


Fire Literacy & Applied Fire Dynamics

From Knowledge To Practice



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Division Chief – Safety & Innovation
Revinge, Sweden
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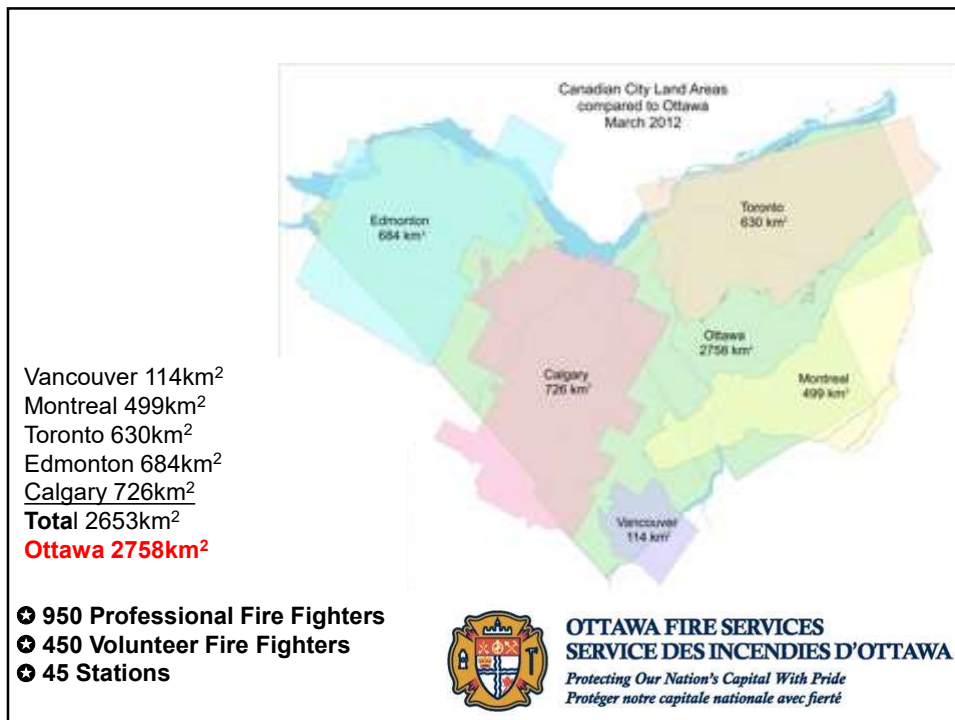


Ottawa Fire Services

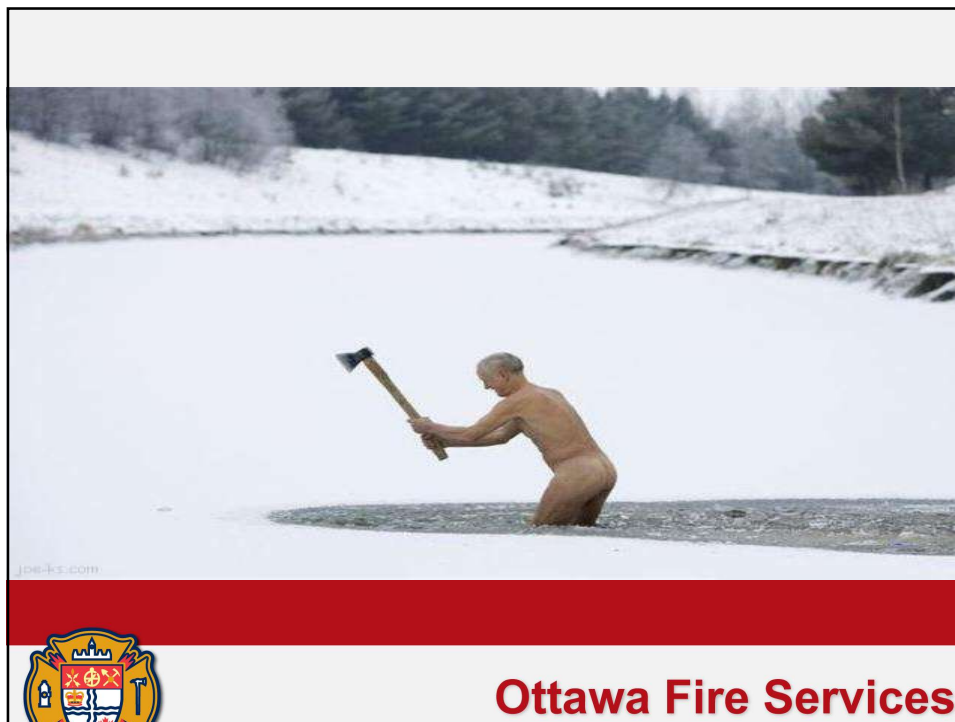
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Ottawa Fire Services

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Ottawa Fire Services

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Overview

Ottawa Fire Services is the lead proponent for a **\$1.2 Million grant** submission under the Canadian Safety and Security Program (CSSP)

End users and fire service industry investments of **>\$3 Million in-kind**

U.S. DoD \$500,000.00 for e-learning



Safety & Innovation

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Prime Objective

Address policy and capability gaps between the science of fire dynamics and current firefighting strategies and tactics



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Project Goals

- **Reduce:**
 - social, economic, environmental, legal and life-safety risks and impacts due to fire.
- **Develop:**
 - a collaborative, evidence-based fire dynamics curriculum, and safe, realistic live fire training tools.
- **Transition:**
 - to operational level through new industry standards, endorsed curriculum and validated technologies.
- **Inform:**
 - fire service investment decisions, policies, procedures and practices nationally and internationally.



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Forward Avenue Feb. 12, 2007



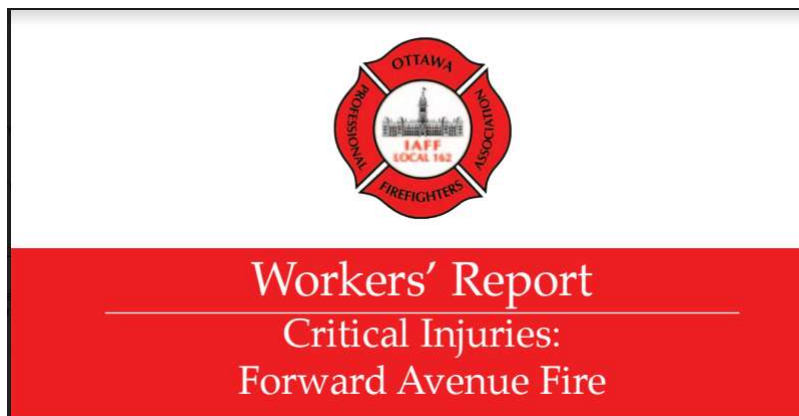
187 Forward Avenue February 12, 2007

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100 Page Report



<http://ottawafirefighters.org/index.cfm?section=10&pagenum=250>

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Key Recommendations

- OFS develop, implement and maintain a comprehensive fire dynamics course for all operational personnel.
- OFS develop, implement and maintain a strategic and tactical considerations curriculum directed at firefighter, officer and chief officer development that encompasses knowledge (theory), skills (application) and abilities (evaluation) in its design.

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Funded by



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What is the FIRE CoP?

- In the Sci-Fi classic Fahrenheit 451 the fire service's primary role is knowledge management – state censorship through book burning
- People become living books to resist censorship and maintain knowledge that has been banned
- The truth of the morality tale is that people are the real source of knowledge and its practical application!
- The FIRE CoP is a knowledge management tool designed to access, share and evolve practitioner knowledge within the Fire Community and other Communities of Practice

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FIRE CoP Strategic Intent

Four Primary Strategic Intents for Community:

- ❑ **Helping** – provide a forum for community members to help each other solve everyday work problems
- ❑ **Best Practice** – develop and disseminate best practices, guidelines, and procedures for their members to use
- ❑ **Knowledge Stewarding** – organize, manage, and steward a body of knowledge from which members can draw
- ❑ **Innovation** – create breakthrough ideas, knowledge, and practices

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<p>Project Manager Peter McBride Division Chief of Safety & Innovation, OFS</p>	<p>Project Champion Sean Tracey Assistant Deputy Fire Chief of City Operations, OFS</p>	
Project Management Team		
<p>Brad Bignucolo Firefighter</p>	<p>Shawn Mathieson Firefighter</p>	<p>Geoff Randall Firefighter</p>
<p>Scott Stilborn Logistics Manager</p>	<p>Tim Stuempel Firefighter</p>	
Project Team Support		
<p>Cheryl Hunt Firefighter</p>	<p>Vern Fiddler Firefighter</p>	
Project Partners		
 <p>Calgary Fire Department Dan Heney Robin Loewen Broderick Moore</p>	 <p>Service de securite incendie de Montreal J. Gordon Routley Francois Lefebvre Eric Delorme</p>	 <p>Halifax Regional Fire & Emergency David Meldrum Vince Conrad Bruce Lake</p>
		
<p>Project Leader Mark Williamson A/Director General, CSS</p>		
<p>Project Director Sheldon Dicke Portfolio Manager, CSS</p>		



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The FKTP Program

40 hour program (student) and 80 hour program (instructor) including:

- Nine theoretical sessions
- Practical live fire demonstrations
- Practical live fire sessions
- **5 Modules (FD 201 to FD 205)**
 - Intro, FD, Enclosure FD, Fire Assessment, Fire Control
 - Lesson Plans, Instructor Notes, Safety Document, Plans

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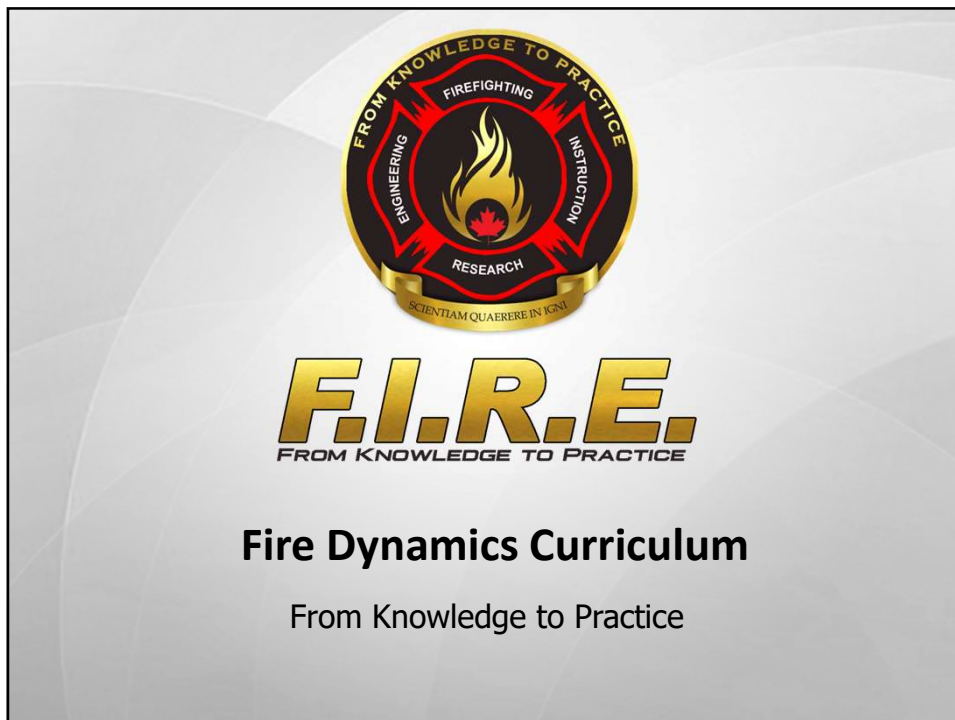


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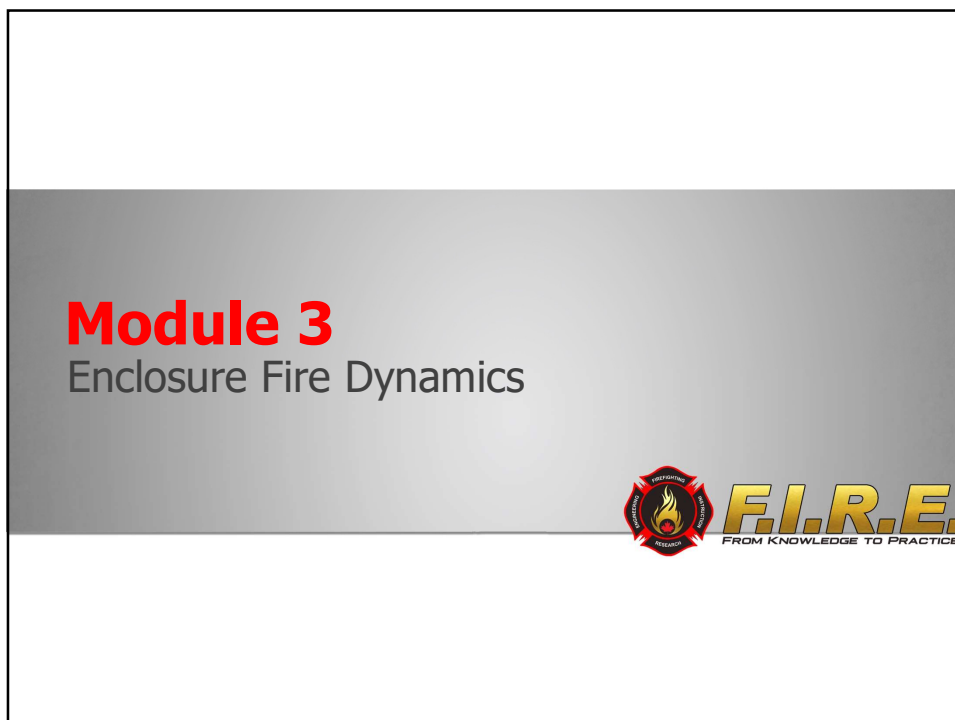
Why?

- **F.I.R.E. Literacy**
 - Focus the passionate and committed fire fighter's mind on:
 - Fire Fighting (Anticipation, Prevention, Intervention, Recovery)
 - Instruction
 - Research
 - Engineering

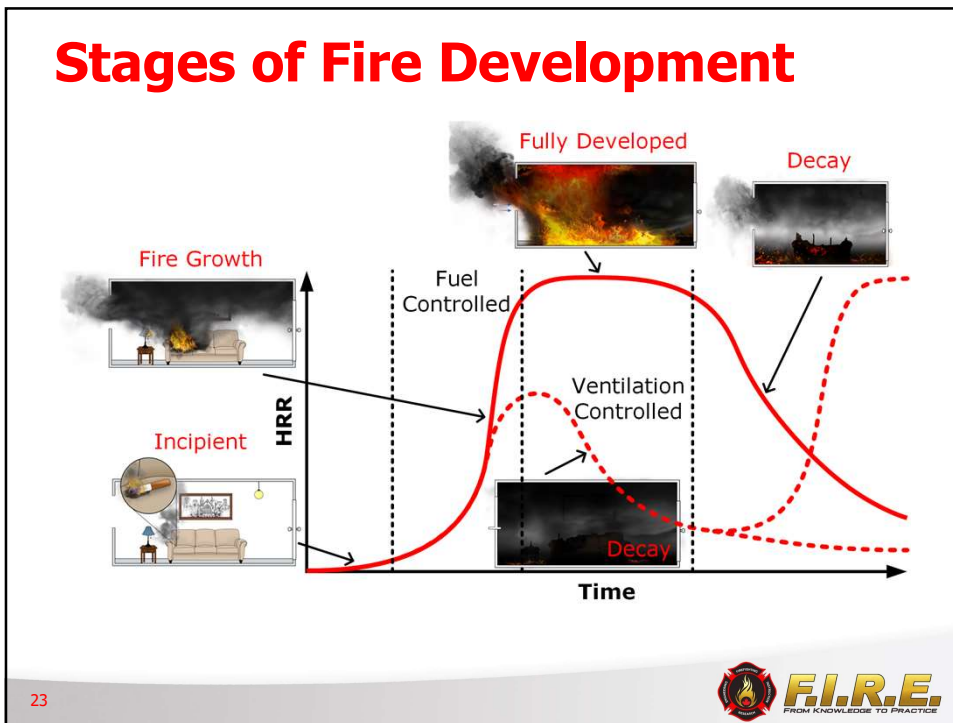
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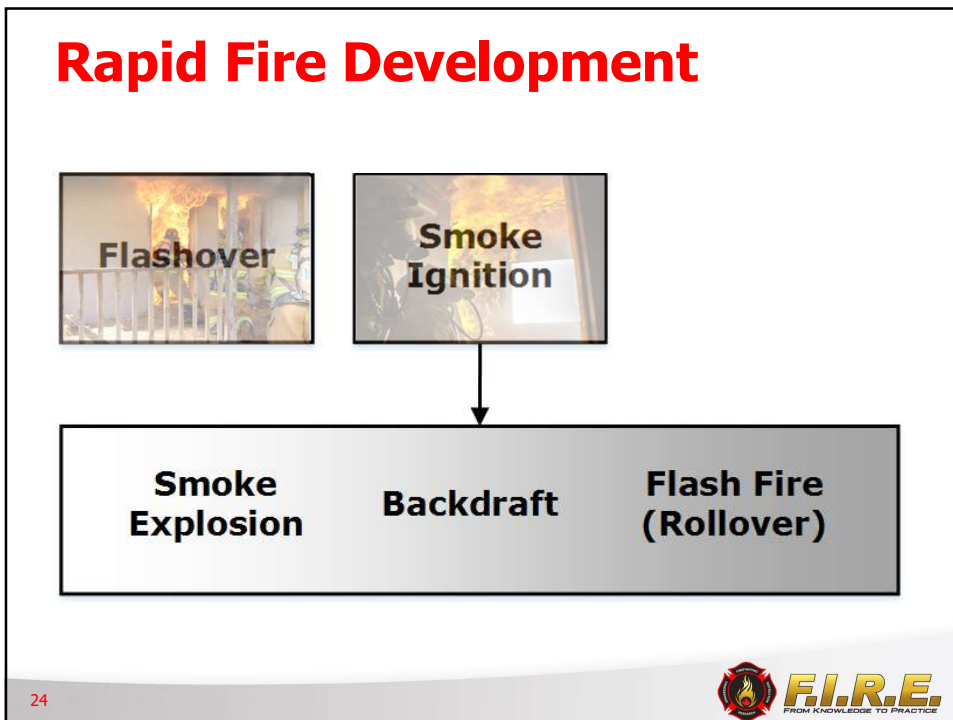
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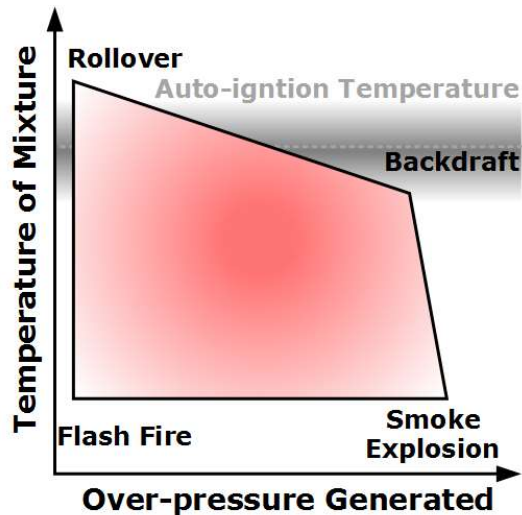


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Distinguish Smoke Ignitions

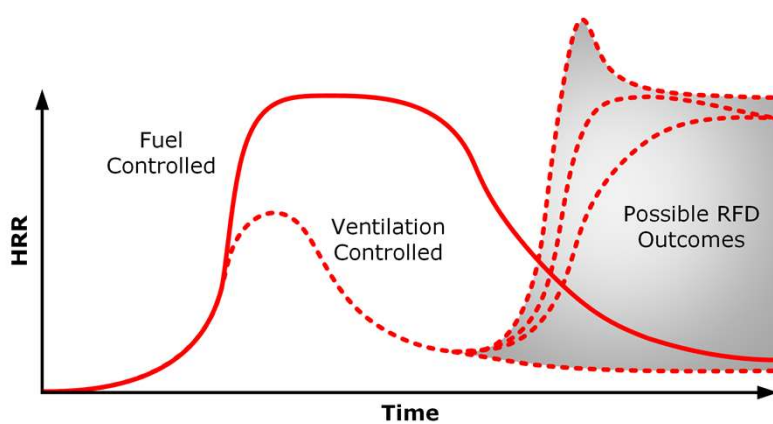


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Possible Outcomes



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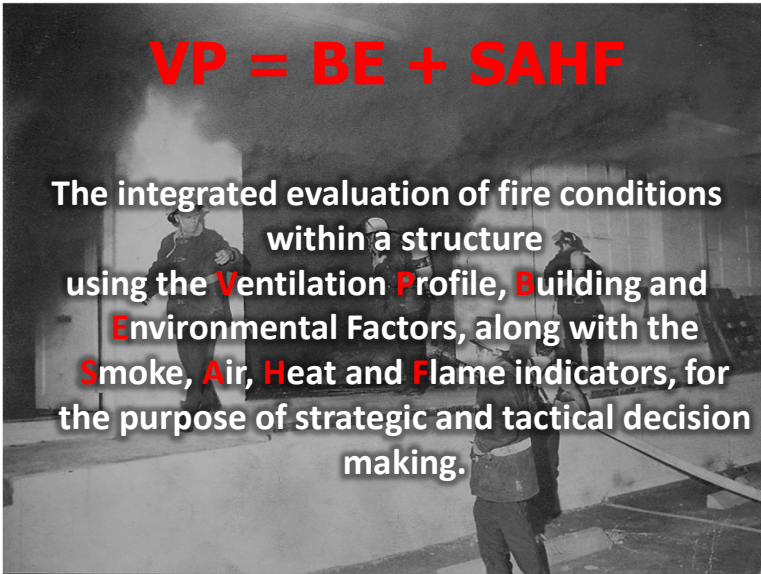


F.I.R.E.
FROM KNOWLEDGE TO PRACTICE

FD204


Fire Assessment: Module 4

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VP = BE + SAHF

The integrated evaluation of fire conditions within a structure using the **V**entilation **P**rofile, **B**uilding and **E**nvironmental Factors, along with the **S**moke, **A**ir, **H**eat and **F**lame indicators, for the purpose of strategic and tactical decision making.



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VP = BE + SAHF

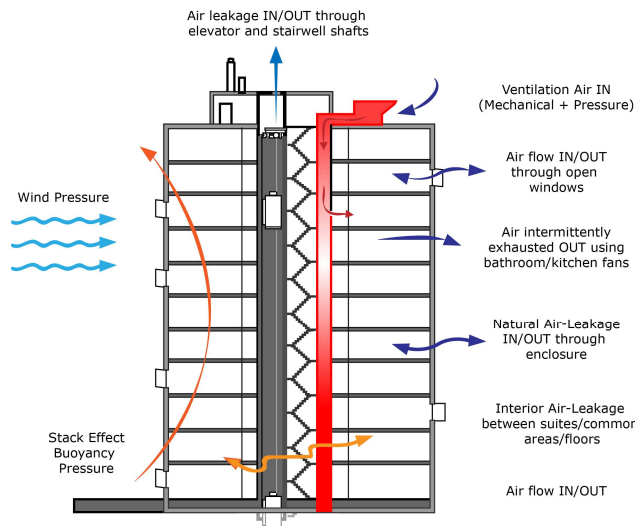
Ventilation Profile:

- The appearance of the entire fire building's ventilation openings, showing the flow paths of any air movement into the structure as well as smoke, heat or flame out of the structure.



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Building Factors

Loads

- Identification
- Imposition, resistance and transfer

Forces

- Compression, tension and shear

Materials Characteristics

- Brittle, ductile and composites

Structural Elements

- Hierarchy and interdependence
- Connections and systems
- Weak links



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Building Factors

Types of Construction

- Fire-resistive
- Non-combustible
- Ordinary
- Heavy timber
- Wood frame
- Performance-based design (PBD)
 - Lightweight trusses
 - Engineered wood, steel, plastics



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Building and Environmental Factors

Topography

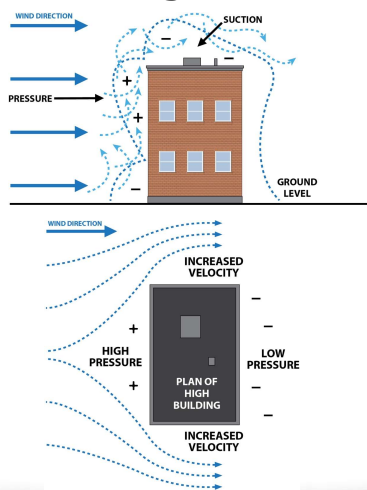
- Can generate significant aerodynamic effects, even in low-to-moderate wind conditions such as:
 - Pressure zones
 - Buffeting
 - Rip currents, and
 - Vortices.
- Effects caused by variations in elevation of land and/or buildings and building geometry.



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Building and Environmental Factors



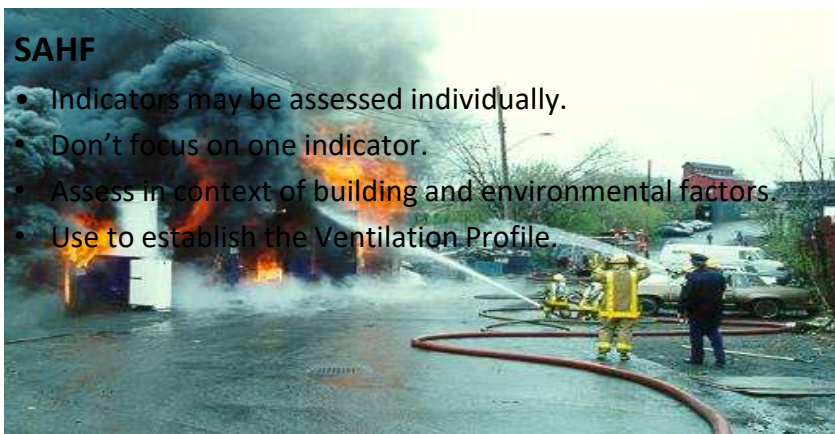
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Smoke, Air, Heat and Flame Indicators

SAHF

- Indicators may be assessed individually.
- Don't focus on one indicator.
- Assess in context of building and environmental factors.
- Use to establish the Ventilation Profile.



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Smoke/Air Track, Heat and Flame Indicators

Smoke/air track

- Layering a function of the gravity current.
- Read together to quickly establish the:
 - Burning regime;
 - Flow path(s); and
 - Ventilation profile (vent profile).
- Gravity current layering can be disrupted by wind or the combustion cycle and create irregular or dynamic flow(s) indicating extreme or unstable fire conditions.



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Smoke/Air Track, Heat and Flame Indicators

Flow path

- The route followed by smoke, air, heat or flame toward or away from an opening; typically, a window, door or other leakage points.



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Smoke/Air Track, Heat and Flame Indicators

Flow

- The flow is caused by pressure differences that result from temperature differences, buoyancy, expansion, wind impact and HVAC systems.



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Smoke/Air Track, Heat and Flame Indicators

Flow characteristics

- Include stratification within the boundaries of a compartment or at an opening; degree of turbulence; its direction, velocity and shape.
- Can often be identified by evaluating the **smoke/air track**.



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Smoke/Air Track, Heat and Flame Indicators

Smoke/air track

- At openings, or within rooms, the smoke/air track flow(s) may be classified as:
 - Unidirectional;
 - Bidirectional; or
 - Dynamic.



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Smoke/Air Track, Heat and Flame Indicators

Smoke/air track

- Multiple flow paths are possible within a structure fire, there may be multiple combinations of inlets and/or outlets .
- Flow paths can be altered by firefighting tactics.



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Smoke/Air Track, Heat and Flame Indicators



Unidirectional Flow:
A flow of smoke or air moving in a single direction.



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Smoke/Air Track, Heat and Flame Indicators



Bidirectional Flow:
Smoke/air flows moving
in opposing directions.



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Smoke/Air Track, Heat and Flame Indicators



Dynamic Flow: A unidirectional or bidirectional flow of
smoke/air that presents irregular stratification and shape,
or alternates in direction (pulsations).



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Smoke/Air Track, Heat and Flame Indicators

Dynamic Flow

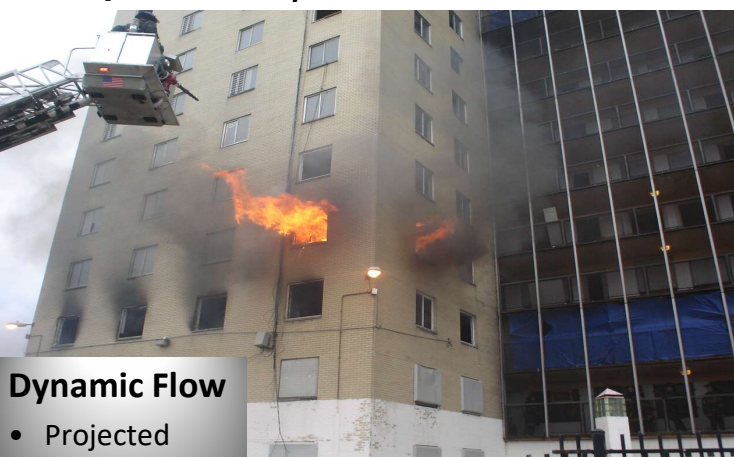
- Eccentric



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Smoke/Air Track, Heat and Flame Indicators



Dynamic Flow

- Projected



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Smoke/Air Track, **Heat and Flame Indicators**



Dynamic Flow

- Projected
- Inverted



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Smoke/Air Track, **Heat and Flame Indicators**



Dynamic Flow

- Inverted
- Eccentric
- Projected



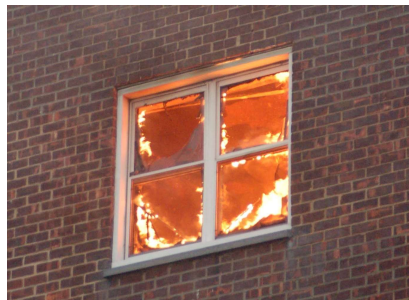
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Smoke/Air Track, Heat and Flame Indicators

Dynamic Flow

- Hollowed



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Smoke/Air Track, Heat and Flame Indicators

Dynamic Flow

- Pulsations
- Puffing



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Smoke/Air Track, Heat and Flame Indicators

Dynamic Flow

- Pulsations
- Starfire



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Outcomes

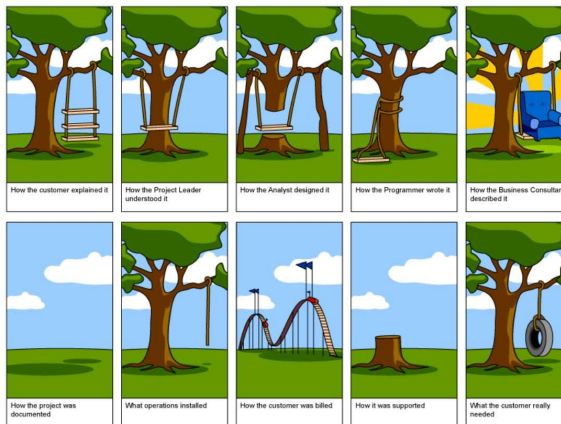
- IAFF Endorsement of the Materials
- IAFF 54th Convention **Resolution 44** – Fire Dynamics - Passed
- 5 Canadian provinces have or will adopt as of today
- Draft NFPA 1700 Standard on Structural Firefighting has adopted FKTP definitions
- Ottawa Fire Service
 - Recruits and FF 3rd Class must take course
 - All existing OFS must take course
 - Integrated into promotional system



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Eight T's

- Theory
- Tools
- Technique
- Task
- Tactics
- Training
- Transition
- Thinking Strategically



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THANK YOU! - Peter.McBride@ottawa.ca



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