Design characteristics for a novel linear accelerator for challenging environments

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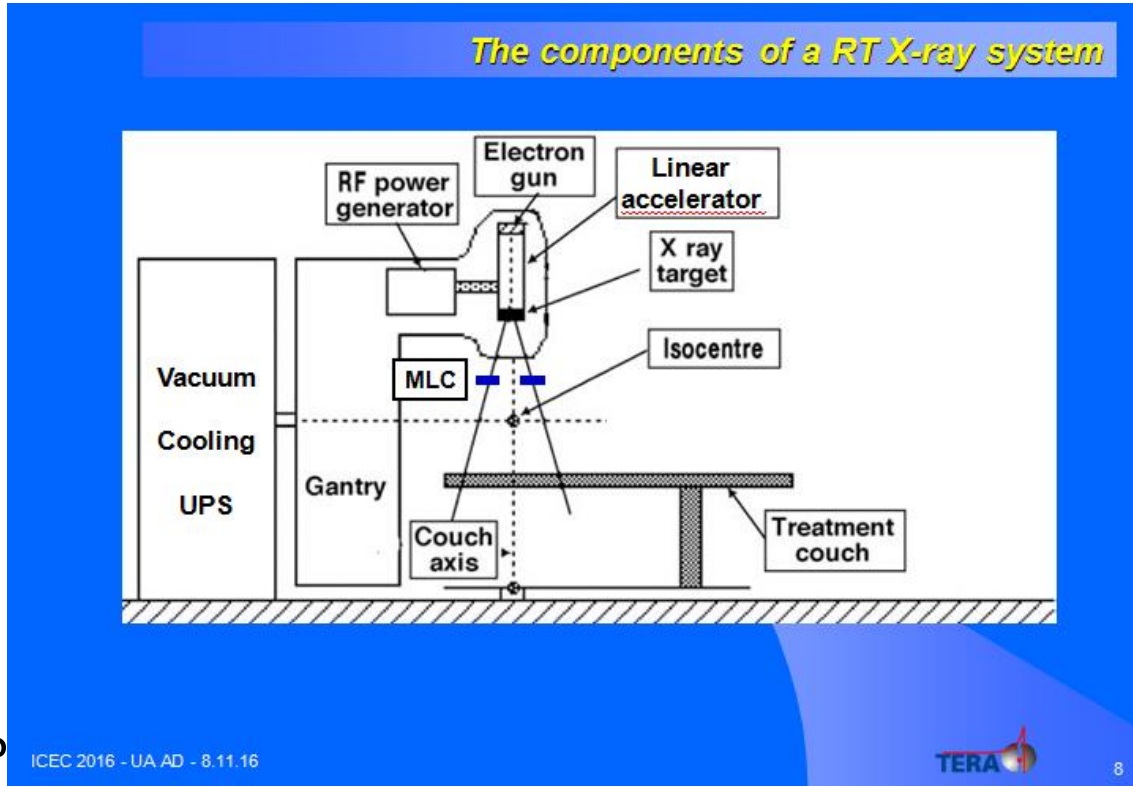
"DREAMLINER" LINAC FEATURES

NOVEL
MODULAR
UPGRADABLE
LOCALLY FIXABLE
ROBUST / RELIABLE
EASILY REPAIRABLE
Remote diagnostics
Turnkey installation
Less cooling needed
Optimize real time
On-board imaging
CT/MR Rx planning
Remote serviceability
Reliable in high temp
Virtual wedges/ MLCs
Reliable w/o chilled water
More efficient commissioning / nanotube-based cold cathode systems / Military-spec integrated circuits
Knowledge-based treatment planning / Remote environmental monitoring / Low demand on infrastructure / Low standby power need
Improved safety and testing technology / Non-human performance monitoring / Competency testing of operators / Integrated Educ. interfaces
Potential-failure readout
Off-grid power storage
Photons and electrons
Decreased PACS costs
3D navig vs gantries
Robust optimization
Hybridize: MR/linac
Hybridize : CT/linac
Automated Rx planning / digital detectors
Safety system for opns / Automated QA platforms
Alternate power:
Battery storage
Solar power
Fast restart
6-10 MV

Machine requirements ?

- Energy ?
- Field size?
- Movable part (mechanics) vs. all-electronics approach
- Rotating gantry vs. many linacs from different directions?
- Coupled to imaging? Which technology?
- Software control ?
- Reliability – power stability?



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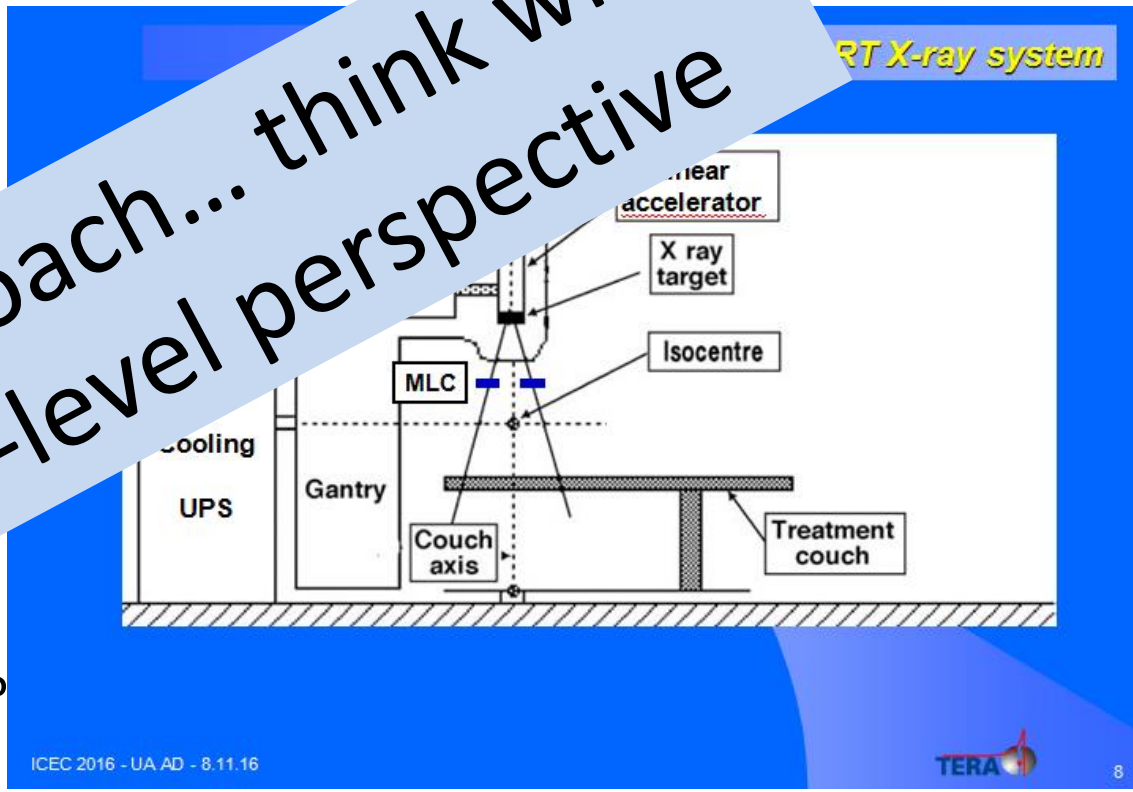
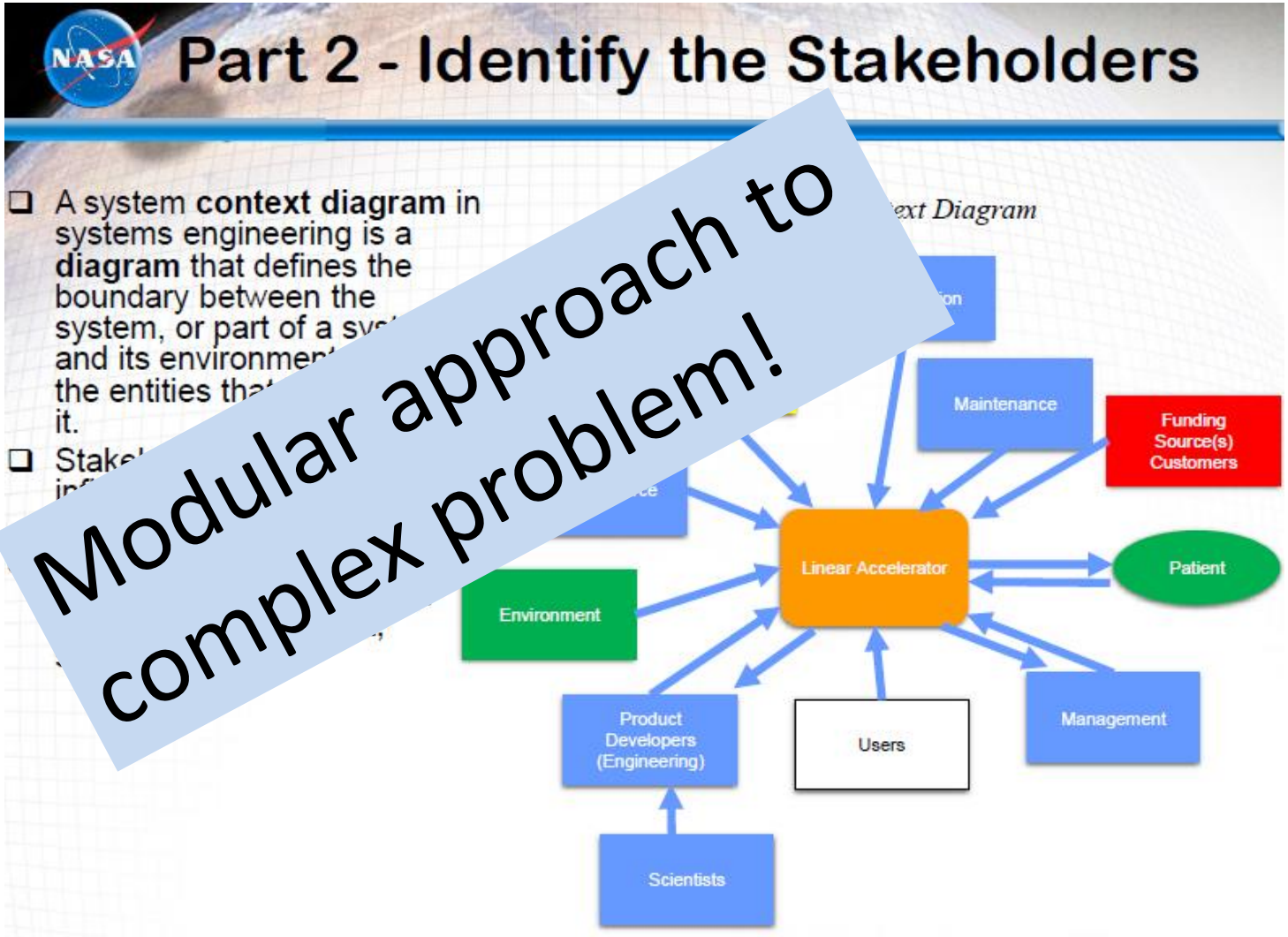
New approach… think with a system-level perspective



Modular approach to complex problem?

R. Cobbs (NASA)



Modular approach to complex pr

D. Jaffray

Modular and "smart" approach – bury the complexity

Principle #3: W
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If you don't get this right, the treatment will fail and waste precious time, money, and lives.

The branching point

- Branch Type 1: “starter machine”
  - Define specs. for novel “Starter Machine” and engage industry
- Branch Type 2: new disruptive technology
  - Identify “Program Team” to bury complexity of radiotherapy

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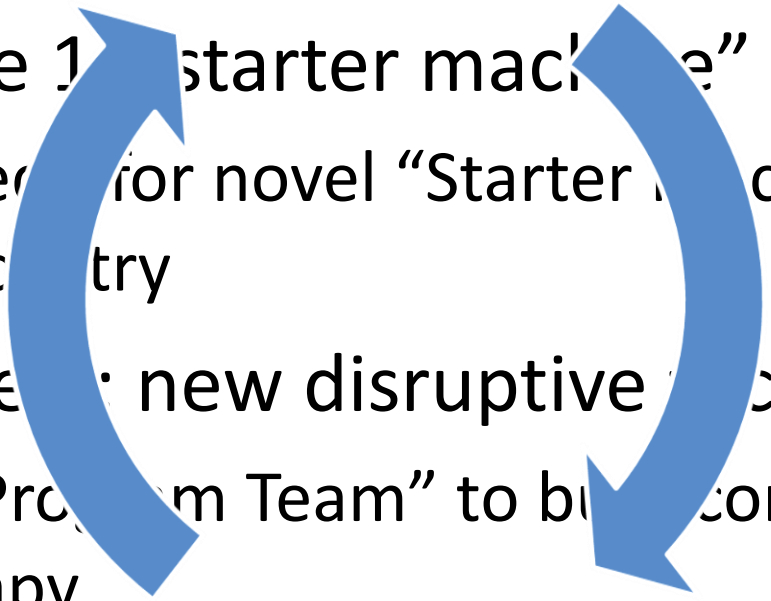

→ BOTH !