Agenda

Remarks about RE evolution

Overview of enterprise vision of RE

RE-Business Relationship

WW Requirements Engineering context

Software industry

– A mobile handset has 10 million LOC, in-car software has 100 million LOC)

– Boeing 787 has 6.5 million LOC (three times as much LOC as the Boeing 777)

– Software growth in 2009 against hardware and IT services decline

Software Engineering

– Growth of CMMs family certified organizations

– Growth SE graduate studies
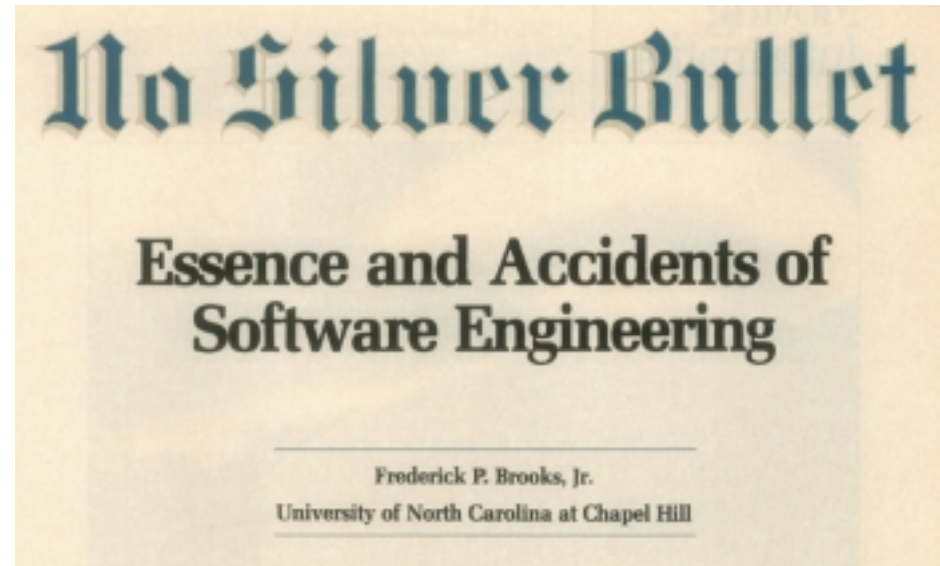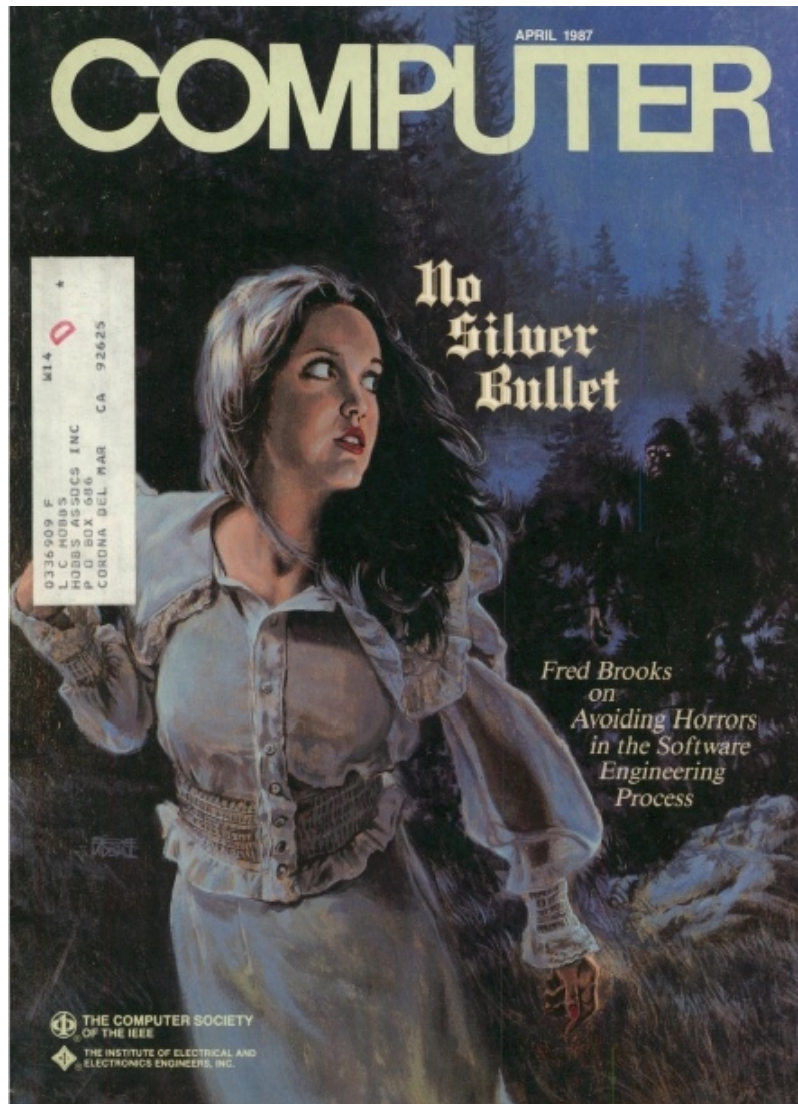
Regional Requirements Engineering Context

Software industry
- Latin America IT industry is 4% of WW Industry
- Share of growth is bigger than 4%
- LA exports of Software and Information Technology Services Growth in volume and share
- LA is a player in offshore outsourcing game
- Growth of CMM certified companies

Academy
- LA Universities have a very good performance in ACM competition
- More Software Engineering graduate courses
- Growth of LA RE community (academician, master and doctoral thesis, research)

A RE milestone in 1986

APRIL 1987

COMPUTER

No Silver Bullet

Fred Brooks
on
Avoiding Horrors
in the Software
Engineering
Process

THE COMPUTER SOCIETY
OF THE IEEE

THE INSTITUTE OF ELECTRICAL AND
ELECTRONICS ENGINEERS, INC.

No Silver Bullet

Essence and Accidents of Software Engineering

Frederick P. Brooks, Jr.
University of North Carolina at Chapel Hill

Requirements refinement and rapid prototyping. The hardest single part of building a software system is deciding precisely what to build. No other part of the conceptual work is as difficult as establishing the detailed technical requirements, including all the interfaces to people, to machines, and to other software systems. No other part of the work so cripples the resulting system if done wrong. No other part is more difficult to rectify later.

Evolution of RE

SEI Maturity Models and Requirements Engineering	

1989	The Humphrey's book, "Managing the Software Process", developed the rationale of CMM
	It had five parts:
	    1. Software Process Maturity
	    2. The Repeatable Process
	    3. The Defined Process
	    4. The Managed Process
	    5. The Optimizing Process
	These parts were the ancestors of Maturity Levels of CMM
	RE didn't have appear in any of five parts.

1991	CMM v1.0 had a Key Process Area related with RE, but it was Requirements Management…
2006	CMMI-DEV, v1.2 had two Process Area related to RE: Requirements Management and Requirements Development (Engineering has 6 PA)

Theory and practice

"In theory, theory and practice are the same. In practice, they are different"

Y. Berrra, Baseball manager, [Alexander]

"User is the worst thing of the Analyst Profession"

AO, System Analyst, 1974

What happens with RE use ratio?

The decreasing penetration of RE

New industry and market areas need RE but it is not acting, for example:

- Web systems (look government sites!!)
- Non functional requirements (security, friendliness)
- Stakeholders
- Mobile systems (smartphone/netbooks/handheld based)
- Digital TV (the world of interaction)

Is RE contribution in this areas similar to other areas of software engineering?

Has RE more penetration in the newest software areas than in traditional areas?

Is RE making a relevant contribution to the growing business of offshore outsourcing and Global Software Development?

Classical Loucopoulos & Karakostas of RE Processes
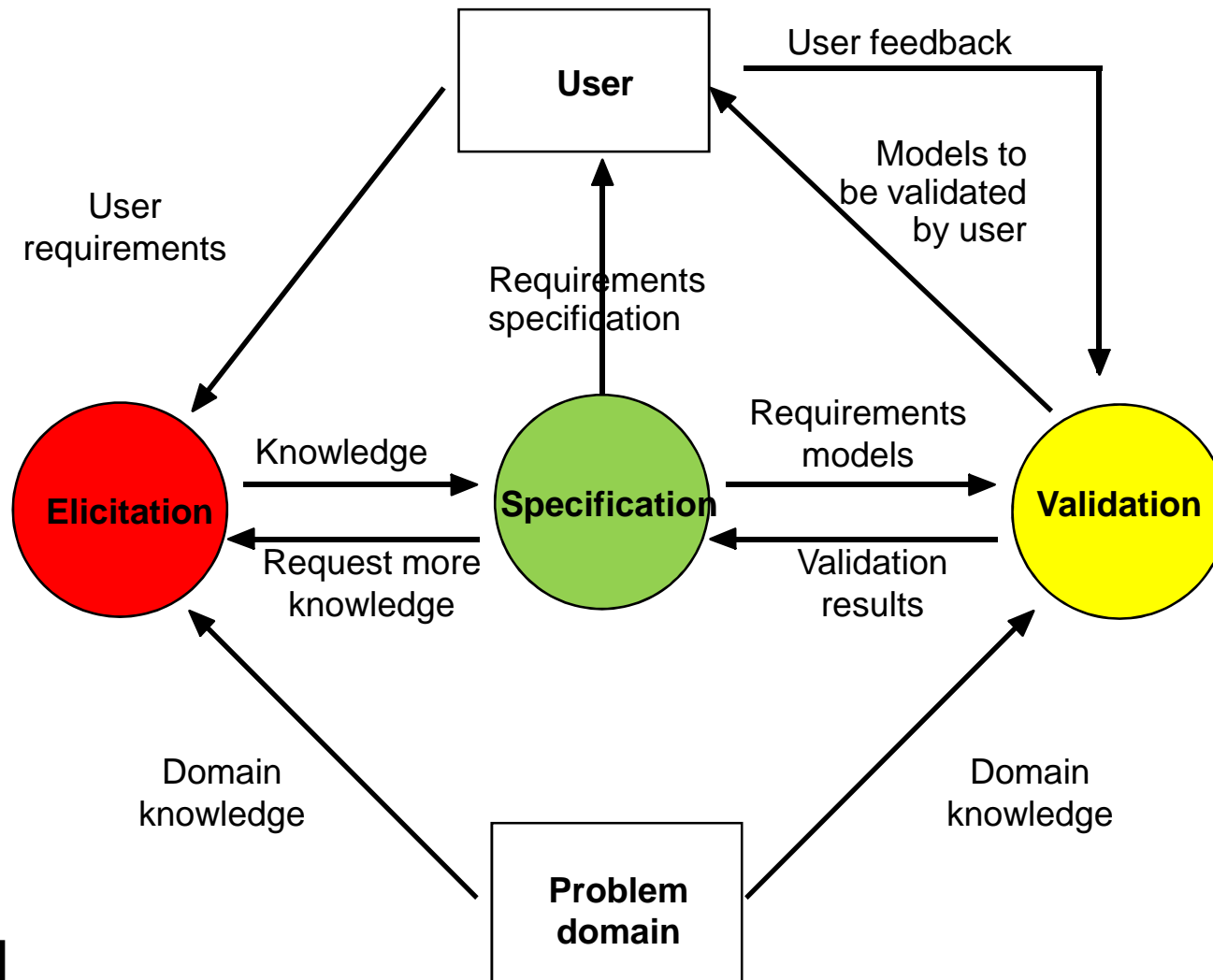
[Loucop]

Decreasing search of RE
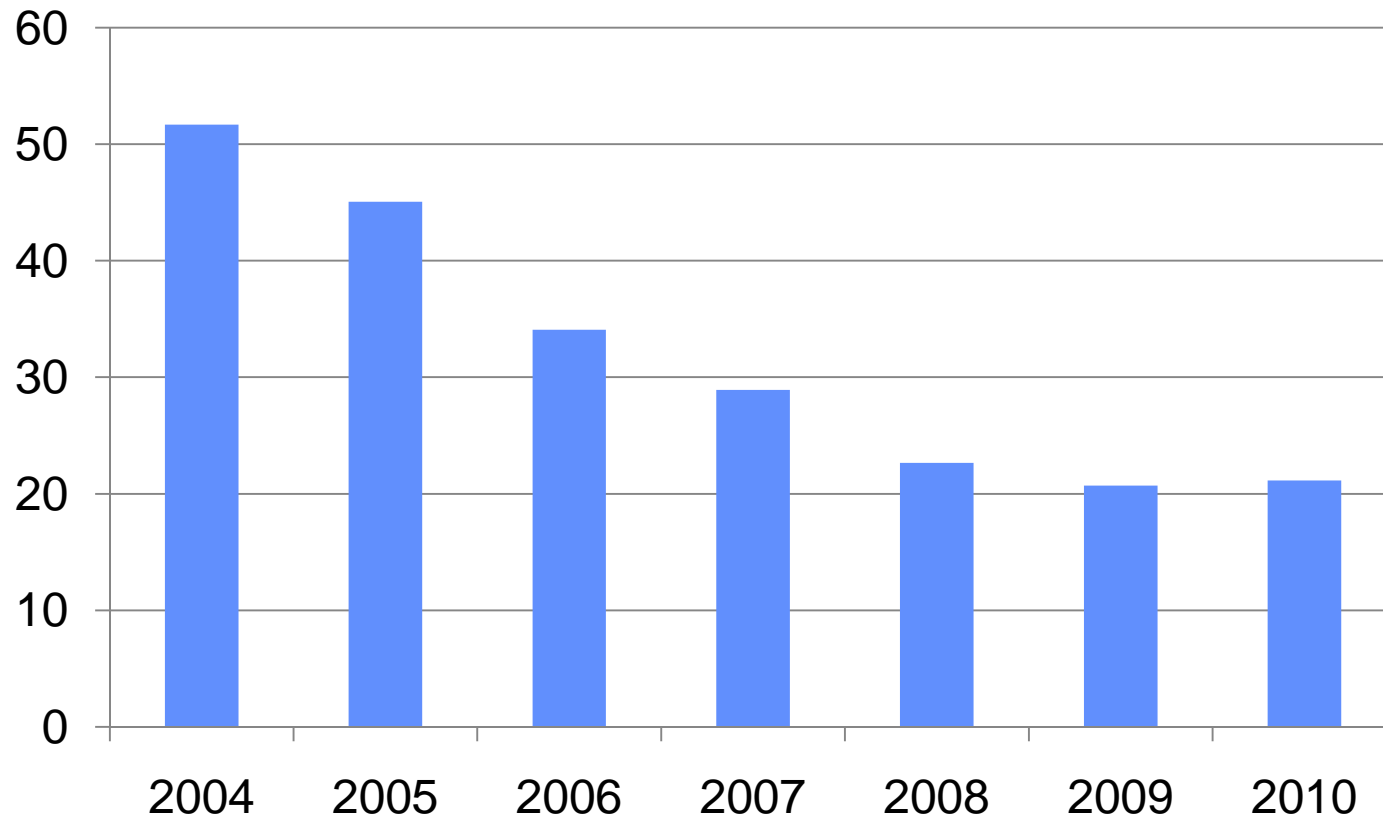
2010: 18 weeks
2004: value 100

Suggestions

Culture

Communication

Ignorance of developers and organizations

Approaches to technology transfer

Marketing of RE results

Culture

Ethnography contribution

- "…[culture is] the acquired knowledge that people use to interpret experience and generate social behavior"
- "Language is more than a means of communications about reality: it is a tool for constructing reality" [Spradley]

Business administration contribution

- "Commercialization and innovation produce results, all the rest are 'costs'." [Drucker, translation by AO]

Remarks about Business People brain

Business people are results oriented and short term driven (tyranny of quarter and fiscal year)

They does not "see" the whole Life Cycle

RE has not solid and persuasive metrics

"RE request a lot of time"

Where is the RE business case?

Communication

The well known image of Babel tower

Brooks explained the reasons of Babel fail: lack of communications and its consequent, organization

Organizations has a long history of silver bullets (SA, OOA, UC, RUP)

Requirements Engineers are not good enough communicating the advantages of RE

RE community needs apply this concept of communication to improve relations with organization

Levels of ignorance

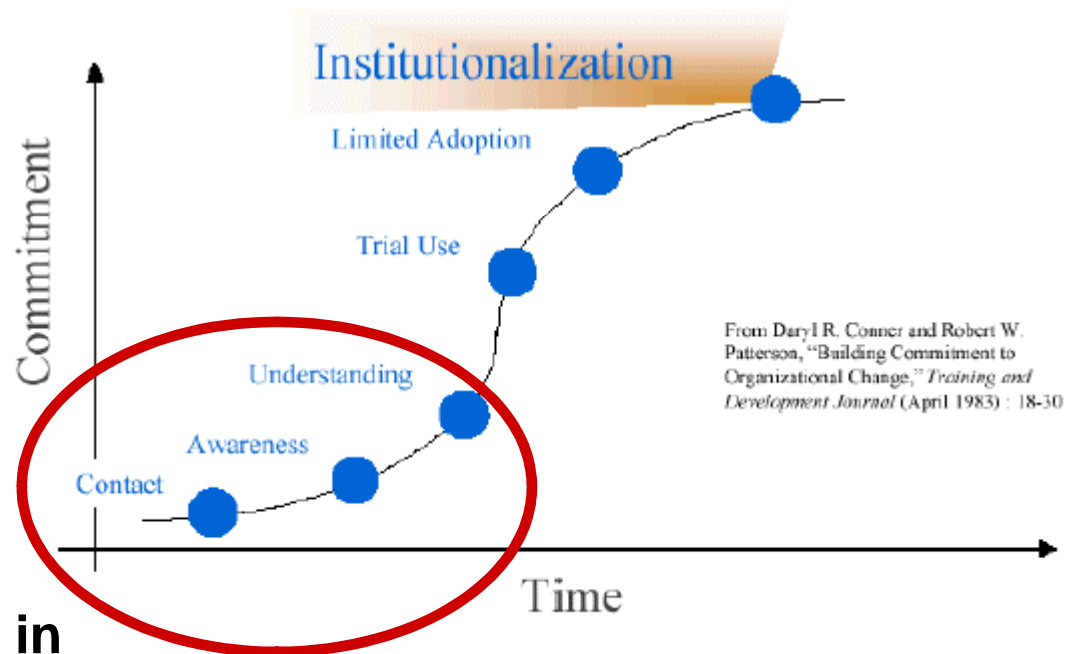| Order	Name	Description
0th (0OI)	Lack of Ignorance.	I have 0OI when I know something and can demonstrate my lack of ignorance in some tangible form, such as by building a system that satisfies the user. 0OI is knowledge
1st (1OI)	Lack of Knowledge	I have 1OI when I don't know something and can readily identify that fact. 1OI is basic ignorance
2nd (2OI)	Lack of Awareness	I have 2OI when I don't know that I don't know something
3rd (3OI)	Lack of Process	I have 3OI when I don't know a suitably efficient way to find out I don't know that I don't know something. This is lack of process, and it presents me with a major problem: If I have 3OI, I don't know of a way to find out there are things I don't know that I don't know.
4th (4OI)	Meta Ignorance	I have 4OI when I don't know about the Five Orders of Ignorance

Levels of ignorance about RE

Order	Name	Description
0th (0OI)	Lack of Ignorance.	Expert practitioner, academician, WER attendant
1st (1OI)	Lack of Knowledge	Software Engineering Master Student
2nd (2OI)	Lack of Awareness	Practitioner using open interview as only elicitation technique. She/he ignores that exist a lot of techniques
3rd (3OI)	Lack of Process	"We neither need attend conferences nor buy magazines because we are good enough doing our developments"
4th (4OI)	Meta Ignorance	I have 4OI when I don't know about the Five Orders of Ignorance

Classical approach to technology insertion

From the Change Agent's Viewpoint

Institutionalization
Limited Adoption
Trial Use
Understanding
Awareness
Contact

Commitment
Time

From Daryl R. Conner and Robert W. Patterson, "Building Commitment to Organizational Change," *Training and Development Journal* (April 1983) : 18-30

Critical area in cultural change

[Garcia]

Commercial approach to RE distribution

Product to sale: Requirements Engineering

There are producers, commercial channels and consumers

Producers:
- RE community (academician + expert practitioners)

Channels:
- research people
- graduates
- professors
- consulting firms
- software package (development tools)
- media: magazines, journal, conferences

Consumers:
- software industry
- companies for internal use
- Professionals

Who is the client?: Develop Organization *and* whole Organization

Requirements rationale. Defensive approach

"Why engineer requirements?

"[…] citations and facts that provide anecdotal evidence about the importance of RE and the consequences of poor general perspective"
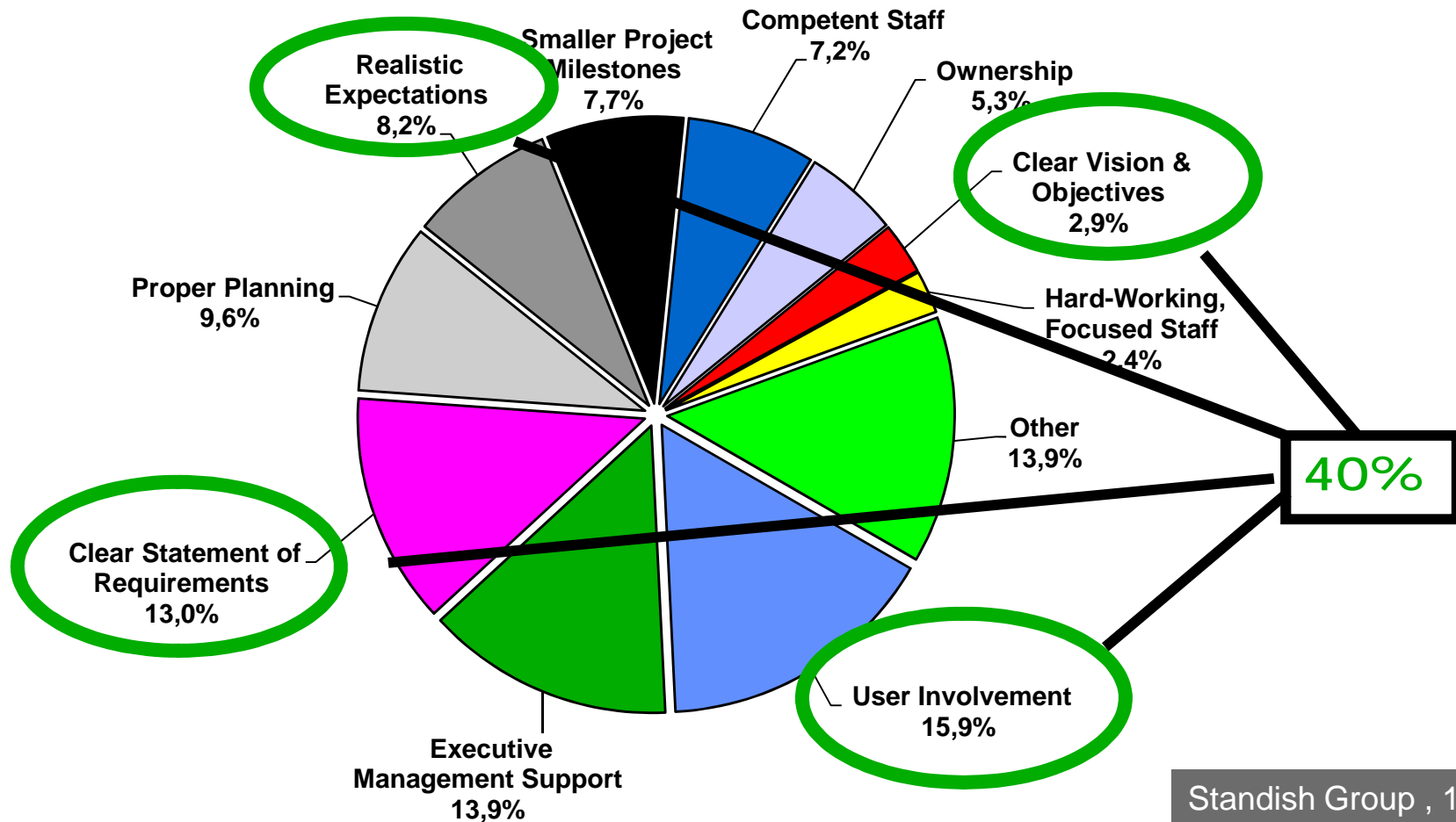
Requirements errors are numerous and persistent

Requirements errors are the most dangerous software errors

([von Lams], 47)

Requirements contribution to success

Sources of sucess in quality, time and cost

Realistic Expectations 8,2%

Smaller Project Milestones 7,7%

Competent Staff 7,2%

Ownership 5,3%

Clear Vision & Objectives 2,9%

Proper Planning 9,6%

Hard-Working, Focused Staff 2,4%

Other 13,9%

Clear Statement of Requirements 13,0%

User Involvement 15,9%

Executive Management Support 13,9%

40%

Standish Group , 1994

RE is strongly associated with software quality

ISO9126:

– **The goal is to achieve the necessary and sufficient quality to meet the real needs of users. ISO 8402 defines quality in terms of the ability to satisfy stated and implied needs**

RE and business

- **Software is in the core of business**
- **Business needs quality**
- **Then: RE could be a real contribution to business.**

Final suggestions

To understand the company culture to adopt changes of approaches

Improve the communicational abilities to broadcast the advantages of RE approaches

Considerer de level of ignorance of developers and organizations in your proposal of improvement of processes

The client are the developing organization and the whole organization

Marketing and sale of RE

In summary: understand the different essence of RE and the other areas of SE

Referencias

[Alexander] Alexander, I., Beus-Dukic, L., *Discovering Requirements*, Wiley, 2009

[Armour] Armour, P.G., *"The Five Orders of Ignorance"*, *Comm. ACM*, October 2000

[Drucker] Drucker, P., *La gerencia. Tareas, responsabilidades y prácticas,* El Ateneo, 1976

[Garcia] Garcia, S., Glover, M., *Are You Prepared for CMMI?*, SEI, Technology Transition Practices Group, 2002

[van Genu] van Genutchen, M., Hatton, L., "Software: What's In It and What's It In?", *IEEE Software*, Jan/Feb 2010

[Hump] Humphrey, W.S., "Managing the Software Process", Addison-Wesley, 1989

[van Lams] van Lamsweerde, Axel, *Requirements Engineering,* Wiley 2009

[Loucop] Loucopoulos, P. ,Karakostas, V., *System Requirements Engineering*, McGraw-Hill , 1995

[Spradley] Spradley, J.P. ,*The Ethnographic Interview*, Wadsworth, 1979

Thanks you!!

Alejandro Oliveros

aoliveros@gmail.com