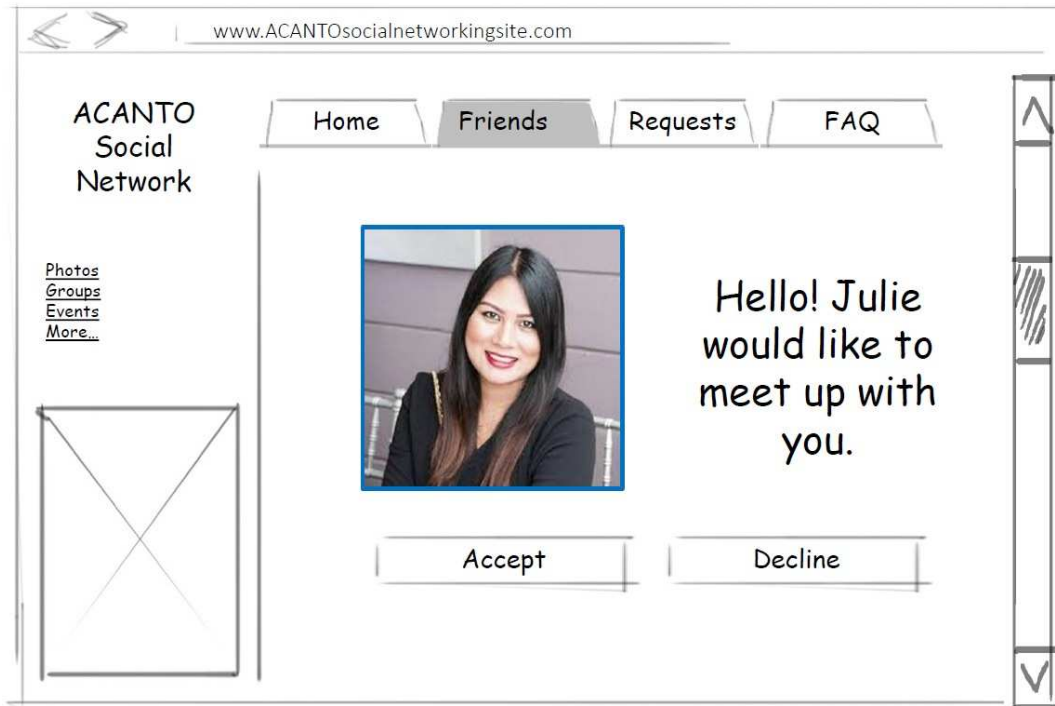
Adam: a young, male adult

Source: <https://pixabay.com/en/young-man-forest-young-person-1323605/> (CC0; Public domain)



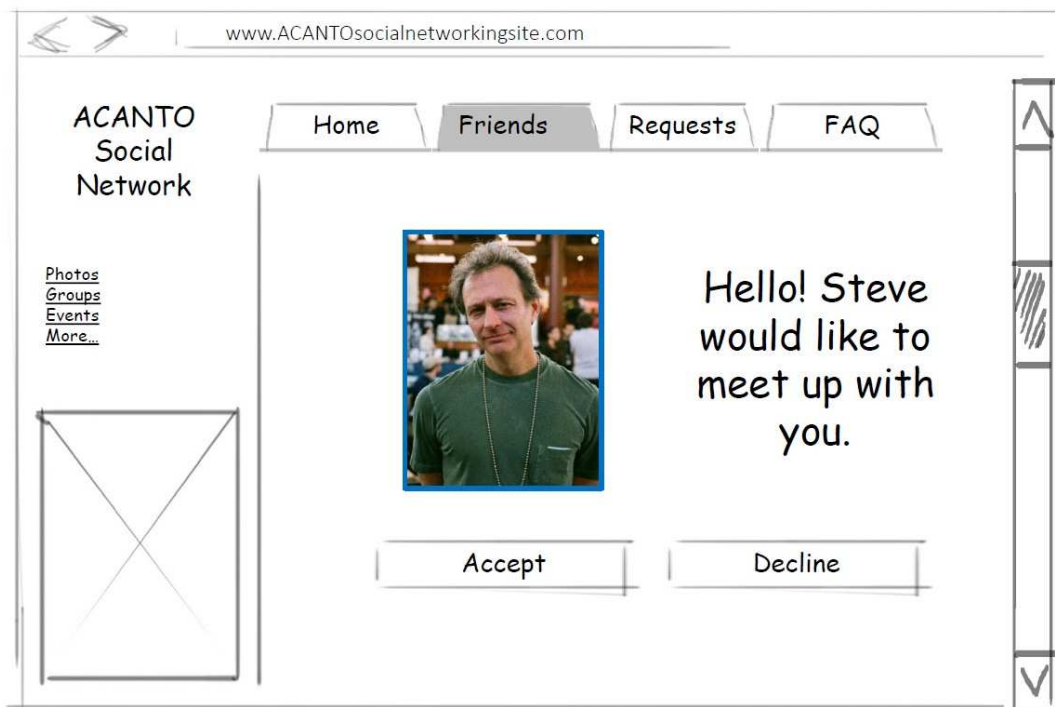
Julie: a young, female adult

Source: <https://pixabay.com/en/female-model-head-shot-fashion-1544783/> (CC0; Public domain)



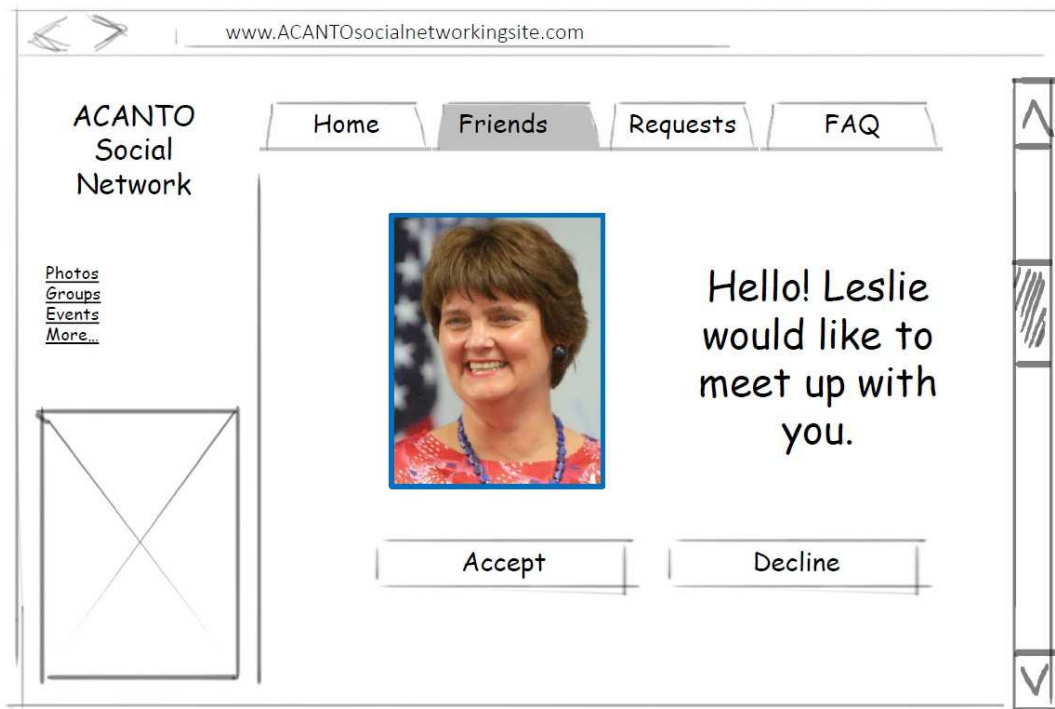
Steve: a middle-aged, male adult

Source: [https://en.wikipedia.org/wiki/Gary_Groth#/media/File:Gary_Groth_\(2007\).jpg](https://en.wikipedia.org/wiki/Gary_Groth#/media/File:Gary_Groth_(2007).jpg)
Image (<https://www.flickr.com/photos/mr-kiss-kiss-bang-bang/479493578/>) by Chris Anthony Diaz (<https://www.flickr.com/photos/mr-kiss-kiss-bang-bang/>) is licensed under CC BY 2.0 (<https://creativecommons.org/licenses/by/2.0/>).



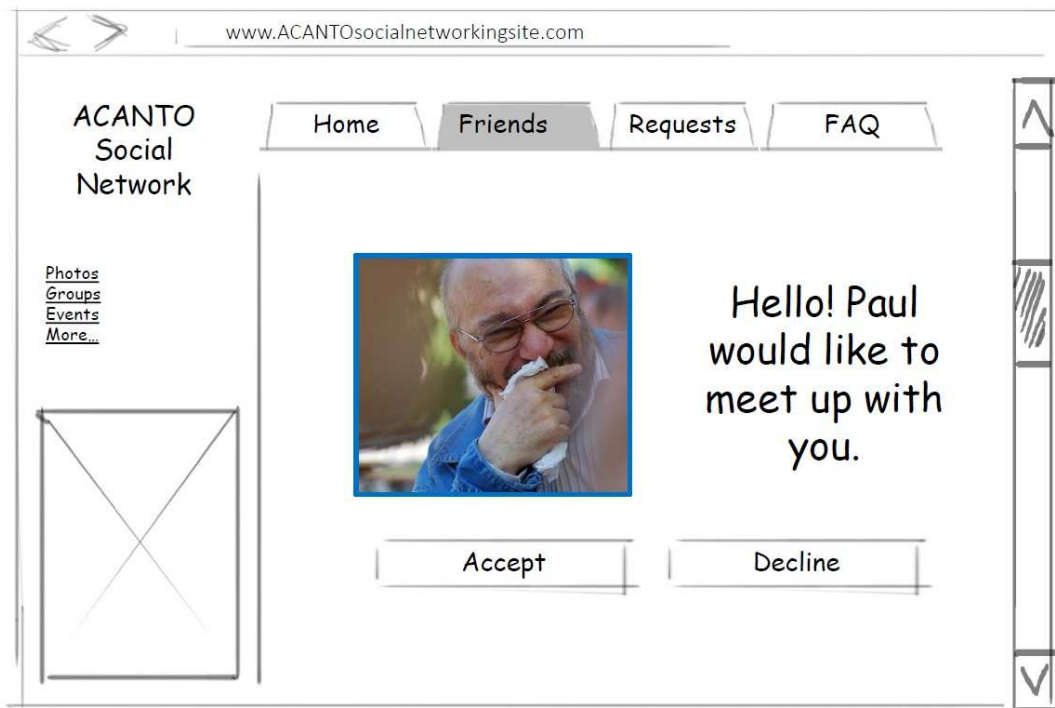
Leslie: A middle-aged, female adult

Source: Image (<https://www.flickr.com/photos/gageskidmore/28921395253>) by Gage Skidmore (<https://www.flickr.com/photos/gageskidmore/>) is licensed under CC BY-SA 2.0 (<https://creativecommons.org/licenses/by-sa/2.0/>).



Paul: an older, male adult

Source: https://commons.wikimedia.org/wiki/File:Old_man_laughing.jpg (Public domain)



Rose: an older, female adult

Source: <https://pixabay.com/en/lady-cheers-drink-wedding-650400/> (CC0; Public domain)

