Software Testing & Human Factors

Luiz Fernando Capretz

University of Western Ontario

Canada

lcapretz@uwo.ca

What is Software Psychology?

The marriage between psychology and software engineering.

We think too readily of programs as just being for execution. We should think of them as vehicles for expressing our own thoughts to others.

Why is Software Psychology Important?

When dealing with people remember:
You are dealing with creatures of logic and emotions.

The expression that best describes you lifestyle is:

- 1) Not guts, no glory
- 2) Just do it!
- 3) Look before you leap
- 4) All good things come to those who wait

Myers-Briggs Type Indicator

We all observe differently, but behavior based on perception can be predictable.

- Based on the work of Carl Jung
- Way to sort, not to measure
- Used internationally
- Reliability and Validity

MBTI

- “Who I am and who are they?”
- Know yourself first, then understand others
- Implications of MBTI in software engineering

MBTI Theory

- Seemingly random human behavior is actually quite orderly and consistent
- Due to basic instinct and common sense we prefer to use our perception and judgement in different ways

More MBTI Theory

- Perception: all the ways of becoming aware of things, people, happenings, ideas
- Judgement: all the ways of coming to conclusions about what has been observed
- My assumption is that these are critical variables in software development

MBTI Scales

- Extrovertion (E)
- Sensing (S)
- Thinking (T)
- Judging (J)

- Introvertion (I)
- iNtuition (N)
- Feeling (F)
- Perceiving (P)

*right/left hand

Extroverts (E) vs Introverts (I)

- Active
- People
- Participative
- Change the world

- Contained
- Privacy
- Reflective
- Understand

*talk to think/think to talk

Sensing (S) vs iNtuition (N)

- Concrete
- Realistic
- Details
- Practical

- Theoretical
- Imaginative
- Patterns
- Original

*see the tree vs forest

Thinking (T) vs Feeling (F)

- Logical
- Objective
- Impersonal
- Cool-head

- Empathetic
- Subjective
- Caring
- Warm-heart

*gender difference

Judging (J) vs Perceiving (P)

- Plan ahead
- Control
- Early starter
- Organized

- Wait and see
- Adapt
- Pressure prompted
- Flexible

*look at their desks

MBTI Questions?

1) At parties, do you

- **A) sometimes get bored, or**
- **B) always have fun?**

2) Do you prefer to do many things

- **A) on the spur of the moment, or**
- **B) according to your plans**

3) Make (A) or (B) Create ?

4) Abstract (A) or (B) Solid ?

The 16 MBTI Types
16 Ways to Be Normal

ISTJ 11.6%	ISFJ 13.8%	INFJ 1.5%	INTJ 2.1%
ISTP 5.4%	ISFP 8.8%	INFP 4.4%	INTP 3.3%
ESTP 4.3%	ESFP 8.5%	ENFP 8.1%	ENTP 3.2%
ESTJ 8.7%	ESFJ 12.3%	ENFJ 2.5%	ENTJ 1.8%

Population Statistics

- E’s and I’s are split 50% : 50%
- S’s outnumber N’s at 2:1
- Men are 60% Thinking
- Women are 60% Feeling
- Judging/Perceiving 55% : 45%

What is your Preference?

Software Engineers

ISTJ 24%	ISFJ 2%	INFJ 1%	INTJ 7%
ISTP 8%	ISFP 5%	INFP 2%	INTP 8%
ESTP 8%	ESFP 1%	ENFP 3%	ENTP 7%
ESTJ 15%	ESFJ 4%	ENFJ 1%	ENTJ 4%

Some Comments

- ISTJ, ISTP, ESTP, ESTJ: 55%
- ISFJ, INFJ, INFP, ESFP, ENFJ: 5%
- ST and NT are abundant (technology)
- SF and NF are scarce (people-oriented)

More Comments

- Introverts = 57%, Extroverts = 43%
- Sensing = 67%, iNtuitives = 33%
- Thinking = 81%, Feeling = 19%
- Judging = 58%, Perceiving = 42%

UWO Engineers (1,252 subjects)

ISTJ 19.5%	ISFJ 3.3%	INFJ 3.0%	INTJ 10.1%
ISTP 8.2%	ISFP 2.9%	INFP 4.3%	INTP 9.9%
ESTP 5.4%	ESFP 2.4%	ENFP 3.6%	ENTP 6.8%
ESTJ 10.9%	ESFJ 2.5%	ENFJ 2.3%	ENTJ 5.0%

Implications for Software Engineering

- Approach to technology
- Team interaction
- Communication with users
- Creativity and perseverance
- Diversity in the workplace

Implications: Requirements Analysis

- Talk to the user
- Communication skills
- Extroverts x Introverts
- What else?
- Sympathetic to users' needs
- Thinking x Feeling

Implications: Design

- Innovation
- Ability to see further
- Sensing x Intuition
- Other dimensions?
- Problem solving skills
- Thinking x Feeling

Implications: Programming

- Logical thinking
- Thinking x Feeling
- Other traits?
- Solitary work
- Introversion x Extroversion

“I did not realize that the success of tests is that they test the programmer, not the program”.

C. A. Hoare

What Makes a Good Software Tester?

- They are explores: not afraid to venture into the unknown
- They are trouble shooters: good at figuring out why something does not work
- They are relentless: keep trying, never dismiss a failure as a fluke
- They are creative: testing the obvious is not enough, try off-the-wall approach

What Makes a Good Software Tester?

- They are perfectionists: or get as close to perfection as they can
- They exercise good judgment: what to test? for how long? is it really a bug?
- They are tactful and diplomatic: how to tell the programmers that their baby is ugly?
- They are persuasive: make their points clear and convincing why the bug needs fixing.

Implications: Testing

- Systematic work
- Judging x Perceiving
- Another MBTI scale?
- Attention to details
- Sensing x Intuition

Testers Common Traits

- A software tester should preferably, and very generally speaking, be:
  - **Intelligent**: Testing is an intellectual type of work
  - **Creative**: Testing needs to be inventive to be effective
  - **Persevering**: Testing needs to go on and on despite resistance and pressure
  - **Systematic**: Testing needs to have a trustworthy coverage
  - **Good Communicator**: Testing has many stakeholders
  - **Courageous**: Testing can be perceived to bring bad news.

Interpersonal Skills

- Giving Criticism: We don't want to hurt each other by pointing out failures
- Tester have to give criticism. The basic rules are:
  - **Stay calm**: "Is it OK with you if we talk about my findings now?"
  - **Keep to the facts**: "Today I have found 17 failure in the invoicing feature"
  - **Don't blame**: "We need to stabilizing this situation, anything I can do?"
  - **Keep an open mind**: "I could be wrong"
  - **Ask for clarification**: "How do you suggest I go about reporting failures?"
  - **Make concessions**: when the criticism is legitimate, you have to admit to it frankly, otherwise you'll lose credibility!

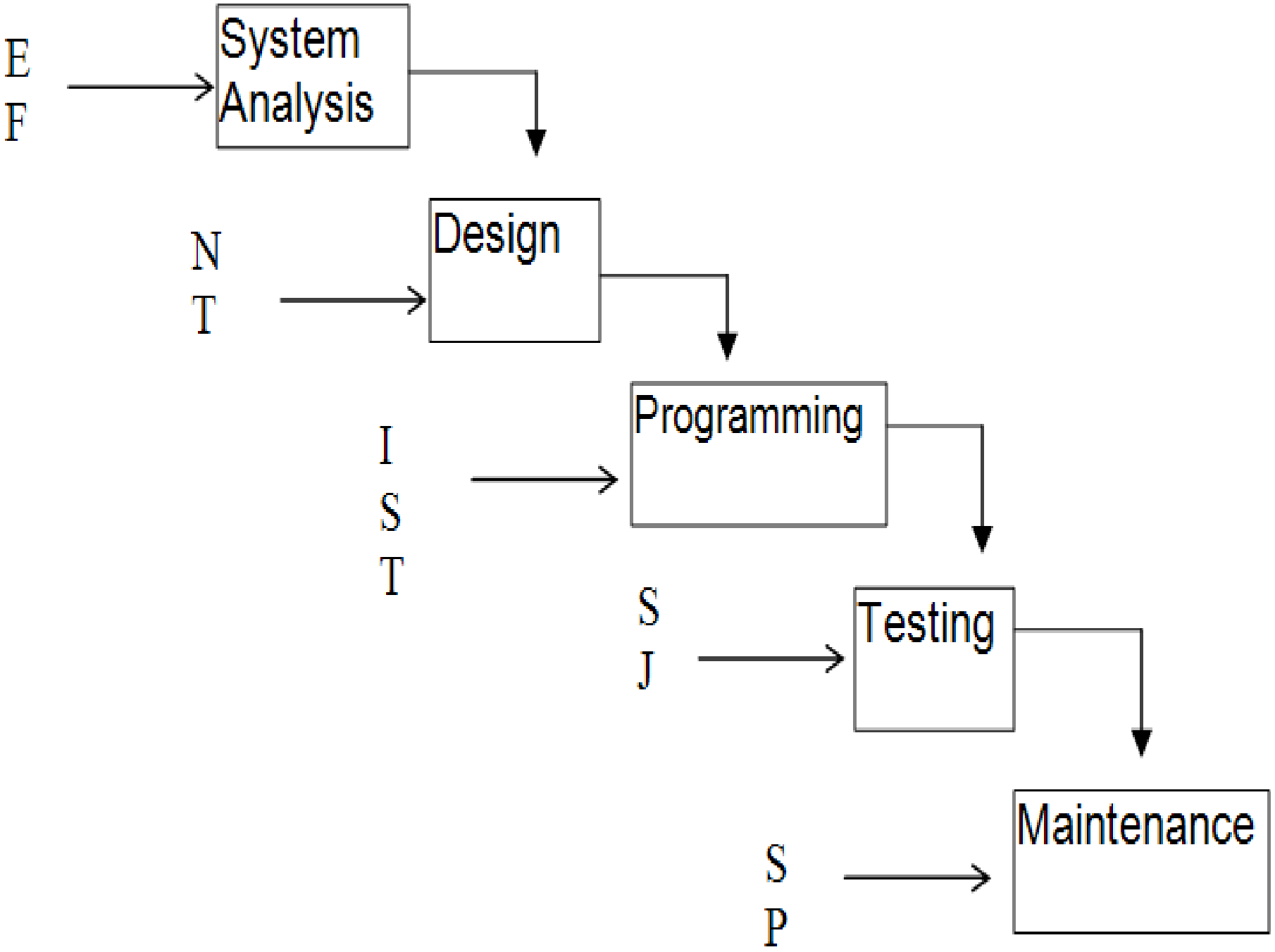
And Remember:

- Testing is difficult
- Testing requires overview
- Testing requires creativity
- Testing requires systematic work
- Testing requires imagination
- Testing requires courage
- Testing is fun!

Implications: Maintenance

- Fact-oriented
- Application of well-learned knowledge
- Sensing x Intuition
- Other MBTI dimensions?
- Open and adaptable to changes
- Judging x Perceiving

MBTI Dimensions	*Software Life Cycle Phases*				
	Systems Analysis	Software Design	Programming	Testing	Maintenance
Extroversion (E)	√				
Introversion (I)			√		
Sensing (S)			√	√	√
Intuition (N)		√			
Thinking (T)		√	√		
Feeling (F)	√				
Judging (J)				√	
Perceiving (P)					√


E
F
System
Analysis
N
T
Design
I
S
T
Programming
S
J
Testing
S
P
Maintenance

MBTI and Teams

- Today many team are cross-functional and composed of peers with no one having direct authority over others. Thus, team members may be less certain of their respective roles.
- The MBTI can help team members manage these roles and contribute to the team in their own unique styles.

Team Organization

As a member of a team, MBTI helps you:

- Understand leadership styles
- Contribute to team functioning
- Be aware of things that annoy teammates
- Respond to team challenges
- Improve team productivity

Benefits

- Use type preferences to better understand yourself and how you function in a group setting.
- Understand your teammates and the contributions they may make to the team.
- Look for potential areas of strength and weakness, and growth.

More Benefits

- Help to match specific tasks assignments with team members according to their preferences.
- Supply a framework to better handle conflicts.
- Maximize team's diversity in order to reach more useful and insightful conclusions, and better decisions.

A Case Study

A team of 4 ESTJ, 2 ENTJ, 1 INTJ, 1 ENTP, 1 ESTP, 1 ENFJ

- 9 Extroverts vs. 1 Introvert (How we energize ourselves)
- 5 Sensors vs. 5 Intuitive (How we gather data)
- 9 Thinkers vs. 1 Feeler (What we base decisions on)
- 8 Judgers vs. 2 Perceiver (How we manage our time)

– Lots of E's
  - Not afraid to speak up but we can come across as too brash. Need to focus on our listening skills

– Equal S's and N's
  - Good balance of fact-gathering and reading between the lines

– Lots of T's
  - Base our decisions on facts and data but may not take people's feelings into consideration.

– Lots of J's
  - Very good at adhering to schedules, but may not be open to considering alternatives and spotting new opportunities

Predictions about Teams

- Groups with high similarity will reach quicker decisions but are more likely to make errors due to inadequate representations of all viewpoints.
- Groups with many different types will reach decision more slowly (and painfully) but may reach better decisions because more viewpoints are covered.
- Teams that come to appreciate and use different types may experience less conflict.

Other Issues

- In small companies SEs play different roles.
- MBTI only sorts preferences, it does not predict success in a career.
- It does not measure intelligence, competence or productivity.
- Avoid using MBTI alone as a basis of selection for team membership and team task assignment. Remember that MBTI sorts preferences; it does not measure abilities.

Conclusions

- We do what we are
- Awareness of personality difference may help cope with frustrations during software development
- The software engineering field profits from diversity

Wanna Know More?

- www.mbti.org
- www.myersbriggs.org
- www.humanmetrics.com
- “Making Sense of Personality Types and Software Development” , by L. Capretz and F. Ahmed, IEEE IT Professional, 2010.
- “Why Do We Need Personality Diversity in Software Engineering?”, ACM SIGSOF Software Engineering Notes, 2010.

Teaching = Coaching

I push you to perform to the best of your abilities.