INFO 5100: Application Engineering and Development

How to engineer the human into the application?

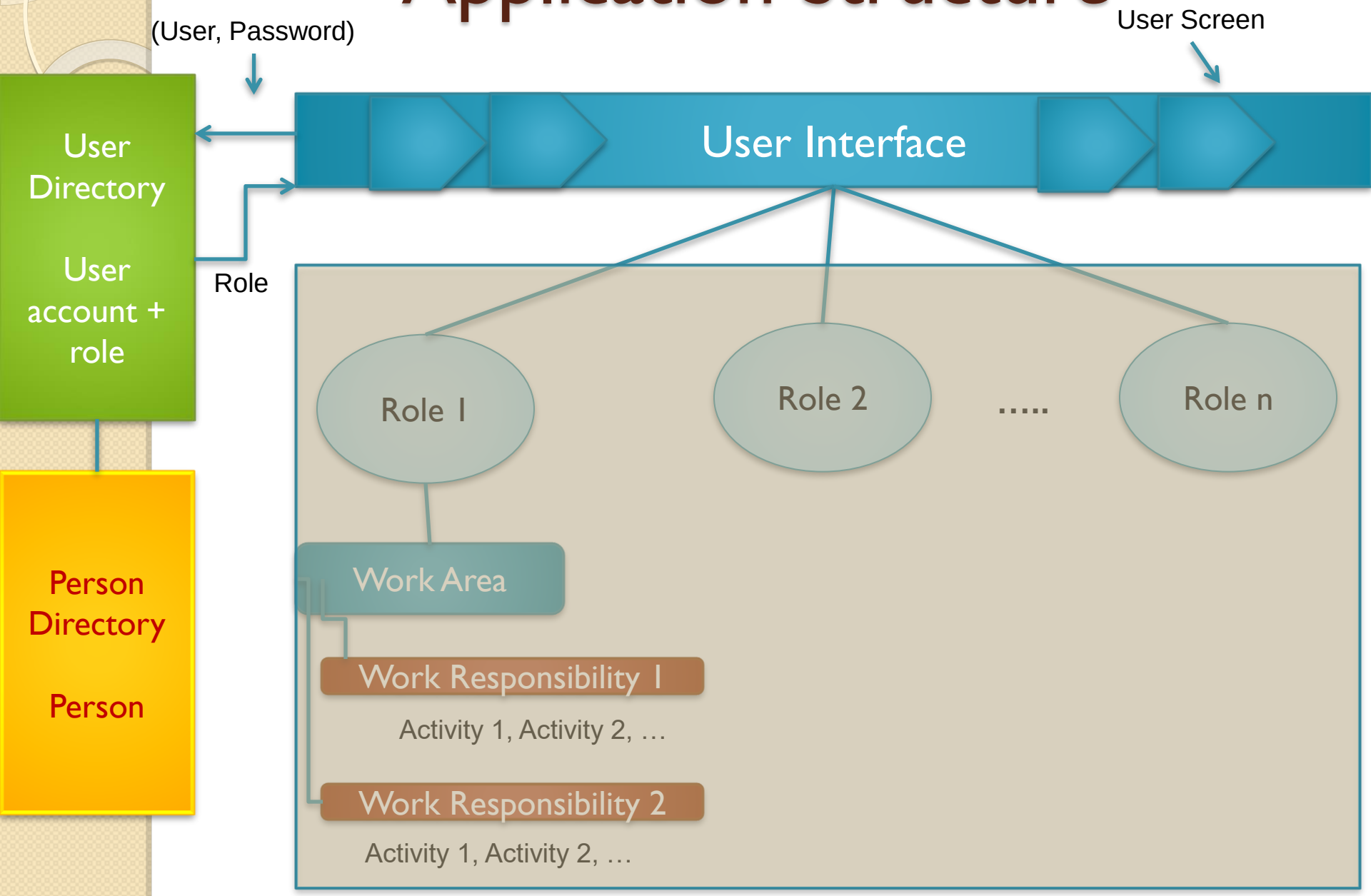
The problem

- Applications are designed for users. The applications must identify the users
- We need to know who did what, when, how, etc ..
- How to prove that you are who you say you are.

Who are the players?

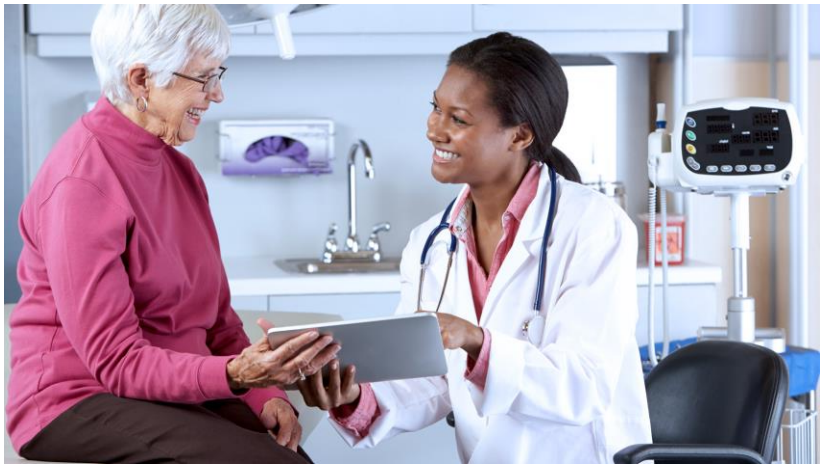
Users are people

Application Structure

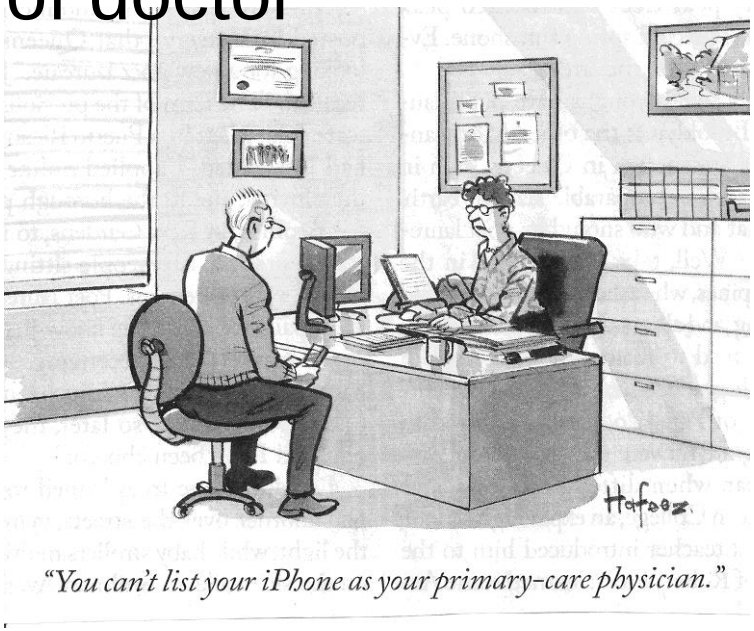


Persons as subjects of user actions

The doctor as a user uses an app to access patient record – we say patient (person) is subject of doctor action



patient



Doctor as user

The Business Model

First name,
Last name,
Social security number
DOB
Address,
Userid
Password
Account type
Status (active, disabled)
Creation Date
Organization (affiliation)
Etc

Example: Multiple user accounts means duplication of information

Joe,
Smith,
290-29-2974
2/2/1986
36 Huntingtion Ave,
JoeB
xxxxxx
Student
Status (active, disabled)
Creation Date
School of Business
Etc

Joe,
Smith,
290-29-2974
2/2/1996
100 Main Street,
JoeCoe
xxxxxxs
Student
Status (active, disabled)
Creation Date
College of Engineering
Etc

Joe,
Smithy,
200-29-2974
2/2/1886
360 Huntingtion Ave,
JoeNeu
xxxxxx
Student
Status (active, disabled)
Creation Date
Northeastern University
Etc

What if we split the info into:

First name,
Last name,
Social security number
DOB
Address

Userid
Password
Account type
Status (active, disabled)
Creation Date
Organization (affiliation)
Etc

What if we split the info into:

First name,
Last name,
Social security number
DOB
Address

Personal information

Userid
Password
Account type
Status (active, disabled)
Creation Date
Organization (affiliation)
Etc

Affiliation specific

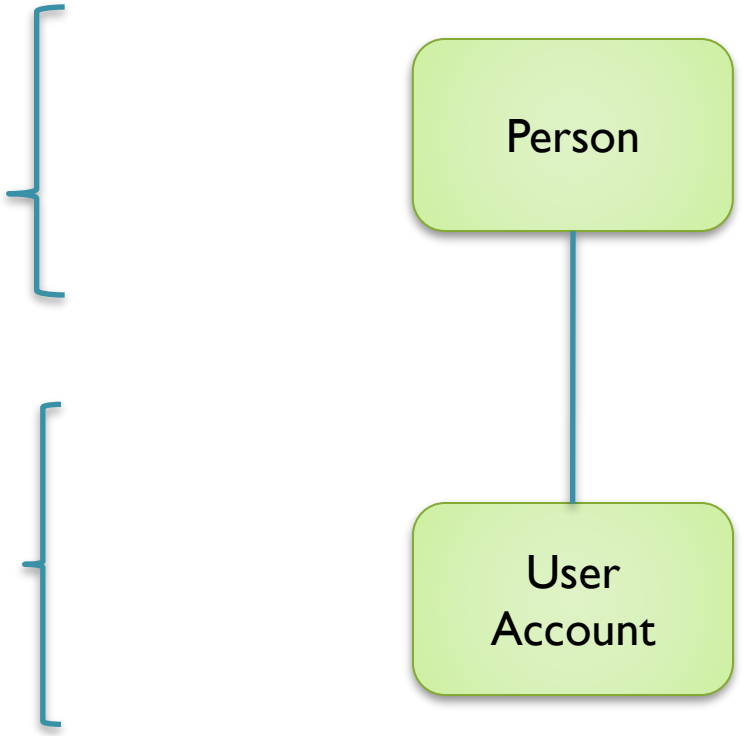
For example if you are a double major and have two accounts with two different colleges

Person has an account with organization (user account)

What if we split the info into:

First name,
Last name,
Social security number
DOB
Address

Userid
Password
Account type
Organization (affiliation)
Etc



Compare this to previous example

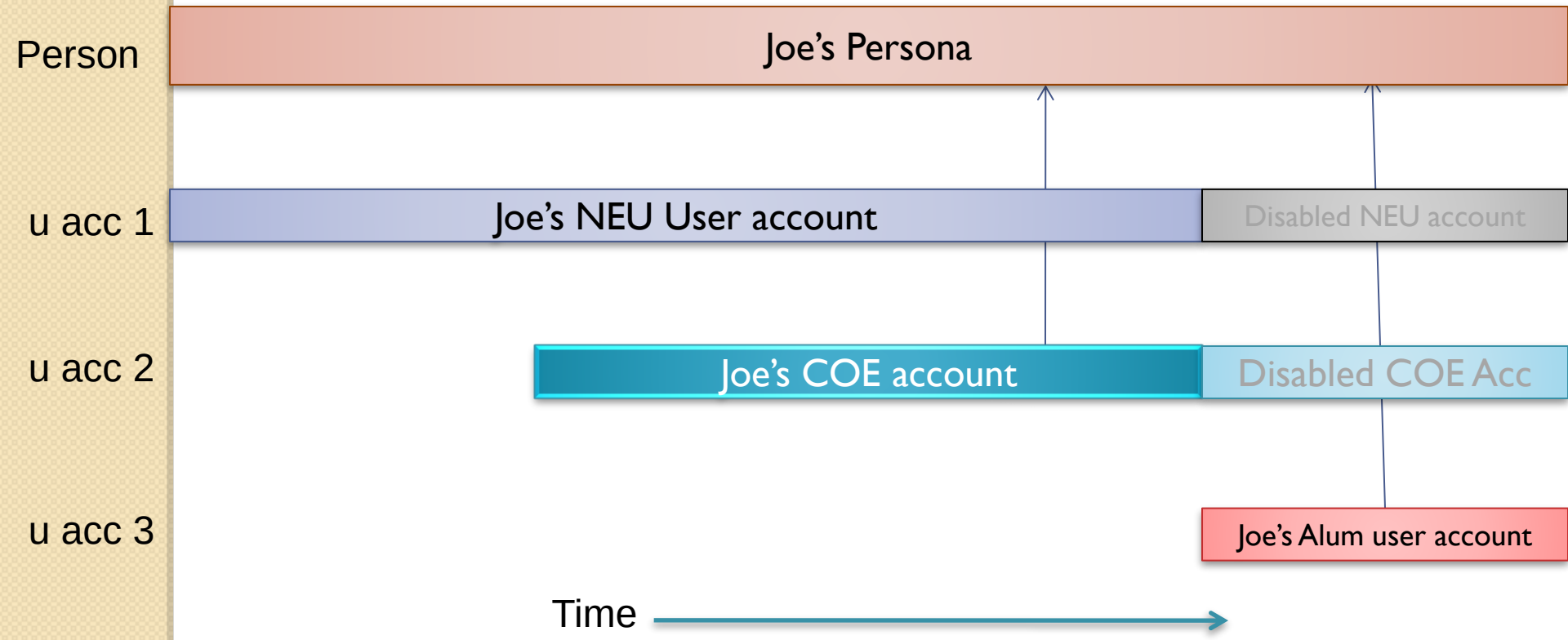
Joe,
Smithy,
200-29-2974
2/2/1886
360 Huntingtion Ave,

JoeB
xxxxxx
Student
School of Business
Etc

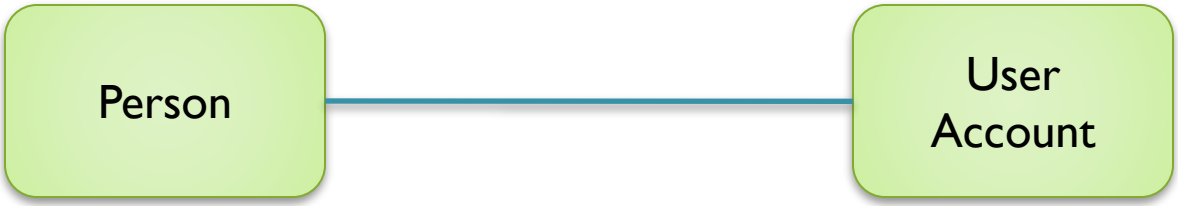
JoeCoe
xxxxxxs
Student
College of Engineering
Etc

JoeNeu
xxxxxx
Student
Northeastern University
Etc

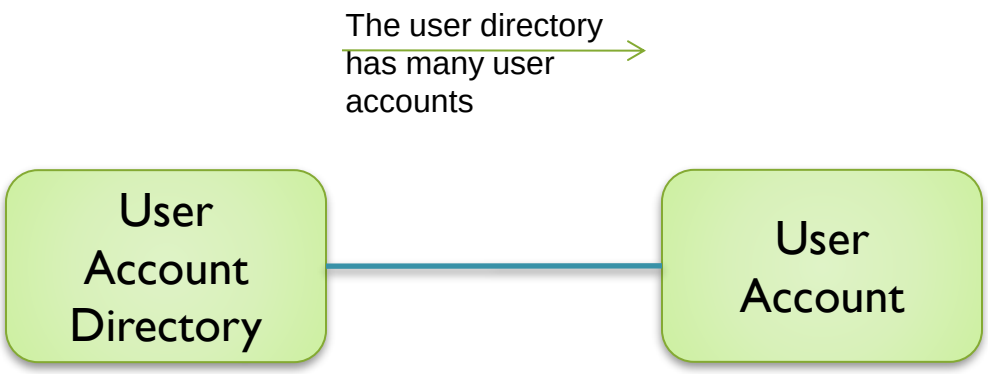
One person multiple user accounts over time: All link to Joe the person



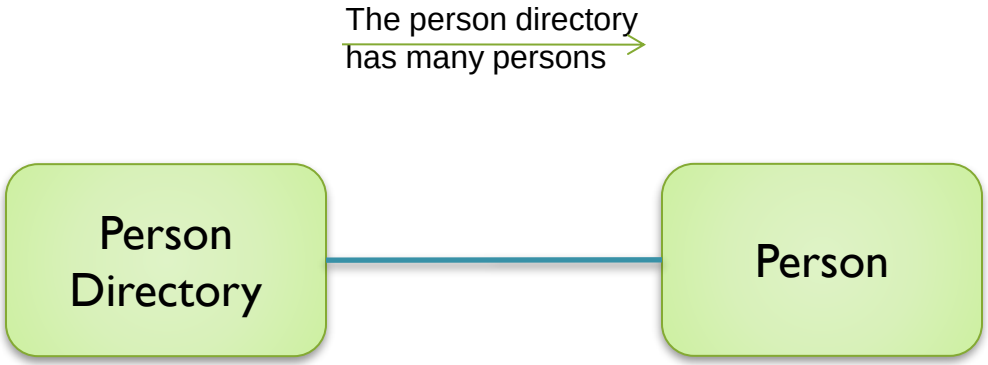
What if we split the info into:



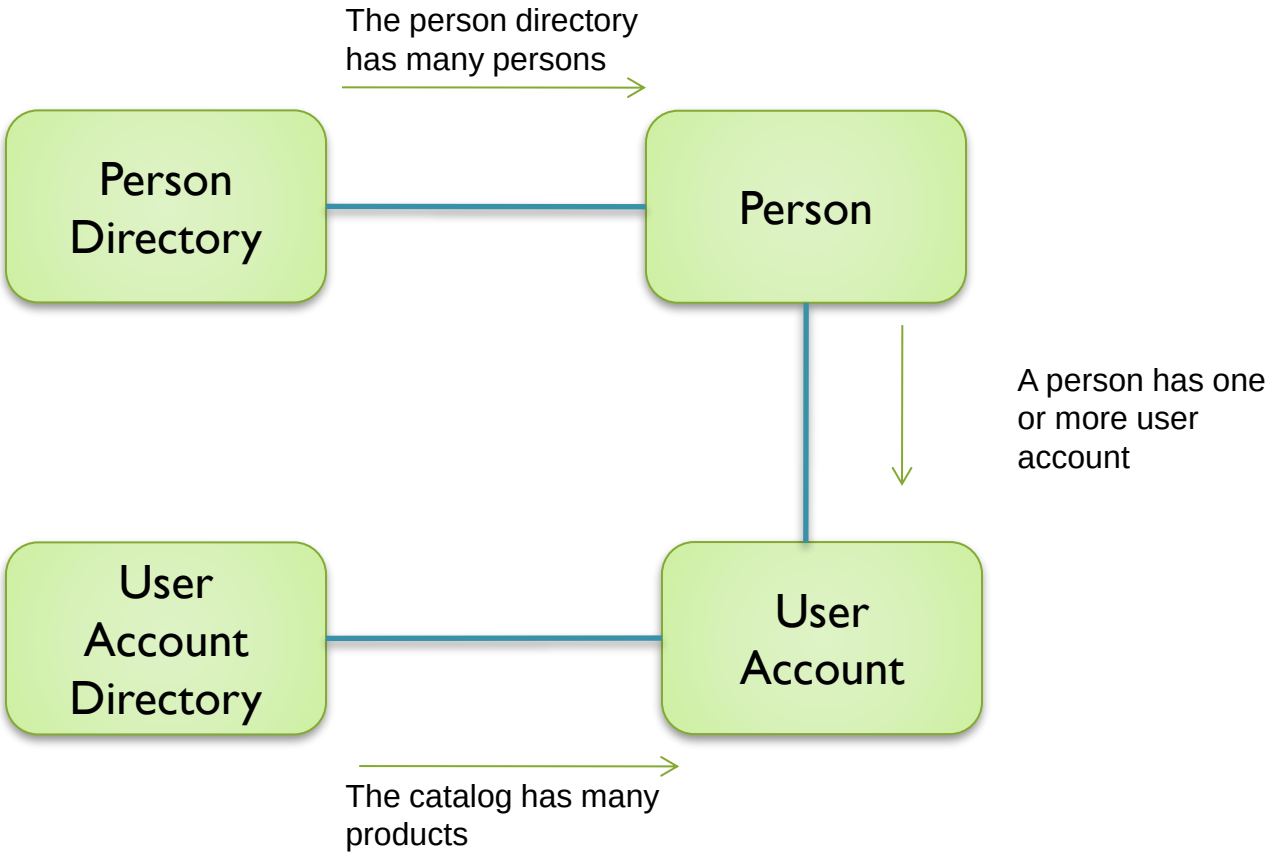
Group user accounts to a directory



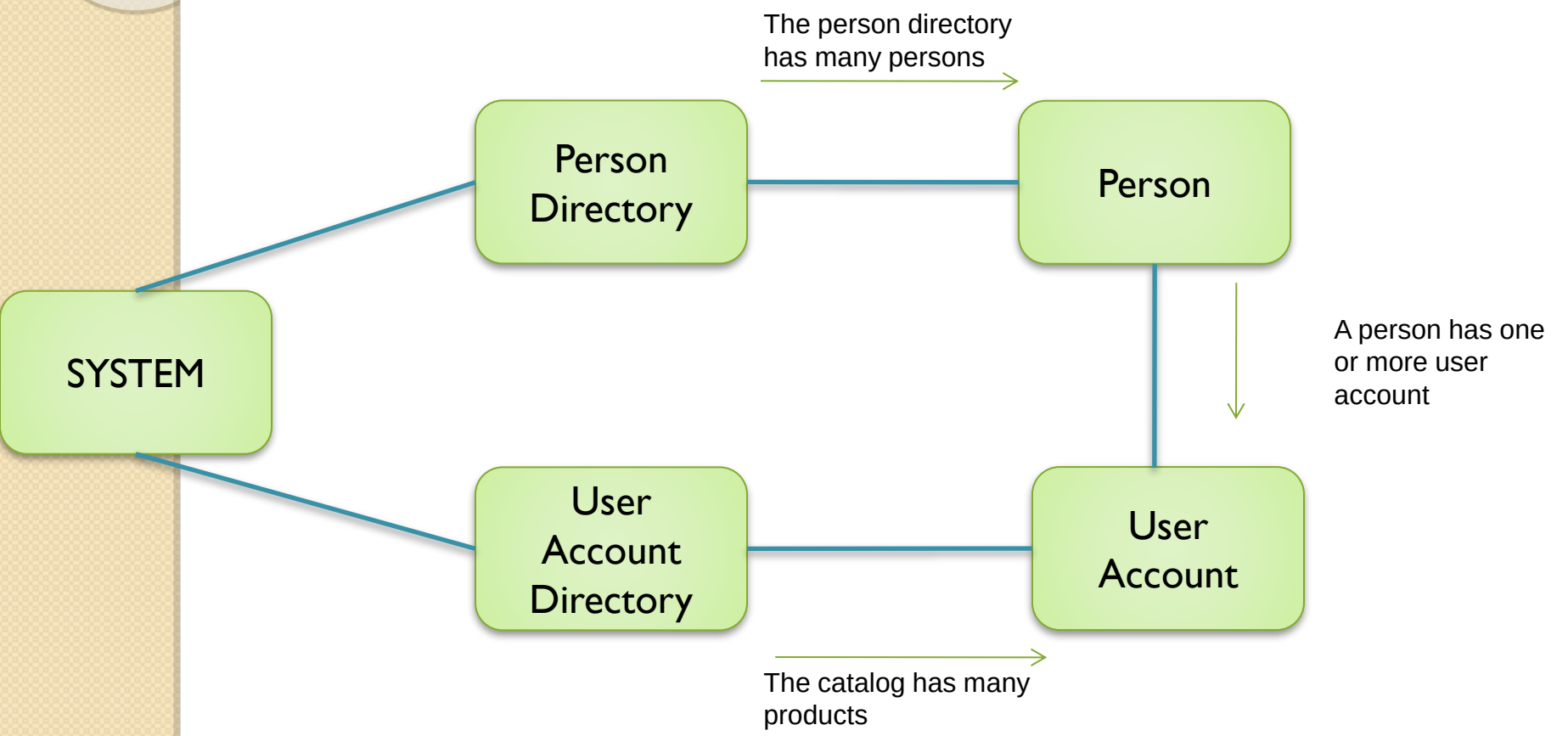
Group user accounts to a directory



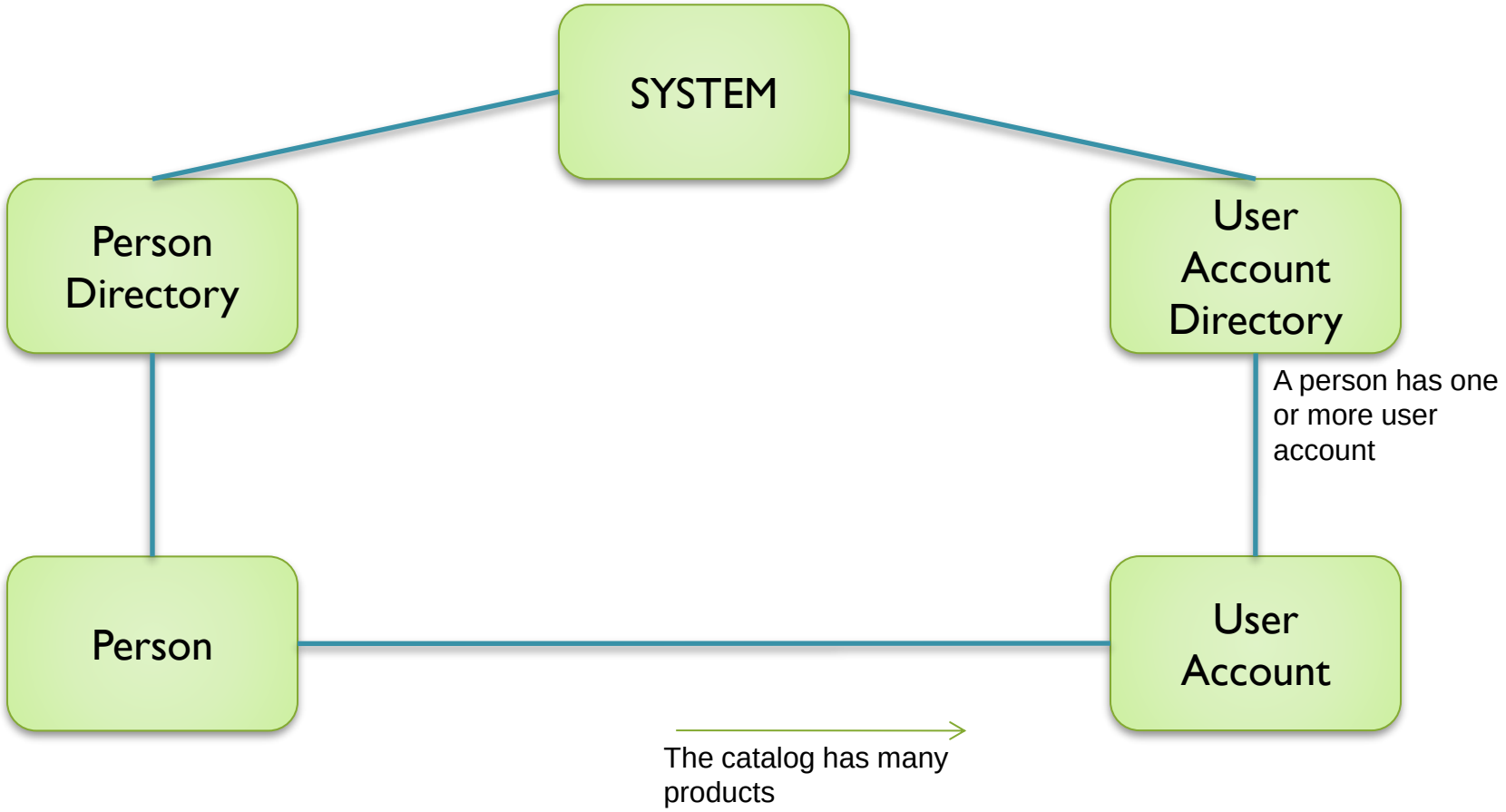
Combine the two:



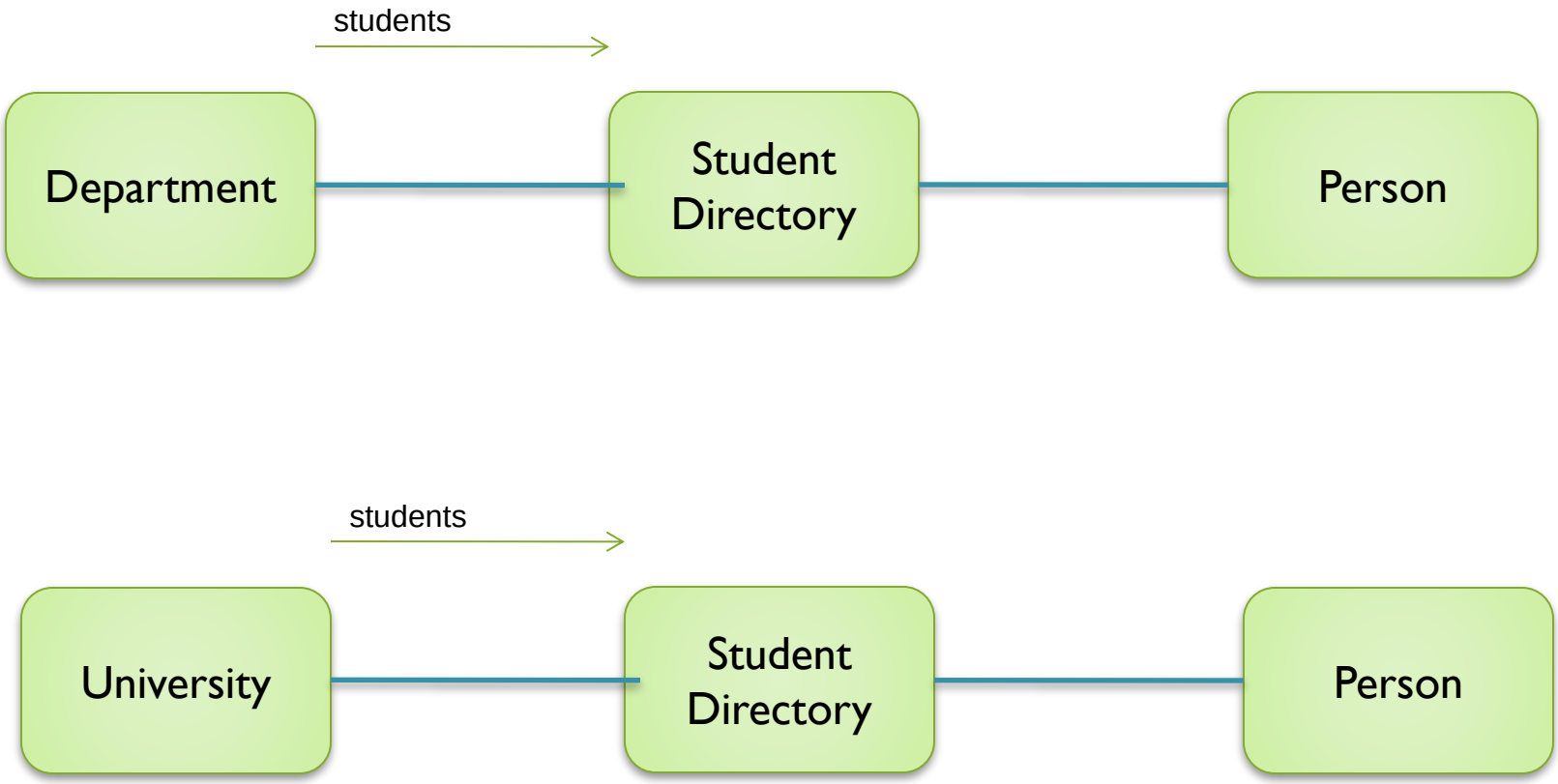
System concept is the organizational Structure that unifies these personnel and their accounts



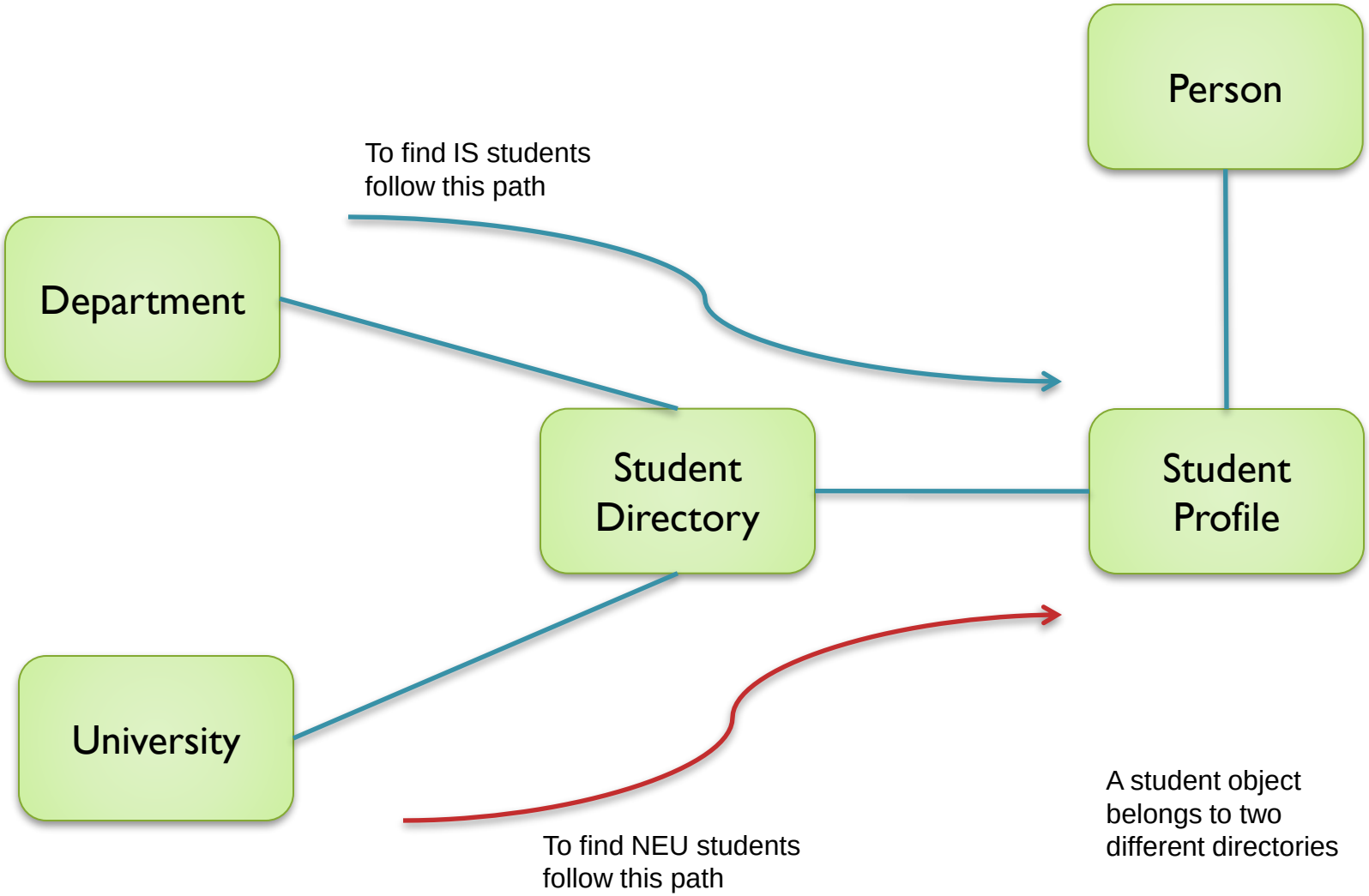
Combine the two:



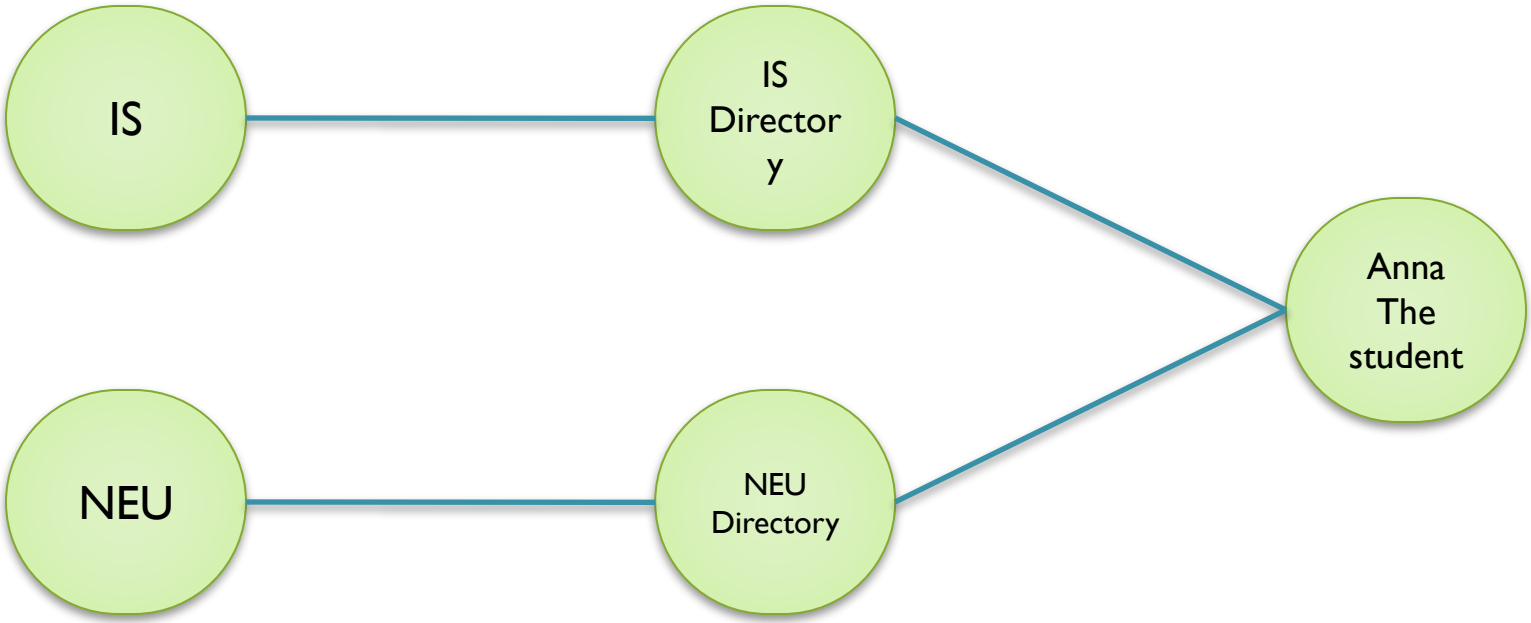
Other patterns

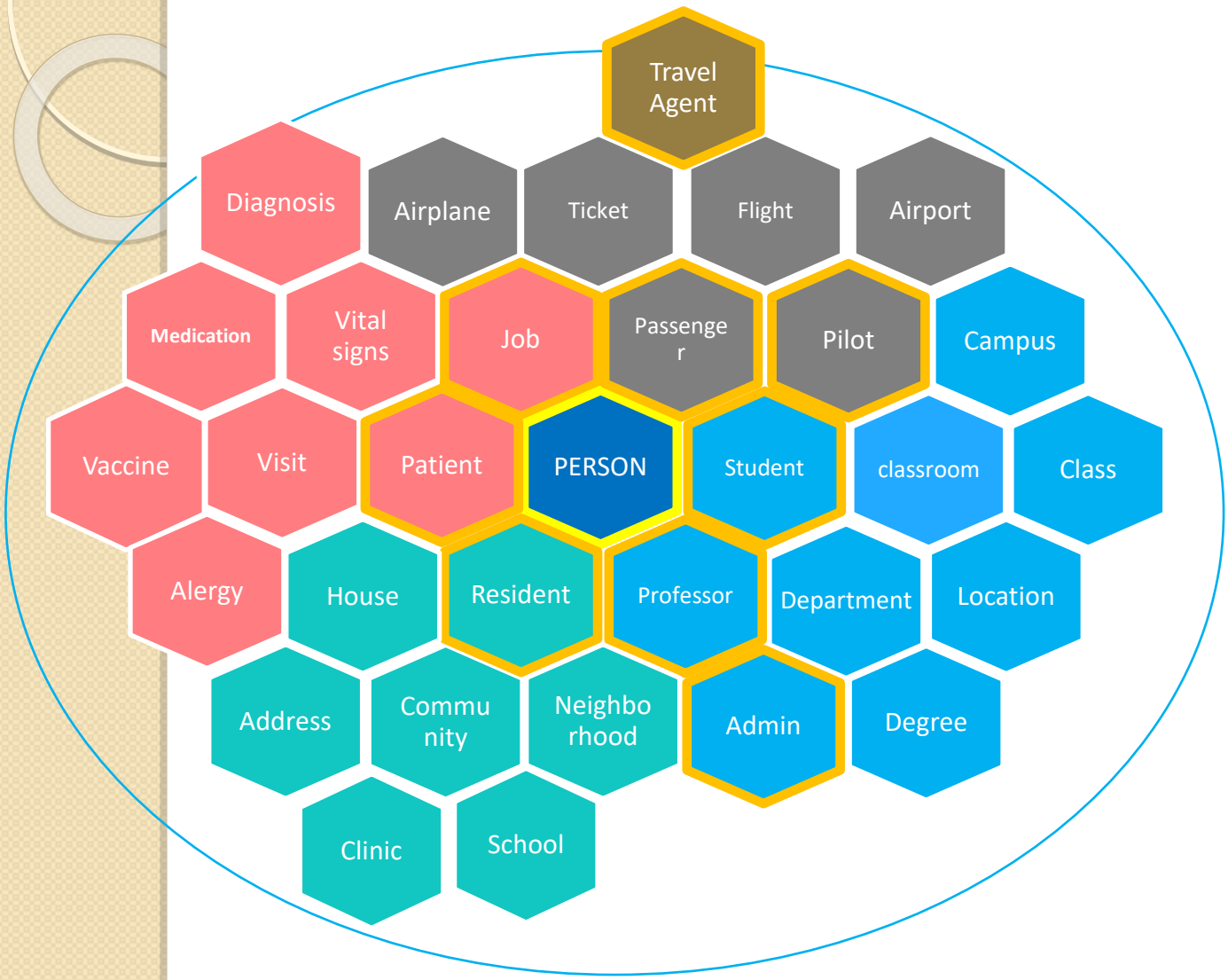


The same group of students but classified differently



Model Instances Example

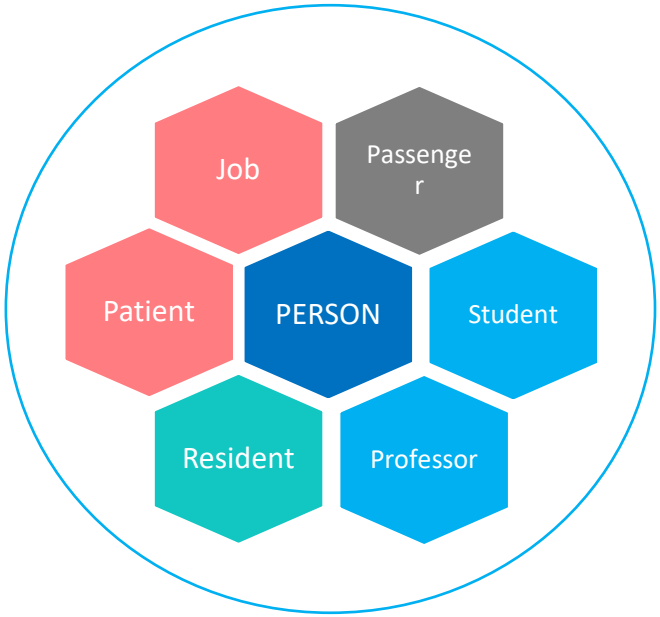




Domains and their Component

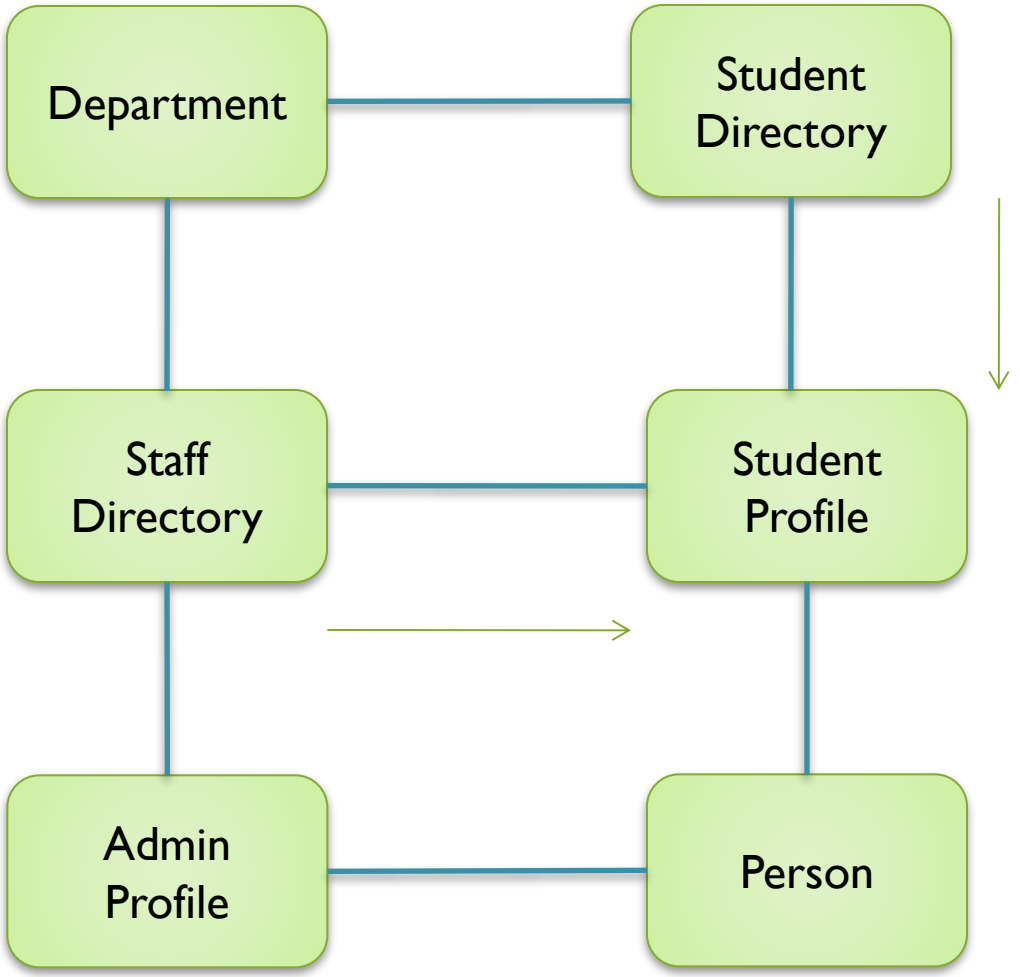
Careful attention must be given how we integrate the human element into the domain model.

Person Component across different industie

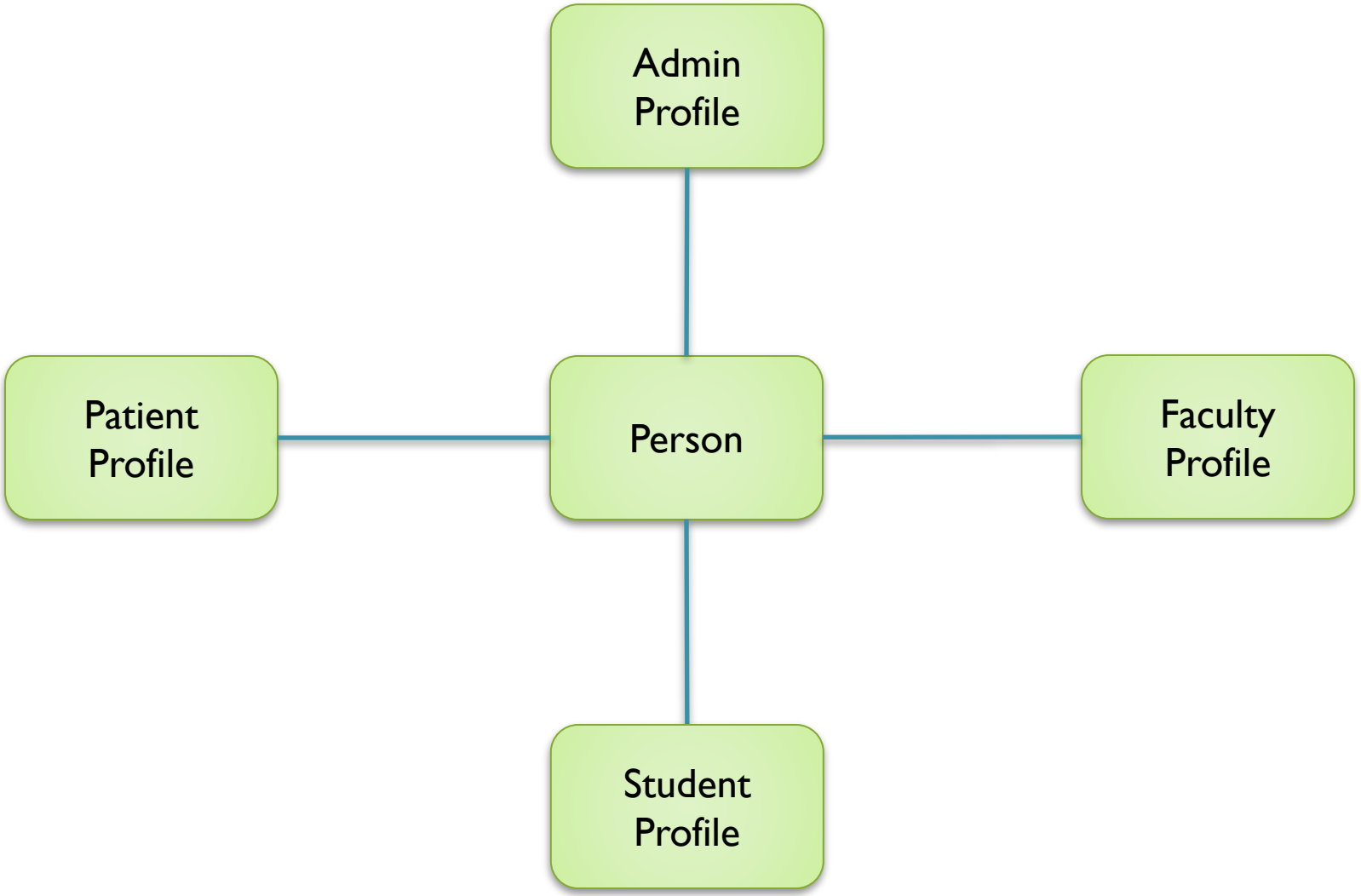


We must distinguish the person component from the various role components they play as users and subject of other users' actions. The various roles have different time scales from that of the person.

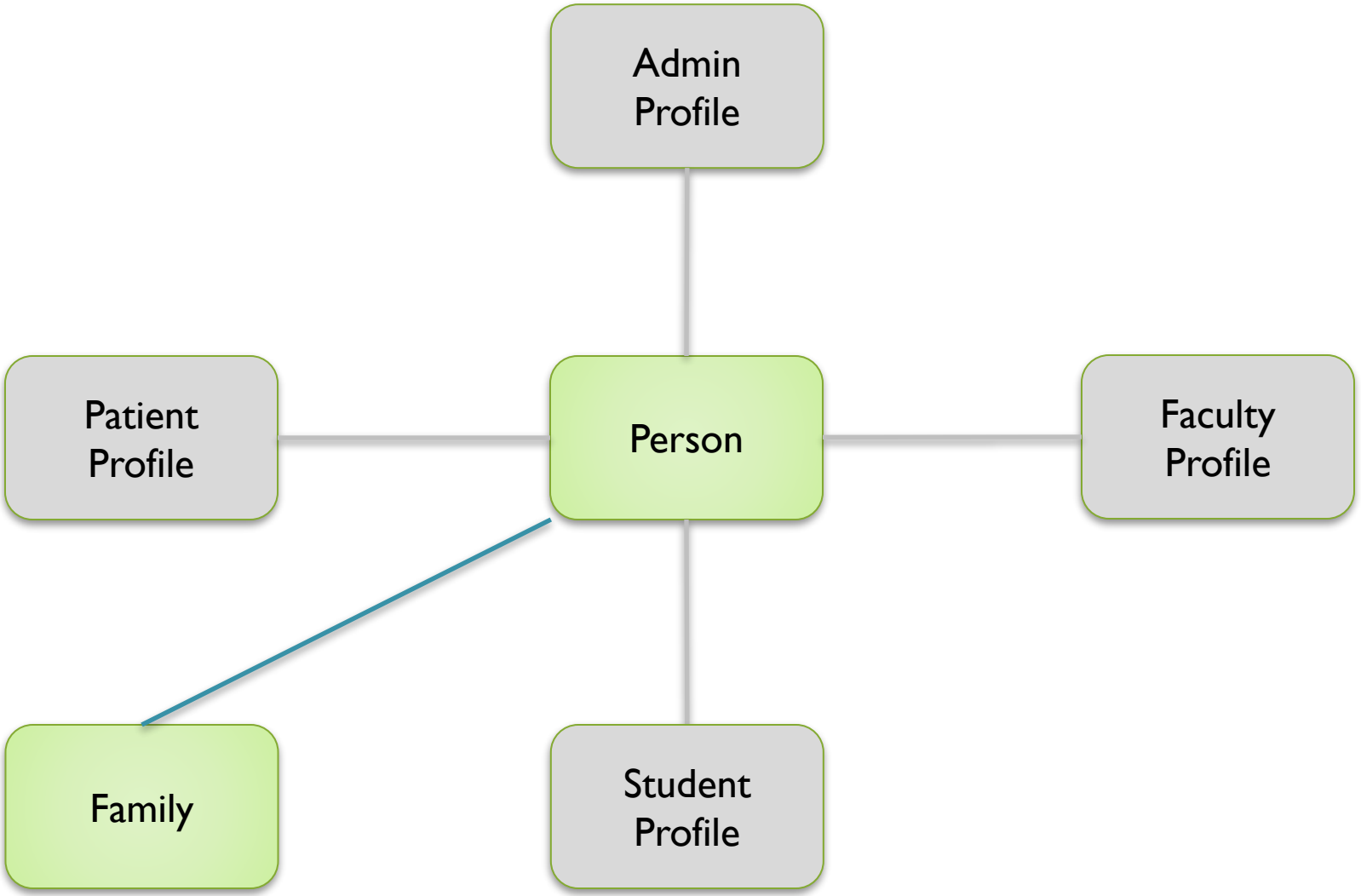
Directory is a way to group persons into categories or roles



Modularity Principle: decoupling responsibilities



Modularity Principle: Family is part of the person



Digital Smart City Ideas

- Suppose we want to understand the quality of life in a community or neighborhood so a city figure out how to budget their resources properly.
- Should we put money in more hospitals or more educational programs for example?
- What is quality here?

For any family in the community what is impacting what?

Is financial impacting health?

Is legal issues for kids impacting health?

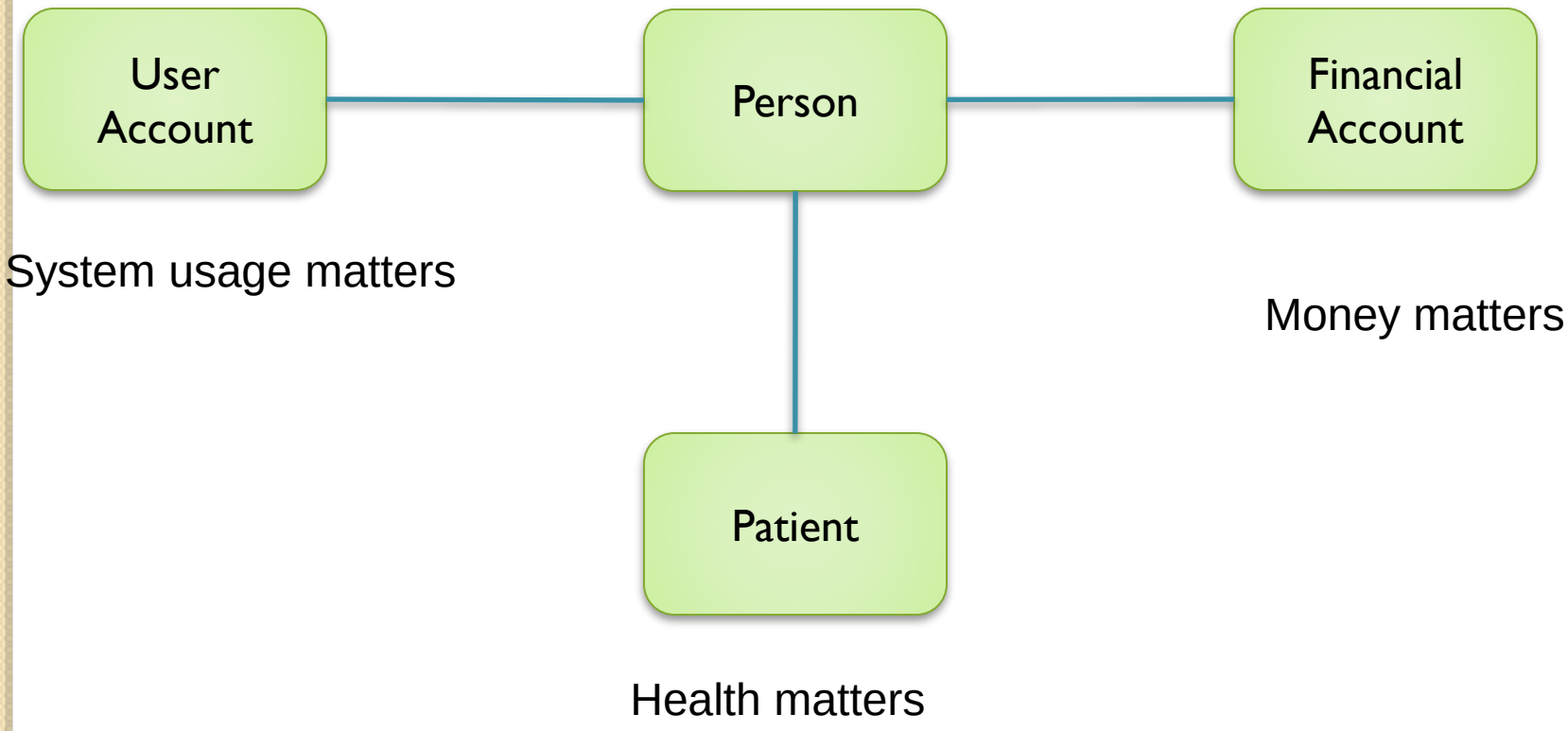
Is education having a positive impact on health? Financial?

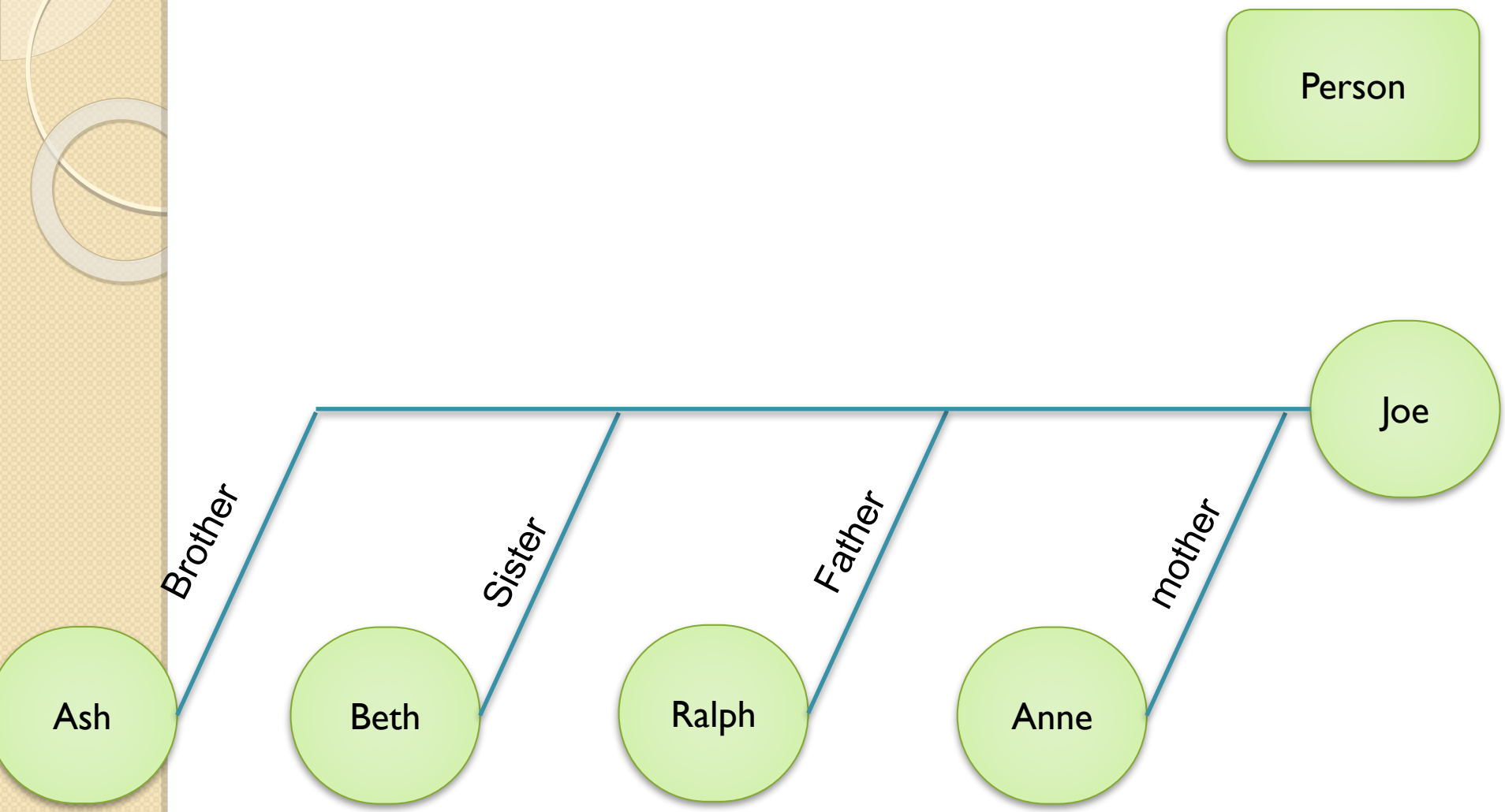
What is the impact of environmental conditions on quality of life?

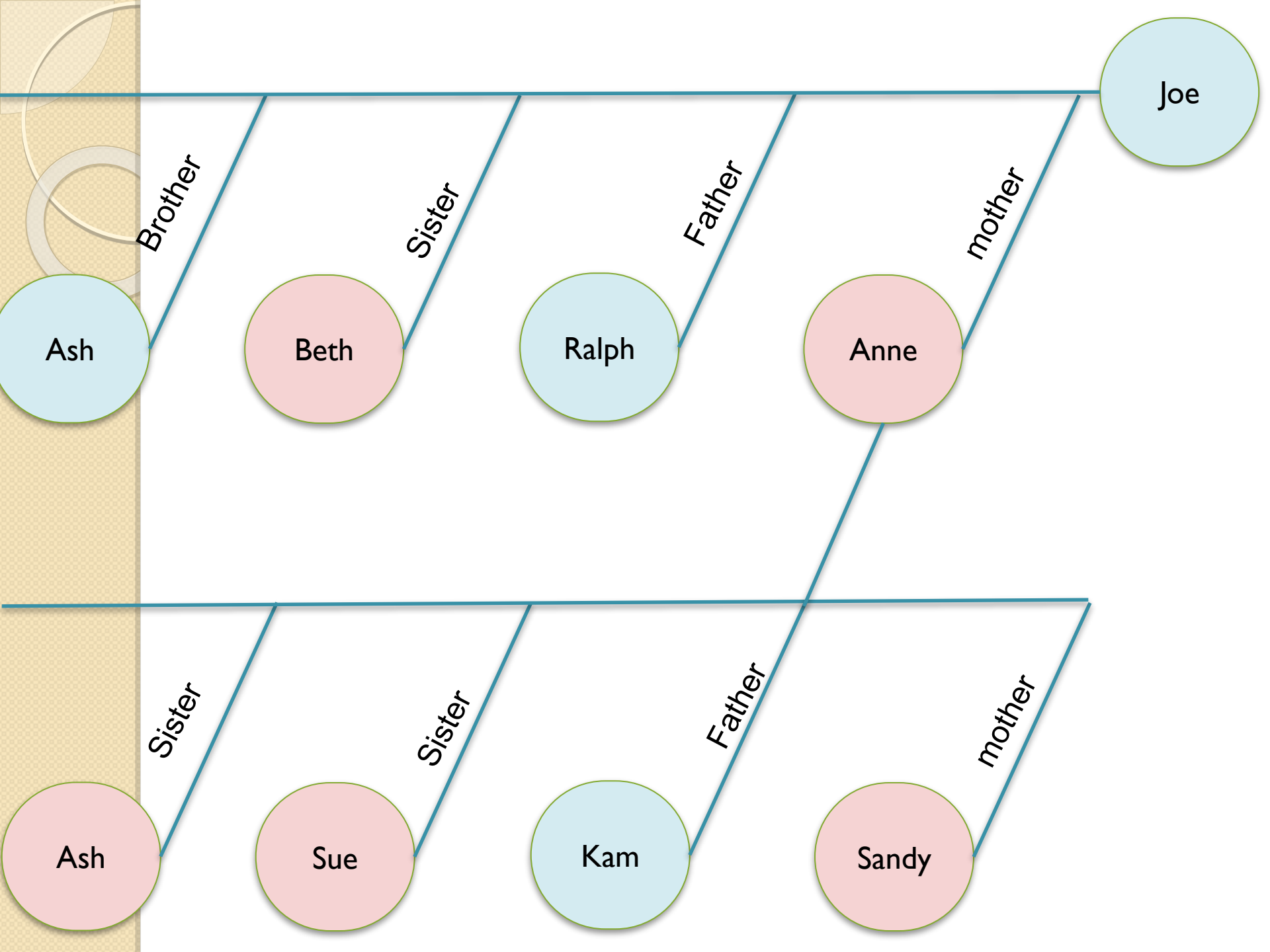
What is the impact of one family one family

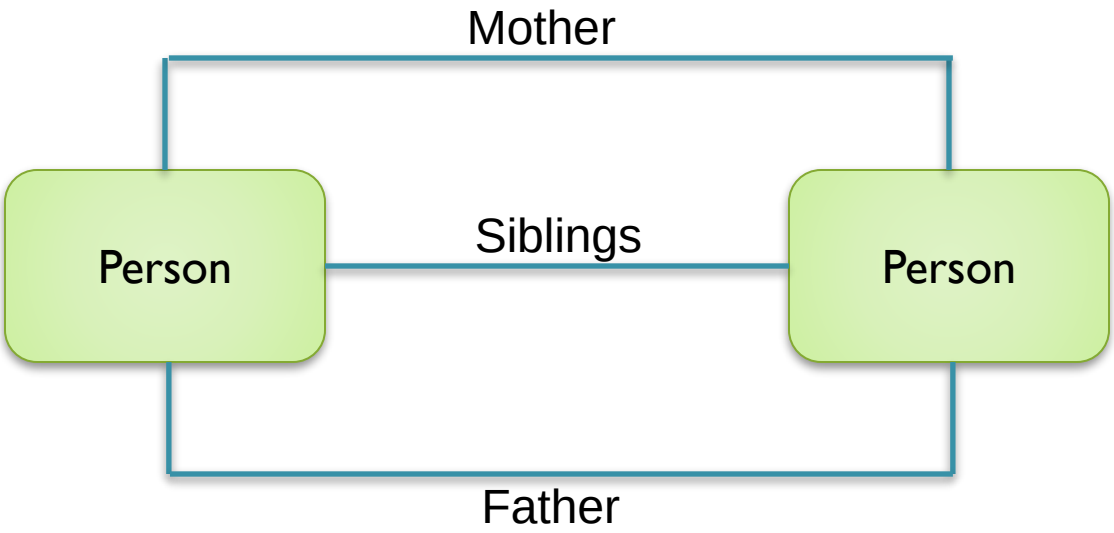
Member on another?

Decouple information (modularity)

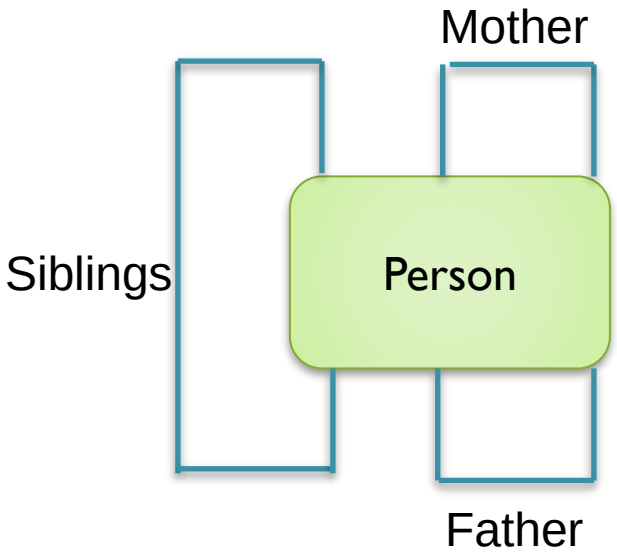



Person
Joe
Brother
Sister
Father
mother
Ash
Beth
Ralph
Anne

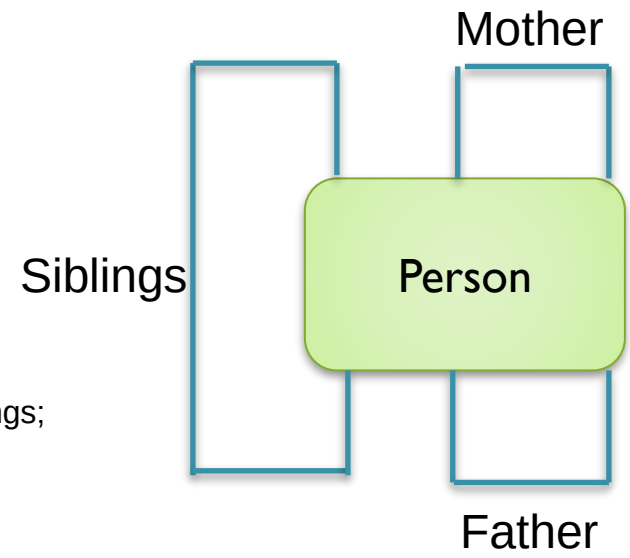

Joe
Brother
Sister
Father
mother
Ash
Beth
Ralph
Anne
Sister
Sister
Father
mother
Ash
Sue
Kam
Sandy


Mother
Person
Siblings
Person
Father

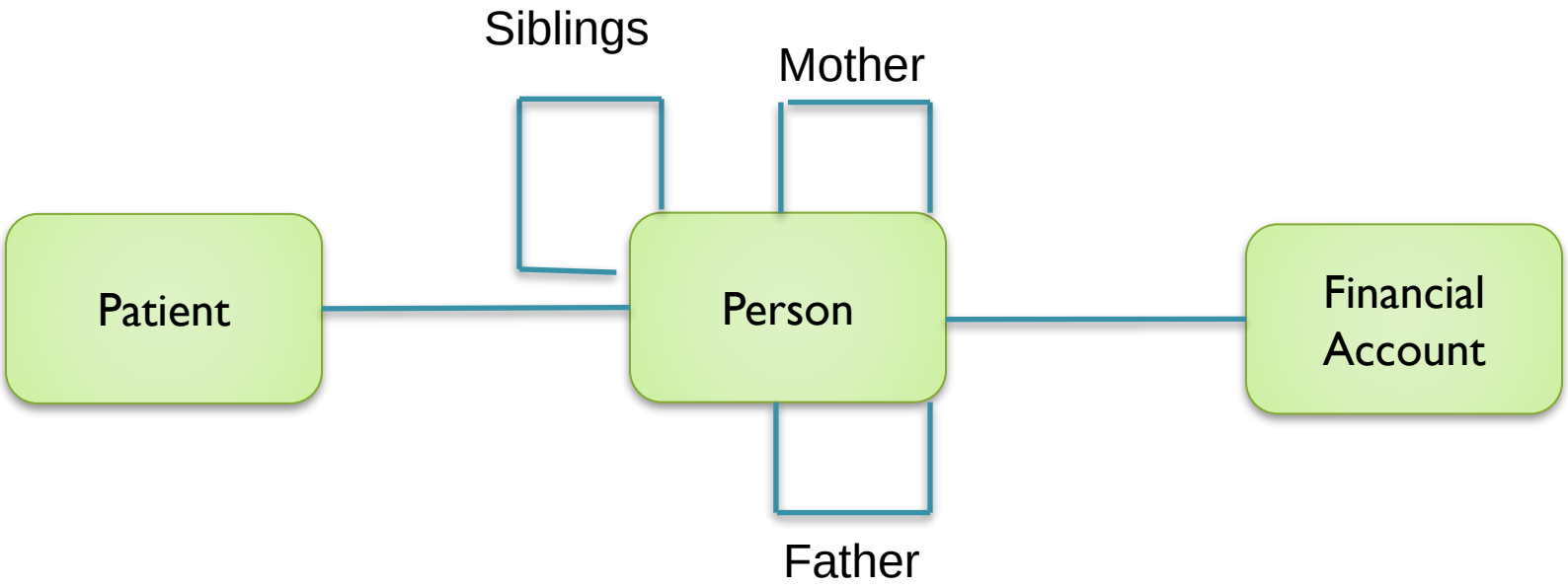
Recurisve Representation



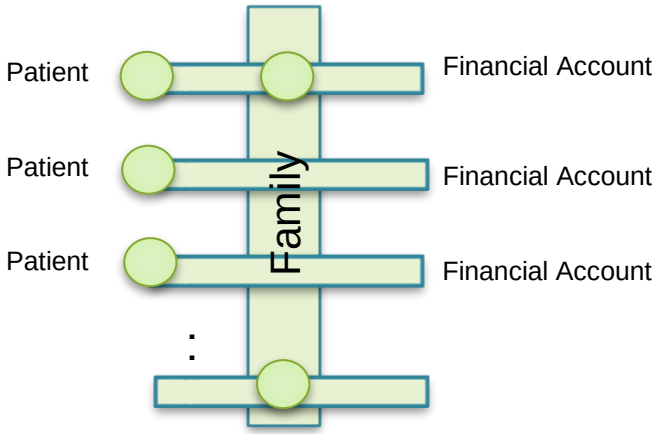
Recurisve Representation



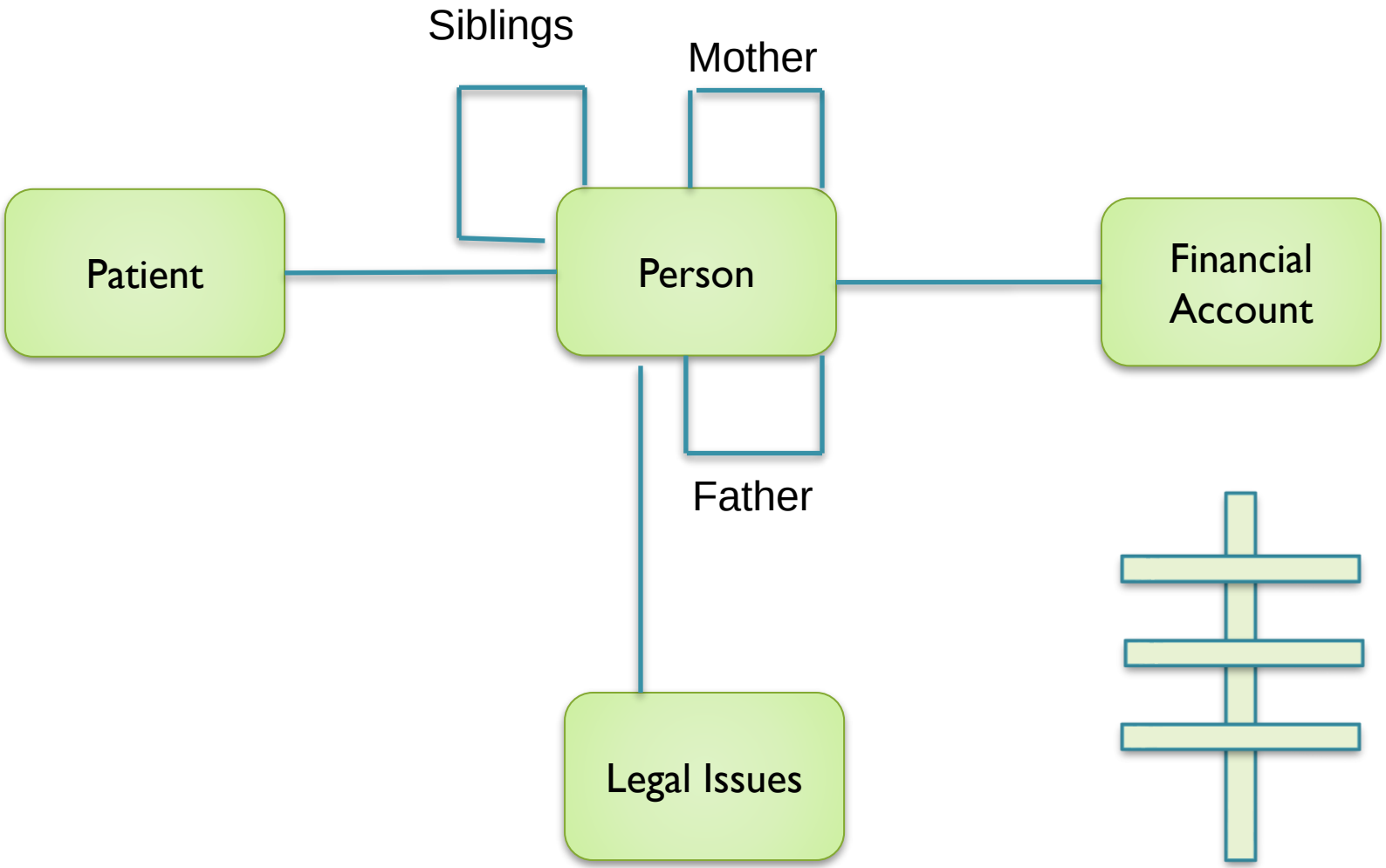

```
Class Person {

Arraylist <Person> siblings;
Person mother ;
Person father;


:
Public void addSibling (Person p){}
Public void setFather (Person p}{}
Public void setMother(Person p){}
}
```



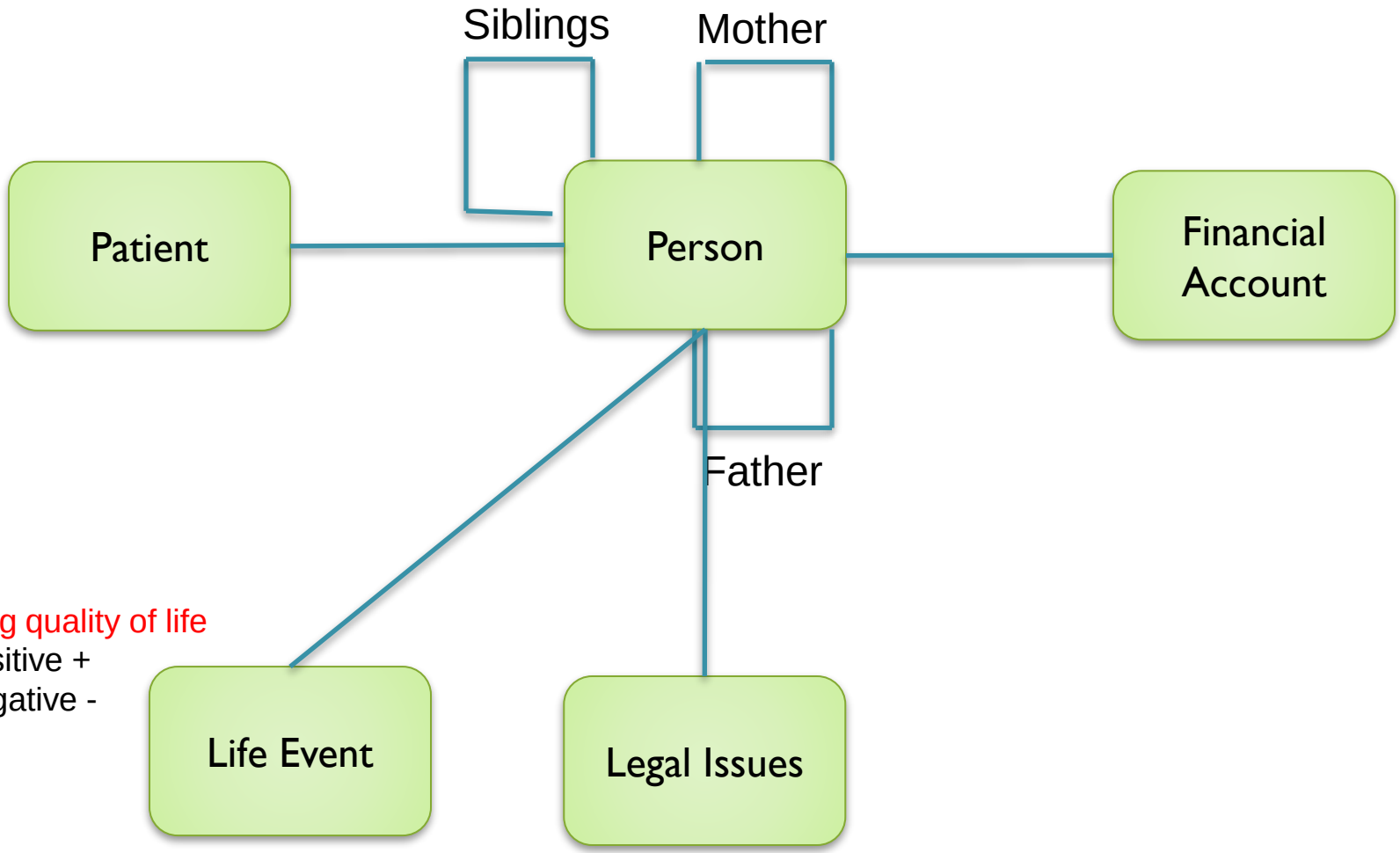

```
Class Person {

Arraylist <Person> siblings;
Person mother ;
Person father;

FinancialAccount fn;
Patient patient;

:

}
```



A way to establish connection between financial, legal, and health in poor communities – all as they relate to family problems



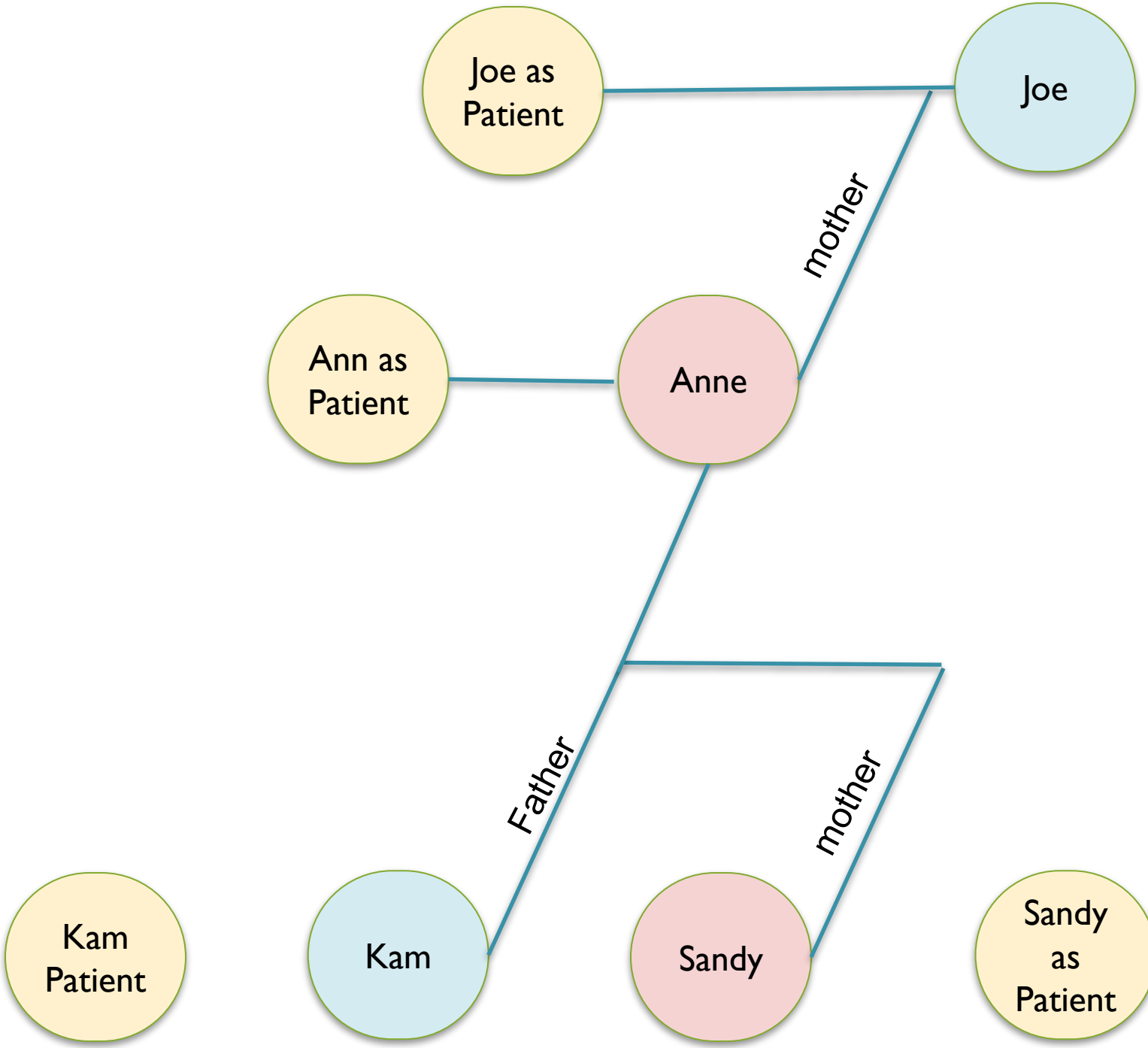
A way to establish connection between financial, legal, and health in poor communities – all as they relate to family problems



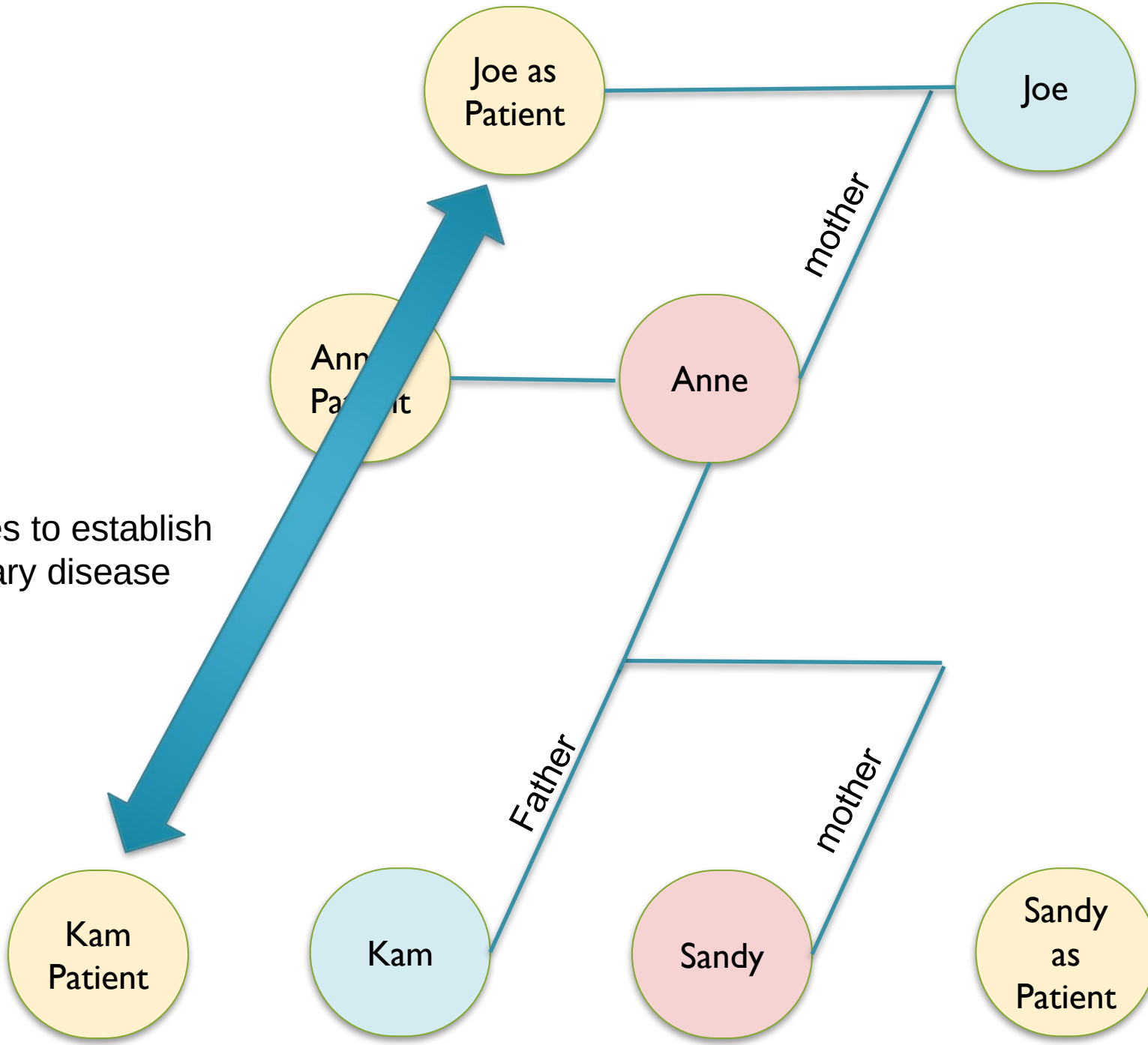
Measuring quality of life

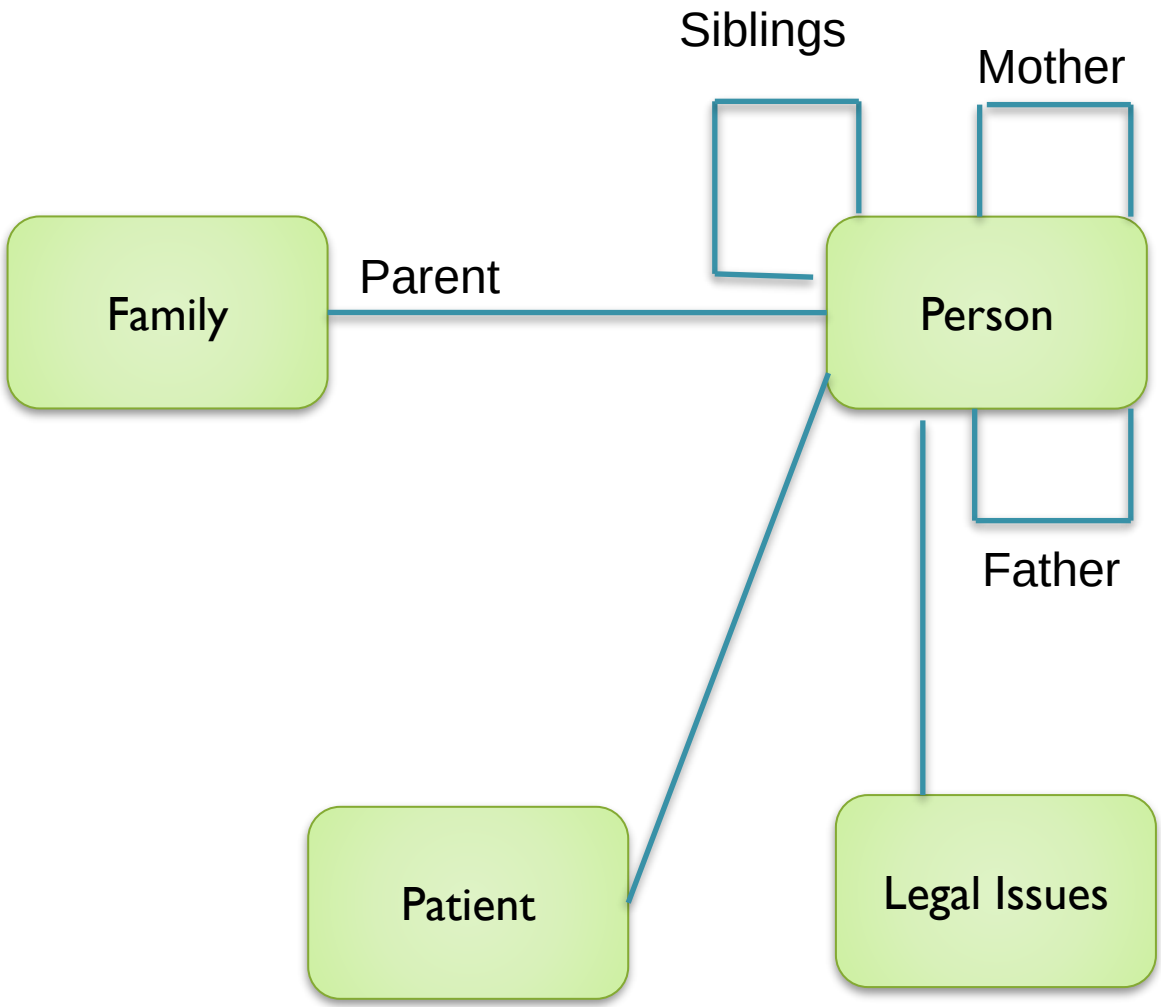
Positive +

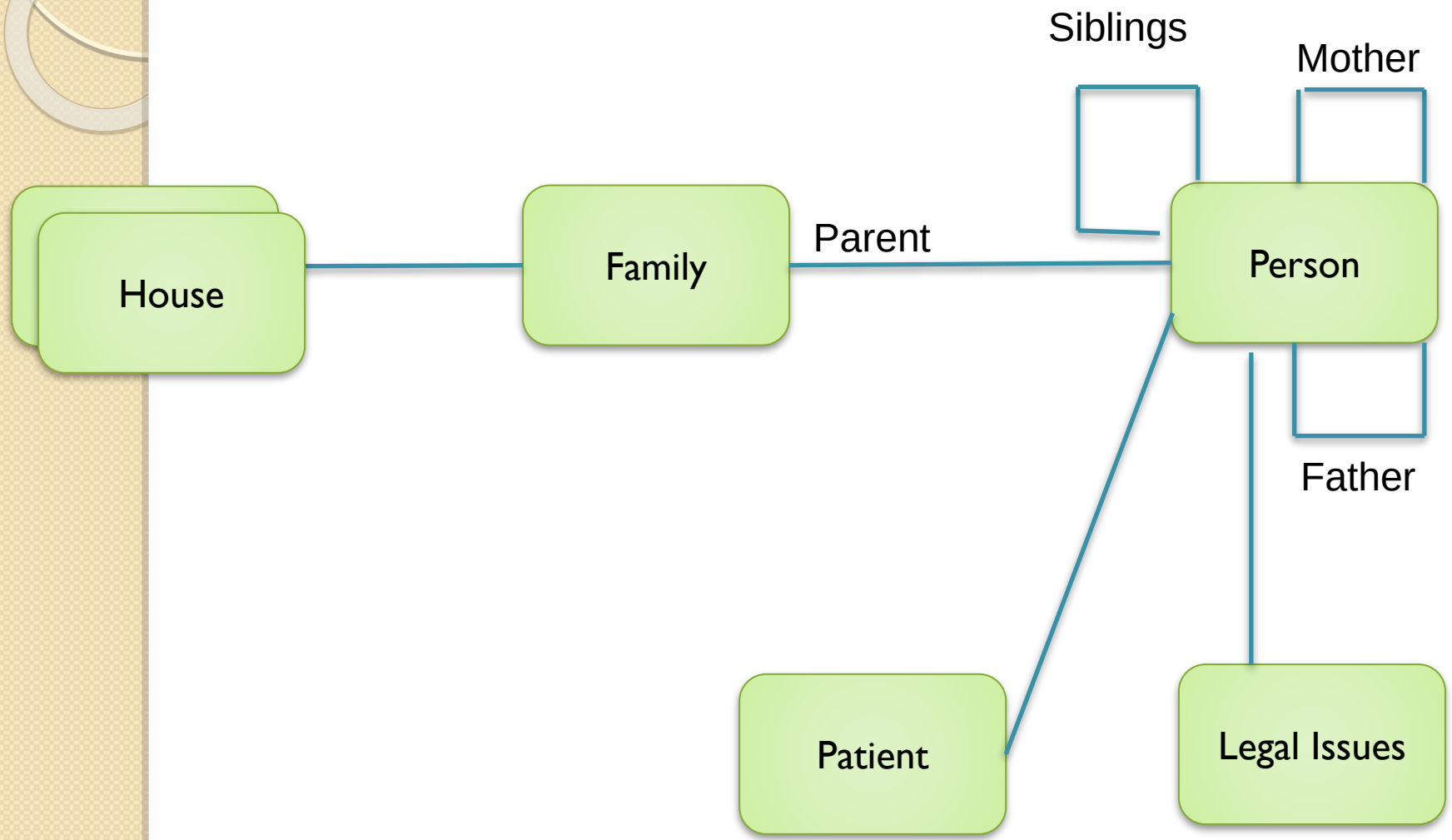
Negative -

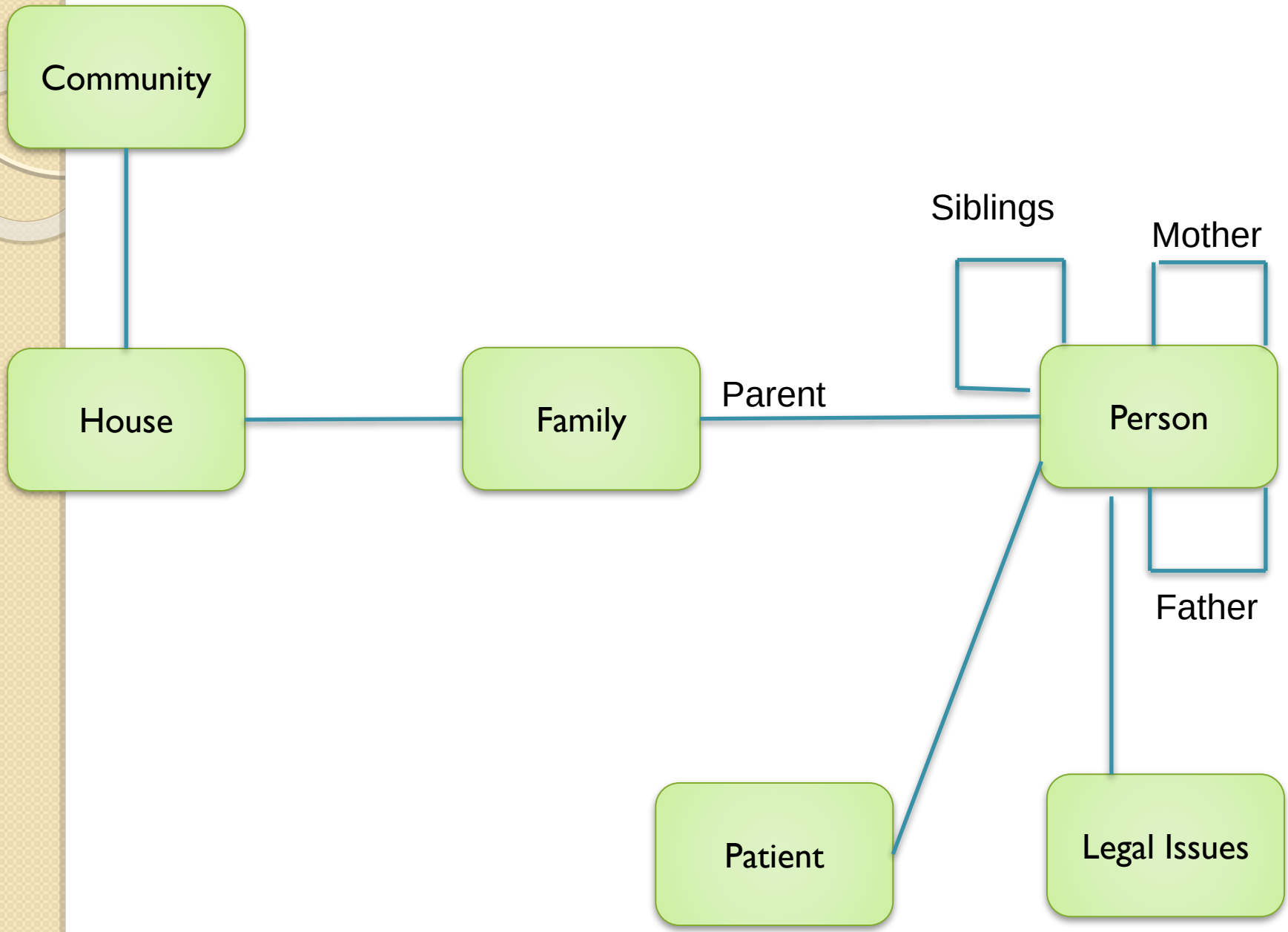

Joe as Patient
Joe
mother
Ann as Patient
Anne
Father
mother
Kam Patient
Kam
Sandy
Sandy as Patient

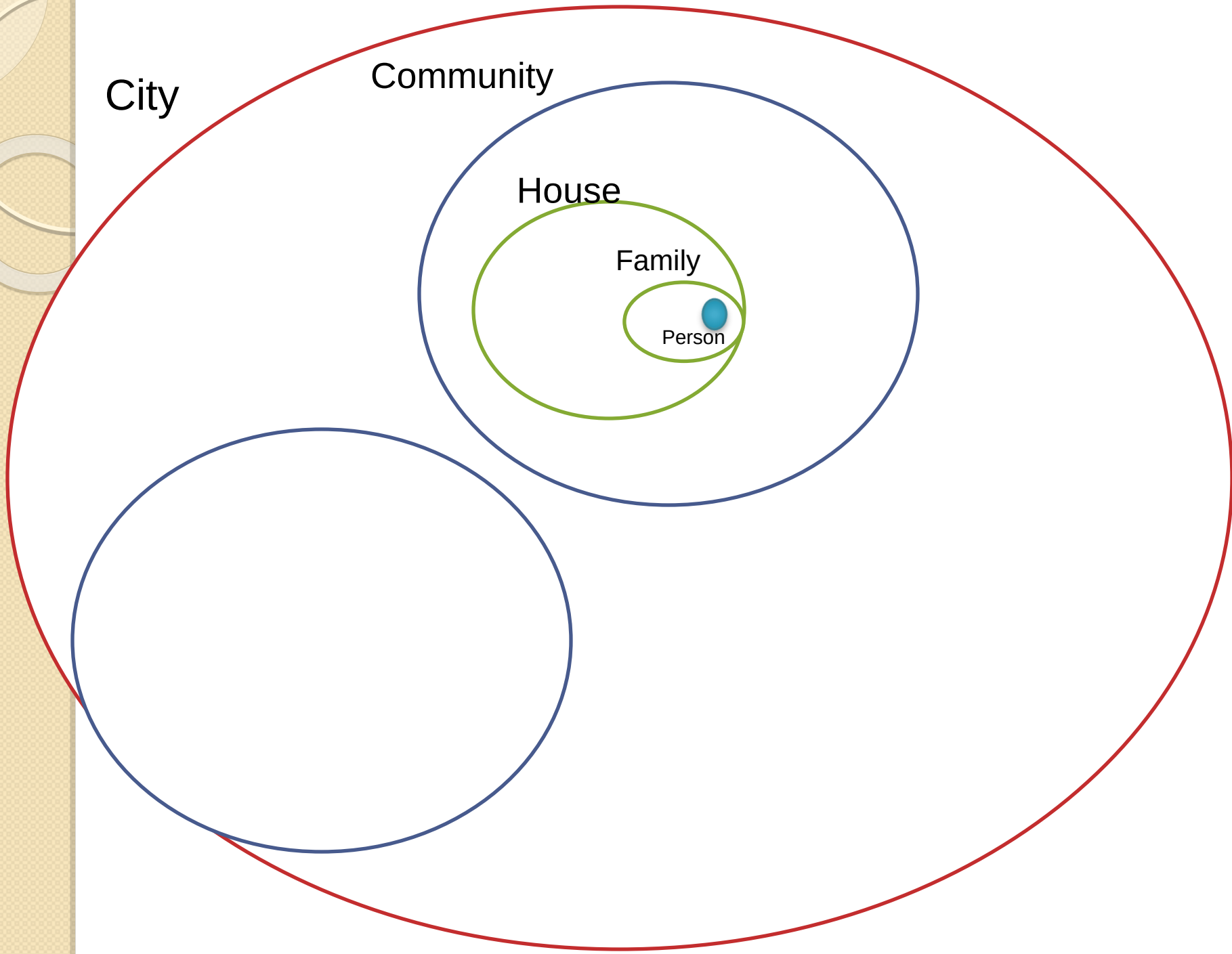
Linkages to establish hereditary disease




Siblings
Mother
Family
Parent
Person
Father
Patient
Legal Issues


Siblings
Mother
House
Family
Parent
Person
Father
Patient
Legal Issues


Community
House
Family
Parent
Siblings
Mother
Person
Father
Patient
Legal Issues


City
Community
House
Family
Person

Java Implementation

The User-cases

1. Manage Person database
   - Add a person
   - Update a person
   - Remove/Disable a person
2. Manage User Account Directory
   - Add UserAccount
   - Remove UserAccount
   - Update UserAccount

Approach

- Define business, person and user directory classes
- Define user screens
  - Determine the input requirements for each user screen (is it business? persondirectory? person? Etc.
  - Remember: You must navigate from the root object, which is business in this case. For example business.getPersonDirectory().findPerson(Id);

Define Business Class

under the Business package

```
class Business {
Private String name;
Private PersonDirectory persondirectory; // a
   reference variable that keeps track
Private UserAccountDirectory
  useraccountsdirectory;


public Business (String n) {


 name = n; //the this operator means this business object.
persondirectory = new PersonDirectory () ;
useraccountsdirectory = new
  UserAccountDirectory()
```

Define PersonDirectory Class

under the Business.HumanResources.PersonDirectory package

```
class PersonDirectory{
private ArrayList<Person> personlist; // a reference variable that keeps track
                                      // of the persons in one place

public PersonDirectory() {

      personlist= new ArrayList();
}

}
```

Define UserAccount Directory Class

under the Business.SystemAdministration package

```
class UserAccountDirectory{
private ArrayList<UserAccount> useraccountlist;
   // a reference varaible that keeps all
                                                    // suppliers in one place
 public UserAccountDirectory() {

   useraccountlist = new ArrayList(); // make sure to
create the arraylist and assign
                                                    // it to the reference
variable
                                                    // the arraylist will be
created immediately as
                                                    // you create the
useraccount directory
```

Define MainJFrame Class

under the userinterface package

Create a global variable of type Business

```
class MainJFrame {
private Business business; // Global Variable

 public MainJFrame() {

     initComponents();
      business =
  ConfigureABusiness.Initialize("General
  Motors");      //notes we did not create an
  instance of the class. //We executed a method
  on the class. That is the idea of //"static
  methods on classes"
```

Define Class called ConfigureABusiness

under the Business.BusinessConfiguration package

Create a global variable of type Business

```
class ConfigureABusiness{

 public static Business Initialize (String n) {
  // returns a business object

      <create a business>
      <add some persons>
      <add some user accounts>
}
}
```

ConfigureABusiness

```
public static Business Initialize (String n) {  // returns a business
object


Business b = new Business(n);


PersonDirectory pd = b.getPersonDirectory();

Person p = pd.newPerson(); //create person object
p.setFirstName("Ann");
p.setLastName("Wells");

:

p = pd.newPerson(); // create a second person object
p.setFirstName("John");
p.setLastName("Brown");
:

UserAccountDirectory uad= b.getUserAccountDirectory(); // prepare to
create user accounts

Person  p2 = pd.findPersonByLastName("Brown");
```

ConfigureABusiness

```
public static Business Initialize (String n) {  // returns a business object


Business b = new Business(n);


PersonDirectory pd = b.getPersonDirectory();

Person p = pd.newPerson(); //create person object
p.setFirstName("Ann");
p.setLastName("Wells");

:

Person p = pd.newPerson(); // create a second person object
p.setFirstName("John");
p.setLastName("Adam");
:

UserAccountDirectory uad= b.getUserAccountDirectory(); // prepare to create user
accounts

Person  p2 = pd.findPersonByLastName("Brown");

If (p2!=null){

UserAccount ua = uad.newUserAccount(p2);

ua.setPerson(p2);          //link user account to the Mr. Brown
ua.setUserId("jadam");
ua.setPassWard("pw"); ua.setRole("System Admin")
```

Things you will need to do

- The person class must have a method toString as follows

```
Public String toString(){
return getFirstName() + “
  “+getLastName();
}
```

This will return first name followed by space and followed by last name

Things you will need to do

- The User account class must have a method toString as follows

```
public String toString(){
return getUserId() + “
}
```

If you insert a user account object into a swing component, java swing will call the toString method on the object in order to display meaningful information to the user

UserAccountDirectory class

- You will need an isValidUser method on this class
- This method will take a user name and password and determine if the user exists in the directory database. If found it returns the user account if not it returns null

UserAccountDirectory class (contd.)

- public UserAccount isValidUser (String userid, String pwd){
- For each useraccount in the user directory do the following step
- If (useraccount id matches userid and useraccount password matches pwd) then return the useraccount object
- Otherwise continue until no more to check
- Return null if not found
- }

How to enter data into a combox?

- Get the person directory
- Get the list of persons as an arraylist
- For each person in list of persons
  - Insert person into the combox
    - Use comboxname.addItem(person);
- The toString method on the person class will display the name of the person in the combox

How to determine the selected person in the combox

- When there is an action performed even to create a user account, for example, retrieve the selected person object from the combox using:
  - Comboxname.getSelectedItem().
- Make sure to force the selected item to be a person because the combox does not remember the object type.

- selectedperson = (Person)comboxname.getSelectedItem();