"*In tangled layered networks, because of extensive interdependencies in time, space, functions, and scale, changes will produce multiple effects that go beyond those intended. In some cases (A), change directed only at one unit or role within the system will trigger inadvertently deleterious effects on other aspects of the system that cancel out or outweigh the intended benefits. In other cases (B), changes in one area will tend to recruit or open up beneficial changes in many other aspects of the network. To the degree (A) occurs, stalls follow; to the degree (B) happens, florescence begins.*" David Woods on Fluorescence (personal communication circa 2014)

Using FRAM Beyond Safety: How sociotechnical systems might flourish or stall

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Dominic Furniss, Paul Curzon, Ann Blandford

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10th Workshop on the
Functional Resonance Analysis Method (FRAM)

Friday 3rd June 2016

Presentation Plan

1. **Orientation**: Woods on fluorescence
2. **Our focus**: Functional resonance and different forms of performance variability
3. **Empirical work**: Why do Human Factors practitioners use the methods they use?
4. **Current work**: Using FRAM for quality and safety
5. **Discussion**: Questions and discussion prompts

Functional Resonance

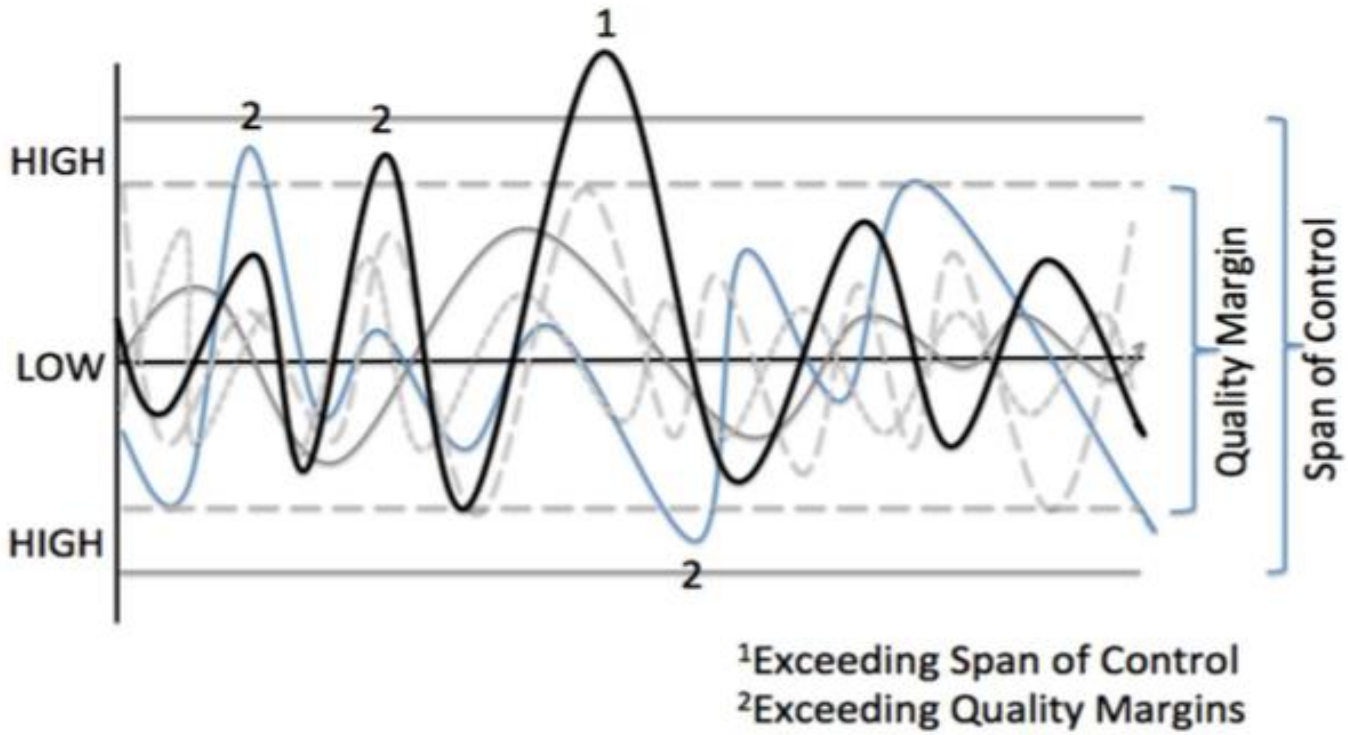


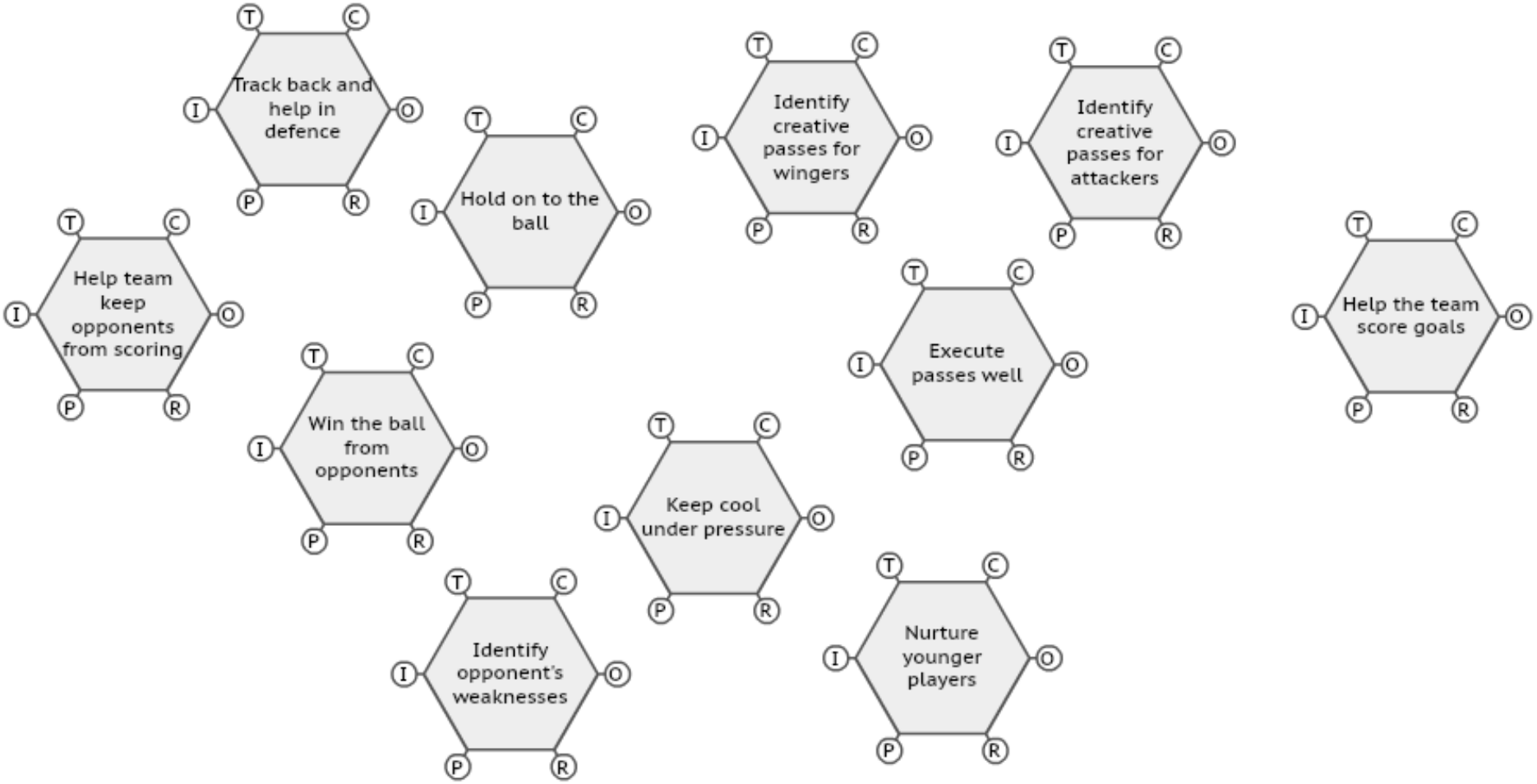
Figure 1: Performance variability of functions (from high to low) against time. Each faint wavey line represents the output of a function, whereas the bold line represents the summative effect of these outputs (adapted from Dijkstra, 2006, p. 97).
250x153mm (72 x 72 DPI)

Forms of performance variability

Performance variability	Low Amplitude	High Amplitude
FRAM (circa 2004): Uncontrolled performance variability (normally focused on risk and safety issues)	Systems is under control and in a stable state – consistent and predictable	System has higher uncontrolled performance variability for +/- outcomes and surprises
FRAM (circa 2012): Performance variability across different dimensions	Low variability in performance	High variability in performance
Our focus: Positive resonance (focuses on quality of processes and outcomes)	Stall – low quality processes and outcomes	Flourish / fluoresce – high quality processes and outcomes, i.e. systems that excel

Example (single dimension): The Swing

Example (multi-dimensional): The Football Player



EMPIRICAL WORK: WHY DO HF PRACTITIONERS USE THE METHODS THEY USE?

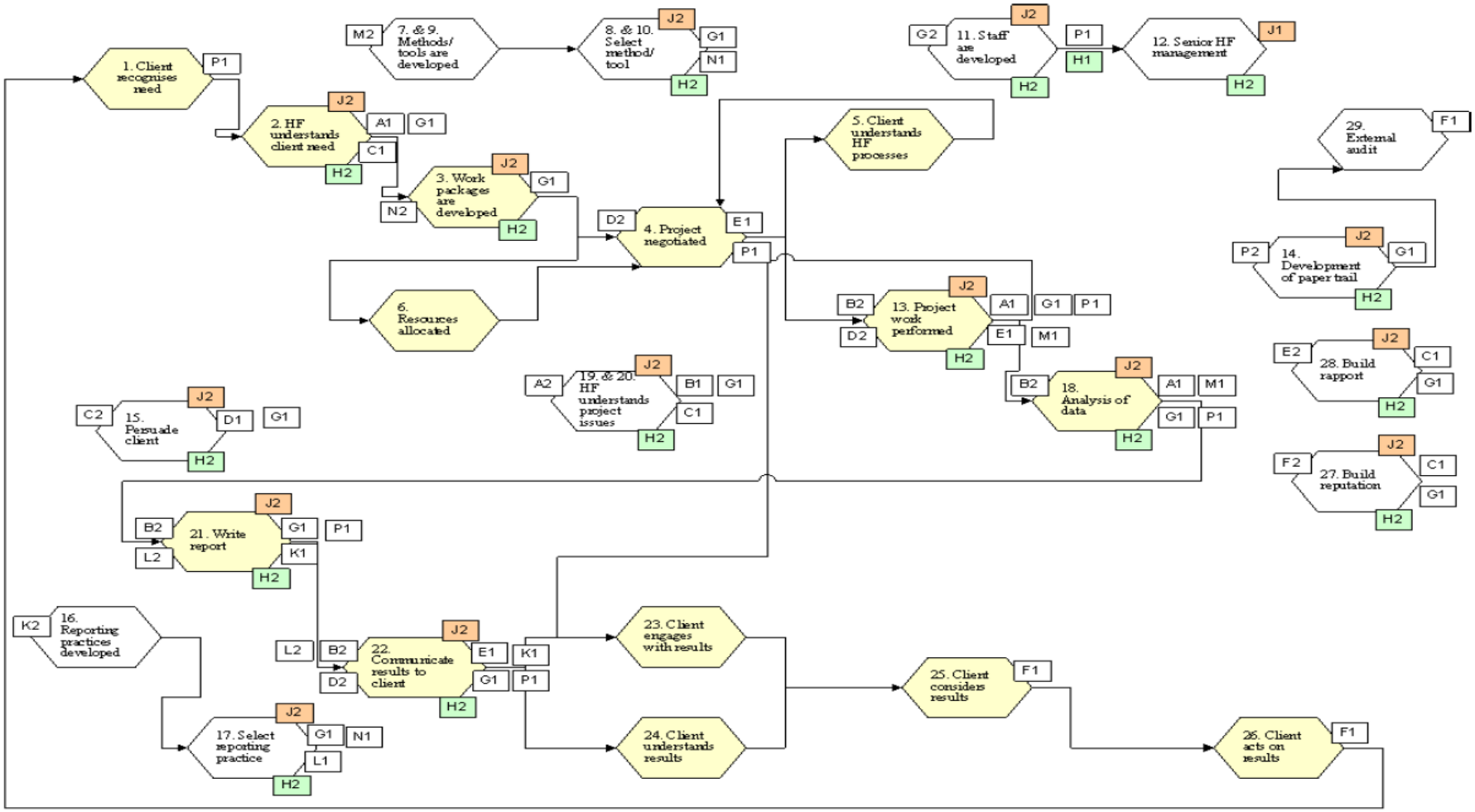
Background and Motivation

- Important issue because we need to use the right methods to get good results.
- Controversy – going beyond problem identification and other intrinsic qualities of methods. (internal variability)
- There are contextual factors that impact method adoption and adaptation. (external variability)
- ‘It depends…’ Intractable or an opportunity to use FRAM+ to explore these dependencies? (variability based on upstream-downstream coupling)

Method

- Interviewed 9 HCI practitioners who predominantly work on the usability of websites, and 13 Human Factors practitioners who do safety related work
- Interviews were about an hour each
- Applied FRAM+ (i.e. with positive resonance)
- Validated final model with participants: member checking with internal and external participants

Results: FRAM of Human Factors practice



Results: 6 subsystems

1. Central project process
2. Analytic insight and project understanding
3. Enhancing persuasion, rapport and reputation
4. Managing staff development and supervision
5. Evolution of tools, methods and reporting practices
6. Managing documentation and auditing

Points of interest and Discussion Points

- Constructing a general FRAM model across cases
- Data gathering done before we intended to use FRAM
- Validation: member checking
- FRAM as a tool for communication not just analysis
- 6 interconnected tangled layered networks
- Selecting main functions and links rather than all
- **Focus on positive resonance and adaptations to encourage the system to excel**
- Quality not well defined. Relationship between Q&S?
- Other applications? Sports, Service, Productivity

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Current work:
ECLIPSE (Exploring the Current Landscape of Intravenous Infusion Practices & Errors)

- Using FRAM for exploring BOTH quality & safety in a single project
- Quality: How do we foster *positive* patient experiences by adapting to different needs and contexts?
- Safety: How do we realistically and effectively manage *unwanted* performance variability, e.g. from smart pumps to nursing adaptations?

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