

SURREAL LABORATORY PRESENTATION:

ICC – 815 Research Findings + Direction &
Committee Involvement. : A Method to the
Madness



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SURREAL

Sustainability and Resilience Adaptation Lab

The **SURREAL Engineering Lab** strives to create innovative, next-generation concepts and designs to help at-risk communities combat stressors due to climate change. Our solutions are practical, affordable, and include the following focus areas: (1) Fundamental & Applied Research (2) Innovative Designs (3) Public Education & Workforce Development.

A Note on our Approach...

The process we are employing to develop ICC 815 is a **novel approach** to standard development. **Scientific Evidence & Committee input** are paramount to the success of this process and will be the foundation on which this standard is built.

Project Goals

Global
Product



Living
Document



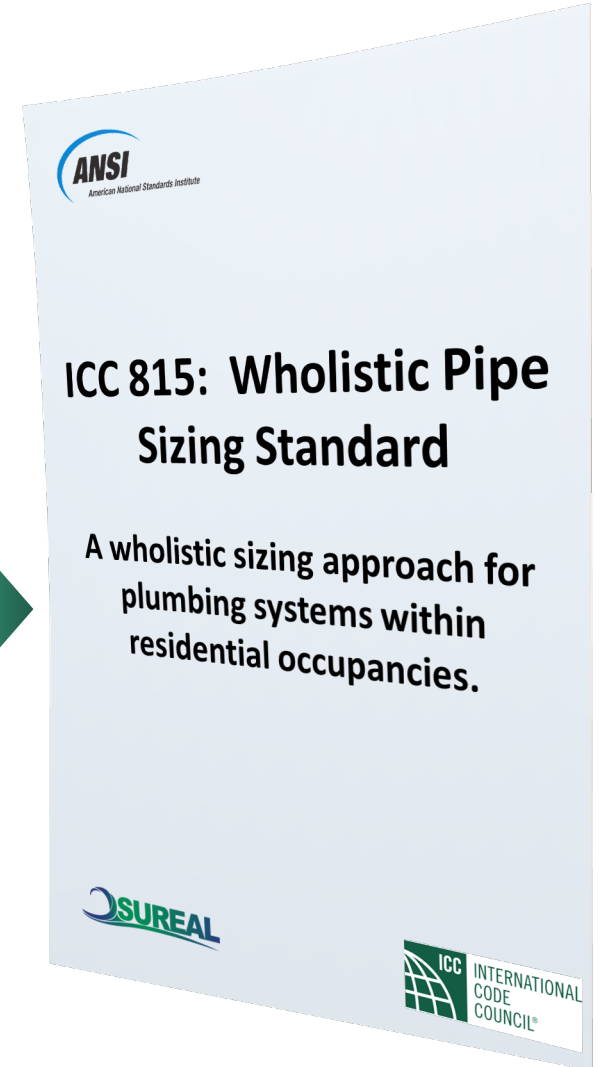
Adapts to
Communities



Public Health
and Safety



Wholistic in
Approach





ICC 815: Next-Gen Pipe Sizing

DREW RICH · PhD CANDIDATE

NEXT-GEN PIPE SIZING APPROACH

Creation of a pipe sizing guideline for all plumbing systems accounting for all factors deemed relevant in Phase I

DISSEMINATION AND INTEGRATION

Upon completion of pipe sizing guidelines, and incorporation into the standard, information will be spread to regulatory agencies, industry, and the workforce through a series of presentations, workshops, and papers.



PHASE I

LITERATURE REVIEW

Current pipe sizing methods, background, water sources, social sciences, anything with impact on pipe sizing.



PHASE III

TESTING/VALIDATION & ASSOCIATED BENEFITS

Testing and validating the pipe sizing guidelines through simulations and case studies and exploring associated benefits.



PHASE IV



PHASE I: Literature Review

Definitions & Scope

Sizing Breakdown

Simultaneous Review

Possible Scope



Duplex & Multiplexes



Educational Institutions



Single Family Dwellings



Apartments / Condos



Medically Assisted Living

End User Group (EUG)

Water Supply System (WSS)

Probabilistic, Empirical, & Stochastic Demand Calculation

Residential Plumbing System

Building Water Supply Systems (BWSS)

Ideal Operating Conditions

Opportunistic Premise Plumbing Pathogens (OPPPs)

Water Demand Vs. Pipe Sizing

Possible Definitions

PHASE I: Literature Review

Definitions & Scope

Simultaneous Review

Pipe Sizing Methods

Water Scarcity

Influential Factors on Water Use

Water Quality In Plumbing Systems

Data Set Identification & Acquisition

Intermittent Water Supply Systems

Water Demand & Pipe Sizing Methods

Ideal Operating Conditions for Premise Plumbing Systems

Impact of Piping Materials on Operating Conditions & Biofilm Development

PHASE I: Literature Review

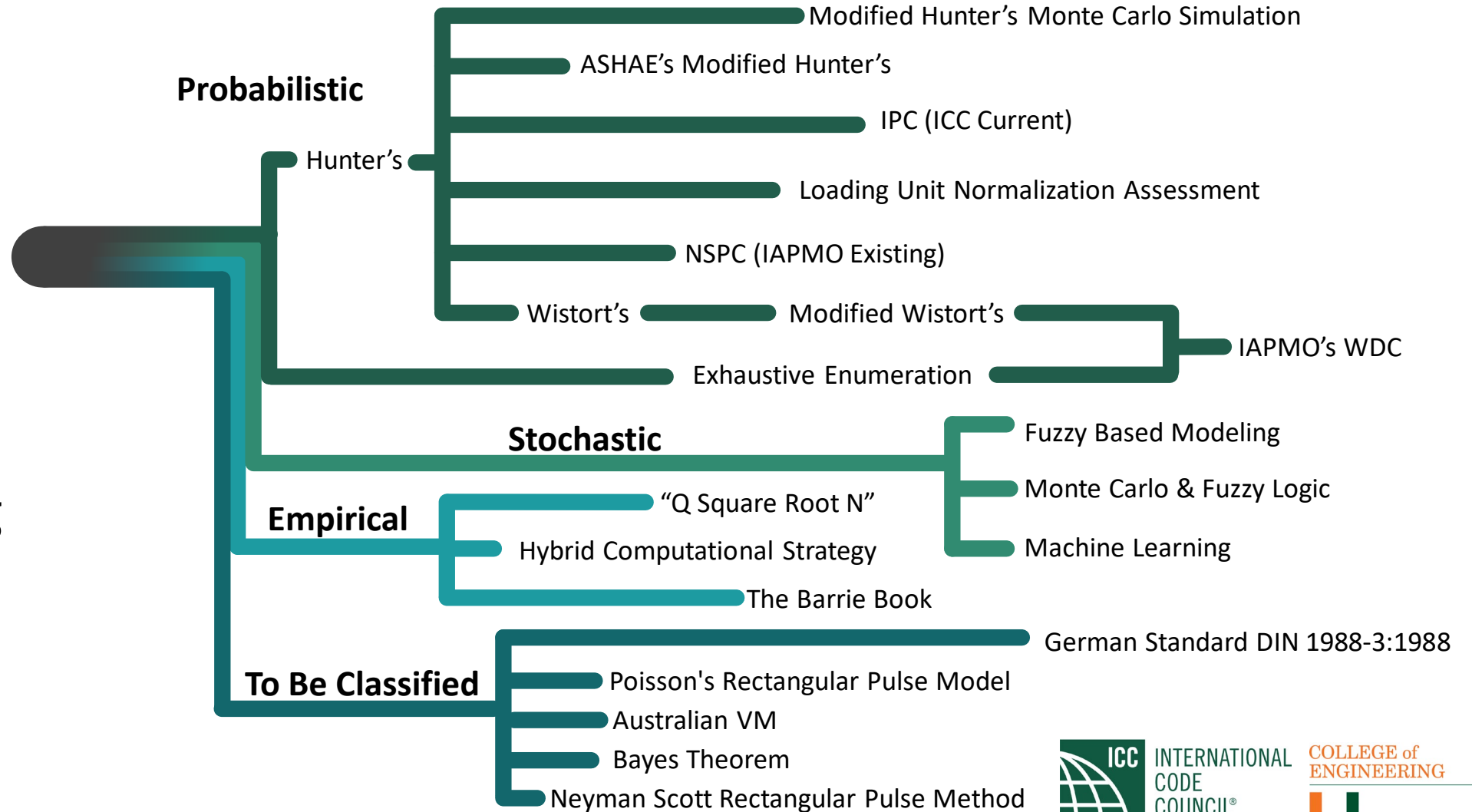
Definitions & Scope

Sizing Breakdown

Pipe Sizing Methods

Water Demand Prediction Methods

Pipe Sizing Methods



PHASE I: Literature Review

Definitions & Scope

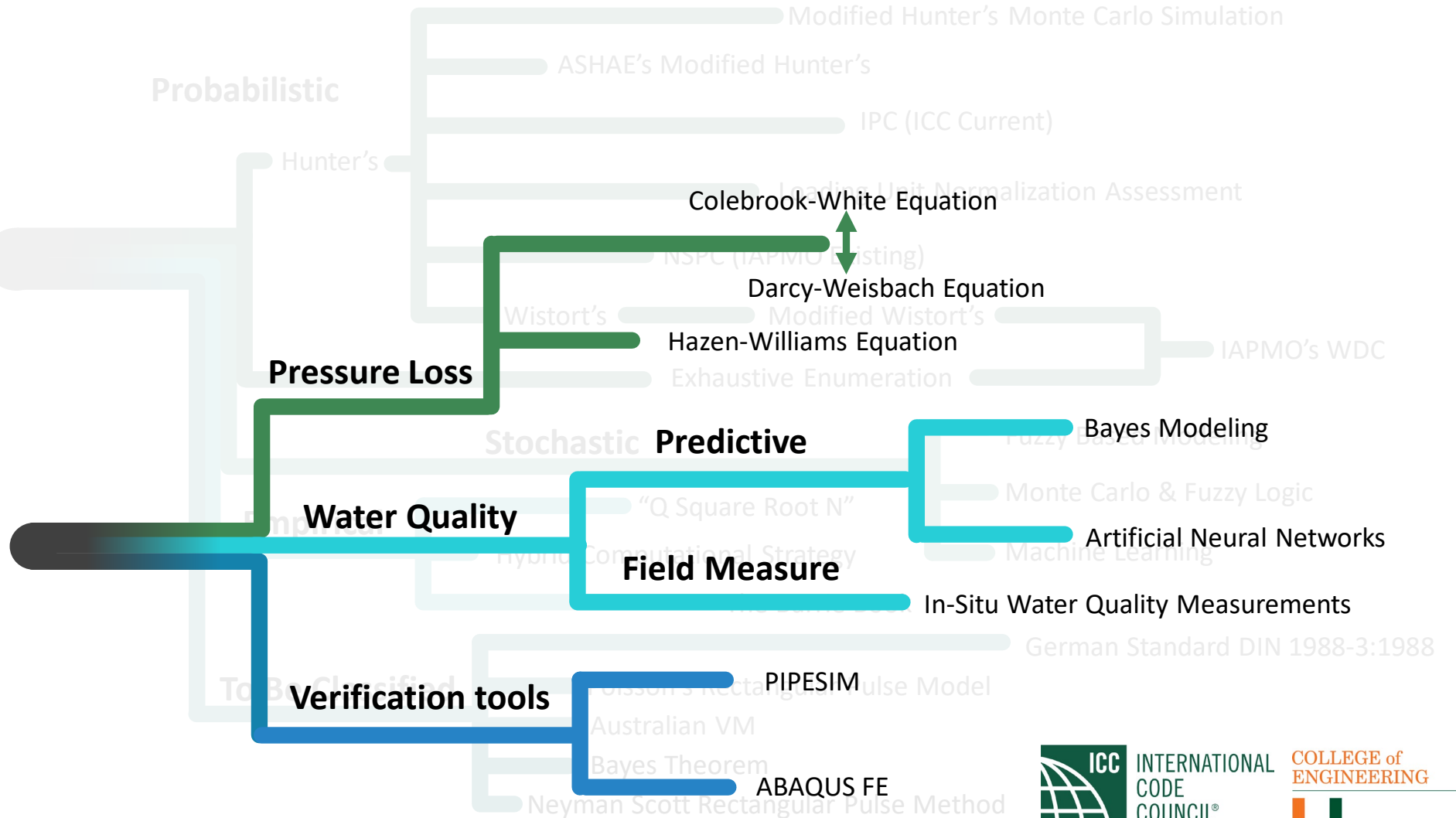
Sizing Breakdown

Pipe Sizing Methods

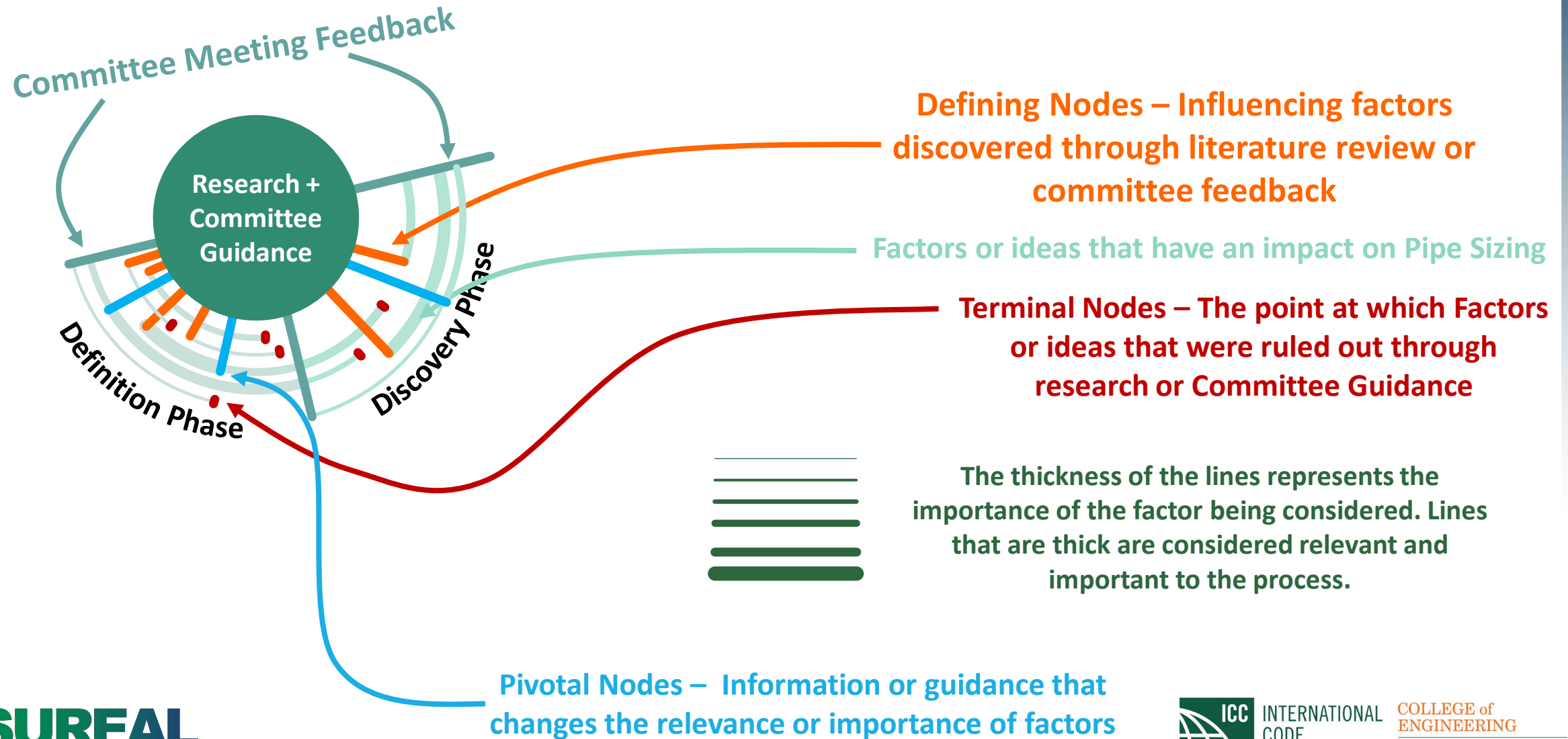
Water Demand Prediction Methods



Pipe Sizing Methods



Legend For Development of Pipe Sizing Methodology



Development of Pipe Sizing Methodology

Committee Feedback

Upon presentation of information from research provide feedback, suggestions, publications for inclusion, relevant data, and possible new areas that may have been overlooked

Committee
Feedback

Definition Phase

Understanding scope, the basic principles of the problem the reason for the problem and beginning to understand the approaches that exist.

Discovery Phase

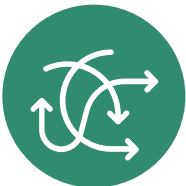
Diving deep into literature to better understand how past research has addressed pipe sizing.



Working Group Suggestions



Plumbing Pathogens & Biofilms



Flow Properties through Different Materials



Fixtures Testing & Recommended Flow Level



Sanitary & Venting



PHASE II: Next-Gen Sizing Approach

Preliminary Standard Outline

Committee Roles and Interactions

1

Scope

2

Definitions

3

Peak Water Demand

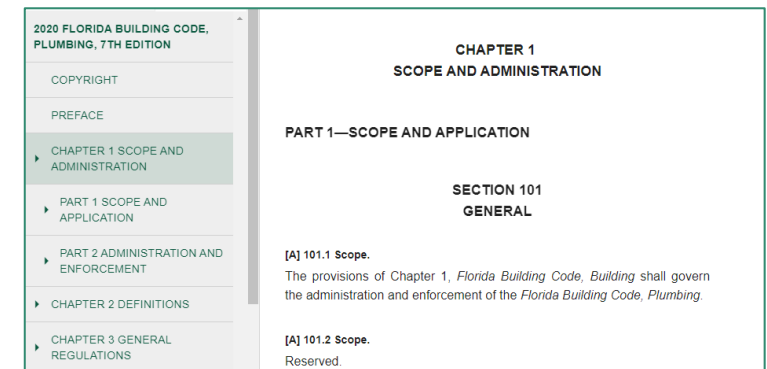
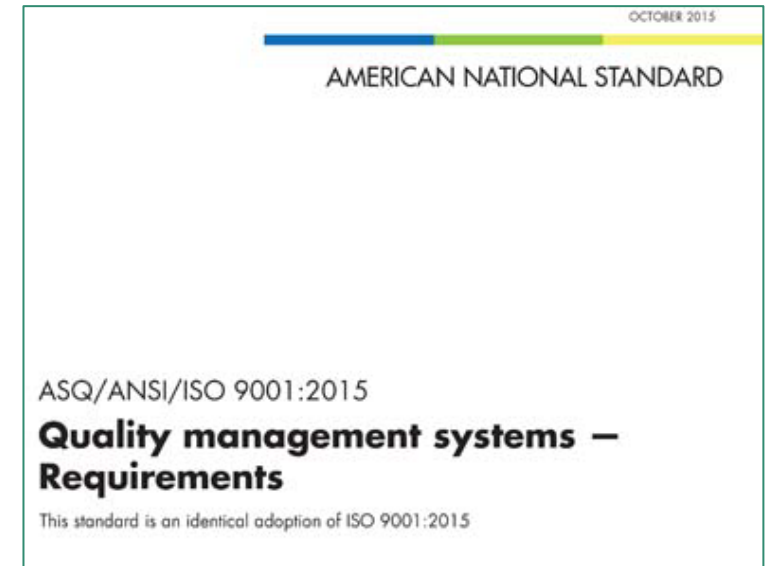
4

Pipe Sizing

STANDARD

VS.

CODE



Development of Pipe Sizing Methodology

Committee Feedback

Upon presentation of information from research provide feedback, suggestions, publications for inclusion, relevant data, and possible new areas that may have been overlooked

Definition Phase

Understanding scope, the basic principles of the problem the reason for the problem and beginning to understand the approaches that exist.

Discovery Phase

Diving deep into literature to better understand how past research has addressed pipe sizing.

Focusing & Creation Phase

Elimination of variables that aren't vital to the development of the solution and beginning to fabricate a working model of said solution.



Development of Preliminary Solution for Testing and Validation

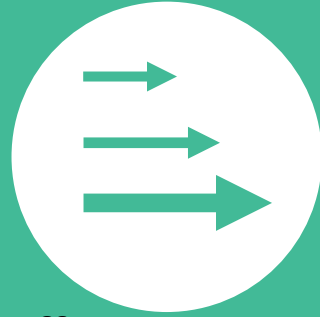
Not all aspects are completely solidified but there is a framework that can be tested and adjusted based on results.

PHASE III: Testing & Validation

Anticipated Experiments



Pressure Loss in Modern Fixtures



Affects on Varying Velocity



Temporal/Aging Impacts on Plumbing Systems



Pipe Size Effects on Biofilm/Pathogens



Pipe Sizing - Energy Impacts



Comparison with Other Methods



More Based On Committee Recommendations and Research

Development of Pipe Sizing Methodology

Committee Feedback

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Focusing & Creation Phase

Elimination of variables that aren't vital to the development of the solution and beginning to fabricate a working model of said solution.

Strengthening Phase

Utilizing experiments and data to further strengthen the model or solution that was created. Adjusting weights of based on parameter significance.

Fine Tuning

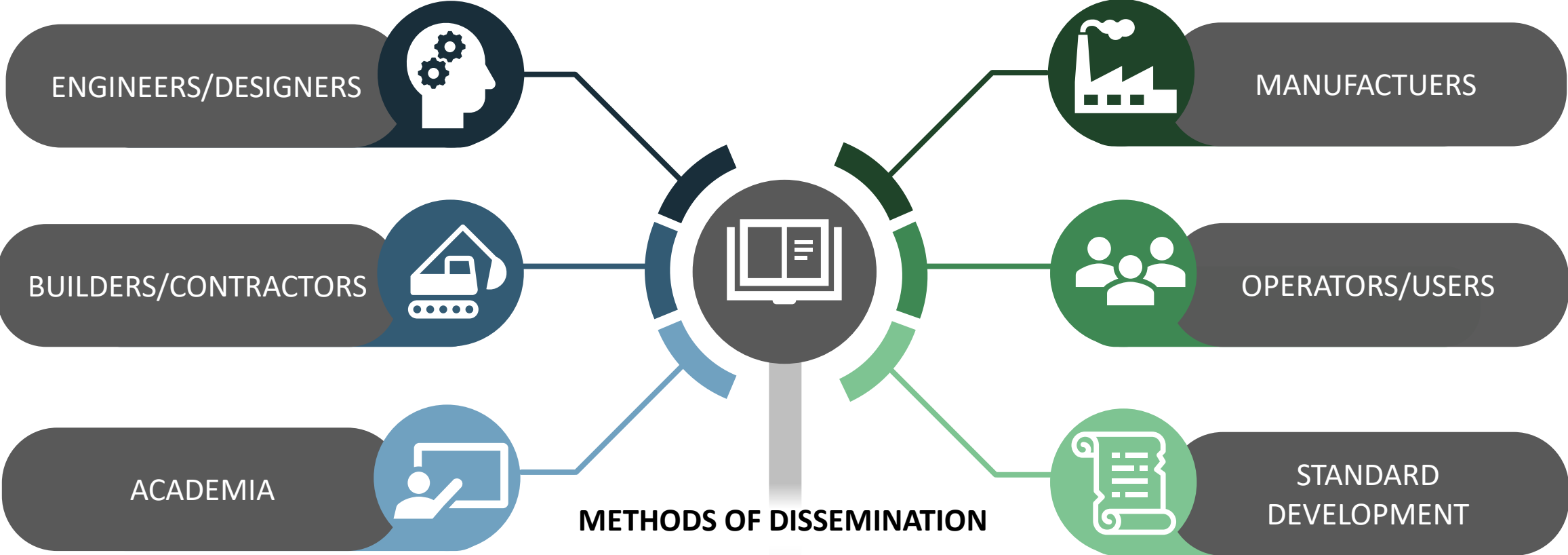
Adding the final touches and adjusting the factors in preparation for final product and demonstration to stakeholders.

Cohesive Final Product

The final product will be a solution that caters to the problem in a holistic manner that has been refined through previous steps.

PHASE IV: Dissemination & Integration

Stakeholders & Methods of Dissemination



Inform Regulatory Agencies
Workforce Training
Workshops / Seminars
Community Outreach

Scholarly Products
Conference Presentations
Industry Trade Shows
Codification

THANK YOU



DREW RICH · PhD CANDIDATE



Scan For
Contact Information
Drew Rich



QUESTIONS

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