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Webcast

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Authored and presented by David Sabina, MEUK Corporation

# 2022 SR&ED Tax cases

| SR&ED TOPIC | APPELLANT | PRIMARY ISSUE | WIN / LOSS |
|---|---|---|---|
| **Technological eligibility** | | | |
| Claims by Telcom | Allegro Wireless | Whether SR&ED | Win |
| Air quality research | Airzone One | How vs. Why factors | Win |
| Energy efficiency | Global Sustainable | Technological Uncertainty | Loss |
| Solar panels | Logix Data | Documentation | Loss |
| Construction | WRD Borger Construction | Systematic Investigation | Loss |
| Concrete forming | Atelier Béton | Systematic Investigation | Loss |
| **Financial issues** | | | |
| Loans as government assistance | CAE | If loan reduces SR&ED? | Loss |

# Implications of judgements

| APPELLANT | RULING & RATIONALE | IMPLICATIONS & OPPORTUNITIES | SIGNIFICANCE |
|---|---|---|---|
| Allegro Wireless | 3 of 3 projects eligible | examples including AI and software | High |
| Airzone One | 4 of 6 projects eligible | cut-off between eligible and ineligible | High |
| Global Sustainable | Work routine | compare vs. Airmax case | Moderate |
| Logix Data | Tests not recorded | good project if documentation | Moderate |
| WRD Borger Construction | Trial & error | business vs. technological problems | Low |
| Atelier Béton | Documenting hypotheses | examples of missing variables by CRA | Moderate |
| CAE | Related to SR&ED | need to separate R&D vs. non -R&D loans | Moderate |

# Project Format for tax case analysis

## The RDBASE project

| | | |
|---|---|---|
| I | **OBJECTIVES > STANDARD PRACTICE** | **IDENTIFY** |
| | **STATE of EXISTING KNOWLEDGE** | **BENCHMARKING SOURCES** |
| | **OBJECTIVES** | **BENCHMARKS VS. OBJECTIVES** |
| II | **UNCERTAINTIES & HYPOTHESES** | **VARIABLES for EXPERIMENTATION** |
| | **EXPERIMENTS** | **CORRELATE** |
| III | **RESULTS** | **OBJECTIVES** |
| | **CONCLUSIONS** | **VARIABLES** |

# Format for tax case analysis

- Paragraph numbers for quoted text
  - E.g. 54] The judge stated ….
  - Relevant data in project sections
  - PDF downloads available
  - View live at : rdbase.ca / login / demo

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# SR&ED cases – TECHNOLOGY

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# Allegro Wireless – WIN 3 of 3 projects

Facts:

•

Issue(s):

- Evidence of advancement & systematic investigation

Relevant legislation and analysis:

- ITA 37 & 248(1)

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# Allegro - Facts

3] For 2010, Appellant claimed SR&ED “ITCs” of $279,420 in respect of three projects.

Minister disallowed $244,208 (87%) ITCs in respect of two projects.

4]  2011 claimed SR&ED ITCs of $215,567 minister disallowed $162,190 (75%)

101] core product was its platform (software), which it built and constantly improved to accommodate idiosyncrasies of various hand-held devices, servers and printers.

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# TU – Technological Uncertainties & Prior Art

101] clients were using numerous hand-held devices and printers that were in the early stages of development … various servers of its clients

28] different operating systems  the frequent updates to the software controlling the low-level features of the devices.

31] did not have access to source codes for various underlying software that operated hand-held devices  (black box)

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# SR&ED documentation – Bugs vs. Quirks

32]BUGS: Underlying tools and software performed as expected a mistake when writing its software, which it needed to fix.

33] QUIRKS:  could not determine why the event was occurring it required a deeper investigation

34] quirk may or may not end up SR&ED - review if significant experimentation or relatively straightforward

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# Documentation system(s)

46] bug/quirk tracking software:

- one called FogBugz and
- a second called Jira X

Appellant, with the help of ("CRA") SR&ED technical advisor set up bugs/quirks tracking software

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# Principal Investigator background

47) (Allegro) called three fact witnesses, Mr. Wesley Rupel, Mr. Khalid Eidoo, and Mr. Russell Roberts, and one expert witness, Doctor Gerald Penn.

Mr. Rupel holds an undergraduate degree in physics and mathematics. In 1981, he started a combined Masters and Ph.D. program in physics

- completed the Masters portion & joined Dynamical Systems Research (“Dynamical”), a software start- up
- Microsoft acquired Dynamical 1 year later
- Mr. Rupel’s work at Microsoft focused on increasing speed of Windows operating system

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# Client expert witness – Dr. Penn

- PhD, Computer science 1991

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# CRA WITNESSES:

Respondent (CRA) called

- one fact witness,
  - Ms. Cathy Sporich, and
- two expert witnesses,
  - Doctor Shrinavensen Keshav and
  - Doctor Shirook Ali.

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# EXPERT WITNESSES: ADMISSIBILITY

67] admissibility of expert opinion evidence two-step test

68] first step = four threshold requirements (Mohan factors)

- Relevance;
- Necessity in assisting the trier of fact;
- The absence of any exclusionary rule; and
- A properly qualified expert.

69] second step requires trial judge conduct cost-benefit analysis re. consumption of time, prejudice and the risk of causing confusion.

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# Choosing expert witness input

Per Judge:

120] The Appellant was attempting to develop a new product (its platform) that would work seamlessly with a multitude of devices using different operating systems and operating on various client operating systems.

- Neither (CRA expert witness) aware of this difficult environment
- only expert report of Doctor Penn

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# Project 1 - Protocol Compliant Methods to Extend Bluetooth Functionality

126] Objective “the implementation of a throttling mechanism to prevent overruns when sending more than 64KB across a Bluetooth printer connection (overcoming specific Bluetooth printing implementation limitations).”

<u>Technological Obstacles</u>

128] printers in question small (hung on belt) Microsoft wrote the software used to communicate (referred to as the “Bluetooth stack”) … Appellant not able to “look inside”

129] small printers had 64 KB buffer … too much information sent … buffer exceeded … some or all information lost

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# Technological Uncertainty (TU)

(130) different clients had Bluetooth stacks from different companies

(131) Mr. Rupel … normal engineering one is working with systems that do not have buffer overruns someone else's system that had bugs and did not work properly

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# Technology or Knowledge Base Level:

**Technology or Knowledge Base Level:**

Mr. Rupel as one of the original 10 developers in the Microsoft Windows team.

<u>Similar prior in-house technologies</u>

The 3 current projects are all built upon Allegro core device management technology

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# Experimentation - overview

132) three different solutions tested

- “lossy-type scenario”,
- using a transparent compression method &
- using a throttling mechanism

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# Experimentation - details

133] “lossy-type scenario” involved sending less data … incomplete… may be acceptable

134] Compressing the data meant using one of numerous available methods.

- tried to create JPEG image .. have all the text needed

135] transparent compression method.

- compress then decompress data w/o intervening software
- software to “dig” into different places in Bluetooth stack
- to try to inject compression in a way that would
- avoid the 64 KB buffer

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# Experimentation - details

- 136] Neither of these methods successful.
- Appellant then developed a throttling mechanism
  - to control speed at which
  - data pushed through system.
- able to find optimum speed allowed Bluetooth printer to clear out its buffer

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# Expert witness analysis

140] Per Dr. Penn Expert report

- The application of throttling and compression can only be achieved by setting certain quantitative parameters that are inherent in these techniques, such as
- lengths of time and
- targetted transfer rates or
- percentages of compression.

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# Expert opinion – not routine

140] While setting or optimizing the settings for a fixed pair of devices could be considered routine

- this project dealt with interoperability across a range of mobile devices not manufactured by Allegro.
- I know of no readily assessable knowledge base, now or in 2010, with which Allegro's engineers could have set these parameters merely through due diligence.
- This was a painstaking, experimental diversion from ordinary software development activities that no reasonable software engineer would call routine

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| 2201 - Allegro - Protocol Compliant Methods to Extend Bluetooth Functionality | |
|---|---|
| **BENCHMARKS** | **ACTIVITIES BY YEAR** |
| Internet searches: 10 Articles<br>Patent searches: 5 patents<br>Competitive products or processes: 2 products | 2022 |
| Similar prior in-house technologies: 3 products / processes | '1-1 |
| Queries to experts: 2 responses | year 1 |
| **OBJECTIVES** | **RESULTS** |
| Maximum buffer use: 64 K | 62 |
| Fidelity (relevant info retained): 90 % | 83 |
| **UNCERTAINTIES & KEY VARIABLES** | **CONCLUSIONS** |
| 1 - Technological uncertainty | |
| “lossy-type scenario” (less data) | Y |
| buffer overrun - speed vs. clearing | Y |
| proprietary systems - blackbox issues | Y |
| throttling - time vs. rate vs. % compression | Y |
| transparent compression methods | Y |

Google Patents

(Maximum buffer use) & bluetooth

SEARCH TERMS

(Maximum buffer use) & bluetooth × or

+ Synonym

+ Synonym

SEARCH FIELDS

Date · Priority

YYYY-MM-DD – YYYY-MM-DD

+ Inventor

+ Assignee

Patent Office · Language

Status · Type

Litigation

About 181,620 results

Download · Side-by-side

Sort by · Relevance · Group by · None · Deduplicate by · Family · Results / page · 10

## Wireless sensor network survey

Google Scholar • citeseerx.ist.psu.edu • Yick J • Computer networks

Published 2008

… Depending on the **application** and the type of sensors **used**, … A subject will **use** the GPS receivers and location points to … is **used** to adapt the sampling rate and minimize energy **usage**. …

## Wireless network buffered message system



WO EP US CN KR AU CA ES *NZ* • US10321320B2 • Gregory G. Raleigh • Headwater Research Llc

Priority 2009-01-28 • Filed 2017-04-28 • Granted 2019-06-11 • Published 2019-06-11

A network server system maintains secure Internet data message links with respective device link agents on each of many wireless end-user devices. Through a network interface, the server system receives messages from network elements, for which delivery is requested to specific software components …

## Methods and systems for in-device interference mitigation

WO EP US CN JP KR CA *SG* TW • TWI552537B • 凡吉爾 康薩 • 內數位專利控股公司

Priority 2010-08-13 • Filed 2011-08-15 • Granted 2016-10-01 • Published 2016-10-01

For example, the ISM technology included in wireless devices can use the global unlicensed ISM 2.4GHz short-range radio frequency band. This unlicensed ISM 2.4GHz short-range radio band can be used to support **Bluetooth and** WiFi technologies, as well as other ISM technologies. For example, with Time …

**Info:** Patent citations (1600), Non-patent citations (62), Cited by (1727), Legal events, Similar documents, Priority and Related Applications

Google Patents

(Maximum buffer use) & bluetooth

← Back to results ✎ **(Maximum buffer use) & bluetooth;**

# Wireless network buffered message system

## Abstract

A network server system maintains secure Internet data message links with respective device link agents on each of many wireless end-user devices. Through a network interface, the server system receives messages from network elements, for which delivery is requested to specific software components on specific ones of the devices. A message buffer system buffers such messages for delivery, and logic determines whether one of several potential triggers has happened to cause the system to deliver buffered messages to a particular one of the devices. For at least some messages, receiving the message at the buffer will not trigger delivery. At least one trigger identifies a time-critical message, however, which can cause all buffered messages for a particular device to be delivered. Such a system balances wireless network efficiency and opportunistic delivery with a potential for fast message delivery, when needed.

# Project #2 - Optimize TCP Services over Cellular Networks

142] the CRA split the 2010 Project 2 into three components

143] The technological objective - develop methods and techniques to improve scalability and throughput of TCP (Transmission Control Protocol) services transmitted over IP (Internet Protocol) on cellular networks

- methods to enable more efficient streaming of digital audio, connection-handling mechanisms to translate UDP to TCP & reduce overhead

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# Development environment

144] Mr. Rupel explained to the Court the meaning of UDP and TCP. He also explained what is meant by a load balancer, session control and caching.

- 145] TCP built on top of the internet protocol
- 146] similar to TCP. UDP is a very lightweight protocol when compared to TCP
- 147] data is being sent broken down into pieces (packets)
- 148] TCP sends a notice feature that ensures that packets received, are placed in the correct order.
- 149] UDP does not have these features can be faster than TCP.

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# Problems encountered

**150] UDP protocol, worked well initally, however interaction between its UDP protocol and new firewalls created problems**

**151]  purpose load balancers balance usage of servers**

**152] interaction of load balancers and session control with caching caused portions of information to be stored on different servers**

**153] required to abandon its UDP protocol**

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# *Uncertainty #1: Byte array pool*

155] technological advancement Appellant trying to achieve

- “the implementation of a non-disposable byte array pool
- into which digital audio was compressed for transmission
- completely eliminating audio breakup caused by buffer under runs
- (the under runs were in turn caused by insufficient packet throughput).”

**156] switching UDP to TCP files not sent fast enough**

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# Experimentation

157] Appellant began experimenting with different ways to compress the audio files. … methods it tried were not successful.

158] then began experimenting with “unsafe attributes” … adding code that was not going to be managed…

160] resulted in less overhead … could hopefully push data through quickly enough

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# Results

161] unsafe attributes did not work ultimate solution managed world and hybrid solution "doing things that [were] a little bit unsafe but not particularly unsafe

162] involved reusing certain of the objects transferred

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# Conclusions - per Dr. Penn's report

165] . . Programming with audio is a very niche expertise that most software engineers lack.

- combined with increasing demand for smartphones over the last seven years, has led to a
- commodification of audio processing hardware and audio processing APIs within the mobile device industry
- that has greatly consolidated during the interval.
- In 2010, however, there was still a considerable variance among handheld mobile devices in the range of supported audio formats, audio codecs, available audio transfer rates and supported functionality for audio in vendor-supplied APIs.

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# Conclusions - per Dr. Penn's report

165] In the present component, these audio-specific parameters were underlying technological uncertainties in an ecology of

- foreign devices that Allegro's platform developers would have had to adapt their product to. ...
- characterizing the distribution of parameters relevant to digital audio transmission in 2010

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# *Uncertainty #2: Synchronous event wrapper*

- 166] Appellant's technological advancement - trying to achieve "The development of an [sic] synchronous event wrapper
- capable of timing out a process quickly,
- eliminating an average wait of 5-8 minutes for a TCP timeout from a mobile device".

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# Synchronous vs. Asynchronous events

- 167] Mr. Rupel explained synchronous event and an asynchronous event.
- A synchronous event .. system sends a request then waits until receives answer.
- An asynchronous systems sends a request for information and then does other things while another part of the system waits for the answer.

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# Black box – new environment

169] problem … Microsoft had built a five-to-eight- minute timeout into its software that

- controlled the low-level features of the hand-held devices.
- The Appellant had no control over this timeout.

171] Appellant had to fix the problem without access to code used by Microsoft, while operating in a very complex system.

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# Technological Uncertainty

- 170] Mr. Rupel described the problem as a software problem that occurred because Microsoft developed the software
- using protocols from a wired network and the devices were now being used on a wireless network.
- He noted that the designers of the software never envisaged a situation

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# Experimentation

172] Mr. Rupel described three methods that the Appellant tested in an attempt to solve the problem.

173] The first method involved using a firewall and deep packet inspection

174] deep packet inspection meant “peeking” into places that it would not normally, namely the network buffers

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# Deep packet inspection & firewalls

175] Since firewalls monitored system traffic and knew exactly what was passing through the network,

- Firewall could be used to find information on what was going through the network.

176] deep packet inspection and firewalls did NOT lead to a solution to its problem

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# 2nd method – loopback process

177] The second method experimenting with a loopback process which involved

- sending a packet out through networking layers with instructions to go back to point it originated.

178] hoped to avoid five-to-eight-minute timeout problem by killing the network session, which, theoretically, would

- cause everything to immediately reset.
- problem encountered only able to kill one side of the session (such as the device side) but not able
- to kill the session on the other side (the server side).
- left system in an inconsistent state, which caused a problem.

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# Results

179] resolved by developing a two-pronged mechanism created a parallel situation create this other process that then creates a new session with the server  track of what's happening  channel then to do our communication until that five-to-eight-minute timeout finally times out.

181] Dr. Penn - does not believe that TA3/TO3 of 2010 Project 2 by itself constituted experimental development supported the other parts

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# Why supporting activity – Dr. Penn

182] Projects as a whole had one overarching technological advancement: a TCP-based application protocol that surpasses UDP in throughput and scalability vs. long timeout delays in TCP stacks

- To achieve advancement, certain design features of TCP inconsistent in this application protocol.
- One of those is the long timeout delays built into TCP stacks.
- It is a defect of subproject terminology, that it implies such a limited scope of work as to preclude the
- identification of a TA or TU for just this one component.
- This component shares in the technological advancements and uncertainties of the project to which it contributes. .

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| 2202 - Allegro - Optimize TCP Services over Cellular Networks | | |
|---|---|---|
| **BENCHMARKS** | **ACTIVITIES BY YEAR** | |
| | 2022 | |
| | '1-1 | '2-1 |
| Internet searches: 20 Articles | Activity 1 | Supporting Activity |
| **OBJECTIVES** | **RESULTS** | |
| Scalability: % | | |
| Throughput: MB | | |
| Reduce TCP timeouts: number | | |
| Reduced data vs TCP: 55 % | 52 | |
| supported devices: 500 number | 500 | |
| Minimum timeout : 1 minutes | 2 | |
| **UNCERTAINTIES & KEY VARIABLES** | **CONCLUSIONS** | |
| 1 - Byte array pool | | |
| causes low package througput | | |
| eliminating buffer under runs | Y | |
| parameters relevant to digital audio transmission | Y | |
| unsafe attributes checking vs speed | Y | |
| 2 - Synchronous event wrapper | | |
| firewall and deep packet inspection | | Y |
| packet loopback process | | Y |
| parallel session process | | Y |
| redesign legacy hardwire code for wireless | | Y |
| sync vs async events | | Y |

# Project 3 - Multi-point Integration Platform for Mobile Applications

184] The technological objective of this project was to develop an integration platform for mobile devices that enables dynamic multiple endpoints.

- Specifically, the objective was to develop methods to enable mobile data packets to be
- intelligently routed to different applications
- without the need for setting up specific end points or messaging agents for each integration point.

185] Appellant hoped to achieve a technological advancement by developing a connection timeout mechanism for distributed transactions initiated by a mobile device.

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# *TU: necessary wait times*

188) timeout caused a different problem.

- messages are broken up into pieces and sent through in little packets,
- reconstructed on the other side
- queuing mechanism feed information through underlying black box
- then reconstruct it on the other side.

Timeouts are affecting fidelity of the Appellant's queuing process.

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# Experimentation

190] tests on application timeouts to determine the optimal timing

- too short, you have one set of problems,
- too long, you have another set of problems
- working with black boxes knowing how long to wait when developing a product within an ecology of foreign devices
- on multiple cellular networks

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# Conclusions

191] He (Dr. Penn) provided the following opinion in his written report:

- . . . development of a mechanism that waits a specified period of time before resetting a network connection is standard practice, and experimentation required to set the wait time often involves only a trivial amount of experimentation. . . .
- however,
- knowing how long to wait when developing a product within an ecology of foreign devices and on multiple cellular networks is not routine.
- Allegro were building just such a knowledge base

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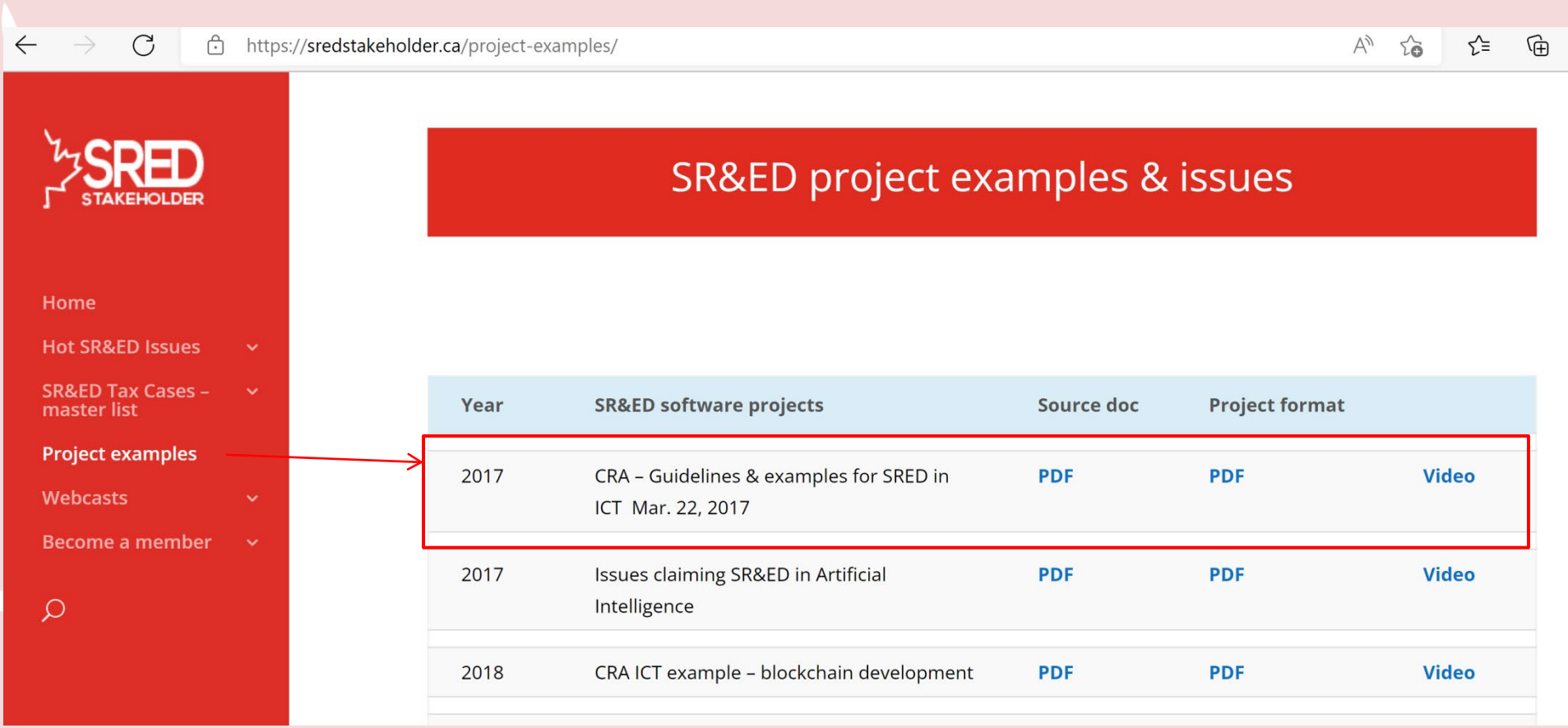
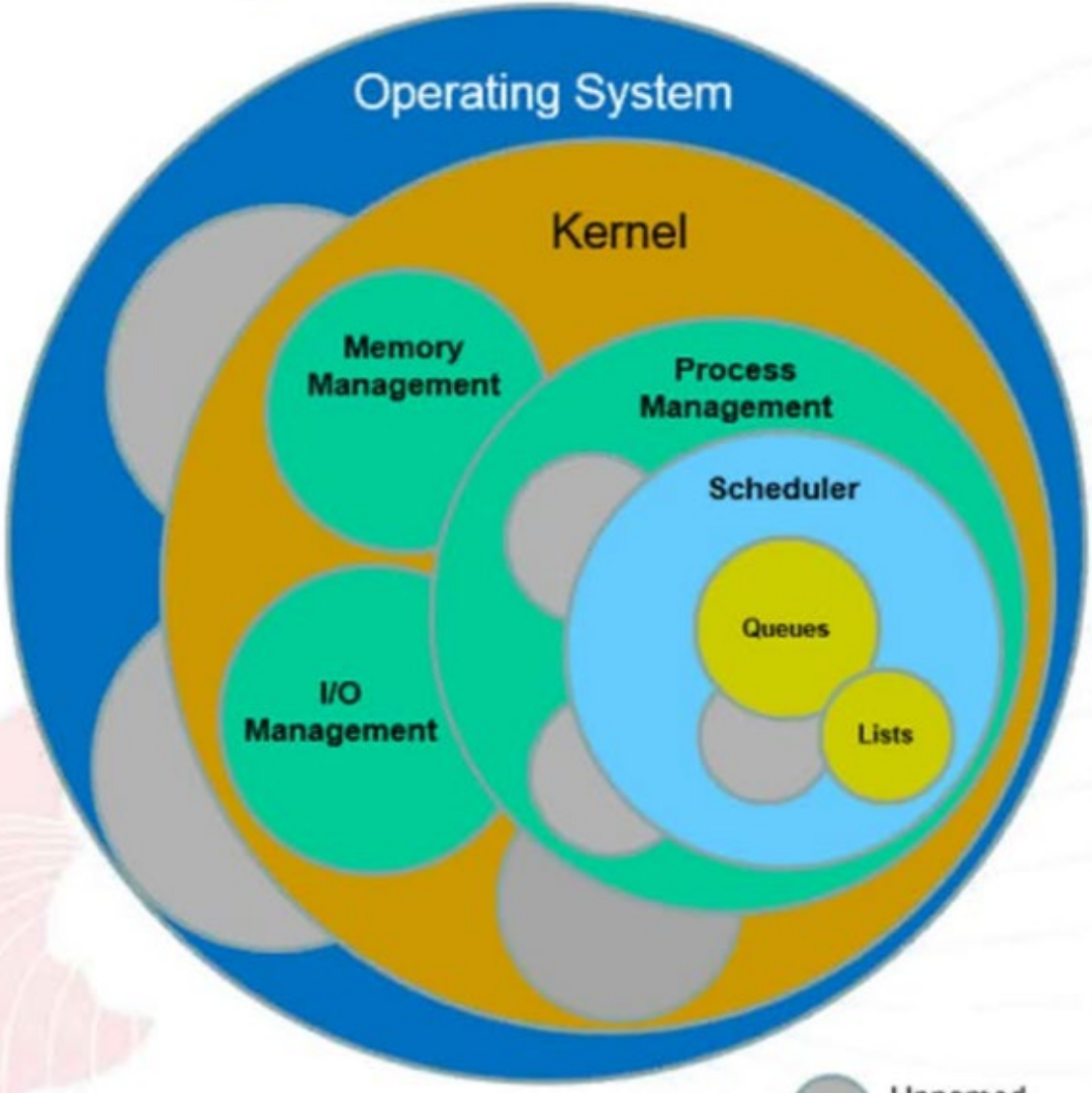
| 2203 - Allegro - Multi-point Integration Platform for Mobile Applications | |
|---|---|
| **BENCHMARKS** | **ACTIVITIES** |
| | 2022 |
| | '1-1 |
| Internet searches: 10 Articles | Activity 1 |
| **OBJECTIVES** | **RESULTS** |
| distributed transaction timeout: 1 1= yes/ 0 = no | 1 |
| intelligent packet routing: 1 yes = 1 / no = 0 | 1 |
| **UNCERTAINTIES & KEY VARIABLES** | **CONCLUSION** |
| 1 - necessary wait times | |
| filtering methods vs. latency vs. ... | Y |
| timeout length vs. queuing mechanisms | Y |

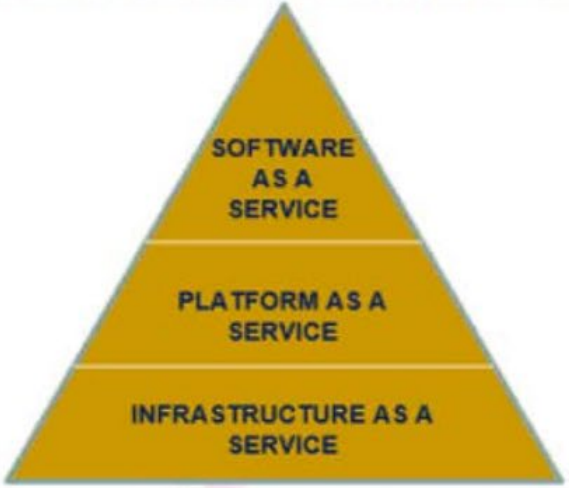
# Parallels to CRA project examples

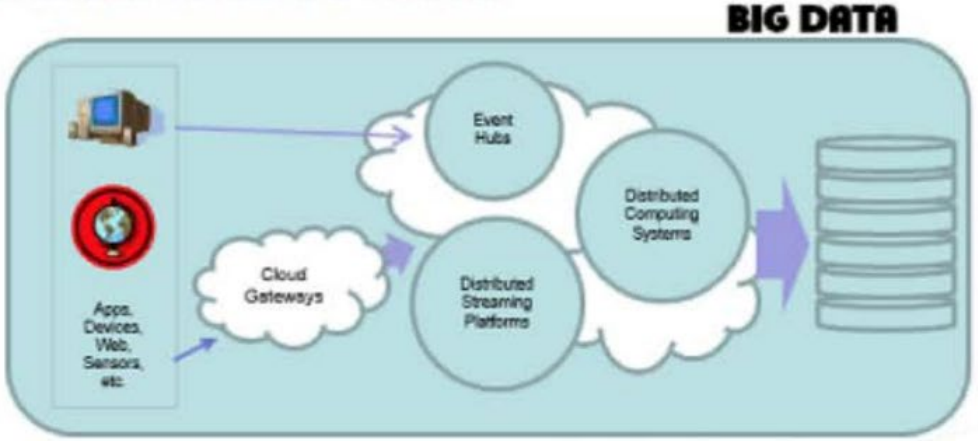


# – Example 1


Operating System
Kernel
Memory Management
Process Management
Scheduler
Queues
Lists
I/O Management
Unnamed Embodiments

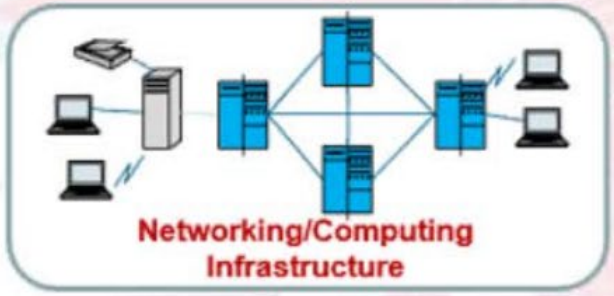
# Various advancement areas

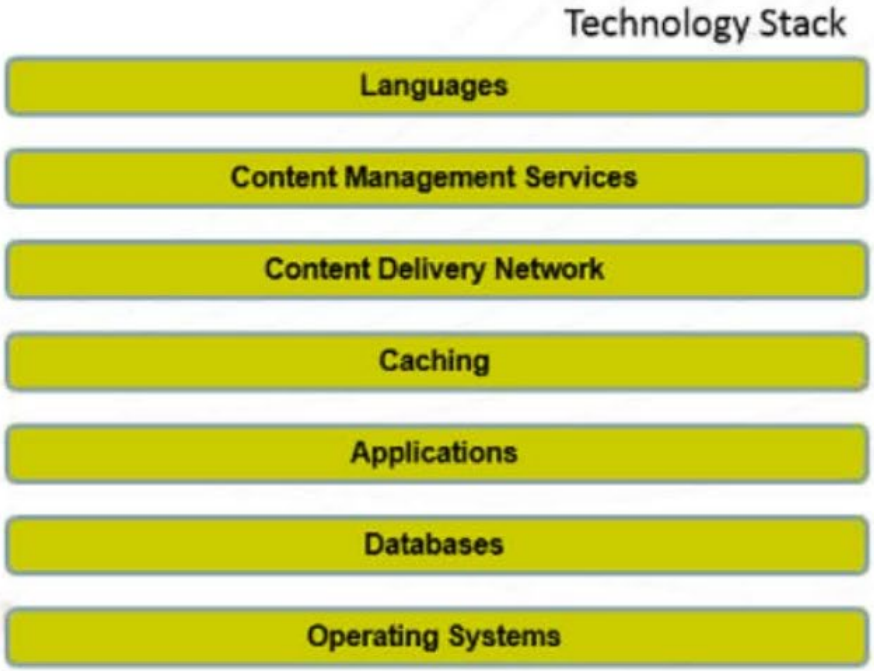








| 1710 - Defining software technology | | | |
|---|---|---|---|
| **BENCHMARKS** | **ACTIVITIES BY YEAR** | | |
| | 2017 | | |
| | '1-1 | '2-1 | ' |
| (none) | Big data examples | Technology vs. features | I |
| **OBJECTIVES** | **RESULTS** | | |
| Reliability: 99 % | 88 | | |
| Scalability: 8500 % | 4400 | | |
| Availability: 99.9 % | 99.3 | | |
| **UNCERTAINTIES & KEY VARIABLES** | **CONCLUSIONS** | | |
| 1 - O/S design issues | | | |
| kernel - process, memory & I/O mgmt | Y | | |
| process mgmt - scheduler lists & queues | Y | | |
| 2 - Micro processors | | | |
| compilers | | Y | |
| Interface | | Y | |
| linkers | | Y | |
| programming languages | | Y | |
| 3 - Other areas | | | |
| big data methods (store, process, manage) | | | |
| improved infrastructure options | | | |
| scaling, reliability & availability options | | | |
| technology stack or tool designs | | | |
| vision design options | | | |

# Airzone One – 4 of 6 projects eligible

Facts:

- We will examine 2 projects
  - 1 Win / 1 Loss

Issue(s):

- Evidence of advancement & systematic investigation

Relevant legislation and analysis:

- ITA 37 & 248(1)

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# Judge rules 4 of 6 projects eligible

- [94] SR&ED Claim with respect to projects 1, 2 and 3 for the 2014 taxation year and project 2 for the 2015 taxation year should be allowed.
- also … projects 1 and 3 for 2015 taxation year were properly disallowed by Minister.

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# Witness Backgrounds

- According to the judge;
- [22] I found Mr. Fellin, the sole witness to be called by the Appellant, to be an extremely knowledgeable, credible and reliable witness.
- He graduated with a degree in chemistry from the University of Toronto in 1972. He has been employed in one capacity or another in the field of air quality monitoring since 1976.

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# Airzone – Project 1 - WIN
# Optimizing Passive Monitoring of Low-Concentration Compounds

Objectives

37] prior years detection protocol for a suite of 44 types of airborne compounds

38] project sought to increase the range of detectable compounds from 44 to 52

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# Technological Uncertainty

41) ] Extraction techniques are known to fail because compounds are not separated from each other in a way that allows for the measurement

- After failing through a variation of extraction times decided to test the hypothesis that a more polar solvent would improve measurement

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# Technological Uncertainty

47] The evidence shows that standard methods, procedures and equipment may reach their detection limits when contaminants are present in low levels of concentration.

- Some compounds have similar attributes.
- other cases, attributes of compounds in an air sample quite diverse
- Extraction procedures can cause compounds to co-elute, which prevents reliable identification and quantification of each sample.
- According to Mr. Fellin, this was the challenge that Airzone sought to resolve.
- An improved extraction and identification process was required.
- process could not be established without systematic scientific investigation.

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# Technological Uncertainty

49] The previous 44 compounds were simple aromatic hydrocarbons. Therefore, they could all be treated in the same way

- Conversely, the eight new compounds had different properties (such as polar groups).
- This meant compounds could not be extracted from same medium with same efficiency.

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# Technological Uncertainty

49] Additionally, because the previously used solvent had been modified,

- Airzone had to adjust the chromatographic conditions
- for both the existing suite of 44 compounds and the eight new additional compounds

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# Experimentation

40] first experimented with extraction times each set of tests for each compound included

- modifying extraction times, solvent mixtures, solvent modifiers (to alter polarity), and chromatographic conditions with different chromatography machines

42] experimentation was then necessary to adjust the chromatographic variables typically utilized to analyze each compound.

- variables include temperature, column length, column type, flow rate through the column, carrier gas, and injection volume.

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# CRA argument for denial

(43) work involved optimizing established detection techniques and applying commercially available passive monitoring tools (3M brand)

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# Judges ruling & Rationale:

45] I was surprised when I read the CRA's reasons for disallowing Airzone's SR&ED claim considered in light of CRA's published guideline describes as eligible experimental development.

- The most recent CRA guideline is dated August 13, 2021.
- The "Why" requirement in the context of experimental development

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# Judges ruling & Rationale

46] There were too many variables or unknowns for Airzone to be able to accurately detect and measure the full slate of 52 compounds.

- Data on how to extract the full slate of compounds was not publicly available.
- Airzone did not have this technical knowledge at the outset.
- It conducted tests to establish a reliable identification and quantification method.

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# Key Criteria Summary

| 2211 - Airzone - WIN Optimizing Passive Monitoring of Low-Concentration Compounds | |
|---|---|
| **BENCHMARKS** | **ACTIVITIES BY YEAR** |
| Internet searches: 5 Articles | 2022 |
| Suppliers: 1 products | '1-1 |
| | Activity 1 |
| **OBJECTIVES** | **RESULTS** |
| Detectable compounds: 52 number | 52 |
| single protocol for 8 items: 1 protocols | 1 |
| **UNCERTAINTIES & KEY VARIABLES** | **CONCLUSIONS** |
| 1 - Technological uncertainty | |
| chromatographic variables | Y |
| extraction times | Y |
| solvent polarity vs. aromatic hydrocarbons | Y |
| | **METHODS** |
| Analysis<br>Trials<br>Prototypes<br>Lines of code | 10 |
| | **COSTS** |
| Hours | 870 |
| Materials $ | 3370 |
| Subcontractor $ | |

# Airzone - Project 2 – Loss
# Solving Combustion Issues to Develop Artificial Smouldering

72] During summer months, coal piles that were stored at a shipping terminal were prone to spontaneous smouldering

73] Faced with this difficulty, Airzone decided that the identification and quantification of the compounds had to be measured in a testing device.

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# Experimentation

73] Airzone designed a testing chamber and used that chamber to collect representative emissions from various types of stored coal

Mr. Fellin explained that burning coal releases fewer emissions than smouldering coal because the fire itself consumes the contaminants typically released by smouldering coal.

75] large part of the work undertaken concerned design of testing chamber and use to mimic smouldering coal.

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# Judges ruling & comments

- 75] In my opinion, the testing chamber, although a little more sophisticated, was not that different from a home use barbecue.
- 76] unlike the three projects undertaken in 2014, there is no evidence in the record that shows that Airzone had difficulty establishing the identification and quantification of the emissions
- What Airzone did was measure emissions using standard methods and techniques typically employed when contaminants are released in a testing chamber.

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# Key Criteria Summary

| 2212 - Airzone - LOSS Solving Combustion Issues to Develop Artificial Smouldering | |
|---|---|
| **BENCHMARKS** | **ACTIVITIES BY YEAR** |
| | 2022 |
| | '1-1 |
| (none) | Activity 1 |
| **OBJECTIVES** | **RESULTS** |
| measure emissions: % expected | |
| **UNCERTAINTIES & KEY VARIABLES** | **CONCLUSIONS** |
| 1 - Technological uncertainty | |
| identify compounds | Y |
| | **METHODS** |
| Analysis | |
| Trials | 25 |
| Prototypes | 1 |
| Lines of code | |
| | **COSTS** |
| Hours | 323 |
| Materials $ | 2750 |
| Subcontractor $ | |

# Global Sustainable – Energy Efficient House - Loss

Facts:

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Issue(s):

- Evidence of advancement & systematic investigation

Relevant legislation and analysis:

- ITA 37 & 248(1)

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# Objectives

1] Appellant's 2012 and 2013 taxation years...

- claimed expenditures construction of a house, in southern Ontario,
- intended to be uniquely energy efficient while staying within the price range of a "regular home".

8] Total SR&ED expenditures roughly $200,000

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# Principal Investigator background

9] one witness – Mr. Cory Smith (CS), President

10] CS testified that he has experience in house construction and has earned various training certifications relating to house

- construction. They include a 2008 certificate from Sir Sanford Fleming College marking completion of a six month study
- program in “sustainable building design and construction”.

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# Prior Art & Technological Uncertainty

- 12] As a first step, the Appellant engaged a company knowledgeable in passive house design to render formal, computer
- software generated design plans for the small house

26] In oral submissions, Appellant's counsel addressed these two steps. He submitted,

- hypothesis is I can build a house that doesn't need a furnace, at a price point that's similar to a regular home.
- That's the hypothesis and the technical [sic: technological] uncertainty is the cost.

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# Experimentation & judges analysis

27] None of these various aspects, including extra insulation of the footings and foundation, walls and attic, extra taping of gaps and seams, and as well development of the modified ground loop as a cheaper and less energy efficient geothermal system, were described by CS as reflecting new technological knowledge.

- That is, none of these various aspects that CS testified to reflected development of technological knowledge new to the home construction industry.

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# COST AS A BASIS FOR ADVANCEMENT: Judges' comments

30] Conceptually there is no technological aspect implicit in the notion of an item costing or priced at 'x' rather than 'y' dollars.

- Of course one might envisage that the cost (or price) of an item could be reduced in the event of some particular technological advancement.
- But the relevant question for SR&ED purposes would remain – what is that contemplated technological advancement itself

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# Key Criteria Summary

| 2215 - Global Sustainable - Efficient home - LOSS | |
|---|---|
| **BENCHMARKS** | **ACTIVITIES BY YEAR** |
| | 2022 |
| | '1-1 |
| (none) | House construction |
| **OBJECTIVES** | **RESULTS** |
| Enneguide efficeincy rating: 90% | 91% |
| **UNCERTAINTIES & KEY VARIABLES** | **CONCLUSIONS** |
| 1 - Technological uncertainty | |
| effects of natural force interactions | |
| | **METHODS** |
| Analysis<br>Trials<br>Prototypes | <br><br>1 |

# Logix Data – solar panels - Loss

Company background

1] The Appellant is an information technology services company.

Background to the Solar Shingle Project

31] Silfab S.r.l. (“Silfab”) is an Italy-based solar panel manufacturer that decided to establish a manufacturing plant in Canada.

- Appellant engaged in an IT capacity, to develop Silfab’s IT infrastructure for its Canadian manufacturing plant.
- Appellant continues to provide IT services to Silfab.
- Silfab produces solar panels for utility power generation at that plant.

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# Principal Investigator

35] Mr. Baird said that he and three other employees of the Appellant were involved in the Solar Shingle Project.

36] Mr. Baird describes himself as a computer engineer. He holds certifications from several manufacturers of computer hardware and software systems but these are vendor or product specific qualifications.

Mr. Baird has not taken any

- programs or courses at college or university.
- courses or training in engineering (including mechanical or electrical engineering).
- did not explain what it was about his experience working on the IT installation project that gave him the requisite knowledge.

37] Two of the other three individuals Mr. Baird described as involved in the Solar Shingle Project are IT technicians. The third is a sales consultant.

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# Prior Art & Technological Uncertainty

- 67] What was the knowledge in the industry at the time?
- 74] What is particularly troubling is that the Research Summary suggests solar shingles did exist.
- Mr. Baird also described seeing Tesla advertisements for solar shingles. He said he did not believe they were available for purchase at the time, but rather were in development

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# Lack of Systematic Investigation

109] In each case, the description of the test procedure lacks precision. Let me give some examples;

- 110] Nowhere does it specify how or where the measurements are to be taken.
- 117] The test procedure provides for testing at several wind speeds, but nowhere are the wind speeds indicated.
- The test procedure does not specify the placement of the fan (distance from the shingle and/or centered or otherwise along the shingle edge).

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# Problems with Expert report

15] With respect, this is not the purpose of an expert report. ...the expert's role is limited to providing the court with a set of

- prescription glasses through which the technical information may be viewed before being analyzed and weighed by the trial judge.

16] Report states several opinions without explaining the facts and assumptions on which those opinions are founded or reasons for the opinions

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# Judges Analysis

- 75] Mr. Baird acknowledged he did not contact Tesla or look at any online engineering forums to see what might have been developed or have been under development by Tesla or otherwise.
- He did not speak with the manufacturers, suppliers or installers of the solar shingles referred to in the Research Summary, any other manufacturers of solar panels, or any other experts in the field of solar energy.
- The only people he said he spoke with were employees of Silfab, an enterprise that was neither manufacturing, nor interested in manufacturing, solar shingles.
- His description of those conversations did not suggest a particularly robust inquiry about technological issues.

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# Key Criteria Summary

| 2216 - Logix Data (solar panels) - LOSS | |
|---|---|
| **BENCHMARKS** | **ACTIVITIES BY YEAR** |
| | 2022 |
| | '1-1 |
| (none) | Activity 1 |
| **OBJECTIVES** | **RESULTS** |
| Cost: $<br>Performance: 250 W/m2<br>Snow load: kg<br>Windload: km/h | |
| **UNCERTAINTIES & KEY VARIABLES** | **CONCLUSIONS** |
| 1 - Technological uncertainty | |
| | **METHODS** |
| Analysis<br>Trials<br>Prototypes<br>Lines of code | <br>10<br>2 |

# WRD Borger Construction – Loss

Project background

2] The appellant claimed two SRED projects that year,

- “Improved sealing between submerged, rough cast surfaces”
- “Pressure activated removable plugs for large box culverts.”
- Minister claimed second project did not meet the definition of SRED

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# Company & PI backgrounds

4] The appellant is part of the Borger Group of Companies, established in 1919.

The appellant's general manager Ahmed Kalaf testified that it specializes in deep utility servicing, earthmoving and more recently, transportation.

15] Mr. Kalaf testified that he has a Bachelor of Science degree earned in 2007 and acknowledged that he is not a civil engineer

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# Prior Art & Technological Uncertainty

6] culverts are generally installed above water level so in this instance, it was a particular challenge that the invert (i.e. the bottom of the interior) of the box culvert was approximately 4 metres below the pond's surface

7]hoop stress, which Mr. Kalaf explained to be the stress exerted on a cylindrical device

- i.e. in this case, the culvert itself and the inflatable bladder dam discussed below

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- INDUSTRY STANDARDS:
- 8] Mr. Kalaf stated that the appellant made inquiries within their industry as to how/whether others had encountered this
- situation, as well as conducted internet research.
- He testified that both lines of inquiry yielded minimal information,

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# Experimentation

8] appellant ultimately tried both a

- water-filled inflatable bladder dam (also known as an inflatable or portable cofferdam)
- as well as a rigid cap as blockage devices.

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# Judge's comments

21] I would consider use of physical objects and pumps in this manner within scope of their standard usages.

22] example of trial and error, appellant purchased inflatable bladder dam manufacturer's specifications indicated could control 6 feet of still water.

- The culvert itself was 2.4 metres x 2.4 metres (i.e. 7.8 feet x 7.8 feet) with 4 metres (i.e. 13 feet) of head pressure exerted by the pond water.
- Even though the culvert's interior surface was not smooth, the appellant informed the seller that there were no objects present which could potentially damage the dam's interface.
- Given parameters and contraindications, seems success unlikely

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# Judge's ruling & rationale

- 22] No effort disproving a scientific hypothesis because bladder dam used for its created purpose (i.e. blocking water) and exceeded capabilities set out by its manufacturer
- 24] no advancement in the field of civil engineering for purposes of the SRED provisions
- 25] The appeal is dismissed, without costs.

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# Key Criteria Summary

| 2217 - WD Borger - Pressure activated removable plugs for large box culverts | |
|---|---|
| **BENCHMARKS** | **ACTIVITIES BY YEAR** |
| | 2022 |
| | '1-1 |
| (none) | Activity 1 |
| **OBJECTIVES** | **RESULTS** |
| (none) | |
| **UNCERTAINTIES & KEY VARIABLES** | **CONCLUSIONS** |
| 1 - Technological uncertainty | |
| hoop stress | |
| water head pressure | |
| | **METHODS** |
| Analysis<br>Trials<br>Prototypes<br>Lines of code | <br>2<br>1 |

# Atelier Beton – 2 Concrete projects - Loss

Facts:

•

Issue(s):

- Evidence of advancement & systematic investigation

Relevant legislation and analysis:

- ITA 37 & 248(1)

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# Witness backgrounds

- 5 ] Mr. Frédéric Tremblay, president and owner of the appellant testified at the hearing. Mr. Tremblay holds a bachelor's degree in history and geography teaching and a bachelor's degree in administration. He is the son of a cement applicator.
- [ 6 ] Mr. Tremblay started his business in 2005 by manufacturing concrete counters.
- [ 7 ] In February 2014, Mr. Tremblay hired as a consultant a chemical engineer, Mr. Benjamin Bousquet…the supervisor of the appellant's research and development activities. …. remained there until July 2016.
- Mr. Bousquet unfortunately died in 2017 following an accident in Colombia.

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# Beton Project 1 – LOSS
# Transportable concrete modular panels

e) objective claimed was to manufacture transportable concrete panels,

- the thickness reduced by half compared to that manufactured conventionallys:
- without warping;
- without generation of fractures;
- with equal or greater compressive strength than panels made with conventional concrete;
- with superior physical properties in terms of finish quality, porosity and mechanical strength

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# Prior Art & Technological Uncertainty

16 ] In order to achieve these objectives, the appellant had to overcome the following two major challenges:

- a) develop a mixing and casting process so as to eliminate the formation of cracks and
- b) determine chemical and physical parameters allowing to control the appearance of surface aggregates and to better control the color and the uniformity of the surface.

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# Experimentation

(g) the appellant used a trial and error (deduction)

- approach, involving the testing and experimentation of:
- different concrete mix formulations by applying different types of chemical and fiber additives, such as nylon, metal,
- cardboard, glass sand, etc.;
- a basic formulation using a new type of very thin fiber purchased in Japan;
- different methods of preparations;

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# Judge's Comments

- (i) the Appellant has not identified or encountered any limitation of current technology and/or science in the development of
- concrete mixes and concrete panel manufacturing methods;
- (j) the current state of science or technology, in the field of civil engineering, was sufficient to overcome the technical uncertainties encountered by the appellant;

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# CRA Expert Witness comments

[ 25 ] Mr.  Migneault (CRA expert witness) made the following comments:

- the panel that the appellant is seeking to develop is a larger version than the one it already displayed in its available products
- (fibre-reinforced "concrete" panels measuring 2' x 4' and ½ or ¾ thick inches);
- with the materials available, in particular at the level of adjuvants, the knowledge publicly available for the cure appellant could obtain a panel with the targeted dimension of 4 x 8 feet with a thickness of ½ to ¾ inches;
- at each stage of work, appellant proceeded by applying
- known solutions to resolve the technical problems encountered,
- without making assumptions aimed at addressing an uncertainty

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# Key Criteria Summary

| 2221 - Beton - transportable concrete modular panels | | |
|---|---|---|
| **BENCHMARKS** | **ACTIVITIES BY YEAR** | |
| | 2022 | |
| | '1-1 | '2-1 |
| (none) | Claimant arguments | Expert witness rebuttal |
| **OBJECTIVES** | **RESULTS** | |
| Thickness: 0.5 inches<br>Strength: 100 % | | |
| **UNCERTAINTIES & KEY VARIABLES** | **CONCLUSIONS** | |
| 1 - As claimed = LOSS | | |
| additives | | |
| casting process | | |
| fibres types - weight, porosity, strength | | |
| ingredient proportions | | |
| 2 - Documentation weaknesses | | |
| | **METHODS** | |
| Analysis<br>Trials<br>Prototypes<br>Lines of code | 3 | |

# Beton Project 2 – Loss
# Mixing and pouring concrete floors

m) objective to improve the process for mixing and pouring polished concrete floors in order to reduce the visibility of aggregates while:

- respecting the compressive strength of 30-50 MPa;
- eliminating the formation of cracks;
- controlling the appearance of surface aggregates, surface color and uniformity, etc.;

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# Prior Art & Technological Uncertainty– Expert Witness comments

26] concrete floors, even polished, do not represent a new product on the market.

Area regulated. Public knowledge and standards in force provided enough information to carry out the development of a manufacturing process or the

- improvement of this type of product;
- from the starting formulation established by what is known in the field, the appellant then made educated guesses in order to
- achieve the desired characteristics for the product, polished concrete floors;

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# Documentation weaknesses

26] although a register exists (experiment sheets), it does not contain hypotheses, nor all the measurements allowing to establish

- a relation of cause and effect in the parameters explored;
- several important measurements, such as
  - setting time,
  - time between casting,
  - measurement of surface hardness andconcrete strength (compressive strength are not reported or are missing).

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# Key Criteria Summary

| 2222 - Beton - mixing and pouring concrete floors | | |
|---|---|---|
| **BENCHMARKS** | **ACTIVITIES BY YEAR** | |
| | 2022 | |
| | '1-1 | '2-1 |
| Suppliers: 2 products | Claimant arguments | Expert witness critique |
| **OBJECTIVES** | **RESULTS** | |
| Compressive strength: 50 mPa | | |
| **UNCERTAINTIES & KEY VARIABLES** | **CONCLUSIONS** | |
| 1 - As Claimed = LOSS | | |
| additives | | |
| casting methods | | |
| 2 - Ideas per Expert witness | | |
| cement types | | |
| fibre types | | |
| setting times | | |
| super plasiticers & foaming agents | | |
| water types and amounts | | |
| | **METHODS** | |
| Analysis<br>Trials | 20 | |

# Judge concluded

[ 39 ] The analysis of the evidence reveals that the appellant did not adopt a scientific method in carrying out its research activities within the framework of its two projects.

- Rather, the appellant proceeded to resolve its technical problems by trial and error methods
- without trying to understand or solve the problems associated with the technology used.

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# Takeaways

- Disconnect between TU and work done lead to loss
- Fine line between hypothesis and “educated guess”
- Expert witnesses increasingly relied upon by courts

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# CAE – Government assistance

- Canadian aerospace company
- $115+  million in government loans
  - 2012 & 2013
  - via Industry Canada
  - Strategic Aerospace and Defense Initiative
    - Project Falcon” (“ISAD Agreement”)
  - Interest rate of 2.5%
  - Risk free rate estimated at 3.65%
  - FMV Market rate estimated at 7.15%

- Issue – whether “government assistance”

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# Relevant legislation

ITA 127(9) “government assistance”

- “Assistance received from a government, municipality or other administration in the **form of a grant, grant, conditionally repayable loan, tax deduction or investment allowance or in any other form,** excluding a deduction under subsection (5) or (6).”

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# Judgement

- 137 ] In view of this and as mentioned above, the Court concludes that the ISAD Agreement does not constitute an “ordinary commercial agreement” .

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# Implications

- Eligible SR&ED expenses upon repayment of loans however;
  - Time value of money
  - Whether lower interest rate worth ITC deferral
  - Quebec ITC's SR&ED wages for Public Co's 14% +

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