FACULTAD DE CIENCIAS
FÍSICAS Y MATEMÁTICAS
UNIVERSIDAD DE CHILE

Departamento de Ciencias de la Computación
UNIVERSIDAD DE CHILE

Proximity is in the Eye of the Beholder: A conceptual framework

Victor Ramiro
<vramiro@dcc.uchile.cl>

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Schedule

- Pervasive Computing
- Proximity as a Concept
- Proximity in AmbientTalk
- Demo
- Conclusions
- Future Work

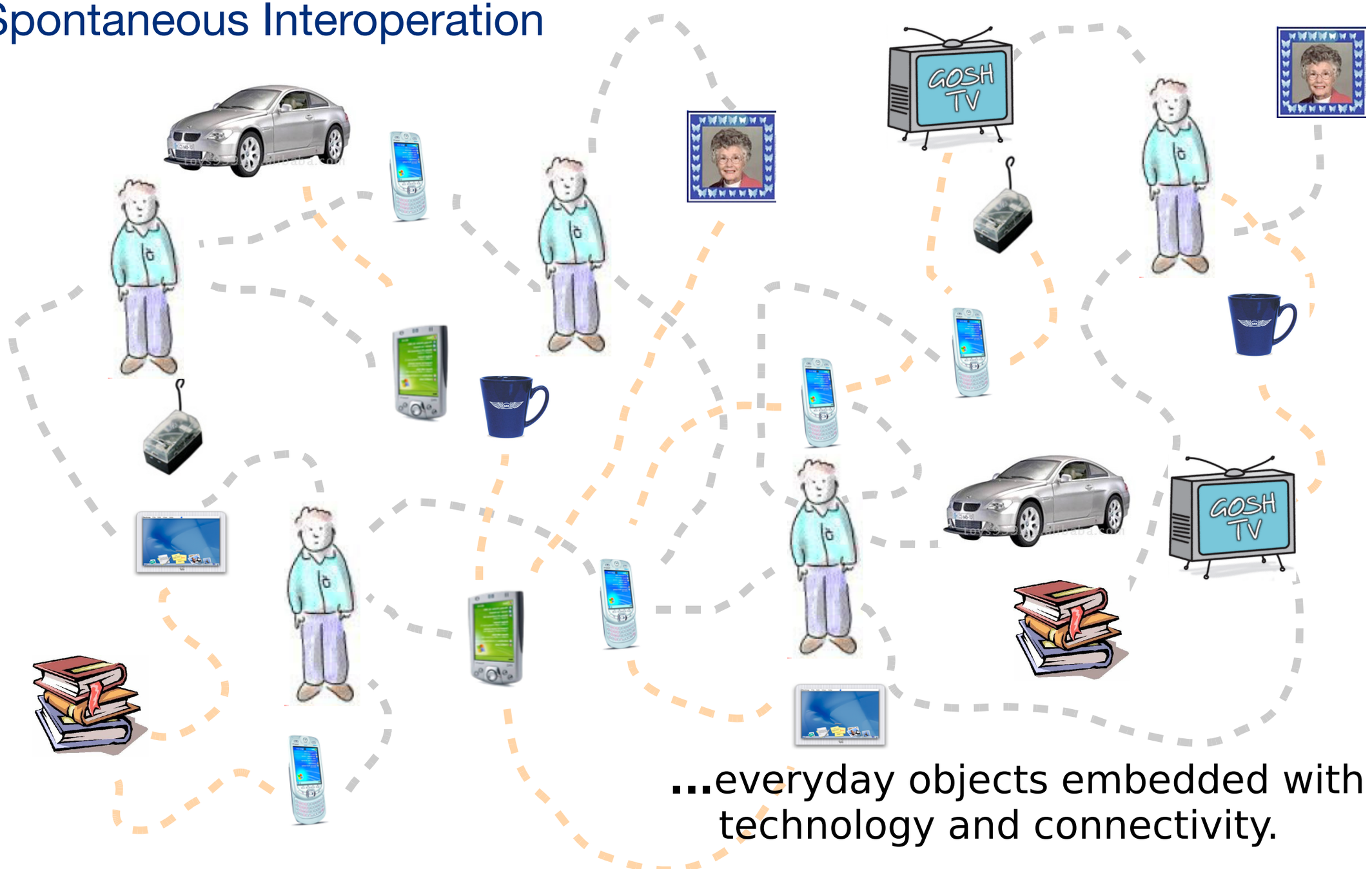
Pervasive Computing

Pervasive Computing

- Spontaneous Interoperation

Pervasive Computing

- Spontaneous Interoperation



...everyday objects embedded with technology and connectivity.

Proximity as a Concept

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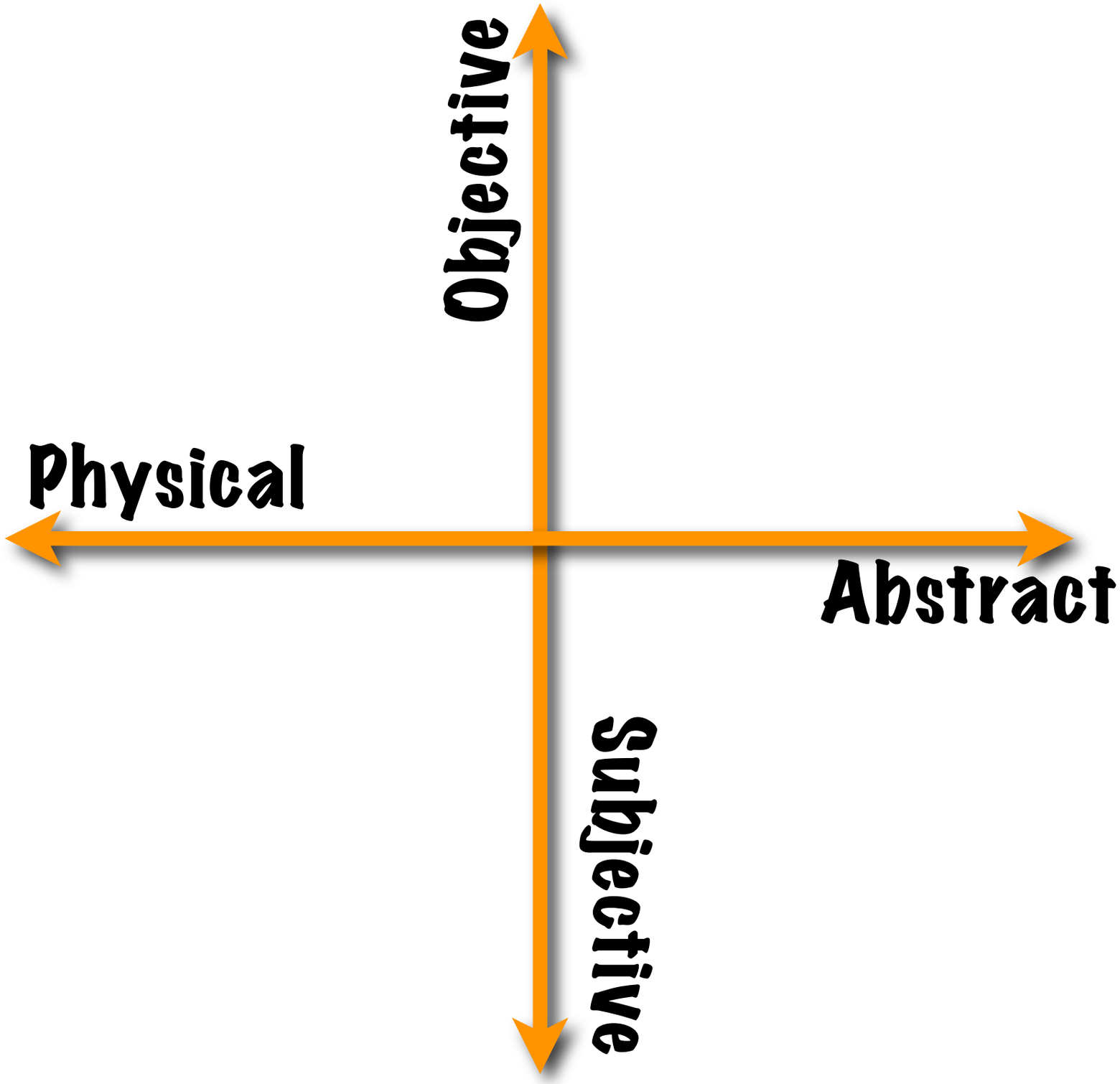

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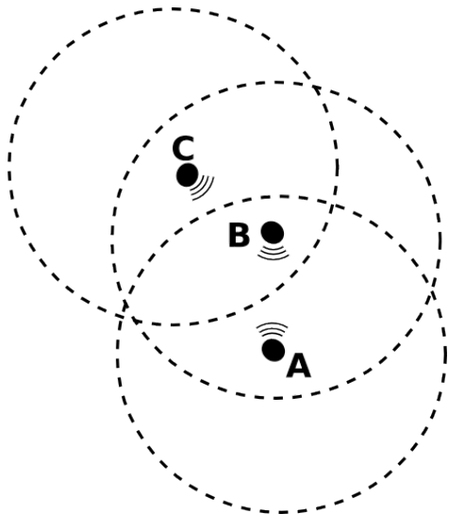
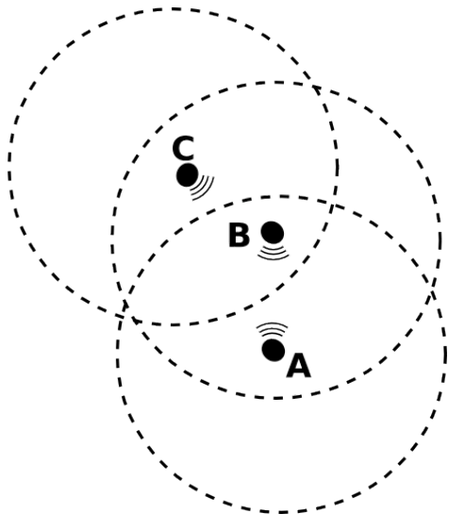
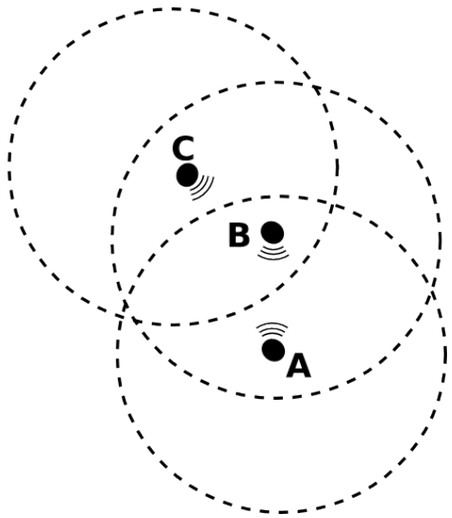


Proximity as a Concept



Proximity as a Concept



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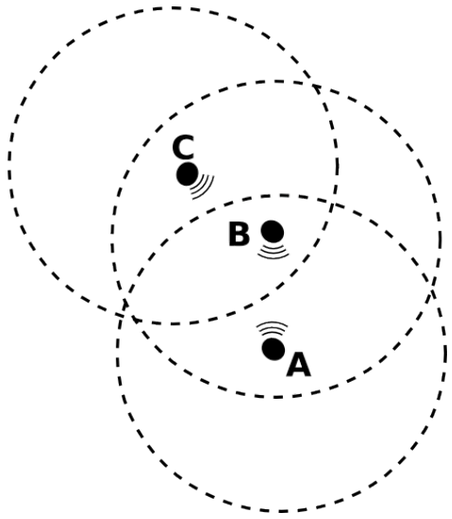

Service Discovery in AmbientTalk

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```
def hp := Printer.new(...);
export: hp as: PrinterServer;
```

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def hp := Printer.new(...);
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```
when: PrinterServer discovered:{ |printer|
    printer<-addJob(job);
}
```

Service Discovery in AmbientTalk

```
def hp := Printer.new(...);
export: hp as: PrinterServer;
```

what if I want:
- 700 dpi
- not so full queue
- Printer near me

```
when: PrinterServer discovered:{ |printer|
    printer<-addJob(job);
}
```

Service Discovery in AmbientTalk

Service Discovery in AmbientTalk

```
def hp := Printer.new(...);
export: hp as: PrinterServer;

def hp_gps := GPS.new(...);
export: hp_gps as: GPSPrinterServer;
```

Service Discovery in AmbientTalk

```
def hp := Printer.new(...);
export: hp as: PrinterServer;

def hp_gps := GPS.new(...);
export: hp_gps as: GPSPrinterServer;
```

```
def loop := whenever: PrinterServer discovered:{ |printer|
    when: GPSPrinterServer discovered:{ |printer_gps|
        when: hp<-dpi() becomes:{|dpi|
            if: dpi == 700 then:{
                when: gps<-getQueueSize() becomes:{|queue_size|
                    if: queue_size < 5 then:{
                        when: gps<-getX() becomes:{|x|
                            when: gps<-getY() becomes:{|y|
                                if: euclidian(x,y,my_gps.getX(), my_gps.getY()) then:{
                                    printer<-addJob(job);
                                    loop.cancel();
                                };
                            };
                        };
                    };
                };
```

Proximity in AmbientTalk

Proximity in AmbientTalk

```
def hp := Printer.new(...);

def printerProps := properties:{ |hp,gps|
    def dpi := 700;
    def queue(){ hp.getQueueSize() };
    def x(){ gps.getX() };
    def y(){ gps.getY() };
};

export: hp as: PrinterServer attach: printerProps in: euclidian(100);
```

Proximity in AmbientTalk

```
def patternPrinter := pattern:{
  def type := PrinterServer;
  def dpi := 700;
  def queue := constraint: { _ < 5 };
};

def clientProps := properties:{ |gps|
    def x(){ gps.getX() };
    def y(){ gps.getY() };
};

when: patternPrinter discovered:{ |printer|
    printer<-addJob(job);
} with: clientProps in: euclidian(5);
```

```
def hp := Printer.new(...);

def printerProps := properties:{ |hp,gps|
    def dpi := 700;
    def queue(){ hp.getQueueSize() };
    def x(){ gps.getX() };
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};

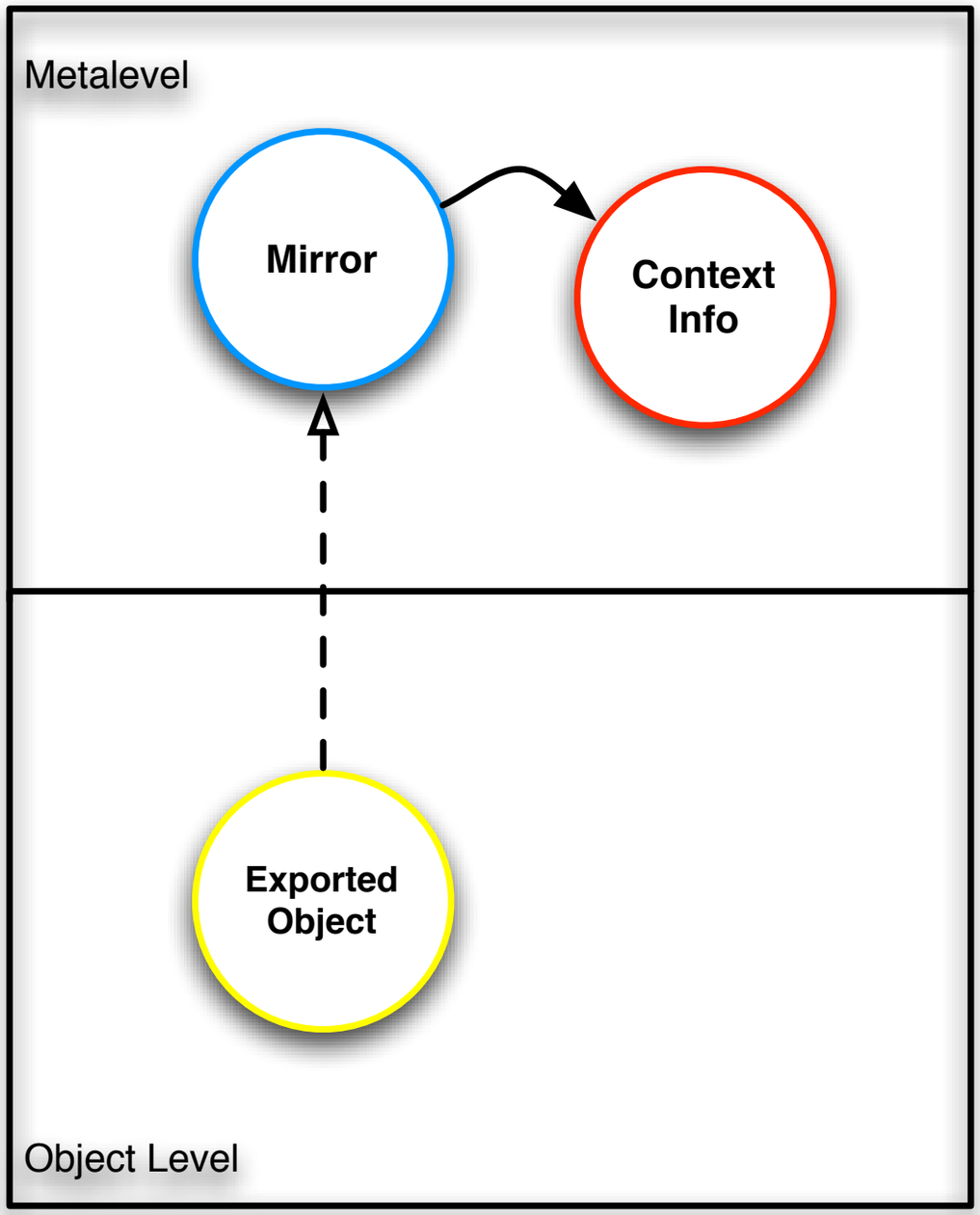
export: hp as: PrinterServer attach: printerProps in: euclidian(100);
```

What about the interactions?

- what if I go out of proximity while printing?
  - continue printing?
  - select another printer?
  - cancel printing job?
- how to choose between multiple matching printers?
- what about priority/locking systems?

Proximity References

Proximity References



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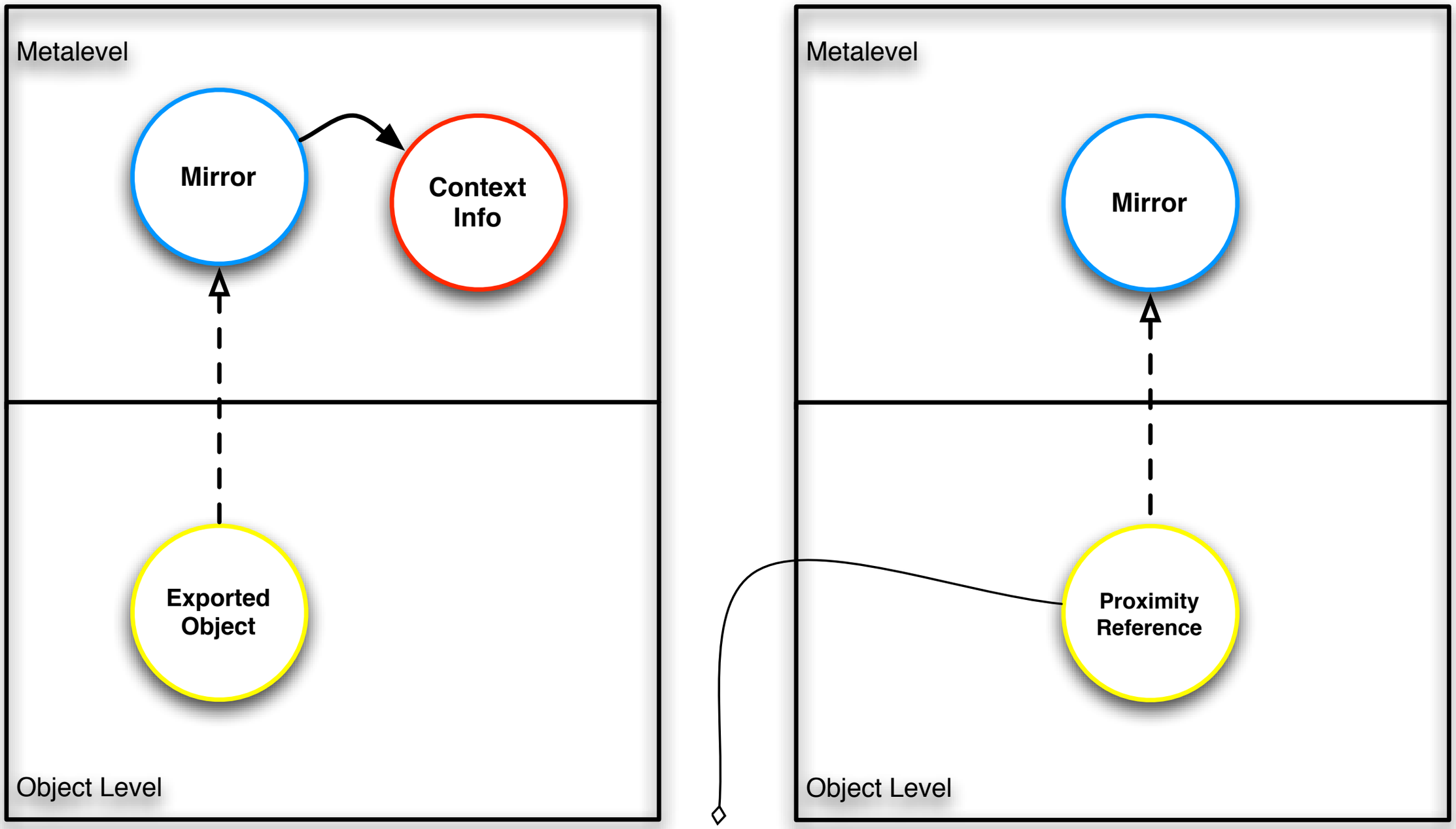

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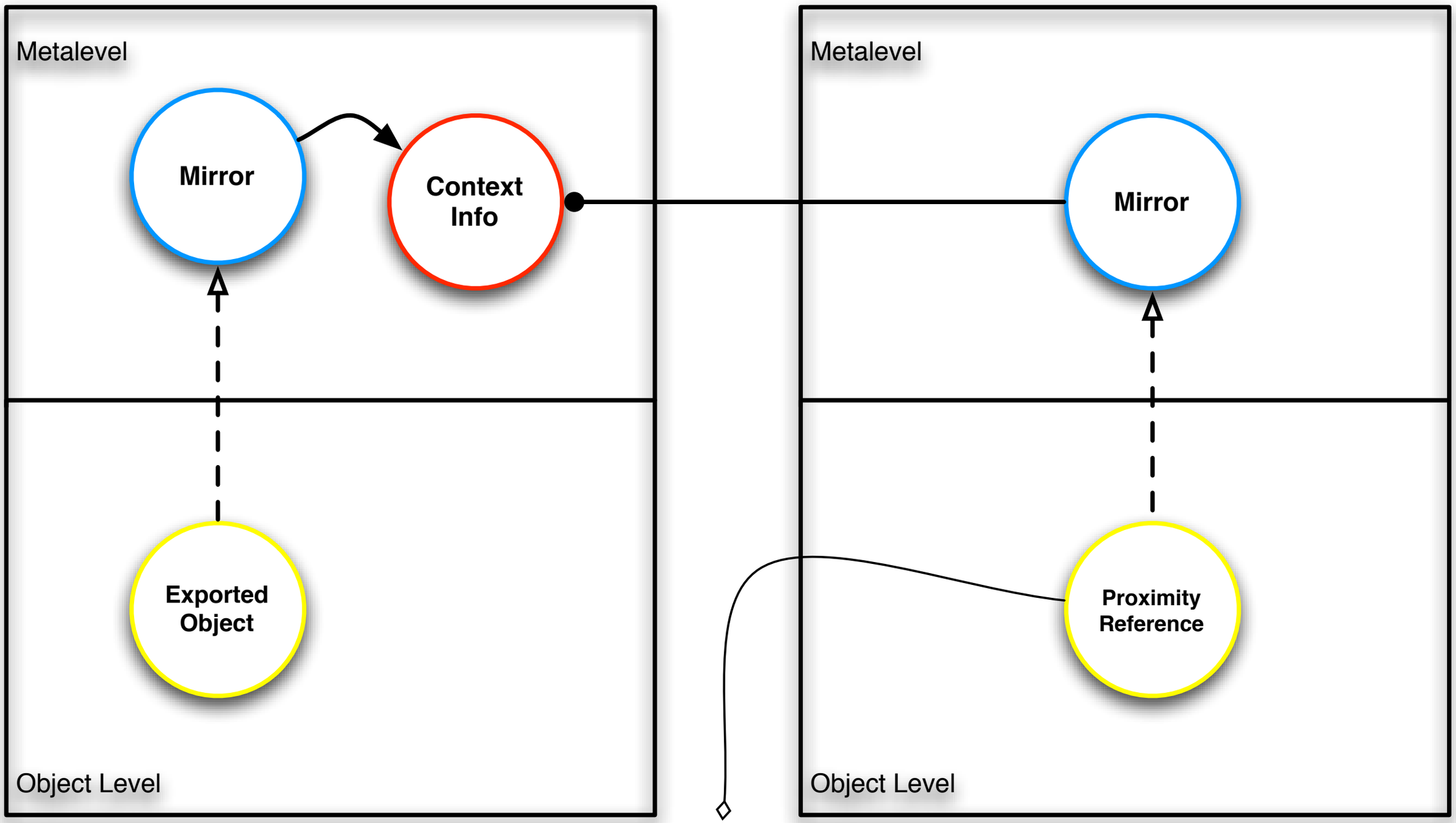

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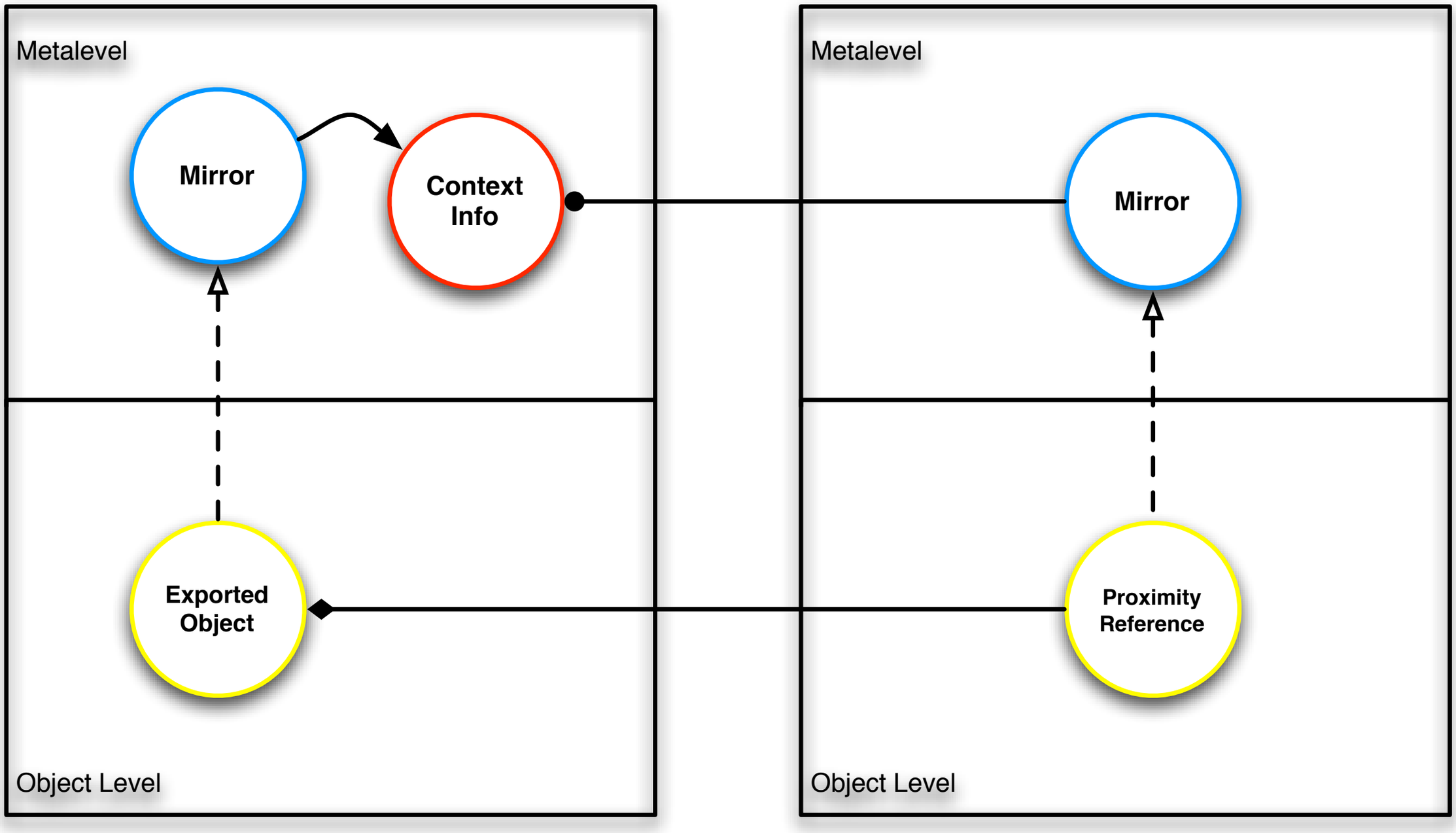

Proximity References

Proximity References

```
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def printerProps := properties:{ |hp,gps|
    def dpi := 700;
    def queue(){ hp.getQueueSize() };
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export: hp as: PrinterServer attach: printerProps in: euclidian(100);
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Proximity References

```
def hp := Printer.new(...);

def printerProps := properties
    def dpi := 700;
    def queue(){ hp.getQueueSi
    def x(){ gps.getX() };
    def y(){ gps.getY() };
};

export: hp as: PrinterServer a
```

```
def patternPrinter := pattern:{
  def type := PrinterServer;
  def dpi := 700;
  def queue := constraint: { _ < 5 };
};

def clientProps := properties: { |pda_gps|
    def x() {pda_gps.getX()};
    def y() {pda_gps.getY()};
};

def printerService := proximity: printerPattern
                      attach: clientProps
                      in: euclidian(pda_radius,"PDA");

when: printerService<-flipColor() becomes: { |v|
    clientApp.flipColor();
    window.draw();
    res1.resolve(true);
};
```

Conclusion

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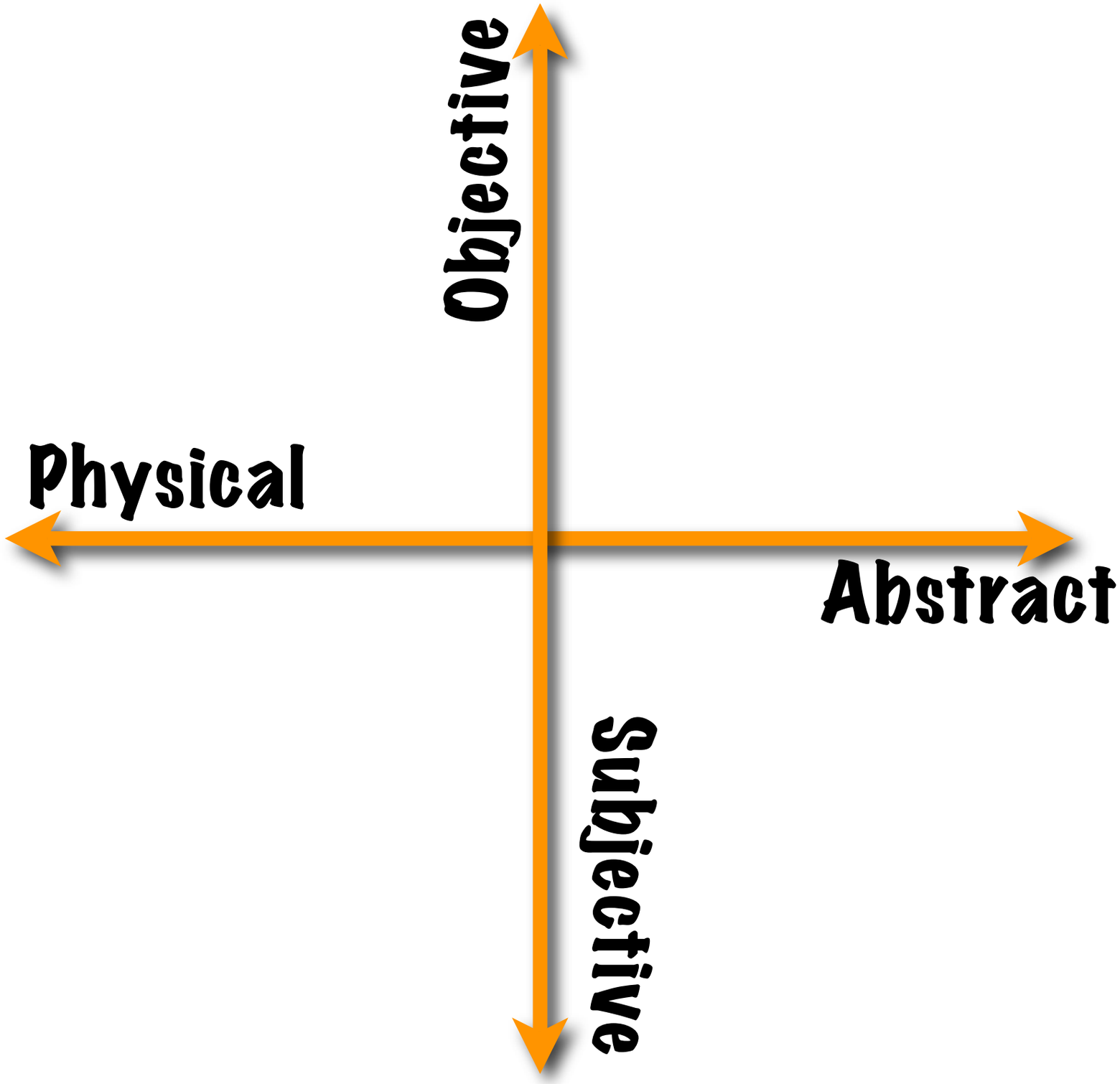
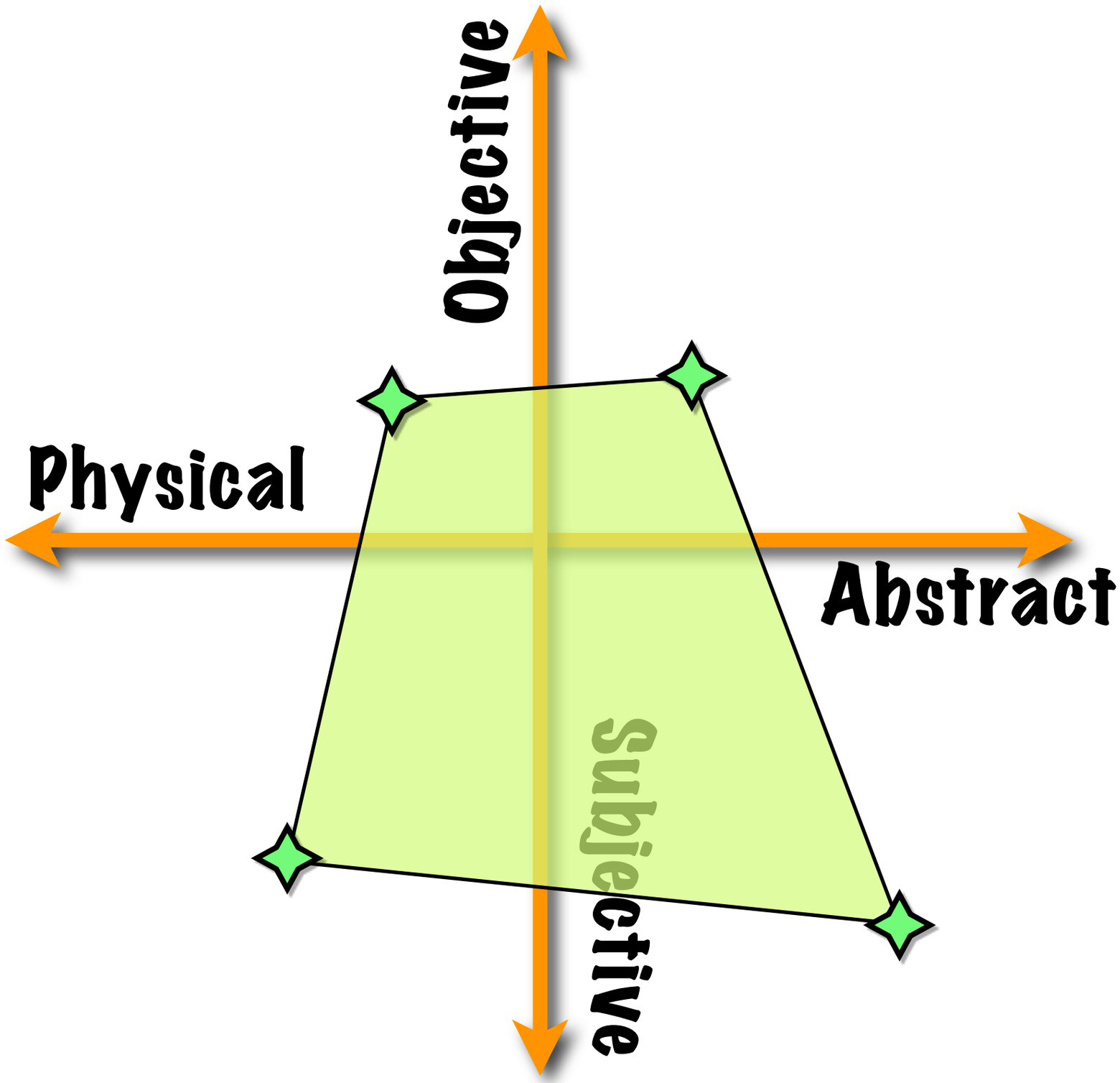


Conclusion



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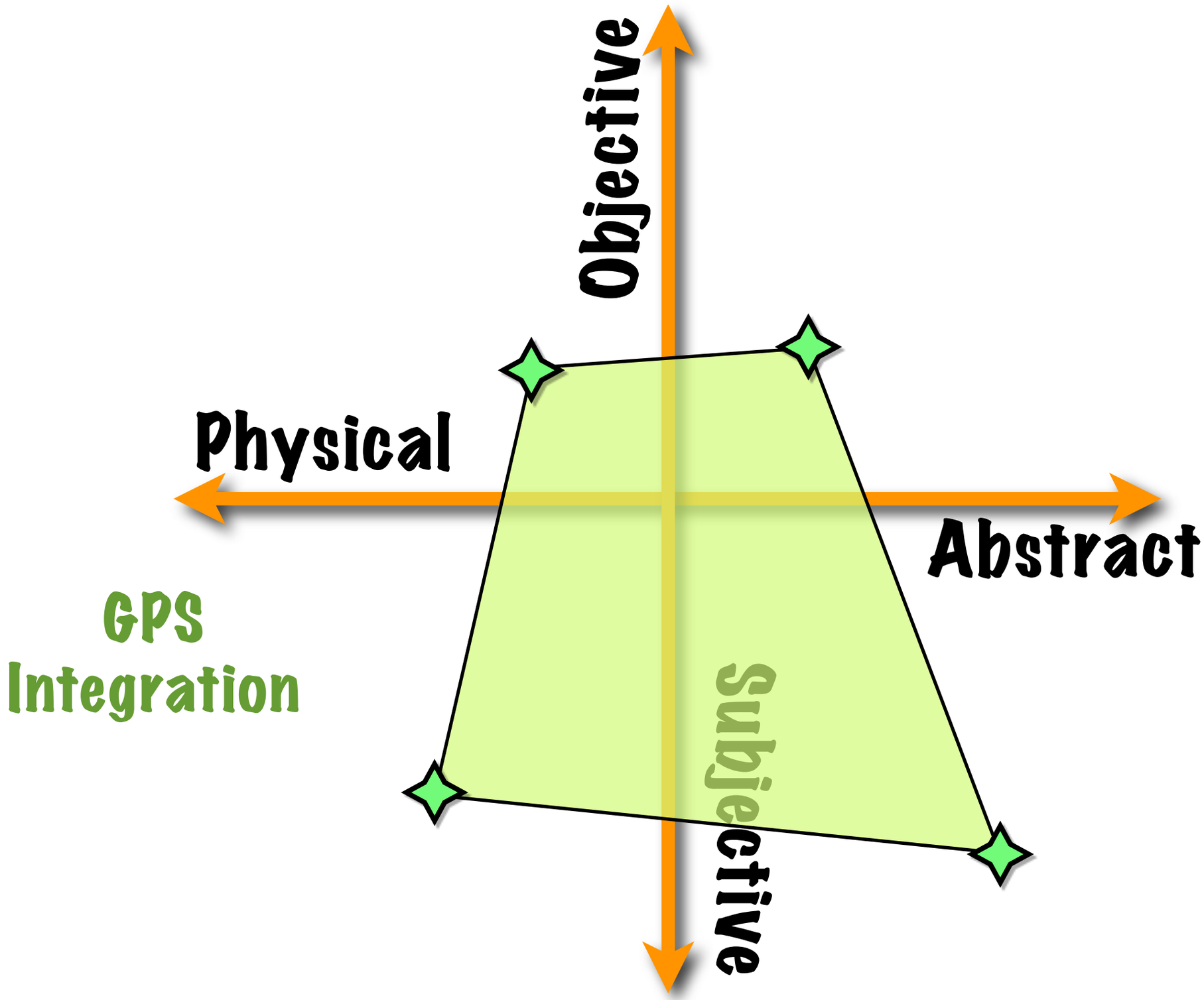

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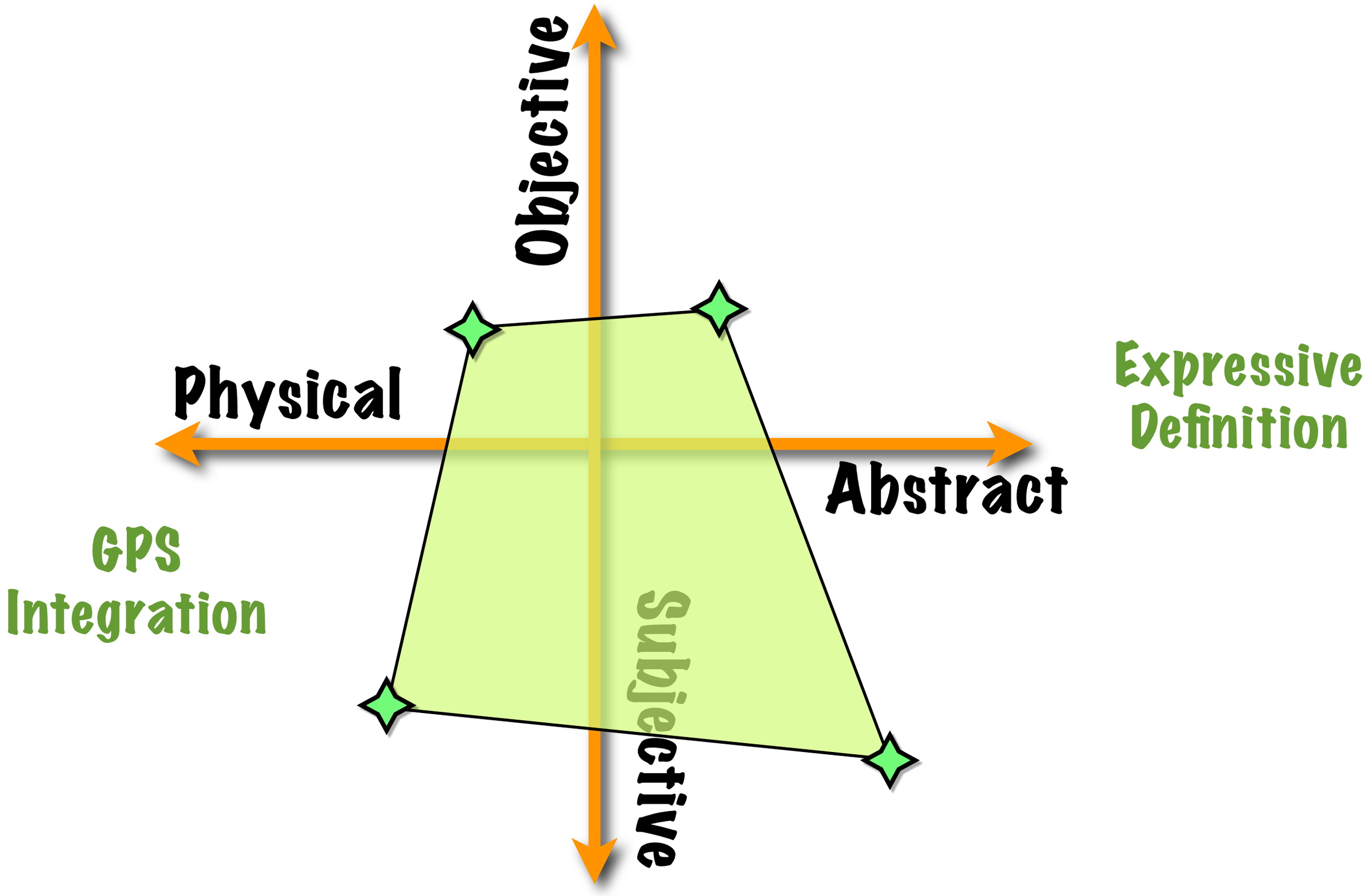
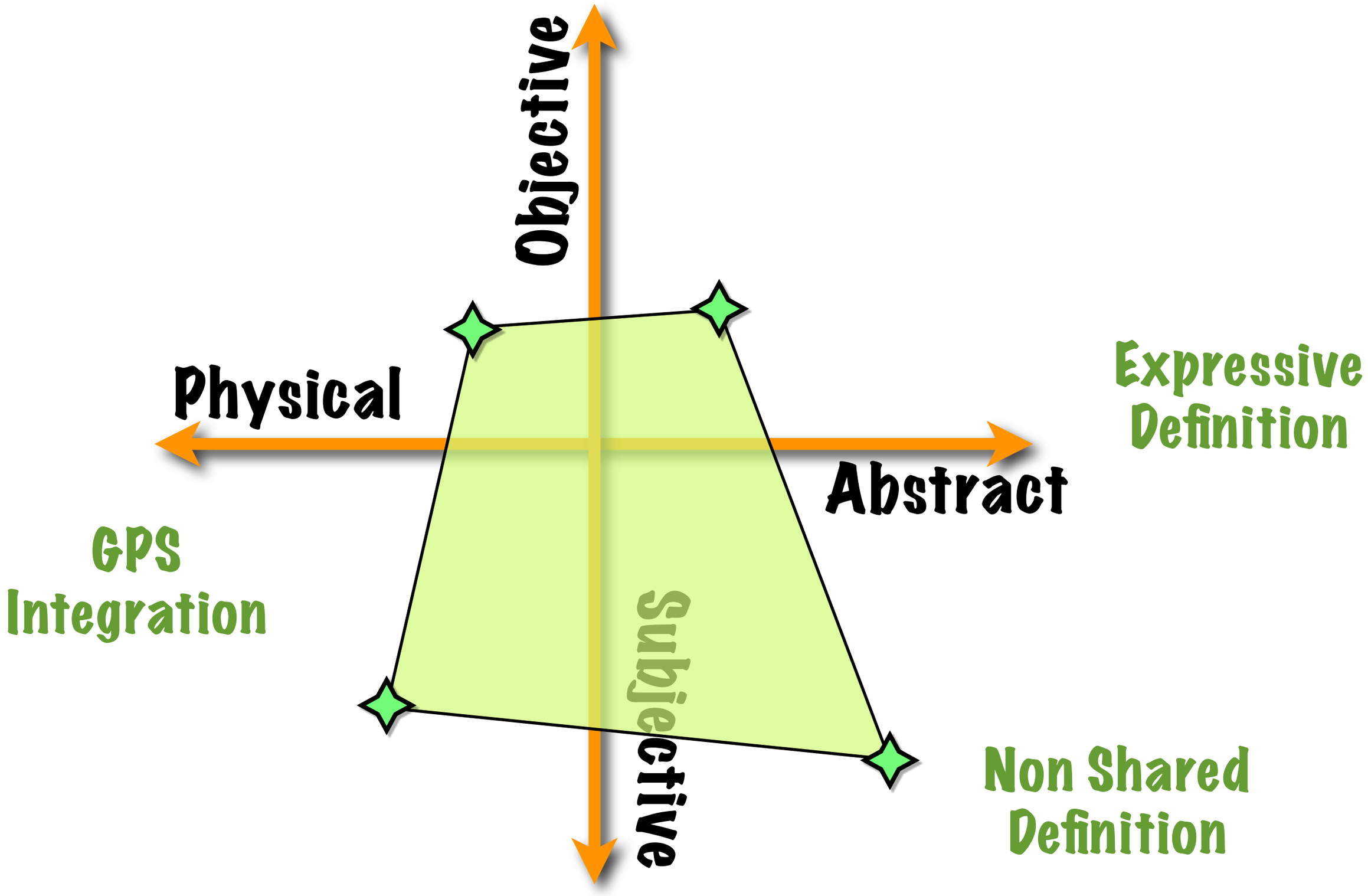

Objective
Physical
Abstract
Subjective
GPS
Integration
Expressive
Definition

Conclusion


Objective
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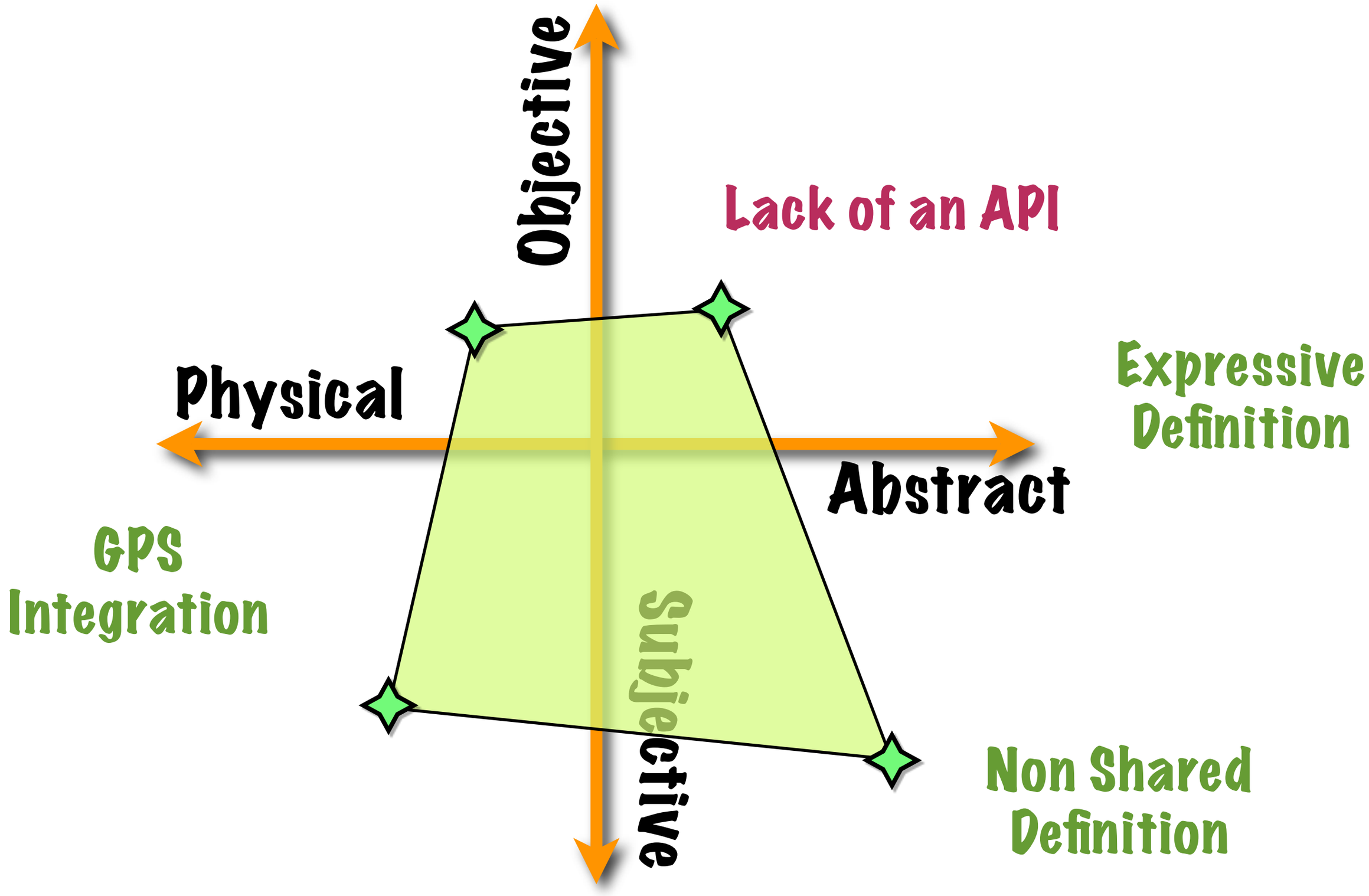
Objective
Physical
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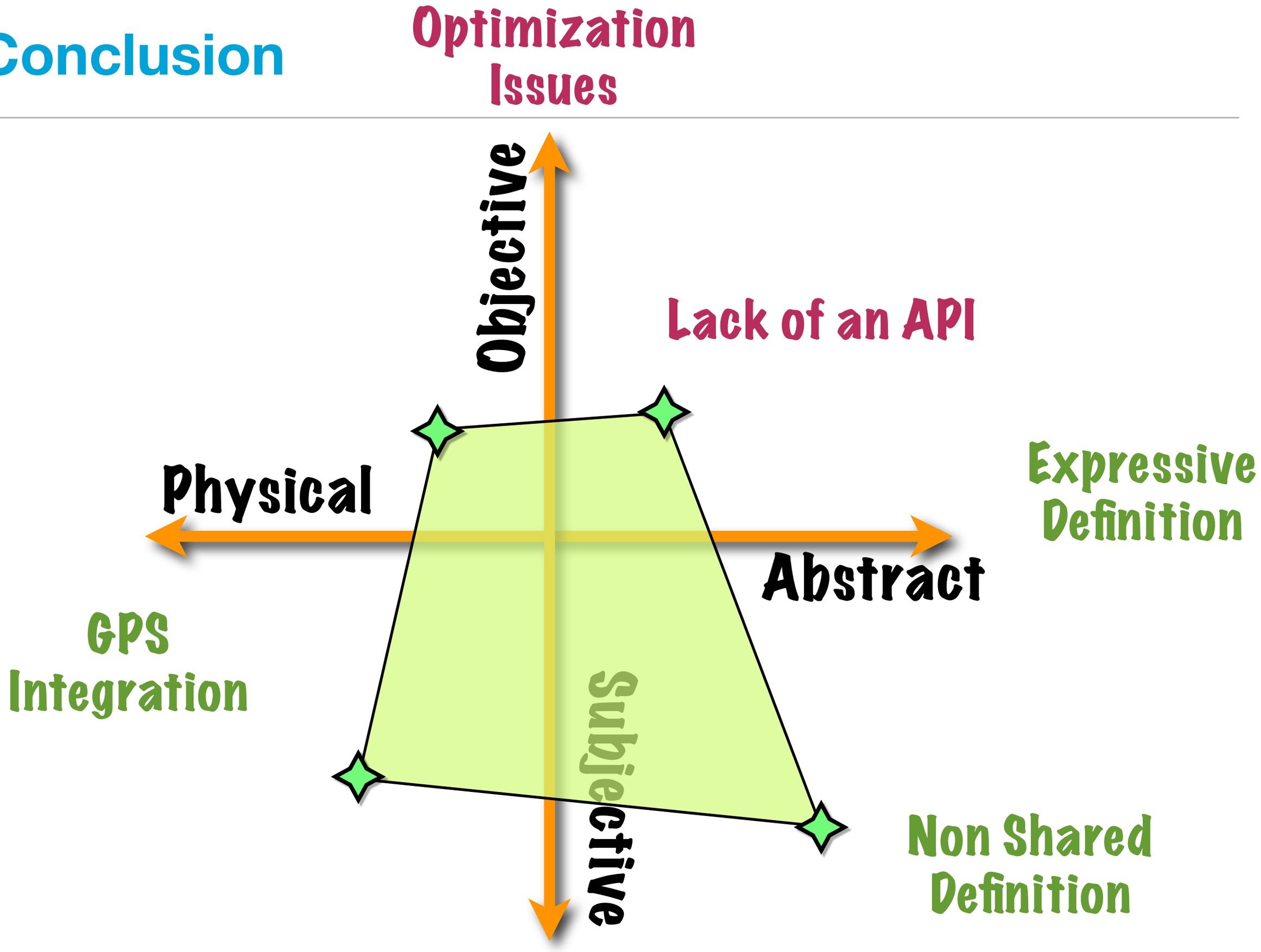
Lack of an API
Expressive Definition
GPS Integration
Non Shared Definition

Conclusion


Optimization Issues
Objective
Lack of an API
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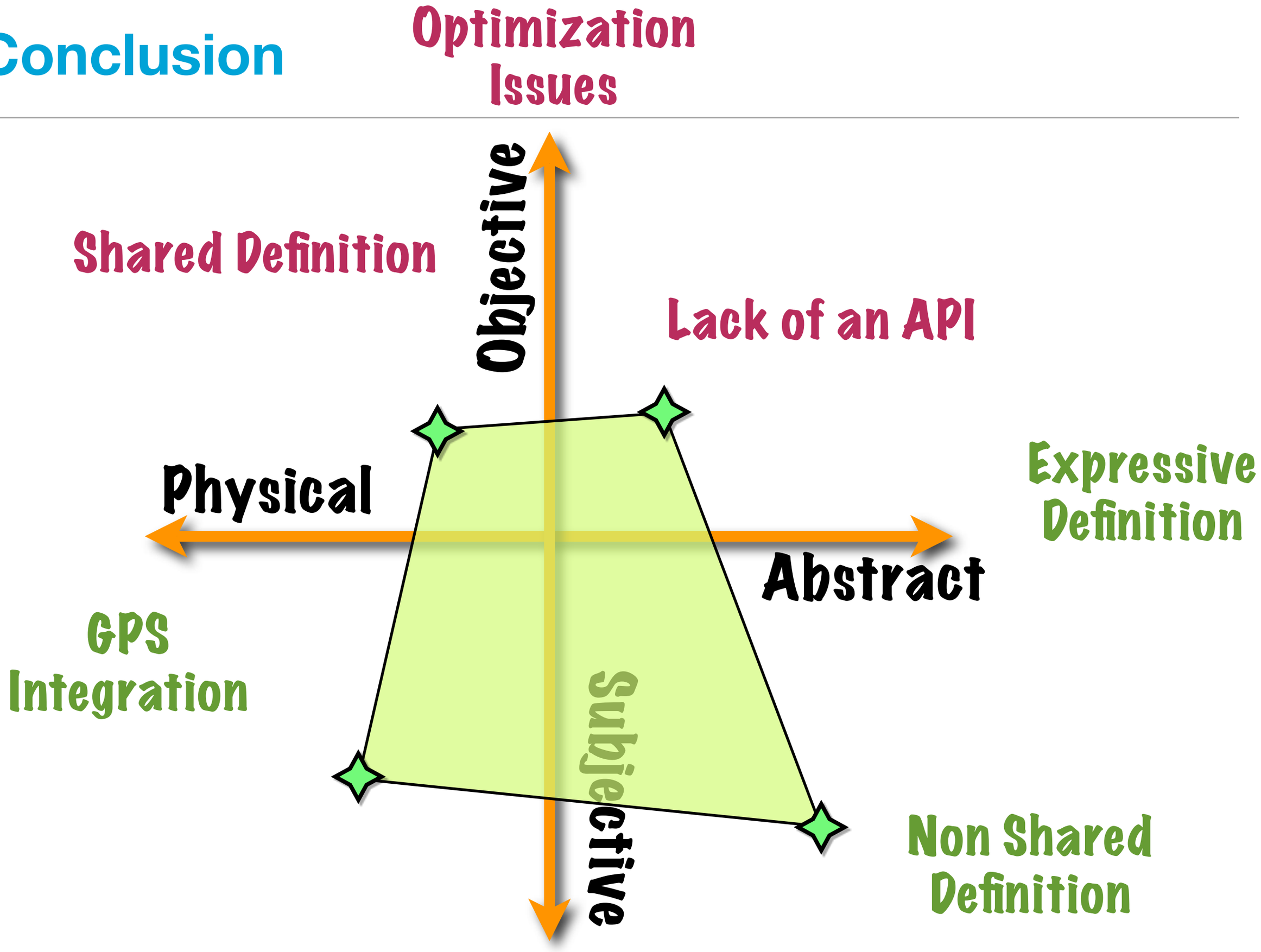
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Future Work

- Composite proximity functions
  - For now, just simple boolean compositions
- Client/Server service discovery
- Evaluation strategies and optimizations
- An example: Friend Finders

Questions?