Software Engineering
The University of Auckland

Software Development Methodologies

Lecture 2 - Academia & Business

SOFTENG 750 2013-03-06

Some CompSci People

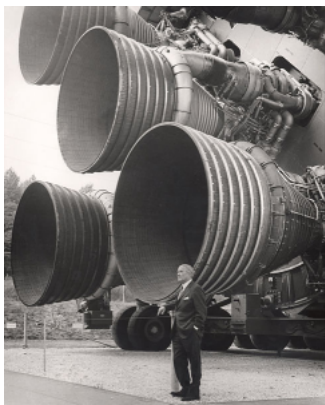
CC
SOME RIGHTS RESERVED

http://en.wikipedia.org/
http://flickr.com/photo/46982319@N06/5490017549

The Product Lifecycle of Academia

Research is what I'm doing when I don't know what I'm doing.

(Wernher von Braun)



Get Inspired

Software Engineering
The University of Auckland

1. What do you like?

2. Look at the world.

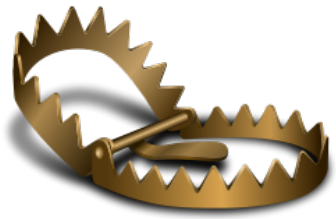
3. Don't overthink.

4. Don't quit.

Related Work

Know the topic!

- Understand the **problem**
  - Motivation (e.g. applications, benefits)?
  - Research questions?
- Understand the **theory**
  - What are the main concepts?
  - What words are used (terminology)?
  - What methods are used (methodology)?
- Learn about existing **solutions**
  - Seminal works
  - Status quo
- Learn what **doesn't work**
  - Mistakes & dead ends



Make a Contribution

Delta Contribution

- Improve something that is already there
- E.g. vary parameters, replace components

New Application

- Use something that is already there for something it has not been used before
- E.g. new context, new user group, new goals

Empirical Results

- Explore something that is already there and gather data
- E.g. performance measurements, user studies, experiments

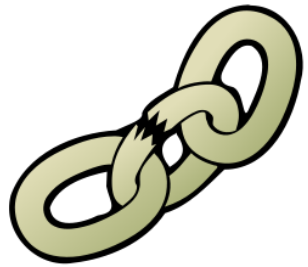
New Theory

New problems, new solutions, new methods for finding a solution

Provide Evidence

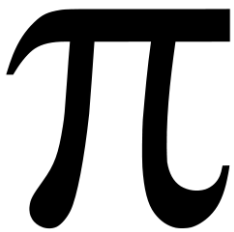
Logical Arguments

- Concisely describe logical relations
- Build a chain of arguments to reach a conclusion



Formalism

- A precise notation, e.g. from mathematics
- Proofs (of interesting characteristics)

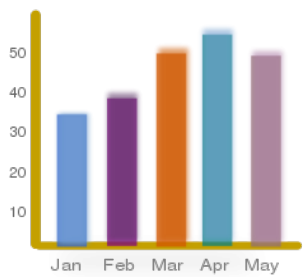


Prototype

- Demonstrating that it works practically

Empirical Data

- Helping the reader to see what happens
- Making statistical conclusions



Publishing

Writing and Revising

- Big part of academic life (get used to it)
- For good quality at least as much revising as writing

Peer Review

- Other researchers critique your work
- Publishing only if reviewers are happy

Presentation

- At conferences, talks, demonstrations
- Connecting with other researchers

Research Grants

Software Engineering
The University of Auckland

What for?

- People: postgrad students, researchers
- Research travel
- Equipment

From where?

- Government funding agencies
- Industry

How?

- Motivate your problem compellingly
- Describe your work clearly (for the right audience)
- Demonstrate novelty and capability

Patents

Protecting Ideas

- Can be used to protect a novel idea (invention)
- Must be sufficiently different from existing work (prior art)
- Idea should not be published before patent application

Patenting Process

- International application to reserve right to patent first
- Then need to file individual applications for each country

Right to Sue

- Patents give the holder the right to sue others
- May force others to buy or license a patent
- But: sueing costs money - hard for small players
- But: big players may be willing to buy even weak patents

Starting Your Own Business

Defeat is not the worst of failures. Not to have tried is the true failure.

(George Edward Woodberry)

The Value Proposition

Promise to your client that you can deliver some value

- Value = Benefits - Cost
- Value can financial but can also be very subjective

1. **Capability**: What do you do and how?
2. **Impact**: What difference does your capability make?
3. **Proof**: What evidence do you have for the impact?
4. **Cost**: What is the cost (including risk) of the capability?

Neil Rackham, John De Vincentis. Rethinking the Sales Force; Redefining Selling to Create and Capture Customer Value, McGraw Hill, 1999.

Market Validation

Does your value proposition work? (Evidence)

Target Market

Who are your potential customers?

Pain Point

- Known problem in the market that you can address
- Reasonably ubiquitous (lots of potential customers)
- Sense of urgency, willingness to pay for it

Rob Adams: http://www.youtube.com/watch?v=rYya2P7sLSM

How?

- Market statistics: interpret them, be realistic about them
- Market polls: questionnaire for potential customers
- Interviews: talk to potential customers and see what they value

Competitor Analysis

Identify your competitors, analyze their strengths and weaknesses

Direct Competitors:
offer same primary service to the same customers

Indirect Competitors:
offer a viable substitute, or a similar service as part of wider range

- Who exactly are their customers?
- What is their market share?
- What are your strengths and weaknesses compared to the competitor?
- Frequently-used tool: SWOT analysis

Business Model

How do you make money with your business?

- **Pay-per-Download:** often in combination with limited free version
- **In-App Purchase:** extensions, game currency, virtual items
- **In-App Advertising**: sell ad-views in popular apps
- **Interface for existing business**: selling goods and services (virtual & physical), Bricks & Clicks
- **Software as a Service (SaaS)**: esp. for enterprise applications, e.g. Pay-per-Use
- **Subscriptions:** esp. for content-heavy apps (e.g. magazines)
- **Contract development**: sell a custom app to another business

Team

Expectations

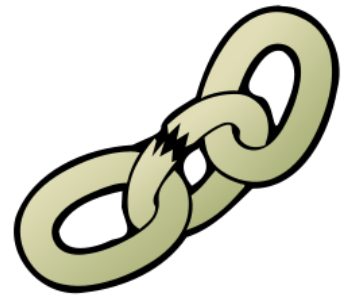
- Commitment
- Roles
- Money & Ownership

Strengths

- Things that hold you together
- Competencies

Weaknesses

- Differences in expectations
- Missing competencies



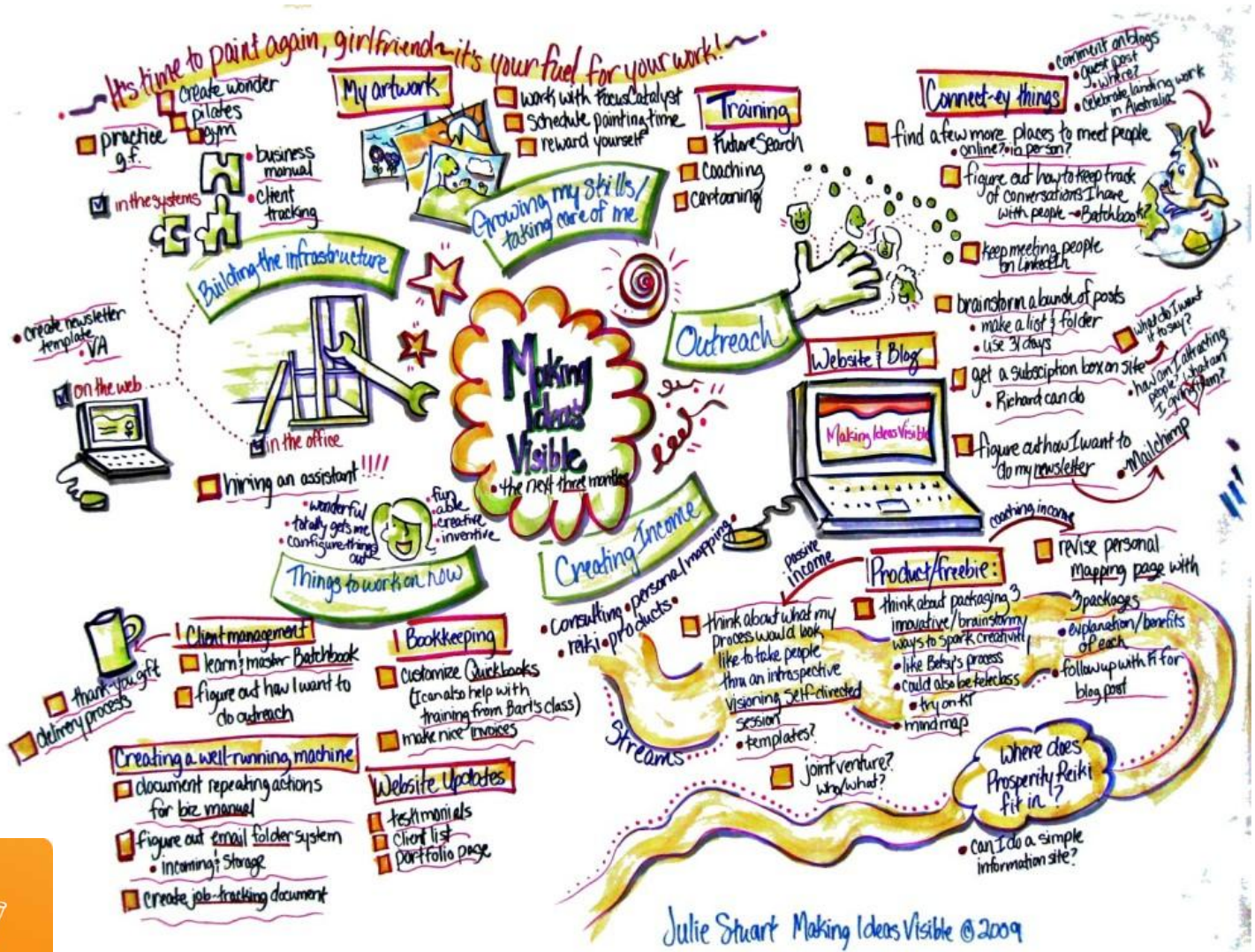
Business Plan

SE Software Engineering
The University of Auckland

What are your business objectives & how you will achieve them?

1. Cover Page
2. Executive Summary
3. Table of Contents
4. Business Overview
5. Market Overview
6. Objectives
7. Requirements
8. Operations
9. Sales and Marketing
10. Finances

www.business.govt.nz

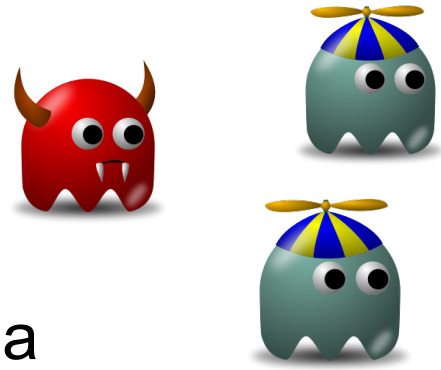


Courtesy of Julie Stuart
http://www.makingideasvisible.com/viz-biz-plan/

Making Ideas Visible
Visual and Creative Facilitation: Conversations that Change the World.

Investor's Game

Present your business idea to an "investor"



- Choose someone to play the Investor
  - Devil's advocate
  - Try to find good reasons why you wouldn't put your money into the idea
  - Point out risks (e.g. blind spots), weak arguments (e.g. exaggerations,
  - ...but be honest in your opinion
- The Team
  - Present the best possible evidence supporting your idea
  - Try to convince the investor, not just win an argument
  - Be honest about the risks & weaknesses
  - Reality check: are you convinced yourself?

Today's Summary

- In academia, researchers take an idea, elaborate it, make a contribution and publish it
- To commercialize an idea, you need a clear value proposition (provide evidence through market validation and competitor analysis)

Lab every Thursday: Now 1-2pm in UG4 !!!

Milestone 1 (Deadline: Lab on Thursday)

1. Form a team of 4
2. Decide on a project together
3. Email group member names & UPIs and project abstract to Christof

Quiz

For the following questions consider your project idea.

1. What kind of contribution could your project make for the scientific community?
2. What evidence would you use in a publication?
3. What would be the value proposition of your project?
4. What could be a business model for your project?

```
#include <stdio.h>
#include <math.h>
#define E return
#define S for
char*J="LJFFF%7544x^H^XXHZZXHZ]]2#{ #@@DA#(.@@%(0CAaIqDCI$IDEH%P@T@qL%PEaIpBJCA\
I%KBPBEP%CBPEaIqBAI%CAaIqBqDAI%U@PE%AAaIqBcDAI%ACaIaCqDCI%(aHCcIpBBH%E@aIqBAI%A\
AaIqB%AAaIqBEH%AAPBaIqB%PCDHxL%H@hIcBBI%E@qJBH#C@@D%aIBI@D%E@QB2P#E@'C@qJBHqJBH\
%C@qJBH%AAaIqBAI%C@cJ%"   "cJ"   "CH%C@qJ%aIqB1I%PCDI`I%BAaICH%KH+@'JH+@KP*@%S@\
3P%H@ABhIaBBI%P@S@PC#",     *j   ,*e;typedef float x;x U(x a){E a<0?0:a>1?1:a; }
typedef struct{x c,a,t;       }   y;y W={1,1,1},Z={0,0,0},B[99],P,C,M,N,K,p,s,d,h
;y G(x t,x a,x c){K.c=t   ;       K.t=c; K.a=a;E K;}int T=-1,b=0,r,F=-111,(*m)(i\
nt)=putchar,X=40,z=5,o,   a,      c,t=0   ,n,R;y A(y a,y b,x c){E G(a.c+b.c*c,a.a
+c*b.a,b.t*c+a.t);}x H=   .5,Y    =.66     ,I,l=0,q,w,u,i,g;x O(y a,y b){E q=a.t*
b.t+b.c*a.c+a.a*b.a;}x Q(){E A(P,M,T       ),O(K,K)<I?C=M,I=q:0;}y V(y a){E A(Z,
a,pow(O(a,a),-H));}x D(y p){S(I=X,P         =p,b=T; M=B[++b],p=B[M.c+=8.8-l*.45,
++b],b<=r;Q())M=p.t?q =M_PI*H,w=atan2(   P.a-M.a,P.c-M.c)  /q,o=p.c-2,a=p.a+1,t=
o+a,w=q*(w>t+H*a?o:    w>t?t:w<o-H*a?t   :w<o?o:w),A(      M,G(cos(w),sin(w),0),
1):A(M,p,U(O(A(P,M,T)     ,p)/O(p,p)));   M=P;M.a=-          .9;o=P.c/8+8;o^=a=P.t
/8+8; M=Q        ()?o&1    ?G(Y,0,0):W    :G(Y,Y,1);E        sqrt        (I)-.45;}
int main(   int    L,char    **k){ S(e    =L>1?1[z=    0,    k]:J   ;*e   &&l<24 ;
++e)S(o=a   =0,j   =J+9;(c=    *++j)&&   !(o&&c<    X&&(q=l+=w)   );o   ?o=*j++/
32,b++[B]   =G(q   +=*j/8&3,*    j&7,0    ),B[r    =b++]=G(((c/8&        3)*( o<2?
T:1), (c&   7)+    1e-4,o>2),1:    (o     =(a    =(c-=X)<0?w=c+6   ,t=   a+1:c?(t
?0:m(c),a        ):*++j)==((*e|32          )    ^z)&&1[j]-X));S(z   =3*(   L<3);++
F<110;)S(L=-301;p=Z,++L<300;m(               p.c),m(p.a),m(p.t))S(c=T;++c<=z;)S(h
=G(-4,4.6,29),d=V(A(A(Z,V(G(5,0             ,2)),L+L+c/2),V(G(2,-73,0)),F+F+c%2),G
(30.75,-6,-75),20)),g=R=255-(n=z)*64;       R*n+R;g*=H){S(u=i=R=0;!R&&94>(u+=i=D(h=
A(h,d,i)));R=i<.01);S(N=V(A(P,C,                  T)),q=d.t*d.t,s=M,u=1;++i<6*R;u-=
U(i/3-D(A(h,N,i/3)))/pow(                        2,i));s=R?i=pow(U(O(N,V(A(
M=V(G(T,1,2)),d,T))))                              ,X),p=A(p,W,g*i),u*=U(
O(N,M))*H*Y+Y,g*=                                     n--?Y-Y*i:1-i,s:G(
q,q,1); p=A(p,s                                         ,g*u);h=A(h,N,.1
);d=A(d,N,-2*O                                            (d,N));}E 0;}
```

International Obfuscated C Code Contest (ioccc.org)