Human Systems
integration division

Operational Guidance

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A Collaborative Project between SWA and NASA

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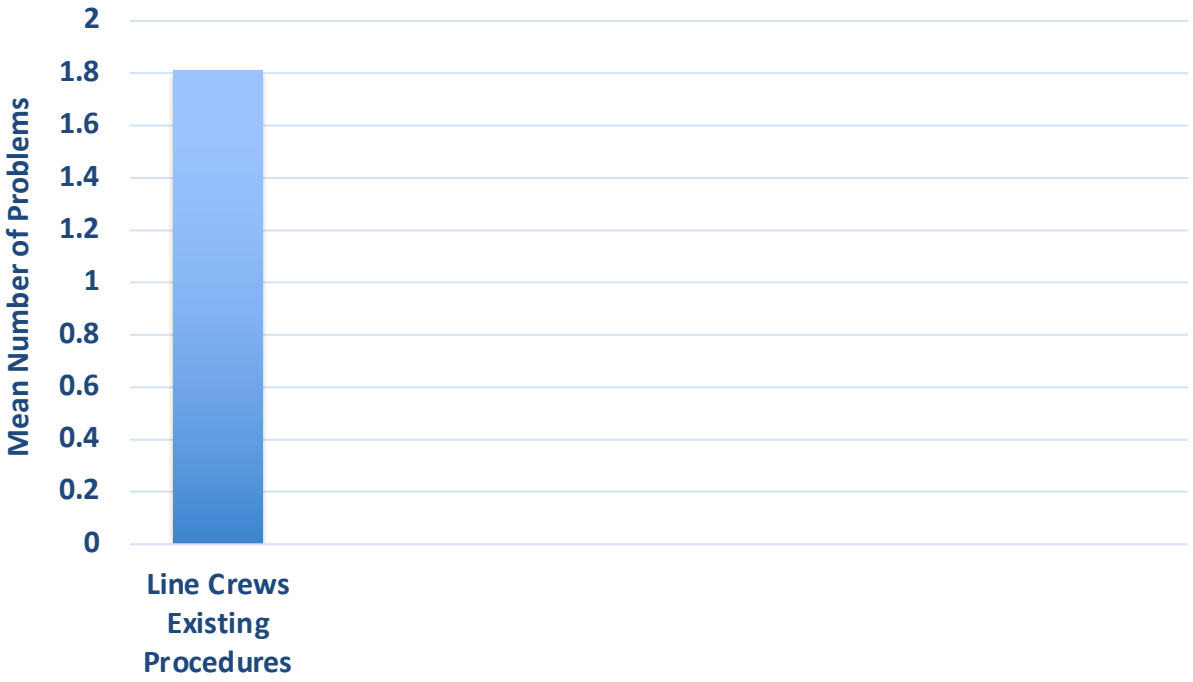
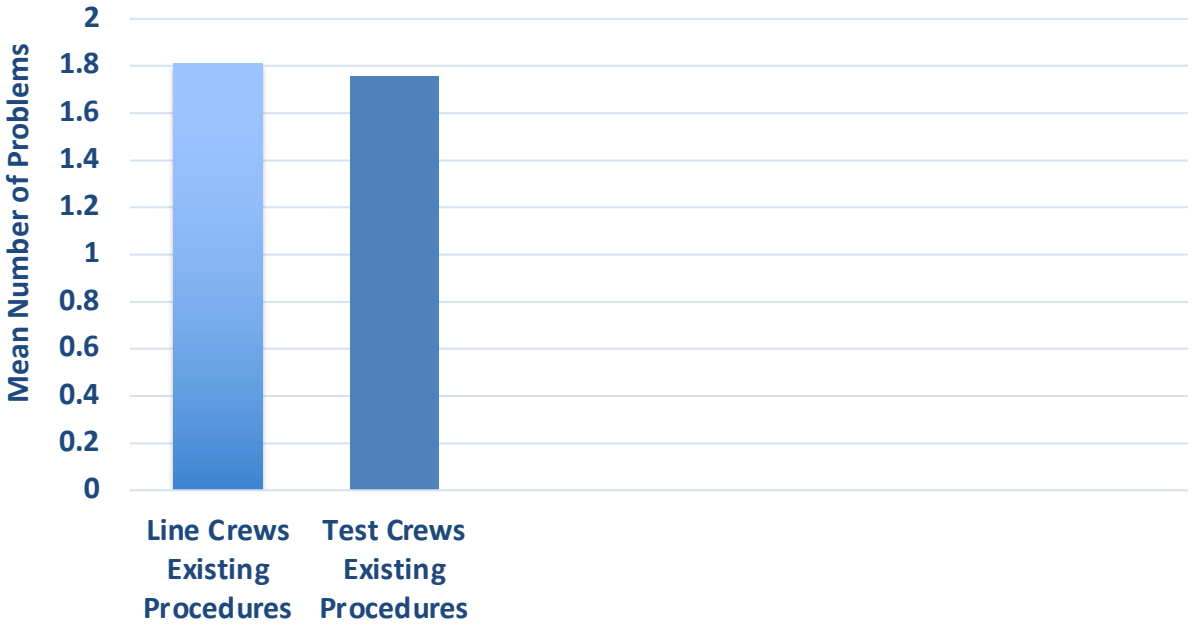
- An iterative procedure design, development, and testing process.
- An extensive validation and evaluation process.

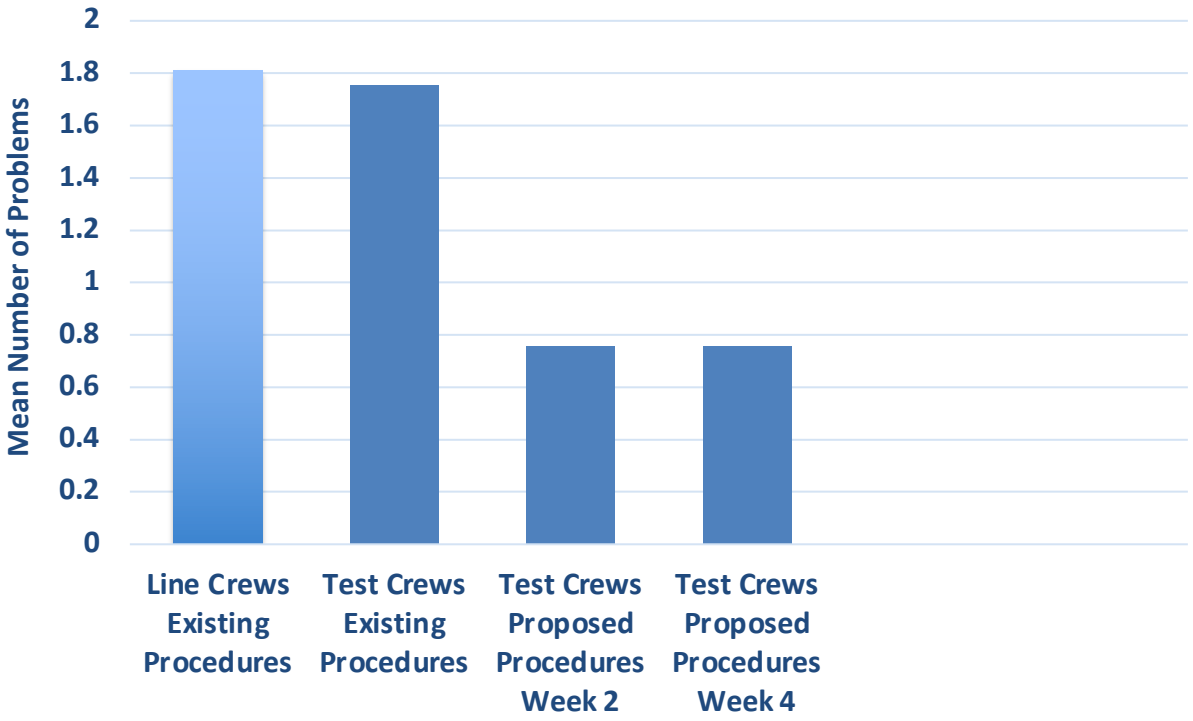
Mean Number of Problems on Target Items per Flight: Understanding Existing Operations



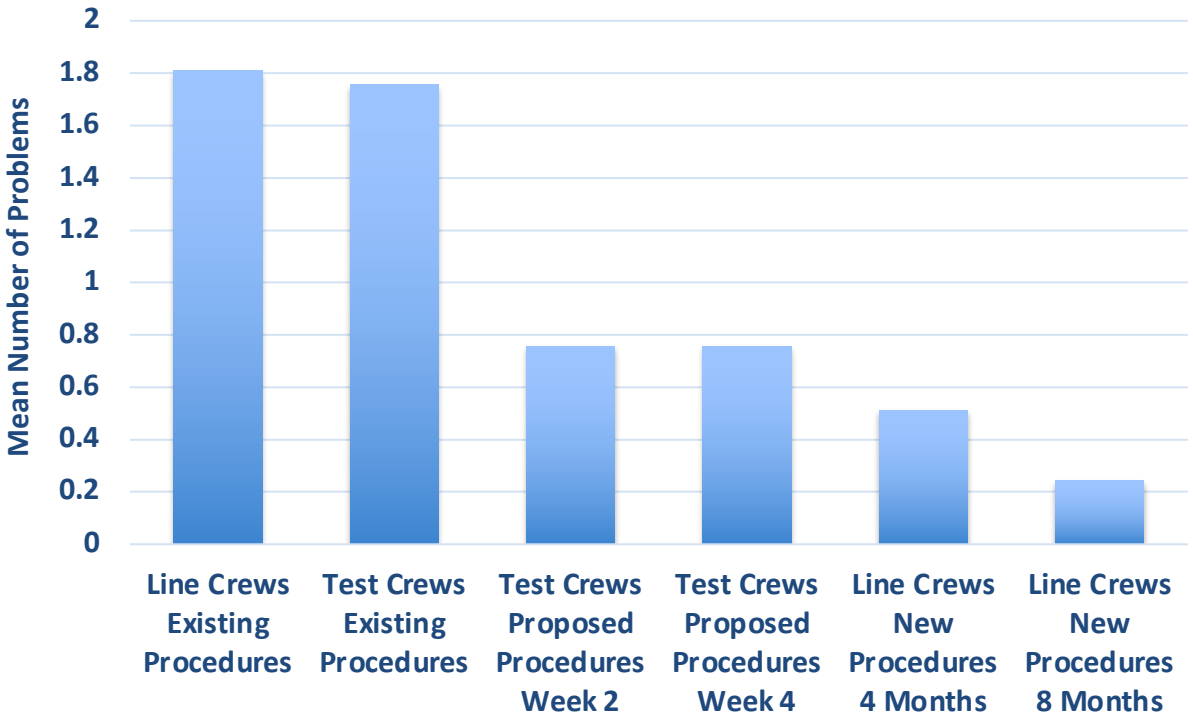
Mean Number of Problems on Target Items per Flight: Setting a Base Rate for the Validation of the Proposed Procedures

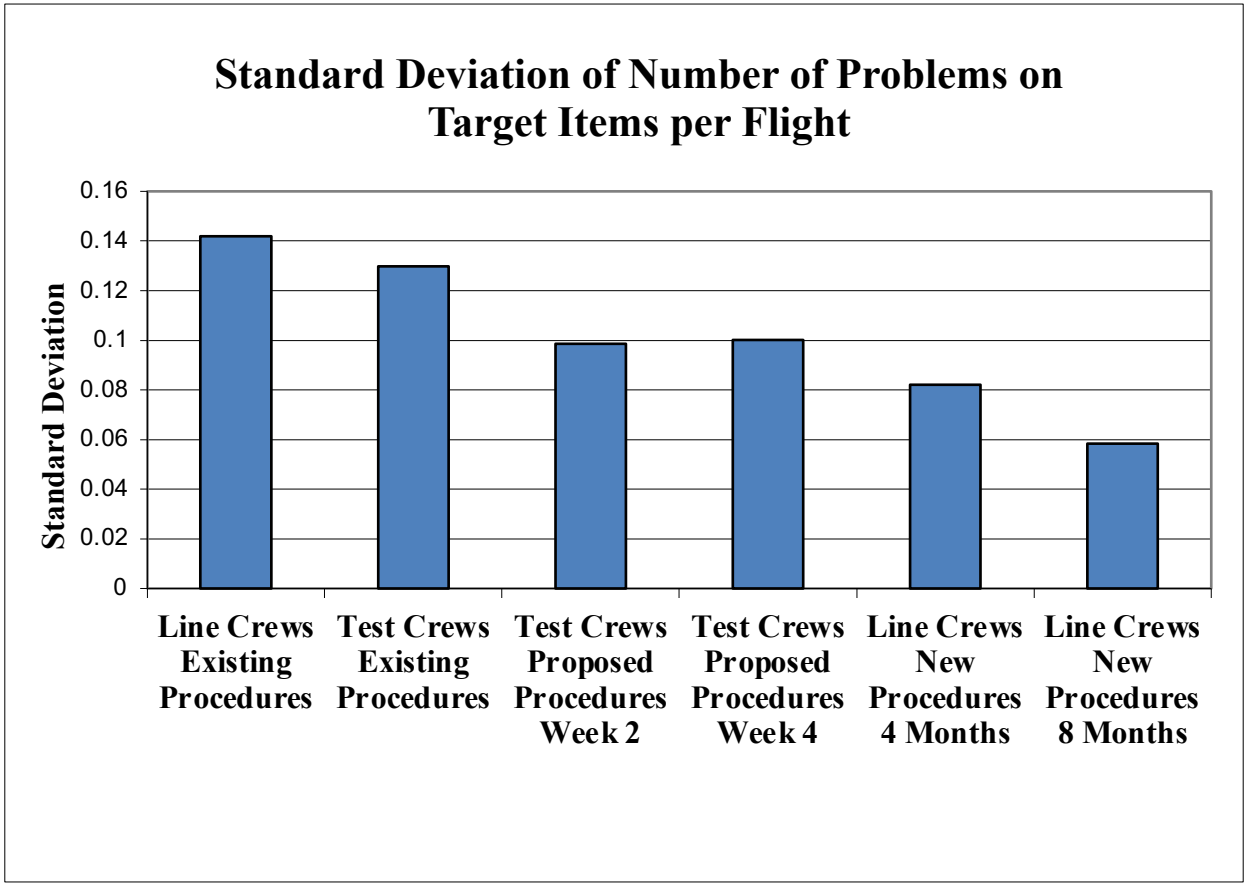


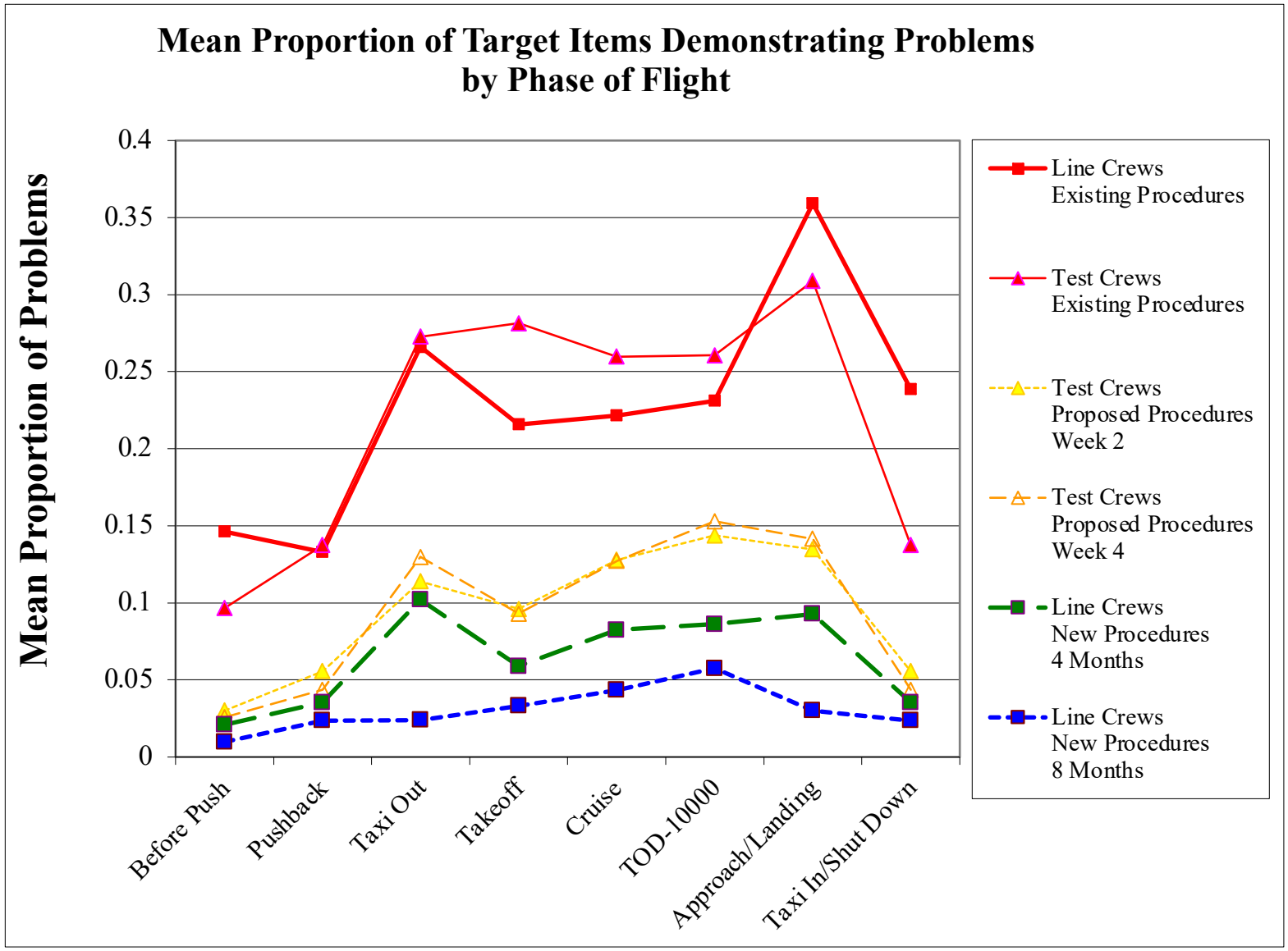
Mean Number of Problems on Target Items per Flight: Validating the Proposed Procedures



Mean Number of Problems on Target Items per Flight: The Complete Evaluation




Standard Deviation of Number of Problems on Target Items per Flight
Standard Deviation
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Line Crews Existing Procedures
Test Crews Existing Procedures
Test Crews Proposed Procedures Week 2
Test Crews Proposed Procedures Week 4
Line Crews New Procedures 4 Months
Line Crews New Procedures 8 Months


Mean Proportion of Target Items Demonstrating Problems
by Phase of Flight
Mean Proportion of Problems
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Before Push
Pushback
Taxi Out
Takeoff
Cruise
TOD-10000
Approach/Landing
Taxi In/Shut Down
Line Crews
Existing Procedures
Test Crews
Existing Procedures
Test Crews
Proposed Procedures
Week 2
Test Crews
Proposed Procedures
Week 4
Line Crews
New Procedures
4 Months
Line Crews
New Procedures
8 Months

Pilots' Perceptions of Flight Under the New Procedures Compared to Fight Under the Old Procedures 4 and 8 Months Following Adoption of the New Procedures			
Question		**Response**	
Compared to legs flown under the old procedures, on this leg:		Worse	Same or Better
How well did things go overall?	4 Months	10.1 % (12)	90.0% [26.9 (32); 63.0 (75)]
	8 Months	2.2% (2)	97.8% [18.7 (17); 79.1 (72)]
How well did you and the other pilot communicate?	4 Months	3.4 % (4)	96.6% [26.1 (31); 70.6 (84)]
	8 Months	2.2% (2)	97.8% [23.1 (21); 74.7 (68)]
How well did you and the other pilot check / monitor each other?	4 Months	2.5 % (3)	97.5% [22.9 (27); 74.6 (88)]
	8 Months	3.3% (3)	96.7% [17.6 (16); 79.1 (72)]
How well did you and the other pilot check / monitor the aircraft systems?	4 Months	2.5 % (3)	97.5% [38.7 (46); 58.8 (70)]
	8 Months	0.0% (0)	100.0% [31.9 (29); 68.1 (62)]
How tired were you?	4 Months	10.9 % (13)	89.1% [66.4 (79); 22.7 (27)]
	8 Months	4.4% (4)	95.6% [69.2 (63); 26.4 (24)]
How stressed did you feel?	4 Months	12.6 % (15)	87.4% [53.8 (64); 33.6 (40)]
	8 Months	2.2% (2)	97.8% [58.2 (53); 39.6 (36)]
How much effort did you expend?	4 Months	15.1 % (18)	84.9% [44.5 (53); 40.3 (48)]
	8 Months	5.6% (5)	94.4% [42.2 (38); 52.2 (47)]
How rushed were you?	4 Months	13.4 % (16)	86.6% [21.0 (25); 65.5 (78)]
	8 Months	5.5% (5)	94.5% [22.0 (20); 72.5 (66)]

So what did we get?

- A significant reduction in error across all phases of flight.
- A significant improvement in standardization across crews.
- A very strong acceptance of the new procedures.
- A significant improvement in crews' experience.

But how did we do it?

By Taking a Comprehensive Approach.

- By understanding the complexity of the operation and of the operator.

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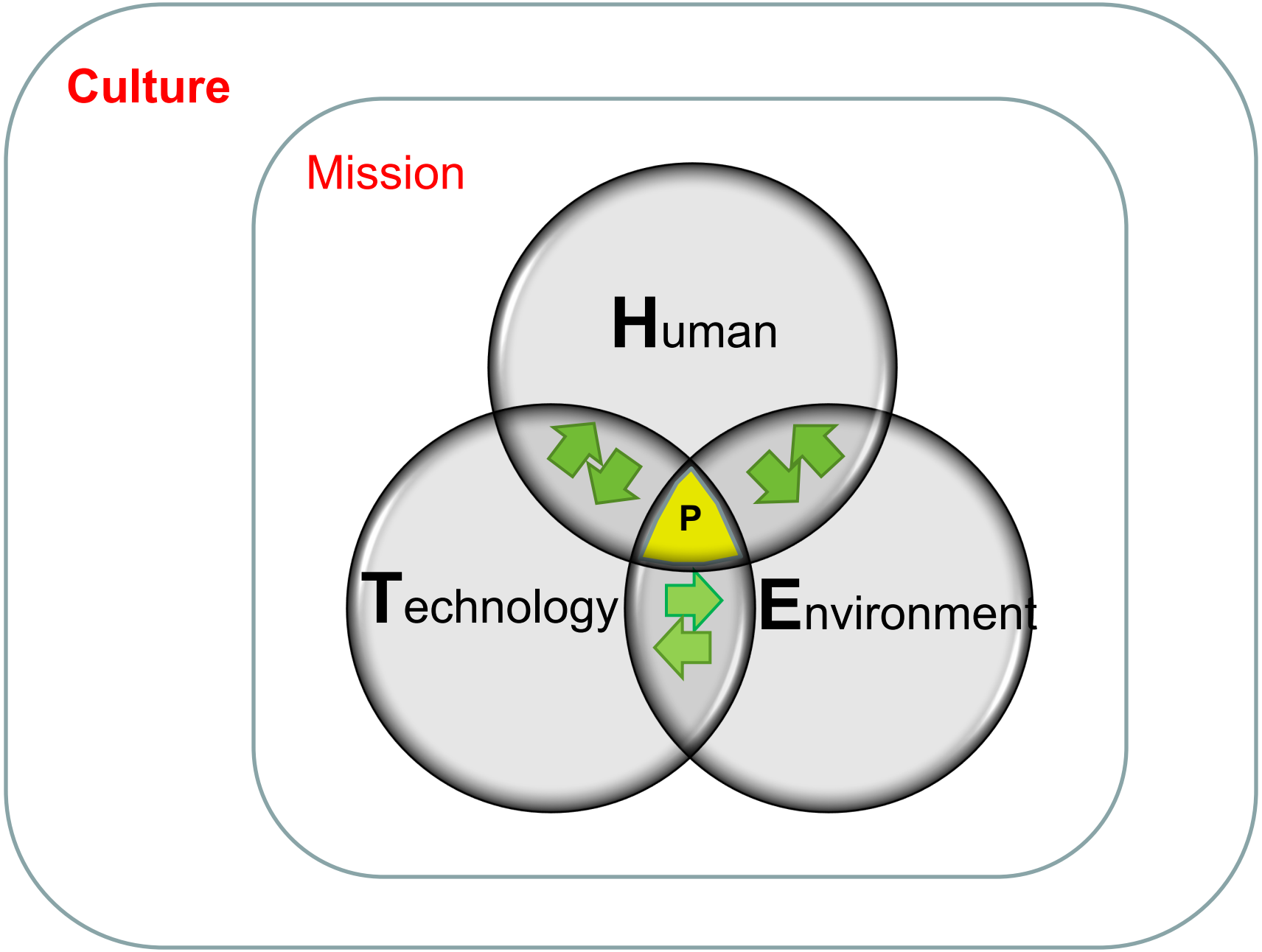
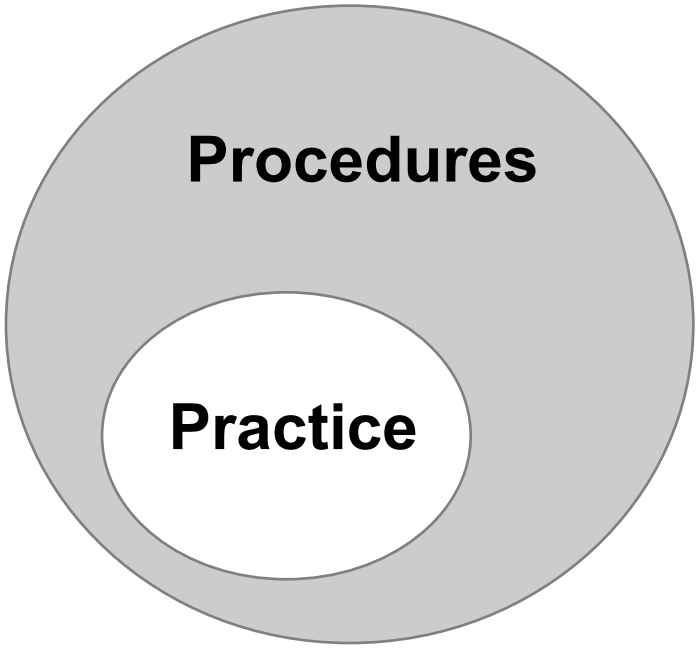
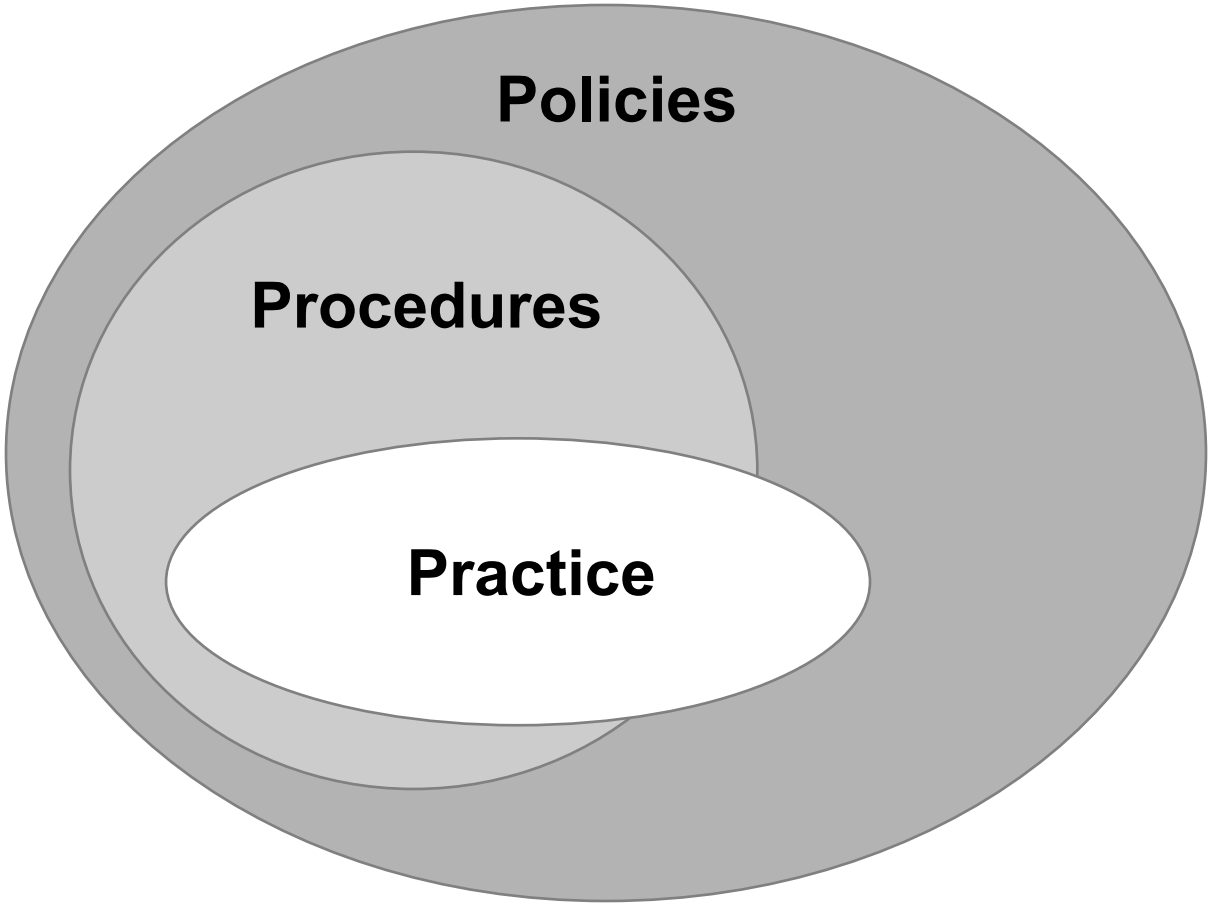
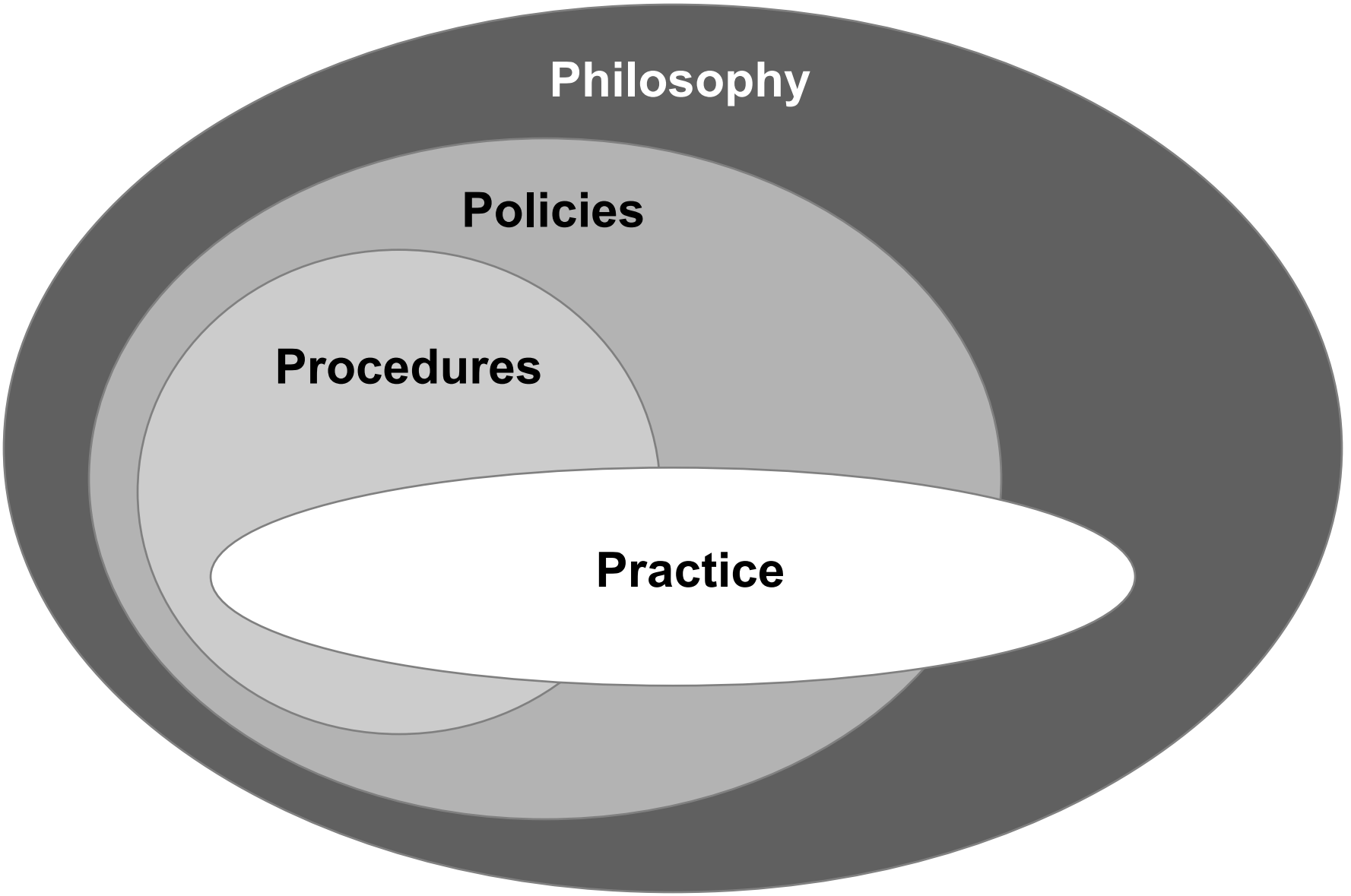
- The 4C's, THE Model, and the 4P's.



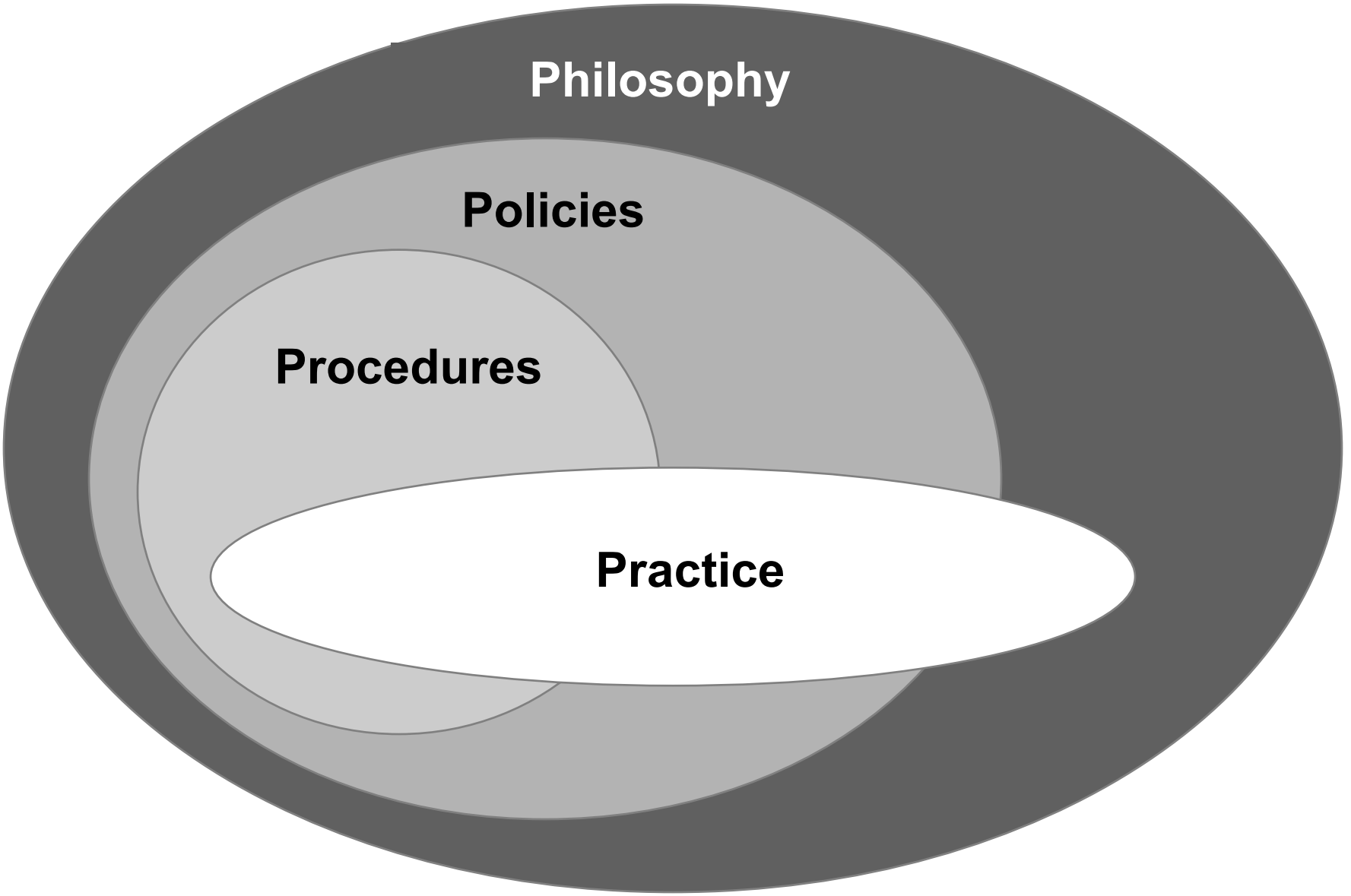
THE Model


Procedures
Practice


Policies
Procedures
Practice


Philosophy
Policies
Procedures
Practice

The 4P's



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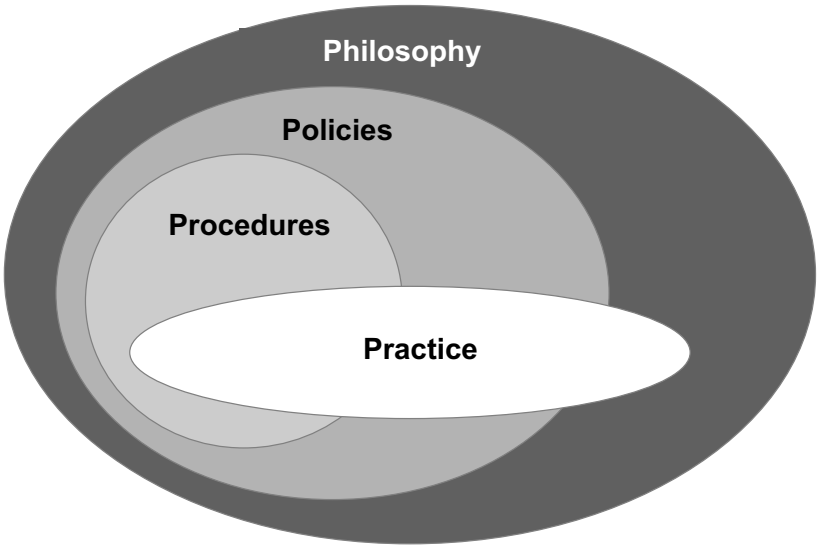

- Not a theoretical model.

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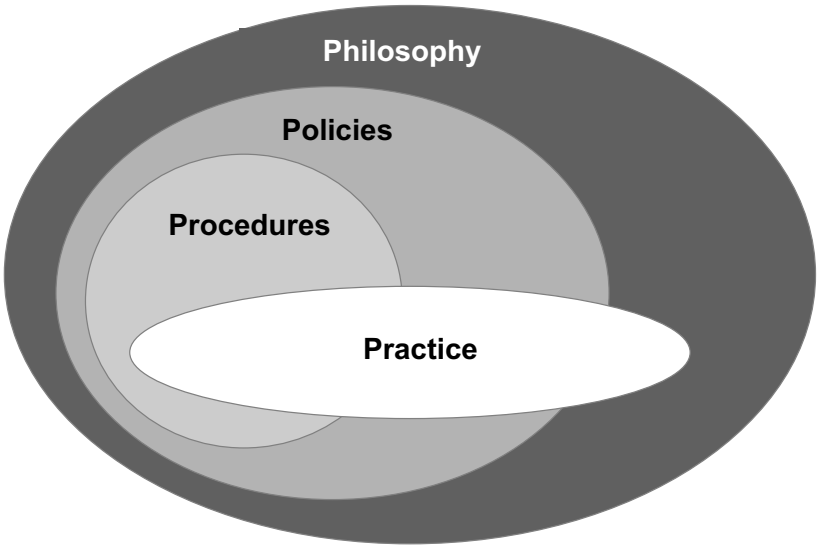

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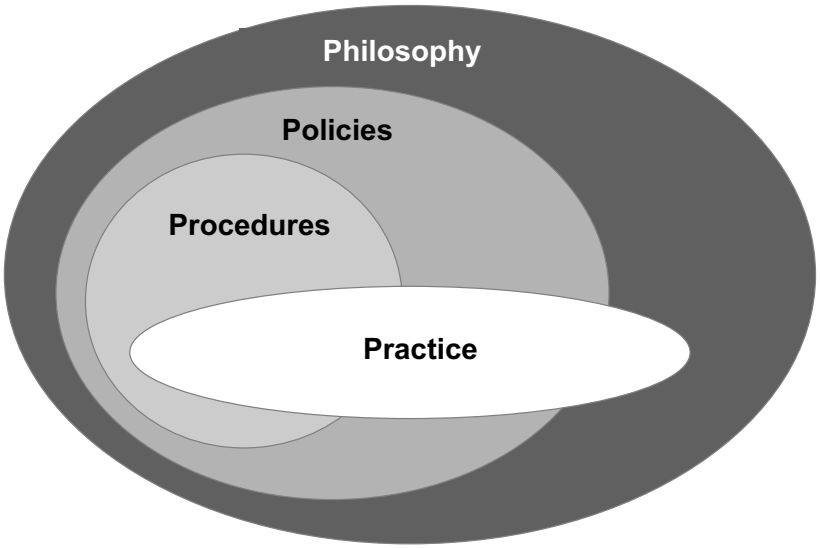

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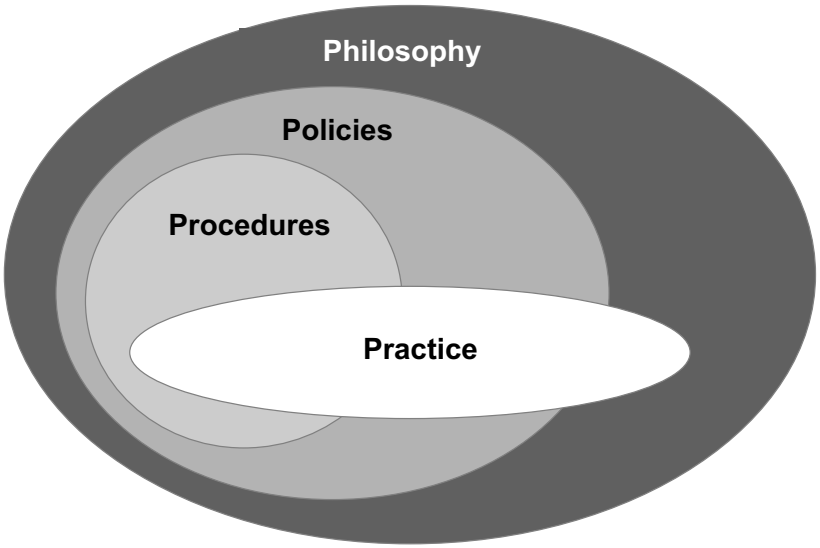
The 4P's



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- The question is whether you want to make it explicit or not.

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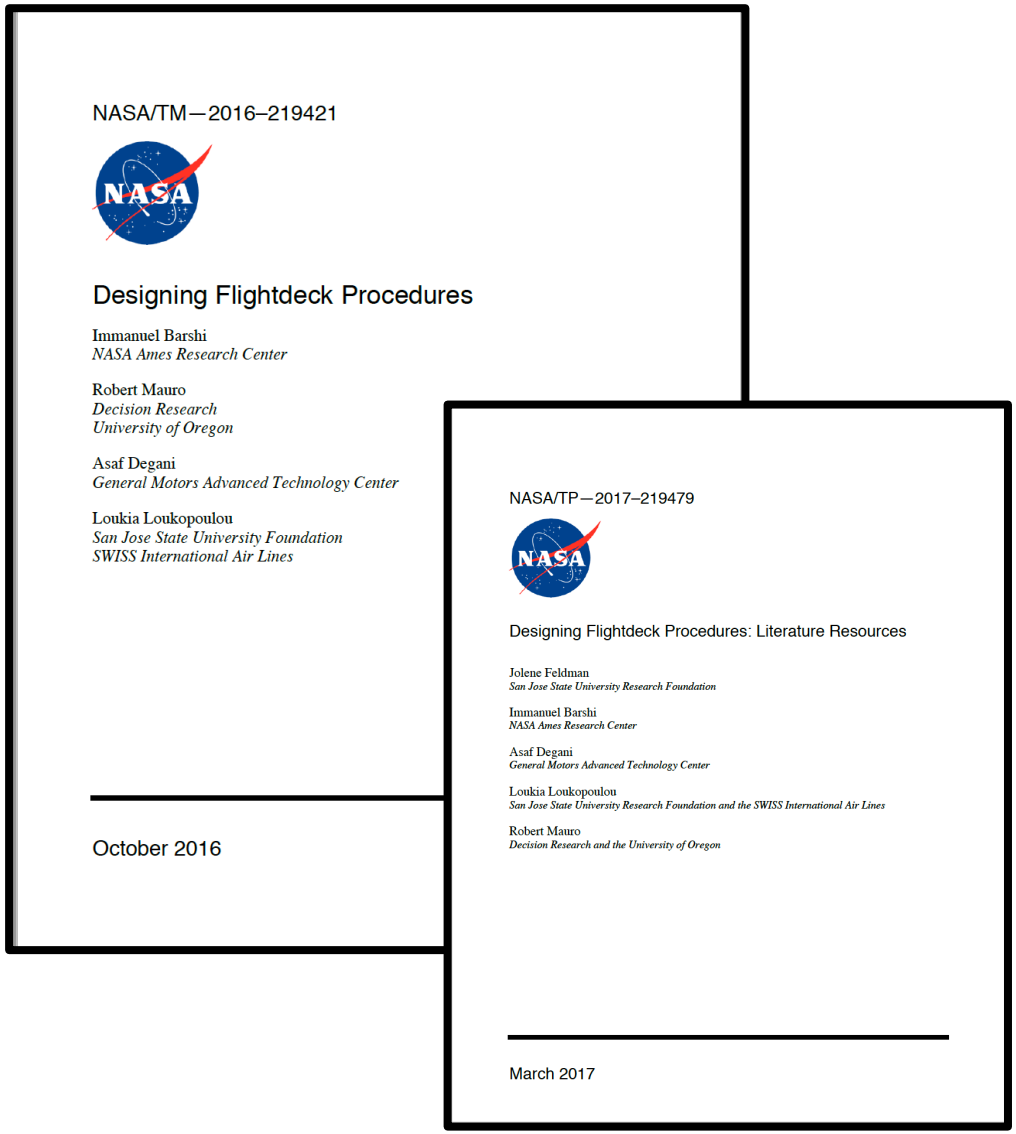

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