# The Intersection of Sensors, Tactical Users and Virtual Worlds

FCVW 2011

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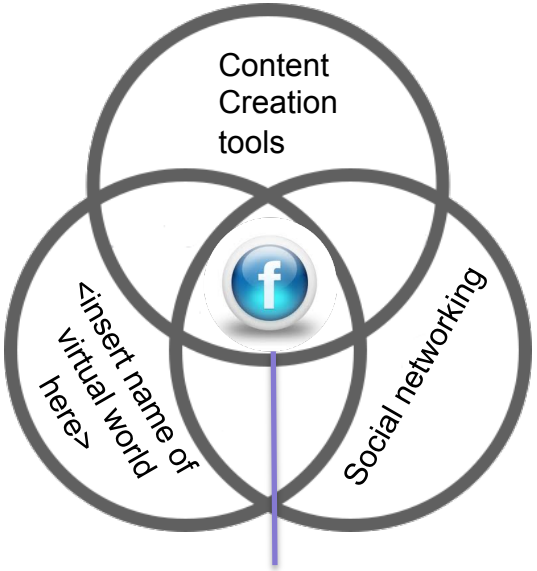
From Science to Solutions

# The Thesis

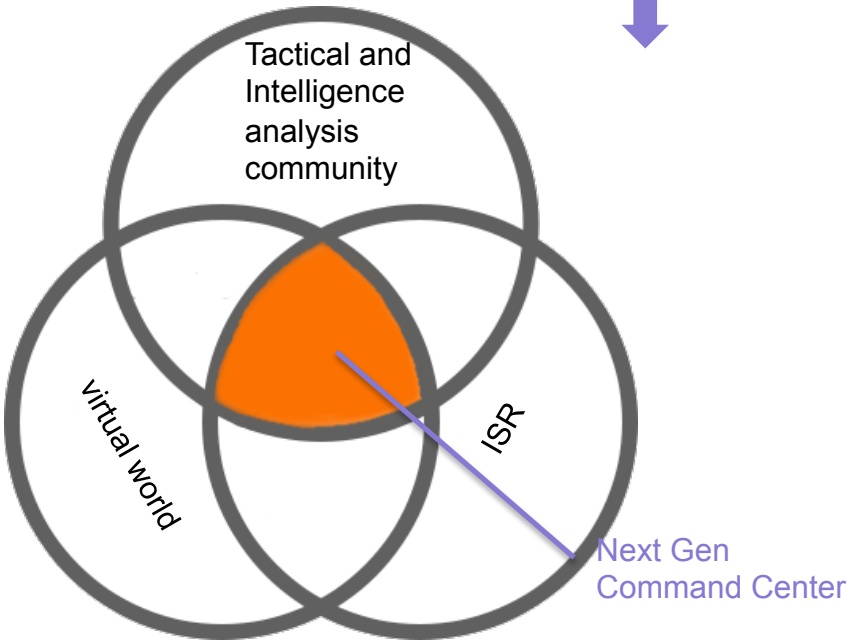
## Everyone “Knows” This

Virtual worlds can add value to many domains.
It's possible to draw many Venn diagrams that feature virtual worlds serving as the presentation or interaction layer for almost any use you can imagine




Next Gen “Facebook™”

## But What About This?




Next Gen Command Center

- Improved sensor deployment planning
- Enhanced mission rehearsal
- Better mission execution (C4ISR)
- AAR “2.0”
- Ad hoc intelligence analysis
- Better Tactical modeling/simulation

# What Are Virtual Worlds

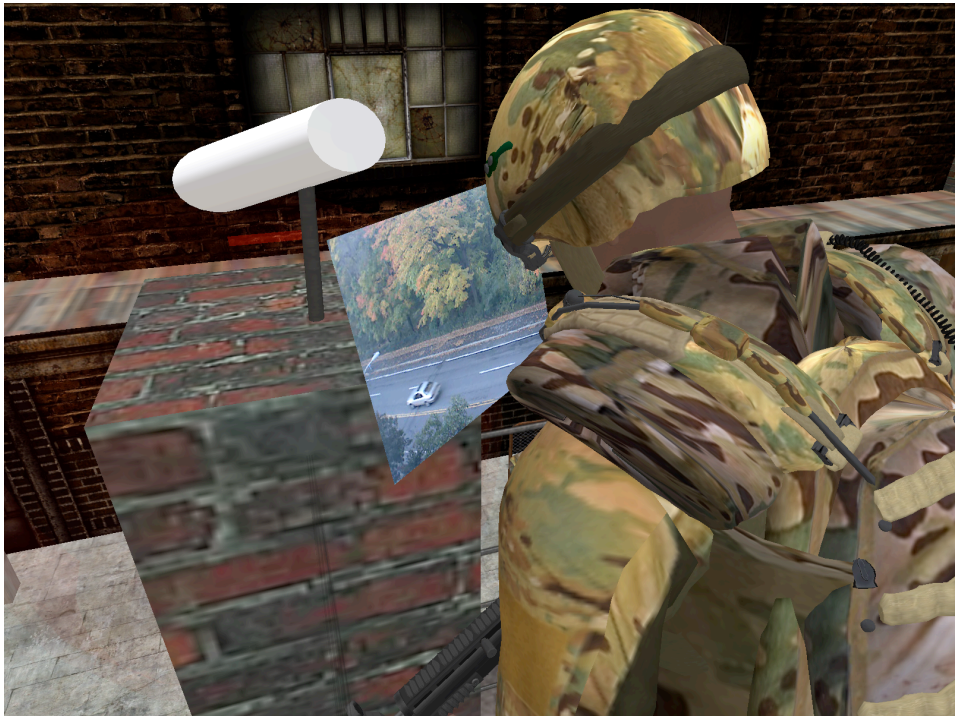
*More to the point of this talk, VWs are 3D representations built in open playboxes which conjoin tactical and intelligence users in spatial environments to create consensual experience reified through places, people, things, over time*

***Place**: Window into a surrogate environment that is geo-typical or geo-specific*

***People**: Avatars represent blue force, red force, collaborators in interactions*

***Things**: Structure, terrain, environment, models (interactive or static), physical and abstract phenomena using metaphors presented with necessary fidelity*

***Time**: Measured in the context of shared activities*

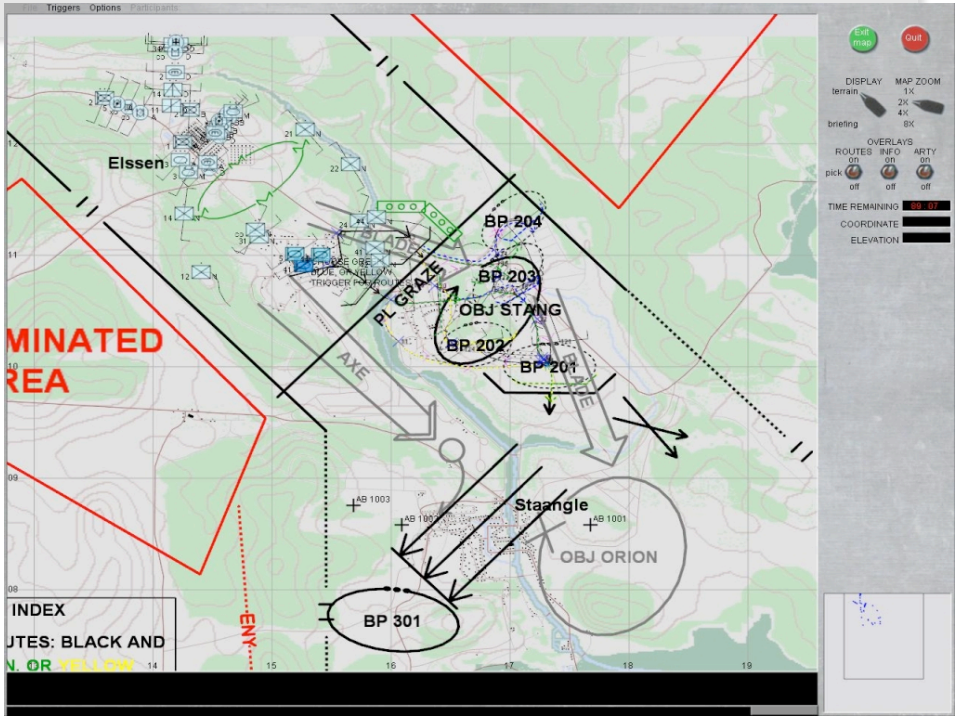


Realtime Video Feed to Proof of Principle Tactical Prototype
- Presenter's screen 2010

# Visual Representation and Sensing Architectures

## Many approaches and a long history of work to "make sense of sensed events"

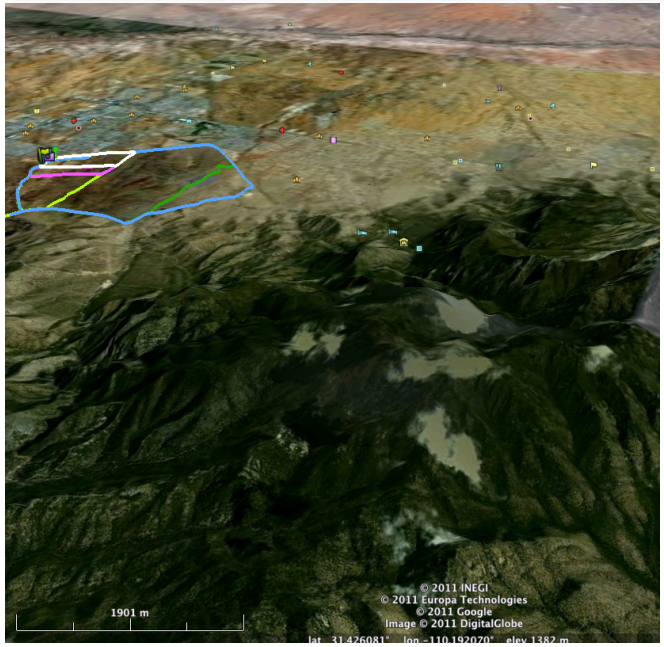
In the old days, tactical overlay maps on paper or cloth ...




...which basically got supplanted by computer screens which essentially emulate acetate overlay maps

# Visual Representation and Sensing Architectures

## Current ability to add 3D get us part way there




EC 10 Sensor planning KML Expeditionary terrain. Useful at wide range of regard

-- Google Earth™ August 2010

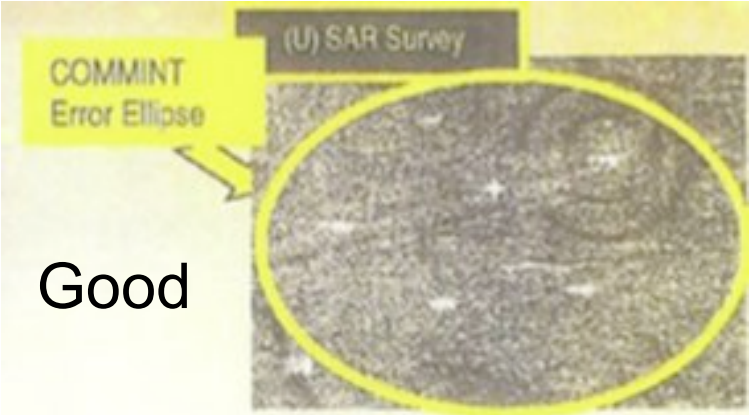
Utility significantly lower in the "urban engagement" view
-- Google Earth™ False 3D of MOUT
August 2010

Looks impressive, but is it useful?
Grey box view of Arlington VA
--Google Earth™vc. 2011

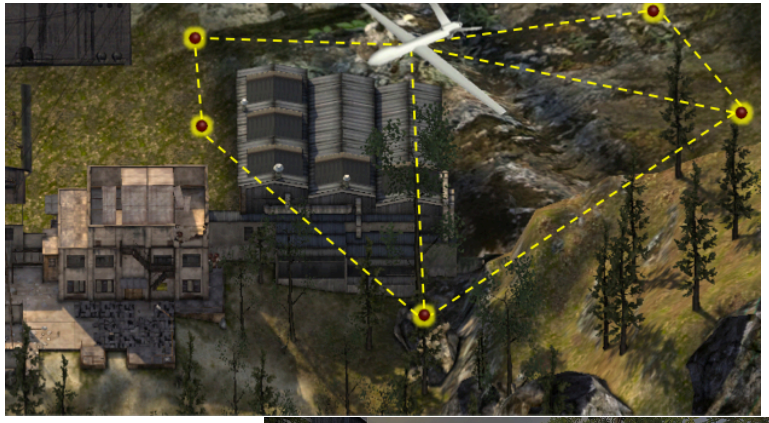
## Q: What's missing?
## A: People. Collaboration. Sensing. Real 3D detail

Acronym definitions and trademark attributions see slide 20

# VW Integration Benefits: A “Tactical Sensing Guy” Perspective




Good



Better

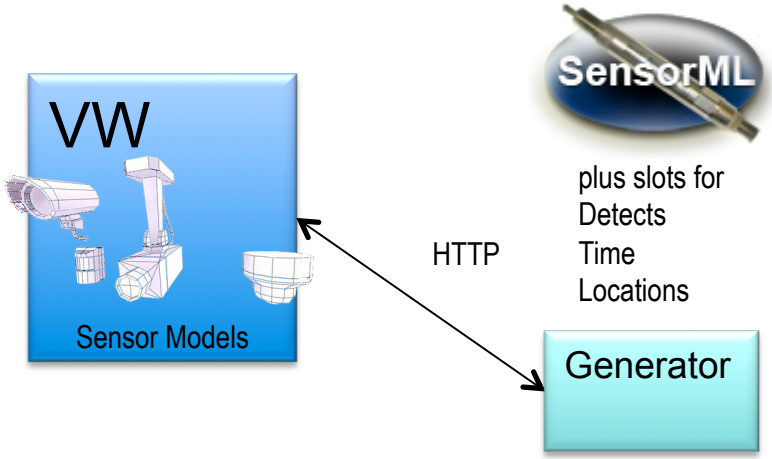
Best

- Fire angles and vantage points better understood
- Optimal sensor placement aided by 3D understanding
- Entry and egress points now more visible (urban caves and canyons)
- Occlusions become more apparent.
- UAV persistent surveillance programs materially improved

# Challenges for Sensor Systems

## Limited interoperability between sensors/virtual worlds

- Different formats and proprietary interfaces
- Isolated sensors use different, stove-piped communication methods
- Sensor networks controlled by different organizations with different operational vision
- No standard way of automatically sharing sensor data across organizations
- Difficult or impossible for a user outside of a specific controlling organization to discover and utilize sensors that meet his or her needs. There's no "Google™ for sensors"
- Sensor tasking cannot be done automatically and through a standard 3D interface
- Current inability to tie disparate sensor systems into a system of systems




But here's a thought. What if …



Acronym definitions and trademark attributions see slide 20



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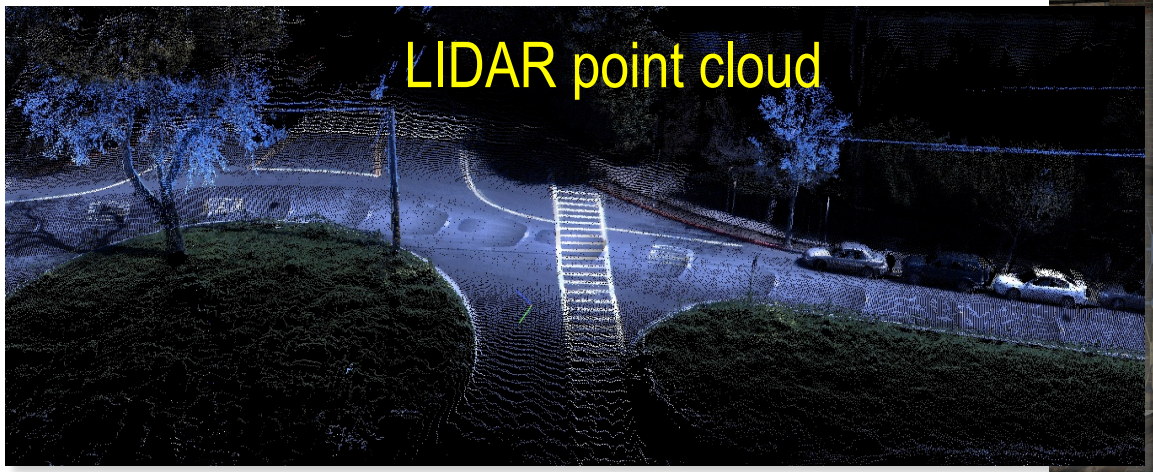
# Challenges for Virtual Worlds

- Object interoperability: HLA,DIS, VR Federates other sources with great models
- Object Standards
- (Semi) Automatic generation of terrain and static structure:
  - “Point clouds to meshes”
- Higher graphic realism (terrain, structure, sensors)
- Lightweight clients




Velodyne™ HDL-64 LIDAR point cloud

-- C. 2009

How does this → Become this





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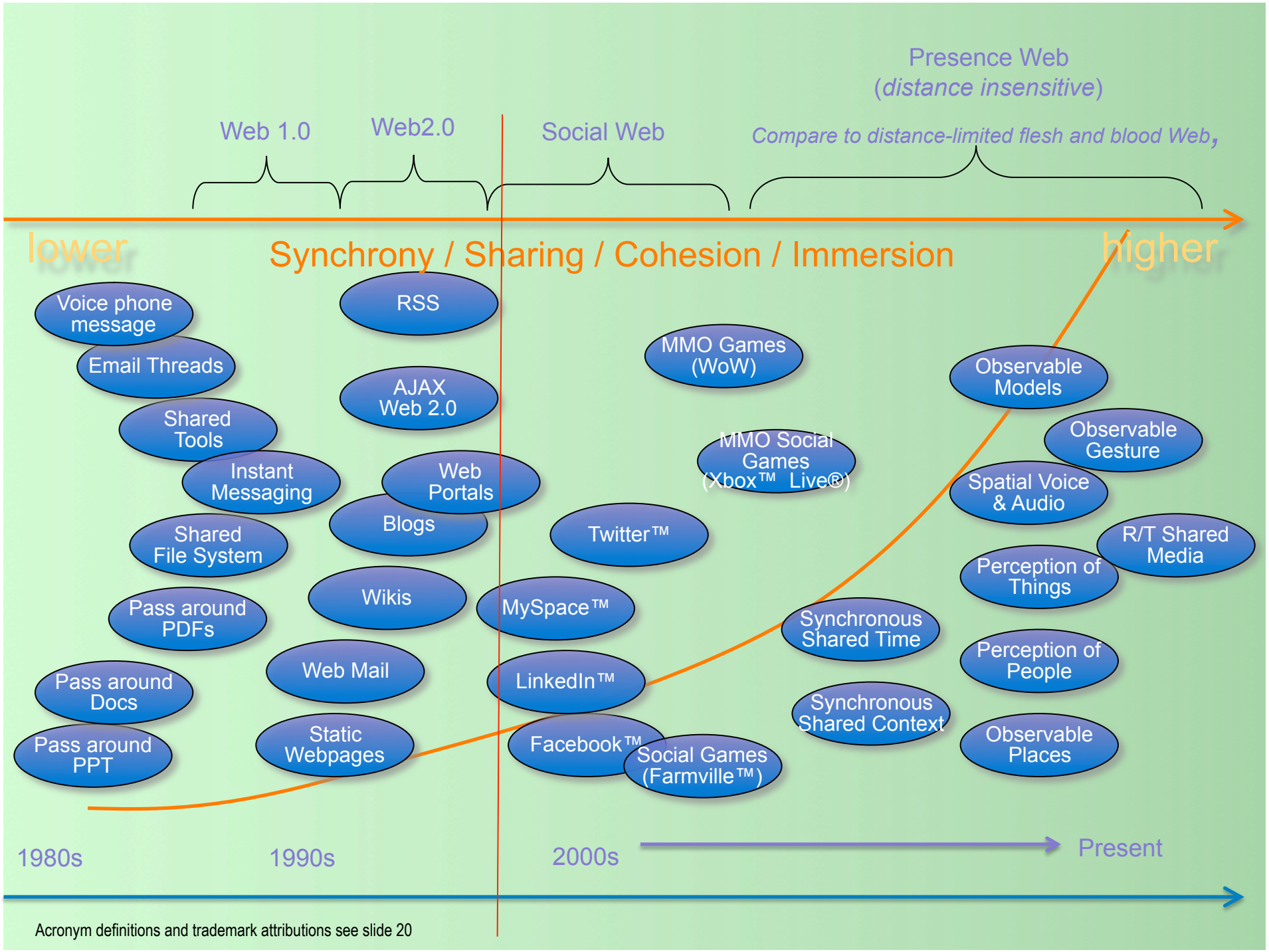


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