27th ANNUAL
FIRST CONFERENCE BERLIN
14 - 19 JUNE 2015

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27th ANNUAL FIRST CONFERENCE BERLIN 14-19 JUNE 2015

CSIRT Information Sharing Workshop

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Project Information

Project funded by:

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- Dutch National Cyber Security Centre
- Swedish Civil Contingencies Agency

Full Research Team:

Examining CSIRT Effectiveness

CSIRTs can benefit from both technical and non-technical evaluations of effectiveness.

NEEDS

- Majority of research focused on technological aspects

APPROACH

- Applied behavioral science approach
  - Individual, team, and multiteam system (MTS) levels of CSIRT functions

BENEFITS

- New team approach can be customized to specific CSIRT needs

COMPETITION

- Integrates technical and non-technical guidelines and evaluations compared to existing process and maturity models

Project Overview

1. Data Collection

- Collect data from individual interviews with CSIRT managers, focus groups with team members, and survey instruments

Informs

2. Identifying Knowledge, Skills, and Abilities

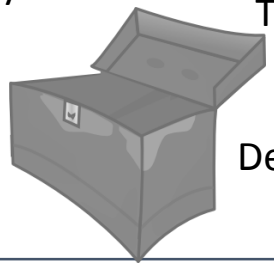
Informs

3. Handbook: Tools to Improve Selection, Training, and Processes

Team Staffing

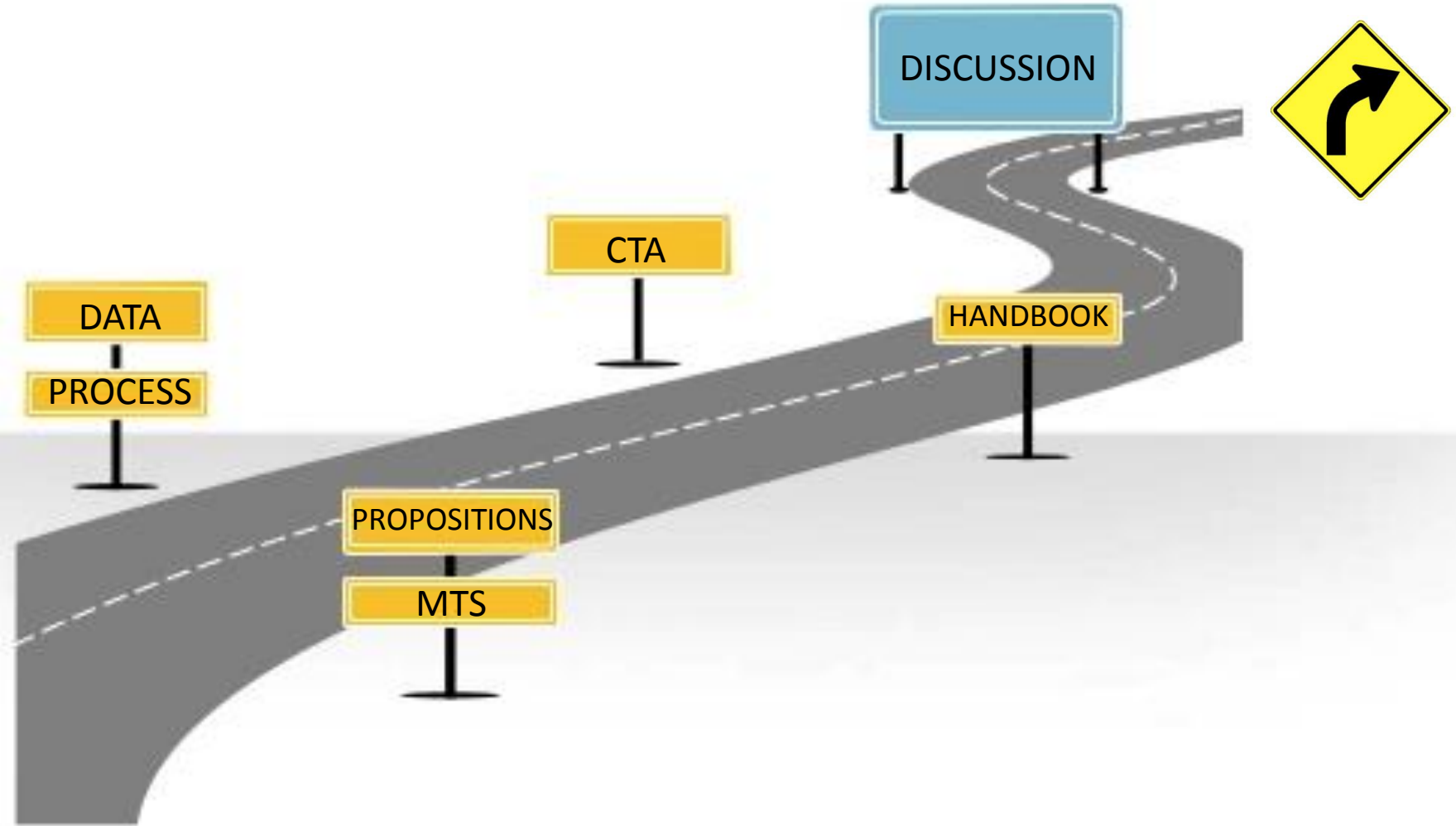
Selection Systems

Training



Decision Aids

Presentation Roadmap



Data: Focus Groups

Total Interviewees	CSIRT Teams (focus group total)	Leader Interviews	MTS Leader Interviews
130+*	48**	19	10

CSIRT Types

Coordinating	Managed Service (external clients)	Corporate (internal)	Other
16	10	16	6

*FG participants anonymous – total interviewees estimated from transcript review where not directly noted.

**Seemingly among the largest number of CSIRT interviews conducted in a single CSIRT research project.

Data: KSAO Survey

- Survey of Knowledge, Skills, Abilities, and Other important attributes (KSAOs)
- Leader interviews and focus groups **endorsed 46 attributes**
- Survey designed to **verify** those observations
- Surveyed over 80 CSIRT professionals
  - National and corporate CSIRTs

Identified "**Top 20**" KSAOs

Endorsed as "*very important*"

TOP 20 CSIRT KSAOs

Cognitive

- Learning ability
- Problem-solving skills
- Investigative skills
- Intelligence
- Decision-making Competence

Character

- Work Ethic
- Specific Curiosity
- Resilience
- Self-motivated
- Detail-oriented
- Proactive
- Adaptive
- Perseverance
- Diversive Curiosity
- Ambiguity Tolerance

Social/Team

- Trustworthiness
- Collaborative problem-solving
- Motivation to work on behalf of team
- Communication skills
- Mentor/coaching ability

Effective CSIRT Performance

- **CSIRT performance requires:**

Taskwork:

- Detect and respond to incidents
- Triage incoming incidents
- Analyze incidents
- Develop and execute comprehensive solutions

Teamwork:

- Solve problems collectively
- Assess team performance
- Give, seek, and receive task-clarifying feedback
- Active listening skills
- Knowledge about team members' roles

Effective CSIRT Performance

- Behavioral science research
  - Helps explain how and why CSIRTs can be more effective

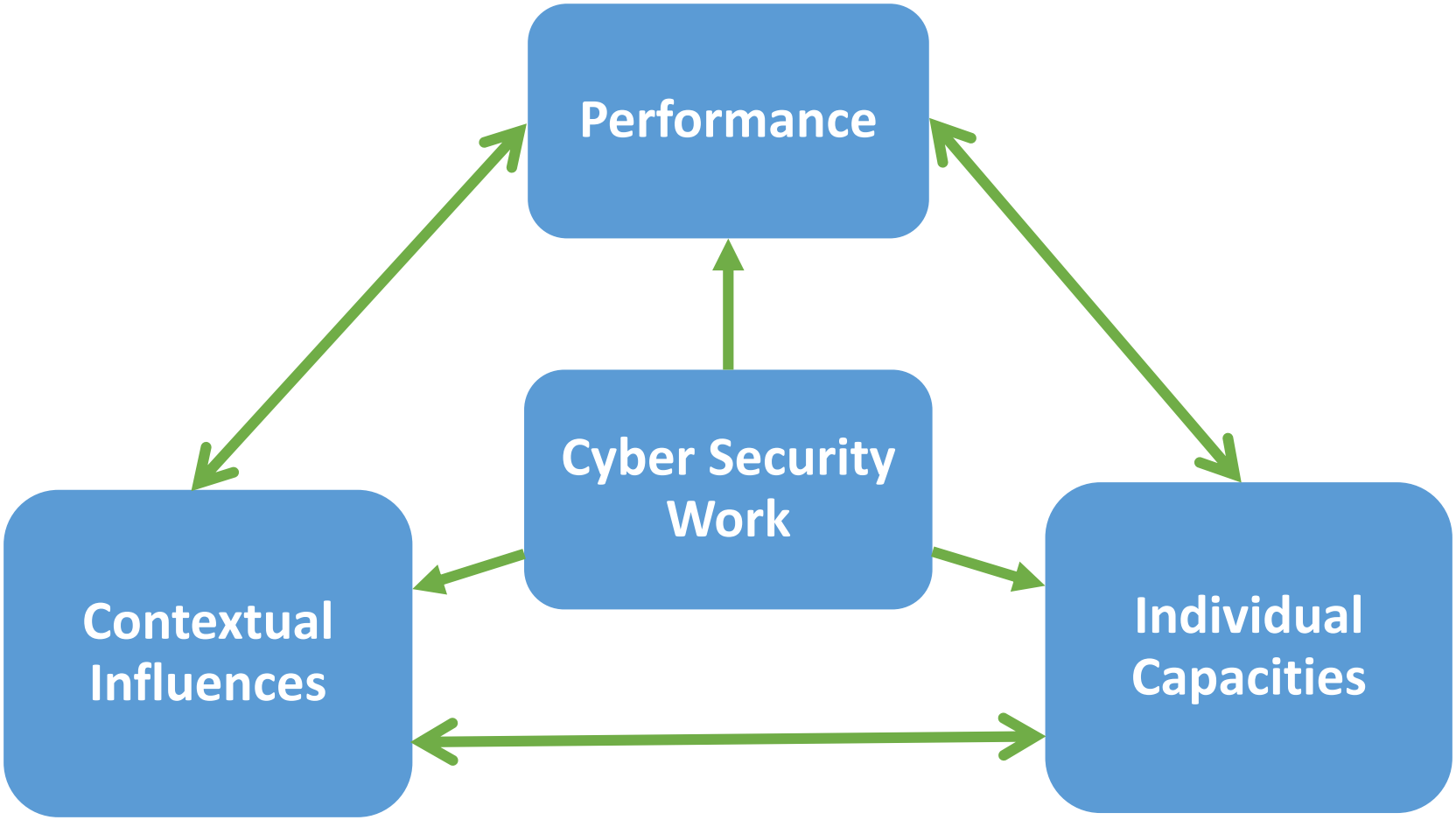
- Three-level CSIRT Framework

Individual

Within Team
(Component Team)

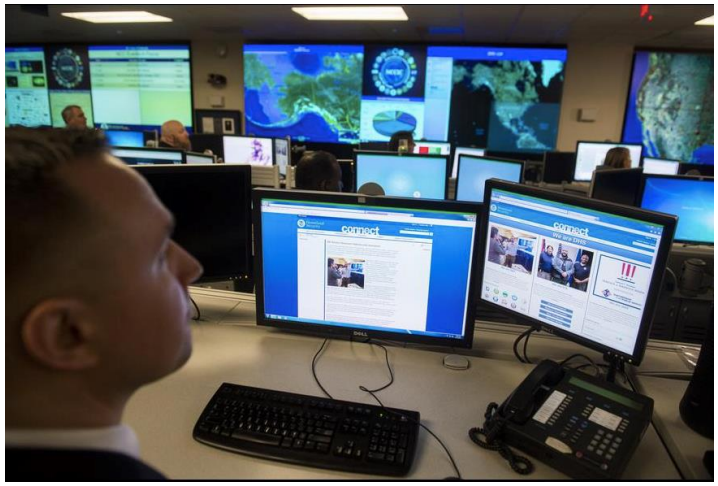
Between Team
(Multi-Team System)

Research Observation Themes



Key Research Observations

- CSIRT work:
  - Occurs in complex and quickly changing environments
  - Requires effectively managing information and knowledge in a data rich context
  - Depends upon collaboration among individuals and teams



Key Research Observations

CSIRTs are multilevel

*"Yeah. And so there's sort of **different levels of success**. There's one for **your team** and **you as an individual** as well. But then success also gets the other people on board and for them to do what they need to do to fix the issue."*

*"You're not only **communicating between teams**; you're communicating **with a lot of other people**. So, you basically need to know some of the technical terms . . . you will definitely need to know what's being talked about."*

Key Research Observations

CSIRT work fundamentally involves:

- **Information management**
- **Collaboration (arises through individual initiative)**

*"There [are] a lot of times where we just like do on the fly meetings where **we discuss problems and share ideas and try to find solutions to problems**. So … if somebody gets stuck we usually have a meeting like that and talk about it."*

*"Well, if I don't feel comfortable like saying yes, this is an incident or no, it is not, I'll literally turn around. I mean, like guys, **do you mind looking at this, and giving your input?**"*

Key Research Observations: Data Findings

- **Collaborative problem-solving**
  - Ranked in Top 10 KSAOs by CSIRT professionals
  - #3 KSAO in focus groups and interviews

Key Research Observations

Information sharing: Critical for success

"Basically ***communications is definitely important,*** *because we work, like we explained, with each other and the other teams and other resources. So often,* ***you've got to be able to communicate. I think that's very important."***

Key Research Observations: Data Findings

- Strong drive to learn and **share information** and skill in talking to others ranked #1 and #2 in focus groups and interviews

- Communication skills, collaborative problem-solving, and motivation to work on behalf of the team all ranked in the Top 20 KSAs by CSIRT professionals

Key Research Observations

Characteristics of effective CSIRT members:

- **Attention to detail**
- **Curiosity**
- **Adaptable**

*"**Attention to detail** is important with any technical type job . . . correlating events."*

*"You've got to kind of like to tinker with stuff. I think **curiosity is the biggest thing."***

*"We have to be able to **be as flexible as the attack** and we have to be able to stay at the bleeding edge of current methods of detecting these attacks and handling these intrusions. If we can't do that, then we're dead in the water. The attackers are extremely agile and we have to be as well."*

Key Research Observations: Data Findings

- **Adaptability**
  - Ranked among **Top 15** KSAO by CSIRT professionals
  - **Top 5** KSAO in focus groups and interviews
- **Collaborative problem-solving**
  - Ranked in **Top 10** KSAOs by CSIRT professionals
  - **#3** KSAO in focus groups and interviews
- Types of **Curiosity**
  - Ranked in **Top 20** KSAO by CSIRT professionals (#3 and #19)
  - **#1** Top KSAO in focus groups/interviews

So what does this mean?

Research Implications & Strategies

Adaptability

- Adaptive first line analysts can enable teams to perform better
- Increasing team knowledge can enhance the adaptive capacity of teams.
  - Focus of team knowledge: Team tasks, team interactions, and task contingencies

Strategies to Enhance Adaptability

- Cross-training
- Virtual documentation of task procedures and contingencies

Research Implications & Strategies

Collaborative Problem-Solving

- Team managers should identify when teamwork and collaboration becomes more necessary
  - Develop team interaction norms and expectations accordingly
- Training and hiring strategies should target within- and between-team collaboration.
- Consider “countervailing forces” that can arise among teams, and between teams and the MTS

Research Implications & Strategies

Strategies to Enhance Collaboration

- **Counterfactual thinking** (thinking about what "might have been")
  - Can increase the amount of unshared or unique information shared among team members and improve decision-making accuracy (Galinsky & Cray, 2004).
- **Devil's Advocacy** procedure: each team member advocates for a specific course of action
  - Can reduce premature decision-making

Research Implications & Strategies

Curiosity

- Includes seeking information, knowledge acquisition, learning, and thinking
- Some positions might involve higher levels of seeking ambiguous information than others

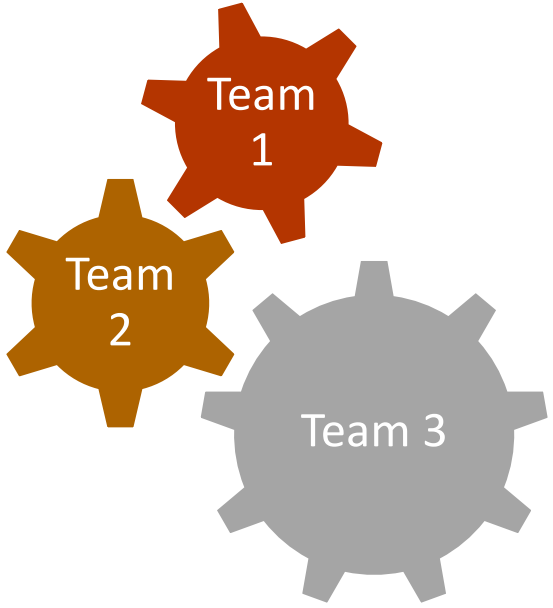
Strategies to Enhance Curiosity

- Hire highly curious individuals
- Train individuals to develop information-seeking skills

CSIRTs as Multiteam Systems

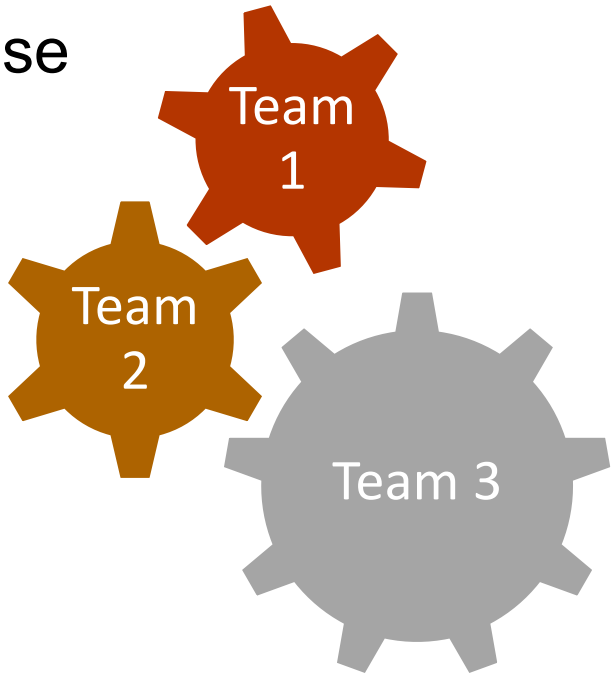
- Creating the best CSIR**T** is not enough

- CSIRTs typically operate as part of *multiteam systems*



CSIRTs as Multiteam Systems

- What are Multiteam Systems?
  - Teams interact interdependently
  - Teams share a common goal
    - Maintain separate team goals
  - Members' functions and expertise
    - Similar within team
    - Different across teams
  - Dispersed teams
    - Geographically
    - Temporally



MTS Example: Emergency Medical Teams

EMT / Fire

Ambulance/Transport

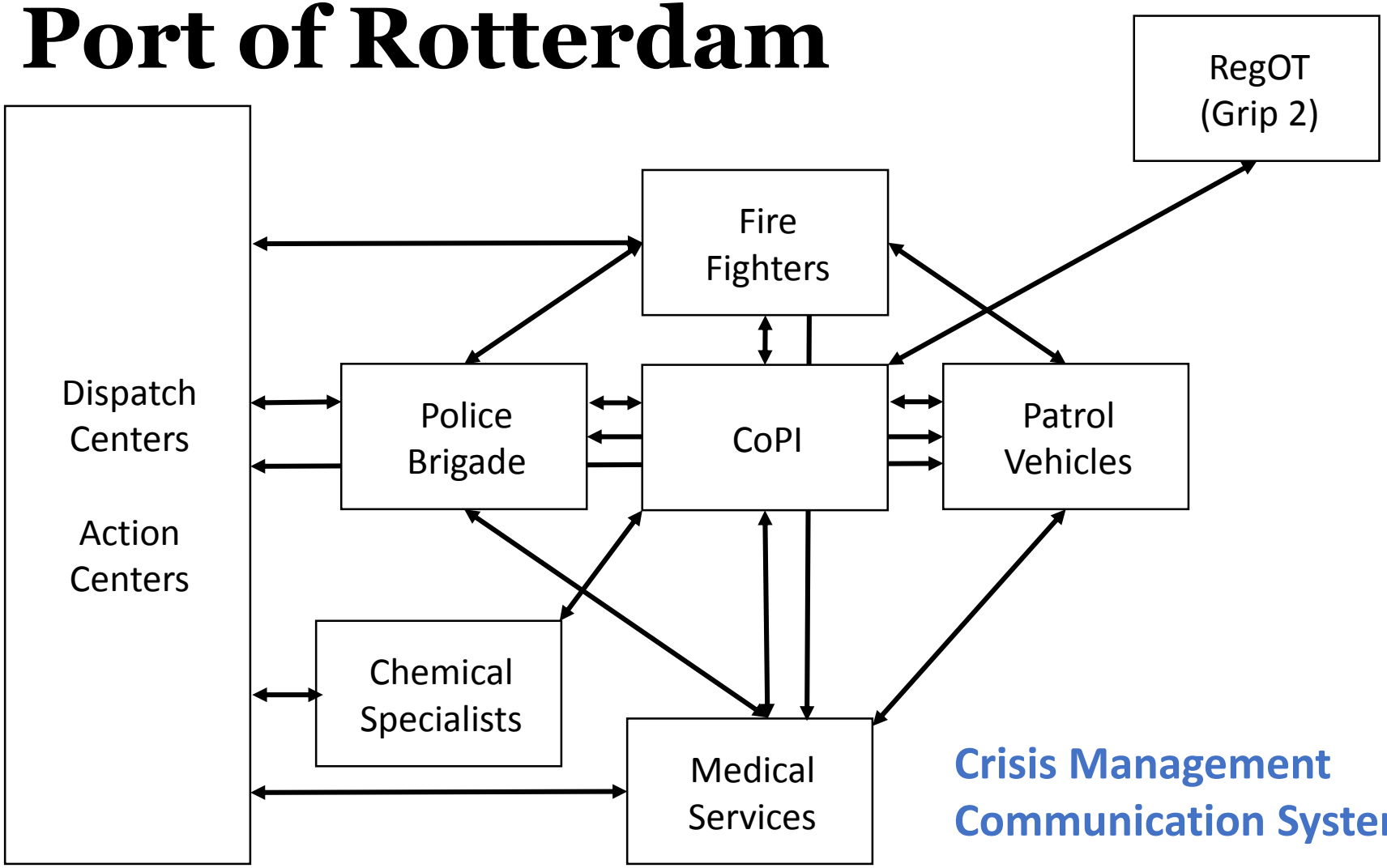
Save Lives

Surgical

Recovery

Slides from Leslie DeChurch (used with permission)

MTS Example: Port of Rotterdam



Crisis Management Communication System

CSIRTs as Multiteam Systems

Steady State MTS

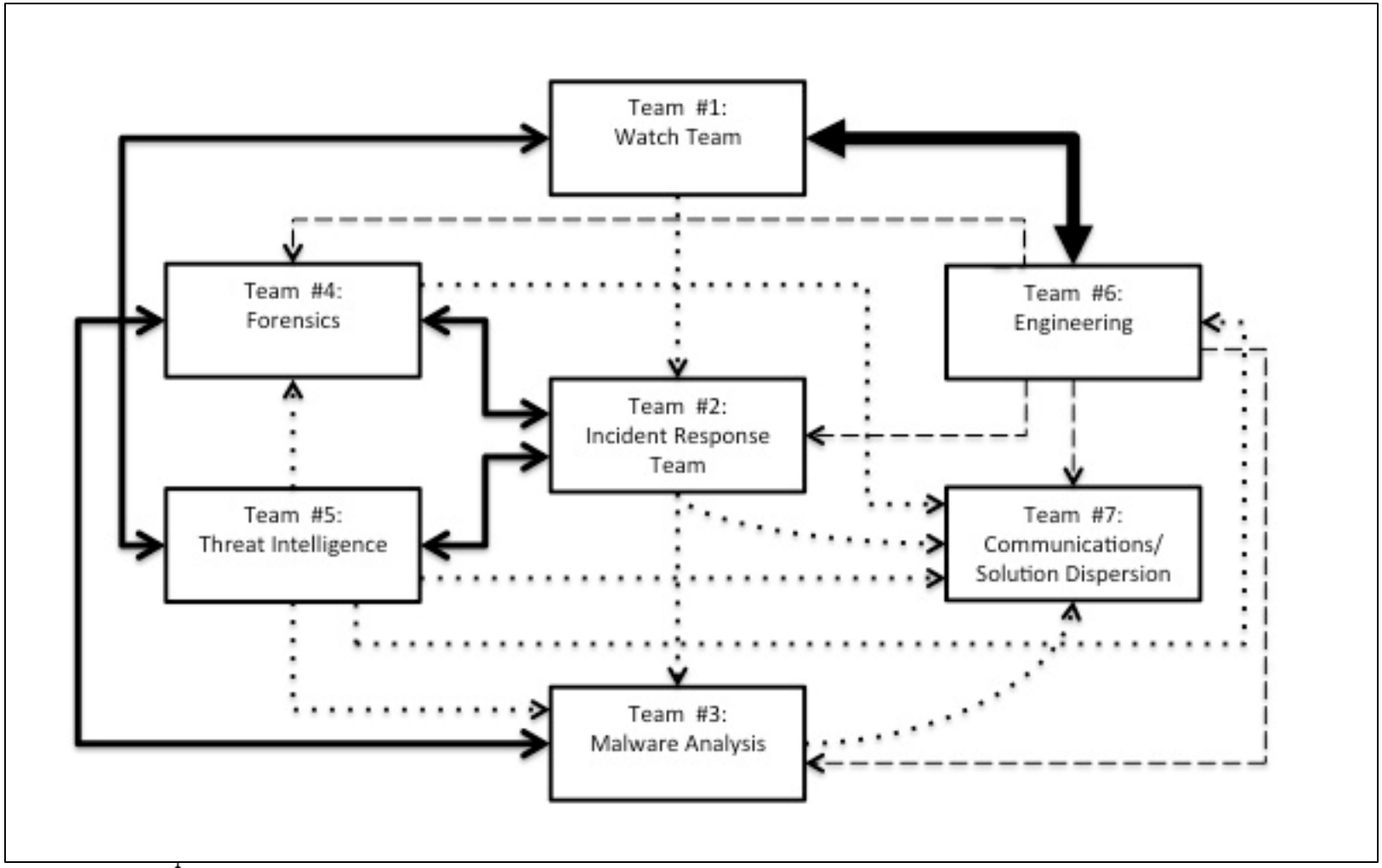
Development

- *Step 1* – I/O Psychologists
  - Reviewed data from 14 CSIRTs
  - Created team task statements and generic MTS structure diagrams for each CSIRT

- *Step 2* – Subject Matter Experts
  - Independently verified and validated MTS structure
  - Edited structures accordingly

- *Step 3*
  - Verification with data collected from 6 additional CSIRTs

CSIR MTS Steady State Structure



CSIRTs as Multiteam Systems

- Remaining Questions
  - Is the steady state structure an accurate baseline depiction?
  - What changes the structure?
    - Incident severity
    - CSIRT maturity
  - What information is missing from the structure?

Cognitive Task Analyses

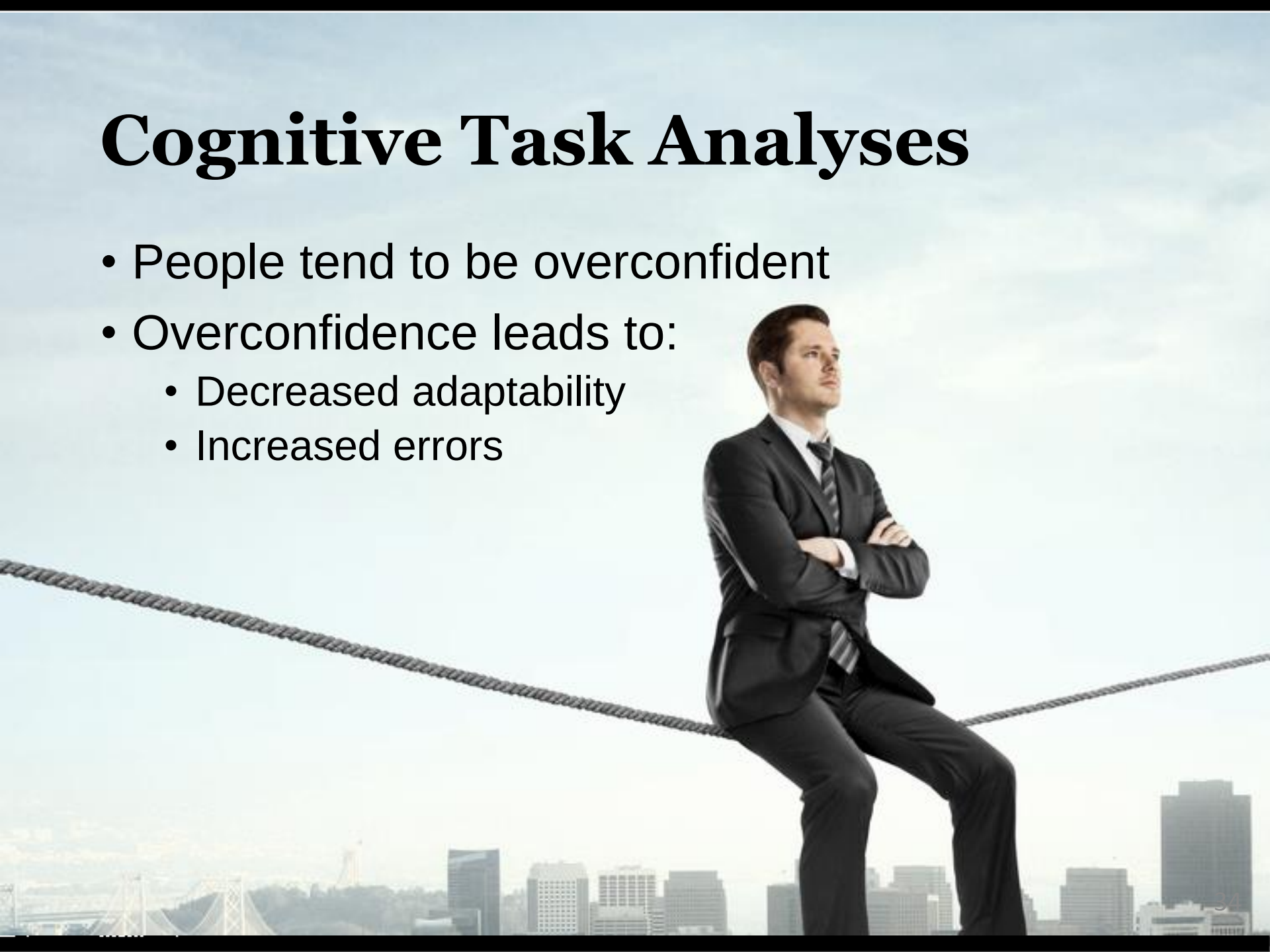
- A type of job analysis
  - Primarily for cognitive jobs
  - Identifies:
    - Thought processes
    - Decision-making skills
- Includes a variety of interview techniques
  - Explain process diagrams of decision-making steps
  - Discuss decisions made in challenging situations
  - Respond to hypothetical scenarios

Cognitive Task Analyses

- Hypothetical scenario
  - Frontline analyst in a small shop
  - Abnormally high network traffic
  - Outbound traffic going to a ".ru" domain
- Questions
  - What do you think is happening?
  - How confident are you that you know what's happening?
  - How would you respond?

Cognitive Task Analyses

- People tend to be overconfident
- Overconfidence leads to:
  - Decreased adaptability
  - Increased errors



Cognitive Task Analyses

- Pre-Mortem Exercise
  - Prescriptive hindsight: Anticipatory thinking
    - How could someone fail?
  - **Preliminary Results**
    - Decreased confidence (often too high)
    - Increases accuracy
  - Applications
    - Prompts (e.g., Pop-up box during incidents)
    - Training exercises

Handbook on CSIRT Effectiveness

Table of Contents

1. Introductory Chapter
   - Intended Audience, How to use this book, etc.
2. CSIRTs in Their Operating Environment
3. Performance
4. Collective Problem Solving in Teams
5. Communication Skills
6. Successful Adaptation
7. Fostering a Learning Climate Among CSIRTs
8. Maintained Attention and Focus Over Time (Vigilance)
9. Maintained CSIRT Performance Under Adversity (Resilience)
10. Future Considerations/Where do we go from here
11. Appendices (e.g., white papers, taxonomy, assessment questions, developmental strategies)

Discussion and Feedback

Questions or Comments:
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