The Elephant In The Room – Software Risk & Digital Resilience

Gill Ringland, Emeritus Fellow, SAMI Consulting

Professor Ed Steinmueller, Professorial Fellow, SPRU – University of Sussex

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A Word From Today's Chairman

FS Club

Professor Michael Mainelli

Chairman

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Today's Agenda

- 11:00 – 11:05   Chairman's Introduction
- 11:05 – 11:25   Keynote Presentation – Gill Ringland & Professor Ed Steinmueller
- 11:25 – 11:45   Question & Answer

Gill Ringland

Emeritus Fellow

SAMI Consulting

Professor Ed Steinmueller

Professorial Fellow

SPRU – University of Sussex

Poll

- Do you rely more or less on IT systems than you did during the pandemic?

- Much more

- A little more

- The same as before

- A little less

- Much less

Poll

- How many times in the last week have you had a break in service, delayed response, or "unavailable message" from an IT system?

- 0

- 1-2

- 3-5

- 6-10

- > 10

Why?

- Why is software risk and digital resilience the elephant in the room?
  - People, organisations, the economy and society rely on software-based systems
    - These systems are vulnerable to both internal defects and external threats
    - The complexity of reducing these defects and threats is large and often leads to inaction
    - Software is subject to intermittent failure, malfunction (wrong results of decisions) and catastrophic failure – each of which can have a substantial negative effect on productivity and profit.
  - Software services are largely unregulated and rarely conform to standards
  - Software failures are already a significant cost to the UK economy, and
    - The risks of software failure are increasing.
    - The scope of the potential impact of software failures on continuity and quality of business services is increasing.

Who? What?

- Aim of today

- Discuss the impact of software failure on organisational productivity
  - Issues of counting the cost
  - Estimates of cost to the UK economy
  - Three examples of impact on organisations

- Conclude with some thoughts arising from a Roundtable
  - Held by the BCS's IT Leaders Forum and the National Preparedness Commission on 15th November
  - About who? And what?

Definitions – risk and resilience

- A **risk** is any factor that could result in a future negative consequence. Risk is quantifiable to the extent that risks are known and their probability of occurrence can be assessed.

- **Digital resilience** is the ability of a system to deal with operational software or hardware failure in ways that do not destroy or corrupt data and, ideally, that preserve some degree of functionality and operational service.

- The FCA defines Operational Resilience "Operational resilience is the ability of firms, financial market infrastructures and the financial sector as a whole to prevent, adapt and respond to, recover and learn from operational disruption."

Sources: itlf-software-risk-resilience.pdf (bcs.org), Operational Resilience | FCA

Software risk

- Software is everywhere – yet it is not managed as the utility it has become
  - **Most organisations rely for their operation on software that is outside their control.**
- Software and IT configuration and network issues are overtaking power outages as causes of major IT service breaches.
- Major shocks from software system failure and/or digital service breaches are almost inevitable – only the location and timing are unknown.
- The causes and mitigations of software failure are not well understood.
- Software risk is largely invisible in organisations in the UK – yet it has potential to damage them through service or data breaches, and then reputational risk.
- Economic effects of breaches are not routinely quantified or reported by UK organisations.
- Social costs of software failure could be catastrophic.
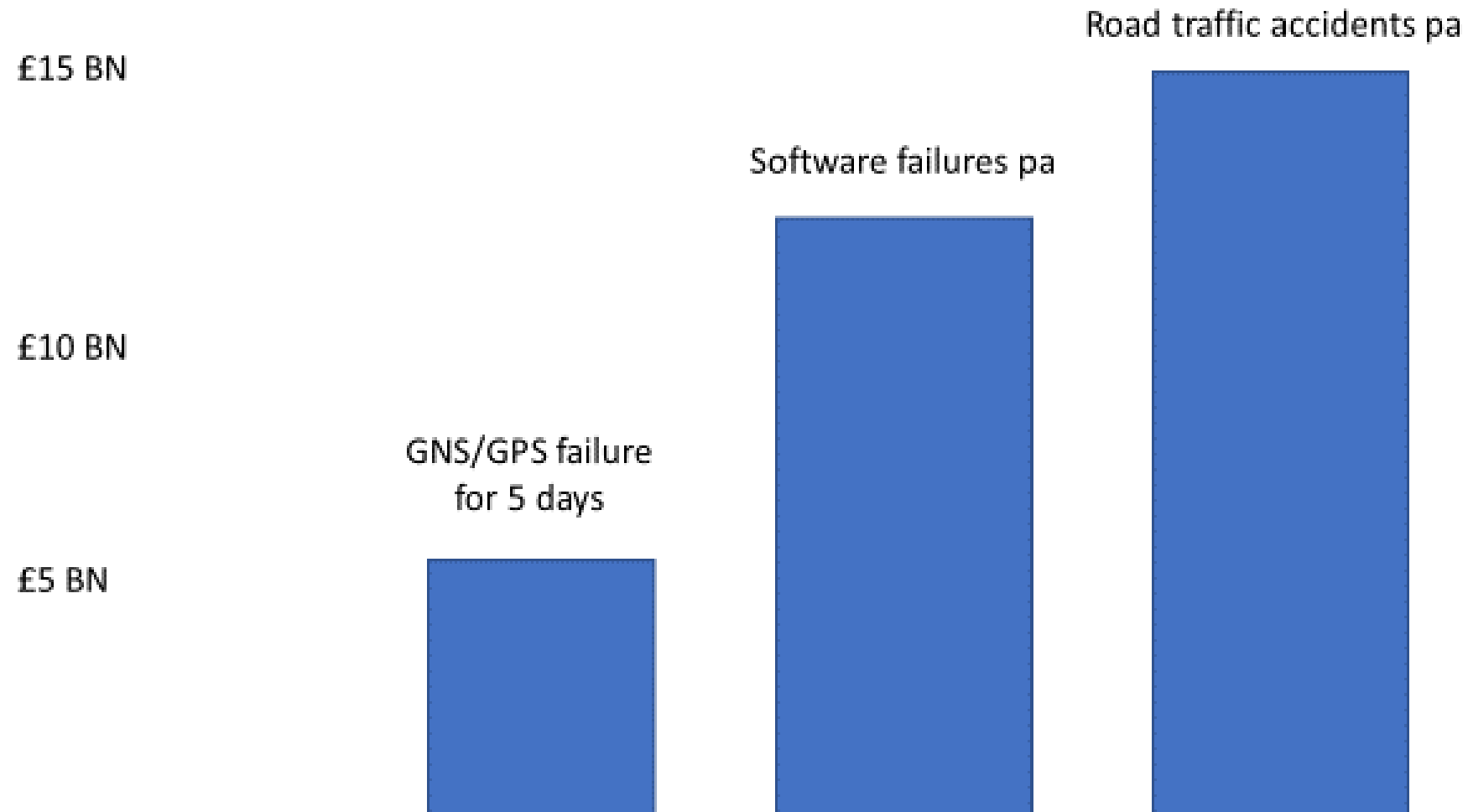
What can go wrong with software?

- Common causes of failure include:
  - Code errors (defects); legacy software; fixes for known vulnerabilities not implemented; assumptions on security of Commercial Off the Shelf Software (COTS), response delays or crash due to exceeding throughput limits.

- Technological trends are acting as causes or accelerators of risk:
  - Increased volumes of software means the risk is growing; complexity from interactions, their frequency and intensity, leads to unpredictable failures.
  - Internet of Things (IoT) is becoming the Internet of Everything (IoE) – software throughout;
  - Speed-to-market software development approaches reduce considerations of service breaches and maintenance.

- Social trends are also increasing software risk;
  - Digitalisation and integration of business operations with use of common components spread the effects of any malfunction.

Counting the cost

- Users – be they individuals or organisations – bear the immediate cost of failure
  - Through disruption to their services or wrong information
  - Effect of a software failure can be spread across many users (individuals or organisations), making measurement of the impact difficult.
  - Failures may have widespread and long-lasting consequences in terms of lost business and reputation, stress on/loss of staff, etc;
- Software suppliers bear the cost of fixing the causes of failure, and may have associated reputational costs
  - But have little reason to count the cost to users.
- Systematic, UK-specific data on software failures and their cost to the economy do not exist.
  - Hurdles to sharing data include organisations' sensitivity, reputation, etc

Some estimates to UK economy

Chart showing estimated costs to the UK economy:
- GNS/GPS failure for 5 days: approximately £5 BN
- Software failures pa: approximately £12 BN
- Road traffic accidents pa: approximately £15 BN

Y-axis: £5 BN, £10 BN, £15 BN

Impact on organisational productivity

- Three examples

- ICRC (Red Cross) had to shut down the computer systems running its Restoring Family Links programme when hackers got access to data about 515,000 extremely vulnerable people. The programme seeks to reunite family members separated by conflict, disaster or migration.

- A software package to create automation control systems was already embedded within 261 different manufacturers' products when it was revealed to be vulnerable to access by hackers in 2012 . The latest version of the same software has been found to have similar or worse issues, including being able to execute arbitrary uploaded code - which makes it open to corruption or attack by hackers .

- A recent survey of 1006 people has led to estimates that Working From Home has cost the economy £60 billion per year, with more than a quarter describing technical difficulties occurring very or fairly often. Data delays led to "chaos" for City traders and caused pricing errors in fast moving transactions

Sources: Hacking attack on Red Cross exposes data of 515,000 vulnerable people | International Committee of the Red Cross (ICRC) | The Guardian; https://thehackernews.com/2022/06/critical-security-flaws-identified-in.html; Sunday Telegraph, 13/11/2022

Who? What? – thoughts from our Roundtable

- Software is different
  - Intangible, obeys different rules from physical systems
- Software failures are a significant and increasing cost to the economy and society
  - A utility, in wider usage and more subject to failure
- The first need is to raise awareness
  - End users – influenced by skills and awareness
  - Purchaser organisations – influenced by insurers and auditors, regulators in some sectors, skills and awareness – of owners, Board, IT & risk professionals
  - Software suppliers – influenced by purchasers including government procurement, policy makers and regulators, standards bodies

Thank you for listening!

- Please feel free to follow up the discussion -----
- Our contact details are
  - gill.ringland@btinternet.com
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- A BCS-ITLF Policy Think Piece is at
  - itlf-software-risk-resilience.pdf (bcs.org)
- Our Pamphleteers blogs are on the Long Finance web site
  - The Pamphleteers Blog - Long Finance

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Forthcoming Events

- Thu, 24 Nov (15:00-15:45)   How Does Government Use Corporate Finance Techniques To Support Taxpayers?

- Fri, 25 Nov (11:00-11:45)   Financial Centres Of The World 2022: Focus On Tallinn

- Mon, 28 Nov (11:00-11:45)   What Is The Purpose Of The Finance Industry?

- Tue, 29 Nov (11:00-11:45)   Price Wars: How The Commodities Markets Made Our Chaotic World

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