Wanted: Techie Nerd others need not apply

the stereotyping of software developers

Dr Jocelyn Armarego

J.Armarego@murdoch.edu.au

Murdoch UNIVERSITY

DISCOVERERS WELCOME

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Stereotypes within software development teams illustrated

http://i.imgur.com/1WvaZ.jpg

Why psychology?

2 perspectives:

The individual

- What drives you?

The discipline

- Software development activities

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Characteristic of Software Development

The major problems of our work are not so much technological as sociological in nature

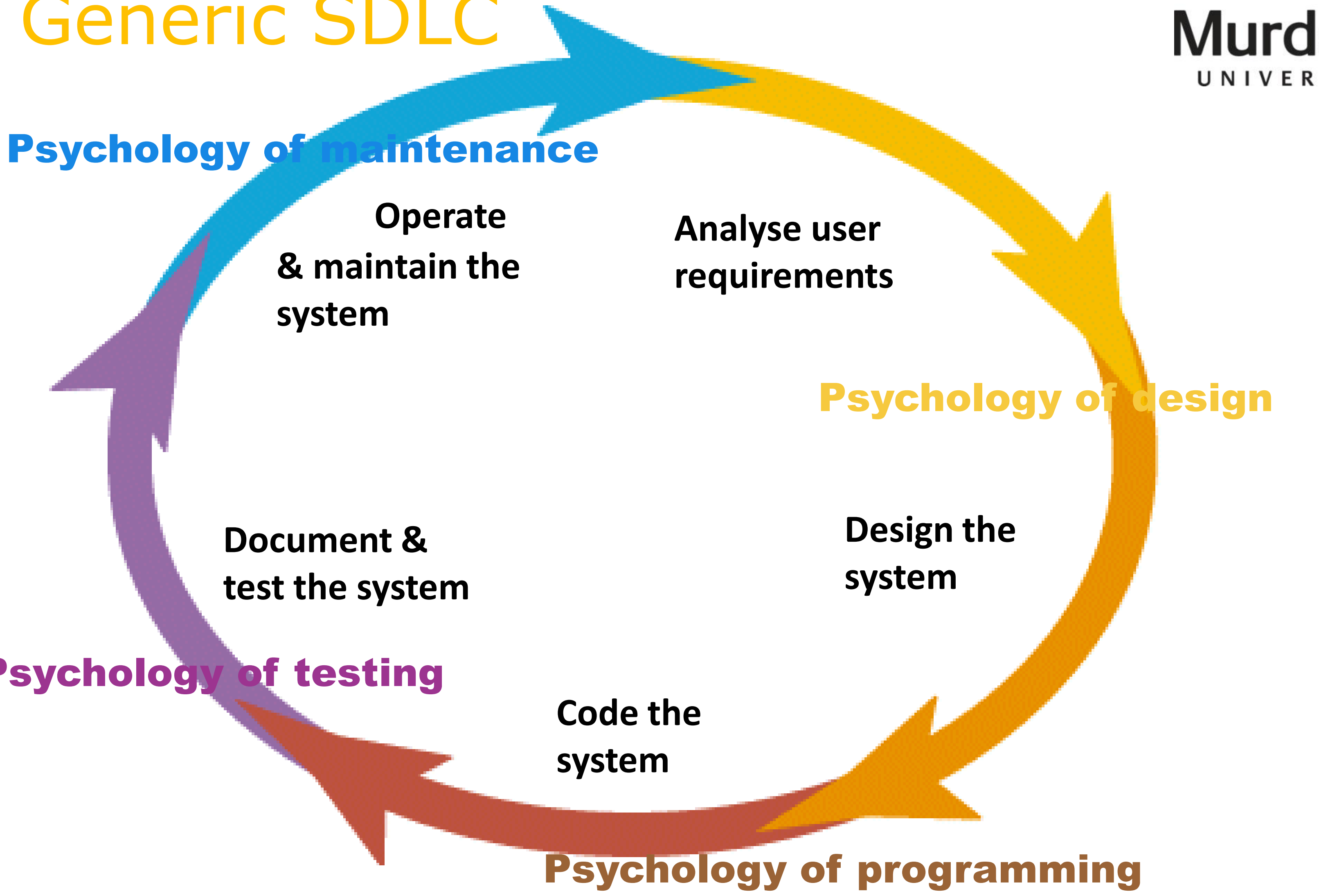
de Marco, T & Lister, T (1999) *Peopleware: Productive Projects and Teams (Second Edition)*

Software development is a messy problem. The only way to solve it is to interact with each other, and to let our understanding and path forward emerge

Miller, R(2003) *Growing Software: Debunking the Myth of Prediction and Control*

Before Weinberg, no one had ever suggested that software development might be considered as a human activity

Generic SDLC


Psychology of maintenance
Operate & maintain the system
Analyse user requirements
Psychology of design
Design the system
Code the system
Psychology of programming
Document & test the system
Psychology of testing

http://www.samsvb.co.uk/index.php?page=lesson&les=Lesson%2014

What drives you?

Most research undertaken looks at

Personality

However,

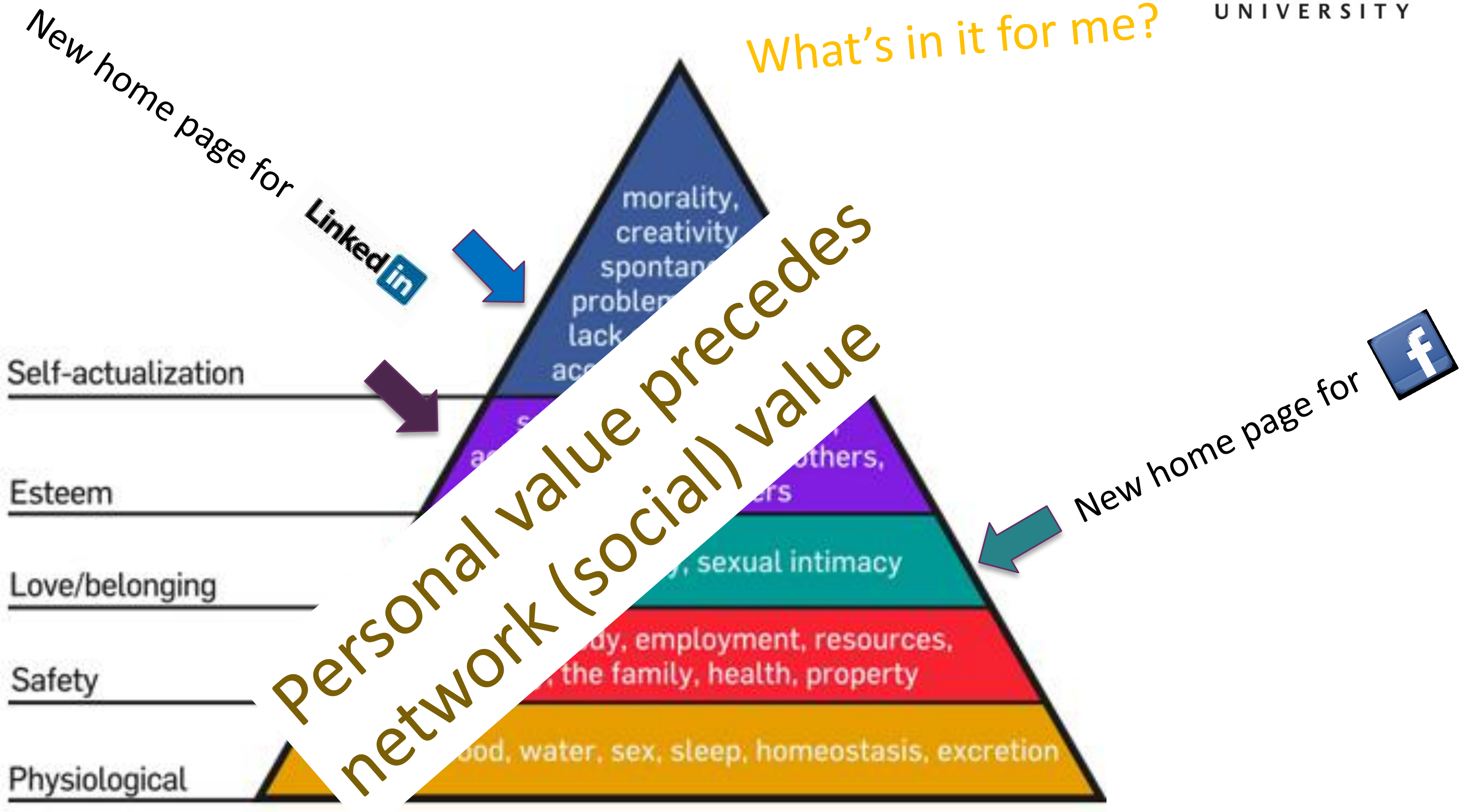
Needs

and

Culture

also play an important part in how well software is developed, and what makes a great software developer

Needs of the individual


What's in it for me?
New home page for
LinkedIn
New home page for
Self-actualization
Esteem
Love/belonging
Safety
Physiological
morality, creativity, spontan… problem… lack… acc…
…others, …rs
…, sexual intimacy
…dy, employment, resources, …the family, health, property
…ood, water, sex, sleep, homeostasis, excretion
Personal value precedes network (social) value

http://en.wikipedia.org/wiki/File:Maslow%27s_Hierarchy_of_Needs.svg

Personality

The particular combination of emotional, attitudinal, and behavioural response patterns of an individual

Why is personality important?

Personality traits affect the software life cycle phases
– well or badly

For example: introversion/extroversion might have a significant impact on system analysis

Image: http://unrealitymag.com/index.php/2010/05/07/modern-wizard-of-oz/

Personality types

Jung (1921) identified

- two attitude-types
  - *Introversion* - those who limit their activities and carry them on intensively. They are inner directed
  - *Extraversion* - those who are extensive in their activities and therefore less intense
- two function-types
  - *Rational* - those who process information somewhat like a computer. They organise experience in a framework of cause and effect [Sensing & Thinking]
  - *Irrational* - those who process information like a network. They organise experience in a framework of patterns with more complex and higher dimensional structures [iNuitive & Feeling]

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Extraversion ⟺ Introversion

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Expressive	Reserved
Energised by prolonged contact with others	Drained
Drained by time alone	Energised
Speak before they think	Think before they speak
External motivation	Internal motivation
Process by talking	Can't process while anyone is talking
Need contact	Need time alone

Jung says these needs are *basic*

Es seem to be the majority

Our culture created by Es for Es

Es take pride in adjusting to others, fitting in

If those needs are not met:

Es become depressed, *Is become anxious, irritable, confused*

http://cs.anu.edu.au/~Ian.Barnes/research/slides.html

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Sensing ⟺ iNtuition

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Observant	Imaginative
What is	What can be
Body	Head, mind
Quantitative	Qualitative
Experiment	Theory
Facts in the real world	Theories and patterns
Attention to detail	Bored by detail
Not interested in theory	Only interested in underlying principle
Trees	Forest

More Ss than Ns in the world

The best of N - Einstein *N taken to extreme - John Nash* A Beautiful Mind

http://cs.anu.edu.au/~Ian.Barnes/research/slides.html

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Thinking ⟺ Feeling

Thinking	Feeling
Tough-minded	Friendly
Objective	Sympathetic
Practical	Personal
Get the job done	Feels like an insult
Being right	Values and feelings

Extreme Ts lose friends over arguments about trivia.

Fs will compromise to avoid hurting someone.

This is about how people instinctively make decisions

Judging ⟺ Perceiving

Scheduling	Probing
	Looking around for alternatives
Work steadily	Work in bursts of creativity
Love to make plans and stick to them	Can't stand plans
Feel lost without them	Feel trapped by them
Hate to change them	More flexible
Like to have decisions made	Prefer to put them off

According to Js, they are organised, Ps are chaotic

According to Ps, they are flexible, Js are rigid

http://cs.anu.edu.au/~Ian.Barnes/research/slides.html

Personality Type & Software

S ⟷ N

- design vs. implementation
- language choice
- interface design

T ⟷ F

- teamwork
- correctness

P ⟷ J

- process

I ⟷ E

- work environment
- contact with clients
- interface design

http://cs.anu.edu.au/~Ian.Barnes/research/slides.html

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Generic SDLC

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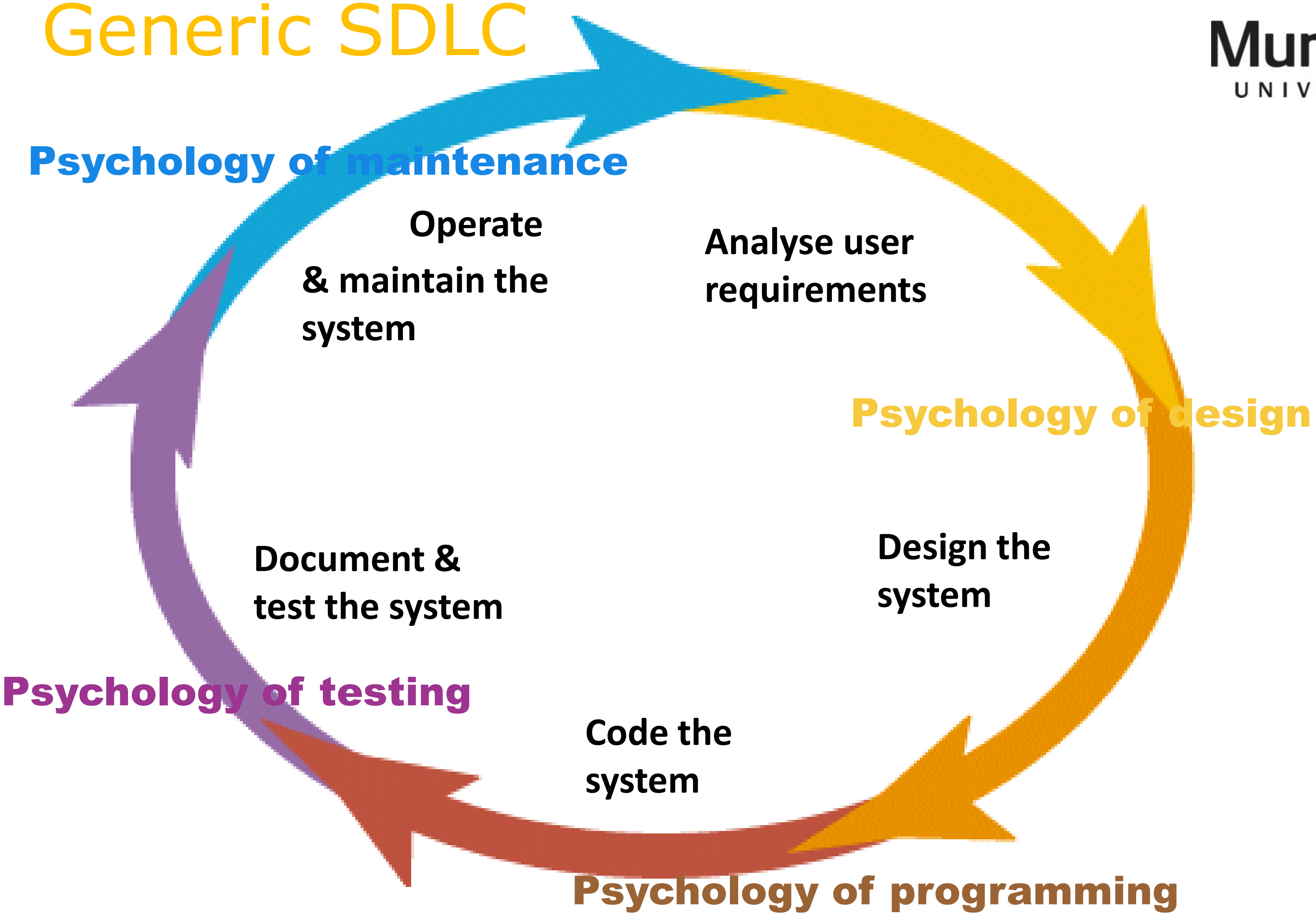
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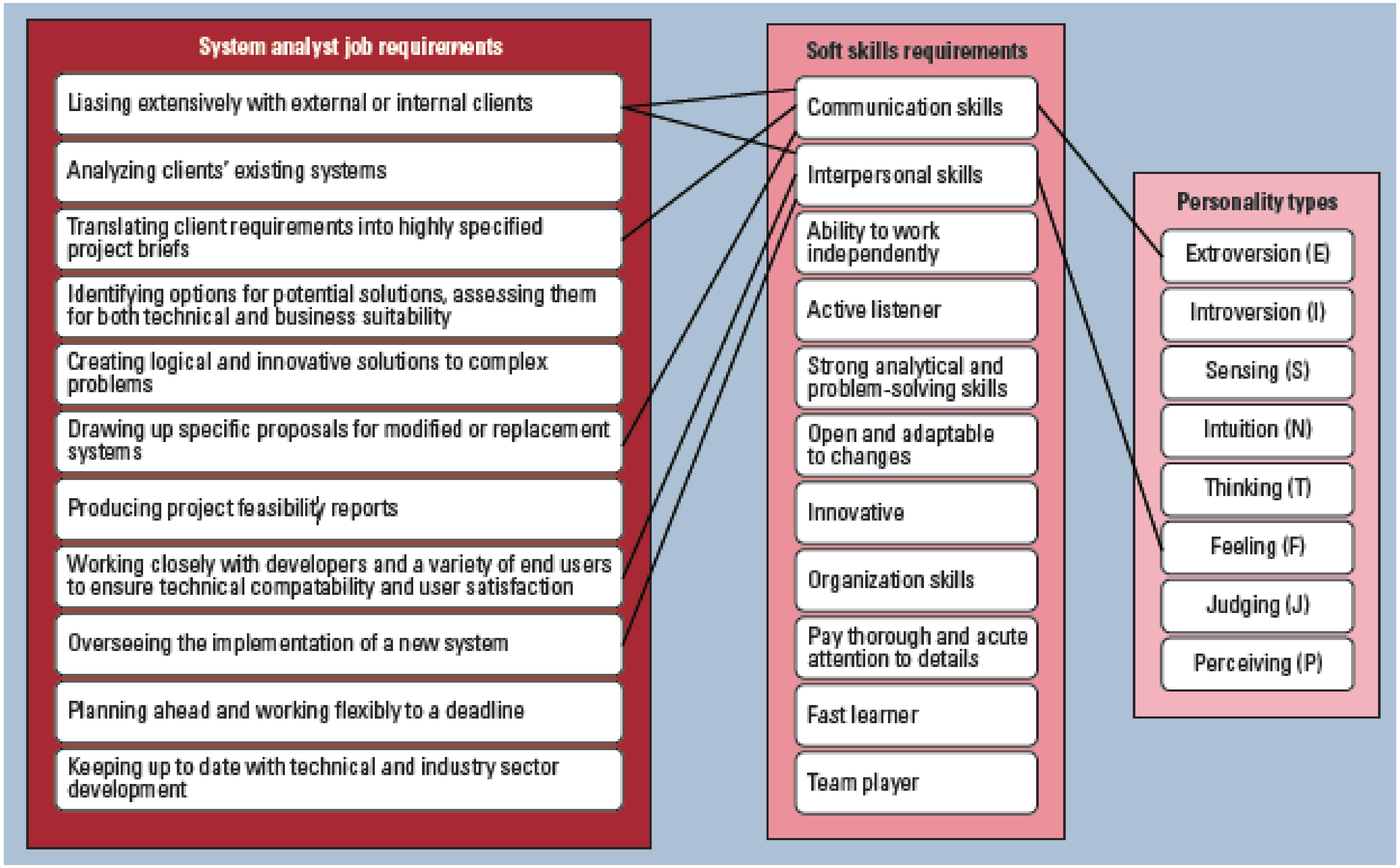
Early studies

Bush and Schkade (1985)	58 scientific programmers	ISTJ(25%); INTJ(16%); ENTP(9%) T(74%) ; J(70%)
Buie (1988)	computer professionals	ISTJ(19%); INTP(15%); INTJ (13%)
Smith (1989)	37 systems analysts	ISTJ(35%); ESTJ(30%); S(81%); T(89%) ; J(86%)
Lyons (1985)	1,229 software professionals	ISTJ(23%); INTJ(15%); INTP(12%); T(81%); J(65%); I(67%)
Turley & Bieman (1995)	programmers	I(90%); T(85%)
Hardiman (1997)	software engineers	mostly NTs and SJs
Chandler (2003)	Computing students at 3 UK universities	dominated by I; S; J; T(86%)

I - This may partially explain why software systems are notorious for not meeting users' requirements; it seems that there is some form of self-selection taking place with regard to career choice

Analysis


System analyst job requirements
Liasing extensively with external or internal clients
Analyzing clients' existing systems
Translating client requirements into highly specified project briefs
Identifying options for potential solutions, assessing them for both technical and business suitability
Creating logical and innovative solutions to complex problems
Drawing up specific proposals for modified or replacement systems
Producing project feasibility reports
Working closely with developers and a variety of end users to ensure technical compatability and user satisfaction
Overseeing the implementation of a new system
Planning ahead and working flexibly to a deadline
Keeping up to date with technical and industry sector development
Soft skills requirements
Communication skills
Interpersonal skills
Ability to work independently
Active listener
Strong analytical and problem-solving skills
Open and adaptable to changes
Innovative
Organization skills
Pay thorough and acute attention to details
Fast learner
Team player
Personality types
Extroversion (E)
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Judging (J)
Perceiving (P)

http://www.wtst.org/2011/WTST2011CapretzPaperv2.pdf

Psychology of Design

How people interact with the world of human-made artifacts

There is evidence that psychological methods, theories, and findings are becoming increasingly important to design.

The fields of human factors, human–computer interaction, and environmental psychology, of course, have long brought design and psychology together.

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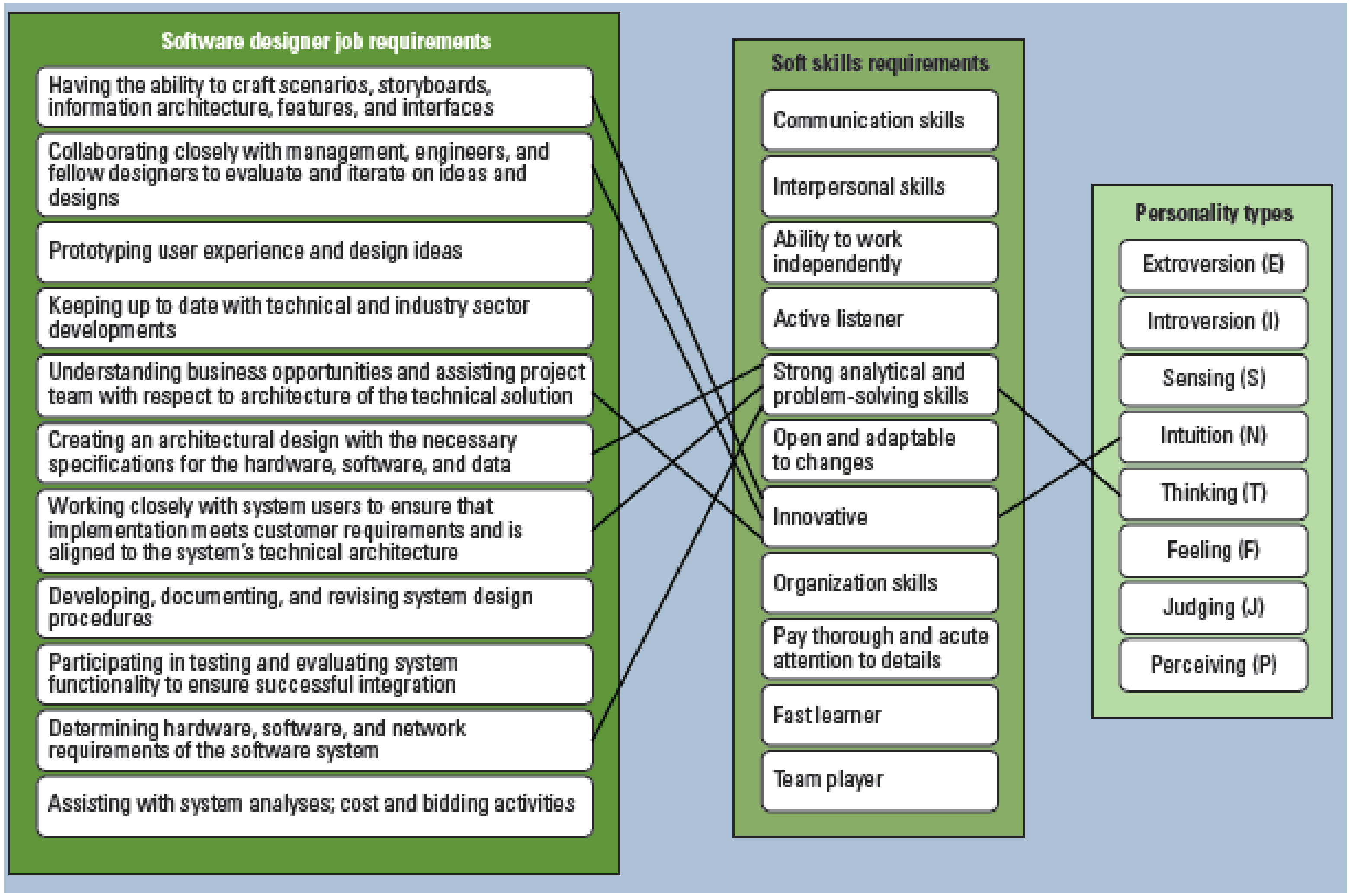
Design



Software designer job requirements
Having the ability to craft scenarios, storyboards, information architecture, features, and interfaces
Collaborating closely with management, engineers, and fellow designers to evaluate and iterate on ideas and designs
Prototyping user experience and design ideas
Keeping up to date with technical and industry sector developments
Understanding business opportunities and assisting project team with respect to architecture of the technical solution
Creating an architectural design with the necessary specifications for the hardware, software, and data
Working closely with system users to ensure that implementation meets customer requirements and is aligned to the system's technical architecture
Developing, documenting, and revising system design procedures
Participating in testing and evaluating system functionality to ensure successful integration
Determining hardware, software, and network requirements of the software system
Assisting with system analyses; cost and bidding activities
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Psychology of Design

"I'm very curious, I probably ask too many questions and I also probably observe things most people wouldn't and that then in turn informs my work”

“I purely start a dialogue for design, start a dialogue for a relationship I'm intending to build with these companies and that's worked very well”

In designing effectively it's essential to observe the way people interact with products and understand the way they use things, or lack thereof

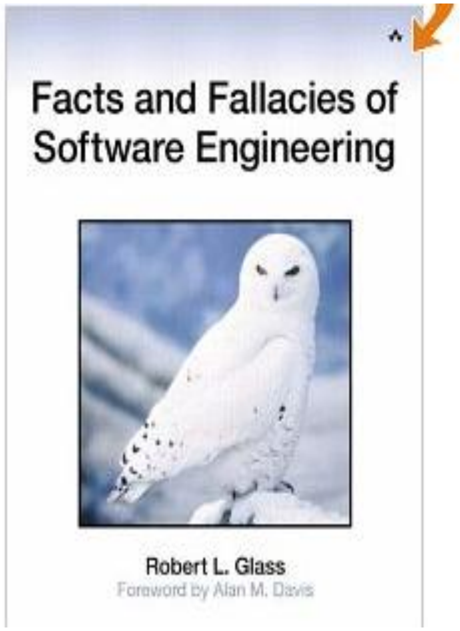
"If things are designed well people shouldn't need to think; good design should just be"

http://www.neoskosmos.com/news/en/design-Helen-Kontouris-HACCI

The Psychology of Computer Programming (Weinberg 1971)

Weinberg writes "This book has only one major purpose to trigger the beginning of a new field of study: computer programming as a human activity, or, in short, the psychology of computer programming. All other goals are subservient to that one."

The Psychology of Programming


Facts and Fallacies of Software Engineering
Robert L. Glass
Foreword by Alan M. Davis

Fact 1:
The most important factor in software work is not the tools and techniques used by the programmers, but rather the quality of the programmers themselves.

[p 11]

the best programmers are up to 28 times better than the worst programmers:

- Optimist or pessimist
- Sloppy code
- Long term planning
- Attention to detail

http://www.softwarebyrob.com/2006/08/20/personality-traits-of-the-best-software-developers/

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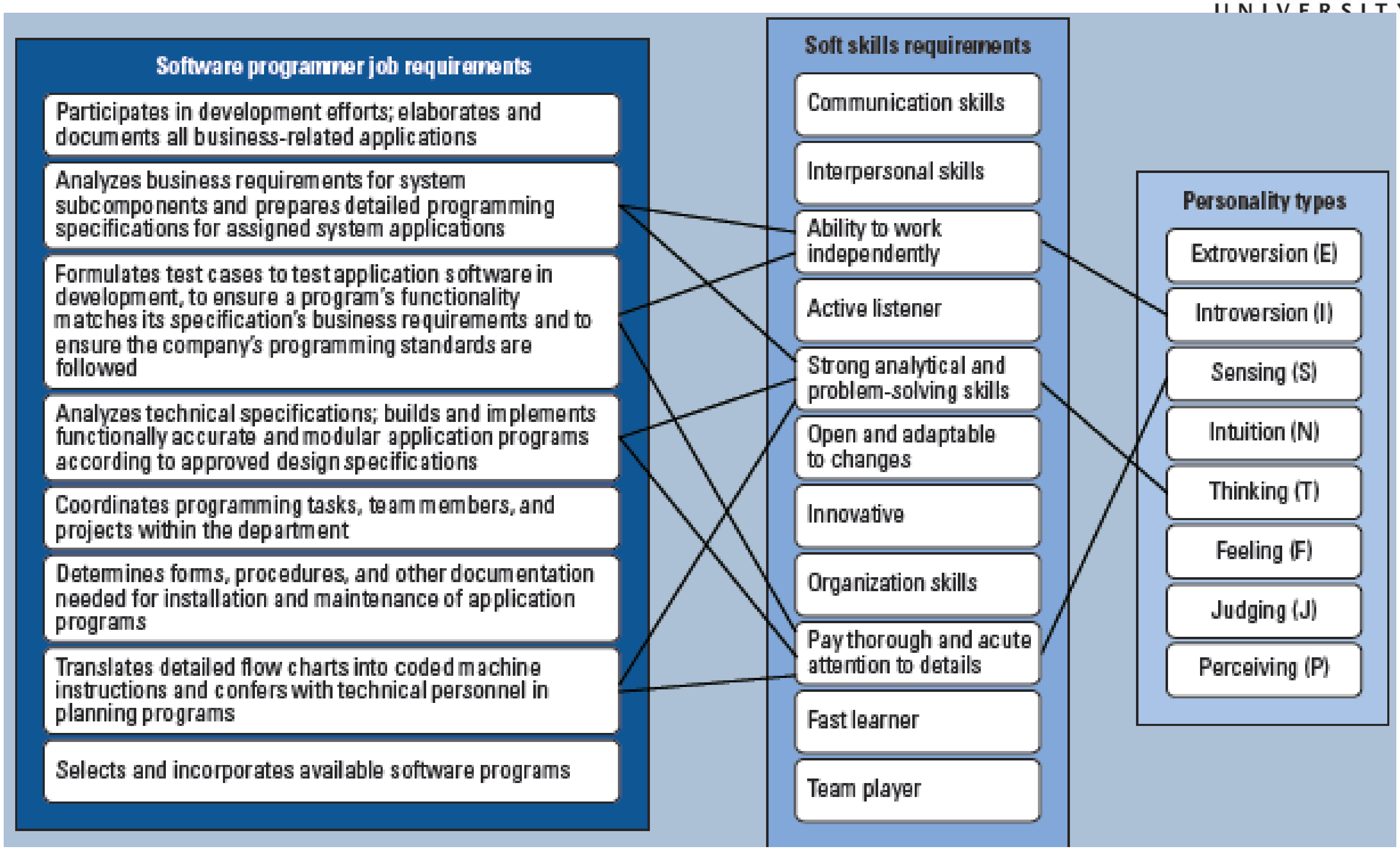
Programming


Software programmer job requirements
Participates in development efforts; elaborates and documents all business-related applications
Analyzes business requirements for system subcomponents and prepares detailed programming specifications for assigned system applications
Formulates test cases to test application software in development, to ensure a program's functionality matches its specification's business requirements and to ensure the company's programming standards are followed
Analyzes technical specifications; builds and implements functionally accurate and modular application programs according to approved design specifications
Coordinates programming tasks, team members, and projects within the department
Determines forms, procedures, and other documentation needed for installation and maintenance of application programs
Translates detailed flow charts into coded machine instructions and confers with technical personnel in planning programs
Selects and incorporates available software programs
Soft skills requirements
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Ability to work independently
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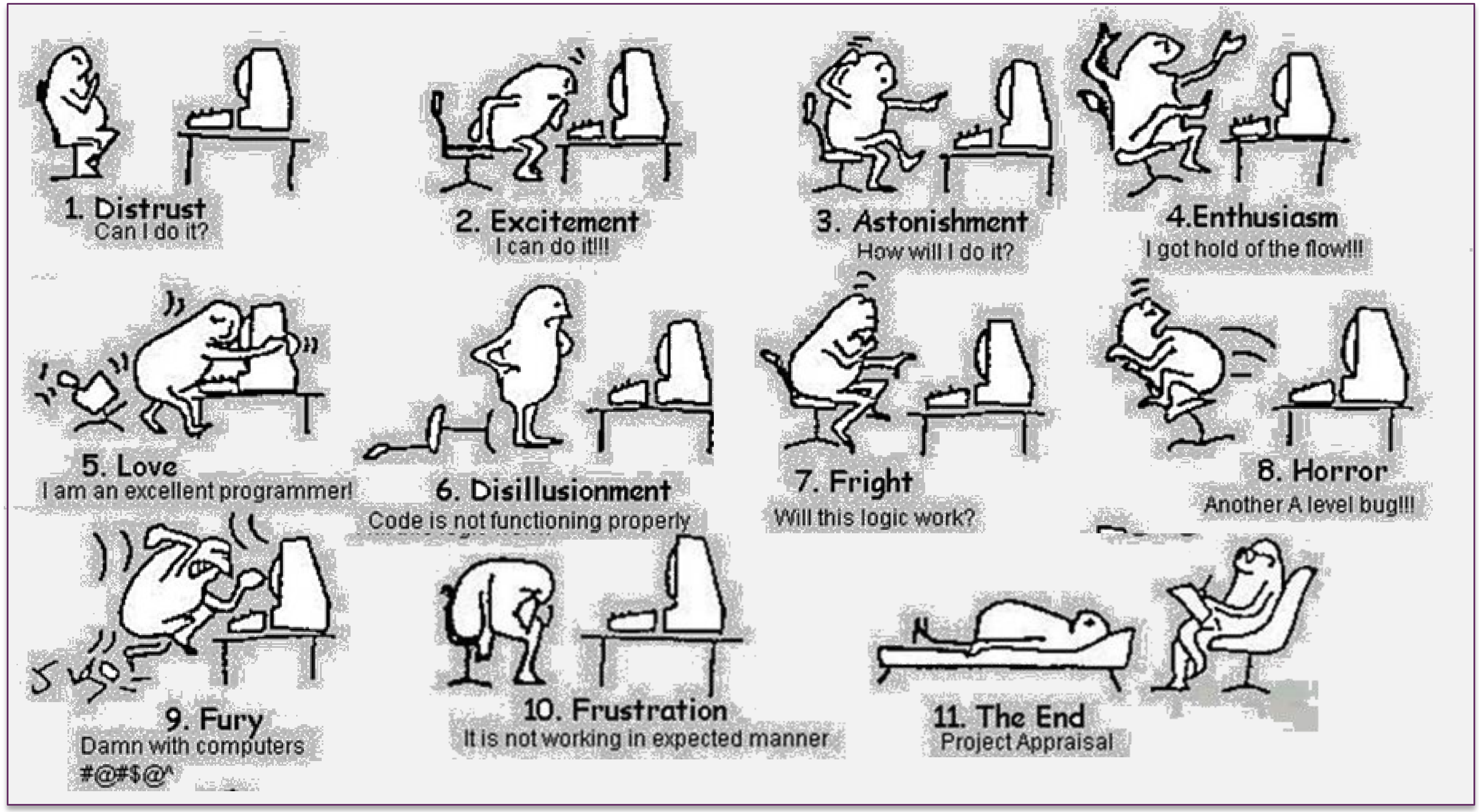
Programming



http://urdustar.com/home/beautifull-funny-images/111983-software-development-life-cycle-emotions.html

Software Testing

Testing is perceived as destructive job or negative job (as opposed to the creativity of development).

Software testing proves that the software works correctly [Definition1]

Testing is the process to detect the defects and minimize the risks associated with the residual defects [Definition 2]

http://www.codeproject.com/KB/bugs/Pratap.aspx

Psychology of Testing

[Definition 1]

This person's intentions would mostly revolve around the point to prove the software works. He/She will only give those inputs for which correct results are obtained.

However,

The testing has to be done without any emotional attachment to the software

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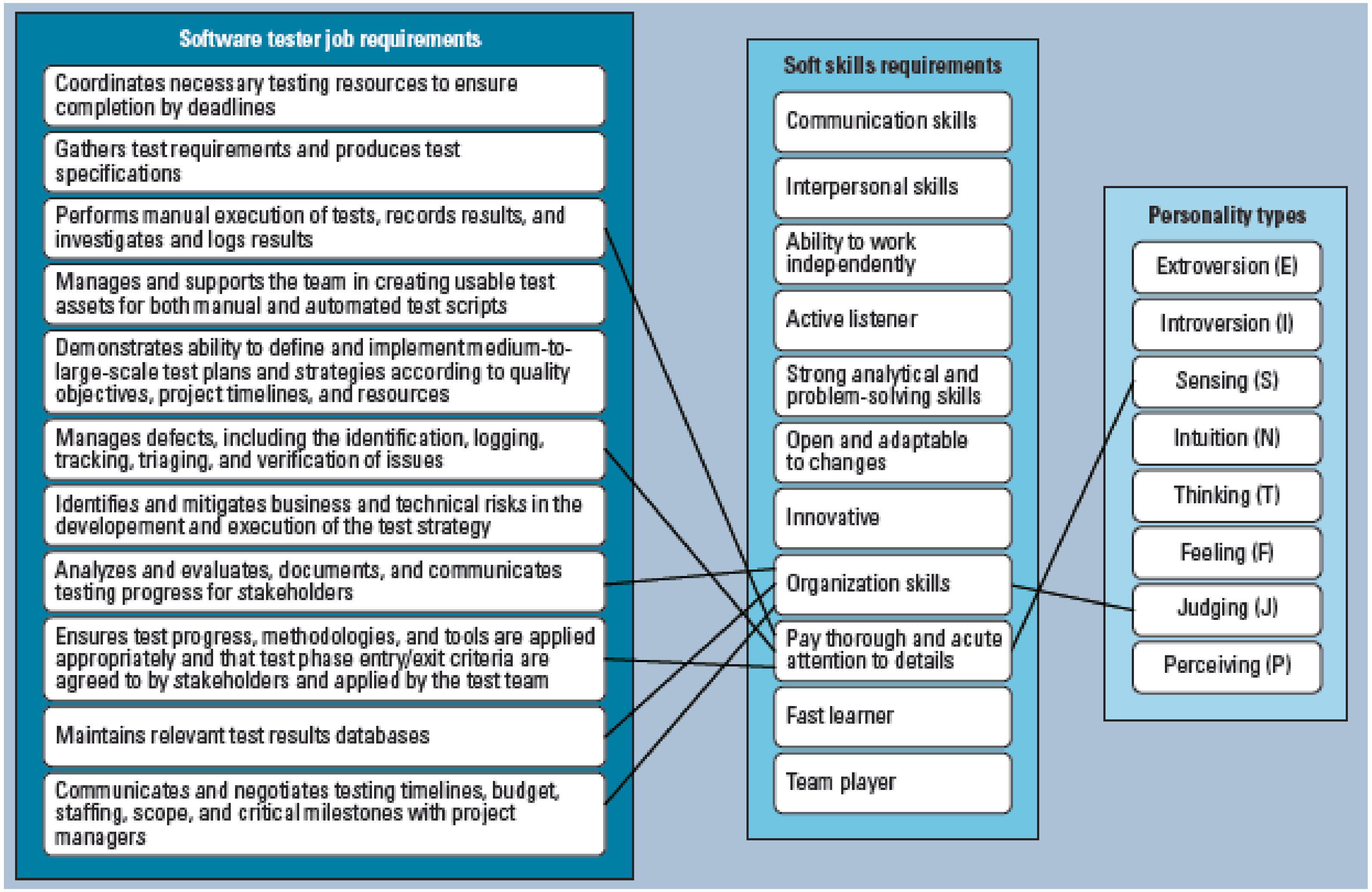
Testing


Software tester job requirements
Coordinates necessary testing resources to ensure completion by deadlines
Gathers test requirements and produces test specifications
Performs manual execution of tests, records results, and investigates and logs results
Manages and supports the team in creating usable test assets for both manual and automated test scripts
Demonstrates ability to define and implement medium-to-large-scale test plans and strategies according to quality objectives, project timelines, and resources
Manages defects, including the identification, logging, tracking, triaging, and verification of issues
Identifies and mitigates business and technical risks in the developement and execution of the test strategy
Analyzes and evaluates, documents, and communicates testing progress for stakeholders
Ensures test progress, methodologies, and tools are applied appropriately and that test phase entry/exit criteria are agreed to by stakeholders and applied by the test team
Maintains relevant test results databases
Communicates and negotiates testing timelines, budget, staffing, scope, and critical milestones with project managers
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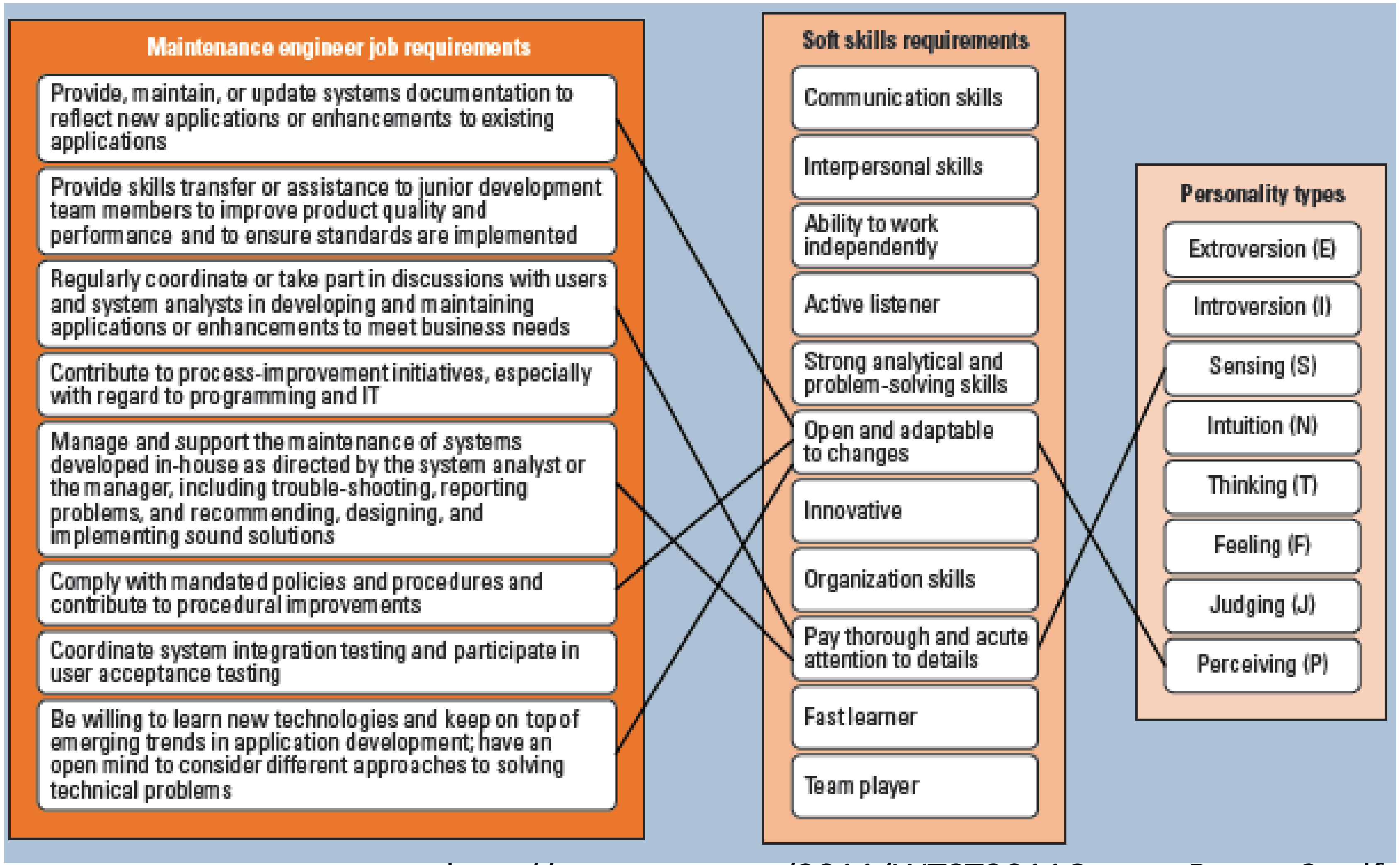
Maintenance



Maintenance engineer job requirements

- Provide, maintain, or update systems documentation to reflect new applications or enhancements to existing applications
- Provide skills transfer or assistance to junior development team members to improve product quality and performance and to ensure standards are implemented
- Regularly coordinate or take part in discussions with users and system analysts in developing and maintaining applications or enhancements to meet business needs
- Contribute to process-improvement initiatives, especially with regard to programming and IT
- Manage and support the maintenance of systems developed in-house as directed by the system analyst or the manager, including trouble-shooting, reporting problems, and recommending, designing, and implementing sound solutions
- Comply with mandated policies and procedures and contribute to procedural improvements
- Coordinate system integration testing and participate in user acceptance testing
- Be willing to learn new technologies and keep on top of emerging trends in application development; have an open mind to consider different approaches to solving technical problems

Soft skills requirements

- Communication skills
- Interpersonal skills
- Ability to work independently
- Active listener
- Strong analytical and problem-solving skills
- Open and adaptable to changes
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Implications

Generally speaking, managers hire people with whom they are comfortable - people they like - in their own image (probably is **not a good software developer type**)

The software industry can't afford to lose professionals who might come from a diverse group of people

Certain characteristics may be less desirable now than they were in the past

From the past into the future?

Current vs 'Traditional' projects…

Managers have to cope with at least seven critical dimensions of physical and psychic distance within the context of a project:

Physical Distance

- geographical
- time-zone

Psychic Distance

- linguistic
- emotional
- cultural
- normative
- regulative

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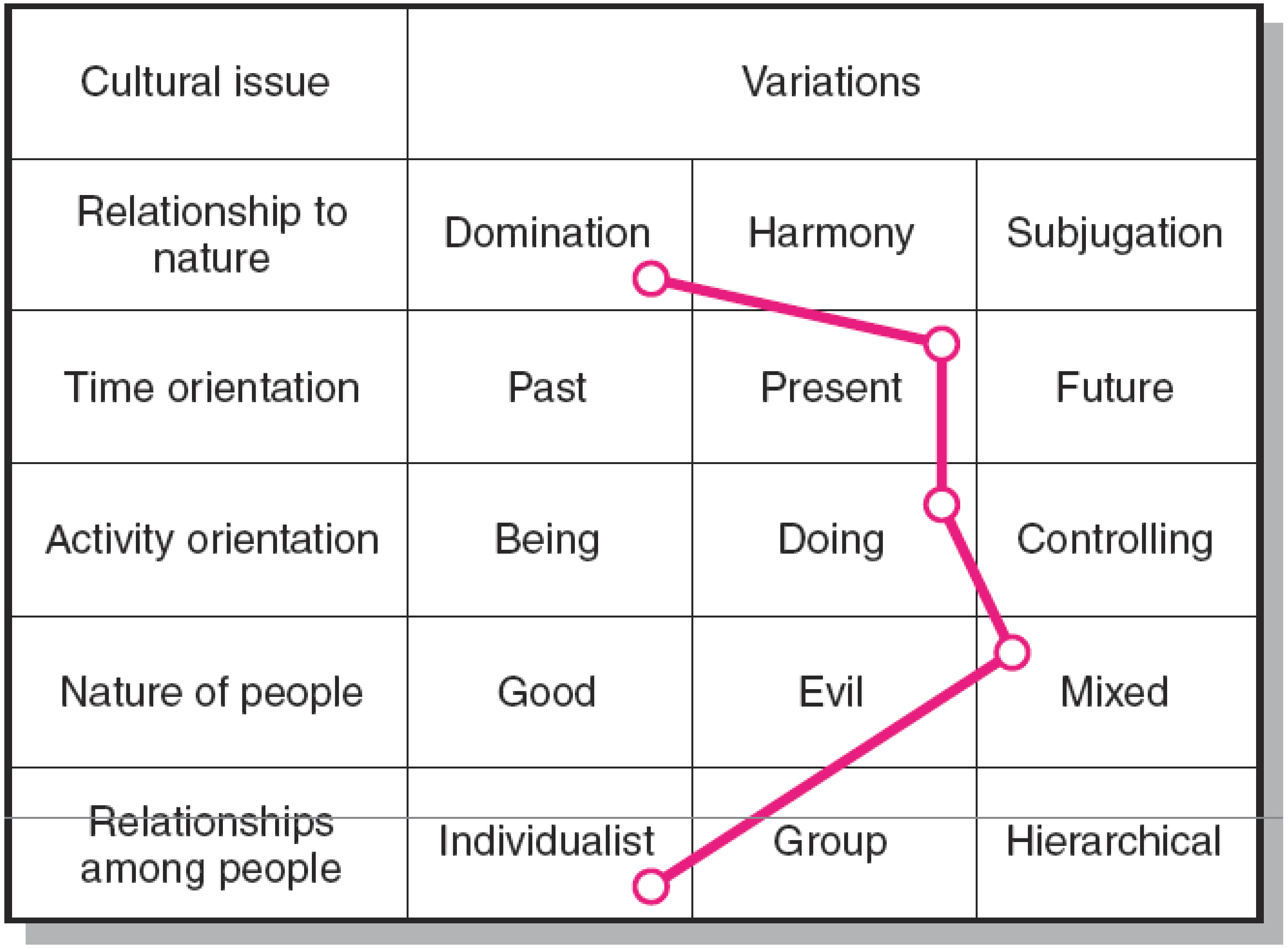
Kluckhohn-Strodtbeck's cross-cultural framework



Cultural issue	Variations		
Relationship to nature	Domination	Harmony	Subjugation
Time orientation	Past	Present	Future
Activity orientation	Being	Doing	Controlling
Nature of people	Good	Evil	Mixed
Relationships among people	Individualist	Group	Hierarchical

Note: **The line indicates where the United States tends to fall along these issues.**

Hofstede cultural dimensions framework

Individualism versus collectivism

- Identifies whether a culture holds individuals or the group responsible for each member's welfare

Power distance

- Describes degree to which a culture accepts status and power differences among its members

Uncertainty avoidance

- Identifies a culture's willingness to accept uncertainty and ambiguity about the future

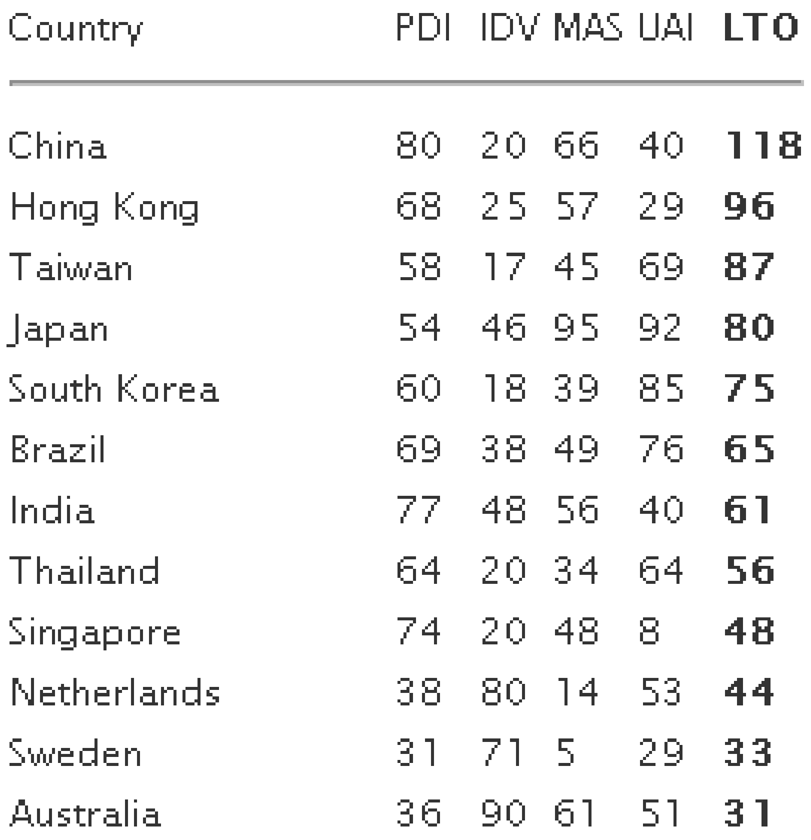
Masculinity-femininity

- Describes the degree to which the culture emphasises competitive and achievement-oriented behavior or displays concerns for relationships

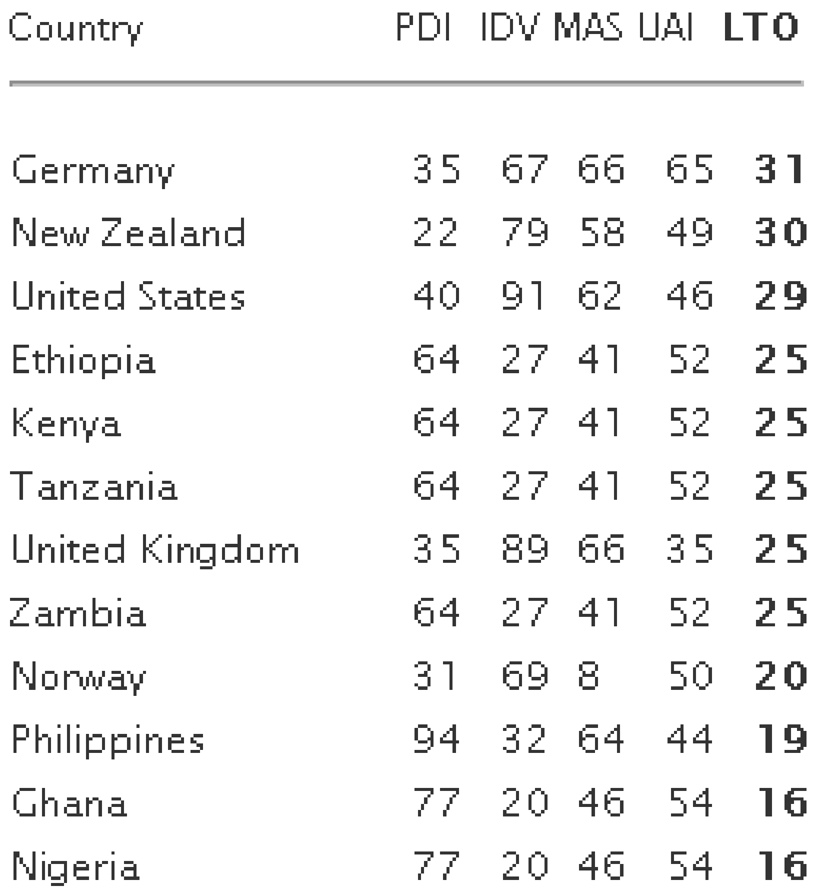
Long-term orientation

- Describes the difference in thinking between the East and West based on an understanding of the influence of the teaching of Confucius on the East

Hofstede cultural dimensions framework …

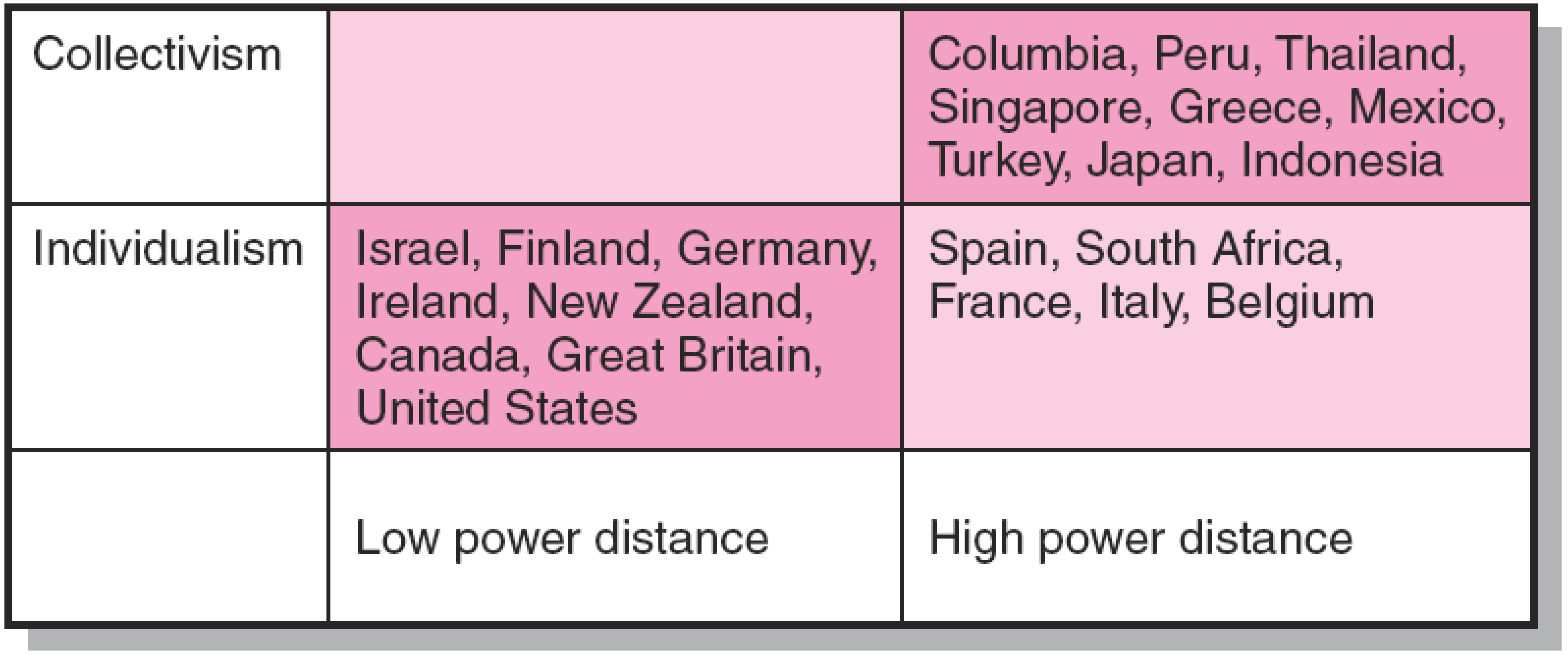


Country	PDI	IDV	MAS	UAI	**LTO**
China	80	20	66	40	**118**
Hong Kong	68	25	57	29	**96**
Taiwan	58	17	45	69	**87**
Japan	54	46	95	92	**80**
South Korea	60	18	39	85	**75**
Brazil	69	38	49	76	**65**
India	77	48	56	40	**61**
Thailand	64	20	34	64	**56**
Singapore	74	20	48	8	**48**
Netherlands	38	80	14	53	**44**
Sweden	31	71	5	29	**33**
Australia	36	90	61	51	**31**



Country	PDI	IDV	MAS	UAI	**LTO**
Germany	35	67	66	65	**31**
New Zealand	22	79	58	49	**30**
United States	40	91	62	46	**29**
Ethiopia	64	27	41	52	**25**
Kenya	64	27	41	52	**25**
Tanzania	64	27	41	52	**25**
United Kingdom	35	89	66	35	**25**
Zambia	64	27	41	52	**25**
Norway	31	69	8	50	**20**
Philippines	94	32	64	44	**19**
Ghana	77	20	46	54	**16**
Nigeria	77	20	46	54	**16**

Example: Hofstede's dimensions of individualism-collectivism & power distance



Collectivism		Columbia, Peru, Thailand, Singapore, Greece, Mexico, Turkey, Japan, Indonesia
Individualism	Israel, Finland, Germany, Ireland, New Zealand, Canada, Great Britain, United States	Spain, South Africa, France, Italy, Belgium
	Low power distance	High power distance

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Hofstede’s power distance

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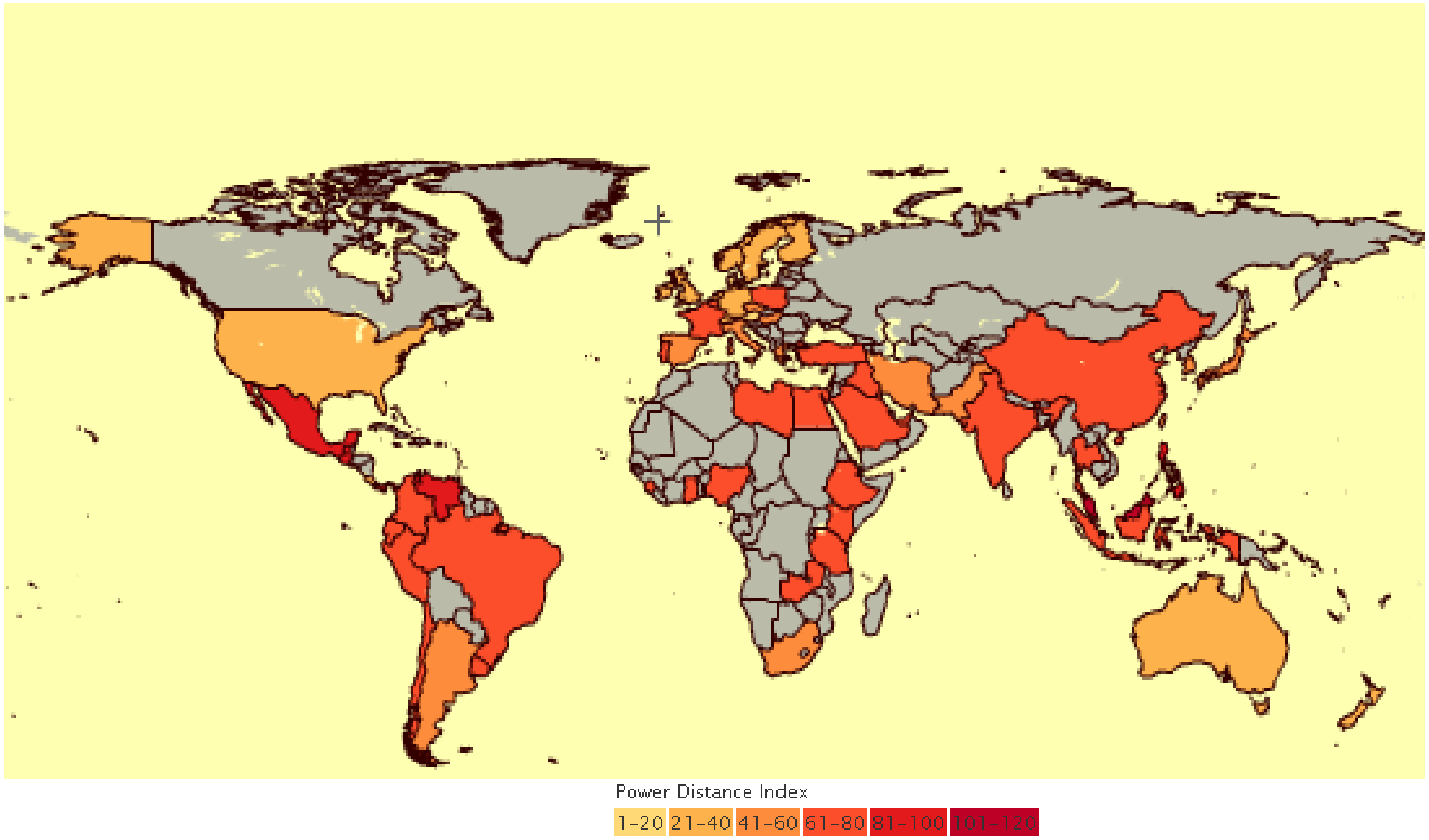
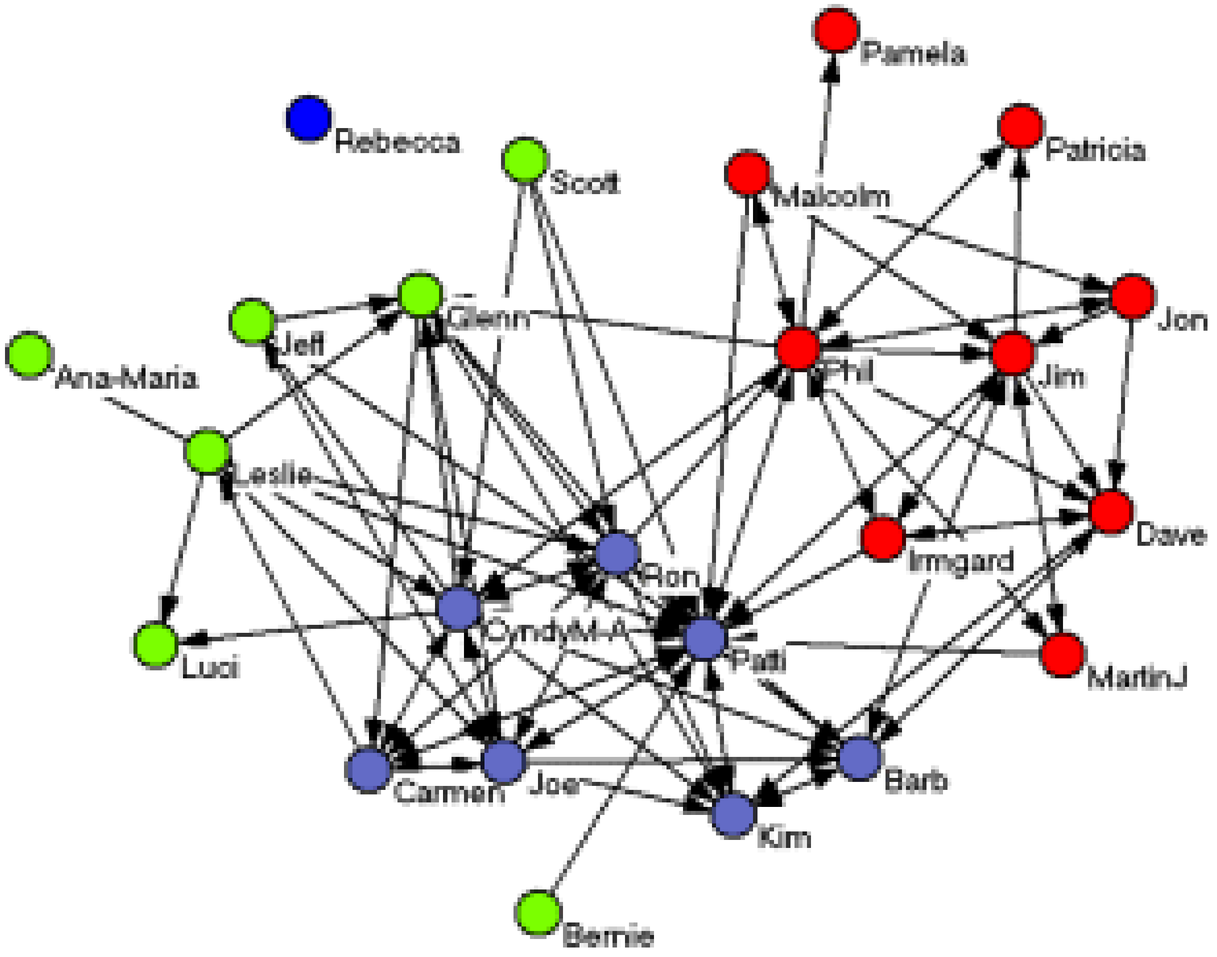


Social Network Analysis



http://www.byeday.net/sna/

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