



Senior Design Team 509

Environment-Controlled Test Stand Chamber

Michael Stoddard, Meghan Fonda, Donald Laughlin, & Dai (Bill) Truong

3/6/2020



Team Introductions

Team 509



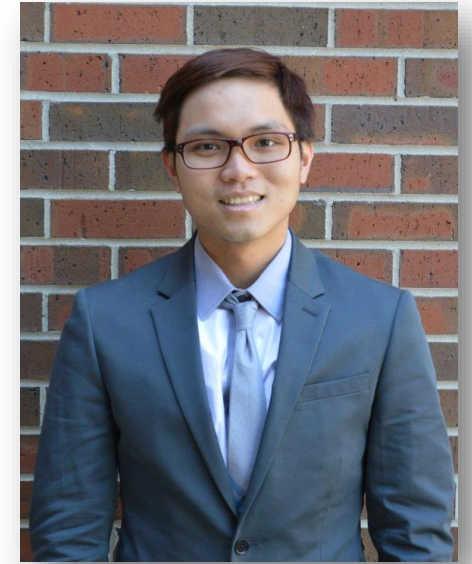
Michael Stoddard
Project manager &
Validation Engineer



Meghan Fonda
Quality and Test Engineer



Donald Laughlin
Thermal Fluids Engineer



Dai (Bill) Truong
Design Engineer

Sponsors

Danfoss



FAMU-FSU
COLLEGE OF
ENGINEERING

Donald Laughlin



Sponsors

Danfoss Liaisons:

- Jerry Huang
 - R&D Lab Engineering Manager
- William Sun
 - Director of Research and Development

University Adviser:

- Dorr Campbell, Ph.D.

Objective

The objective of this project is to design and construct a temperature and humidity-controlled testing chamber for the TT and TG models of Danfoss Turbocor Compressors.

Turbocor Compressor Models



TT Model



TG Model

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Danfoss Turbocor Compressors - TT



Refrigerant used:
HFC134a

- TT models can operate under standard water cooled and low lift chiller operation or at high lift for air cooled or heat recovery operation
- Capacity ranging from 60 tons/200 kW to 200 tons/700 kW
- The TG Series have sound pressure levels as low as 70.0 dBA at 1.5 meters away
- Typical Dimension: 788mm x 518mm x 487mm

Donald Laughlin

Danfoss Turbocor Compressors - TG



Refrigerant used:
HFO-1234ze

- TG models can operate under standard water cooled and low lift chiller operation or at high lift for air cooled or heat recovery operation
- Capacity ranging from 40 tons/140 kW to 150 tons/540 kW
- The TG Series have sound pressure levels as low as 70.0 dBA at 1.5 meters away
- Typical Dimension: 788mm x 518mm x 487mm

Donald Laughlin

Project Scope



Goals and Assumptions

Goals

- Achieve a temperature range of 10 to 55 °C
- Maintain a relative humidity range of 0 to 95%
- Keep lab personnel safe throughout the testing procedure
- Easy to assemble and disassemble

Assumptions

- Dimensions of compressors being tested inside the chamber are constant
- Device will be used inside a Danfoss facility
- Power comes from the testing rig
- The chamber will sit atop the rig
- Danfoss-Turbocor can provide machining services

Donald Laughlin

Markets and Stakeholders

Primary Market

- Danfoss-Turbocor
- R&D Test Facilities



Stakeholders

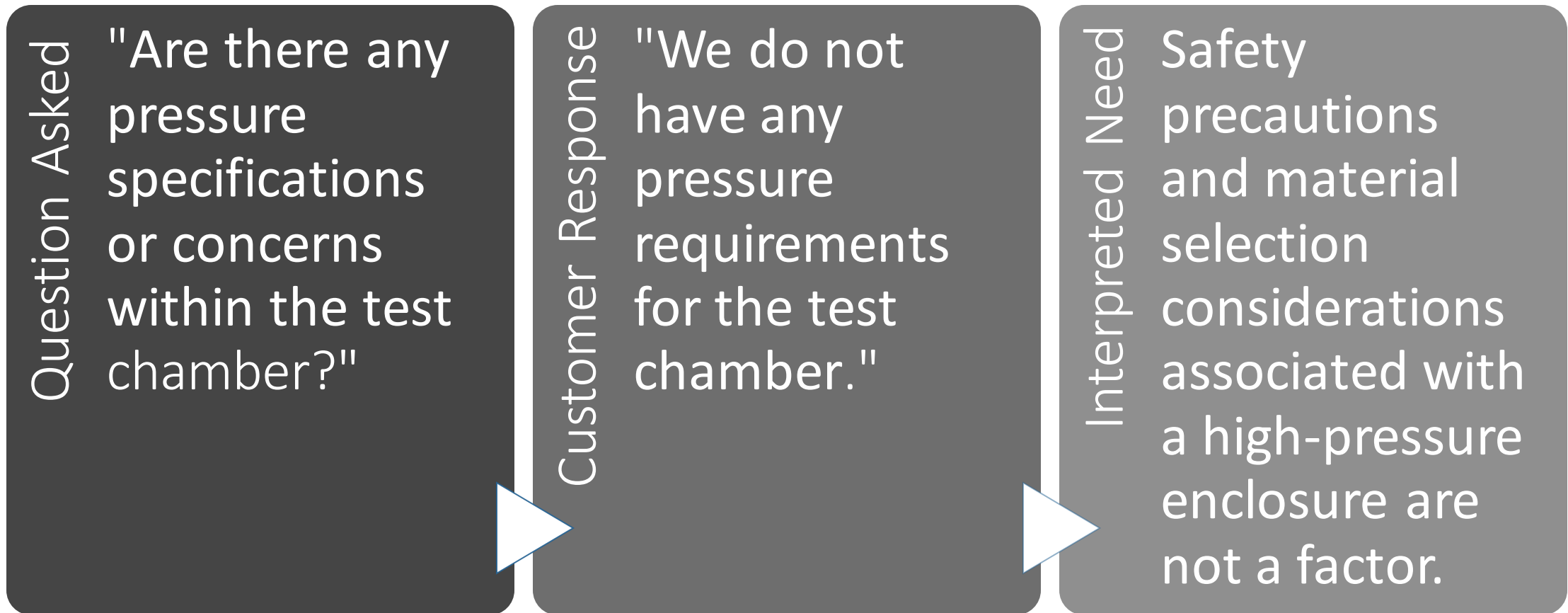
- Sponsor
 - Jerry Huang, Danfoss employee
- Facilitators
 - FAMU-FSU College of Engineering
 - Dr. Shayne McConomy



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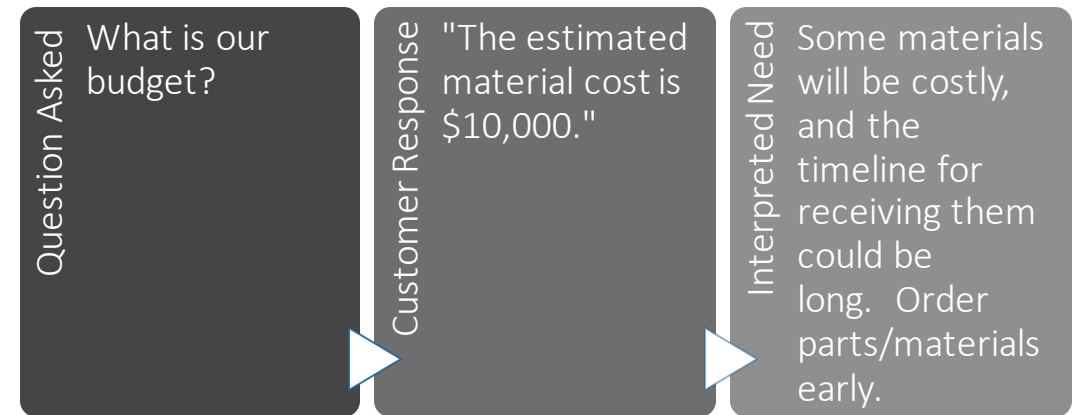
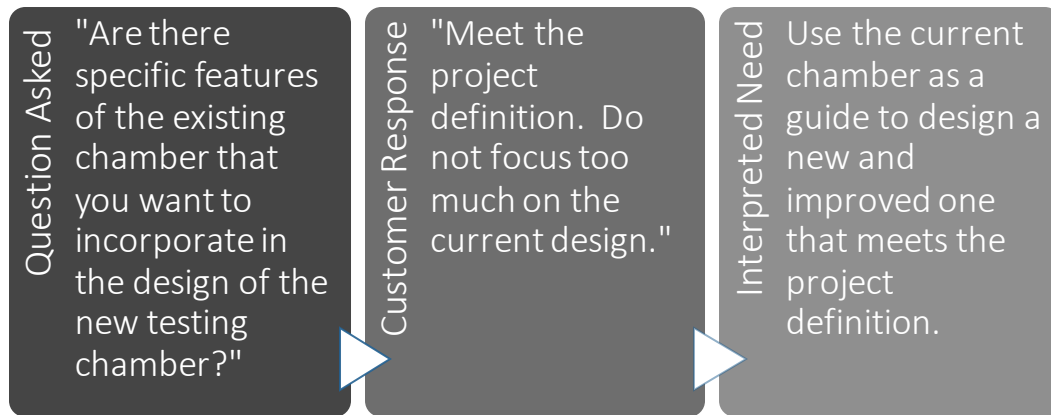
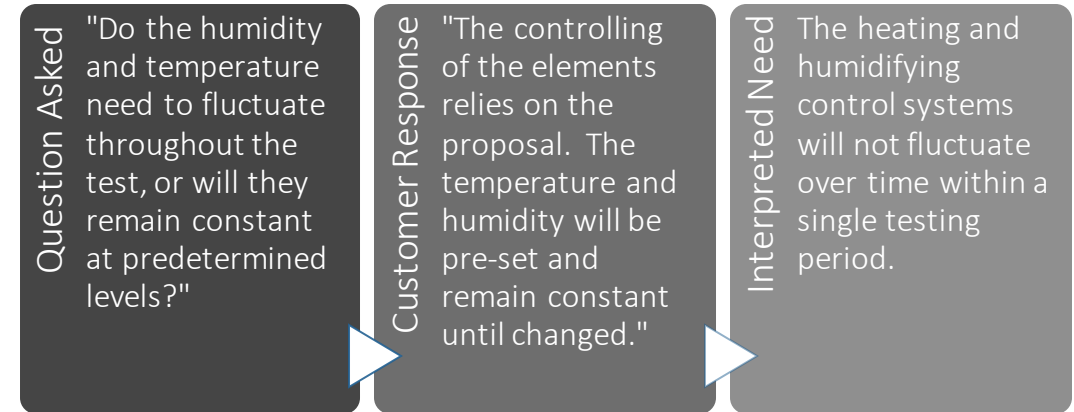
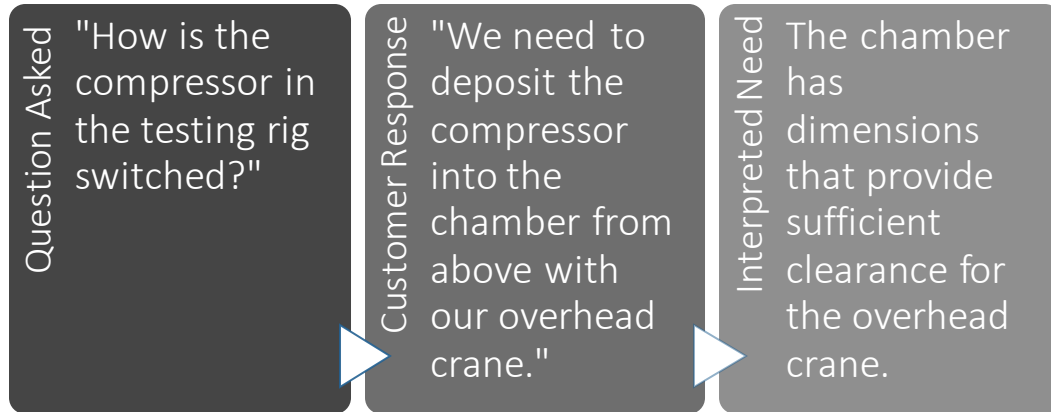
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Customer Need Statements



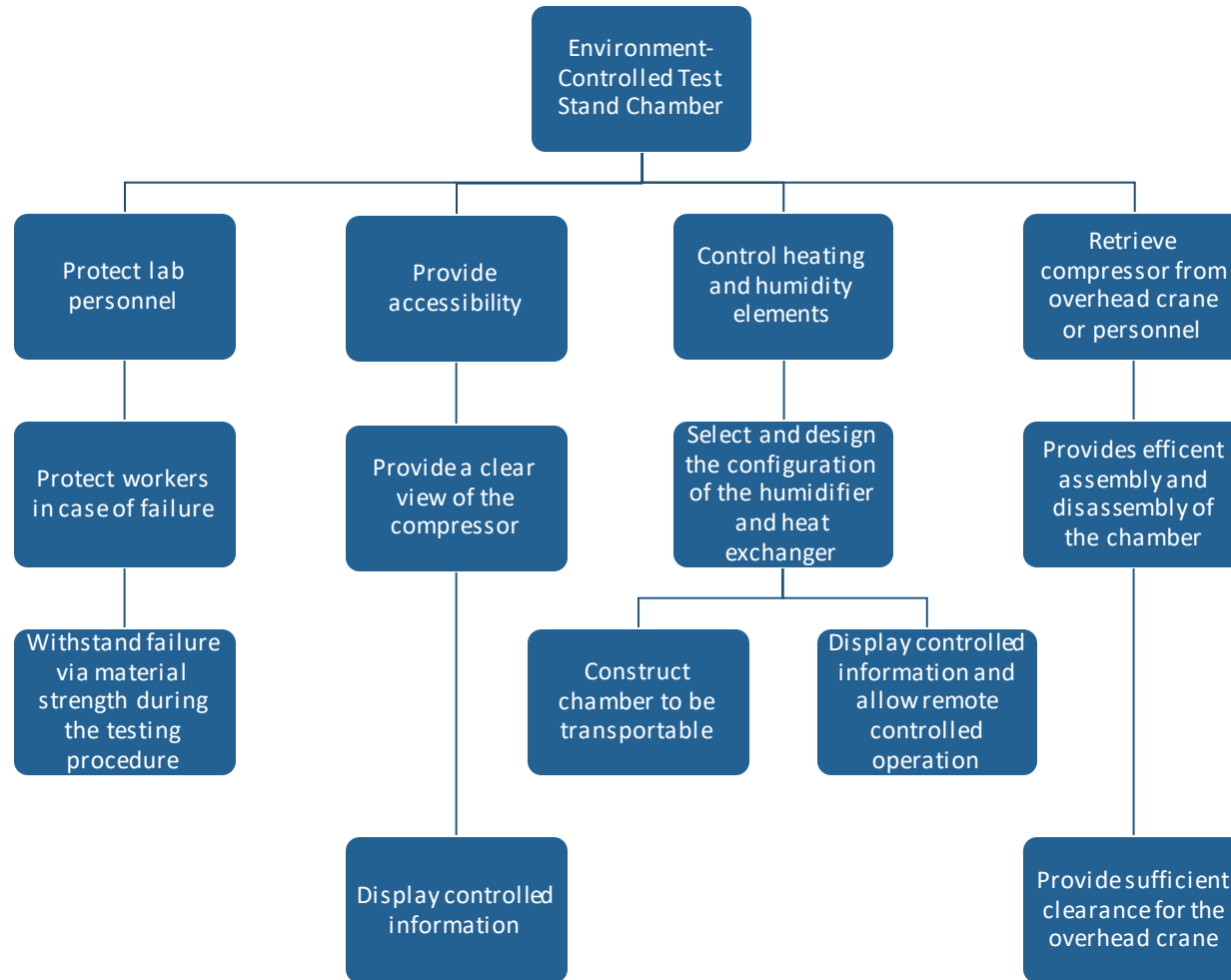
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Customer Need Statements, cont'd.



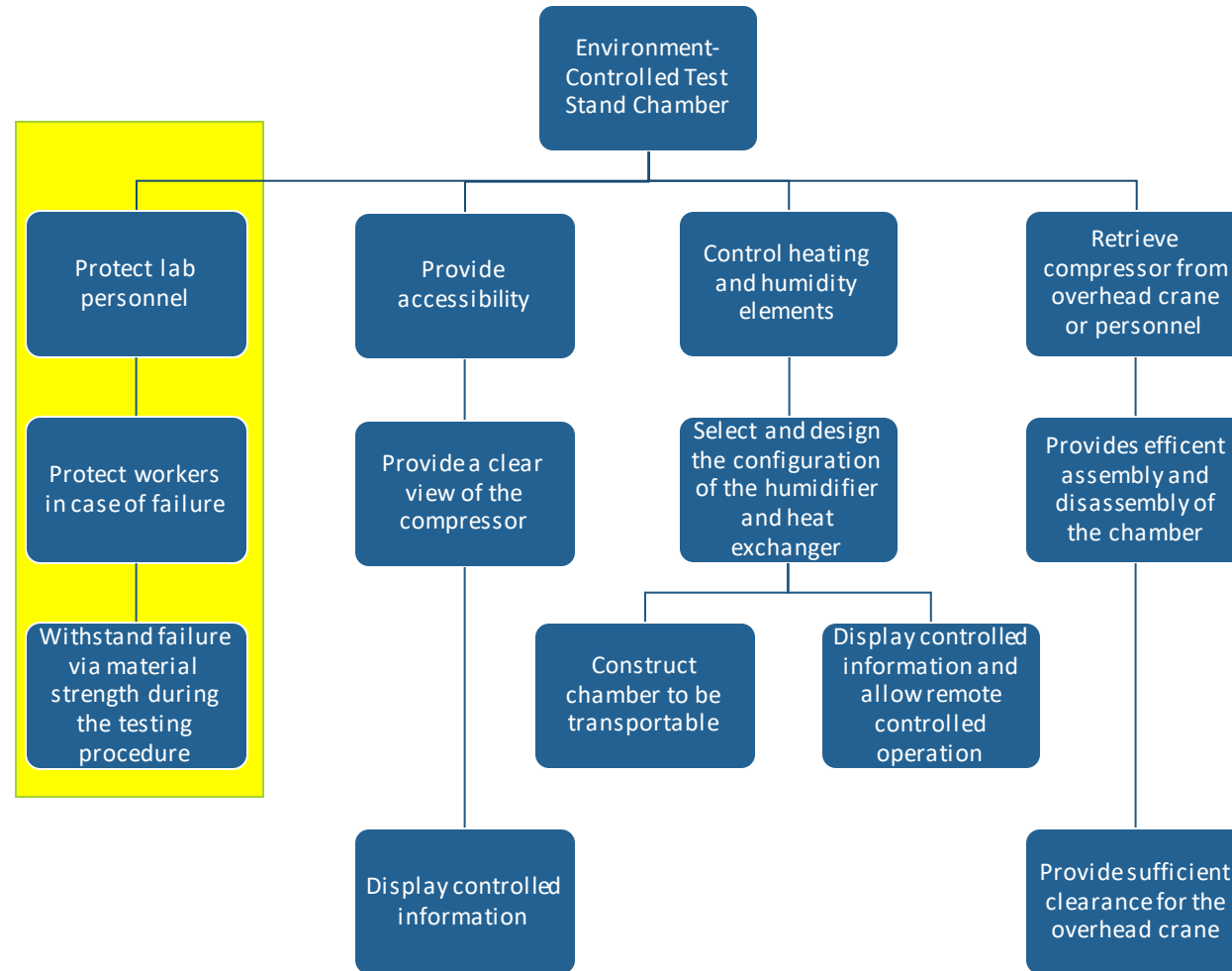
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Functional Decomposition



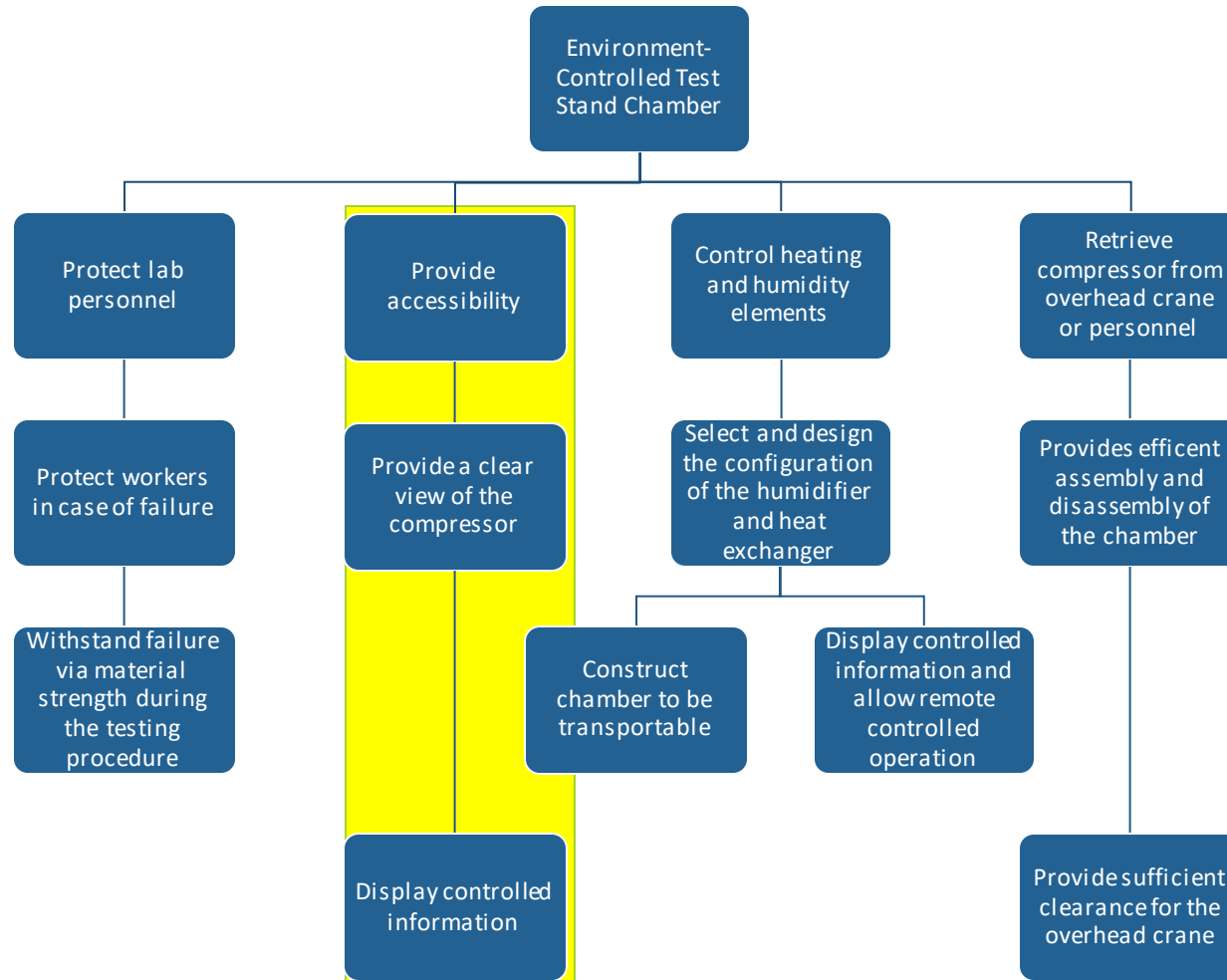
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Functional Decomposition, cont'd.



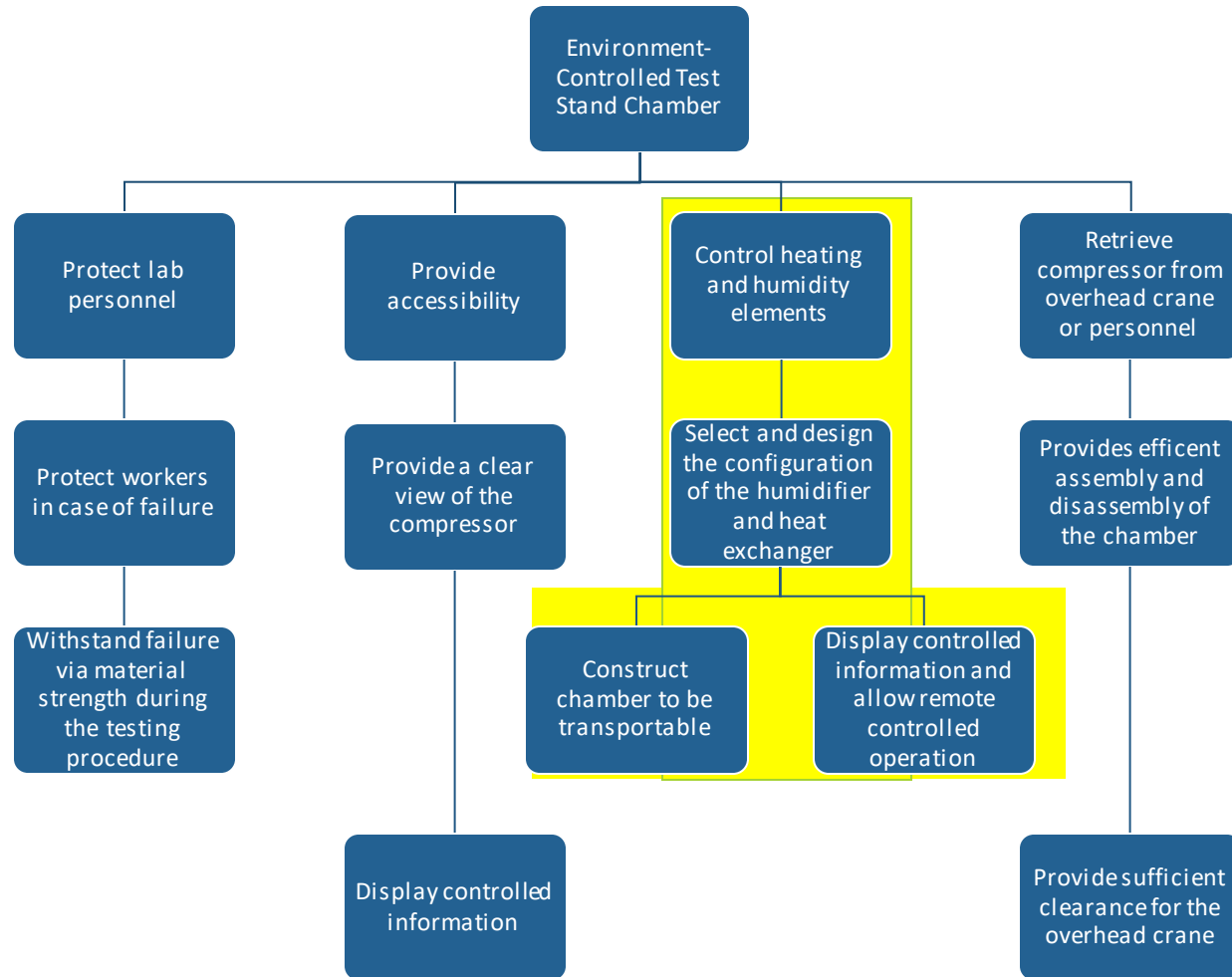
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Functional Decomposition, cont'd.



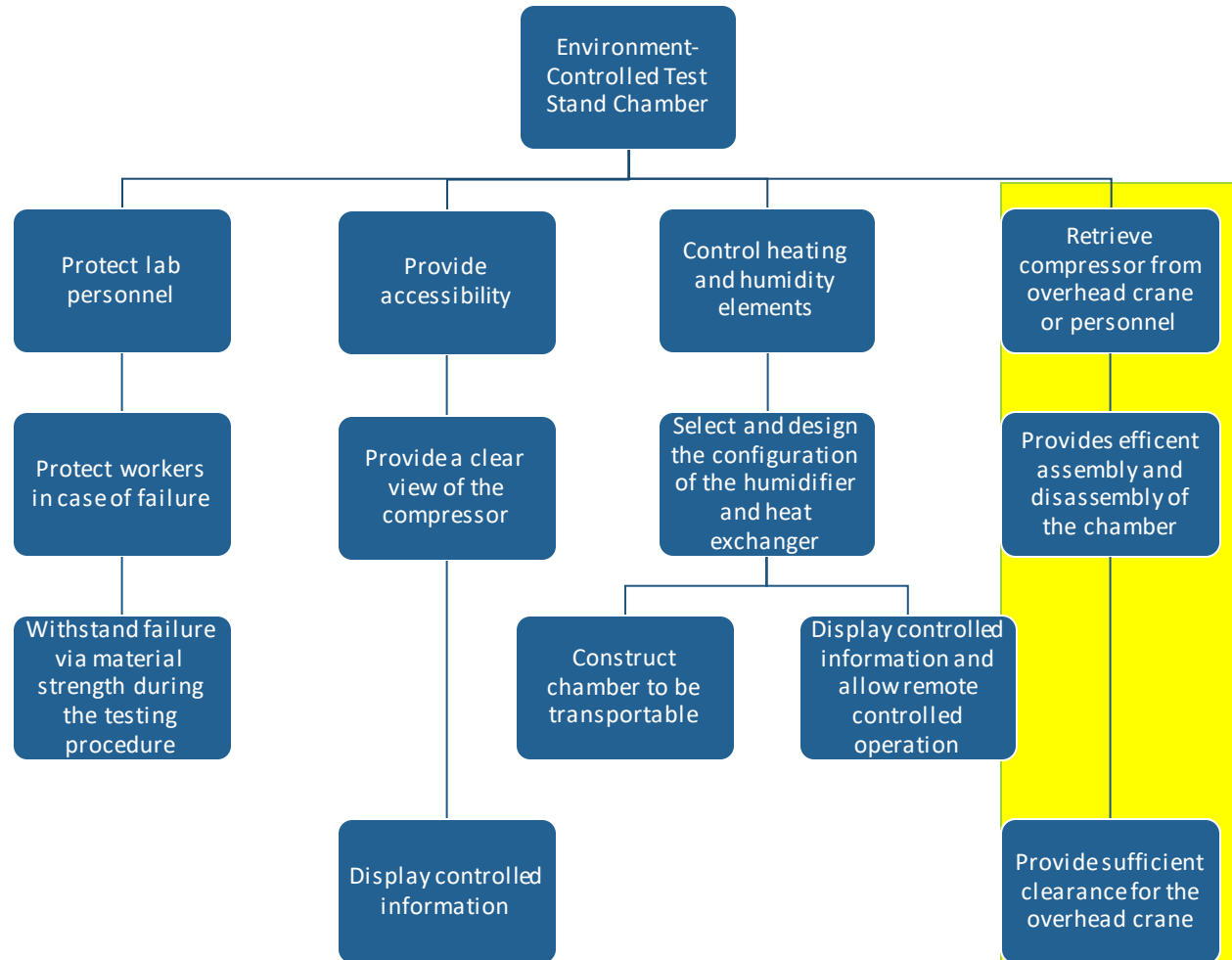
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Functional Decomposition, cont'd.



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Functional Decomposition, cont'd.



Michael Stoddard

Major Takeaways From This Lecture

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2. Concept generation.
3. Material selection and heat transfer calculations.
4. Our group is making the final product for Danfoss. Prototyping will be testing the control systems
5. Project plan

Future Work

- Concept selection

Future Work

- Concept selection
- Bill of materials

Future Work

- Concept selection
- Bill of materials
- Spring project plan

References

- Danfoss. (n.d.). *Turbocor - TG*. Retrieved from Highly energy efficient and environmentally friendly compressor: <https://www.danfoss.com/en/products/compressors/dcs/turbocor/turbocor-tg/#tab-overview>
- Danfoss. (n.d.). *Turbocor - TT*. Retrieved from Danfoss Turbocor® TT series: Oil free compressors using HFC134a refrigerant: <https://www.danfoss.com/en/products/compressors/dcs/turbocor/turbocor-tt/#tab-overview>
- Danfoss. (n.d.). *Turbocor – Danfoss Turbocor Compressor Specification Sheet*.

Questions?

